

PHYSIOTHERAPY CARE FOR WOMEN'S HEALTH

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Physiotherapy Care for Women's Health

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Foreword

We live in a century with awesome scientific advances. But the health care of women is still far from satisfactory. This well structured and informative book will be of great value to all practitioners involved in the care of women from childhood through pregnancy to menopause and beyond. This book focuses on many problems seen in obstetric and gynecological practice and has a comprehensive list of exercises with detailed and clear illustrations. The importance of physiotherapy for the final outcome for the patient cannot be overemphasized. A classical example is the role of antenatal exercises during pregnancy and labor.

I feel privileged and very happy to welcome this book which will be very useful to all its readers.

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Preface

Physiotherapy had been considered important in the field of Obstetrics and Gynecology for the past three decades. Initially, it was concentrated on perinatal and postnatal stages. There are many other problems faced by the women community in all age groups. We have attempted to bring the major problems affecting women's health from menarche to menopause and their physiotherapy treatment under one roof.

We have emphasized that not only exercises play a major role, but exercises along with various physical therapy modalities can also help in overcoming women's problems. We have highlighted both the obstetric and gynecological problems and have given a special emphasis on the athletic women. We could also provide a few questionnaires which could be useful for the readers.

We would like to thank all those who gave their valuable time in helping us and that adding to our effort have paved way for the success of publishing a lecture notes considering various problems of women under the title "*Physiotherapy Care for Women's Health*".

Our sincere thanks to PSG Management for their encouragement and Mr Jayanandhan, Senior Author Coordinator and all other staff of Jaypee Brothers Medical Publishers, for their support in our success in publishing this book.

**R Baranitharan
V Mahalakshmi
V Kokila**



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- Absence of menstruation.
- Refers to missing periods in a female of age 16 or older.
- Amenorrhea is a normal feature in prepubertal, pregnant and postmenopausal females.

TYPES

- Primary
- Secondary

Primary

When the women has never had a period in her life.

Causes

- Drastic weight reduction
(Poverty, anorexia nervosa, bulimia, very strenuous exercises)
- Malnutrition
- Extreme obesity
- Chronic (long-term) illness
- Genital abnormalities present since birth—absence of the uterus or vagina, vaginal septum, cervical stenosis (Asherman syndrome), imperforate hymen, intrauterine adhesions
- Gonadal dysgenesis (Abnormal gonadal development)
- Hypoglycemia
- Hypo- and hyperthyroidism
- Cystic fibrosis
- Cushing's disease
- Polycystic ovarian disease
- Chromosomal abnormalities such as Turner's syndrome

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- Hypogonadotrophic hypogonadism (Defective gonadal development or function due to inadequate secretion of pituitary gonadotrophins)
- Hyperprolactinemia
- Testicular feminization
- True hermaphroditism (Both testes and ovaries present in same individual)
- Adrenogenital syndrome (Congenital adrenal hyperplasia—deficiency in cortisol and aldosterone)
- Congenital heart disease
- Craniopharyngioma, pituitary tumors, ovarian tumors, adrenal tumors
- Prader-Willi syndrome (Genetic condition caused by the absence of chromosomal material from chromosome 15)
- Pregnancy
- Recreational drug abuse
- Depression or other psychiatric disorders
- Psychotropic drug use.

Secondary Amenorrhea

It is the absence of menstrual periods for 6 months in a woman who had previously been regular or for 12 months in a woman who had irregular periods.

Causes

- Hypothalamic problems
 - Anorexia nervosa
 - Simple weight loss
 - Anxiety reactions
- Medications
 - Tricyclic antidepressants
 - Phenothiazines
- Pituitary problems
 - Simmonds's disease—when the pituitary fails for without any particular disease (idiopathic).
 - Shreehan's syndrome—when the pituitary is damaged from massive bleeding caused by stress of child birth.
 - Micro-adenomas—tumors that interfere with the function of the pituitary.

Other Causes

- Polycystic ovarian disease.
- Pre-mature ovarian failure (early menopause).

Symptoms

- Absent periods
- Increased facial hair
- Decreased pubic and arm pit hair
- Deeper voice
- Decreased breast size
- Secretions from the breast.

Management

- Nutritional supplements
- Dietary changes
- Life style modification
- Exercises.

FEMALE ATHLETES AND MENSTRUAL IRREGULARITIES

The effect of exercises and nutrition on women's reproductive and metabolic physiology has become an important aspect of sports pathology.

The primary menstrual dysfunction is amenorrhea. The criteria has included:

- One menstrual period during the last ten months
- Less than three menstrual cycles per year
- The absence of periods from 3-12 months.

According to recent review of the literature, amenorrhea is reported to exist in up to 50% of the female athletes.

Causes**a. Dysfunction of the hypothalamic level**

- Referred to 'functional hypothalamic amenorrhea'
- Hypothalamus secreted several hormones that control the release of other hormones throughout the body
- Pulsatile secretion of gonadotrophin releasing hormone (GnRH) from the hypothalamus regulates the release of the gonadotrophins, LH and FSH. These hormones are released from the pituitary and in turn regulate release of other hormones, such as estrogen from ovaries.

b. Body fat composition

Amenorrhea can be caused by Low body fat. But there is no research that conclusively proven that there is a "critical level" of body fat necessary to maintain regular cycles.

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c. Diet

Amenorrhea may be a consequence of dietary restriction or weight loss (below or near their purported "ideal weight" determined by body fat and body mass index). The rate of body mass loss may be more critical than the absolute amount of body fat lost (actual rate of body mass loss rather than the amount of loss may be more important). Although amenorrhea may be associated with weight loss, nutritional deficiency (such as in a low fat diet) which leads to body fat loss or brings on menstrual irregularities may be responsible.

d. Training volume and intensity

- Exercise related menstrual irregularities or exercise induced amenorrhea (ERMI)
- Short term exercises elicits a transient change in some hormone levels, prolonged and extreme endurance exercises induces significant changes in gonadotrophin plasma levels and additional hormones.
- Other mechanisms such as lower ovarian blood circulation, an increase in metabolism and change in metabolic clearance rate of endogenous hormones may also contribute to menstrual irregularities.

e. Energy balance

Several studies document changing eating habits and exercises patterns reverse exercise related menstrual irregularities.

Health Risks

- Long-term menstrual irregularities are known to have detrimental effects on bone mineral status and fertility. While there is little evidence of harmful effects of exercise related menstrual irregularities on reproductive status, the most serious risk is the impact on the skeleton. Osteoporosis and increased risk for stress fractures are of major concern.
- Long-term amenorrhea may result in low bone density at multiple skeletal sites, especially the spine. Even skeletal sites subjected to impact loading during exercise fail to mineralize bone.
- Hormone replacement therapy have not been effective in increasing bone mass in athletes with long-term amenorrhea, but protect further bone loss.
- Oral contraceptives are used to restore menstruation in training athletes.
- The possible changes to required to resume menses include exercising 5-10% less and eating a little more.

Tips

- Throw away the bathroom scale.
- Strive to achieve a certain weight.
- For lose weight don't crash diet. Instead cut back on calories by about 20%.
- Include small portions of red meat in your diet, 2-3 times/week.
- Eat adequate protein.

- Consume atleast 20% of calories from fat.
- Calcium rich diet.

FEMALE ATHLETIC TRIAD

The female athletic triad can have a significant impact on morbidity and even mortality in a relatively young segment of population. Indeed the full impact of the syndrome may not be realized until these women reach menopause, when bone loss is calculated.

Components of Triad

- Amenorrhea
- Disordered eating
- Osteoporosis.

Not all patients have all three components of triad, even having one or two elements of the triad greatly increases these female long-term morbidity.

Amenorrhea usually refers to secondary amenorrhea, although delayed menarche (primary amenorrhea) can occur in young athletes. By consensus, 3-6 consecutive missed menses is the requirement for diagnosis, although the continuum of normal menstruation may range from oligomenorrhea to amenorrhea.

Disordered eating includes anorexia nervosa and bulimia. This includes a spectrum of behaviors from as simple as the athlete not taking in enough food to offset the energy expended to pre-occupation with eating and a fear of becoming fat by instituting measures such as food restrictions and or the use of diet pills, laxatives and or diuretics.

In the young athletic population, **Osteoporosis** refers to premature bone loss or inadequate bone formation leading to increased skeletal fragility, micro-architectural deterioration and low bone mass. This can be manifested as multiple stress fractures or frank fractures.

Frequency

Although all female athletes are at risk for the female athlete triad or any of its components, sports that have esthetic component (example—ballet, figure skating, gymnastics) or sports tied to a weight class (example—wrestling) have a higher prevalence.

Obtaining epidemiologic data is difficult because of lack of reporting, athletes hide their symptoms or behavior from friends, family, trainers or coaches. Vast majority of cases are diagnosed only after advanced symptoms become apparent.

History

When an athlete is identified as being at risk for the female athletic triad, a detailed screening history should be obtained. The purpose of screening process is to gather information about the patient's medical history and dietary and exercise behaviors and to evaluate the athletic existing psychopathology and medical complications.

Past Medical History

- Endocrine disorders, such as thyroid abnormalities, panhypopituitarism and diabetes.
- Past stress fractures and complete fractures, verified with trainers, coach, parents if possible.

Menstrual History

- Age of menarche.
- Length of menses.
- Menstrual cycle.
- Any missed menses.
- Menstrual pattern during the season or that period when the athlete is exercising the most.
- Use of anabolic steroids (potential cause of secondary amenorrhea).

Psychosocial History

- Tobacco use
- Illegal drug use
- Sexual or physical abuse
- Depression
- Previous eating disorders
- Suicidal behavior
- Recent trauma or illness
- Change in coaches
- Failure at school or work
- Other significant personal events
- Lack of family or social support system is a risk factor for the female athletic triad.

Exercise History

- Number of hours/day
- Formal practice (with coaches)
- Additional time (conditioning, running, lifting apart from scheduled workouts)
- Any changes in work pattern during off season.

Nutritional Assessment

- Women who exercise for hours per day are likely to need more than 1600-2000 Kcal that their body weight would indicate
- The Eating Disorder Inventory (EDI), a questionnaire designed to help identify those with eating disorders (not a precise instrument but used to identify people at risk).

Physical

- Anthropometric data and vital signs should be obtained without comment about weight or weight-height ratios.
- BMI (may not be suitable).
- Percentage of body fat.
- Pediatric growth charts are often helpful in teenagers or college students.

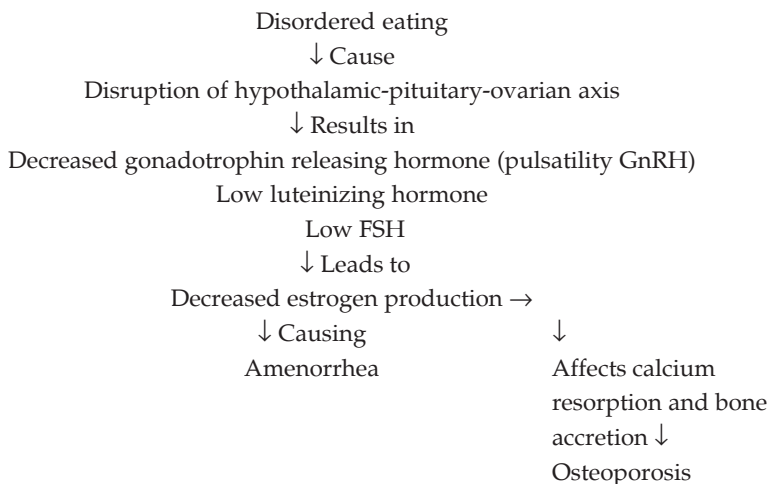
Other Physical Examination

- Thyroid should be palpated for possible goiter.
- The parotid glands should be palpated for evidence of hypertrophy.
- Bulimia can cause blood shot eyes and ptechieae of the sclera or cheeks.
- Dental examination—dental caries or pitting from the regurgitation of stomach acid through the oropharynx.
- If finger is used to induce vomiting, the knuckles may be scarred from the patient biting down on them during regurgitation. The Russell sign is typical callous formation on the distal extensor surface of the long finger used to induce vomiting.
- Anorexia may cause cachexia, bradycardia and hypotension later in course of disease:
 - Sinus bradycardia early sign in eating disorder
 - Conduction abnormalities—evidenced in advanced cases.
- Dermatology—dry and yellow skin.

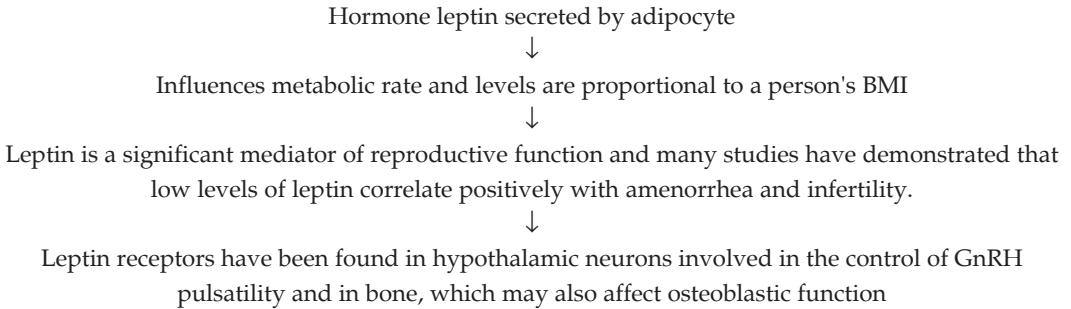
Causes

The current theory is that female athletic triad is caused by energy drain/caloric deficit, i.e. athlete's energy expenditure exceeds her dietary energy intake (Flow chart 1.1, 1.2).

Flow chart 1.1: Energy drain theory



Flow chart 1.2: Role of leptin



Complications

- Continued bone loss leading to irreversible osteoporosis
- Multiple stress fractures or complete fractures
- End stage eating disorders can result in more serious complications such as hospitalization, cardiac arrhythmias or even death.

Prevention

- Early detection
- Height/weight
- Specific athletic achievement
- Pre-participation physical examination.

Education

- Amenorrhea is not a positive sign of hard work but a harbinger of disease, they may seek treatment sooner
- Education regarding diet
- Educating trainers, coaches and parents.

DEFINITION

Carpal tunnel syndrome, the most common of the nerve compression syndromes is a painful disorder of the wrist and hand.

Incidence

28% of pregnant women experience this disorder (William Hag berg). Some authors show much higher incidence of upto 50%, upto 20% of pregnant women complain of nocturnal hand parasthesia with edema (Shaafish 2006).

Cause

- Alterations in fluid balance may predispose some pregnant women to develop this syndrome. The median nerve supplies the thenar muscles and the first and second lumbrical muscles, and gives a sensory supply to the thumb, index and middle fingers. Carpal tunnel syndrome occurs when the median nerve, traveling through the "tunnel" of the wrist bones is compressed by the flexor tendons which also run through the carpal tunnel.
- Breastfeeding also can prolong carpal tunnel syndrome. Holding an infant to chest for long periods of time can keep a wrist bent in the same position, causing compression of the nerve.

Pathophysiology

It is caused predominantly by compression of the median nerve at the wrist because of hypertrophy or edema of the flexor synovium. Pain is thought to be secondary to nerve ischemia rather than direct physical damage of the nerve.

Signs and Symptoms

- Tingling or numbness in part of the hand (thumb, index, middle or ring fingers).
- Sharp pains that shoot from the wrist up the arm.
- Burning sensations in the fingers.
- Morning stiffness or cramping of hands.

- Frequently dropping objects or trouble gripping objects.
- Numbness in hands while driving.
- More numbness or pain at night than during the day.
- Weak thumb muscles (abductors), thenar muscle atrophy (mainly Abductor Pollicis Brevis).
- Hypalgesia (diminished sensitivity to pain along the palmar aspect of the index finger).
- Flick sign is positive (to relieve the symptoms, patient often flick their wrist as if shaking down a thermometer).
- Symptoms are typically bilateral and first noted during third trimester.
- More common in dominant hand.

Clinical Tests

Phalen's Maneuver

It is positive when flexing the wrist to 90 degrees for one minute elicits symptoms in the median nerve distribution.

Tinel's Sign

It is positive when tapping over the carpal tunnel elicits symptoms in the distribution of the median nerve.

Diagnosis

- History and physical examination.
- Sensory findings can be elicited by two point discrimination, vibration and monofilament testing. There is loss of discrimination in the median nerve distribution.
- Nerve conduction studies confirms the presence of median nerve neuropathy.

Severity of syndrome is considered as follows.

Mid Carpal Tunnel Syndrome

Increased distal latency of median nerve sensory component conduction velocity > 3.5 m/s or prolonged distal latency of median nerve in comparison with ulnar nerve.

Moderate Carpal Tunnel Syndrome

Decreased of amplitude of median nerve sensory component to 50% less of other hand or less than 20 mv.

Severe Carpal Tunnel Syndrome

Decrease of amplitude of median nerve motor component conduction velocity to 50% of the other side or less than 4 mv.

- EMG

Treatment

Things that may Help to Prevent Carpal Tunnel Syndrome

- If you do the same tasks with your hands over and over, try not to bend, extend or twist your hands for long periods.
- Don't work with your arms too close or too far from your body.
- Don't rest your wrists on hard surfaces for long periods.
- Switch your hands during work tasks.
- Hold objects instead of pinching them.
- Reducing salt intake allows the body to retain less fluid.
- Make sure your tools aren't too big for your hands.
- Use tools that don't vibrate too much.
- Take regular break from repeated hand movements to give your hands and wrists time to rest.
- Don't sit or stand in the same position all day.
- If you often use a computer or type a lot, adjust the height of your chair so that your forearms are level with your wrist to type.
- Reduce caffeinated food and beverages. Caffeine can restrict blood vessels and reduce blood flow to arms and wrist.

Tips

- Prop up your arm with pillows when you lie down.
- Avoid using your hand too much.
- Find a new way to use your hand by using a difficult tool.
- Try to use the other hand more often.
- Avoid bending your wrists down for long periods.
- Symptoms are exacerbated by weight bearing on an outstretched hands, as in four point kneeling. To avoid pain, the women should be advised to bear weight on clenched hands with the wrist in neutral to avoid combined extension of the wrist and fingers.
- If the mother is nursing, using pillows for support can help.

Physiotherapy Management

- Wrist and hand exercises to stretch the muscles of arm and shoulder. Stretch fingers by flexing them and rotating the wrists.
- Application of ice packs two to three times a day to wrist to reduce inflammation.
- Massage.
- Wrist splints.
- Splinting the wrist at neutral angle helps to decrease repetitive flexion and rotation thereby relieving mild soft tissue swelling.

- Night splint use is recommended to prevent prolonged wrist flexion or extension.
- Manu hand brace. This specially designed brace provides gentle pressure to the heads of the metacarpal bones while stretching the third and fourth fingers.

Here are some exercises intended to help prevent carpal tunnel syndrome. Remember doing a quick five minute exercise warm-up before starting work, just as runners stretch before a run, can help prevent work-related injuries.

Wrist and fingers are extended and held for a count of 5 (Fig. 2.1).

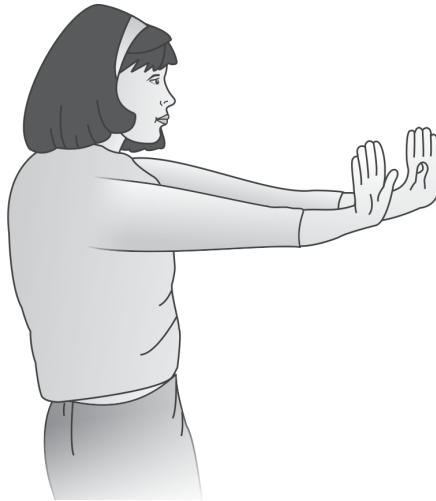


Fig. 2.1: Wrist and finger extension

Then straighten both wrists and relax fingers (Fig. 2.2).

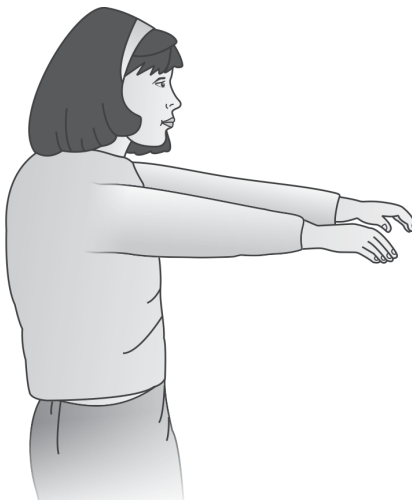


Fig. 2.2: Straighten wrist and relax fingers

Making a fist with both the hands, bend the wrist and hold for 5 counts (Fig. 2.3). Then bend both wrists down while keeping the fist. Hold for a count of 5 (Fig. 2.4). Straighten both wrists and relax fingers, for a count of 5.

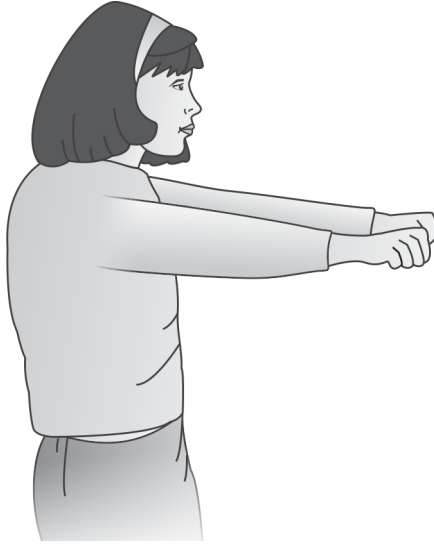


Fig. 2.3: Fist both hands

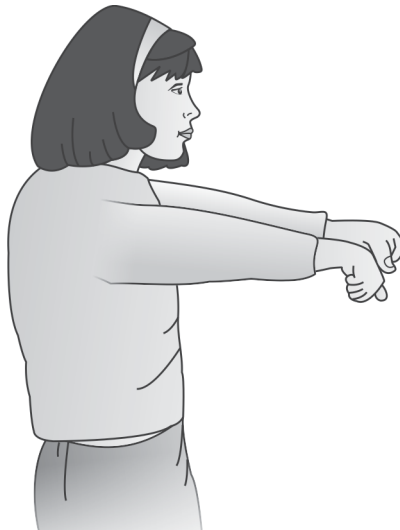


Fig. 2.4: Wrist flexion with a fist

The exercise should be repeated 10 times.

Then let your arms hang loosely at the side and shake them for a few seconds (Fig. 2.5).



Fig. 2.5: Arm at rest

CHAPTER

3

Chondromalacia Patella

(PATELLOFEMORAL DYSFUNCTION)

Chondromalacia Patella is damage to the patella cartilage. It is more common in younger females. It is also informally called "Housemaid's Knee" or "Secretary's Knee".

Chondromalacia patella occurs in 2 distinct age groups:

- i. It can happen in the older age group (in the 40's and beyond) when the articular cartilage breaks down as part of the wear and tear process.
- ii. It can occur in teenagers (especially girls) when the articular cartilage "softens" in response to excessive and uneven pressure on the cartilage due to structural changes in the legs with rapid growth and muscle imbalance around the knee.

At this stage, there is no break down of the articular cartilage of the patella yet, and is totally reversible. In fact, the term "Chondromalacia Patellae" is not used at this stage as there is no actual breakdown of the cartilage. A more appropriate diagnosis would be "Anterior knee pain syndrome" or "Patellofemoral stress syndrome" or "Patellofemoral dysfunction".

Factors that cause patellofemoral dysfunction are:

- i. Increased ligamentous laxity
- ii. Increase in femoral torsion
- iii. Wider pelvis

These factors are thought to cause an increased lateral motion of the patella during flexion and extension of the knee joint.

Predisposition of patellofemoral dysfunction during pregnancy:

The normal physiologic changes that occur during pregnancy may worsen this condition if it already exists, or an increase in ligamentous laxity may be enough to bring on this condition in a susceptible pregnant woman.

Weight gain during pregnancy changes a woman's centres of gravity, increases stress and strain on the already posturally and hormonally compromised joints of the lower extremities.

Pathomechanics of patellofemoral dysfunction:

Pronated foot occurring due to weight gain during pregnancy affect the alignment of the foot, ankle, leg and pelvis.

Pronated foot causes:

- Collapse of arches and causes the soft tissues to stretch.
- Knee valgus, thereby increasing the "Q" angle.
- Any flexion of the knee increases the tendency of the patella to dislocate.
- Undue pressure is placed on the lateral (outer) facet of the patella.
- Vastus medialis and lateralis components of the quadriceps muscles may not be well balanced.
- The vastus lateralis tends to be more powerful than the vastus medialis, thus increasing the tendency for the patella to track or dislocate laterally.
- This again puts undue pressure on the lateral facet.
- This uneven and excessive pressure on the lateral facet of the patella tends to cartilage "softening" and breakdown.

Signs and Symptoms of Patellofemoral Dysfunction

- Anterior knee pain that is usually more pronounced with:
 - Squatting
 - Kneeling
 - Going up and downstairs (especially going down the stairs)
 - Sitting with knees bent for prolonged periods of time
- Stiffness in the knee
- Knee "Cracks" or needs to be cracked to decrease pain
(Cracking that is often associated with patellofemoral stress syndrome is the sound of the patella clunking back into its groove)
- Patient cannot sit for long-time without straightening out of the knee to make it crack. This is called "Theatre sign" - Patients must sit in an aisle seat at the theatre so that can straighten out their knee frequently.

Physical Examination

- Shows tenderness around the periarticular structure
- The patient may also exhibit patellar apprehension when gently pushing the patella laterally.

If the patella does not move easily inwards (towards the other knee), the knee is described as having "lateral tightness", which is indicative of excess lateral pressure syndrome.

Physiotherapy Treatment

- Ice over the knee for pain relief
- Begin with 2 exercises that do not bend the knee much.

Straight Leg Raising

- Lie on the back and raise the affected leg up off the ground, keeping the leg straight at all times. Repeat this movement 10-15 times (Fig. 3.1).

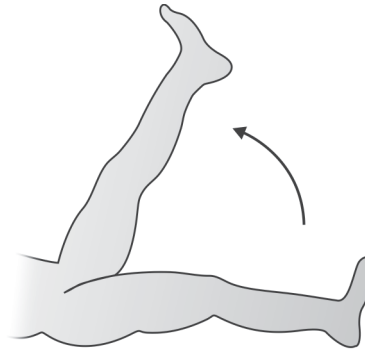


Fig. 3.1: Straight leg raising

- Progression —Add ankle weights

Caution: During pregnancy, do not lie in this position for more than 10 minutes.

Quadriceps Setting Exercises

- Sit with legs straight.
- Keep a rolled towel under your knee.
(This should put a bend in your knee—may be 20°)
- Now push down with leg, trying to straighten knee.
- Concentrate on contracting the quadriceps muscles not the hamstrings (Fig. 3.2).
- Repeat this movement 10-15 times.

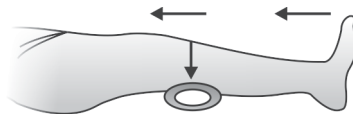


Fig. 3.2: Static quadriceps contractions

Progression

- Sit on a bench, facing a wall.
- Legs at 90°, and toes up against the wall (wear shoes).

- Now, push into the wall with legs, contracting the quadriceps but not moving through a range of motion.
- Hold 10 seconds and relax.

Short-arc Extensions

- Can be done sitting up or lying down.
- Use a rolled-up towel to support thigh while keeping leg and foot in the air for 5 seconds.
- Lower your foot as you bend knee slowly.
- Repeat 10 times for each leg, twice a day.

Stationary Bicycling

On low tension setting improves exercise tolerance without stressing the knee. The seat height should be adjusted in such a manner that the leg is straight on the down stroke. Start with a 15 minutes a day and work up to 30 minutes a day.

The exercises described above concentrates on strengthening the vastus medialis obliquus (VMO), responsible for stabilizing the patella. Once that strengthened and muscle balance is restored, the pain improves.

If pain persists:

- Stretching of vastus lateralis and hamstrings.
- Strengthening of quadriceps and hamstrings muscles using manual and electrical technique.

"Patellar Tapping" — Helps to keep the patella from tracking laterally.

Do's

- Avoid squatting, kneeling and stairs.
- Avoid full squat exercises with weight.
- Avoid strenuous use of the knee until the pain eases. Symptoms usually improve in time if the knee is not over used.

Tail bone pain, coccyx pain, coccygodynia.

Inflammation and pain in the area of the coccyx is called coccydynia.

Coccydynia can be anything from discomfort to acute pain, varying between people and varying with time in any individual.

THE NORMAL COCCYX

A normal coccyx consists of 2 or 3 segments. Studies by Postacchini and Massobrio have shown that less than 10% of the populations have all the coccyx vertebrae fused into one segment. It is more common for it to be in two or three segments, sometimes more. The first segment may be fused to the sacrum. The study also showed that two thirds of people have a coccyx that curves down and slightly forward and one-third have a coccyx that points straight forward.

Normal range of coccyx is 3 to 10 cm (1-4 inches) (Figs 4.1 and 4.2). People with long coccyxes seem to be more likely to have coccyx pain.

When, walking or bending over, the coccyx does not move much in relation to the spine. But during sitting down, this pushes the flesh of bottom out of its normal position, making the coccyx move by up to 22 degrees. The coccyx curves gently forward and flexes slightly in sitting, if it is not, more likely to have coccyx pain.

Contributions of the Coccyx

The coccyx is triangular in shape and attached to the bottom of the sacrum. Because it is not connected to the ribs, the coccyx does not have pedicles, lamina, or spinous processes that are present on certain other vertebrae. The coccygeal vertebrae have only three transverse grooves which provide an attachment to the ventral sacrococcygeal ligaments and the levator ani, two broad thin muscles which form part of the hammock-like floor of the pelvis. These muscles function as a single sheet which extends across the middle line, forming the principle part of the pelvic diaphragm and support for the rectum. The coccygeus muscle also helps to support the posterior organs of the pelvic floor, especially during blocked forced expiration, as in elimination.

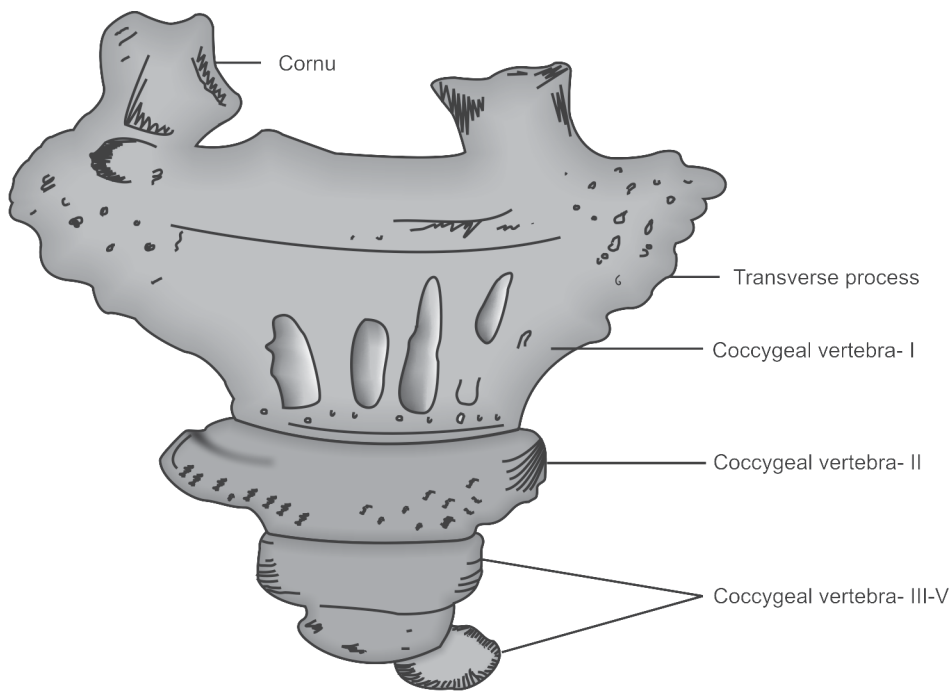


Fig. 4.1: Coccyx—ventral view

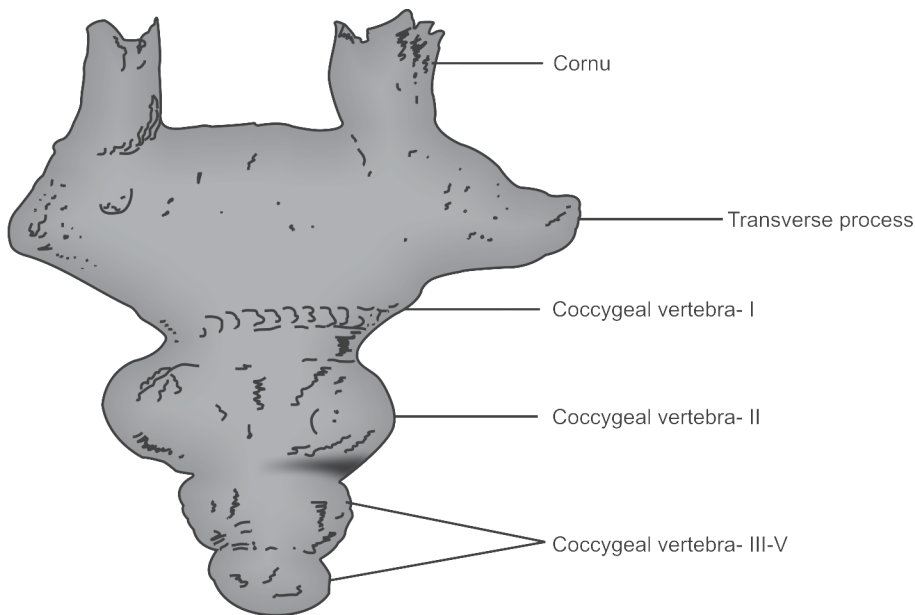


Fig. 4.2: Coccyx—dorsal view

The coccygeus muscle can draw the coccyx ventrally to give added support to the pelvic floor against abdominal pressure. It draws the coccyx forward after defecation. This muscle is inserted by its base into the margin of the coccyx and into the side of the last section of the sacrum. The coccygeus muscle consists of the levator ani and the piriformis which enclose the back part of the outlet of the pelvis.

In females, the coccygeus muscle draws the coccyx forward after it has been pressed back during parturition. Smith (1986:134) reported that the movements of the coccyx help to enlarge the birth canal during childbirth. The levator ani muscles constrict the lower end of both the rectum and the vagina, drawing the rectum both forward and upward. The small sling of muscles attached to the coccyx serves several functions.

On the left and right dorsal surfaces of the coccyx is located a row of tubercles called the "rudimentary articular processes". However, they are "rudimentary" only in the sense that they are smaller than the tubercles on the thoracic vertebrae. The larger first pair, the coccygeal cornua, articulates with the cornua of the sacrum and allows some movement. On the opposite side are the openings called foramina-openings for the transmission of the dorsal division of the fifth sacral nerve. The narrow borders of the coccyx receive the attachment of the sacrotuberous and sacrospinous ligaments laterally for support of the bones, the coccygeus muscle ventrally, and the gluteus maximus muscle dorsally.

The oval surface of the coccyx base articulates with the sacrum. Cray (1966:130) pointed out that the rounded apex or lowest part of the coccyx is attached to the tendon of the sphincter ani externus and its movement can be bifid, meaning that it can be deflected to both sides, and thus make bowel movements possible. Also, Cray (1966:130) discussed the anococcygeal raphe which is a narrow fibrous band that extends from the coccyx to the margin of the anus.

Without the coccyx and its attached muscle system, humans would need a radically different support system for their internal organs which would require numerous design changes in the human posterior concerning the coccyx and its importance, Allford concluded that:

The posterior surfaces (of the coccyx) serve as attachments for the gluteus maximus muscle and the sphincter and externus muscles. The gluteus maximus muscle is essential for defecation and labor during childbirth. The sphincter ani externus muscle is needed to keep the anal canal and orifice closed. These are obviously very important functions. The interior surfaces of the coccygeal vertebrae also serve as important attachments for muscles that aid in the containment of faeces within the rectum... (as well as control of) defecation, and the expulsion of the fetus during labor. For these important reasons, the coccyx can never be classified as a rudimentary or vestigial rudiment of our ancestors. Aliford (1978:42).

Causes

It is not clearly understood which portions of the anatomy can cause coccyx pain. Either the ligaments or the vestigial disc may be a cause of pain and, rarely, a primary bone tumor or soft tissue tumor can cause pain.

The condition is more common in women because:

- In women the coccyx is rotated and faces backward, which makes it more susceptible to trauma.
- Women have a broader pelvis, which means that sitting places pressure not only on their ischial tuberosities but also on the coccyx.
- Childbirth is a common cause of the condition.

The most common causes of coccydynia are:

- **Local trauma:** A fall on the tailbone can inflame the ligaments or injure the coccygeal attachment to the sacrum.
- **Childbirth:** During delivery, the baby's head rides over the top of the coccyx and can injure the same structures.

Other Causes

- Idiopathic
- Repetitive strain or surgery (rowing machine, prolonged bicycle riding)
- Unstable coccyx
- Infection
- Tumor
- Fracture
- Increased body mass index is a risk for coccydynia.

Symptoms of Coccydynia

- Pain during or after sitting, the level of pain depending on duration of sitting. This is the main problem caused by coccydynia. Intensity of pain depends on the design of the chair and the padding. The increased pain and sensitivity caused by having to sit for a long period may continue for days afterwards.
- Acute pain while moving from sitting to standing. This particular symptom had a coccyx that partially dislocated or moved abnormally when the patient sat down.
- Pain caused by sitting on a soft, but not a hard surface. This usually happens when the joint between the sacrum and coccyx is unstable, so that the coccyx can be pushed out of place when you put pressure on it by sitting or lying. Sitting on a hard surface, puts more weight on ischial tuberosities. But when sitting on a soft surface, the foam rubber pushes up between the bones, increasing the pressure inside and pushing the coccyx out of place.
- Deep ache around the coccyx.
- Sensitivity to finger pressure on the tip or edges of the coccyx.
- Shooting pains down the leg.
- Feeling like sitting on a marble that moves around.

- Feeling like sitting on a knife.
- Pain during bowel movements, and sometimes before.
- Pain during sexual intercourse.
- Increased pain around the time of a woman's monthly period—this may be due to variations in the levels of estradiol.

If the pain was caused by trauma, then there may be other parts of the body damaged as well. If this damage includes the sacrum, hips or legs, it may be very difficult to sort out what is causing the most pain. An injection of local anesthetic to the coccyx area helps to find out how much of the pain is caused by the coccyx.

Secondary Symptoms

If the pain persists for a long time, it is common for people to get secondary symptoms, such as:

- Painful feet, from standing too much. One particular problem that can develop is plantar fascitis.
- Exhaustion, depression, lack of sleep.
- Painful back, from sitting in awkward positions to relieve the pressure on the coccyx.
- Other aches and pains around the body. Pain in one region of the body can lead to hypersensitivity of another region due to crosstalk between the nerve fibers. In the case of coccyx pain, the whole area of the buttocks can become hypersensitive because of this effect. This, of course, makes sitting even more uncomfortable, and chairs and sitting positions which were initially OK can become uncomfortable. Hips may become painful in lying on them most of the time.

Dynamic radiography, with standing radiographs taken in the neutral position and sitting views taken in the painful position, allows an assessment of coccyx mobility. In light of the findings, coccygeal mobility may be classified according to the system proposed by Maigne et al. This classification comprises four groups:

1. Luxation : Backward displacement of the mobile portion of the coccyx when the patient is sitting down
2. Hypermobility : Coccygeal flexion exceeding 25° when the patient is in the sitting position
3. Immobile coccyx : Less than 5° of flexion or extension when the patient is in the sitting position
4. Normal mobility : Coccygeal mobility between 5° and 25°.

Luxation and hypermobility are abnormal entities in their own right. Absence of mobility is not an abnormal condition. However, coccydynia in patients with an immobile coccyx appears to be associated frequently with bursitis of the coccygeal apex caused by a bony spicule. In patients with a normally mobile coccyx, the cause of the coccydynia is unknown.

Diagnosis

Thorough medical history and completing a physical examination.

A thorough physical examination should include:

- Pelvic and rectal exam to check for a mass or tumor that could be a cause of the pain.
- Palpation to check for local tenderness.

The most striking finding on examination is usually the local tenderness upon palpation of the coccyx. If the coccyx is not tender to palpation, then the pain in the region is referred from another structure, such as a lumbosacral disc herniation or degenerative disc disease.

Diagnostic studies that should be done include:

- X-rays of the sacrum and coccyx should be done to rule out the unlikely event that either an obvious fracture or a large tumor is the cause of the discomfort.
- An MRI scan is useful to rule out infection or tumor as a cause of pain.

Management

Conservative Treatments for Coccydynia

Treatments for coccydynia are usually conservative and local. The first line of treatment typically includes:

- A donut-shaped pillow to help take pressure off the coccyx when sitting (Figs 4.3 and 4.4).

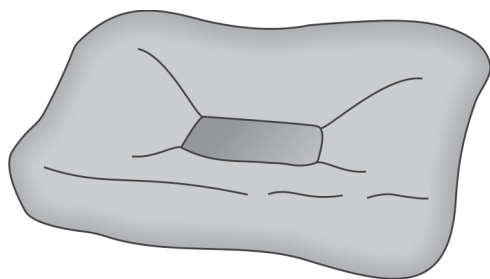


Fig. 4.3: Donut pillow



Fig. 4.4: Coccyx cushion

If the pain is persistent or severe, additional conservative treatments may include:

- A local injection of a numbing agent and steroid (to decrease inflammation in the area) can provide some relief.
- Manipulations.

External: Pull the tip of the coccyx backwards through the skin just above the anus

Internal: Therapist placing a gloved finger into the anus of the patient, and gently massaging or stretching the muscles attached to the coccyx. Gently pull the coccyx into its normal position, if it is out of position.

The idea behind manual therapy is that tense muscles pull the coccyx out of position causing pain. The treatment aims to relax and extend the muscles, so that coccyx can return to its normal position.

- Stretching the ligaments attached to the coccyx can be helpful.
- Physical therapy with ultrasound can also be helpful.
- Levator anus and coccygeus massage.
- Pelvic floor exercises.
- Postural advice
- Short wave diathermy
- Craniosacral therapy
- Laser
- Hot bath (sitz bath)
- Joint mobilization with the coccyx in hyperextension stretching the levator anus, joint mobilization with circumduction of the coccyx.
- Self-manipulation sit down and lean forward, then place a finger on your coccyx and pull it back, and then straighten your back up so that you're sitting upright. You need to apply quite a lot of pressure in order to get your finger to a position where it can pull back on the tip of the coccyx, and then keep the pressure applied under it and upwards in order to maintain contact with the tip of the coccyx.
- Assessment of pelvic muscle tone. The internal finger is inserted following the axis of the rectum. It then is gradually pushed upward (posteriorly), stretching the pelvic floor, until contact is made with the coccyx, whereupon the pull is released. If the finger is returned immediately to its initial position in the rectum by the patient's muscle tone without any conscious effort by the patient, the muscle tone is considered abnormally high (Fig. 4.5).

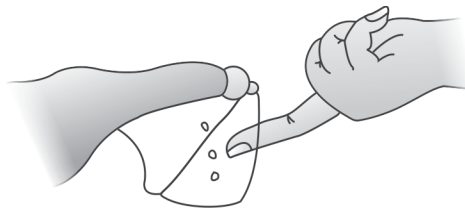


Fig. 4.5: Palpation of pelvic floor muscles

Thiele's technique of massage in the direction of the fibers (Fig. 4.6).

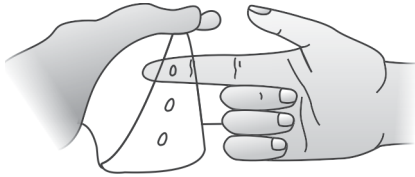


Fig. 4.6: Thiele's technique

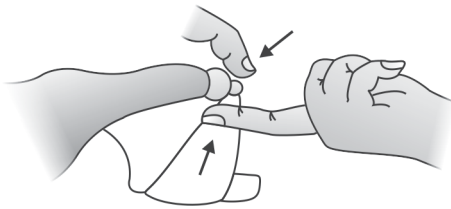


Fig. 4.7: JY Maigne's technique

JY Maigne's technique. The internal finger touches, but does not mobilize, the coccyx. The external finger checks to ensure that the coccyx is being kept still. This maneuver results in stretching of the coccygeus, the levator anus, and the external sphincter (Fig. 4.7).

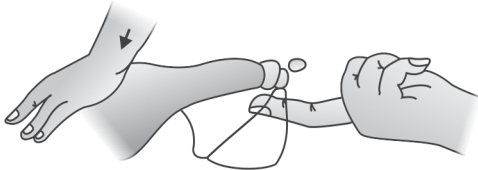


Fig. 4.8: R Maigne's technique

R Maigne's technique of coccygeal mobilization. The coccyx is kept in hyperextension, which stresses the sacrococcygeal and intercoccygeal joints and stretches the levator anus (Fig. 4.8).

William's Exercises

- 1. Abdominal strengthening. Crook lying, raise your neck, hold for few seconds and relax (Fig. 4.9).

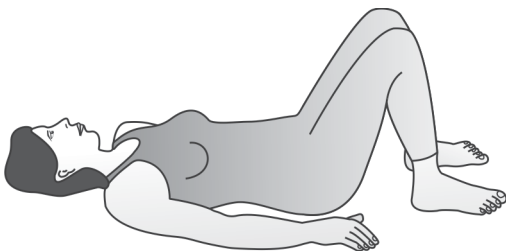


Fig. 4.9: Crook lying

2. Gluteal and hamstring strengthening—while lying flat on back with knees bent and feet on floor, lift hips off the floor by squeezing cheeks of buttocks together (Fig. 4.10).

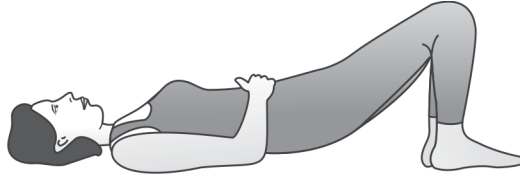


Fig. 4.10: Bridging

3. Low back strengthening—lie on back and grasp knees, one in each hand. Pull knees down tightly to arm pits. So as to lift the lower part of the back off the floor (Fig. 4.11).

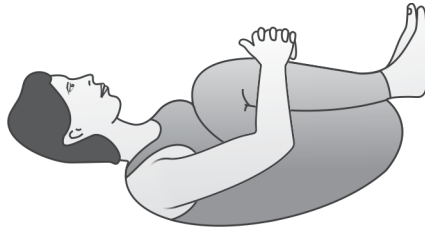


Fig. 4.11: Lifting the lower part of back off the floor with flexed knees

Surgical Treatments for Coccydynia

For people who have persistent pain that is not alleviated or well-controlled with conservative treatment, surgical removal of the coccyx (coccygectomy) is an option.

Do's and Don'ts

- Feed the baby lying down.
- Don't drive.
- Sit with the chair facing the wrong way, so that leaning on the back with bottom hanging off the edge. Or lean forward as the weight sits on thighs, not on coccyx.
- Have a plan for when things get really painful—instead of lying on the floor, go for a walk.
- Coccyx is linked to pelvic floor, so exercising pelvic floor is good, but only if they don't hurt when performing them. Try doing them lying down.
- Get a U-shaped foam cushion, not a ring, or sit on two cushions, one under each thigh, with a gap in the middle.

CHAPTER

5

Dysmenorrhea

Synonym—Menstrual pain, menstrual cramps, painful periods.

PRIMARY DYSMENORRHEA

- Affects young women in their teens and early twenties
- Pain usually begins a day or two days before menstrual flow, and may continue through the first two days of menstruation
- Discomfort tends to decrease over time and after pregnancy.

Signs and Symptoms

- Abdominal cramping
 - Dull ache that moves to lower back and legs
- Heavy menstrual flow
- Headache
- Nausea
- Constipation or diarrhea
- Frequent urination
- Vomiting (not common).

Causes

Primary Dysmenorrhea

- Strong uterine contractions
 - Stimulated by increased production of the human prostaglandin by the lining of the uterus (endometrium).
 - Prostaglandin
 - Produce uterine ischemia through,
 - Platelet aggregation
 - Vasoconstriction
 - Dysrhythmic contractions with pressure higher than systolic blood pressure.

- Anxiety and stress.
- Blood and tissue being discharged through a narrow cervix.
- Displaced uterus.
- Lack of exercise.

Secondary Dysmenorrhea

- Endometriosis.
- Blood and tissue being discharged through a narrow cervix (cervical stenosis).
- Uterine fibroid or ovarian cyst.
- Infections of the uterus.
- Pelvic inflammatory disease.
- Intrauterine device.
- Adenomyosis (endometrial tissue within the uterine wall).
- Inflammatory bowel disease.

Pathogenesis

Dysmenorrhea is thought to be caused by the release of prostaglandins in the menstrual fluid, which causes uterine contractions and pain. Vasopressin also may play a role by increasing uterine contractility and causing ischemic pain as a result of vasoconstriction. Elevated vasopressin levels have been reported in women with primary dysmenorrhea.

History

Questions for Assessment

- Age of menarche
- Pain during menstrual cycle
- Nature of pain—sharp, dull, intermittent, constant, aching, or cramping
- Sexually active or not
- Use of contraceptives
- If yes, type of contraceptive
- Date of last menstrual period
- Flow of last menstrual period a normal amount/large amount
- Heavy or prolonged periods (lasting longer than 5 days)
- Clots in menstrual blood
- Periods generally regular and predictable
- Measures to relieve the discomfort. And how effective was it?
- Aggravating factors
- Any other symptoms.

Pain

- Primary dysmenorrhea—usually starts within 24 hours of menses and may last for 48-72 hours.
- Secondary dysmenorrhea—a week or more prior to the onset of menses and pain may continue for a few days after cessation of flow.

Gynecological History

- Menarche
- Abnormal vaginal bleeding
- Discharge
- Dyspareunia
- Infertility.

Associated Symptoms

- Headache
- Nausea and vomiting
- Suprapubic pain
- Backache
 - Radiating down to anterior thigh
- Diarrhea
- Syncope.

Physical Examination

Primary

- Vital signs normal
- Pelvic examination may disclose a tender uterus but no cervical motion tenderness or adnexal abnormalities.

Secondary

- Vital signs may vary depending on the underlying etiology
- Adnexal tenderness and enlargement may be noted
- Evaluation of uterosacral ligament and rectovaginal septum for palpable abnormalities or nodularities.

Risk Factors

Primary

- Attempts to lose weight
- Nulliparity
- Depression

- Obesity
- Cigarette smoking
- Heavy menstrual flow
- Positive family history
- Age < 20 years.

Secondary

- Pelvic infection
- Sexually transmitted disease
- Endometritis.

Diagnostic Tests

- Blood tests ultrasound
- Laparoscopy
- Cultures (may be taken to rule out sexually transmitted diseases such as gonorrhea, primary syphilis, or chlamydia infections).

Complications

- Anxiety
- Depression
- Infertility secondary to underlying pathology.

Management

- a. Nutrition
 - Increase the intake of fatty acids (fish, nuts)
 - Decrease intake of saturated fats (meat, dairy products)
 - Increase intake of fresh fruits and vegetables, proteins, magnesium rich foods
 - Vitamin-E, B-complex, essential fatty acids (omega-3).
- b. Rest
- c. Stress reduction—Relaxation exercises
- d. Castor oil pack
 - Apply oil directly to skin
 - Cover with a clean soft cloth
 - 30-60 minutes duration of treatment
- e. Heat therapy
 - Warm bath or a heating pad applied to the lower abdomen
- f. Contrast sitz bath
 - Use two basins that you can comfortably sit in
 - Sit in hot water for 3 minutes

- Then in cold water for one minute
- Repeat three times, to complete one set
- One or two sets per day.

g. Exercise

- Do the following exercises above 2 to 3 times a day several days before period:
- Lie face up with legs and knees bent; perform abdominal breathing about 10 times feeling abdomen slowly inflate then slowly fall.
- Stand holding back of chair; lift one heel off the floor, then the other; repeat 20 times.
- Stand holding back of chair then do 5 deep knee bends.
- While lying on back lift and bring knees to touch chin, 10 times.

h. TENS

- Pads are placed on or near the area of pain

Acupressure

- SP-6 acupressure (Sanyinjiao point—four finger widths above the tip of the medial malleolus).
- CV2 acupoint: In the pubic region, on the anterior midline, at the superior border of the symphysis pubis.
- Position of the patient—prone.
- Pillows under head, shoulders and knees.
- Two complete five minutes cycles of pressure performed on each leg.
- The acupressure garment: The Relief Brief is a cotton Lycra panty brief with a fixed number of lower abdominal and lower back latex foam acupads that provide pressure to dysmenorrhea—relieving Chinese acupressure points.

i. Acupuncture.

j. Massage—therapeutic massage helps in reducing the effects of stress.

k. Spinal manipulation.

Home Care

- Apply a heating pad to your lower abdomen (below your belly-button). Be careful NOT to fall asleep with it on.
- Take warm showers or baths.
- Drink warm beverages.
- Do light circular massage with your fingertips around your lower abdomen.
- Walk or exercise regularly, including pelvic rocking exercises.
- Follow a diet rich in complex carbohydrates such as whole grains, fruits, and vegetables, but low in salt, sugar, alcohol, and caffeine.
- Eat light but frequent meals.
- Practice relaxation techniques like meditation or yoga.

- Vitamin B-6, calcium, and magnesium supplements, especially if pain is from PMS (Premenstrual Syndrome).
- Keep legs elevated while lying down. Or lie on your side with knees bent.

Scales

- Menstrual attitude questionnaire
— Brookes-Gunn and Ruble (1980)
- Menstrual joy questionnaire
— Janice Delaney et al (1988)
- Menstrual distress questionnaire
— Moos (1968).

Menstrual Attitude Questionnaire (Adapted with permission from Brooks-Gunn et al)

Answer the questions below by circling the number that most closely describes your attitude: 1 = strongly disagree, 7 = strongly agree

- Women feel as fit during menstruation as they do at other times of the month
1 2 3 4 5 6 7
- Women are more tired than usual when they are menstruating
1 2 3 4 5 6 7
- Women expect extra-consideration from their friends when menstruating
1 2 3 4 5 6 7
- The physiological effects of menstruation are normally no greater than other usual fluctuations in a physical state
1 2 3 4 5 6 7
- A woman's performance in sports is not negatively affected by menstruation
1 2 3 4 5 6 7
- Women don't allow the fact that they are menstruating interfere with their normal activities
1 2 3 4 5 6 7
- Women enjoy their menstrual periods in some way
1 2 3 4 5 6 7
- Avoiding certain activities during menstruation is often very wise
1 2 3 4 5 6 7
- The menstrual period can affect women's performance on intellectual tasks
1 2 3 4 5 6 7
- Women just have to accept the fact that they may not perform as well when they are menstruating
1 2 3 4 5 6 7
- A woman who attributes her irritability to her approaching period is neurotic
1 2 3 4 5 6 7
- Women cannot expect so much of themselves during menstruation compared to the rest of the month
1 2 3 4 5 6 7

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13. Menstruating is something women just have to put up with
1 2 3 4 5 6 7
14. Women are more easily upset menstrually and premenstrually than at other times of the month
1 2 3 4 5 6 7
15. Men have a real advantage in not having the monthly interruption of a menstrual period
1 2 3 4 5 6 7
16. The only thing menstruation is good for is to let women know that they are not pregnant
1 2 3 4 5 6 7
17. Menstruation provides a good way for women to keep in touch with their bodies
1 2 3 4 5 6 7
18. Women who complain of menstrual distress are just using that as an excuse
1 2 3 4 5 6 7
19. Women's moods are not influenced in any major way by their menstrual cycle phase
1 2 3 4 5 6 7
20. The recent monthly flow is an external indication of a woman's general good health
1 2 3 4 5 6 7
21. Menstruation is an obvious example of the rhythmicity which pervades all life
1 2 3 4 5 6 7
22. Menstruation provides a way for women to keep in touch with their bodies
1 2 3 4 5 6 7
23. Women can anticipate their period by the mood changes which precede it
1 2 3 4 5 6 7
24. Women can tell their period is approaching because of the physical signs such as breast ache and cramps
1 2 3 4 5 6 7
25. Menstruation allows women to be more aware of their bodies
1 2 3 4 5 6 7
26. Most women show a gain in weight just before or during their period
1 2 3 4 5 6 7
27. Women are more easily upset during their premenstrual and menstrual periods than at other times of the month
1 2 3 4 5 6 7
28. Cramps are only bothersome if attention is paid to them
1 2 3 4 5 6 7
29. Others should not be critical of a woman who is easily upset before or during her period
1 2 3 4 5 6 7

30. Menstruation can adversely affect sports performance	1	2	3	4	5	6	7
31. Most women make too much of the minor physiological effects of menstruation	1	2	3	4	5	6	7
32. Menstruation is recurring affirmation of womanhood	1	2	3	4	5	6	7
33. Premenstrual tension/irritability is all in a woman's head	1	2	3	4	5	6	7

Menstrual Joy Questionnaire (Adapted with permission from Janice Delaney et al)

Below is a list of pleasures, which women sometimes experience. Kindly evaluate your experience during the three different states listed below:

- A. During your most recent menstrual flow.
- B. During the week preceding your menstrual flow.
- C. During the remainder of your cycle.

Write the number in each space, which corresponds most accurately to your experience:

- 1 = none
- 2 = hardly noticeable
- 3 = mild
- 4 = moderate
- 5 = strong
- 6 = acute

Note: In answering your questionnaire, reflect the experience of your most recent cycle.

S.No.	Women's experiences	A Most recent flow	B Week before	C Remainder of cycle
1.	High spirits (elated /merry)			
2.	Increased sexual desire (greater)			
3.	Vibrant activity (full of vitality/energy)			
4.	Revolutionary zeal (heartly persistent endeavour in pursuit of an object or cause)			
5.	Intense concentration (extreme concentration)			
6.	Feeling of affection (goodwill, kindly feeling and/or love)			
7.	Self-confidence (sure of yourself, your course, etc)			
8.	Sense of euphoria (strong feeling of well being, cheerfulness)			
9.	Creativity (inventive/imaginative)			
10.	Feelings of power (control of authority)			

Menstrual Distress Questionnaire (Adapted with permission from Rudolf H Moos)

Below is a list of experiences, which women sometimes experience. Kindly evaluate your experience during the three different states listed below:

- A. During your most recent menstrual flow.
- B. During the week preceding your menstrual flow.
- C. During the remainder of your cycle.

Write the number in each space, which corresponds most accurately to your experience:

- | | |
|------------|-----------------------|
| 1 = none | 2 = hardly noticeable |
| 3 = mild | 4 = moderate |
| 5 = strong | 6 = acute |

Note: In answering your questionnaire, reflect the experience of your most recent cycle.

S.No.	Women’s experiences	A Most recent flow	B Week before	C Remainder of cycle
1.	Weight gain			
2.	Insomnia			
3.	Crying			
4.	Lowered study or work performance			
5.	Muscle stiffness			
6.	Forgetfulness			
7.	Confusion			
8.	Take naps: Stay in bed			
9.	Headache			
10.	Skin disorders			
11.	Loneliness			
12.	Feelings of suffocation			
13.	Affectionate			
14.	Orderliness			
15.	Stay at home			
16.	Cramps			
17.	Dizziness, faintness			
18.	Excitement			
19.	Chest pains			
20.	Avoid social activities			
21.	Anxiety			
22.	Backache			
23.	Cold sweats			
24.	Lowered judgement			
25.	Fatigue			
26.	Nausea, vomiting			
27.	Restlessness			
28.	Hot flushes			
29.	Difficulty concentrating			
30.	Feelings of well being			

S.No.	Women's experiences	A	B	C
		Most recent flow	Week before	Remainder of cycle
31.	ringing in the ears			
32.	Distractable			
33.	Swelling			
34.	Accidents			
35.	Irritability			
36.	General aches and pains			
37.	Mood swings			
38.	Heart pounding			
39.	Depression			
40.	Decreased efficiency			
41.	Lowered motor co-ordination			
42.	Numbness: Tingling			
43.	Change in eating habits			
44.	Tension			
45.	Blind spots, funny vision			
46.	Bursts of energy, activity			

Exercises

Cat Stretch

Starting position: Hands and knees on the floor, hands under shoulders, knees under hips, feet relaxed, eyes looking at the floor.

- 1. Arch your back; by tucking chin in. Hold for 10 seconds. Then relax (Fig. 5.1).
- 2. Round back, pushing it toward the ceiling by dropping your head toward the floor (Fig. 5.2).
- 3. Hold for 10 seconds, counting aloud. Maintain a rounded back.
- 4. Sit back on heels, stretching your arms out in front of you as far as possible (Fig. 5.3).
- 5. Hold for 20 seconds, and then relax.

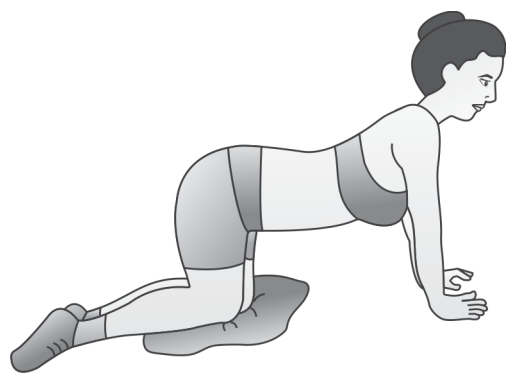


Fig. 5.1: Arching the back

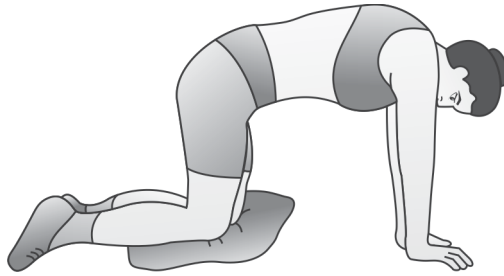


Fig. 5.2: Round back



Fig. 5.3: Sitting back on heels and stretch arms out

Note: A pillow or cushion placed under knees or behind knees may be helpful if you have arthritic knees.

Lower Trunk Rotation

Starting position: Lying on back, knees bent, feet on the floor, arms extended out.

1. Keeping the arms straightened horizontally, place shoulders on the floor as much as possible (Fig. 5.4).
2. Bend both knees and roll them towards left (Fig. 5.5).
3. Hold for 20 seconds, then roll to the right side (Fig. 5.6).
4. Hold for 20 seconds, then return to starting position.

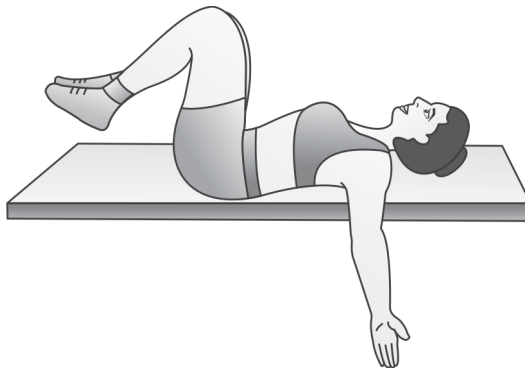


Fig. 5.4: Bending knees from supine position

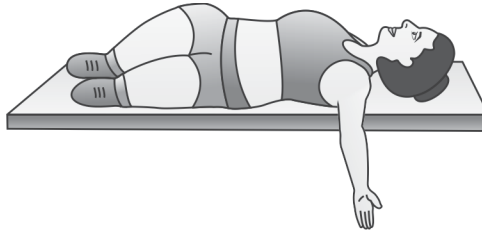


Fig. 5.5: Rolling knee towards left

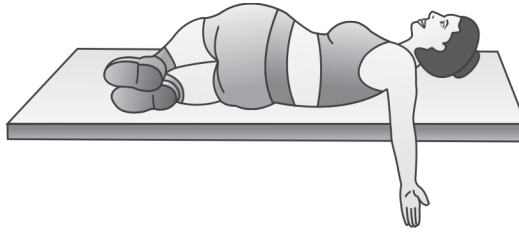


Fig. 5.6: Rolling knees towards right

Note: For those who need more of a challenge, bring both knees up toward chest, lifting feet off the floor until knees are over hips. Roll knees to the right, and then to the left. Make sure back stays flat to the floor.

The Buttock/Hip Stretch

Starting position: Lying on back, knees bent.

1. Bend one leg with knee flexed, and try to pull it towards chest (Fig. 5.7). Maintain the other leg extended on the floor or bed (Fig. 5.8).
2. Hold for 20 seconds, then return to the starting position and relax.
3. Repeat on the other side.

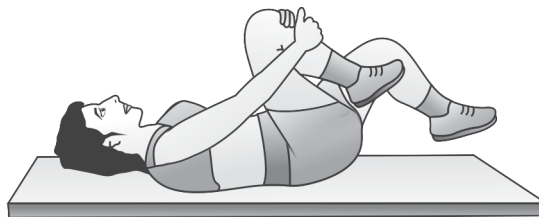


Fig. 5.7: Starting position for buttock/hip stretch

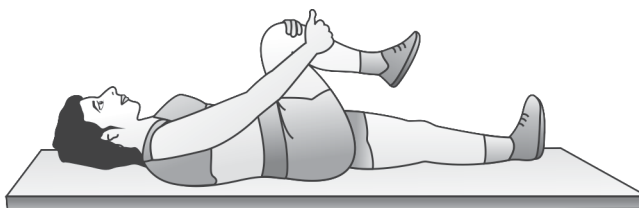


Fig. 5.8: Right buttock and hip stretch with extension of left leg

Abdominal Strengthening: Curl up

Starting position: Lying on back on the floor, knees bent, feet on the floor, hands resting beneath head.

1. Clasping hands behind head, curl up upper body in towards the knees (Figs 5.9 and 5.10).
2. Hold for 20 seconds, counting aloud. Then relax.

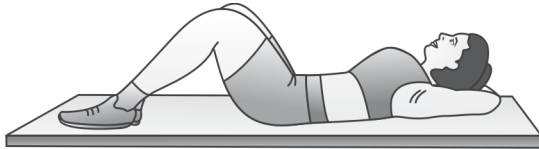


Fig. 5.9: Starting position for curl ups

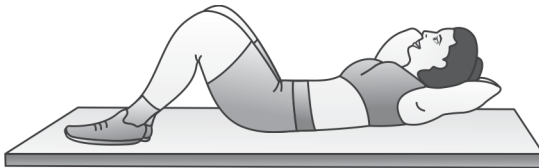


Fig. 5.10: Abdominal curl ups

Lower Abdominal Strengthening

Starting position: Lying back on the floor, knees bent, arms extended out.

1. Hold an exercise ball between heels and buttock.
2. Flatten the lower back against the floor by tightening the muscles of abdomen and buttock (Fig. 5.11).
3. With the ball held between the legs against thighs, bring both knees up toward the chest. Slowly lower both legs to starting position (Fig. 5.12).

Note: Do not arch back.

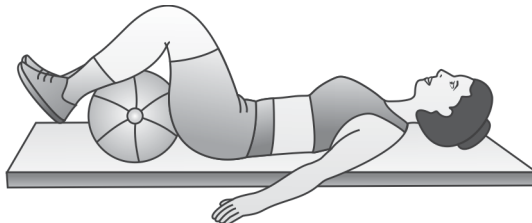


Fig. 5.11: Starting position for lower abdominal strengthening

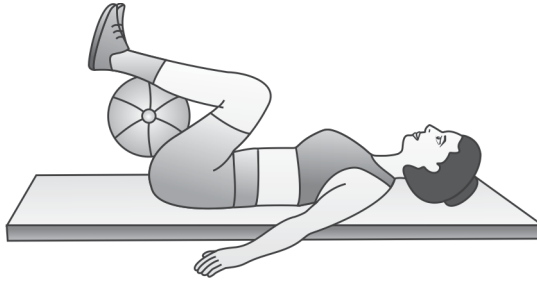


Fig. 5.12: Hip flexion and lowering with ball between legs

"The Bridge" Position

Do not perform this exercise with neck pain.

Starting position: Lying on back on the floor, knees bent, feet and elbows on the floor, arms extended out.

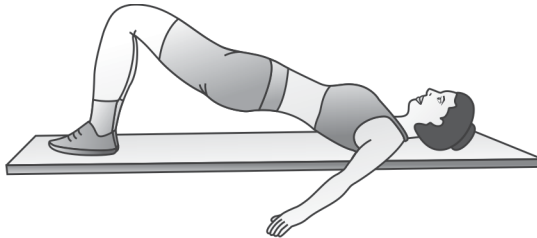


Fig. 5.13: Bridging

1. Flatten the low back against the floor by tightening the muscles of abdomen and buttock.
2. Lift up hips and lower back (Fig. 5.13).
3. Hold for 20 seconds, then return slowly to starting position and relax.

CHAPTER

6 Gestational Diabetes Mellitus

Definition: Gestational Diabetes Mellitus (GDM) is defined as "Carbohydrate intolerance with recognition or onset during pregnancy."

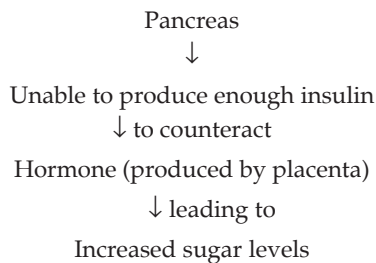
The maternal metabolic adaptation is to maintain the mean fasting plasma glucose of 74.5 ± 11 mg/dl and the postprandial peak of 108.7 ± 16.9 mg/dl.

Gestational diabetes is a carbohydrate intolerance of variable severity that starts or is first recognized during pregnancy or the inability of the tissues to absorb glucose from the blood stream during pregnancy due to lack of hormone insulin.

This fine tuning of glycemic level during pregnancy is possible due to the compensatory hyperinsulinemia, as the normal pregnancy is characterized by insulin resistance. A pregnant woman who is not able to increase her insulin secretion to overcome the insulin resistance that occurs even during normal pregnancy develops gestational diabetes.

In gestational diabetes, the pancreas is not at fault. Instead, the problem is in the placenta. During pregnancy, the placenta provides the baby with nourishment. It also produces a number of hormones that interfere with body's usual response to insulin. This condition is referred to as "insulin resistance". Most pregnant women do not suffer from gestational diabetes, because the pancreas works to produce extra quantities of insulin in order to compensate for insulin resistance. However, when women's pancreas cannot produce enough extra insulin, blood levels of glucose stay abnormally high and the women is considered to have gestational diabetes (Flow chart 6.1).

Flow chart 6.1: Cause of GDM



Risk Factors

- Over weight (body mass index is over 30)
- Family history of diabetes
- Previous history of very large, heavy baby
- Previous history of still born or birth defect
- Excess amount of amniotic fluid
- Over 25 years of age
- Previous history of gestational diabetes
- High blood pressure.

Symptoms

Most women with gestational diabetes have no recognizable symptoms.

It is recommended that all pregnant women be screened for gestational diabetes during the 24th and 28th weeks of their pregnancy. Recently during their first visit (I trimester).

- Increased thirst
- Weight loss in spite of increased appetite
- Fatigue
- Increased urination
- Nausea
- Vomiting
- Frequent infections including those of the bladder, vagina and skin
- Blurred vision.

Diagnosis

American Diabetes Association recommends 3 hours 100 gm OGTT and gestational. Diabetes mellitus is diagnosed if any 2 values meet or exceed FPG ≥ 95 mg/dl, 1 hour PG ≥ 180 mg/dl, 2 hours PG ≥ 155 mg/dl and 3 hours PG ≥ 140 mg/dl. With 75 gm OGTT (WHO criteria).

<i>Values</i>	<i>In pregnancy</i>	<i>Outside pregnancy</i>
2 hours ≥ 200 mg/dl	Diabetes	Diabetes
2 hours ≥ 140 mg/dl	GDM	IGT
2 hours ≥ 120 mg/dl	DGGT	—

- DGGT — Decreased gestational glucose tolerance
- IGT — Impaired glucose tolerance
- OGTT — Oral glucose tolerance test
- FPG — Fasting plasma glucose
- PG — Post-load glucose.

Complications

Untreated or uncontrolled blood sugar levels can cause problems both for mother and baby.

a. Macrosomia

Extra glucose can cross the placenta and end up in baby's blood. When that happens, baby's pancreas makes extra insulin to process the extra glucose and this cause the baby to grow too large. For a full term pregnancy, a birth weight of 4.500 grams or more.

Very large babies may have difficulty during delivery and are more likely to sustain birth injuries or to be born by caesarean delivery.

b. Shoulder dystocia

— Rare but serious complication of gestational diabetes

Very large baby



Shoulders may be too big to move through birth canal



Results in potentially life threatening obstetrical emergency
(Shoulder dystocia)

c. Hypoglycemia

Low blood sugar develops in baby shortly after birth. That's because they are accustomed to receiving large amounts of blood sugar from their mothers, and their own insulin production is high. These infants should have blood sugar levels checked regularly after delivery.

Treating this problem involves feeding right way, some times baby needs a glucose solution through an intravenous line to prevent low blood sugar.

d. Respiratory distress syndrome

Babies born prematurely to mothers with gestational diabetes are more likely to develop respiratory distress syndrome.

e. Jaundice

Newborn jaundice may begin during the second or third day of life, but sometimes is not evident until a week after birth.

Jaundice occurs because a baby's liver is not mature enough to break bilirubin, which normally forms when the body recycles old or damaged RBC.

f. Stillbirth or death

If gestational diabetes goes undetected, baby has an increased risk of stillbirth or death.

Complications to Mother

• Preeclampsia

— This condition is primarily characterized by a significant increase in blood pressure.

- Left untreated, it can lead to serious even deadly complications for the mother and the fetus. Gestational diabetes puts at higher risk of developing this condition.
- Operative delivery
- Gestational diabetes in another pregnancy
- Type II diabetes
 - Women who have gestational diabetes are more likely to develop type II diabetes as they get older.

Management

Patient Education

The importance of educating women with GDM (and their partners) about the condition and its management cannot be overemphasized.

The compliance with the treatment plan depends on the patient's understanding of:

- The implication of GDM for her baby and herself
- The dietary and exercise recommendations
- Self-monitoring of blood glucose
- Self-administration of insulin and adjustment of insulin doses
- Identification and treatment of hypoglycemia (patient and family members)
- Incorporate safe physical activity
- Development of techniques to reduce stress and cope with the denial.

Care should be taken to minimize the anxiety of the women.

Diet

Mild forms can be treated with diet.

The overall principles are to reduce the amount of fat, simple sugar and salt and increase the amount of complex carbohydrates and foods high in fiber.

Guidelines

- Do not diet or try to lose weight during pregnancy
- Eat three small meals and two or three snacks at regular times everyday. Do not skip meals or snacks
- Eat a variety of food to get all the nutrients you need
- Choose whole grain and enriched breads and cereals, dark green and orange vegetables, and orange fruit more often
- Avoid sugar and other sweet foods such as honey, jam, jellies, sweet baked products, candies, chocolate, regular soft drinks and fruit juice

- Have three to four cups of milk products daily
- Have meat, fish or alternatives daily
- Drink 6-8 cups of fluids such as water or milk daily
- Limit coffee and strong tea to 2 cups daily.

Exercises

- Regular physical activity is used to keep blood sugar levels lower, because contracting muscles help stimulate glucose transport.
- In the absence of other medical or obstetrical contraindications, exercise prescription can be an alternative or adjunct therapy for women who have gestational diabetes.
- Non-weight bearing exercises such as stationary cycling, swimming and arm exercises are more suitable.
- Walking
 - Walking about 30 minutes after eating has been beneficial in keeping post-prandial blood sugars.
 - 20-30 minutes walk, 2-3 times per day.

Frequency

4-5 days per week.

Warm up and cool down period

5-10 minutes.

Stop exercising if you experience:

- Pain
- Dizziness
- Shortness of breath
- Faintness
- Palpitations
- Back or pelvic pain
- Vaginal bleeding.

Do's

- Drink fluid prior to and after exercise.
- If necessary drink fluid during the activity to prevent dehydration (Keep accurate records of blood glucose, physical activity, and fetal movements).

Don'ts

- Avoid vigorous exercises in hot, humid weather or if you have a fever.
- Do not exercise, if the maternal heart rate exceeds 140 beats per minute (Monitor fasting and two hours post-meal blood glucose, don't exercise if less than 60 mg/dl or more than 250 mg/dl or if ketonuria is present).

Medication

When diet and exercise do not keep blood glucose levels within an acceptable range, they may need to take regular shots of insulin.

Prevention

There is no known way to actually prevent diabetes, particularly since gestational diabetes is due to effects of normal hormones of pregnancy. However, the effects of insulin resistance can be best handled through careful attention to diet, avoiding becoming overweight throughout life, and participating in reasonable exercise.

BODY WEIGHT STRETCHES

Upper Body

Shoulder Stretch

- Pull your right arm with left arm across the body towards the left shoulder
- Feel for a stretch in right shoulder (Fig. 6.1).
- Hold for ten to twenty seconds, repeat with both arms.



Fig. 6.1: Pulling of right arm towards left shoulder

Triceps Stretch

- Apply pressure on your bent left elbow with right hand above the head and feel a stretch in the triceps, shoulder, and the middle of your back (Fig. 6.2).
- Hold for ten to twenty seconds, repeat with both arms.

Seated Shoulder Stretch

- Placing arms behind in a sitting position, lean back to feel for a stretch in your anterior shoulder (Fig. 6.3).
- Hold for ten to twenty seconds.



Fig. 6.2: Left triceps stretch in standing position



Fig. 6.3: Anterior shoulder stretch in sitting position

Lower Body

Feet Together (Seated)

- In a long sitting position, reach your hands towards the toes. Feel for a stretch in low back, hamstrings and calf muscles (Fig. 6.4).
- Do not bounce. Hold for 10 to 30 seconds.

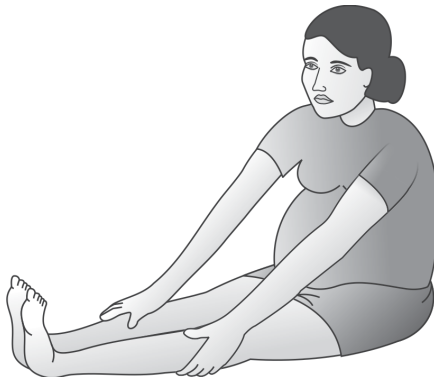


Fig. 6.4: Starting position for low back, hamstring and calf stretch

Butterfly Stretch

- Sit up tall, with hips abducted and knees bent and feet facing each other.
- Try to stretch your adductor muscles by pushing out the knees using your elbows (Fig. 6.5). Do not bounce. Hold for 10 to 30 seconds.



Fig. 6.5: Hip adductor stretch (Butterfly stretch)

Modified Hurdler

- Sit with one knee flexed and hip abducted.
- Reach with both hands towards the toes of the extended leg (Fig. 6.6).



Fig. 6.6: Modified stretch for lower body

- Do not bounce. Hold for 10 to 30 seconds, repeat with other leg.

Strength Training Exercises

Upper Body

Dumbbell Row

- Place one foot slightly behind your hips on the ground with your knee slightly bent; place the other knee on the bench below your hips. Keep your back flat and your head focused straight ahead.
- Grasp the dumbbell in one hand (Fig. 6.7), and slowly pull the weight to the chest while squeezing your shoulder blades together (Fig. 6.8).
- Pause the weight at the chest and slowly lower the weight to the starting position.
- Perform desired repetitions on one arm then perform the same number on the opposite arm.

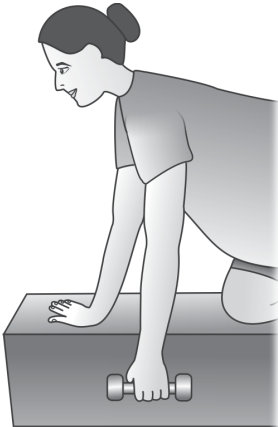


Fig. 6.7: Grasp dumbbells with elbow extension

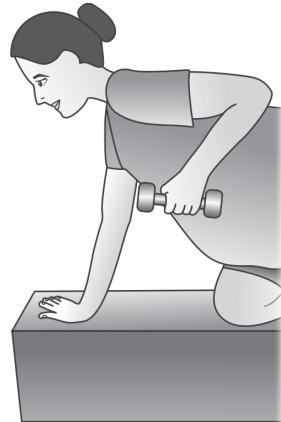


Fig. 6.8: Pulling the weight to the chest

Pull Down

- Grasp the bar with an underhand grip (palms facing your body). Make sure your hands are evenly spaced and approximately shoulder width apart.
- Begin the exercise with arms straight. Pull the bar to your chest, attempting to pull the elbows down and backward.
- Pause the bar at your chest before extending the arms back to the starting position.

Incline Dumbbell Press

- Sit on a bench (with the back pad at a 45 degree angle), with your feet flat on the floor.
- Hold a dumbbell in each hand. Start with the weight at chest level. With palms facing each other, slowly press the dumbbells straight up.

- Pause with arms fully extended and then slowly lower the weights to starting position.
- When performing this exercise have a spotter standing directly behind you.

Machine Press

- Depending on where you are working out will depend on what type of machine is available.
- Adjust the seat so the handles hit you in the middle of your chest. Press the machine lever arms straight out.
- Pause with arms straight, then slowly lower the weight back to the starting position.
- A machine is a good alternative when there is no one available to spot dumbbell exercises.

Side Raise

- Begin with arms hanging by the side of the body (Fig. 6.9).
- Raise the arms out to your sides until the hands are parallel with your shoulders (Fig. 6.10).
- Pause at the top and lower the weight.

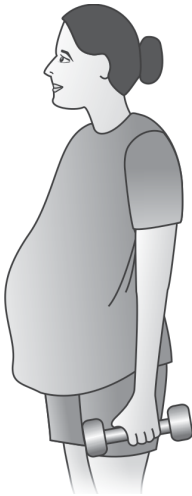


Fig. 6.9: Starting position for side raise

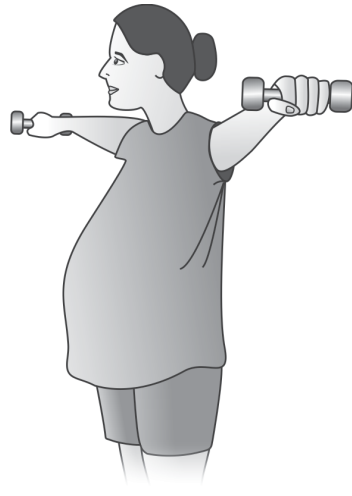


Fig. 6.10: Raising dumbbells on the sides

Front Raise

- Hold the dumbbells in front of your upper legs with arms fully extended (Fig. 6.11).
- Lift the dumbbells up until your arms are parallel to the ground (Fig. 6.12).
- Pause at the top and then lower the dumbbells under control.

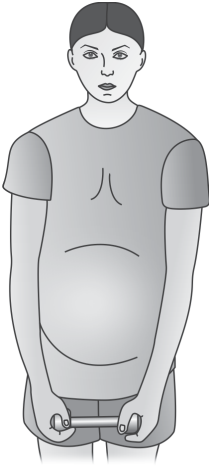


Fig. 6.11: Hold dumbbells in front

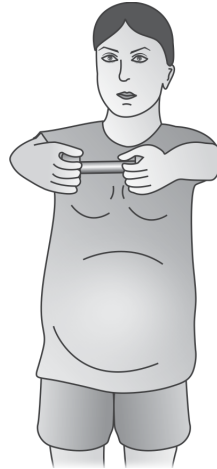


Fig. 6.12: Lifting dumbbells up by shoulder flexion

Bicep Curl

- Stand tall, hold the dumbbells with your arms fully extended (Fig. 6.13) and slowly curl your arms at the elbows bringing the weights up to your chin (Fig. 6.14).
- Lower the weights under control to the starting position.

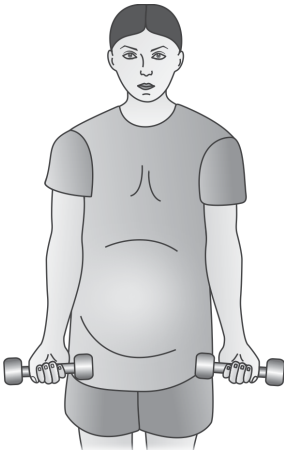


Fig. 6.13: Holding dumbbells with arms extended

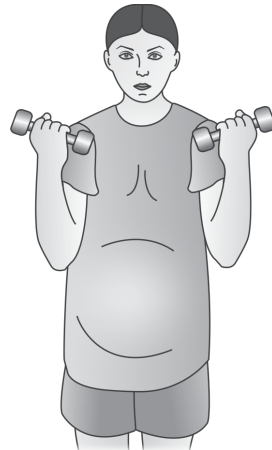


Fig. 6.14: Lift dumbbells by flexing the elbows

Tricep Pressdown

- Stand facing the machine with hands on the bar, shoulder width apart, spaced evenly.
- Pull the bar down to the front of your body. Pause then return the bar slowly to the starting position.
- Keep the elbows fixed at your sides the entire time.



Fig. 6.15: Holding dumbbells with elevated arms and bent elbows



Fig. 6.16: Straighten elbows by lifting up the dumbbells

Triceps Extension

- Sit on the edge of bench
- Hold the dumbbell in right hand (Fig. 6.15) and try to lift the dumbbell above head by stabilizing the right elbow with left hand (Fig. 6.16). Pause and slowly lower.

Incontinence is defined as the involuntary loss of urine in inappropriate times and places.

Innervation of Bladder

Sympathetic neurons (T9-L1) innervate (via the sympathetic chain and hypogastric plexus) the bladder neck (Fig. 7.1).

Parasympathetic neurons from the sacral cord (S2-4) innervate (via the pelvic nerves and vesicle plexus) the detrusor muscle of the bladder and the vascular supply of the pelvic genital organs.

Somatic neurons from the sacral cord (S2-4) innervate (via the pudendal nerve) the external urethral sphincter as well the external anal sphincter.

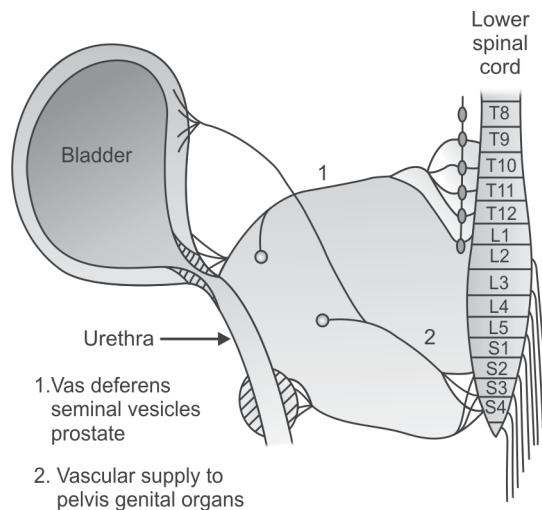


Fig. 7.1: Innervation of bladder

Pelvic Floor Muscles

- Superficial pelvic floor muscles
- Deep pelvic floor muscles.

External Anal Sphincter

This is a true sphincter muscle and described in three parts:

- Subcutaneous segment has circular fibers which insert into the skin and cause skin puckering as they contract
- Superficial section has fibers which encircle the anus and attach posteriorly to the tip of the coccyx and anteriorly to the perineal body
- Deep part is a true sphincter and the fibers of puborectalis are incorporated into it.

Action

- It assists in maintaining anal closure at rest, being responsible for up to 30% of this pressure.
- It maintains a low level of activity in sleep
- It contracts strongly when there are increases in intra-abdominal pressure and with voluntary effort.

Superficial Perineal Muscles

- **Ischiocavernosus** arises from the ischial tuberosity and inserts into the side and undersurface of crus of the clitoris
- **Bulbospongiosus** arises from the perineal body and, encircling the vagina and urethra, inserts across the body of clitoris
- **Transverses perinei superficialis** arises from the ischial tuberosity and inserts into the perineal body, which is a fibromuscular structure set in the mid point of perineum, between the anus and vagina. Fibers of the levator ani also attach to it.

Action

- Ischiocavernosus and bulbospongiosus act upon the clitoris and are probably involved in the female sexual response.
- Bulbospongiosus closes the vaginal orifice.
- Transverses perinei superficialis acts as the hub of the superficial muscle complex and its stability contributes to the efficient functioning of those muscles as well as providing support for the anal canal.

Striated Urogenital Sphincter Muscle

Consists of Three Parts

The sphincter urethrae surround the urethra in its mid region. The circularly directed fibers tend to be deficient posteriorly in the adult and the muscle inserts into the fibrous tissue.

The compressor urethra is continuous above with the urethral sphincter. It arises from the ischio pubic rami, travels forward and medially to arch across the anterior surface of the urethra.

The *sphincter urethrovaginalis* blends with the compressor urethrae above and arises from the anterior side of the urethra. It passes posteriorly across the urethra and vagina to insert posterior to the vagina into the posterior muscle and perineal body.

Action

The three muscles act to compress, retract and elongate the urethra. The lower two are probably responsible for voluntary interruption of micturition.

Deep Pelvic Floor Muscle Group

Levator Ani

Puborectalis—arises from the posterior surface of the pubic bone in conjunction with the pubococcygeus and passing backwards along side the urethra, vagina and the rectum, it inserts into the muscle from the other side. It forms a U-shaped sling around the anorectal region, where it is incorporated into the deep anal sphincter. It is inferior to the levator plate. It pulls the anorectal junction anteriorly, thus assisting in anal closure. Puborectalis and the external anal sphincter are considered to act as one unit.

Pubococcygeus—arises from the posterior surface of the pubic bone and the fascia over the obturator internus and passes backwards with the puborectalis, contributing varying slips to the vagina, perineal body and the rectum. It joins with the muscle of the other side posterior to the anus to form the anococcygeal ligament and through this inserts into the anterior surface of the coccyx. It tends to pull the coccyx forward, elevates all the pelvic organs and compresses the rectum and vagina.

Iliococcygeus arises from the fascia over the obturator internus and the ischial spine and passes posteriomediaally to join the muscle of the other side, posterior to the anus and inferior to the pubococcygeus. It inserts into the fibrous anococcygeal raphe and the lateral margins of the lower surface of the coccyx. It tends to pull the coccyx side to side and elevates the rectum which lies on the levator plate. The levator plate is the term applied to the combined layers of pubococcygei and iliococcygei that unite posterior to the anorectal junction and insert into the coccyx.

Ischiococcygeus can be considered as part of the levator ani or as a separate muscle. It arises from the ischial spine and the sacrospinous ligament and inserts into the lateral margins of the upper coccyx and lower sacrum. It exhibits marked individual variation. It provides support for pelvic contents and contributes to sacroiliac joint stability.

Everything that contracts at the anterior part of the vagina and is felt as a squeeze at the base of the palpating finger is the anterior or superficial pelvic floor. The muscles which contract, elevating the posterior vaginal wall in a cranio-ventral direction, are the deep or posterior muscles, and these are palpated under the pad of the examining finger.

The numbers of the clock were used in the ring of continence to describe the anatomy of the pelvic floor (Laycock 2002). On the ring, the pubococcygeus lies 4 and 8 o'clock

and will be represented as vertical clock. The horizontal clock is the clock of the posterior pelvic floor. The vertical clock faces in the examiners position and the horizontal clock is on an incline away from the vertical. Both the clock have a common base at 6 o' clock. On the vertical clock the pubis symphysis is at 12 o' clock, and on the horizontal clock, the coccyx is at 12 o' clock.

On the horizontal clock, the pubococcygeus is located at 10 and 2 o'clock under the base of the palpating finger, and the iliococcygeus is at 10 and 2 o'clock under the pad of the palpating finger.

The levator ani muscles lift the pelvic floor in a cranioventral direction; iliococcygeus lift the upper vagina to a horizontal position. In maximal valsalva, the uterus moves posteriorly towards the sacrum and inferiorly on to the levator plate, which will contract in reflex response.

Types of Incontinence

Urge Incontinence

(Over active bladder, spastic bladder, reflex incontinence)

- Refers to strong urge to pass urine
- It occurs when the urgency is so great that leakage of urine occurs before the person can reach the toilet
- Urine can leak the instant you feel the urge to pass it. Even the sound of the running water can provide the stimulus, putting the key in the front door exacerbate the problem
- Frequent urination
- Most common in older people and women after menopause.

Causes

- Poor bladder habits
- Hormonal changes
- Medicines such as diuretics
- Diseases affecting nervous system (multiple sclerosis, dementia, stroke, Parkinson's disease, Alzheimer's disease)
- Urinary tract infection
- Irritation from bladder stones
- Interstitial cystitis
- Injury occurs during surgery
- Tumor in the uterus or bladder
- Childbirth
- Menopause

- Cesarean section
- Other urological problems

Marked by need to urinate more than seven times daily or more than twice nightly.

Overflow Incontinence

When the quantity of urine exceeds the capacity of the bladder, leakage of urine occurs.

Symptoms

- Feel as bladder is never fully empty
- Spend long periods of time in the bathroom because of unpleasant feeling
- Some people do not feel bladder fullness but dribble and pass urine with little control
- Retention of urine (not able to empty properly) resulting in dribbling, poor stream, hesitancy, nocturia and post-micturition dribble.

Causes

- Physical obstruction (blocking or narrowing of urethra due to urinary stones, tumor, birth defect)
- Faecal impaction when there is full bowel pressing on bladder and stopping it from emptying properly
- Neurological problems that leave the bladder partly full all the time
- Weakened bladder muscles as a result of nerve damage from diabetes or other diseases.

Mixed Incontinence

- Some people will experience more than one type, so called mixed incontinence
- For example stress incontinence may become functional type as their Alzheimer's disease progress
- Stress plus urge incontinence is more common.

Transient Incontinence (Temporary)

Triggered by,

- Medication—diuretics, sleeping pills or muscle relaxants, narcotics such as morphine, antidepressants, anti-histamines, antipsychotic drugs or calcium channel blockers.
- Urinary tract infection
- Vaginal infection
- Mental impairment
- Restricted mobility
- Stool impaction (severe constipation)—push against the urinary tract and obstruct outflow.

Stress Incontinence

Most common type of incontinence in women and occurs when the sphincter muscle gives way, when the bladder is put under pressure, urine leakage occurs.

The leakage of urine occurs on exertion or effort such as when coughing, laughing, sneezing, and exercising. In severe cases, urine might leak out when walking or getting up from the sitting position.

Causes

- Pelvic floor weakness
- Traumatic child birth injuries
- Low levels of estrogen (resulting in thinning and weakening of the pelvic floor muscles)
- Pelvic nerve damage resulting from surgery, e.g. hysterectomy
- Weight gain
- Pregnancy
- Strenuous exercises
- Chronic heavy lifting or straining
- Change in the position of the bladder
- Damage to nerves controlling the bladder resulting from diseases such as diabetes, stroke, parkinsonism, and muscular sclerosis
- Radiation or chemotherapy.

Functional Incontinence

Functional incontinence refers to passing urine in inappropriate places and incontinence due to inability to get to the toilet. It may be caused by inability to recognize the toilet (due to cognitive impairment such as dementia), an inability to recognize when bladder or bowels need to be emptied, poor mobility skills affecting the ability to get to an appropriate toileting place or poor dexterity affecting the ability to remove clothing in order to toilet effectively.

Reflex Bladder

Reflex bladder occurs due to spinal or neurological trauma or disease when there is little or no sensation or voluntary control of the bladder.

Atonic Bladder

Atonic bladder refers to an inability to empty the bladder effectively. Spinal cord injury, diabetic neuropathy or an over stretch injury of the bladder may cause it.

Anatomic or Developmental Abnormalities

An abnormal opening in the bladder can cause incontinence.

Diagnosis

- Ultrasound
- Cystoscopy—to check healthy bladder
- Bladder diary
 - Amount of drinks
 - Time of urination
 - Amount of urine
 - Urge to urinate
 - Number of episodes
- Urinalysis
Check signs of infection, traces of blood or other abnormalities
- Blood test
Check various chemicals and substances related to cause incontinence
- Urodynamic studies
A catheter is inserted into urethra and bladder. The catheter is used to fill bladder with water. As bladder fills, pressure within the bladder is recorded. Normally pressure increases by only very small amounts during filling. In incontinence, the bladder goes into spasms as it fills. This test is also used to measure the strength of bladder muscle.
- Stress test
Examination of loss of urine during coughing
- Post void residual measurement (PVR)
 - Urinate into a funnel like container to measure urine output
 - Check, the amount of residual urine in bladder using a catheter to drain the remaining urine
 - A large amount of residual urine shows urine tract obstruction or problem with bladder nerves or muscles
- Cystogram.

INCONTINENCE PHYSIOTHERAPY ASSESSMENT

Demographic data	:	
Occupation	:	
Height	:	
Weight	:	Target weight :
Chief complaints	:	
History	:	
Onset of incontinence	:	
Circumstances of loss	:	Cough, sneeze, laugh, walk, lift, jump, orgasm Others -----
Frequency of accidents	:	
Amount loss	:	Few drops/small amount/spurt/complete

Type of loss : Continuous/intermittent/on stress/urge/physical activity

Frequency of voiding : Day :
Night :

Fluid intake :

Type of drinks :

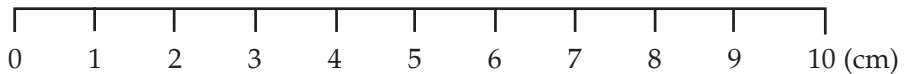
Midstream “Stop Test” : Stop/Slow/No change

Faecal incontinence :

Clinical Grading (Textbook of Obstetrics and Gynaecology—DC Dutta)

- I. There is incontinence during coughing and sneezing
- II. Mild exercises like walking leads to leakage of urine
- III. Even in recumbent position there is incontinence and sometimes trigger by change of position

Visual Analog Scale (Physiotherapy in Obstetrics and Gynecology)



Obstetrical History

Gynecological History

Menstruation

Length of cycle :

No of days :

Menopause :

Dyspareunia :

Orgasm :

Contraception :

Previous surgery :

Medical history :

Other surgeries :

Obesity :

Chest condition :

Cough :

Allergies, sneeze :

Drugs taken :

Bowels : Loose, normal, constipated

Diabetes :

Blood pressure :

Depression :

Other (specify) :

On Observation :

- Perineum :
- Effect of cough :
- Edema :

On Examination :

- Abdominal examination :
- Diastasis recti :
- Perineal sensation :

Strength of the Pelvic Floor Muscles

None	0	No duration (number of seconds) of muscle contraction, pressure or strength, displacement.
Trace	1/5	Slight but instant contraction; < 1 second.
Weak	2/5	Weak contraction; with or without posterior elevation of fingers, held for > 1 second but < 3 seconds.
Moderate	3/5	Moderate contraction with or without posterior elevation of fingers, held for at least 4-6 seconds repeated 3 times.
Good	4/5	Strong contraction with posterior elevation of fingers, held for at least 7-9 seconds, repeated 4-5 times.
Strong	5/5	Unmistakably strong contraction with posterior elevation of fingers, held for at least 10 seconds, repeated 4-5 times.

Usage of Accessory Muscle Groups

Abdominal	Yes	No
Gluteal	Yes	No
Thigh/Adductor	Yes	No

(Clinical scale for grading digital evaluation of muscle strength. Adapted with permission from Newman DK. Managing and Treating Urinary Incontinence. Baltimore: Health Professions Press; 2002)

Uterine prolapse grade (Shaw Textbook of Gynaecology)

- 1 - Descent of the cervix into the vagina
- 2 - Descent of the cervix up to the introitus
- 3 - Descent of the cervix outside the introitus
- Procidentia - All of the uterus outside the introitus

Diagnosis:

Aims:

Means:

Incontinence Quality of Life Scale (Adapted with permission from Donald L Patrick et al)

1. I worry about not being able to get to the toilet on time.
2. I worry about coughing or sneezing because of my urinary problems or incontinence.
3. I have to be careful standing up after I've been sitting down because of my urinary problems or incontinence.
4. I worry about where toilets are in new places.
5. I feel depressed because of my urinary problems or incontinence.
6. Because of my urinary problems or incontinence, I don't feel free to leave my home for long periods of time.
7. I feel frustrated because my urinary problems or incontinence prevents me from doing what I want.
8. I worry about others smelling urine on me.
9. Incontinence is always on my mind.
10. It's important for me to make frequent trips to the toilet.
11. Because of my urinary problems or incontinence, it's important to plan every detail in advance.
12. I worry about my urinary problems or incontinence getting worse as I grow older.
13. I have a hard time getting a good night of sleep because of my urinary problems or incontinence.
14. I worry about being embarrassed or humiliated because of my urinary problems or incontinence.
15. My urinary problems or incontinence make me feel like I'm not a healthy person.
16. My urinary problems or incontinence makes me feel helpless.
17. I get less enjoyment out of life because of my urinary problems or incontinence.
18. I worry about wetting myself.
19. I feel like I have no control over my bladder.
20. I have to watch what or how much I drink because of my urinary problems or incontinence.
21. My urinary problems or incontinence limit my choice of clothing.
22. I worry about having sex because of my urinary problems/incontinence.

Mark 1-5 for the above mentioned questions.

(1. Extremely 2. Quite a bit 3. Moderately 4. A little 5. Not at all)

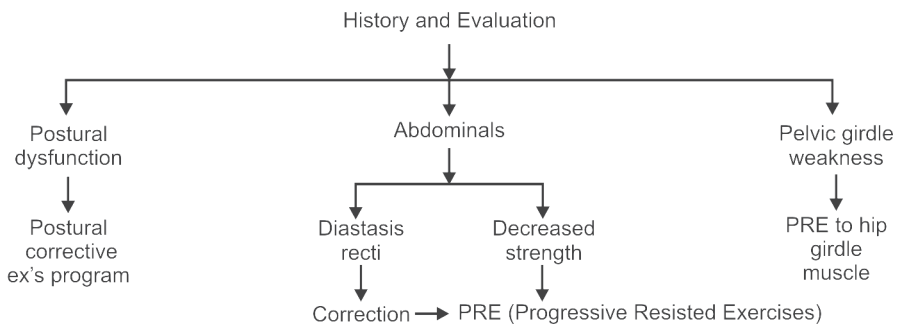
Transformed Score =

$$\frac{\text{The sum of the items – lowest possible score}}{\text{Possible raw score range (Highest possible item score – lowest possible item score)}} \times 100$$

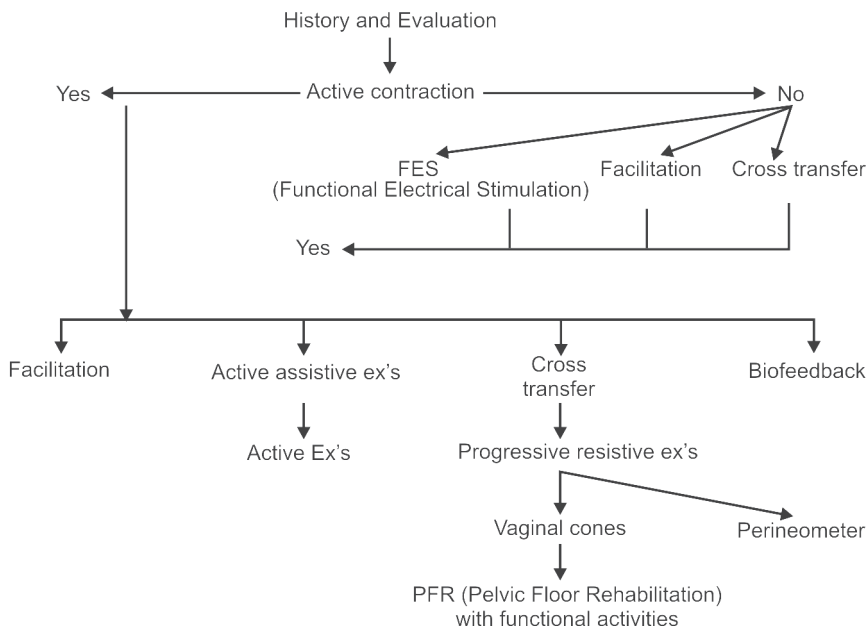
Total Score:

Management (Flow chart 7.1, 7.2)

Flow chart 7.1: Management of musculoskeletal dysfunction



Flow chart 7.2: Pelvic floor management



Pelvic Floor Exercises

Tighten your pelvic floor muscles as if you are trying to stop the urine flow. Hold for specified seconds and relax (Fig. 7.2).

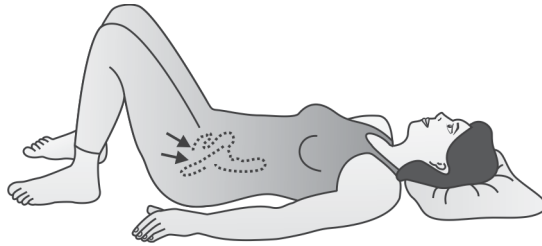


Fig. 7.2: Pelvic floor contraction in crook lying

PROCEDURE - I

Week 1

Tighten the pelvic floor muscles for 6 seconds and relax for 6 seconds. Perform 5 contractions for 1 minute. Continue for 5 minutes to produce 25 contractions. Repeat thrice daily. Perform 75 contractions per day.

Week 2

Exercise for 10 minutes. Repeat thrice daily. 150 contractions per day.

Week 3

Exercise for 15 minutes. Repeat thrice daily. 225 contractions per day.

Week 4

Exercise for 20 minutes. Repeat thrice daily. 300 contractions per day.

After 4 Weeks

Continue exercises for 10 minutes 3 times a day or for 15 minutes twice a day.

PROCEDURE - II

Quick Kegel's

Tighten and relax your pelvic floor muscles as fast as possible for 2 to 3 minutes. Perform the exercise for around 100 to 150 times per session.

EXERCISES

Do this in various positions like:

- Sitting
- Standing

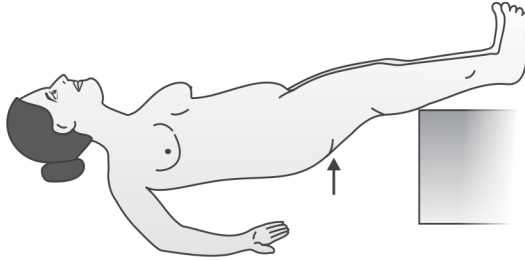


Fig. 7.3: Pelvic floor contraction in leg elevated position

- Lie on your back; legs straight and crossed kept at $\frac{1}{2}$ feet height (Fig. 7.3).
- Squatting (Fig. 7.4).



Fig. 7.4: Pelvic floor contraction in squatting

POINTS TO REMEMBER

- Empty your bladder before doing this exercise.
- Never do this exercise when you are tired.
- Tighten your pelvic floor muscles before coughing, sneezing or lifting. This can prevent pelvic muscle weakening.
- Do not hold your breath while performing the exercise.
- Exercise the pelvic floor muscles correctly. Do not contract your abdominals, buttock or leg muscles.

URGE INCONTINENCE

It is the involuntary leakage of large amounts of urine associated with a sudden and urgent need to void.

EXERCISES

In addition to Procedure-I and II perform the following:

BLADDER RETRAINING

Goals

- To control the frequency and urgency of urination.
- To train the bladder for accepting larger volumes of urine.
- To learn to suppress and ignore the desire to void urine.

TIMED VOIDING

- Begin your bladder retraining program with a fixed time interval, e.g. hourly once.
- Follow the time schedule properly, even if you do not feel the urge to urinate voiding is a must.
- When you can manage a regimen like this for a week increase the time interval by 30 minutes.
- Do not get up every hour during night, void only when you awaken from sleep.
- Keep increasing the time interval on a weekly basis until you are voiding approximately 7 times per day (At intervals of approximately 3 hours).

MANAGING TO DELAY VOIDING

- Sit on a hard seat or across a tightly rolled towel. This puts pressure on the pelvic floor muscles.
- Do five quick squeezes of your pelvic floor muscles.

OVERFLOW INCONTINENCE

It is involuntary loss of urine associated with overfilled bladder without any urge to void. In addition to above exercises follow this "double void technique".

After emptying the bladder as best as possible, stand up, move around, then immediately sit down and try to void a second time to empty the bladder even more. Repeat this technique for 5-6 occasions.

Biofeedback

This is usually used as an adjunct to pelvic floor exercises for symptoms of stress and urge incontinence.

Biofeedback can Take Different Forms

- The physiotherapist hand
 - Squeeze muscles round a finger
- A tampon or Foley catheter
 - Resist its removal
- The Q tip test
 - Cotton wool buds (Q tip) is inserted into urethra and do a set of pelvic floor exercises.
 - If the bud moves upward, indicates improper muscle contraction
- Pelvic floor educator
 - Similar to cotton bud test, but the device is inserted into the vagina
- Manometry
 - Small balloons are put in your vagina and filled with air or water. When the pelvic floor muscles are contracted, the pressure on the balloon measures the strength of the muscles.

Electromyography

- Electrical sensors are placed on the skin inside the vagina or urethra to measure the electrical activity of muscles at rest and when they contract. The reading is shown either on a graph or screen.

Uses

- Used to teach correct pelvic floor exercises methods
- For urge incontinence, it is used to learn to relax bladder long enough to let you reach the toilet
- Helps to gain awareness and control of urinary tract muscles. This means weak muscles can be better activated on demand, muscles that are too tense can be relaxed and overall muscle activity can be co-ordinated.

Electrode Placement

- Electrodes on abdomen and along the anal area
- Sensor in the vagina.

Treatment usually involves eight weekly sessions of one hour.

Contraindications

- Pregnancy
- Infected or inflamed vulva or vagina
- Had pelvic surgery in the last three months
- Psychosexual problems.

Vaginal Cones

- These are small weights used to do pelvic floor exercises.
- Place the cone in vagina and use the pelvic floor muscles to hold it there.
- By using it for 5-10 minutes at a time while walking around at home gives pelvic floor muscles some good relaxation.
- Start by using lightest weight for a short period once or twice a day, gradually increasing the weight, frequency and length of time you use them.

Electrical Stimulation

Electrical stimulation is used in the treatment of both stress and urge incontinence to retrain and strengthen weak urinary muscles and improves bladder control.

Electrode Placement

- Vaginal probe in close contact with pelvic floor muscles
- Surface electrodes placed on the perineum (the area between front and back passages).

Sensation—tingling rather like pins and needles.

Electrical stimulation of the pudendal nerve causes pelvic floor and urethral sphincter muscles to contract. The patient is instructed to squeeze the muscles when the current is on. After the contraction, the current is switched off for 5-10 seconds. Treatment sessions last approximately 20-30 minutes.

Mechanism

When there is intact neural pathway, electrical stimulation can neurally inhibit inappropriate detrusor contractions. This is the basis for utilizing electrical stimulation to treat urge incontinence. Electrical stimulation at a frequency of 20 Hz with a 2 sec/4 sec work rest cycle and a pulse width of 0.1 sec is used for detrusor instability (urge incontinence/urgency—Brubaker et al).

Electrical stimulation of neurally intact muscle promotes hypertrophy of the pelvic floor musculature (stress incontinence). Increased pelvic floor muscle strength is associated with decreased leakage and an increased ability to inhibit inappropriate detrusor contractions.

There are several aspects of musculoskeletal dysfunction that can affect the treatment of urinary incontinence. They are postural dysfunction, abdominal dysfunction and generalized weakness specifically pelvic girdle weakness.

Urgency, Frequency and Pain

Hypertonic pelvic floor muscles can develop through protective guarding with pain or with constant recruitment to inhibit urge. This leaves the pelvic floor in a new shortened position. In this shortened state, the pelvic floor is no longer at its optimal length-tension relationship to adequately function to inhibit urge with resulting urge incontinence, urgency frequency syndrome.

Women who present with urgency/frequency, chronic pelvic pain syndrome may have a different pelvic floor muscle dysfunction. They tend to have tense pelvic floor muscles.

They feel like they have frequent urinary tract infections and if a urine culture were obtained, it would be negative.

Muscular trigger points are commonly found in quadratus lumborum, iliopsoas, abdominals, levator ani, obturator internus and hip adductors. These patients are typically unaware; they chronically contract their pelvic floor, gluteals, hip adductors and or abdominals.

Holding pattern may have begun with muscle guarding due to postsurgical pain, infection or trauma. Women experience stress, unconsciously tense the pelvic floor and surrounding muscle groups. The tense muscles develop trigger points and tend not to contract or relax appropriately. This compromises blood flow and irritates nerves in the area.

The shortened pelvic floor can also be a factor in stress incontinence if it cannot reflexively contract and compress the urethra when there is increased intra-abdominal pressure.

Treatment

- Myofascial release internally (vaginally or rectally)
- Posture training
- Hip stretches
- Pelvic floor stretching
- Visceral mobilization
- PNF
- Electrical stimulation
- Ultrasound
- Diaphragmatic breathing is just one of relaxation techniques used to calm the sympathetic system and increase patient's awareness of tension in their body.
- Surface EMG with biofeedback can be used to teach the patient to improve their muscle function.

Note

- The initial focus is on relaxation and attaining proper muscle function and proper body alignment
- Strengthening will come later
- Instruction on calming urinary urgency, changing diet, avoidance of straining while urinating and normal bladder function is appropriate for this group.
- Treatment is generally once a week for 12 visits.

Neurophysiological Facilitation Techniques

- Quick stretch
- Tapping
- PNF

Resistance to the PNF diagonal of extension, adduction and external rotation neurophysiologically facilitates a pelvic floor contraction.



Fig. 7.5: Hip flexion, abduction, external rotation with knee flexion



Fig. 7.6: Hip extension, adduction, internal rotation with knee extension

Lie with right leg hip and knee fully bent and angled outward, band under foot, end in each hand (Fig. 7.5). Move leg so hip and knee straighten and angle inward (Fig. 7.6).

Core stabilization—on hands and knees with towel roll between knees, slowly inhale, and then exhale. Pull navel towards spine, squeeze roll with knees, and tighten pelvic floor (Fig. 7.7).

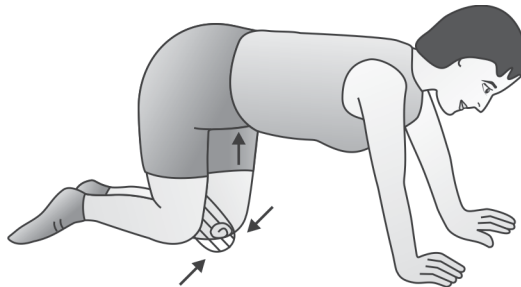


Fig. 7.7: Core stabilization in quadruped position

Cross Transfer

Cross transfer of technique is another technique used to enhance the strengthening of weakened pelvic floor.

Hellebrandt described cross transfer of training more than 50 years ago. Hellebrandt demonstrated that strengthening exercises to a limb will increase the strength in the unexercised contralateral limb. Kannus et al not only found a transfer of muscle strength, but also discovered a transfer of power and endurance.

Progressive resistive, low repetition strengthening program for the hip girdle musculature, facilitate the strengthening of pelvic floor. Initiating the strengthening process in this manner allows minimal isolated active contraction to develop without excessive inappropriate recruitment.

Once a minimal isolated contraction is present, Biofeedback can be utilized to continue the strengthening process. When the pelvic floor strength is at a fair grade, treatment would continue with progressive strengthening exercises.

Neocontrol

This therapy is beneficial for stress, urge or mixed urinary incontinence caused by weak pelvic floor muscles. The treatment is delivered through pulsating magnetic fields in the seat of a chair designed by Neotonus. The patient sits in the chair for 20-30 minutes, twice a week. The magnetic pulses are aimed at the pelvic floor muscles through the seat of the chair and the muscles contract and relax with each magnetic pulses.

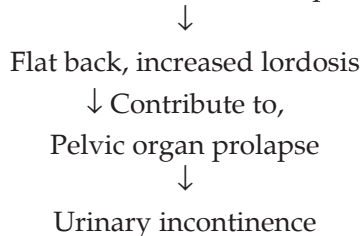
It takes about 8 weeks of therapy to achieve some degree of continence.

Hormone Replacement Therapy

Hormone replacement therapy may benefit patients with stress or mixed incontinence. HRT can restore the health of urethral tissues in postmenopausal women. HRT involves estrogen to heighten bladder outlet resistance by increasing blood flow, muscle tone and nerve response to the urethra.

Postural Dysfunction

Postural dysfunction has been considered a factor in pelvic floor dysfunction



Other Musculoskeletal Dysfunctions

- Diastasis recti
- Contracture of pelvic floor

Weakened abdominal muscle with or without diastasis recti



Pelvic organ prolapse
(Pelvic organ support)

Referred as retentive power of abdominal wall

Optimal skeletal muscle function is dependent on length tension relationship



The force of muscle contraction decreases if the muscle is too long or too short.

Pelvic Floor Myalgia (Chronic Pelvic Pain)

The distressing pelvic pain experienced by many women could be a condition known as pelvic floor tension myalgia or spasm of pelvic floor muscles.

Symptoms

- Pelvic pain
- Urinary frequency or urgency
- Pain during intercourse
- Pain during pressure or heaviness
- Pain in low back, groin, muscle tightness in the rectum.

Pelvic floor tension myalgia is the most common type of pelvic floor dysfunction that can be easily diagnosed during a pelvic examination and is very treatable.

The goal of the physical therapy is to break the spasm cycle and maintain more relaxed muscles.

The root cause of chronic pelvic pain is tension in the pelvic floor muscles. This tension can cause a variety of different types of pelvic pain:

- Levator ani syndrome
- Interstitial cystitis
- Vulvar vestibulitis
- Dyspareunia.

Repetitive muscular stress to the pelvis in athletes or in activities involving frequent increases of intra-abdominal pressure may result in tension myalgia of pelvic floor muscles.

This condition also occurs by reflex contraction of these muscles secondary to pain arising anywhere in lumbosacral spine, sacroiliac joint, coccyx or hips.

Management

Pelvic floor relaxation

Hold on to closed and sturdy door handle. Slowly sink into deep squat. Relax in this position (Fig. 7.8).

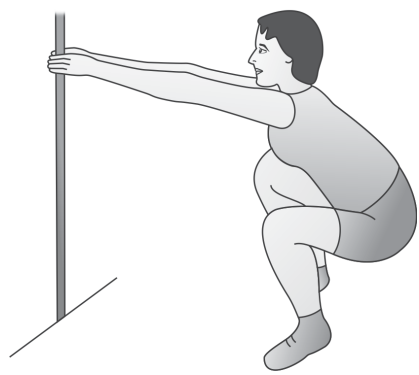


Fig. 7.8: Relaxation of pelvic floor muscles

Massage

- Assessment of pelvic muscle tone. The internal finger is inserted following the axis of the rectum. It then is gradually pushed upward (posteriorly), stretching the pelvic floor, until contact is made with the coccyx, whereupon the pull is released. If the finger is returned immediately to its initial position in the rectum by the patient's muscle tone without any conscious effort by the patient, the muscle tone is considered abnormally high (Fig. 7.9).

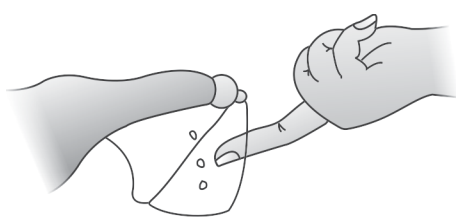


Fig. 7.9: Palpation of pelvic floor muscles

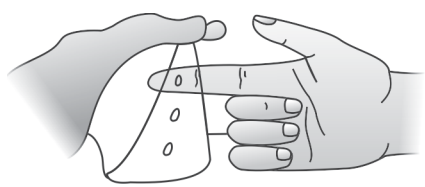


Fig. 7.10: Thiele's technique

Thiele's technique of massage in the direction of the fibers (Fig. 7.10).

Athletic Incontinence

Various sports produce differing effects on the pelvic floor, some of which can generate short-term symptoms. Whether these cause lasting damage is unclear.

Factors influencing the continence mechanism (Fig. 7.11) with reference to the athletic women are:

- Joint hypermobility and the properties of connective tissue matrix
- Hormonal influences, including the role as catecholamine, secreted during competition and estrogen (Flow chart 7.3)
- Pelvic floor and forces generated during a variety of sports.

Athletes and gymnasts are often selectively trained for their inherent flexibility. This predisposes them to continence problems.

The structure and composition of connective tissue are particularly important for an effective continence mechanism and contribute to the continence threshold.

Connective tissue in the pelvic floor has several functions

- It supports the pelvic organs
- Helps dissipate forces through pelvic floor
- Transmits muscular forces on to the urethra.

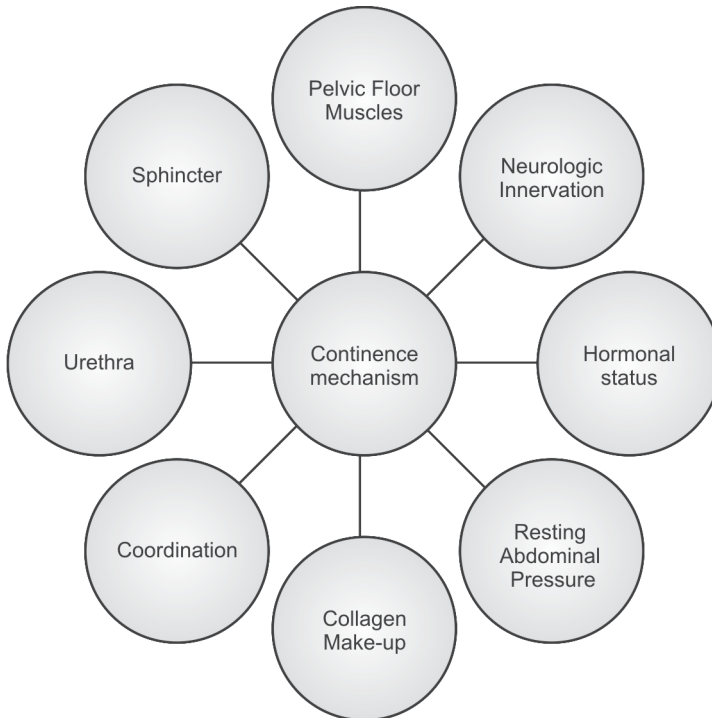
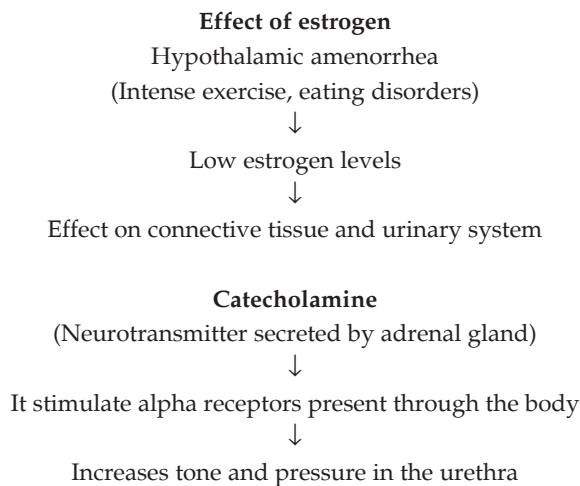


Fig. 7.11: Factors influencing the continence mechanism
(Nygaard et al 1994; De Lancy 1994; De Lancy and Ashton-Miller 2004)

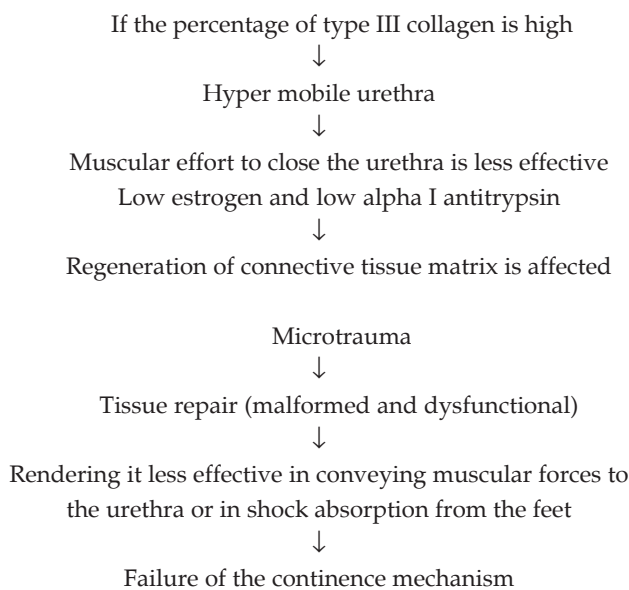
Collagen is one of the most important fibrous proteins which make up the body and it provides both tensile strength and elasticity. Type I and III make up most of the collagen with in the body, with type I predominating. Type III collagen fibers are less rigid, much more flexible and more plentiful in people who are hyper mobile (Flow chart 7.4).

Hormonal Influences

Flow chart 7.3: Factors influencing continent mechanism – hormonal status



Flow chart 7.4: Factors influencing continent mechanism – collagen make-up



Example,

Forces

Physical exertion seems to be a significant provocative factor for incontinence.

The pelvic floor muscles must be able to contract very forcefully and accurately to withstand the constant, repetitive downward force of the abdominal viscera on the pelvic floor caused by repetitive jumping and running.

Management

- Pelvic floor exercises
- Electrical stimulation
- Biofeedback
- Core stability exercises.

The capsule made up of the pelvic floor, multifidus, transverse abdominis and diaphragm muscles, together with lumbar vertebrae. These components contribute to the maintenance of the trunk position in the upright position and act synergically.

Sporting activity may encourage inco-ordination and an over developed rectus abdominis lead to increased puborectalis and external anal sphincter tone leads to dysfunctional pelvic floor.

Manual Therapy

- Release of the sphincter of the urethra.
- Stretch of the pubovaginalis muscle.
- Release of the obturator internus muscle.

Techniques

- Skin rolling of the lower abdomen.
- Pinching of obturator internus and dry point needling.

Over Active Pelvic Floor (OAPF) or Prolapse

- Anterior pelvic floor stretch.
- Posterior pelvic floor release and facilitation.
- Abdominal/diaphragmatic/pelvic floor release and facilitation ("the sniffing exercise").
- Contraction to relaxation.

Intercostals neuralgia is the pain affecting the nerves which emerge from the spinal cord and run along the spaces between the ribs to the front of the body.

The intercostals nerves are the anterior primary rami of the upper 11 thoracic spinal nerves.

First nerve is slender as the major part of it joins the brachial plexus and it does not give a lateral cutaneous branch.

Second nerve gives rise to a lateral cutaneous branch called the intercostobrachial nerve as it forms a plexus with the medial cutaneous nerve of the arm and supplies the upper and medial aspect of the arm.

3rd to 6th nerves only have a typical course in their own intercostals spaces.

The lower five nerves (7-11) run partly in the thoracic wall and partly in the anterior abdominal wall.

Definition

Pain between the ribs on the side or in front of the chest.

Causes

- Hormonal changes during pregnancy leads to relaxation of ligaments and joint capsule (include the joints of the rib).
 - Increased weight gain increases the pressure on the rib cage.
 - Anemia
- Women > men.

Symptoms

- Left side > right side
- Pain in one or several intercostals spaces
- Left side pain
- Left side back pain
- Episodic pain

- Points douloureux (Painful)
- Frequent pain in the painful points in the course of the nerve
- Painful points located under the angle of scapula, beside the vertebra and at the middle of the ribs
- Dull aching type of pain
- Character of pain is stabbing at intervals, or sharp pricking, or electric shock sensation
- Aggravating factors are coughing, deep breathing
- In severe cases—pain radiates to the lumbodorsal region of the affected side with hyperesthesia of the skin of the corresponding area and tenderness on pressure at the borders of the ribs
- Tingling
- Numbness
- Paralysis
- Loss of appetite
- Muscle atrophy
- Shallow respiration

Differential Diagnosis

Pleurisy or some inflammatory affection of lungs.

Management

Pattern of pain seen in a patient with intercostal neuralgia. Characteristically, the pain wraps around the trunk in a band-like distribution (Figs 8.1 and 8.2).

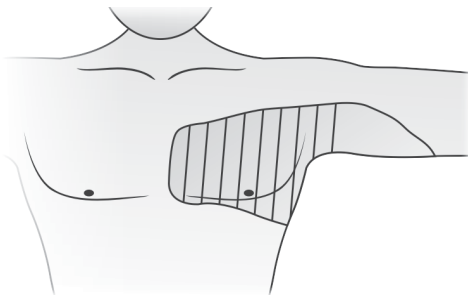


Fig. 8.1: Anterior chest

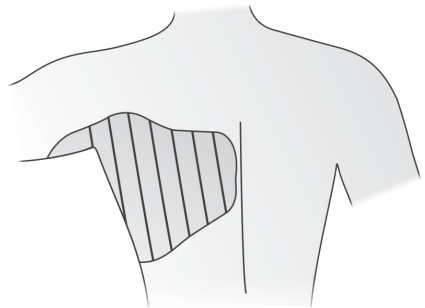


Fig. 8.2: Posterior chest

X-ray demonstrates an intraspinal peripheral nerve root stimulator used to treat intercostal neuralgia.

Freezing tender nerves at or near their exits is an irrational treatment, which may help in some cases, and which may do harm in other cases. Absolute, instantaneous and permanent relief from intercostal neuralgia may be obtained by spinal adjustment.

- Laser
- Mobilization
- Intervention including spinal elongation with arms overhead in supine, sitting, or standing positions, and trunk side bending away from the pain.

Spinal stretch. Let your incoming breath carry both arms over the head. Keep palms up and shoulders down. Feel the space between the vertebrae. Then pause. Turn palms down. Exhale and lower your arms. Do this five times.

Rib cage and diaphragm stretch. Stretch up through your spine as mentioned above. Clasp fingers together and invert the hands, palms up. Feel the rib cage expanding. Exhale while bending over to the left. Then pause. Inhale and return to center. Repeat on right side. Do three sets.

- TENS:

Suggested Treatment Parameters:

- Mode: Modulated

Pulse rate: 100-120 Hz.

Pulse width/duration: 50-150 μ s

Amplitude: Low to moderate level stimulation.

Treatment Time: Throughout the day as needed.

- Mode: Continuous

Pulse rate: 100-120 Hz.

Pulse width/duration: 50-150 μ s

Amplitude: Low to moderate level stimulation.

Treatment Time: Throughout the day as needed.

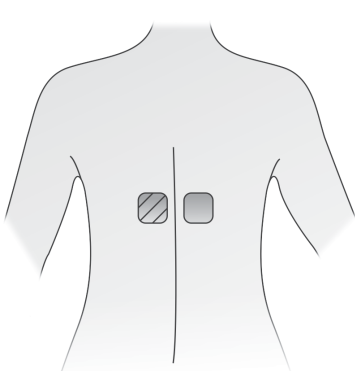


Fig. 8.3: 2 pad placement

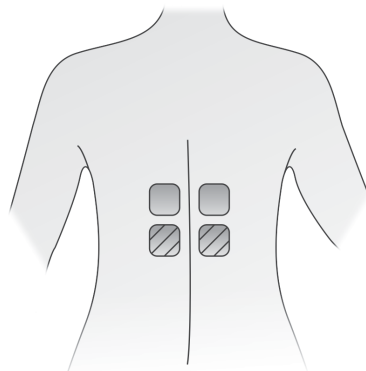


Fig. 8.4: 4 pad placement

2 pad placement—Place electrode pads over bilateral thoracic spine (Fig. 8.3).

4 pad placement—Place electrode pads across thoracic spine (Fig. 8.4).

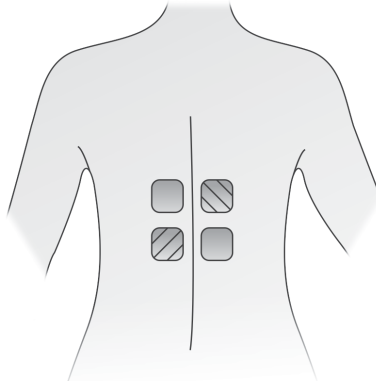


Fig. 8.5: 4 pad criss-cross pattern

4 Pad criss-cross pattern—Place electrodes across thoracic spine (Fig. 8.5).

- It is a sharp pain situated in calf muscles or feet or a jumpy feeling in the legs.
- Most common in second and third trimesters of pregnancy and happen most often at night.

Causes

- Reduced level of calcium
- Reduced level of potassium
- Increased level of phosphorus
- Additional weight gain during pregnancy
- Changes in circulation
- Pressure from growing baby may also be placed on the nerves and blood vessels that go to the legs.

Symptoms

- Severe leg pain or tenderness
- Leg or foot swelling
- Fever
- Temperature changes in legs and foot.

Physiotherapy Management

- Massage to leg, ankle and foot.
- Walking
- Ankle toe movements (Fig. 9.1).

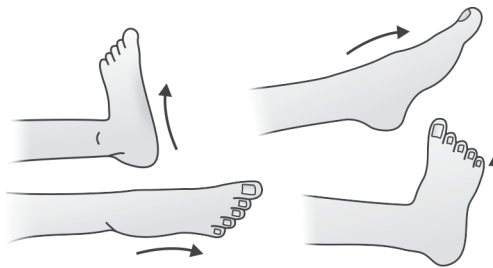


Fig. 9.1: Ankle toe movements

- Calf muscle stretching (Figs 9.2 and 9.3).

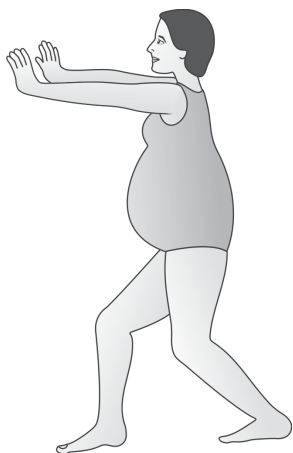


Fig. 9.2: Calf stretching - Starting position

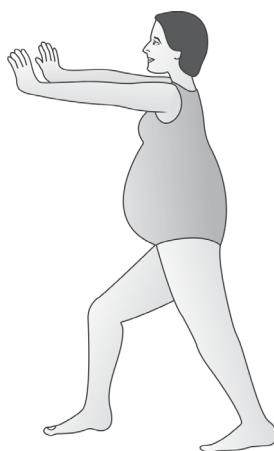


Fig. 9.3: Calf stretching - Ending position

- Rest with leg elevated
- Compression stockings.

Do's

- Drink plenty of fluids.
- Eat calcium rich foods such as dairy products, fish, green leafy vegetables, almonds, etc.
- Reduce intake of phosphorus rich foods such as soft drinks, snack foods.
- Eat potassium rich foods such as bananas.

Don'ts

- Avoid pointing toes when stretching your legs.
- Avoid sitting in position for long period of time.
- Avoid standing for long period of time.
- Avoid crossing legs.

Physiotherapy technique to treat lymphedema was first proposed by Winiwater in 1892.

Lymphedema is a high protein edema caused by low output abnormality of the lymphatic system. The reduced capacity of the lymphatic system causes fluid to build up under the skin, which results in swelling, discomfort and loss of function.

Lymphedema occurs when there is an imbalance between lymph transport capacity and lymph load. After any surgical disruption or radiation treatment to a lymph node region, a state of latent lymphedema occurs. That is to say that the lymph transport capacity is reduced but it is still greater or equal to the lymph load. Acute/chronic lymphedema develops when that balance is shifted and lymph load exceeds the impaired lymph transport capacity. In the case of Primary Lymphedema, where there is a malformation/malfunctioning of the lymphatic transport system that results in a reduced lymphatic transport capacity, lymph load often exceeds that transport capacity, and progressive lymphedema develops over time.

Our lymphatic system, in addition to filtering out waste products, helps our bodies maintain fluid balance so that we are neither dehydrated nor edematous. 90% of the water component of our blood that perfuses the capillary network and nourishes our cells returns to the heart via the venous system. The 10% that is left behind in the tissues along with the extracellular protein that filters out of the capillaries, can only return to the heart via the lymphatics. That 10% can amount to up to 2 liters a day. While 2 liters may not seem like much, it adds up day after day, if there is impairment in lymph drainage. In addition, the extracellular proteins can only return to the central circulation via the lymphatic vessels. The diameter of these molecules is too large to fit into the openings in the vein walls—the openings in the lymphatic vessel walls are large enough for these protein molecules to enter easily.

So lymphedema is not only a problem of excess water remaining in the tissues, but of excess protein that remains in the tissues as well. Unfortunately, the body always moves for a state of balance so it actually tends to pour more water into the tissues to "dilute" this protein concentration—thus a vicious cycle develops. This problem is compounded by the fact that the white blood cells called macrophages, which are part

of our immune response; do not work properly in the lymphedematous fluid. This is why anyone with lymphedema is at increased risk for infection in his or her affected limb.

Types

Primary

Secondary

Causes

Primary

- Congenital abnormality of the lymphatic system.

Secondary

- Trauma
 - Axillary lymph node dissection during surgery for breast cancer
- Filariasis
 - Parasitic infection of the lymphatic system.

Physical Symptoms

- Numbness
- Pain
- Swelling
- Weakness
- Stiffness
- Loss of shoulder mobility
- Fine motor co-ordination is affected.

Psychological Symptoms

- Anxiety
- Depression
- Concern about self-image
- Difficulties with domestic, social and sexual functioning.

Triggered by,

- Increased body mass index
- Localized infection
- Air travel
- Trauma and constriction of the affected limb
- Excessive heat

- Older age and increased body mass index may also be associated with the development of lymphedema because lymphatic pump force decreases with age
- Infection sometimes triggers lymphedema because the lymphatic system's removal of bacteria is compromised.

International Society for Lymphology Identifies Three Grades of Lymphedema

Grade 1 - Pitting edema with pressure, may be reduced with elevation

Grade 2 - No pitting, larger, fibrotic limb, skin and nail changes

Grade 3 - (Elephantiasis) Thick skin with hedge folds, marked skin deterioration.

Winiwarter advocated skin cleanliness, elevation, compression bandaging, exercises and massage to disperse edema.

In 1936, Vodder developed specific massage techniques known as manual lymph drainage (MLD).

MLD also called Vodder technique is effective through the pumping and stretching effect on the lymph vessels. Manual lymph drainage stimulates contraction of the lymph vessels, which in turn assist the movement of lymph forward. This action drains connective tissues.

MLD can be used to treat:

- Lymphedema after mastectomy
- Lymphostatic edema of the extremities
- Primary lymphedema
- Edema of the traumatic origin
- Hematoma, sprains, joint dislocations, ligament lesions, torn muscles, treatment of fractures, etc
- Scar treatment including post-cosmetic surgery and oral surgery
- Rheumatic illness
- Lupus erythematosus
- Local chronic inflammation in the respiratory tract
- Dermatological indications
- Ache, eczema, etc
- Tendinitis
- Fibrositis
- Sinusitis
- Bursitis
- Arthritis
- Carpal tunnel syndrome
- Reflex sympathetic dystrophy

- Ulceration
- Sports injuries
- Venous insufficiency
- Burns
- Pre and post-plastic surgery.

In 1975, Foldi updated MLD proposing complex decongestive physiotherapy (CDP) as a new way to treat lymphedema.

The Foldi technique was adopted in Australia by the Casley-Smiths and Micheal Mason, who perform complex physical therapy (CPT).

CPT is a multi-intervention treatment approach incorporating MLD, compression bandaging and fitted garments, special exercises and meticulous skin care.

Other treatment modalities include, electrotherapy, pneumatic compression. However pneumatic compression is not used as a sole treatment for secondary lymphedema because the pump assists in reabsorption of water from the limb but leaves protein molecules in place, which may accelerate development of fibrosis.

CPT/CLT/CDPT

Complex lymphatic or lymphedema therapy (CLT)

Complex decongestive physical therapy (CDPT)

The course of treatment normally lasts 2-6 weeks depending on severity of condition and the number of limbs involved.

CPT Consists of Four Main Parts

1. Skin care
 - a. To prevent infection adding to lymphatic load and to improve skin condition
2. A special form of massage each day, which removes the excess fluid and the protein and opens collateral lymphatics so that unaffected region can drain the affected one in the future
3. Compression bandages during the course, followed by compression garments after it, to stop the reduced limb from rapidly resuming its former size
4. Special exercises to supplement the massage.

Skin Care

Skin problems usually cause a local high protein edema which adds to the load of an already inadequate and over burdened lymphatic system in a generalized high-protein edema.

Skin should be clean, healthy, supple and moist to avoid problems or if they present, to treating them and clearing them up.

Mineral oil cleanser is much less drying and better for the skin than normal toilet soap.

Special Lymphatic Massage

The special lymphatic massage first empties the lymphatics of the trunk (even of quite distant regions) and the normal areas adjacent to the lymph edematous one are further cleared. Then the limb is massaged. This is always in the direction of lymph flow. It starts on the part of the limb adjacent to the trunk. Gradually more and more of the limb is involved, until the hand or foot is reached. Reduction will only continue to improve after treatment if the drainage from the blocked area to the normal adjacent areas has been improved by enlarging the size and the number of the lymphatics which join one drainage area to the next (the collateral lymphatics).

Compression Bandages

- Bandages are essential during CPT since the limb size changes rapidly and so the size of the compression garment and the amount of compression must also change rapidly.
- They are necessary partly because of the destruction of the elastic fibers of the skin in lymphedema, to maintain newly lax tissues, and to reshape the limb using specially shaped padding.
- The bandage at night is more comfortable than an elastic compression garment because of its low resting pressure.
- Bandaging over the compression garment is also recommended during long air craft flights.

Bandaging at night and in the aircraft is particularly recommended for patients whose lymphedema has a hyper plastic component, i.e. with mega-lymphatics in the subcutaneous tissue and other areas. Elevation at night is also recommended for those. And for those with lymphedema whose limbs are still soft and pitting.

The Principles of Bandaging for Lymphedema

- A sleeve or stocking of gauze which can be changed and washed daily should first be put on. Do not cut this to the length of the limb; it needs to be almost double this length so that it will be the right length when stretched sideways and to allow for shrinkage.
- Fingers and toes may need to be bandaged separately at this stage.
- Suitable padding should be applied, starting at the distal end of the limb and working up the limb towards the trunk, this is to prevent indentations forming from the outer bandaging and to equalize the pressure over the entire limb, it will also prevent chafing and protect any tender areas.
- As well, foam padding (of various densities, shapes and formations) is applied to shape the limb, fill hollows, even-out pressure of the outer bandage, and breakdown fibrotic areas.

Bandages Suitable for Lymphedema

Low stretch (elasticity) bandage.

The lymphatics only pump when they are compressed (by muscular contraction, massage or other form of pressure) against something solid and unyielding, too elastic bandages just give way and do not compress the lymphatics, which hence do not pump.

Compression Garments

- To prevent lymphedema
- To try to maintain the size of the limb when treatment is unavailable or unaffordable
- To maintain the reduction achieved after and to continue the remodeling of the limb.

Do's and Don'ts

- Do not ignore a slight increase in size or a constant ache
- Keep the lymphedematous limb clean
- Avoid any trauma—knocks, cuts, burn, sports injuries, insect bites
- Be careful while cutting nails
- Any redness, infection should be treated at once
- Do not carry heavy loads especially with bad arm
- The lymphedema person must not allow anyone to measure their blood pressure or to give an injection in the lymphedematous limb or one at risk
- The limb should be kept as cool as possible in hot weather
- Avoid sun burn
- Keep skin supple and moist
- Take normal balanced diet
- Wear loose clothing (do not block few remaining lymphatics)
- Wear the sleeve/stocking at all times including at night
- Underclothes and compression garments are regularly washed
- Exercise regularly.

Outdoors

- DO protect your arm from sunburn. Wear a sunscreen with a high Sun Protecting Factor.
- DO avoid insect bites. Wear insect repellent.
- DO wear gloves when gardening or doing other yard work.
- DO get regular exercise, but avoid repetitive motion with your arm to the point of muscle fatigue.

- DO NOT allow outdoor pets to scratch or bite your hand or arm.
- DO NOT expose at-risk limbs to the extreme heat of hot tubs.
- DO NOT play sports which may result in injury to your arm.

Indoors

- DO wear gloves while doing housework.
- DO wear oven mitts when moving hot plates to and from the oven or burner.
- DO try to avoid burns from grease splatter when frying foods.
- DO NOT allow indoor pets to scratch or bite your arm or hand.
- DO NOT sew unless wearing a thimble to protect against finger pricks.

Hygiene

- DO keep your arm clean and apply moisturizing cream regularly.
- DO thoroughly clean and apply an over-the-counter antibiotic and bandage to any scratch or cut immediately after the injury occurs.
- DO dry your arm thoroughly after bathing, but DO NOT rub the arm harshly with your towel in the drying process.
- DO NOT bathe in extremely hot water.
- DO call your physician immediately if there is any sign of infection.

Grooming and Accessories

- DO wear a soft bra with padded shoulder straps.
- DO NOT shave under arms with a disposable razor. Use a well maintained electric razor with clean heads instead.
- DO NOT cut cuticles when maintaining nails. If someone else does your nails, ask them not to cut the cuticles.
- DO NOT wear tight jewelry of any kind on your arm or hand.
- If you wear a breast prosthetic, DO wear a lightweight form.
- DO NOT hang a heavy purse, bag, or briefcase over the shoulder of an at-risk arm.

Travel

- DO wear a compression sleeve anytime you travel by air to compensate for pressure changes in the plane's cabin.
- DO remember to pack soap, moisturizer, antibiotic cream or ointment, and bandages to maintain your preventive regimen while away from home.

Medical

- DO NOT allow blood to be drawn from an at-risk arm.
- DO NOT allow vaccines or other shots to be given in at at-risk arm.

- DO NOT allow medical personnel to put a blood pressure cuff around an at-risk arm.
- In all three of the above instances, insist that medical personnel use the opposite arm or another appropriate site.
- Finally, DO notify your physician if you see signs of lymphedema developing. If detect any sign of infection, call immediately.

The acute responses to exercise include increases in heart rate, stroke volume, cardiac output, blood flow to active muscles, systolic blood pressure, arteriovenous oxygen difference, ventilation, oxygen uptake, and a decrease in blood pH and plasma volume. Chronic adaptations to exercise include biochemical changes in skeletal muscles, decreased resting heart rate, decrease in total body fat, blood lipids, and the density and strength of bone and connective tissue. During exercise, blood is redirected to the muscles. At rest, only 21% of the cardiac output goes to the muscles, compared with as much as 88% during exhaustive exercise. As the body heats up, an increasing amount of blood is directed to the skin, to conduct heat away from the body core. Remember that lymph transport has to be equal to or greater than lymph load. During exercise, muscles need extra blood to supply the oxygen needed for muscles to do the work of the exercise. Extra blood flow means that extra water will remain in the extracellular spaces needing transport via the lymphatic system. It is important that any exercise program be gradually progressed to avoid sprain/strain. More importantly, a slow progression allows the individual to monitor their affected limb or limb at risk for any sensation of aching or fullness that could indicate an overwhelming of the lymphatic system.

Exercise can increase the uptake of fluid by the initial lymphatics and enhance the pumping of the collecting lymphatics. In addition, exercise mobilizes the joints and strengthens the muscles of the involved limb/limbs/trunk quadrant, thus decreasing the risk of strain/sprain.

Exercise is best done with compression on the affected limb either from compression bandages or compression garments. The bandages provide a new "tight" skin for the muscles to contract against, assisting in pumping the lymph out of the extremity into the central circulation. When lymphedema exists, the remaining lymph vessels that are functioning are working double time to try to carry the load. These vessels become over dilated (stretched) and eventually, their walls can overstretch and fail, causing a worsening of the swelling. Wearing compression bandages/garments provides support to the skin and to the lymphatic vessels directly under the skin, called the superficial lymphatic network. It is these vessels that help to carry the load when the larger vessels have been cut away from the lymph nodes or have been damaged due to trauma or chronic venous disease, or in the case of primary lymphedema, when there are too few large lymph collectors in a region due to improper vessel/node development during fetal growth.

EXERCISES FOR LYMPHEDEMA

Exercises with Stage 1

All exercises can be performed. The only ones to be concerned with are high impact ones.

Exercises with Stage 2

Stretch exercises—flexion, extension, abduction, rotation. Walking, jogging swimming, rowing, bowling, bicycling, dancing and sailing.

Exercises with Stage 3

All of the above sports. Intensity and duration can be modified

- Exercises are performed wearing the appropriate compressive bandages, sleeves or stockings. They should be performed once or twice a day.

Examples of Activities

Aerobic exercises: Also known as endurance exercises, increase heart rate and breathing for an extended period of time. These activities are an important part of any exercise regimen because they:

- Improve the circulation of both blood and lymph
- Aid in the flow of fluid away from affected areas
- Combat fatigue
- Increase a sense of well-being
- Bench pressing
- Dancing.

Strength training exercises: Also known as resistance-training, require the muscles to exert a force against some form of resistance. This type of exercise is beneficial for those with lymphedema because:

- The contraction of the muscles causes a pumping action that helps to move lymphatic fluid away from the affected area and back toward the chest.
- Strength training encourages deep breathing to ensure an adequate supply of oxygen to the tissues. This exercises the chest and abdomen in a manner that stimulates lymphatic drainage.

Stretching exercises: These are activities such as yoga that move the skin, muscle, and other tissues in the affected area and help to relieve the feeling of tightness that often accompanies lymphedema. They also help regain a range of motion in an affected area, increase flexibility, and increase freedom of movement. Stretching exercises are also relaxing; however because they do not improve endurance or strength, these activities need to be part of a balanced exercising program.

Walking is an ideal exercise that does not require major equipment, except appropriate shoes, and can be done almost anywhere.

Water exercises are another ideal exercise because the water provides total body compression and it cushions tender joints and make movement easier.

Basic Exercise Precautions

- Before beginning any exercise program, check with therapist or physician.
- Exercise moderately and avoid overuse of your affected limb. Gradually build-up strength and ability.
- Carefully follow the "warm-up" and "cool down" steps of exercise program.
- Wear your compression garment during exercise.
- Try not to get overheated and be sure to drink plenty of water to keep body hydrated.
- Stop exercising, if you encounter any sign of trouble such as increased swelling or pain. Check with therapist or physician before restarting the exercise program.

It is a sensory mononeuropathy of the lateral femoral cutaneous nerve.

A recent study found that the incidence rate of Meralgia Paresthetica is 4.3/10,000 persons per year and that it is found in higher numbers in patients suffering from carpal tunnel syndrome (suggesting a predisposition to nerve entrapment syndromes) and during pregnancy.

Anatomy

Lateral cutaneous nerve of thigh, a branch of the lumbar plexus (dorsal division of the anterior primary rami of L2 and L3). It descends into the thigh deep to or piercing the lateral end of the inguinal ligament and divides into a larger anterior and a smaller posterior branch.

The posterior branch supplies the skin of the upper part of the lateral side of the thigh and also the skin of the lower and lateral part of the gluteal region. The anterior branch pierces the fascia lata at a lower level and supplies the skin on the lateral side of thigh as far as the knee joint. It may send a twig to patellar plexus.

Causes

- Weight changes in pregnancy
- The chief cause of the condition is ischemia, i.e. deficiency of blood due to constriction or obstruction, of the nerve caused by its entrapped position
- Restrictive clothing
- Obstetrical surgery
- Exacerbated lumbar lordosis leads to compression of the nerve by the posterior fascicle of the inguinal ligament
- Compression by the inguinal ligament during maternal pushing in the thigh flexed position.

Risk Factors

- Obesity
- Trauma in pelvic or lower spine area

- Abdominal surgery
- Orthopedic surgery
- External compression
- Strenuous exercises
- Increased intra-abdominal pressure
- Postural alterations
- Diabetes
- Pressure by the belt
- Prolonged hip flexion.

Clinical Features

- Numbness and paresthesias, pain, tingling, burning sensation in the anterolateral part of the thigh
- Normal tendon reflex
- Positive Tinel's at the level of the inguinal ligament
- Usually only on one side of the body
- Usually more sensitive to light touch than to firm pressure
- Symptoms worse with standing or extending the leg and walking
- There is no weakness of legs.

Treatment

Non-surgical

- Weight loss to shrink abdominal girth
- Remove constricting binders, corsets, tight belts, tight jeans
- Physical therapy
 - Exercises to balance hip muscles
 - Lying on side to draw uterus away from compressed side
 - Soft tissue mobilization techniques for IT band
 - Strengthening for underused synergists to ITB (e.g. posterior gluteus medius).

Surgical

- Steroid/local anesthetic test infiltration around the nerve at the inguinal ligament
- Lateral femoral cutaneous nerve surgical decompression (high recurrence rate) or proximal transaction of nerve.

"Silent" Disease

Osteoporosis (meaning porous bones) is characterized by low bone mass and structural deterioration of bone tissue. It is common ailment seen in postmenopausal women, resulting in fragile and weak bones highly susceptible to fractures of hips, spine and wrist. One in three women over age of 50 years will develop the disease during their lifetime. There is about loss of 20% bone mass in 5 to 7 years following menopause. Osteoporosis can be fatal and more women die of hip fractures, than from cancer of ovaries, cervix and uterus combined. It is a silent disease, because bone loss occurs without symptoms.

Once peak bone mass has been attained, usually between the ages of 20 and 30 years, women and men lose bone at a rate of about 0.5% to 1% yearly, although this varies considerably from person to person. Superimposed on this expected loss is a phase of more rapid bone loss immediately at and after menopause in women.

RISK FACTORS

Nonmodifiable

- Personal history of fracture as an adult
- History of fracture in first-degree relative
- Caucasian
- Advanced age
- Female
- Dementia.

Potentially Modifiable

- Low body weight (<127 lb)
- Estrogen deficiency:
 - Early menopause (age < 45) or bilateral ovariectomy
 - Prolonged premenopausal amenorrhea (>1 year)

- Low calcium intake
- Alcoholism
- Impaired eyesight despite adequate correction
- Recurrent falls
- Inadequate physical activity
- Vitamin D deficiency
- Poor health, frailty.

SECONDARY CAUSES OF OSTEOPOROSIS

Gastrointestinal Diseases

- Malabsorption syndromes (e.g. Crohn's disease, celiac sprue—digestive disease affects absorption of nutrients from food)
- Severe liver disease, especially primary biliary cirrhosis
- Gastrectomy
- Hemochromatosis (Iron overload disease)
- Parenteral nutrition
- Nutrition disorders.

Rheumatologic Diseases

- Osteogenesis imperfecta
- Rheumatoid arthritis
- Ankylosing spondylitis
- Sarcoidosis.

Hematologic Diseases

- Lymphoma and leukemia
- Mastocytosis
- Multiple myeloma
- Pernicious anemia
- Hemophilia
- Thalassemia.

Endocrine Diseases

- Hyperthyroidism
- Primary hyperparathyroidism
- Cushing's syndrome
- Addison's disease

- Acromegaly
- Insulin-dependent diabetes mellitus
- Gonadal insufficiency (primary and secondary).

Bone loss occurs without symptoms. People can lose bone mass over many years but not know the problem. Osteoporosis is often referred as a silent disease. Most people may not be aware that they have osteoporosis until a fractured spine, hip or wrist occurs with a simple fall.

Symptoms occur late in the disease and they are:

- Loss of height as a result of weakened spines. A person may find that his/her clothes are no longer fitting and their pants looking longer. Patients may lose as much as 6 inches in height (Fig. 12.1).
- Cramps in the legs at night
- Bone pain and tenderness
- Neck pain, discomfort in the neck other than from injury or trauma
- Persistent pain in the spine or muscles of the lower back
- Abdominal pain
- Tooth loss
- Rib pain
- Broken bones
- Spinal deformities become evident like stooped posture, an outward curve at the top of the spine as a result of developing a vertebral collapse on the back
- Fatigue
- Periodontal disease
- Brittle fingernails
- Less commonly, decreased height of the main bodies of the vertebrae (vertebral bodies) can cause the bony protrusions (spinal processes) of the vertebrae to make painful contact with each other. This condition is known as Baastrup syndrome, or "kissing spine." This, of course, can result in serious back pain as well
- Loss of mobility
- Disability
- Physical deconditioning
- Depression.

Diagnosis

Bone mineral density is the major criterion used for the diagnosis and monitoring of osteoporosis. BMD of a specific site is the best predictor of fracture at that particular site.

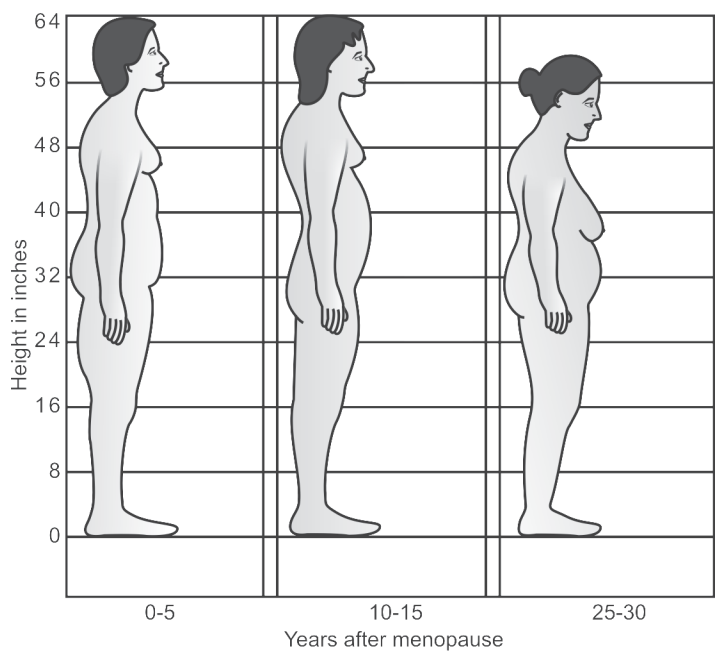


Fig. 12.1: Progressive loss of height

Techniques for measuring BMD

Technique	Appropriate sites
Dual-energy X-ray Absorptiometry (DEXA or DXA)	Anteroposterior (AP) spine, lateral spine, proximal femur, total body, forearm, heel
Quantitative Computed Tomography (QCT)	Spine
Peripheral Dual-energy X-ray Absorptiometry (pDXA)	Forearm
Peripheral Quantitative Computed Tomography (pQCT)	Forearm
Single Photon Absorptiometry (SPA)	Forearm
Single-energy X-ray Absorptiometry (SEXA or SXA)	Forearm
Radiographic Absorptiometry (RA)	Phalanges

Other techniques are available that measure properties related to bone density. Quantitative ultrasound can be used to measure properties of the calcaneus related to bone quality and structure, though it cannot be used to diagnose osteoporosis or to target treatment. Biochemical markers such as resorption markers can be used to assess bone turnover.

Plain Radiographs

Assessment of bone density from plain radiographs is not appropriate as it is open to marked observer variation and apparently normal density does not reliably exclude osteoporosis.

Peripheral Techniques

DXA scanning is the current standard technique for the diagnosis of osteoporosis due to its ability to measure BMD at a variety of sites. Peripheral imaging techniques such as pQCT, pDEXA, SXA, RA, phalangeal ultrasound, and peripheral radiographic fractal analysis are often used as screening methods for subsequent DXA, for diagnosis of osteoporosis, or the monitoring of treatment. Their principal advantages compared to DXA are their relatively modest cost and the portability of the equipment. Few studies have been done to compare these techniques against the current standard of DXA.

Quantitative Ultrasound

Quantitative ultrasound equipment is available that measures a range of parameters using several different methods. Most systems measure speed of sound (SOS) and broadband ultrasound attenuation (BUA) of the calcaneus.

Quantitative Computed Tomography

Quantitative Computed Tomography has been widely used to measure BMD, particularly in the spine. It can be performed on conventional CT scanners by purchasing special software. An advantage of QCT is that it can measure cortical and trabecular bone separately. Disadvantages are the relatively high radiation dose involved and the high cost of scans.

Dual Energy X-ray Absorptiometry

DXA can measure BMD at the spine, hip, forearm, heel, and in the total body.

Management

Calcium

Vitamin D

Exercise

Prevent Falls

Gain weight

OSTEOPOROSIS PREVENTION EXERCISES

In women, the greatest rate of bone loss occurs in the years immediately following menopause.

Everyone loses bone as they age, but not everyone gets bone thinning to the point that they have osteoporosis. Although genetics and gender play important roles, research has identified key, life-long preventive measures—such as having enough calcium in diet every day, and doing weight-bearing and resistance (weight-lifting) exercises regularly—that can help avoid osteoporosis.

Regular weight-bearing exercise in children and teenagers helps produce strong bones; in adults it helps to maintain bone mass; after the menopause it can be part of an overall treatment plan that aims to slow the rate of bone loss; and in adults over 65 years physical activity can be used to both reduce the rate of bone loss and avoid injury to bones by improving muscle strength and balance. The strength of the bones also determines the type of exercise that is appropriate and safe for the bones.

Note: The exercises discussed here are designed for healthy adults who have healthy bones.

Weight-bearing Exercises

Exercises that make the body work against gravity, such as running, walking, stair-climbing, dancing, tennis or netball, are good options for promoting healthy bones. Each time when foot hits the ground stress is applied to bones, which respond by maintaining or sometimes increasing their strength, which can be measured in terms of increased bone mineral density. The higher the impact of the activity contact, the greater the benefit to bones. This is why weight-bearing exercises that include running or jumping are of greater benefit to bone health than gentler weight-bearing exercises such as walking.

To maintain the bone-strengthening benefits of weight-bearing exercise, keep-up the exercise regularly, for the long-term. Experts advise 30 minutes of weight-bearing exercise every day to maintain bone health.

Exercises such as swimming, although good for aerobic fitness, are not so helpful for strengthening bones because they aren't weight-bearing.

Resistance Exercises

Resistance exercises, such as 'weight-lifting', are another good way of strengthening your bones. Doing a program of resistance exercises 2 or 3 days a week, lasting no more than 30 minutes a session, has been shown to help maintain healthy bones.

- First, check with your doctor whether the exercises shown here are suitable for you. This is especially important if you have other medical conditions, or you are over 45 and have not exercised regularly in recent times.
- These exercises are not designed for people who already have osteoporosis. If osteoporosis is already present, then it is better to consult the doctor for a suitable exercise program.

Equipment

For this exercise program a chair without arms is needed that has a high back, approximately to the level of waist. If the chair is of correct size, when sitting with good upright posture, the bottom should rest against the back of the chair, feet should be placed flat on the floor and the backs of knees should touch the seat of the chair.

A pair of portable or strap-on wrist weights, and a pair of strap-on ankle weights are needed. When starting out, use the lightest weights that can be lifted comfortably. Increase the weight gradually. This is vital for building strength.

Wear comfortable, non-restrictive clothing, thick socks and comfortable exercise shoes.

Exercise Tips

Warm up first: Warm up first by doing a repetitive, gentle movement such as walking for a few minutes or slowly going through the motions of a couple of the weight-training exercises, minus the weights. This helps circulate blood to your muscles to increase heat in the body and reduce the risk of an injury.

Slow repetitions: Perform each exercise slowly 8 times ('8 slow repetitions'). A slow repetition means taking about 3 seconds to lift the weight, 1 second to rest, then 3 seconds to lower the weight. Repeat for the opposite leg or arm, where necessary.

Don't hold your breath: Remember to breathe regularly during these exercises. For example, take a deep breath in, then breathe out slowly as you lift the weight; breathe in as you lower the weight. Do not hold your breath while lifting or lowering the weight.

You should not feel pain: You should need to use strong effort when lifting the weights in these exercises, but remember to stay within a range of movement that does not cause you pain.

Stretch your muscles: After you have completed all the exercises in the sequence, gently stretch, in turn, all of the muscles you have just worked.

A day of rest: Do these resistance exercises on 2 or 3 days of the week, always allowing a non-weight training day in-between weight-training days, so that your muscles can recover.

Progression: Do not increase the weight that you lift until you can complete easily the 8th repetition of an exercise. Gradually add enough weight to challenge your muscles, so that it feels hard or very hard to complete the repetitions. When you can lift a weight 8-15 times, then add more weight to challenge your muscles again. Repeating this process will help build strength. Make sure you don't overdo it, however: if you can't lift a weight 8 times in a row, it's too heavy for you so use a lighter weight.

Talk to your doctor or a qualified fitness professional to make sure your exercise program is right for you.

Resistance Exercises

Wear ankle weights for the exercises shown from Figures 12.2 to 12.8 and wrist weights for the exercises shown from Figures 12.9 to 12.11.

1. Calf Raises

Resting both the hands on the back of the chair for balance, lift heels and stand on toes, hold and slowly lower.



Fig. 12.2: Standing on toes

2. Knee flexion

Resting both hands on the back of the chair for balance, bend one knee and try to reach the back of the thigh.

Hold and slowly lower. Repeat on the other leg.



Fig. 12.4: Knee and hip extension

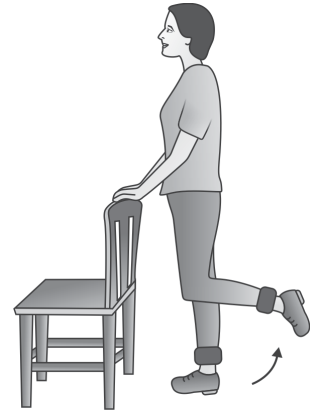


Fig. 12.3: Knee flexion

3. Hip extensions

Adopting the position similar to Figure 12.3, bending forwards for about 45 degrees, lift one leg straight backwards, hold and lower. Repeat on the other leg.

4. Hip flexion

Standing side on the back of the chair and resting one hand on the back of chair for support, raise one knee towards chest. Hold and slowly lower. Repeat for the other leg.



Fig. 12.6: Lateral hip raises



Fig. 12.5: Hip flexion with knee flexion

5. Lateral leg raises

Resting both hands on the back of your chair for balance, one leg is lifted slowly to the side with knee straight. Hold and slowly lower to the ground. Repeat for the other leg.

6. Leg raises

Holding onto the sides of the seat for balance and slide bottom forward towards the front of the seat. Resting shoulders against the back of the chair for support, slowly raise both legs 5-10 cm off the ground with knees straight and feet together. Hold, then slowly lower your feet to the ground.

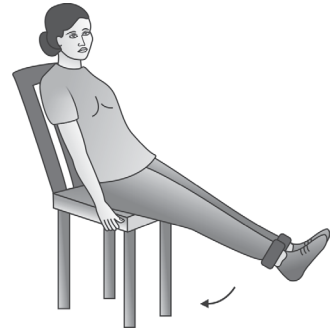


Fig. 12.7: Leg raise

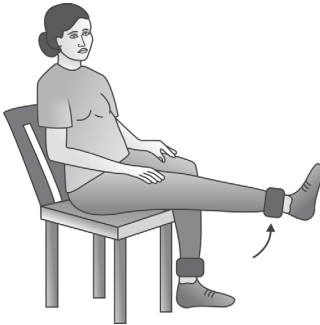


Fig. 12.8: Knee extension

7. Knee extensions

Sitting on a chair and maintaining an upright posture, straighten legs alternately. Hold and then lower slowly.

8. Shoulder strengthening

Starting with hands on the sides of the body, lift both the hands above head. Hold and slowly lower.

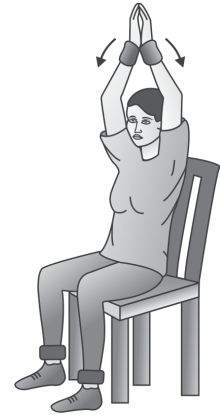


Fig. 12.9: Shoulder strengthening

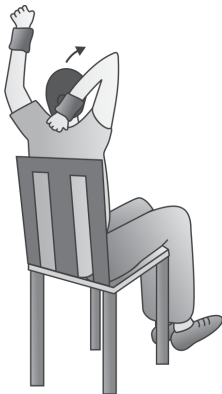


Fig. 12.10: Triceps lift

9. Triceps lift

Raising both arms above the head, bend elbows and straighten alternately. Hold in the extended position and then lower slowly.

10. Biceps curl

Resting both the hands on either side of the seat, bend elbow of one arm to raise the hand towards shoulder.

Hold and slowly lower. Repeat on the other arm.

Exercise can help reduce the risk of falling and fracture.

The 5 C's of Exercise

Comprehend the Importance of Exercise for Healthier Bones

- Active lifestyle helps to make the bone healthier
- Avoid prolonged periods of inactivity
- Exercise for 20-30 minutes at least 3 to 4 times per week
- Exercise that helps the bones:
 - A. *Weight bearing exercises:*
 - Weight-bearing exercises that do not involve jumping are the best starting point for an effective exercise program. These exercises include walking, hiking, dancing, and low-impact aerobics.
 - B. *Strength training exercises:*
 - Strength-training exercises include lifting free weights, using weight machines, and pulling resistance rubber bands (Fig. 12.12).



Fig. 12.11: Biceps curls

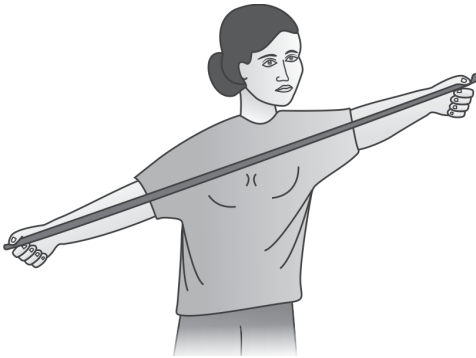


Fig. 12.12: Strength training using resistance rubber bands

- It is important to avoid any exercise that:
 - (i) Increase the risk of falls
 - (ii) Involves bending the spine forward
 - (iii) Involves twisting of spine
 - (iv) Involves high impact
- Stop exercising if you:
 - (i) Have pain
 - (ii) Light headedness
 - (iii) Nausea
 - (iv) Unusually tired
 - (v) Extremely short of breath

Choose the Exercises that are Right for Your Bones

Suggestions for a walking program:

- Choose suitable shoes or clothes.
- Schedule a specific time to walk 3 to 4 times a week.
- Start slowly to warm up. Increase the speed gradually, should still be able to carry on a conversation.
- Walk slowly to cool down.

Conquer the Challenges of Exercise

Getting enough exercise may present some challenges like finding time to exercise, forgetting to exercise and lack of motivation. These challenges could be overcome by remembering the importance of exercise, making exercise as a daily routine, exercising with a friend, setting realistic goals to achieve and tracking the progress.

Communicate: Consult Health Care Professional

In case of difficulty, health care professional must be consulted.

Commit to Exercise for Healthier Bones

Commitment is crucial to make a habit of exercising for the bone health. One way to encourage follow-through on commitments is to use affirmations (positive statements that can help motivate to change behaviors into habits) and another way is to reward as incentives that reinforce the success.

Exercise Guidelines

- Previous exercise recommendation by American Heart Association 1981, American College of Sports Medicine (ACSM) 1985:
 - Intense or vigorous exercise
 - At least 20 minutes continuously
 - At least 3 times per week.
- Exercise recommendation by Centers for Disease Control and prevention and ACSM 1995; U.S. Surgeon General 1996:
 - "Every adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week."
- Recent Institute of Medicine guidelines on diet, September 02, call for at least 1 hr/day of moderate physical activity.
- These guidelines are meant to keep weight in healthy range.
- 30 min/day still sufficient for cardiac health, but insufficient to maintain healthy weight.

The BEST Study Regimen

The BEST bone health regimen is focused on building Bone Mineral Density (BMD) in typically vulnerable areas of the spine and hip. The program includes daily calcium citrate supplementation (800 mg) to ensure adequate intake and three-times-a-week

sessions of 20 to 25 minutes of resistance training—two sets of six to eight repetitions—using six core exercises:

1. Back extension
2. Lateral pull down
3. Leg press
4. One-arm military press
5. Seated row
6. Wall or Smith Squat.

Seven to ten minutes of cardiovascular weight-bearing activity, such as weighted walking, stair climbing and jogging, and small muscle group exercises involving therabands and physio-balls round out the study regimen. The key to achieving the goal of improved bone health is in the intensity of the weight-bearing workout and the level of the resistance training. Progressively increasing the weight lifted and consistently exercising two to three times a week are essential for success.

The ECOS—16 questionnaire (Adapted with permission from Badia Xavier et al) is used for the evaluation of health related quality of life in post-menopausal women with osteoporosis.

During the last week and because of your back problems due to osteoporosis:

1. How often have you had back pain in the last week?

- ☐ 1. I have not had back pain
- ☐ 2. 1 day
- ☐ 3. 2-3 days
- ☐ 4. 4-6 days
- ☐ 5. Every day

2. How severe is your back pain?

- ☐ 1. I have not had back pain
- ☐ 2. Mild
- ☐ 3. Moderate
- ☐ 4. Severe
- ☐ 5. Intolerable

3. How much distress or discomfort have you had because it has been painful to stand for a long time?

- ☐ 1. No discomfort or suffering
- ☐ 2. Slight discomfort or suffering

- ☐ 3. Moderate discomfort or suffering
 - ☐ 4. Severe discomfort or suffering
 - ☐ 5. Very severe discomfort or suffering
4. How much distress or discomfort have you had due to pain from bending?
- ☐ 1. No discomfort or suffering
 - ☐ 2. Slight discomfort or suffering
 - ☐ 3. Moderate discomfort or suffering
 - ☐ 4. Severe discomfort or suffering
 - ☐ 5. Very severe discomfort or suffering
5. Has the back pain disturbed your sleep in the last week?
- ☐ 1. On no occasion
 - ☐ 2. One night
 - ☐ 3. Two nights
 - ☐ 4. Three or four nights
 - ☐ 5. Every night
6. How difficult has it been for you to carry out the household activities?
- ☐ 1. No difficulty
 - ☐ 2. Slight difficulty
 - ☐ 3. Moderate difficulty
 - ☐ 4. Great difficulty
 - ☐ 5. I was unable to do anything
7. Can you climb stairs to the next floor of a house?
- ☐ 1. No difficulty
 - ☐ 2. Slight difficulty
 - ☐ 3. I had to rest at least once
 - ☐ 4. I could only climb the stairs with help
 - ☐ 5. I was unable to climb the stairs

8. Do you have problems with dressing?

- ☐ 1. No difficulty
- ☐ 2. I can dress myself with slight difficulty
- ☐ 3. I can dress myself with moderate difficulty
- ☐ 4. I sometimes need help to dress myself
- ☐ 5. I cannot dress myself unaided

9. How difficult has it been for you to bend?

- ☐ 1. No difficulty
- ☐ 2. Slight difficulty
- ☐ 3. Moderate difficulty
- ☐ 4. Great difficulty
- ☐ 5. I am unable to bend down

10. How much has your walking been limited?

- ☐ 1. Not limited
- ☐ 2. Slightly limited
- ☐ 3. Moderately limited
- ☐ 4. Very limited
- ☐ 5. I am unable to walk

11. How difficult has it been for you to visit friends or relatives?

- ☐ 1. No difficulty
- ☐ 2. Slight difficulty
- ☐ 3. Moderate difficulty
- ☐ 4. Great difficulty
- ☐ 5. I have been unable to visit family or friends

12. Do you feel downhearted?

- ☐ 1. No
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

13. Are you hopeful about your future?

- ☐ 1. Always
- ☐ 2. Often
- ☐ 3. Sometimes
- ☐ 4. Rarely
- ☐ 5. No

14. Do you feel frustrated?

- ☐ 1. No
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

15. Are you afraid of falling?

- ☐ 1. No
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

16. Are you afraid of getting a fracture?

- ☐ 1. No
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Piriformis syndrome is a peripheral neuropathy of the sciatic nerve secondary to compressive entrapment of the nerve as it passes adjacent to the external hip rotators enroute its exit from the gluteal region by way of the greater sciatic foramen. Piriformis syndrome is predominantly caused by shortening or tightening of piriformis muscle

Causes

Overload Training Errors

Commonly associated with sports that require a lot of running, change in direction or weight bearing activity:

- Exercising on hard surface, like concrete
- Exercising on uneven surface
- Beginning an exercise program after a long lay off period
- Increasing exercise intensity or duration too quickly
- Exercising in worn-out or ill fitting shoes
- Sitting for long periods of time.

Biomechanical Inefficiencies

The major biomechanical inefficiencies are faulty foot and body mechanics, gait disturbances, poor posture or sitting habits:

- Poor running or walking mechanics
- Tight, stiff muscles in the lower back, hips and buttocks
- Running or walking with toes pointed out
- Muscle spasm
- Contracture
- Compression
- Increased muscle mass due to hypertrophy
- Femoral anteversion
- Lumbar hyperlordosis
- Forefoot varus

Other Causes

- Prolonged driving
- Pelvic floor myalgia
- Spinal problems like herniated discs and spinal stenosis
- Vascular compromise (medially placed intramuscular injection)
- Trauma—excessively hard fall in the sitting position onto a hard object, muscle contusion or hematomas of gluteus maximus, penetrating knife or bullet wound.

Clinical Features

- Point tenderness in the mid of piriformis
- Dull aching pain in the buttock
- Pain in the gluteal or sacral regions remains the most constant symptom
- Pain typically increases with sitting or walking
- Pain decreases when lying supine
- Resisted hip extension painful
- Resisted external rotation painful
- Motor weakness
- Pain and paresthesia along the sciatic nerve distribution.

Test

- The patient lying with the painful side up, the painful leg is flexed such that the knee is resting on the table.
- The test is positive when buttock pain is produced when the patient lifts and holds the knee several inches off the table.

Management***First Phase***

- Immediately after injury (48-72 hours)
- RICE.

Second Phase

- Heat—Diathermy (Except during pregnancy)
 - Ultrasound
 - Hydrotherapy
- Massage

Rehabilitative Phase

If most of the pain has been reduced its time to move into rehabilitative phase.

The main aim of this phase is to regain the strength, power, endurance and flexibility of the muscles and tendons that have been injured.

Therapeutic Exercises

Strengthening of:

- Hip internal rotators
- Lateral hamstrings

Stretching to:

- External rotators
- Semimembranosus
- Semitendinosus.

Piriformis Stretching

The piriformis can be stretched in sitting position, by flexing, adducting, and internally rotating the hip while keeping the spine straight and the pelvis level (Figs 13.1 and 13.2).



Fig. 13.1: Piriformis stretching in sitting – anterior view



Fig. 13.2: Piriformis stretching in sitting – lateral view

Orthosis

Correction of forefoot varus deformity with a medial forefoot post

Postural Training

- Imbalance due to lumbar hyperlordosis should be corrected
- Strengthening hip extensors and abdominal muscles
- Stretching back and prefemoral muscles.

Spray and Stretch Techniques

Ethyl chloride spray over the involved buttock followed by piriformis stretching.

Relaxation

Relax pelvic floor musculature.

Don'ts

- Prolonged sitting
- Excessive stair climbing
- Prolonged driving
- Prolonged walking.

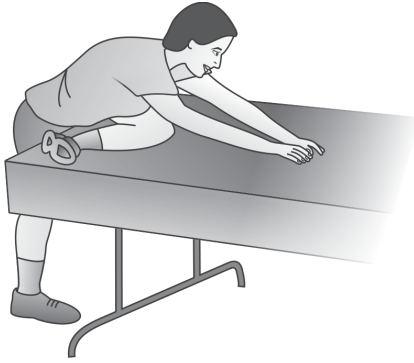


Fig. 13.3: Piriformis stretching – on table

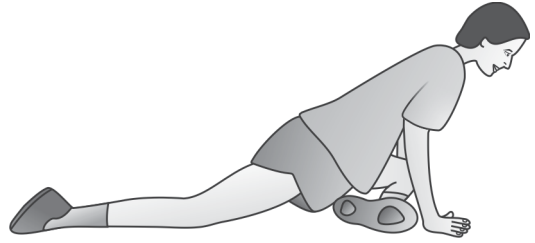


Fig. 13.4: Piriformis stretching – on ground

Sit with one leg straight out in front. Hold onto the ankle of your other leg and pull it directly towards your chest.

Lie face down and bend one leg under your stomach, then lean towards the ground (Figs 13.3 and 13.4).

Postnatal depression is a recognized and treatable illness which affects approximately 10-15% of mothers.

People expect that having a baby is going to be source of happiness, some mother may be very far from feeling this straight way and this can bring with it huge anxiety.

Mother may experience a sort of feeling emotional and tearful, which may be brief and manageable—Baby Blues.

Develop deeper and longer term depression is called postnatal depression.

Very rarely, a new mother may experience an extremely severe form of depression known as Puerperal Psychosis.

The "Baby Blues"

New mothers usually get the baby blues 2-4 days after the birth and it is so common that it is regarded as normal.

Symptoms

- Mother may feel very emotional and liable to burst into tears, for no apparent reason or for reasons that may seem quite trivial to other people
- Difficulty to sleep
- May not feel like eating
- Feel anxious, sad, guilty and afraid that they are not up to being a mother.

Causes

- Changes in hormone levels that happen after the birth
- Experience of being in hospital
- Common with those who have experienced problems with pre-menstrual syndrome
- If the depression goes on for longer, however or gets worse, it may be turning into postnatal depression
- They tend to sort itself out and usually does not require any specific treatment than reassurance that what the mother is experiencing is normal

Postnatal Depression

- At least one new mother in ten goes through postnatal depression. Often when baby is between 4 and 6 months old, although it can emerge at any time in the first year.
- It can come on gradually or all of sudden, and can range from being relatively mild to very hard hitting.
- Usually (half of these mothers) they are afraid to tell health visitors about the way they are feeling because they are afraid it will lead to social services taking away their children or that they would be seen as bad mothers.

Common Signs

They may go through one or more of the following experiences:

- Feeling very low or despondent, thinking that nothing is any good, that life is a long grey tunnel and that there is no hope. The feelings persist for most of the time, though they may be worse at certain times of day, particularly the morning.
- Feeling tired and very lethargic or even quite numb. Not wanting to do anything or take an interest in the outside world.
- A sense of inadequacy, feeling unable to cope.
- Feeling guilty about not coping or about not loving the baby enough.
- Being usually irritable, which makes the guilt worse, irritability may with other children, the new baby and particularly with the partner.
- Being unable to enjoy themselves.
- Wanting to cry.
- Losing appetite, which may go with feeling hungry all the time, but being unable to eat. This can be a particular problem since new mothers need all the energy they can get to look after their babies.
- Difficulty in sleeping. Either not getting to sleep, waking early or having vivid nightmares.
- Being hostile or indifferent to baby.
- Being hostile or indifferent to husband.
- Losing interest in sex.
- Having "panic attacks" which are episodes lasting several minutes when they feel as if something catastrophic is about to happen such as collapsing, having a heart attack or stroke. Panic attacks, which strike at any time, causing rapid heartbeat, sweaty palms and feeling of sickness or faintness. They are extremely frightening but they get better on their own.
- An overpowering anxiety, often about things that would not normally bother, such as being alone in the house.
- Difficulty in concentrating or making decisions.

- Physical symptoms, such as stomach pains, head aches and blurred vision
- Observe fears about the baby's health or well being, or about themselves and other members of the family.
- Thought's about death—very frightening and may make them feel as if they are going mad or completely out of control. They may afraid to tell anyone about these feelings.

Causes (Risk Factors)

Postnatal depression can happen whatever their family circumstances and whether or not the baby is the first. They may have managed happily with the first baby and yet become depressed after second. There is no cause for postnatal depression, but a number of possibilities for why mother may become depressed.

- Past history of psychopathology and psychological disturbance during pregnancy
- Low social support
- Poor marital relationship
- Recent life events
- Baby blues
- Parents perceptions of their own upbringing
- Unplanned pregnancy
- Unemployment
- Not breastfeeding
- Antenatal parental stress
- Antenatal thyroid dysfunction
- Copying style
- Longer time to conception
- Depression in fathers
- Emotional liability in maternity blues
- Having two or more children
- The shock of becoming a mother
- Changed relationships
- Help with adjusting
- Lack of support
- Difficult labor
- Stressful life
- Hormonal upheaval (a sudden violent disruption)
- Lack of nutrients during pregnancy
- Previous episodes of depression.

Management

The following produce improvement in postnatal mood:

- IRR therapy
- Massage
- Relaxation therapy
- Antidepressants
- Psychotherapy
- Cognitive behavioral therapy
- Hormonal therapies
- Physical exercises.

Do's and Don'ts

- Don't try to be "super women". Try to do less during pregnancy and make sure that you don't over tire yourself, if you are at work, make sure you get regular meals and put your feet up in lunch hour.
- Don't move house (if you can help it) while you are pregnant or until the baby is six months old.
- Do make friends with other couples who are expecting or have just had a baby, among other things, this could lead to baby sitting cycle.
- Do find some one to talk to.
- Do go to antenatal classes and take your partner with you.

Postnatal

- Do get enough nourishment
- Do find time to have fun with partner
- Do not be afraid to ask for help when you need it
- Good sleep.

Puerperal Psychosis or Postnatal Psychosis

- It is a mental illness which involves a complete break with reality
- This is a rare complication of childbirth, occurring one in every 500 women
- It is most likely to occur in mothers who have previously had an episode of serious mental illness or in those who had a strong family of serious mental illness.

Symptoms

- Disturbance of mood (either elevation of mood or depression)
- Clouding of consciousness
- Muddled thoughts
- False ideas

- Delusions
- Hallucinations
- Symptoms appear from a couple of days to a couple of weeks after the birth.

Treatment

- Depend on exact symptoms.
- Anti psychotic medications.

Importance of Relaxation in Pregnancy

To most people, relaxation is a simple thing that requires no thought or effort, but in reality it can be the most difficult of all of the techniques to learn.

"High levels of stress have been identified as having a pronounced negative effect on the developing fetus". Stress also increases the risk for maternal depression, both antenatally and postpartum.

A woman on bed rest or restricted activity is under great deal of stress. The circumstances of pregnancy may reduce to an "invalid" lifestyle. As remains on bed rest or restricted activity, her body remains to weaken and she begins to experience reduced motility and the complications that can arise from constipation. The women has unlimited amounts of time to think about her baby and worry about her pregnancy, her stress levels can be high.

Relaxation reduced the effects of the symphathetic system's response to stimulus of stress or labor pains (tension, fear, palm sweating, fight or flight response). It increases the effect of parasympathetic nervous system (calmness, increased blood flow, reduced blood pressure, increased general well being) allowing attention to be pulled into focus and increases the effectiveness of the coping skills employed during pregnancy and delivery.

Relaxation has beneficial and calming effects for the baby as well. By increasing the blood flow to the placenta, the flow of oxygen and nutrients is maximized and the level of stress hormones that circulate in blood is reduced. Relaxed muscles are more oxygenated and they work more efficiently thereby making the contractions more efficient and effectively reducing the length of time that labor can take.

RELAXATION EFFECT MODELS

The Specific Effects Model

The frequently observed desynchronizes across behavioral, cognitive, and somatic measures of anxiety has led researchers (e.g. Davidson and Schwartz, 1976) to develop the specific-effects model. They suggest that relaxation oriented to one modality will benefit symptoms of that modality. Based on this model, for example, Jacobson's

progressive relaxation, a somatic treatment, will help somatic symptoms such as tension headaches.

The Relaxation Response Model

H. Benson (1975, 1983), based in his observation of the relaxation effects, argued that all the relaxation techniques produce a single "relaxation response," characterized by diminished sympathetic arousal.

Integrative Model

Schwartz, Davidson, and Goleman (1978), suggests that the majority of the relaxation procedures have highly specific effects, as well as more generally stress-reducing effects, therefore, the specific effects of various relaxation techniques may be superimposed upon a general relaxation effect.

A somatic-cognitive-behavioral distinction has been proposed by different researchers to help in the selection of appropriate relaxation techniques. Their rationale is that techniques directed to one of these modalities appear to have their greatest and most consistent effects on that particular modality.

RELAXATION THROUGH PACING

Pacing is about learning what your body can cope with without causing a relapse or a set back. Pacing is about learning what you really can do. Pacing is about not expecting or doing too much. Pacing is about staying positive about getting better and working sensibly towards that aim. Pacing is about not harming yourself by trying too hard.

Some ideas on how to pace yourself:

- a. Keep a simple diary of everything you do for at least two weeks. Write down how you felt at mid-day, at tea-time and at bed-time. You can get someone to help you do this if you find it hard to remember or if you feel too tired.
- b. After two weeks, read over it to find out what things you did easily without getting tired. You may find you ought to start doing less!
- c. Carry on keeping your diary.
- d. When you read your diary you may spot that certain things you did made you very tired, like having to do a lot of talking. Could it be that phone calls are a real problem for you? Check.
- e. Mental tasks, like talking and listening, can be very tiring. So, when thinking about things to do, it's important to include thinking tasks, such as reading and writing, as well as those that are physical, such as brushing your teeth or getting dressed. Most of the things we do need to use both brain and muscle power.
- f. Quite often the full effect of something you did won't be felt for up to 3 days afterwards. A diary can be really helpful in spotting these sorts of patterns.
- g. Don't just do things the way you have always done them. For example, if you get up in the morning and eat your breakfast, may be have a rest before you get dressed.

- h. If you get tired in the middle of doing something - STOP! Go back to it later in the day or week.
- i. As the days and weeks go by, try to build up slowly. Little by little you do more and more. You may have set-backs and off-days, but that is normal. Don't push too hard.
- j. Your muscles may ache at times. This is normal if you haven't used those muscles for a while. But watch out! Really bad aches or pain mean you are pushing too hard. Don't do it. Pace yourself! You have to become an expert at reading your body.
- k. Do more of the sort of things you enjoy and are good at, so that you are less likely to get fed up or bored and give up.
- l. It can really help to switch between brain activities, like reading and listening, and moving about, physical activities.
- m. Make sure you make time to rest and relax. Resting means just that—doing nothing! Reading and watching TV may be relaxing, but your brain will still be active. Sit in a comfy chair or lie down. Why not listen to a tape or CD that is especially made to help people relax?
- n. Don't be tempted to compare what you can do now with what you used to do before you got ill. It will make you really fed up and gets you nowhere!
- o. Many people find that they begin to feel better as soon as they stop fighting the illness. Do what you can. Build up gently. In the end the illness will have run its course and you will have helped yourself to get strong again.

Progressive Muscular Relaxation

In the early 1920's, Edmund Jacobson developed Progressive Relaxation. Jacobson was one of the first to measure the electrical activity of the muscles. He believed that anxiety showed itself through tension in the muscles, and he believed that if we could reduce the muscular response, then we would also reduce the amount of stress in our bodies, as well.

Progressive Muscle Relaxation Steps

- Sit in a comfortable chair—reclining arm chairs are ideal.
- Get as comfortable as possible—no tight clothes, no shoes, don't cross your legs.
- Take a deep breath; let it out slowly.
- Each tensing is for 10 seconds; each relaxing is for 10 or 15 seconds.
- Coordinate inhalation of breath with the tightening of the muscle phase and then controlled exhalation with the relaxation phase.

For Example

- Tighten your left fist, slowly, inhaling as you do.
- Hold the tension now, about 5 seconds, continuing to inhale and focus on the feelings of tension.

- Really focus on what the tension feels like.
- Feel the burn, the lightness, the tightness and the restriction.
- Label how the tension feels in your mind.
- Now just let go, slowly, and relax, exhaling all of the stale tension and air.
- Notice any of the relaxation sensations, label those.
- Slowly exhale as you name those sensations of relaxation, utter relaxation.

Sequence

Be careful: Problems with pulled muscles, broken bones, or any medical contraindication for physical activities.

1. *Hands:* The fists are tensed; relaxed. The fingers are extended; relaxed (Fig. 15.1).

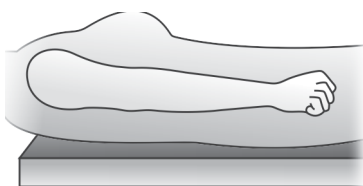


Fig. 15.1: Tensed fist

2. *Biceps and triceps:* The biceps are tensed (make a muscle—but shake your hands to make sure not tensing them into a fist); relaxed (drop your arm to the chair—really drop them). The triceps are tensed (try to bend your arms the wrong way); relaxed (drop them).



Fig. 15.2: Pull shoulders back



Fig. 15.3: Hunch

3. *Shoulders:* Pull them back (careful with this one); relax them (Fig. 15.2). Push the shoulders forward (hunch); relax (Fig. 15.3).
4. *Neck (lateral):* With the shoulders straight and relaxed, the head is turned slowly to the right, as far as you can; relax. Turn to the left; relax.

5. *Neck (forward)*: Dig your chin into your chest; relax (bringing the head back is not recommended—you could break your neck).
6. *Mouth*: The mouth is opened as far as possible; relaxed. The lips are brought together or pursed as tightly as possible; relaxed.
7. *Tongue (extended and retracted)*: With mouth open, extend the tongue as far as possible; relax (let it sit in the bottom of your mouth). Bring it back in your throat as far as possible; relax.
8. *Tongue (roof and floor)*: Dig your tongue into the roof of your mouth; relax. Dig it into the bottom of your mouth; relax.
9. *Eyes*: Open them as wide as possible (frown your brow); relax. Close your eyes tightly (squint); relax. Make sure you completely relax the eyes, forehead, and nose after each of the tensings—this is actually a toughy.
10. *Breathing*: Take as deep a breath as possible—and then take a little more; let it out and breathe normally for 15 seconds. Let all the breath in your lungs out—and then a little more; inhale and breathe normally for 15 seconds.
11. *Back*: With shoulders resting on the back of the chair, push your body forward so that your back is arched; relax. Be very careful with this one, or don't do it at all.
12. *Butt*: Tense the butt tightly and raise pelvis slightly off chair; relax. Dig buttocks into chair; relax.
13. *Thighs*: Extend legs and raise them about 6" off the floor or the foot rest—but don't tense the stomach; relax. Dig your feet (heels) into the floor or foot rest; relax.
14. *Stomach*: Pull in the stomach as far as possible; relax completely. Push out the stomach or tense it as if you were preparing for a punch in the gut; relax.
15. *Calves and feet*: Point the toes (without raising the legs); relax. Point the feet up as far as possible (beware of cramps—if you get them or feel them coming on, shake them loose); relax.
16. *Toes*: With legs relaxed, dig your toes into the floor; relax (Fig. 15.4). Bend the toes up as far as possible; relax (Fig. 15.5).

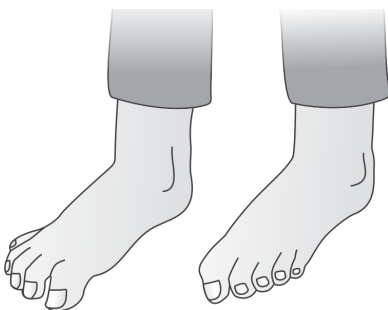


Fig. 15.4: Flexed toes



Fig. 15.5: Extended toes

Progressive Relaxation (By Jacobson, Bernstein and Borkovec)

DA Bernstein and TD Borkovec (1973/1983) carried out an integration and systematization of progressive relaxation method to escape from the array of variations that had been emerging.

a. Muscular groups matching the stages of the basic training proposed by Bernstein and Borkovec (1973):

1. Right hand and forearm
2. Right biceps
3. Left hand and forearm
4. Left biceps
5. Forearm
6. Upper section of cheeks and nose
7. Lower section of cheeks and nose
8. Neck and throat
9. Chest, shoulders and upper part of back
10. Abdominal region and stomach
11. Right thigh
12. Right calf
13. Right foot
14. Left thigh
15. Left calf
16. Left foot.

b. Groups of muscles matching the stages of the intermediate training proposed by Bernstein and Borkovec (1973):

1. Right arm, forearm and hand
2. Left arm, forearm and hand
3. Face
4. Neck
5. Abdomen, chest, shoulders, and back
6. Legs and feet.

c. Groups of muscles matching the advanced training exposed by Bernstein and Borkovec (1973):

1. Hands and arms
2. Face and neck
3. Thorax, shoulders, back, and abdomen
4. Legs and feet.

Mitchell Method of Relaxation

Laura Mitchell, a physiotherapist introduced in 1963, who had a wide experience of teaching and practice in the field of obstetrics.

Mitchell's approach is based on the physiological principle of reciprocal inhibition.

Stress related posture "the punching position" is studied; the working muscle groups are identified and then relaxed by activating the opposing groups. Thus, her approach consists of moving the body out of position of defense or stress and training the mind to recognize the position of ease or relaxation. Joint position sense and skin sensation are used to help retrain the subject to recognize the relaxed position obtained.

Her method is composed of 13 items, referred to as joint changes (although they do not all involve joint activity).

Punching Positions

- Shoulders hunched
- Arms held close to sides
- Fingers curled into the sides
- Legs crossed
- Feet dorsiflexed
- Breathing rapid with noticeable movement in upper chest
- Jaw clenched
- Head held forwards
- Tongue pressed into the upper palate
- Brow furrowed into the frown
- Torso bent forwards
- Hips pursed.

Items of Mitchell Method of Relaxation

- Pull shoulder towards feet
- Slide elbows away from body
 - Elbows out and open in supine position (Fig. 15.6).

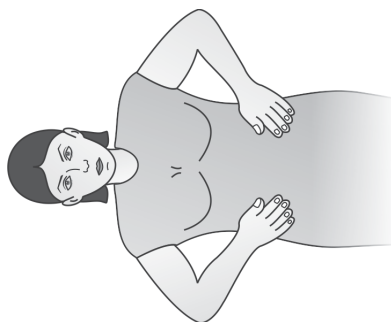


Fig. 15.6: Sliding elbows in supine lying

- Stretch fingers and thumbs (Fig. 15.7).



Fig. 15.7: Stretching fingers and thumb

- Turn hip outwards (Fig. 15.8).

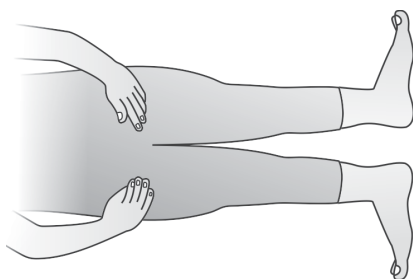


Fig. 15.8: Rotating hip outwards in supine lying

- Move knees until they are comfortable.
- Push feet away from face (Figs 15.9 and 15.10).



Fig. 15.9: In supine

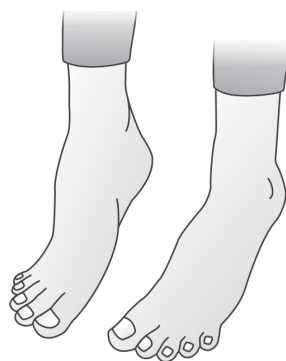


Fig. 15.10: In sitting

- Breathing
- Push body into the support
- Push head into the support
- Drag jaw down wards
- Press tongue down wards in mouth
- Close eyes
- Think of a smoothing action, which begins above eyebrows, rises into hairline, continues over the top of head and down into the back of neck.

A definite sequence of contractions is used to achieve this. The sequence consists of 3 definite instructions:

- Do the chosen movement
- Stop doing it
- Register the new position of the joint concerned and skin sensation (if applicable).

Starting Position

- Supine lying on a firm surface
- Sitting, leaning forwards with head and arms resting on the table (forward lean sitting)
- Sitting in a high backed chair with armrests on which the hands are supported, palms downwards.

Relaxation Response

The technique was developed by Herbert Benson, MD at Harvard medical school. Initiation of the relaxation response occurs through concentration on a passive state. Physiologic changes which have been observed to accompany this stage include decreases in oxygen consumption (significantly lower than in sleep), blood lactate (purported to be associated with anxiety), metabolic rate, heart rate and blood pressure (in subjects with prior elevation of blood pressure). An increase in alpha wave intensity and frequency has also been noted. Benson associates the relaxation response with "an altered state of consciousness". He considers it an altered state because it usually does not occur spontaneously, it must be consciously and purposefully evoked.

Technique

- Sit quietly in a comfortable position
- Close eyes
- Deeply relax all muscles, beginning at feet and progressing up to face. Keep them relax
- Breathe through nose, become aware of breathing. As you breath out, say the word "ONE" silently to yourself. For example:
 - Breath IN-OUT, "ONE", IN-OUT, "ONE", etc
 - Breathe easily and naturally
- Continue for 10-20 minutes
 - When you finish, sit quietly for several minutes, at first with your eyes closed, later with eyes opened. Don't stand up for few minutes
- Do not worry about whether you are successful in achieving a deep level of relaxation. Maintain a passive attitude and permit relaxation to occur at its own pace. When distracting thoughts occur, try to ignore them by not dwelling upon them and return to repeating one with practice the response should come with little effort.
- Don't practice within two hours after any meal, since the digestive processes seem to interfere with the elicitation of the "Relaxation Response".

ALEXANDER TECHNIQUE

I. The Theory of the Alexander Technique

The Alexander Technique is an indirect method of improving human use and functioning. Practice of the technique promotes a continually improving coordination, support, flexibility, balance, and ease of movement.

FM Alexander believed that humans evolved in an environment that did not change very much for thousands of years. Humans, like other animals, used unconscious instinct to direct their movements. Using unconscious, unreasoned, instinctive responses worked, because change happened very slowly, and humans had plenty of time to evolve and adapt to changes. However, as humans developed different cultures and civilizations, change began happening much more rapidly. Unfortunately, humans still used instinctive, unreasoned responses that were suited to a different and more slowly changing environment. Alexander believed that relying on these instinctive responses in new situations is the cause of many if not all of the problems facing civilized people.

The Alexander Technique can help us to become aware of balance, posture and coordination while performing everyday actions. This brings into consciousness tensions throughout our body that have previously gone unnoticed, and it is these tensions which are very often the root cause of many common ailments.

The Alexander Technique is not a quick fix. It is a way of learning, and a way of changing, and these things take time for application.

The Alexander Technique improves the way we use ourselves in everyday activity. Unconsciously acquired habits in movements such as standing, walking or sitting distort the body and interfere with its natural functioning. We react to each stimulus to do something by over tensing or collapsing—literally winding ourselves up (or down!). This 'mis-use' results in aches, pains, tension, and fatigue or simply in feeling ill-at-ease in one's body. The Technique helps us to prevent these unnecessary reaction/habit patterns and to restore our natural 'good use' of ourselves.

'Good posture' is also often recognized as desirable, but is usually only regarded as attainable with considerable willpower and strain, and so efforts towards it soon fall by the wayside.

In fact posture is far more complex than just standing or sitting up straight. It could be described as the way we support and balance our bodies against the ever-present pull of gravity as we go about all our daily activities. From Alexander's own observations, since confirmed by scientific research, it has become apparent that there are natural postural reflexes to organize this support and balance for us without any great effort, provided that we have the necessary degree of 'relaxation activity' to allow these reflexes to work freely.

The mechanisms of support and balance (for which 'poise' is a useful term) can be seen working beautifully in most small children. But they are very delicate mechanisms

and are easily interfered with. The emotional and physical strains accumulated through life can soon become fixed into the body in the form of chronic muscle tensions and patterns of distortion throughout the physical structure. These patterns in turn restrict the workings of the natural postural mechanisms. Common language expressions such as 'things are getting me down' or 'I'm feeling uptight' suggest a feeling for how our relationship with gravity is disturbed.

The role of the Alexander technique is to use guidance with the hands to help unravel the distortions and encourage the natural reflexes to work again. For this to be possible the student must allow themselves to make a pause in their habitual activities and reactions. In this way a balance can be found between the necessary degree of muscle tone (tension) required to support the body against the downward pull of gravity, and the necessary degree of relaxation to allow unrestricted movement, breathing, circulation and digestion.

Along with this manual guidance, Alexander uses verbal instruction to help students become conscious of their own patterns of interference and teaches them to project simple messages from the brain to the body that will help the natural mechanisms of poise to function more freely.

An Alexander Technique lesson often involves simple activities performed while sitting in a chair or lying on a table, but the lesson will always be tailored on individual needs.

II. Concepts Important to the Alexander Technique

Primary Control: Alexander discovered that moving his head in a way he described as "pulling back of the head," resulted in a shortening of his stature, and a worsening of the quality of his functioning. He also discovered that allowing his head to move freely in a direction he described as "forward and up" from the top of his spine resulted in a lengthening of his stature and an improvement in the quality of his functioning. He labeled this discovery "primary control," because this relationship of neck, head and torso was of primary importance in determining the quality of his functioning, and in organizing his reactions into a well coordinated whole.

"...there is a primary control of the use of the self, which governs the working of all the mechanisms and so renders the control of the complex human organism comparatively simple. This primary control...depends upon a certain use of the head and neck in relation to the use of the rest of the body..."

It has three components:

- A neck that is free and whose muscles contain only enough tension to keep the neck upright.
- A head moving forward and up, not back and down to crumple the spine.
- A spine that feels lengthened, thus counteracting any tendency towards sagging.

Psycho-physical Unity: Alexander discovered that if he made a change in one part of his body, that change affected the rest of his body as well. He also discovered that there is no division between "mind" and "body" but that we are indivisible wholes.

"...the unity of the human organism is indivisible. Such that...any change in a part means a change in the whole, and the parts of the human organism are knit so closely into a unity that any attempt to make a fundamental change in the working of a part is bound to alter the use and adjustment of the whole." "Every act is a reaction to a stimulus received through the sensory mechanisms, [and] no act can be described as wholly "mental" or wholly "physical."

The universal constant: Alexander discovered that how he used himself affected how he functioned. He misused himself badly, and as a result had health problems, including trouble with his voice. When he stopped using himself badly, the functioning of his voice improved, as did his overall health. He realized that there was a fundamental relationship between the manner in which he used himself and the general functioning of his whole self that influenced all his activity for either good or ill. He further realized that this relationship between use and functioning is a constant, that is, a person's functioning will continually improve or worsen depending on how they use themselves.

"A good manner of use of the self-exerts an influence for good upon general functioning which is not only continuous, but also grows stronger as time goes on, becoming....a constant influence tending always to raise the standard of functioning and improve the manner of reaction. A bad manner of use, on the other hand, continuously exerts an influence for ill tending to lower the standard of general functioning, thus becoming a constant influence tending always to interfere with every functional activity...and harmfully affecting the manner of every reaction. Our manner of use is a constant influence for good or ill upon our general functioning."

Faulty sensory appreciation: While Alexander was experimenting, trying to discover a better way to use his voice, he would decide to move in a certain way. He would use his feelings (what he called sensory appreciation) to know if he had actually moved in the way he had decided to move. However, when he checked in a mirror, he found out that what he felt he was doing in his body was not what he actually was doing. He realized that he could not rely on feelings alone for accurate information about change.

"Almost all civilized human creatures have developed a condition in which the sensory appreciation (feeling) is more or less imperfect and deceptive, and it naturally follows that it cannot be relied upon in re-education, readjustment and co-ordination, or in our attempts to put right something we know to be wrong with our psycho-physical selves."

Alexander Explains How Faulty Sensory Appreciation can Develop

"We get into the habit of performing a certain act in a certain way, and we experience a certain feeling in connection with it which we recognize as "right." The act and the particular feeling associated with it become one in our recognition."

In addition, Alexander believed that if our sensory appreciation is faulty our judgment will be faulty also.

"Our judgment is based on experience, and we must also see that where this experience is incorrect and deceptive, the resulting judgment is bound to be misleading and out of touch with reality. We have to recognize, therefore, that our sensory peculiarities are the foundation of what we think of as our opinions...."

End-Gaining: During his experimentation, Alexander discovered that he had a very strong desire to go immediately for whatever end he had in mind, using his habitual, unconscious responses, instead of considering a better way (means-whereby) he could achieve his end. He called this desire "end-gaining," and contrasted it with using the best means whereby to gain his end.

[Many people employ a direct procedure when endeavoring to gain a desired end]. "This direct procedure is associated with dependence upon sub-conscious guidance and control, leading, in cases where a condition of mal-co-ordination is present, to an unsatisfactory use of the mechanisms and to an increase in the defects and peculiarities already existing."

III. Alexander Technique Principles

From the above concepts, Alexander derived two principles. We call them the Principle of Prevention on a General Basis (Inhibition and Conscious Direction) and the Principle of Indirect Action (Conscious Direction/Mean's Whereby Principle).

Principle of Prevention on a General Basis (Inhibition and Conscious Direction)

During his experimenting, Alexander discovered that the first step to improving his use, and therefore his functioning, when using his voice, was to prevent himself from making his habitual response to the idea of speaking. Alexander used the word "inhibition" to describe this principle of stopping himself from reacting in an unconscious, habitual way. He further discovered that he could prevent himself from reacting unconsciously if he consciously projected directions that did not allow him to react in his habitual way. Preventing himself from reacting in a habitual (and in his case harmful) way allowed any activity he performed to have a beneficial effect on his overall functioning.

The principle of prevention is "concerned primarily with non-doing in the fundamental sense of what we should not do in the use of ourselves in our daily activities; in other words, with preventing that habitual misuse of the psycho-physical mechanisms which renders these activities a constant source of harm to the organism. The preventive messages projected serve to stop off the misdirection associated with harmful habitual use of ourselves in the performance of an act...."

Principle of Indirect Action (Conscious Direction/Means Whereby Principle)

Alexander also found that he end-gained, that is, he went directly for his end (in his case, speaking). He responded in an unreasoned, habitual way, and relied on the feelings associated with this habitual response to decide if he had done what he wanted to do. As he experimented, however, he developed a new procedure to use. It first involved observing himself to see what he was actually doing; then reasoning out the best means he could use to improve what he was doing; and finally it involved consciously putting the new means into effect. He writes that he must.

"Analyze the conditions of use present; select (reason out) the means whereby a more satisfactory use could be brought about; [and] project consciously the directions required for putting these means into effect."

This new procedure was an indirect way to gain his end. It involved conscious, reasoned analysis, and a conscious directing of him.

"The 'means-whereby' principle...involves a reasoning consideration of the causes of the conditions present, and an indirect instead of a direct procedure on the part of the person endeavoring to gain the desired 'end.' " "Means-whereby"...indicates the reasoned means to the gaining of an end...include[ing] the inhibition of the habitual use of the mechanisms of the organism, and the conscious projection of new directions necessary to the performance of the different acts involved in a new and more satisfactory use of these mechanisms." Direction "...indicates the process involved in projecting messages from the brain to the mechanisms and in conducting the energy necessary to the use of these mechanisms."

- It is important to note that Alexander used the word "instinctive" as synonymous with automatic, habitual and unconscious. In modern biology the term "instinctive" is reserved for those behaviors deemed neurologically predetermined and inborn.

The Technique of Alexander

- The technique itself re-educates the body to perform in a balanced and energy economical way
- Habits of misuse are identified and replaced by more appropriate ways of using the body
- Assessment and corrections are carried out in positions of lying, sitting, standing and walking
- The principal orders and directions, begins with three elements of primary control.

Test for body alignment: An habitual posture whether balanced or not, will feel 'right' to its owner. This makes it difficult for him to recognize miscue in himself. A procedure to solve this matter has been worked out by Barlow (1975).

Stand with your heels 5 centimeters (2 inches) from a wall, with your feet 46 centimeters (18 inches) apart. Let your body sway back until it touches the wall (Fig. 15.11).

If your shoulders and hips touch simultaneously with each side level, your alignment is correct. However, you may find that one side touches the wall before the other or that your shoulders touch before your hips. Do what you can to realign yourself. Next, bend your knees slightly and notice that this action will tend to bring the lumbar vertebrae into contact with the wall (lumbar curve flattened) (Fig. 15.12).

If you can hold this position with relative comfort, then your body is not in a misused state. If you find it unduly tiring, then practice will make it easier and help to restore alignment.



Fig. 15.11: Standing with heels 5 cms from wall



Fig. 15.12: Bending knees with lumbar vertebrae contacting the wall

Relaxation Effects

- Although proponents speak of "balanced use" rather than relaxation, the technique can nonetheless be seen as a method of promoting relaxation.
- Balanced use results in the elimination of excess muscular activity and in establishing of minimum levels of muscle tension.
- Alexander suggests a daily 15 minute session of rest, to be carried out in a crook lying position with a book under the head (height of the book is determined by the shape of the spine). The object is to allow the body to regain its natural symmetry but the procedure is also a relaxing one.

Wittmaack-Ekbom's Syndrome

Restless legs syndrome (RLS) is a condition in which legs feel extremely uncomfortable while sitting or lying down. It usually makes feel like getting up and moving around. When do so, the unpleasant feeling of restless legs syndrome goes away.

Restless leg syndrome usually begins slowly. Over time, the legs become more affected. Less frequently, restless leg syndrome can affect the arms.

Restless legs syndrome affects both sexes, can begin at any age and may worsen as you get older. Restless legs syndrome can disrupt sleep—leading to daytime drowsiness—and make traveling difficult.

A number of simple self-care steps and lifestyle changes may benefit. Medications also help many people with restless legs syndrome.

RLS Pathology

According to the literature, this condition could begin before the age of 10, and may be misdiagnosed as "growing pains," or even attention deficit hyperactivity disorder. In one study, more than 50 percent of the respondents knew of one or more first-degree relatives affected by RLS, and five of 33 patients had RLS initially triggered either by diabetic peripheral neuropathy or lumbosacral radiculopathy.

RLS has been reported to occur in 20 percent of women during pregnancy, and in 20 percent to 62 percent of patients undergoing dialysis. The pathophysiology of this condition is unknown. A family history suggestive of an autosomal dominant mode of inheritance is probable. Using high-resolution, functional magnetic resonance imaging, cerebral generators were localized that were associated with sensory leg discomfort and periodic limb movements in 19 patients with RLS. These findings indicate that cerebellar and thalamic activation may occur because of sensory leg discomfort, and that the red nucleus and brain stem are involved in the generation of periodic limb movements in patients with RLS.

Periodic limb movements in sleep, defined as repetitive flexing of lower limb joints (hip, knee or ankle) and dorsiflexion or fanning of the toes, for periods of 0.5-5 seconds at intervals of 5-90 seconds, are often associated with RLS. Daytime leg movements may also occur in severe RLS; these are also sometimes periodic in nature.

Types

RLS is primary and secondary.

Primary RLS

It is considered idiopathic, or with no known cause. Primary RLS usually begins before age 40 or 45, and can even occur as early as the first year of life. In primary RLS, the onset is often slow. The RLS may disappear for months, or even years. It is often progressive and gets worse as the person ages. RLS in children is often misdiagnosed as growing pains.

Secondary RLS

It often had a sudden onset and may be daily from the very beginning. It often occurs after the age of 40, however it can occur earlier. It is most associated with specific medical conditions or the use of certain drugs. The most commonly associated medical condition is iron deficiency, which accounts for just over 20% of all cases of RLS. The conditions include: Pregnancy, varicose vein, folate deficiency, uremia, diabetes, thyroid problems, peripheral neuropathy, Parkinson's disease and certain auto immune disorders such Sjögren's syndrome, Celiac disease, and rheumatoid arthritis. Treatment of the underlying condition often eliminated the RLS.

Causes

In many cases, no known cause for restless legs syndrome exists. Researchers suspect the condition may be due to an imbalance of the brain chemical dopamine. This chemical sends messages to control muscle movement.

Restless legs syndrome runs in families in up to half of people with RLS, especially if the condition started at an early age. Researchers have identified sites on the chromosomes where genes for RLS may be present.

Stress tends to worsen the symptoms of RLS. Pregnancy or hormonal changes may temporarily worsen RLS signs and symptoms. Some women experience RLS for the first time during pregnancy, especially during their last trimester. However, for most of these women, signs and symptoms usually disappear about a month after delivery.

For the most part, restless legs syndrome isn't related to a serious underlying medical problem. However, RLS sometimes accompanies other conditions, such as:

- *Peripheral neuropathy*: This damage to the nerves in hands and feet is sometimes due to chronic diseases such as diabetes and alcoholism.
- *Iron deficiency*: Even without anemia, iron deficiency can cause or worsen restless legs syndrome. A history of bleeding from stomach or bowels, heavy menstrual periods or repeatedly donate blood, may have iron deficiency.
- *Kidney failure*: In kidney failure, may also have iron deficiency. When the kidney fails to function properly, iron stores in blood can decrease. This, along with other changes in body chemistry, may cause or worsen RLS.
- Pregnancy.

- Obesity.
- Smoking.
- Polyneuropathy (which can be associated with hypothyroidism, heavy metal toxicity, toxins, and many other conditions).
- Some drugs and medications have been associated with restless leg syndrome including caffeine, alcohol, H2-histamine blockers (such as Zantac and Tagamet) and certain antidepressants (such as Elavil).

Signs and Symptoms

People typically describe the unpleasant sensations of restless legs syndrome as "deep-seated, creeping, crawling, jittery, tingling, burning or aching" feelings in their calves, thighs, feet or arms. Sometimes the sensations seem to defy description. People usually don't describe the condition as a muscle cramp or numbness. Common characteristics of the signs and symptoms include:

- *Origination during inactivity:* The sensation typically begins while lying down or sitting for an extended period of time, such as in a car, airplane or movie theater.
- *Relief by movement:* The sensation of RLS lessens by getting up and moving. People combat the sensation of restless legs in a number of ways—by stretching, jiggling their legs, pacing the floor, exercising or walking. This compelling desire to move is what gives restless legs syndrome its name.
- *Worsening of symptoms in the evening:* Symptoms typically are less bothersome during the day and are felt primarily at night.
- *Nighttime leg twitching:* RLS is associated with periodic limb movements of sleep (PLMS). Previously myoclonus, but now they refer to it as PLMS. With PLMS there is involuntarily flexion and extension of legs while sleeping—without being aware of it—often resulting in a restless night's sleep for bed partner. Hundreds of these twitching or kicking movements may occur throughout the night. Severe RLS, results in involuntary kicking movements even at awake. PLMS is common in older adults, even without RLS, and doesn't always disrupt sleep. More than four out of five people with RLS also experience PLMS.

Most people with RLS find it difficult to get to sleep or stay asleep. Insomnia may lead to excessive daytime drowsiness, but RLS may prevent from enjoying a daytime nap.

Although restless legs syndrome doesn't lead to other serious conditions, symptoms can range from bothersome to incapacitating. In fact, it's common for symptoms to fluctuate in severity, and occasionally symptoms disappear for periods of time.

RLS can develop at any age, even during childhood. Many adults who have RLS can recall being told as a child that they had growing pains or can remember parents rubbing their legs to help them fall asleep. The disorder is more common with increasing age.

Screening and Diagnosis

Some people with RLS never seek medical attention because they worry that their symptoms are too difficult to describe or won't be taken seriously. Some wrongly attribute symptoms to nervousness, stress, insomnia or muscle cramps. But restless legs syndrome has received more media attention and focus from the medical community in recent years, making more people aware of the condition.

Questions Used to Diagnose Restless Leg Syndrome

- Do you experience unpleasant or creepy, crawly sensations in your legs, tied to a strong urge to move?
- Does movement help relieve the sensations?
- Are you more bothered by these sensations when sitting or at night?
- Do you often have trouble falling asleep or staying asleep?
- Have you been told that you jerk your legs, or your arms, when asleep?
- Is anyone else in your family bothered by restless legs?

There's no blood or lab test specifically for the diagnosis of RLS. Answers for the above questions help to clarify whether they have RLS or whether testing is needed to rule out other conditions that may explain the symptoms. Blood tests or muscle or nerve studies may be necessary to pinpoint a cause.

Sleep specialist for additional evaluation—This may require that you stay overnight at a sleep clinic, where they can study the sleep habits closely and check for leg twitching (periodic limb movements) during sleep—a possible sign of restless legs syndrome. However, a diagnosis of RLS usually doesn't require a sleep study.

Self-care

Making simple lifestyle changes can play an important role in alleviating symptoms of RLS. These steps may help reduce the extra activity in your legs:

- *Try baths and massages:* Soaking in a warm bath and massaging the legs can relax the muscles.
- *Apply warm or cool packs:* Use of heat or cold, or alternating use of the two, lessens the sensations in the limbs.
- *Try relaxation techniques, such as meditation or yoga:* Stress can aggravate RLS. Learn to relax, especially before going to bed at night.
- *Establish good sleep hygiene:* Fatigue tends to worsen symptoms of RLS. Sleep hygiene involves having a cool, quiet and comfortable sleeping environment, going to bed at the same time every night, arising at the same time every morning, and obtaining a sufficient number of hours of sleep to feel well rested.
- *Exercise:* Getting moderate, regular exercise may relieve symptoms of RLS, but overdoing it at the gym or working out too late in the evening may intensify symptoms.

- *Avoid caffeine:* Sometimes cutting back on caffeine may help restless legs. It's worth trying to avoid caffeine-containing products, including chocolate and caffeinated beverages such as coffee, tea and soft drinks, for a few weeks to see if this helps.
- Stay mentally alert in the evening.
- Wearing compression stockings, tight pantyhose, or wrapping the legs in ace bandages.
- Placing a pillow between the knees or upper-legs while laying in bed.

Coping Skills

Restless legs syndrome is generally a lifelong condition. Living with RLS involves developing coping strategies that work for you. The Restless Legs Syndrome Foundation recommends these approaches.

- *Talk about RLS:* Sharing information about RLS will help the family members, friends and co-workers better understand the condition.
- *Don't fight it:* Get out of bed. Find an activity that's distracting. Stop frequently when traveling.
- Keep a sleep diary.
- *Rise to new levels:* It is more comfortable to elevate the desktop or bookstand to a height that will allow standing while working or reading.
- *Stretch out the day:* Begin and end the day with stretching exercises or gentle massage.
- *Seek help:* Support groups bring together family members and people with RLS. By participating in a group, the insights not only can help themselves but also may help someone else.

17 Symphysis Pubis Dysfunction

Synonym: Pubic shear, Symphyseal separation, Pelvic girdle relaxation, Pelvic joint syndrome, Posterior pelvic pain, Pelvic girdle pain.

Symphysis pubis was an incomplete joint with opposed faces, covered with cartilage and provided with synovial membranes (Fig. 17.1).

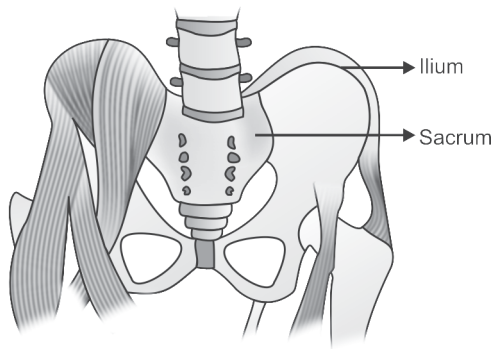


Fig. 17.1: Anterior view of pelvis

In pregnancy, the joint become distended by secretion of synovial fluids, these fluids increase the mobility of the Symphysis pubis.

In 1870, Snelling described the pelvic syndrome as, "the affection appears to consist of a relaxation of the pelvic articulations, becoming apparent suddenly after parturition or gradually during pregnancy and permitting a degree of mobility of the pelvic bones which effectually hinders locomotion and gives rise to the most peculiar distressing and alarming sensations".

Pelvic insufficiency is a kind of preliminary stage of osteomalacia for which disturbances in the calcium metabolism during pregnancy might be responsible.

Possible etiological factors for symphysis pubis dysfunction

- Pelvic instability - Pelvic asymmetry, lordosis, increased load
- Enzymatic - Increased hyaluronidase, decreased collagen synthesis
- Hormonal - Increased estrogen, increased progesterone, relaxin

Metabolic	- Decreased calcium and vitamin D
Traumatic	- Parturition
Inflammatory	- Pubis symphysitis, sacroiliitis
Degenerative	- Arthritis of symphysis pubis
Pregnancy	- Twin pregnancy, maternal weight, delivery position, retroverted uterus, difficult labor, unusual size of the child, abnormal size of the head of the child, muscular weakness
Women	- Oral contraceptives

Normal and abnormal degrees of pubis separation

4-9 mm (normal)

9-20 mm had slight symptoms

>20 mm had marked symptoms

No further widening during parturition

Width of the Symphysis returns to normal shortly after birth.

Symptoms

- Pubic pain
- Pubic tenderness to touch, having the fundal height measured may be uncomfortable
- Low back pain, especially in sacroiliac area
- Difficulty/pain in rolling over in bed
- Difficulty/pain with stairs, getting in and out of cars, sitting down and getting up, putting on cloths, bending, lifting, standing on one foot, etc
- Clicking in the pelvis when walking
- Waddling gait
- Difficulty getting started walking especially after sleep
- Feeling like hip is out of place or has pop into place before walking
- Bladder dysfunction (temporary incontinence at change in position)
- Round ligament pain (sharp tearing or pulling sensation in the abdomen).

Assessment

Subjective

- Fatigue without obvious cause
- Pain
- Difficulty in walking or taking full steps
- Difficulty in turning over in bed
- Difficulty in rising from chair
- Mild or moderate disturbance in gait.

Objective

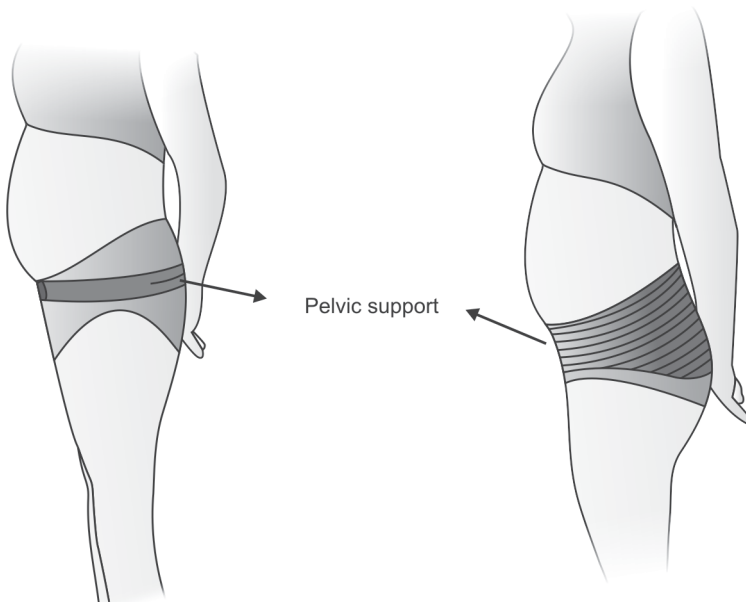
- Waddling gait
- Trendelenburg test positive
- Symptoms of back insufficiency
- X-ray symptoms of diastases
- Posterior pelvic pain provocation test positive—patient felt pain while her vertically positioned femur was gently pressed by the examiner who simultaneously stabilized the pelvis.

Differences between back pain and posterior pelvic pain

<i>Back pain</i>	<i>Posterior pelvic pain</i>
A pain drawing with markings drawn above the sacrum	A pain drawing with well defined markings of stabbing in the buttocks distal and lateral to the L5 S1 area, with or without radiation to the posterior thigh or knee, but not into the foot.
Back pain experienced when the patient bends forward	A history of time and weight bearing related pain in the posterior pelvis, deep in the gluteal area
Decreased motion in the lumbar spine	Pain free intervals
Pain from palpation of the erector spinae muscle	Free ROM in hip and spine and no nerve root syndrome
Negative posterior pelvic pain provocation test	Positive posterior pelvic pain provocation test

Management

- TENS
- Positioning
- Back care
- Acupressure
- Acupuncture
- Movement/strengthening therapies
- Alexander technique and pilates-postpartum
- Pelvic support (Figs 17.2 and 17.3).
- Exercises
 - Abdominal stabilization—siting with feet resting on floor, gently pull in lower abdominals. Hold for 5 seconds
 - Pelvic floor strengthening
 - Gluteus maximus isometric strengthening—sitting or standing, squeeze buttocks together
 - Lattisimus dorsi strengthening—sit on a chair in front of a table or a closed door. Grasp door handle or table with both hands and pull towards you
 - Hip adductor muscle strengthening.

**Fig. 17.2****Fig. 17.3**

Figs 17.2 and 17.3: Maternal support belt can offer extra support and firm pressure

Tips to coping with pubic symphysis pain

- Use a pillow between legs when sleeping
- Use a pillow under pregnancy tummy when sleeping
- Keep leg and hips as parallel as possible when moving or turning in bed
- When getting into bed—sit on the edge of the bed, keep knees close together, then lie down on side, lifting both legs up sideways. Reverse this to get out of bed
- When rolling over in bed—keep knees together
- When getting up from a chair—keep knees together, put hand on knees, bend forward to stand up. Do the reverse to sit down
- When getting into a car—sit down first and then swing leg in, keeping knees together
- When walking, take smaller steps
- When using stairs, step up sideways one step at a time (avoid stairs if possible)
- Move within the limit of pain
- Avoid sitting on a soft sofas and chairs
- Avoid walking as an exercise
- Avoid stretching and exercising with legs apart
- Avoid sudden movements
- Sit down to get dressed, especially when putting on underwear or pants
- Swimming (avoid breaststroke)

- When standing, stand symmetrically with weight evenly distributed through both legs
- Water bed, silk/satin sheets—easier to turn over in bed
- Water aerobics
- Icepack
- Heat therapy
- Massage
- Be extremely carefully of birth positioning:
 - Don't give birth on back (supine lying)
 - Avoid semi sitting
 - Alternative birth positions—standing, kneeling, all fours.

Pelvic floor exercises from early pregnancy reduce the risk of developing Symphysis pubis dysfunction.

Complications

One of the most interesting side effects of a misalignment of the pelvic bones is that anecdotally, it often seems associated with malpositions of the baby.

18 Swelling During Pregnancy

During pregnancy, the body produces approximately 50% more blood and body fluids to meet the needs of the developing baby.

Swelling is a normal part of pregnancy that is caused by additional blood and fluid. This extra fluid is needed to soften the body, which enables it to expand as the baby develops. Extra fluid also helps prepare the pelvic joints and tissues to open to allow the baby to be born. The extra fluids account for approximately 25% of the weight women gain during pregnancy.

Areas—hands, face, legs, ankles and feet.

Causes

Growing uterus puts pressure on pelvic veins and on vena cava. The pressure slows down circulation and causes blood to pool in legs, forcing fluid from veins into the tissues of feet and ankles.

Risk Factors

- Summertime heat
- Standing/sitting for long period of time
- Diet low in potassium
- High level of caffeine consumption
- High level of sodium intake
- Certain medications
- Varicose veins
- High or low blood pressure.

Symptoms

Excessive or sudden swelling of ankles and feet, hands or in face around eyes could be a sign of pre-eclampsia (a serious condition, also called toxemia) that causes high blood pressure and fluid retention. Women experience any of the following symptoms:

- Sudden or severe swelling of hands and feet
- Severe headache

- Blurred vision
- Dizziness
- Severe pain in the belly
- A pound or two pound weight gain in a short period of time.

Management

- While sleeping, lie on side
- Elevate leg slightly with pillows
- Left side lying works best since vena cava is on the right side of the body
- Don't cross legs or ankles while sitting
- Stretch legs frequently while sitting
- Ankle toe movements (Fig. 18.1).

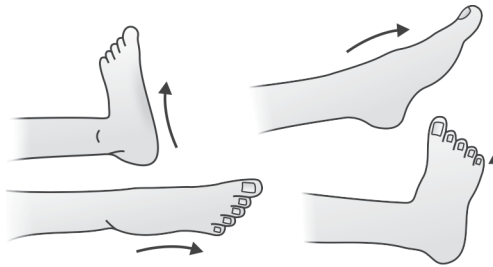


Fig. 18.1: Ankle toe movements

- Take breaks from sitting/standing
- Take a short walk often
- Avoid tight clothing
- Wear comfortable shoes that stretch to accommodate the swelling
- Try waist high maternity support stocking, put them on before get out of bed in the morning, so blood has no chance to pool around ankles
- Drink plenty of water (flush the body and reduce water retention)
- Stay cool
- Exercise regularly—walking, swimming, water exercises
- Avoid high heel shoes
- Minimize sodium intake
- Well balanced diet
- Massage
- Avoid over consumption of diuretic foods such as caffeine.

19 Thoracic Outlet Syndrome

Thoracic outlet syndrome (TOS) refers to compression of the neurovascular structures at the superior aperture of the thorax.

Types

- Neurologic TOS (compression of brachial plexus — 95%)
- Venous TOS (compression of subclavian vein — 4%)
- Arterial TOS (compression of subclavian artery — 1%).

The brachial plexus, subclavian vein, subclavian artery are subject to compression or irritation as they course through three narrow passage ways from the base of the neck toward the axilla and proximal arm.

Interscalene Triangle

- Bordered by anterior scalene muscle anteriorly, middle scalene muscle posteriorly, medial surface by the first rib inferiorly
- The area is small at rest and become even smaller with provocative maneuvers
- Fibrous bands, cervical ribs, anomalous muscles may constrict this triangle further.

Costoclavicular Triangle

- Bounded anteriorly by middle third of clavicle
- Posteromedially by first rib
- Posterolaterally by upper border of the scapula.

Subcoracoid Space

Beneath the coracoid process just deep to pectoralis minor tendon. Common age group—20-50 years.

Causes

- Bad posture (in women with and without pregnancy)
- Cervical rib (most arterial TOS, rare in venous and neurologic TOS)
- Congenital fibromuscular bands (80% with neurologic TOS)
- Elongated C1 transverse process

- Trauma to the shoulder
- Motor vehicle accidents—hyperextension injury with subsequent fibrosis and scarring (scalene muscle)
- Effort vein thrombosis (spontaneous thrombosis of the axillary veins following vigorous arm exertion)
- Shoulder abduction or extension for long periods
- Bone spurs on the cervical vertebrae
- Old fractures of the clavicle that limit space for vessels
- Disc protrusion, herniation or degeneration
- Carrying heavy shoulder bag
- Postural distortions caused by, pectoralis minor, sternocleidomastoid, scalenes, trapezius, levator scapulae, forward head and rounded shoulders, scoliosis, kyphosis
- Loss of curvature in the neck due to longus coli shortening
- Excessive exercises leading to shortening of shoulder and neck muscles
- Irritation or compression of C3-C8 spinal nerves causing increased tension and spasm in anterior scalene muscle
- Anterior scalene tightness
- Pectoralis minor tightness
- Fibrositis of the cervical and shoulder area
- Shallow breathing—hypertrophy of scalene muscle.

Signs and Symptoms

Vascular

- Swelling or puffiness in the arm or hand
- Bluish discoloration of the hand
- Feeling of heaviness in the arm or hand
- Pain associated with strenuous work
- Pulsating lump above the clavicle
- Deep boring tooth ache like pain in the neck and shoulder region which seems to increase at night
- Easily fatigued arms and hands
- Superficial vein distension in the hand, shoulder, chest.

Neurologic

- The most common symptom is paresthesia along the inside forearm and the palm (C8 and T1 dermatome).
- Muscle weakness and atrophy of the gripping muscles (long finger flexors) and small muscles of the hand (thenar and intrinsic).

- Difficulty with fine motor tasks of the hand
- Cramps of the muscles on the inner forearm (long finger flexors)
- Pain in the arm and hand
- Tingling and numbness in the neck, shoulder region, arm and hand
- Cold intolerance
- Headache
- Second most common anatomic pattern involves the upper three nerves of the brachial plexus, C5, C6 and C7 with symptoms referred to the neck, ear, upper chest, upper back and outer arm in the radial nerve distribution
- Supraclavicular tenderness
- Gilliat Sumner Hand
 - Most dramatic atrophy in the abductor pollicis brevis, with lesser involvement of interossei and hypothenar muscles.

Arterial

- Pain
- Claudication
- Pallor and pulselessness
- Coolness of the affected extremity
- Lower blood pressure in affected arm of greater than 20 mmHg.

Special Tests

EAST Test

Elevated Arm Stress Test

- (OR) Hands up test
- (OR) Roos test
 - Most reliable screening test
 - The patient brings their arms up as shown with elbows slightly behind the head (Fig. 19.1). The patient then opens and closes their hands slowly for 3 minutes (Fig. 19.2). A positive test is indicated by pain, heaviness or profound arm weakness or numbness and tingling of the hand.

Adson Test

The examiner locates the radial pulse. The patient rotates their head toward the tested arm and lets the head tilt backwards (extends the neck) while the examiner extends the arm. A positive test is indicated by a disappearance of the pulse.

Allen Test

The examiner flexes the patient's elbow to 90 degrees while the shoulder is extended horizontally and rotated laterally. The patient is asked to turn their head away from



Fig. 19.1

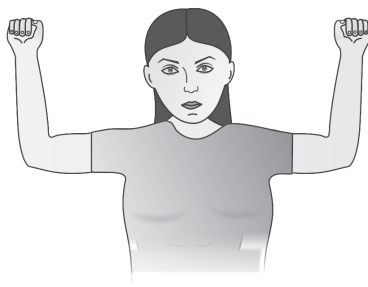


Fig. 19.2

Figs 19.1 and 19.2: Roos test

the tested arm. The radial pulse is palpated and if it disappears as the patient's head is rotated the test is considered positive.

Costoclavicular Maneuver

The examiner locates the radial pulse and draws the patient's shoulder down and back as the patient lifts their chest in an exaggerated "at attention" posture. A positive test is indicated by an absence of a pulse. This test is particularly effective in patients who complain of symptoms while wearing a back-pack or a heavy jacket.

Wright Test

Find the radial pulse. Passively raise arm out to the side and above the head (abduction of shoulder) holding for several seconds. Check for diminishing pulse. A positive sign indicates pectoralis minor or coracoid process compression.

Traction Test

Find the radial pulse. Apply firm traction on the arm for several seconds checking for diminishing pulse. A positive sign indicates cervical rib pressure on the tested side.

Provocative Elevation Test

This test is used on patients who already present with symptoms. The patient sits and the examiner grasps the patient's arms. The patient is passive as the shoulders are elevated forward and into full elevation. The position is held for 30 seconds or more. This activity is evidenced by increased pulse, skin color change (more pink) and increased hand temperature. Neurological signs go from numbness to pins and needles or tingling as well as some pain as blood flow to the nerve returns. Similar to what is felt after an arm "falls asleep" and circulation returns.

Treatment

- Stretching the neck

Using the arm which is on the side of the tightness assume the position which is demonstrated, the head turning away from the pain (left image). The hand behind

the head helps stabilize the head position. Take a deep breath, exhale slowly while bending the knees keeping the elbow where it is against the wall.

Another method for stretching the back of the neck can be accomplished by sitting down in a sturdy chair (right image). Turn the head away from the tight side, look down until a slight stretch is felt. Reach down with the hand on the tight side and hold onto the chair. With the other hand pull the head forward, gently (Fig. 19.3).

- Stretching the chest
- Stretching the shoulder
- Pectoralis stretching
- Mobilization of the first rib.

Use a large bath towel and grasp it at opposite corners. Sling it across the shoulder of tightness and bring both ends across to the opposite hip or waist. With the arm on that side pull gently downward then release slowly (Fig. 19.4).

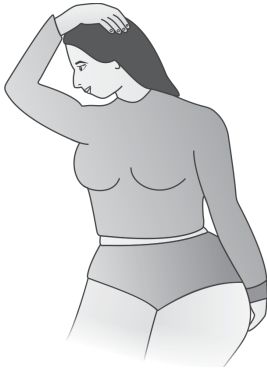


Fig. 19.3: Neck stretch

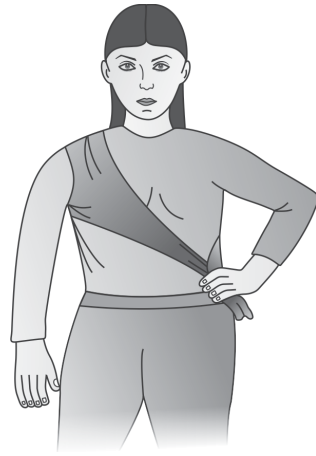


Fig. 19.4: Stretching using towel

SIMPLE VOMITING OF PREGNANCY OR MILDER TYPE

Synonym: Morning sickness, Emesis gravidarum.

Morning sickness is a condition associated with nausea and vomiting.

Morning sickness affects 50-80 % of pregnant women. Morning sickness can happen any time of day. Some women suffer for short periods of time, while others suffer for several weeks.

Morning sickness usually starts around fourth to sixth week and ends by 14-16 week. Although, it can start at week one and last for entire pregnancy.

The vomitus is small and clear or bile stained. It does not produce any impairment of health or restrict the normal activities of the women. The feature disappears with or without treatment by 12-14 weeks of pregnancy.

Causes

- Hormonal—Increased hCG level, helps to prepare the body for upcoming pregnancy
- Sensitivity to smell—It is thought that estrogen and other hormones may contribute to this heightened sense
- Gastrointestinal tract sensitivity during pregnancy.

Management

- Move the limbs for a few minutes before getting out of bed
- Taking a dry toast or biscuit before rising from bed
- Avoid fatty and spicy foods
- Avoid warm places since heat can increase nausea feelings
- Get up slowly after eating
- Don't shake up stomach after eating
- Get out of bed slowly in the morning
- Don't drink many fluids during meal. Drink before and after eating
- Avoid dehydration, drink small amounts of liquids many times during the day

- Drinking noncaffeinated tea like ginger or peppermint can calm nausea
- Good sleep and rest.

If simple measures fail, antiemetic drugs will be given.

HYPEREMESIS GRAVIDARUM

Hyperemesis Gravidarum is a severe type of vomiting of pregnancy which has got deleterious effect on the mother and or incapacitates her in day to day activities.

It is a condition that hampers a woman's life style.

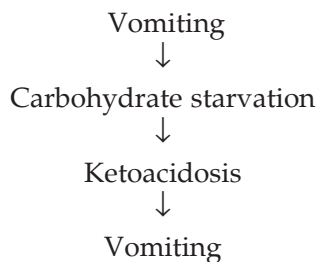
Facts

- It is mostly limited to the first trimester
- It is more common in first pregnancy, with a tendency to reoccur again in subsequent pregnancies
- It has got a familial history
- More prevalent in multiple pregnancy
- More common in unplanned pregnancies.

Causes

1. Hormonal:
 - a. Excess of hCG
 - b. Hyperoestrinism
 - c. Excess progesterone leading to relaxation of the cardiac sphincter and simultaneous retention of gastric fluids due to impaired motility
 - d. Adrenocortical insufficiency
2. Psychogenic: Probably aggravates the nausea once it begins
3. Dietetic deficiency: Probably due to low carbohydrate reserve as it happens after a night without food
4. Deficiency of vitamin B₆, vitamin B₁ and proteins
5. Allergic
6. Immunological basis.

Vicious Cycle of Vomiting



Pathology

- All are manifestations of starvation and severe malnutrition
- *Liver*: Centrilobular fatty infiltration without necrosis
- *Kidney*: Occasional findings of fatty change in the cells of first convoluted tubule which may be related to acidosis
- *Heart*: There may be subendocardial hemorrhage
- *Brain*: Small hemorrhages in the hypothalamic region giving the manifestation of Wernicke's encephalopathy
- *Metabolic*: Inadequate intake of food results in glycogen depletion. For the energy supply, the fat reserve is called upon. Due to low carbohydrate, there is incomplete oxidation of fat and accumulation of ketone bodies in the blood. The acetone is ultimately excreted through the kidneys and in the breath. There is also increase in endogenous tissue protein metabolism resulting in excessive excretion of non-protein nitrogen in the urine. Water and electrolyte metabolism are seriously affected leading to biochemical and circulatory changes.
- *Biochemical*: Loss of water and salts in the vomitus results in fall in plasma sodium, potassium and chlorides. The urinary chloride may be well below the normal 5 gm/liter or may even be absent. Hepatic dysfunction results in acidosis and ketosis with rise in blood urea and uric acid, hypoglycemia, hypoproteinemia, hypovitaminosis and rarely hyperbilirubinemia.
- *Circulatory*: There is hemoconcentration leading to rise in hemoglobin percentage, RBC count and hematocrit values. There is a slight increase in the white cell count with increase in eosinophils. There is concomitant reduction of extracellular fluid.

Symptoms of Hyperemesis Gravidarum

- Severe nausea
- Persistent excessive vomiting
- Dehydration
- A decrease in urination due to dehydration
- Maternal weight loss or failure to gain weight
- Rapid heart rate
- Headache and confusion
- Skin may become pale looking and dry
- Constipation, at times diarrhea
- Epigastric pain
- Loss of weight
- Anxious look
- Eyes—dull, sunken
- Tongue—dry, becoming brown

- Teeth—covered with sordes
- Breath—acetone smell
- Rapid pulse 100-120 or more per minute
- Low blood pressure 100-110 mmHg
- Temperature 100° F.

Signs of Dehydration

- Pinched skin "snap back" slowly
- Flushed dry skin
- Decreased tearing and salivation
- Coated tongue
- Confusion or irritability
- Decreased urination
- Very dark color urine.

Complications

- Wernicke's encephalopathy—mental apathy, restlessness, sleeplessness, convulsion or even coma
- Korsakoff psychosis—mental confusion with loss of memory of recent events
- Features of peripheral neuritis
- Eye—diplopia, dimness of vision
- Jaundice—late feature
- Stress ulcer in stomach.

Hook (1976) and Profet (1988) hypothesized that morning sickness protects the embryo by causing pregnant women to physically expel and subsequently avoid foods that contain teratogenic and abortifacient chemicals, especially toxic chemicals in strong tasting vegetables, caffeinated beverages and alcohol.

Flaxman and Sherman, (June 2000) has quoted that symptoms peak when embryonic organogenesis is most susceptible to chemical disruption (6-18 weeks), women who experience morning sickness are significantly less likely to miscarry than who do not, women who vomit suffer fewer miscarriages than those who experience nausea alone. Morning sickness serves an adaptive prophylactic function.

However, a small percentage of women develop a serious disorder called Hyperemesis gravidarum, during pregnancy. This is a severe form of morning sickness characterized by persistent vomiting, nausea, dehydration and weight loss. 2% of women find it impossible to keep any food down at all during early pregnancy. This can lead to severe complication, if left untreated, leads to:

- Nutritional deficiencies
- Electrolytic imbalance

- Poor fetal growth
- Fetal complications, including miscarriage.

Prevention and Management

Along with the preventive measures mentioned for simple vomiting, the following treatment methods may be considered:

- Relaxation exercises—to reduce stress
- Acupressure:

The patient's wrist is held so that pressure is evenly applied by the flexor surface of the index, middle and ring fingers of the therapist to the distal 5 cm of the forearm. The thumb gives counter pressure underneath. The force applied should be similar to that of a firm handshake.

The acupuncture point stimulated is P6. Pressure is applied for 30 seconds at a time. The non-invasive nature of this technique could be attractive to pregnant women, who could apply their own pressure. A rounded button stitched to a 2 cm wide elastic bracelet and worn so that the button presses on the acupuncture point may also give relief.

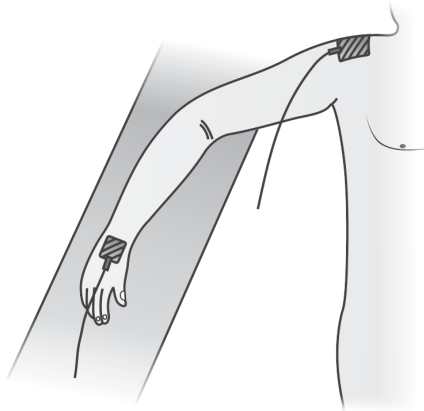


Fig. 20.1: Placement of TENS electrodes

- Acupuncture
- TENS

A high rate TENS of 120 Hz with a medium pulse width of 150 micro seconds, is advised, with minimal intensities. Electrodes are placed at the right acromial tip and at the traditional (right) "hoku" position (i.e. the web space between thumb and forefinger) (Fig. 20.1). It is recommended that treatment be administered for 30 minutes each morning. Interesting to note is that this technique does not seem to work if placed on the left.

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