

Hip Joint



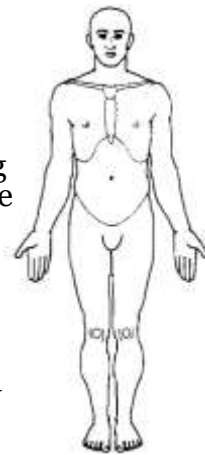
Important role in Balance & Posture

1

Long Driving

- **Subjective Examination**

A 39-year-old man complained of a severe aching pain across his lower back, with radiation into the right buttock, posterior thigh, calf, and lateral foot and two toes. He also complained of severe lancinating pain into the posterior right leg on trunk flexion, which disappears on standing upright but increases in the lower back, buttock, and leg for a few minutes afterwards. Paresthesia in the posterolateral calf and lateral plantar aspect of the foot and two toes was also experienced when sitting.



2

- The onset of the symptoms was 2 weeks earlier with right low-back pain after driving for 6 hours without a break. Over the next few days the pain increased due, the patient believed, to further sitting at work as a computer program designer. The back pain increased and spread to both sides of the back. The ache began first in the buttock and gradually over a day or two spread down the leg. The lancinating pain and paresthesia had been a recent development starting 2 days earlier.

3

- The paresthesia was associated mainly with prolonged sitting and for an hour or two after experiencing the lancinating pain. The pain was worse with prolonged sitting especially in a soft chair and was painful for the first few minutes on standing from sitting. Walking was difficult, especially the first few steps, and had to be done slowly. He was most comfortable in right-side lying with the hip and knees flexed.



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- This man has a history of minor back pain after comparatively heavy exertion such as prolonged yard work but nothing that had caused more than a few hours discomfort or that required treatment.

The patient denied any medical history of significance and appeared in good health. He reported no recent change in health status. He does not smoke or drink alcohol. He has no problem with bladder, bowel, or genital function.

5

Objective Examination

The patient is healthy looking but slightly obese and looks young for his age. He stands with a moderate kyphosis and a scoliosis convex to the right with the right knee slightly flexed.

The patient had severe restriction of lumbar movement.

Flexion was limited to about 30° from his kyphotic start position if the right knee was kept flexed. If he attempted to straighten the knee, trunk flexion

was zero. **In** both cases, attempted flexion produced lancinating pain in the posterior aspect of the right leg.

Extension and right-side flexion was unobtainable and caused a sharp pain in the back, radiating into the right buttock and posterior thigh. Left-side flexion was about 25% limited and produced a moderate ache into the right lower back.

Compression testing reproduced back, right buttock, and posterior thigh pain. Posteroanterior pressure over L4 and L5 were painful and provoked a spasm end feel

6

- The right SLR was unobtainable because the patient was unable to extend the knee without lancinating pain in the posterior right leg and hamstring spasm. Flexing the hip to 90° and extending the knee (Lasegue's test) allowed only 100° of knee flexion before the onset of radicular pain and spasm. Right ankle dorsiflexion in this position reproduced the lancinating pain. The left straight leg raise was limited by spasm to 55° and produced right low-back, right buttock, and posterior thigh pain. Neither neck flexion or left ankle dorsiflexion in conjunction with the SLR affected the patient. The slump/sitting SLR test reproduced the effects of the other SLR tests without change. Prone knee flexion was negative on both sides. Although the sacroiliac stress tests were negative, all of the sacroiliac joint kinetic tests on both sides were positive.

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- Dermatomal testing revealed some pinprick loss over the lateral border of the right foot and toe and over the skin of the posterolateral right calf. Myotomal tests demonstrated pronounced weakness of the right ankle plantar flexors and evertors. There was no change in the deep tendon reflexes of either leg. Spinal cord tests were negative. List your concerns, if any. Then diagnose and treat.

8

Diagnosis

The onset, severe articular limitations, and neurological findings make this a fairly clear-cut case of uncontained (large prolapse or extrusion) herniation of the fifth lumbar disk with isolated compression of the first sacral spinal nerve and dural sheath causing sensory and motor paresis.

Various studies have suggested that the most indicative test results for an uncontained disk herniation are severe articular signs, severe loss of straight-leg raise, a crossover straight-leg raise, and the presence of lancinating pain. Other studies have found that the spinal nerve only produces lancinating pain or causalgia and to do this, there must be either inflammation or preexisting neural adhesions.

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- The kinetic tests are irrelevant and should not have been carried out.
With this degree of lumbar dysfunction, these tests almost have to be positive.
There are no red flags for this case as such, but there are plenty of yellow ones. A disk herniation can easily get worse. With the lancinating pain and neurological signs, the need for caution is being screamed by this patient's presentation. Progression to a cauda equina syndrome is possible.

10



Treatment

- Although manipulation has been advocated for disk herniation, mainly by chiropractors, the success rate is not very high, **whereas the risk of exacerbation and worsening is**. Even if this progression is a natural one, independent of your intervention, you are in close proximity and likely to be blamed

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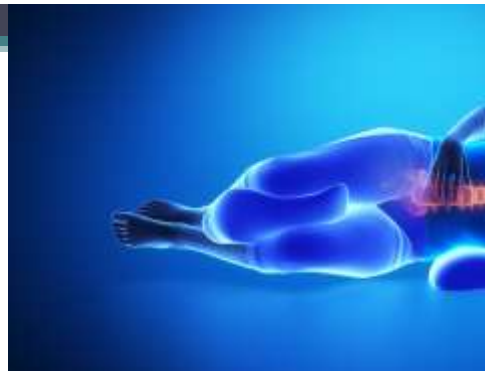


- Correcting the shift a la McKenzie is not likely to be very successful with a herniation as obvious as this one. **More likely the attempt will cause spasm and possibly reproduce the patient's symptoms**. However, a trial attempt is unlikely to be dangerous and, if it fails, do not waste time by repeating this. Similarly, **exercises alone are not likely to be curative**. However, if you are going to try exercises, make sure that they do not reproduce the patient's symptoms.

12


- Rest is always an option in acute cases. There is evidence that the lancinating pain and even the neurological symptoms may be caused by chemical irritation and/or simple contact with the escaped nucleus pulposus rather than simple compression.
- Simple spinal nerve or root compression has been demonstrated to produce motor and sensory paresis and paresthesia but not pain, unless the compression is against the dorsal root ganglion, which of course is a possibility in this case. However, rest is still a good and safe bet.

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- Let the patient select his own position, providing that it does not produce pain either at the time or afterward. Changing positions is almost invariably required, and selected careful painless activities and exercises are useful. Being guided by the pain, especially the lancinating pain, will reduce the contact with the irritated nervous tissue and should help to lessen the inflammation. In general, the patient should avoid sitting, bending, and lifting and should be shown how to use pillows to support the legs while lying.

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- 
- Mechanical traction may be used with caution in the position of deviation. Usually if the traction tends to correct the deviation, the patient has serious trouble when the traction lets off. These notorious cases can take hours getting a patient off of traction.

If this is an axillary prolapse, traction may be more effective, if it is reversed; that is, the pull is from the thorax rather than from the pelvis.

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Prognosis

- Unless rest produces remarkable results (which it does sometimes), this patient is in trouble. The degree of neurological involvement, especially when combined with movements other than flexion causing lancinating pain, does not suggest a good prognosis with physical therapy. This patient may require surgery. Having selected your treatment and administered it on four treatment sessions, the patient returns on the third visit to tell you that although the lancinating pain and aching are unchanged, the paresthesia has disappeared. What is your reaction?

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Discussion

- There are two probabilities here. The patient is recovering, which is demonstrated by the absence of the parasthesia.
- Or the patient is worsening and the parasthesia has been replaced by increased sensory paresis, indicating increasing pressure on the spinal nerve or posterior root. The patient may not be aware of decreasing sensation or may not be volunteering information. **In** either case, the neurological signs must be reassessed in detail. If they have worsened, treatment should be discontinued and either another tried or the patient referred back to the physician. If there is no change in the neurological signs or if improved, continuation of the same treatment is indicated.

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- With very difficult problems, there is a tendency to take the most optimistic view of generated information especially subjective information. Be critical. Subject the patient to clinical testing and fairly pointed questioning. **In** this case, such questions as "Has the feeling in your leg changed?" or "Do you feel stronger or weaker than when I last saw you?" may give a hint about progress.

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Resting Position

- Flex 30
- Abd 30
- ER slight

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Close Pack

- Flex 90
- Abd & ER slight

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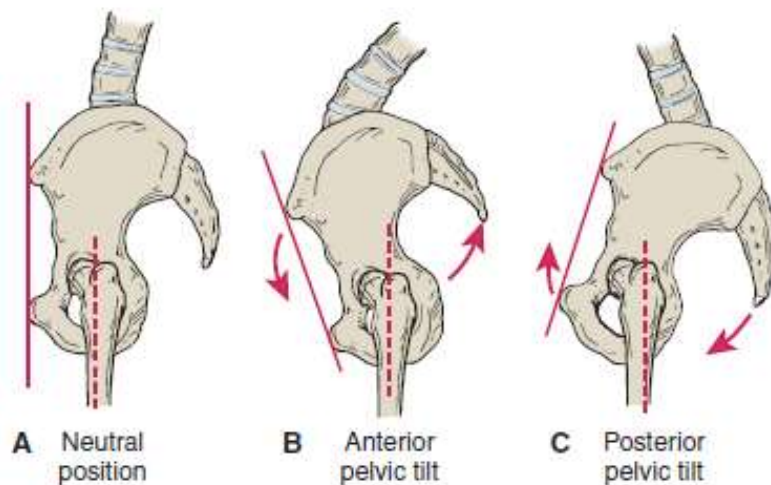
BOX 20.1 Summary of Arthrokinematics of the Femoral Head in the Hip Joint

Physiological Motions of the Femur

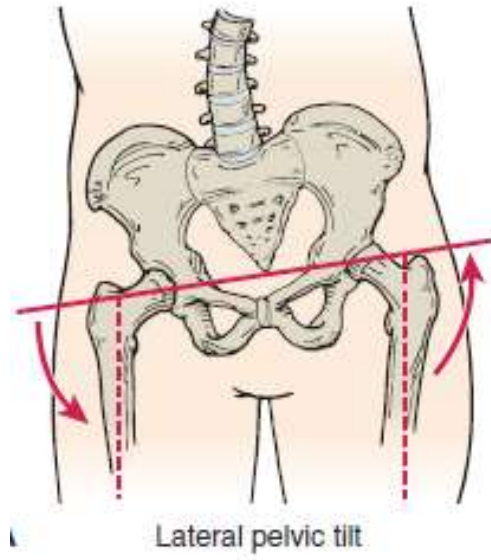
	Roll	Slide
Flexion	Anterior	Posterior
Extension	Posterior	Anterior
Abduction	Lateral	Inferior
Adduction	Medial	Superior
Internal rotation	Medial	Posterior
External rotation	Lateral	Anterior

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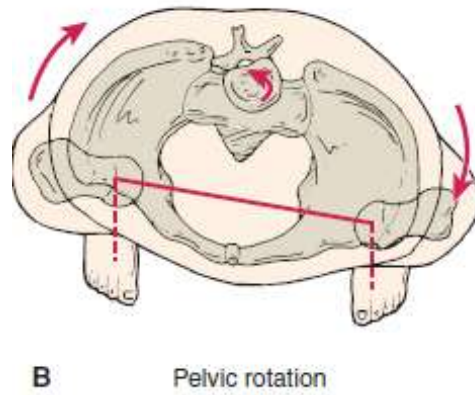
Lumbo-pelvic rhythm



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BOX 20.2 Hip Muscle Imbalances Related to Postural Impairments

Anterior Pelvic Tilt Posture

- Short TFL and IT band
- General limitation of hip external rotation
- Weak, stretched posterior portion of the gluteus medius and piriformis
- Excessive internal rotation of the femur during the first half of stance phase of gait with increased stress on the medial structures of the knee
- Associated lower extremity compensations including internal rotation of the femur, genu valgum, lateral tibial torsion, pes planus, and hallux valgus

Slouched Posture

- Shortened rectus femoris and hamstrings
- General limitation of hip rotators
- Weak, stretched iliopsoas
- Weak and shortened posterior portion of the gluteus medius
- Weak, poorly developed gluteus maximus
- Associated lower extremity compensations including hip extension, sometimes internal rotation of the femur, genu recurvatum, genu varum, and pes valgus

Flat Back Posture

- A shortened rectus femoris, IT band, and gluteus maximus
- Variations of the above two postures



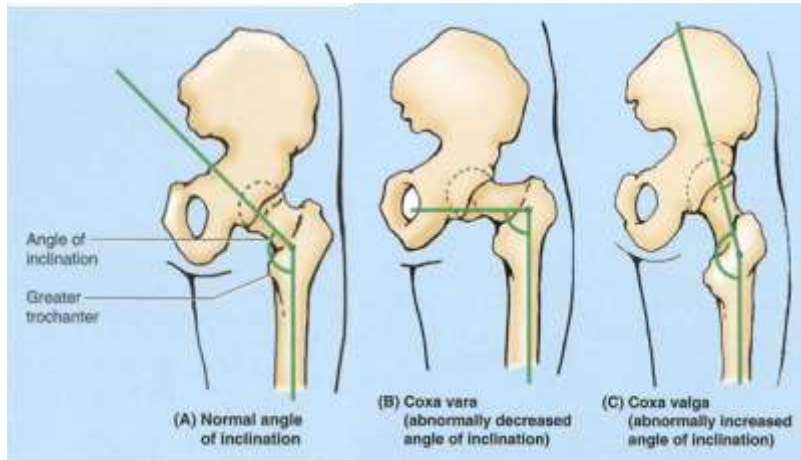
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Patho-mechanics in hip Region : e.g.LLD



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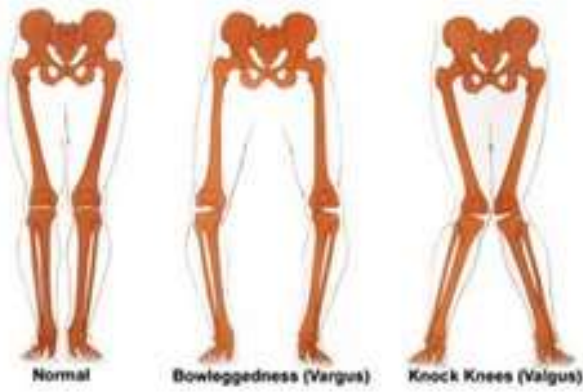
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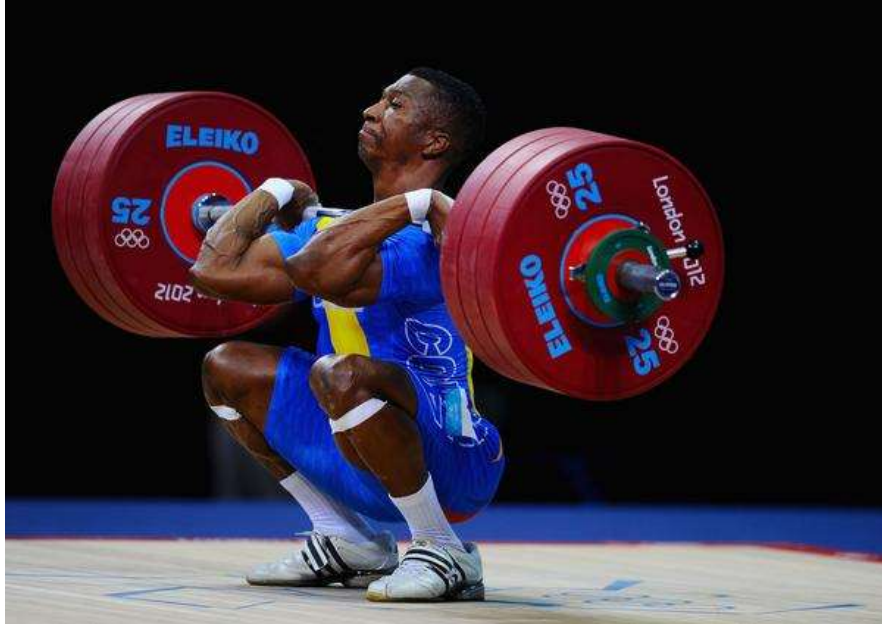
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Quattrocycle



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- Faulty posture & disuse of G max
- Decrease flexibility
- Limited hip Flex : compensated L/Flex
- With disuse..Hamstring dominates as Ext
- Overuse leads to cramping in high demand activity & decrease Flexibility, imbalance with quads.
- Domiated Hamstring in close chain by pulling Tibia post.
- Overuse syndrome / Ant knee pain d/t imbalance in quads pull

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Referred pain in Hip & buttock region

- Nerve roots or tissues derived from spinal segments L1, L2, L3, S1, and S2.
- Lumbar intervertebral and sacroiliac joints.

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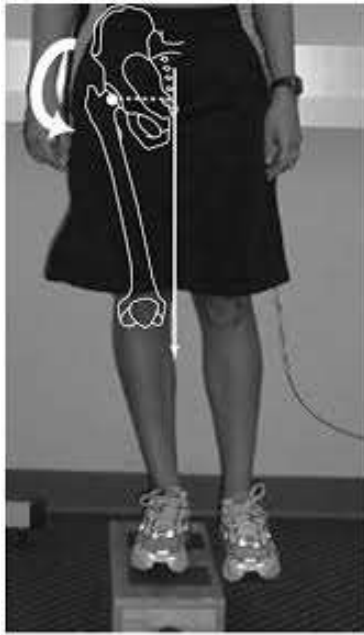
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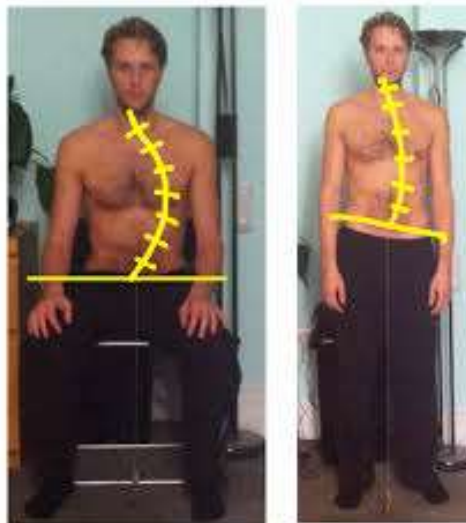
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Unilateral short leg.

- A unilateral short leg causes lateral pelvic tilting (drop on the short side) and side-bending of the trunk away from the short side (convexity of the lateral lumbar curve toward the side of short leg). This may lead to a functional—or eventually a structural—scoliosis.
- ❖ Causes of a short leg could be unilateral lower extremity asymmetries, such as **flat foot**, genu valgum, **coxa vara**, tight hip muscles, anteriorly rotated innominate bone, poor standing posture, or asymmetry in bone growth

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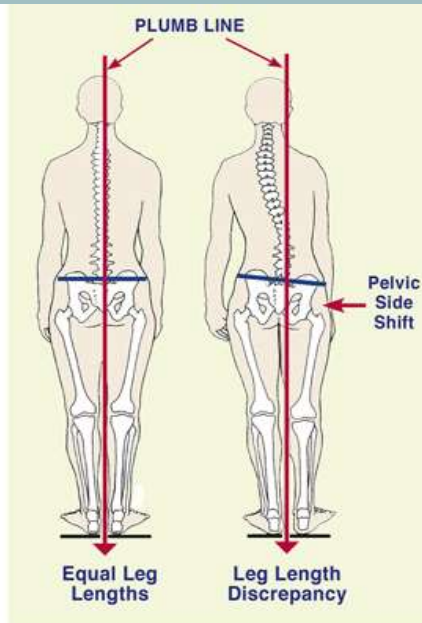
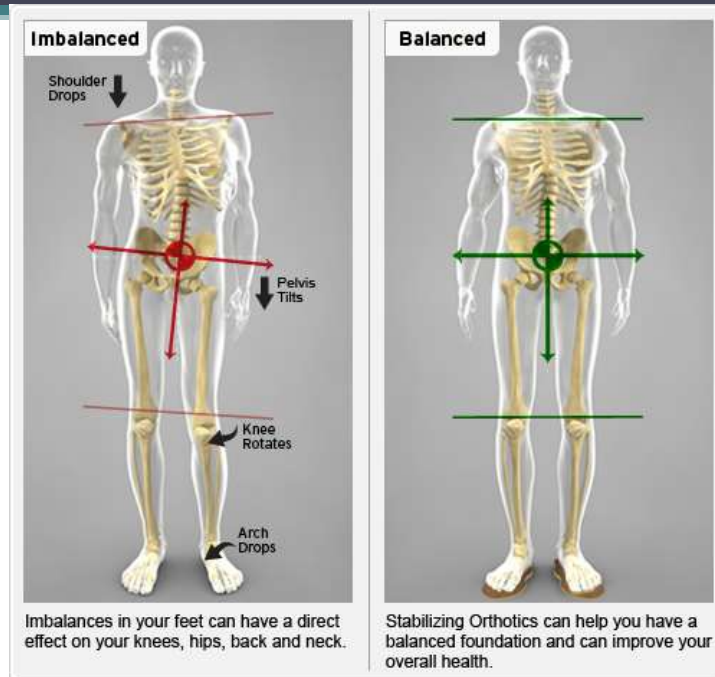


Fig. 5

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How to predict whether person is having Hip osteoarthritis ??

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BOX 20.3 Clinical Prediction Rule for the Diagnosis of Osteoarthritis of the Hip¹³⁹

Variables*

- Self-reported squatting aggravates symptoms.
- Active hip flexion causes lateral hip pain.**
- The scour test with adduction causes lateral hip or groin pain.
- Active hip extension causes pain.
- Passive internal rotation is less than or equal to 25°.**

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Trochanteric Bursitis

Pin in lateral hip
Down thigh ,knee
When ITB rub over
Trochanter..
Discomfort e Standing
asymmetrically
For long time with
Effected elevated hip
& Add ,pelvis drop on
the opposite side.



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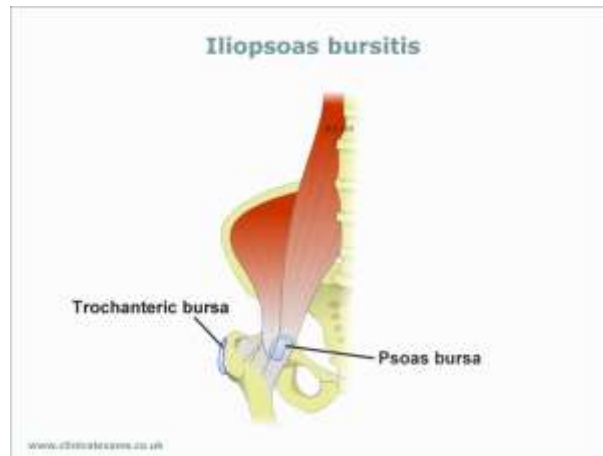


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Psoas bursa



51

- Pain is experienced in the groin or anterior thigh and possibly into the patellar area when there is inflammation of the psoas bursa.

Activities requiring excessive, repetitive hip flexion aggravate the condition

52

Ischial /ischioagluteal bursitis(tailor's/weaver's bottom)

- With inflammation pain is experience in sitting
- If Sciatic Symptoms Then may be irritation sec to swelling



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Indication for Surgery for MSK disorders ??

BOX 12.1 Indications for Surgery for Musculoskeletal Disorders of the Extremities and Spine

- Incapacitating pain at rest or with functional activities
- Marked limitation of active or passive motion
- Gross instability of a joint or bony segments
- Joint deformity or abnormal joint alignment
- Significant structural degeneration
- Chronic joint swelling
- Failed conservative (nonsurgical) or previous surgical management
- Significant loss of function leading to disability as the result of any of the preceding factors

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Indication for Hip surgery

- Severe hip pain with motion and weight bearing and marked limitation of motion as the result of joint deterioration and loss of articular cartilage associated with osteoarthritis, rheumatoid or traumatic arthritis, ankylosing spondylitis, or osteonecrosis (avascular necrosis), leading to impaired function and health-related quality of life
- Nonunion fracture, instability or deformity of the hip
- Bone tumors
- Failure of conservative management or previous joint reconstruction procedures (osteotomy, resurfacing arthroplasty, femoral stem hemiarthroplasty, primary THA)

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Contraindication to THA

- Absolute
 - Active joint infection
 - Systemic infection or sepsis
 - Chronic osteomyelitis
 - Significant loss of bone after resection of a malignant tumor or inadequate bone stock that prevents sufficient implant fixation
 - Severe paralysis of the muscles surrounding the joint

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cont

Relative

- Localized infection, such as bladder or skin
- Insufficient function of the gluteus medius muscle
- Progressive neurological disorder
- Highly compromised/insufficient femoral or acetabular bone stock associated with progressive bone disease
- Patients requiring extensive dental work—dental surgery should be completed before arthroplasty
- Young patients who must or are most likely to participate in high-demand (high-load, high-impact) activities

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Pre OP

- Pt current status of activity
- Pt Education

60

- Examination and evaluation of pain, ROM, muscle strength, balance, ambulatory status, leg lengths, gait characteristics, use of assistive devices, general level of function, perceived level of disability
- Information for patients and their families about joint disease and the operative procedure in nonmedical terms
- Postoperative precautions and their rationale including positioning and weight bearing
- Functional training for early postoperative days including bed mobility, transfers, gait training with assistive devices
- Early postoperative exercises
- Criteria for discharge from the hospital

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Posterior/Posterolateral Approaches

ROM

- Avoid hip flexion > 90° and adduction and internal rotation beyond neutral.

ADL

- Transfer to the sound side from bed to chair or chair to bed.
- Do not cross the legs.
- Keep the knees slightly lower than the hips when sitting.
- Avoid sitting in low, soft chairs.
- If the bed at home is low, raise it on blocks.
- Use a raised toilet seat.
- Avoid bending the trunk over the legs when rising from or sitting down in a chair or dressing or undressing.
- When bathing, take showers, or use a shower chair in the bathtub.
- When ascending stairs, lead with the sound leg; when descending, lead with the operated leg.
- Pivot on the sound lower extremity.
- Avoid standing activities that involve rotating the body toward the operated extremity.
- Sleep in supine position with an abduction pillow; avoid sleeping or resting in a side-lying position.

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TABLE 20.4 Risk Factors Contributing to Joint Dislocation after Total Hip Arthroplasty

Patient-Related Factors	Surgery/Prosthesis-Related Factors
<ul style="list-style-type: none"> ■ Age > 80 to 85 years^{93,97} ■ THA for femoral neck fracture 	<ul style="list-style-type: none"> ■ Surgical approach: higher risk with posterior than anterior, anterolateral, or lateral approaches
<ul style="list-style-type: none"> ■ Medical diagnosis: higher risk in patients with inflammatory arthritis (mostly RA) than patients with OA^{68,157} 	<ul style="list-style-type: none"> ■ Design of femoral component: higher risk with smaller-sized femoral head⁶⁸ ■ Malpositioning of the acetabular component
<ul style="list-style-type: none"> ■ Poor quality soft tissue from chronic inflammatory disease ■ History of prior hip surgery ■ Preoperative and postoperative muscle weakness (particularly the abductor mechanism)⁶⁴ and contractures ■ Cognitive dysfunction, dementia 	<ul style="list-style-type: none"> ■ Inadequate soft tissue balancing during surgery or poor quality soft tissue repair ■ Experience of the surgeon

63



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66



67

DO AND DONTs	
<p>In sitting Do Not bend hip above 90 degree</p>	<p>Do Not cross legs when sitting</p>
<p>Do Not bend body forward to pick objects</p>	<p>Do Not rotate leg when standing. Keep leg straight</p>

68

Post OP management



69

Weight bearing

- Cemented fixation : WBAT
- Hybrid / cement less :
Partial wt bearing / toe touch for 6 wk to WBAT
- early weight bearing as tolerated after cementless or hybrid primary THA can be safe in a young patient population (< 60 to 65 years of age) with excellent bone quality.

70

- the responsibility of determining the need for protected weight bearing during the early phase of postoperative rehabilitation after THA remains with the surgeon.

71



72

Individualized strengthening program

Decision to discontinue use of an ambulation aid,regaining sufficient strength of the hip abductors and extensors to maintain stability and symmetry during ambulation.

73

Structural and functional limitations

- Pain
- Decrease ROM
- Muscle guarding / spasm
- Impaired postural stability
- Balance
- Difficult transfers and ambulation
- Wt bearing restriction and mobility



74

- Post Op Stay 2-4 days
- PT sessions two times a day

75

Feelings after consecutive lectures



76



77

Prevent vascular and pulmonary complications

- Ankle pumping exercise to prevent venous stasis, thrombus formation, and the potential for pulmonary embolism.
- Deep breathing exercise and bronchial hygiene to prevent postoperative lung pathology continued until the patient is up and about on a regular basis.

78

Prevent postoperative dislocation or subluxation of the operated hip.

- Patient and caregiver education about motion restrictions, safe bed mobility, transfers, and precautions during other ADL
- Monitor the patient for signs and symptoms of dislocation

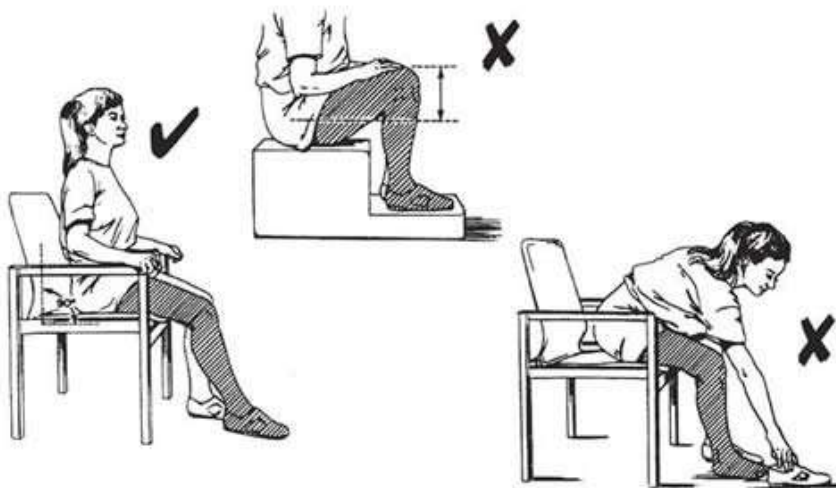
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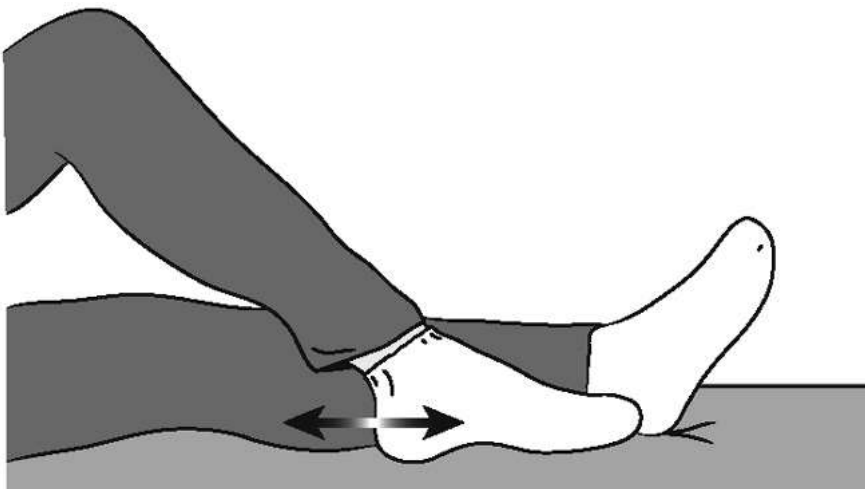
Norco Bed Pull-Up Assist Strap Mobility Aid



84



85



86

Achieve independent functional mobility prior to discharge

- Bed mobility, rising from and sitting down in a chair, and transfer training, emphasizing proper trunk and lower extremity alignment and integrating weight-bearing and motion restrictions

87



88



89



90

Common structural and functional limitations



- Pain
- Decrease ROM
- Muscle guarding & weakness
- Impaired postural stability & balance
- Decrease functional mobility(ambulation & transfers)
- Wt bearing=1/mobility

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Goals & intervention of Early Post OP Rehab

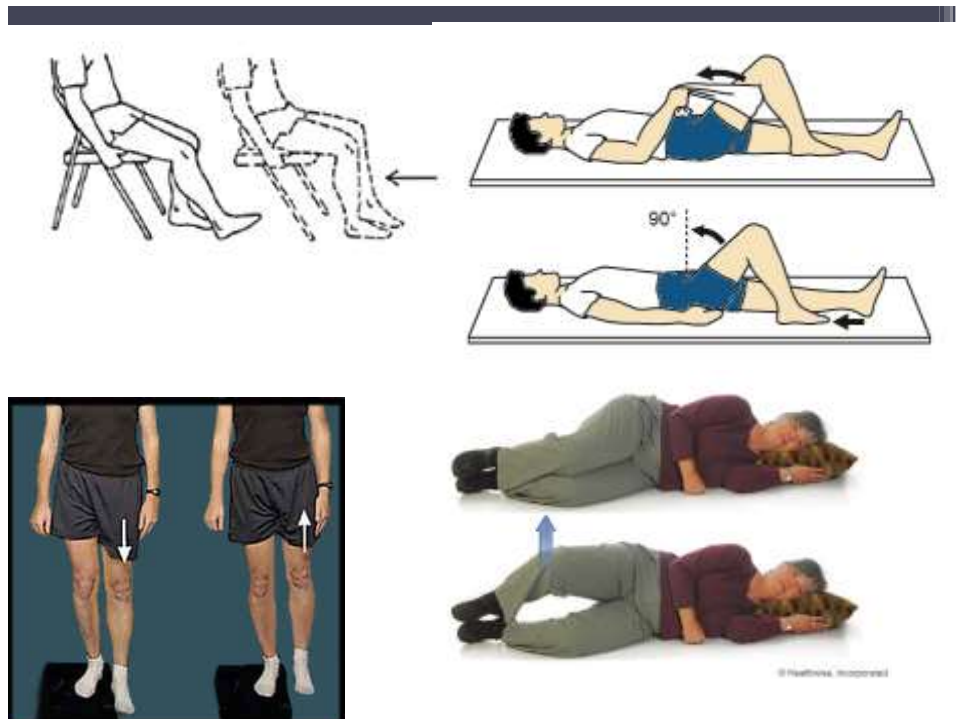
- Prevent vascular & Pulmonary Complications
- Prevent Post OP Dislocation / subluxation
- Independent mobility prior to discharge
- Ambulation with assistive devices
- Stair climbing

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Th Ex in Max Protection Phase

- AP
- Prevent dislocation / subluxation
- Assisted ambulation
- Maintenance of functional strength & endurance in U/Es in sound L/E.
- Preventing atrophy in OP L/E: Sub-max MSE
- Active Mobility & control of OP Ext
(AROM in protected ranges)
(Seated Knee Flex/Ext focusing more on Ext)
(horizontal Plane Hip Abd)
Active Hip ROM in standing
(Hip Hiking) but with wt bearing consid. (Dynamic Balance)

93



94

Flexion contractures...



95

Advance to next Phase

- Well-healed incision; no signs of wound drainage or infection
- Independent level-ground ambulation with one crutch or a cane or no assistive device if weight-bearing restrictions permit
- Ability to bear full weight on the operated extremity without pain and with the knee fully extended
- Functional ROM of the hip
- Muscle strength of operated hip: at least 3/5

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Moderate Protection phase

- Begins 4th - 6th Wk Post Op
- Full Wt bearing and in some cases protected wt bearing by 12 weeks post OP
- Full healing of soft tissue and bone continues for up to a year after surgery.
- Th Ex & functional training for Ms strength esp Abd & Ext
- Symmetrical gait pattern
- Muscular & Cardio pulmonary endurance
- Functional Level ROM

97

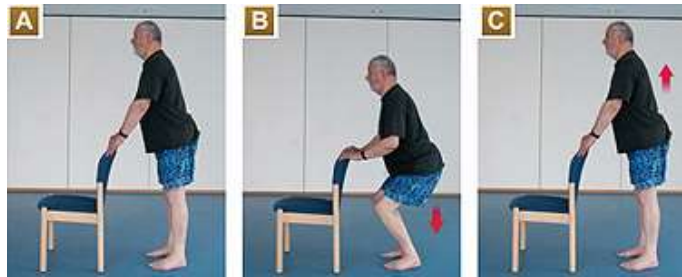
- Post OP precautions during ADLS for 12 wk – longer
- ***Regain strength and muscular endurance, emphasizing strength of hip **abductors** and **Extensors** (**Light R, More Reps** rather R)***

Open chain Ex in op limb within protected ROM



98

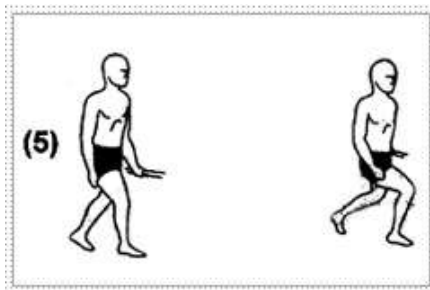
Assisted mini squats e weights in hand



99



- Lunges e involve forward



100

Cardio pulmonary Endurance



101



102

ROM Restoring but with precautions in mind

- degrees of hip Ex beyond Neutral



Ant / Ant Lat approach

103



104

Improve Posture , balance & Gait



- Cane to decrease Ms fatigue



105



106



Criteria to progress in next stage

- Pain-free ambulation with or without a cane and previous exercises
- Functional ROM and strength of the operated hip
- Independence in ADL

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Minimum protection phase

- Occurs around 12 Wks Post OP
- Restoration of Ms strength, Endurance, Gait
- Return to full level of functions take a year.

108

Single Leg Squat



**Strong Hip Abductors =
level pelvis and lower
leg aligned with thigh**



**Weak Hip Abductors =
tilted pelvis and excessive
angle at knee between
the lower leg and thigh**

109

Return to sports (low-moderate impact sports

- Body weight
- Level of demand
- Twisting movements
- Degree of impact
- Repetitive patterns
- Potential of fall
- Level of fitness
- Experience of game



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life of the hip replacement

- refrain from high-impact sports and recreational activities.
- Activities that impose heavy rotational forces on the operated hip can contribute to long-term loosening and wear of the prosthetic implants and eventual failure of the hip replacement

111

Avoiding impact sports/ activities

Allowed

- Golf
- Swimming
- Walking (outdoor/treadmill)
- Stationary cycling or use of elliptical trainer
- Cross country ski unit
- Bowling
- Low-impact aerobics
- Speed walking
- Hiking
- Stair-climbing or rowing units
- Doubles tennis
- Use of weight machines



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Allowed with Caution and Prior Experience

- Pilates
- Cross-country skiing
- Rollerblading
- Ice skating
- Downhill skiing



113

Not Allowed*

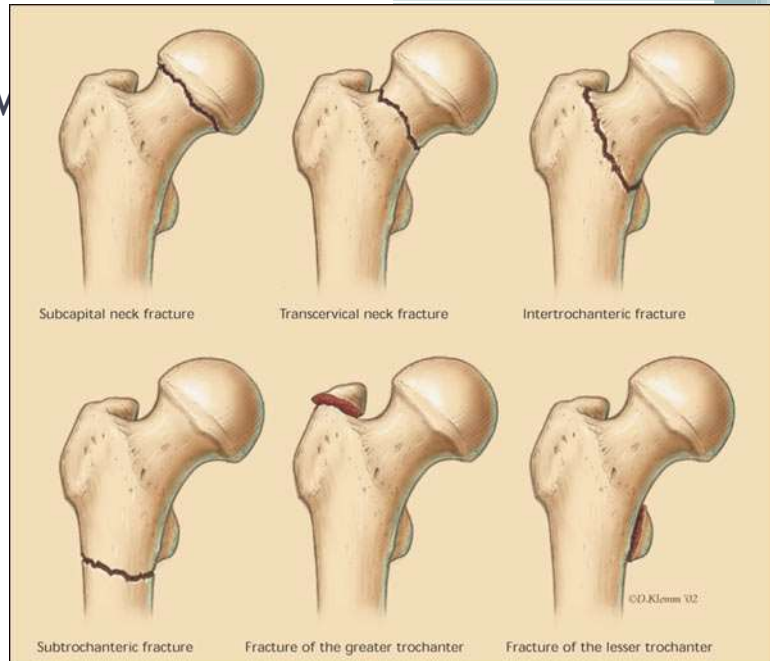
- Jogging/running
- Baseball/softball
- Racquetball/squash
- Snow boarding
- High-impact aerobics
- Contact sports (football, basketball, soccer)



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116



117

Hip # & Post OP management

- One of the more common musculoskeletal problems in the elderly is fracture of the hip or, more correctly, fracture of the most proximal portion of the femur in the hip region. **The acute signs and symptoms of hip fracture are pain in the groin or hip region, pain with active or passive motion of the hip, or pain with lower extremity weight bearing.** The lower extremity appears to be shorter by several centimeters and assumes a position of external rotation.

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Risk factors for falls and the potential for hip fractures in the elderly

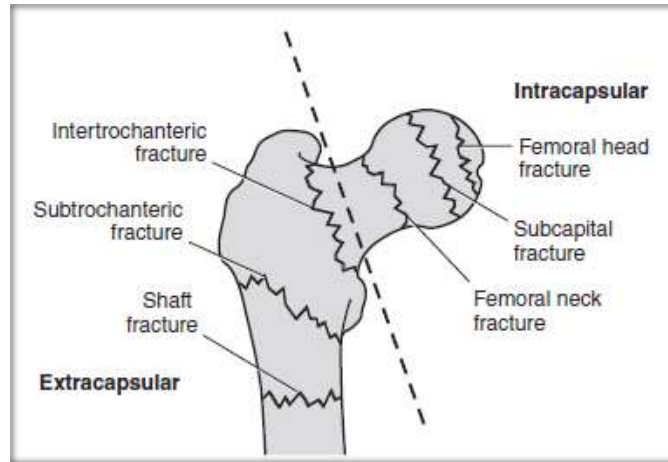
- Age-related loss of muscle strength and flexibility, balance and gait deficits associated with musculoskeletal or neurological disorders,
- Low vision,
- Cognitive decline
- Medications

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- Walking speed decreases with age, particularly past 70 to 80 years,
- falls to the side as a result of loss of balance, rather than falling forward on outstretched hands as occurs with faster walking speeds

120



121

- Reduction and internal fixation with compression Screws



122

- Side Plate & screw



123

Post OP after ORIF Hip #s

- 1st Post OP day
- Prevent Vascular complications
- Restoration Ms control of hip during functional activities.
- Restoration of Hip ROM
- Balance
- strength in U/Es
- 80° to 90° of active hip flexion (with the knee flexed) by 2 to 4 weeks postoperatively
- **Low-intensity resistance exercises** *of the operated hip* may be delayed until 4 to 6 weeks postoperatively to allow time for the hip muscles incised during surgery to heal.

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■ *Prevent vascular and pulmonary complications*

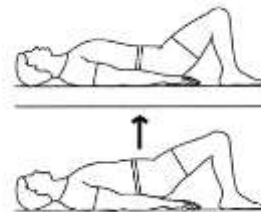
- Ankle pumping exercises performed regularly throughout the day to maintain circulation and reduce the risk of DVTs and thrombo-emboli.
- Deep breathing exercises and airway clearance to prevent pulmonary complications

125

Improve strength in the upper and sound lower extremities

Exercises against progressive levels of resistance targeting key muscle groups used to lift body weight during bed mobility, standing transfers, and ambulation with assistive devices.

- Emphasis on closed-chain training with **most weight on the sound extremity**, such as bridging exercises, **to simulate the movement patterns used during these activities.**



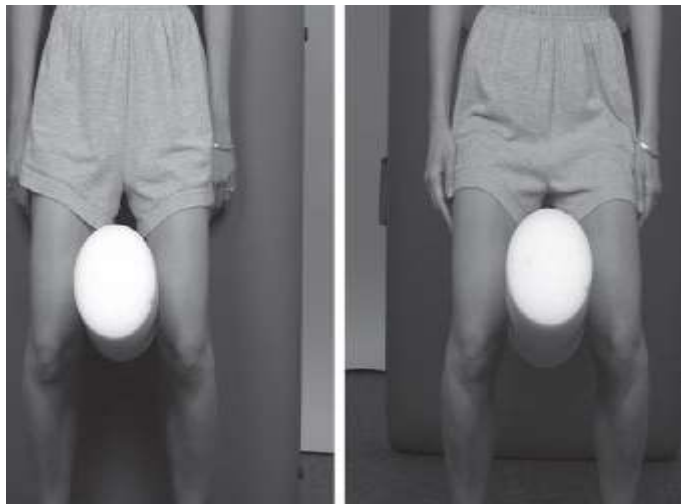
126

Re-establish balance, postural stability, and safe independent functional mobility within weight-bearing restrictions

- Weight-shifting activities in bilateral stance.
- Heel and toes raises in bilateral stance.
- Stabilization exercises in bilateral stance (alternating isometrics/rhythmic stabilization).
- Balance activities with self-initiated perturbations by reaching in various directions.
- Bed mobility, transfers, and gait training with an assistive device.

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Dynamic stabilization



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Prevent postoperative reflex inhibition of hip and knee musculature

- Low-intensity isometric (setting) exercises of the hip and knee musculature of the operated extremity.

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Restore mobility and control of the operated hip and adjacent joints

- Assisted, progressing to active ROM of the involved hip and knee in progressively more challenging positions as pain and fracture healing permit. For example, in the supine position, perform heel slides before straight leg raises (SLRs).
- ****Pelvic tilts and knee-to-chest movements with the *uninvolved* leg to prevent stiffness in the low back region.**
- Unassisted SLR in standing before supine lying

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Moderate & minimum protection Phases

- Soft tissue healing is complete by 6th wk
- By 8-12th WK some degrees of bone healing.
- By 6th Wk PWB ,WBAT is permissible****
- 8-12 wks switch from assistive devices to normal. Some continue to use cane
- Strength
- Functional Control
- Level of functional activities

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Increase flexibility of chronically shortened Ms

- Plantflexors , Hip Flex , Hamstrings



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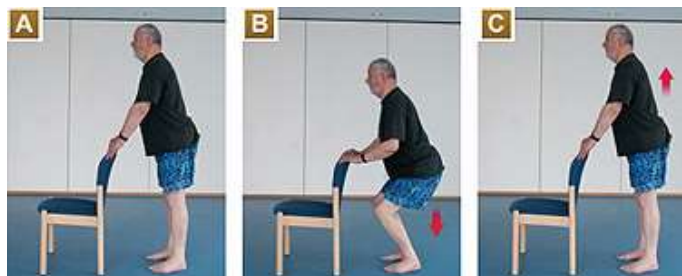
Close chain Ex



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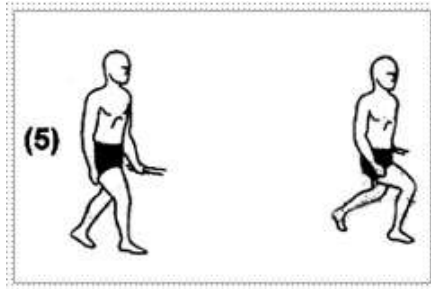
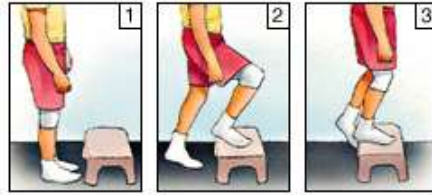
Assisted mini squats



- Heel Raises once PWB is allowed

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Once WBAT is allowed



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- Open-chain hip and knee exercises initially against light to moderate resistance (up to 5 lb) with elastic resistance or cuff weights. Emphasize hip extension and abduction for a positive impact on ambulation

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Task specific training



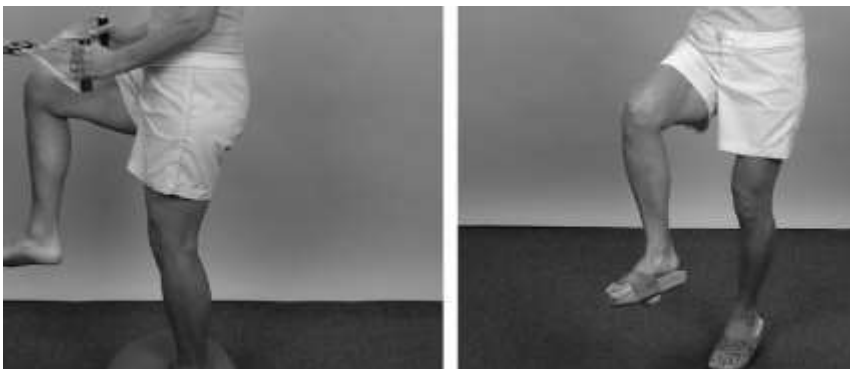
137



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Cardio pulmonary Endurance



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Aerobic Training

- Stationary cycle
- Treadmill walking
- Improve walking distance & velocities

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