Arabian Gulf University
College of Medicine & Medical Sciences
Academic Year 2015/2016

UNIT VII

Professional Skills Musculo-Skeletal System
Tutor Guide

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Further reading & references:

- Clinical Orthopaedic Examination
  - Author: Ronald McRae
  - Publisher: Churchill Livingstone
  - 6th Edition, 2010

- Apley's Concise System of Orthopedics and Fractures
  - Authors: L Solomon, D J Warwick, S Nayagam
  - Publisher: Hodder Arnold
  - 3rd Edition, 2005
  -

- Google search

INTRODUCTION

At the beginning of the programme, the students should understand than medical practice is based on the concept of management. Management in medical practice has three components as follows:

Diagnosis
Management and Treatment
Rehabilitation

Diagnosis has three components as follows:

History
Clinical examination
Investigations

In year 4, students should have appropriate knowledge for the different components of Diagnosis.

HISTORY:
It is expected that each student will prepare and write a history of a patient beside outlines of clinical examination. That should be reviewed by the tutor of the group.

INVESTIGATIONS:
Over the course of the 9 problems in Unit VII, students should be able to know many of the investigations performed for patients e.g.:
Laboratory investigations
Radiographic images
Biopsy
Electromyography (EMG) & Nerve Conduction Studies

CLINICAL EXAMINATRION

General:

- Appearance
- Personality & attitude
- Posture
- Systemic review
- Gait cycle:
  - **Stance phase** (from heel strike to Toe off)
    - Heel strike
    - MidStance
    - Toe off
  - **Swing phase** (from toe off to heel strike)

IN PROFESSIONAL SKILLS SESSIONS, FOCUS SHOULD BE DIRECTED TOWARDS THE DIFFERENT COMPONENTS OF CLINICAL EXAMINATIONS AS FOLLOWS:

- Look
- Feel
- Move
- Measurements
- Special clinical tests

LOOK & FEEL (Inspections & palpations)

A. Students should be able to identify the important anatomical landmarks.

B. Students should be able to identify the normality and abnormalities e.g.:

Asymmetry	Discoloration
Swelling	Deformity
Wasting	Temperature
Tenderness	Pulse
Sensation	

MOVE

Students should understand that the ranges of movements written in a book are approximate and there are individual variations. Therefore, students should performed & recorded ranges of movements for individual joint in the following orders:

- Active
- Passive
- Against resistance to identify the muscle power

Movements of the joints are under the following categories:

- Flexion / Extension
- Abduction / Adduction
- Rotation: Internal & External
- Circumduction
- Pronation / Supination
- Inversion / Eversion

Muscle power grades:

- 0: No movements (complete paralysis)
- 1: Flicker of movement
- 2: Not against gravity
- 3: Against gravity
- 4: Against gravity & some resistance
- 5: Normal power

MEASURMENTS

Students should be able to perform measurements for:

- Length (apparent and true limb length discrepancy)
- Girth (atrophy & hypertrophy)
- Angles (for normal & abnormal alignments)

SPECIAL TESTS

Musculo-skeletal system has hundreds of special tests with many names. There is a need for the students to know that tests are available to help in diagnosis. However, at the stage of professional skills for year 4, it is enough to recognize few number of tests for each region in the body as will be indicated later on.

HISTORY

As in history for other systems, it is important to find out the relative information from the past and family histories and from the social background.

In the musculo-skeletal system and before embarking on regional examination, students should be familiar and able to define some of the common terminology in the system as follows:

PAIN:
Pain is a term used to describe unpleasant feeling/ sensation. It is the most common symptom in orthopedics. It brings patients for medical consultation.

STIFFNESS:
Stiffness is a term used to describe Loss or reduction of range of movement of the joint
Stiffness may be generalized as in ankylosing spondylitis and rheumatoid arthritis, or it could be localized to a particular joint.

DEFORMITY:
Deformity is a term used to describe as a structural deviation from normal appearance. (size or alignment) ,results in disfigurement
Deformity may be fixed or mobile.

SWELLING:
A transient abnormal enlargement of body part or area, not caused by proliferation of cells
Swelling is a term used to describe abnormal increase in size. That may be localized to a small area or generalized affecting a whole limb or more.

INSTABILITY:
Instability is a term used to describe compromised stability of a joint due to lack of support by ligaments, tendons , muscles and bone shape .

REGIONAL EXAMINATION

UPPER LIMB

- Shoulder
- Elbow
- Wrist & Hand

LOWER LIMB

- Hip
- Knee
- Ankle & foot

SPINE

SHOULDER

Anatomical Landmarks:

- Suprasternal notch
- Sterno-clavicular joint
- Clavicle
- Acromion
- Coracoid process
- Tuberosities of the humerus
- Scapula: spine, angles & borders
- Prominent muscles & tendons

Movements: active, passive & against resistance

Normal range of movement of:

- Forward flexion: 0-170 °
- Backward extension: 0-60 °
- Abduction: 0-170 °
- Adduction: 0-50 °
- Ext. rotation: 70 °
- Int. rotation: 70 °
- Circumduction

Special tests:

Joint stability

Apprehension test for shoulder dislocation

Mascular and tendinopathy

Arm drop test for supraspinatus muscle.

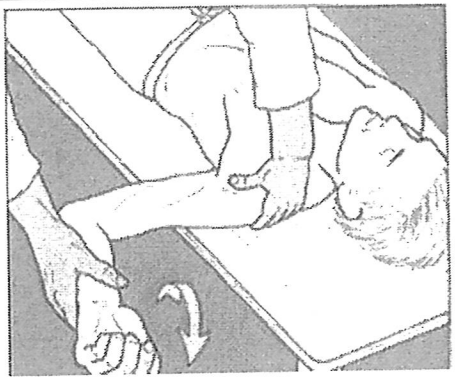
Speed and Yergeson test

Neer's and Hawkins

Obrien test

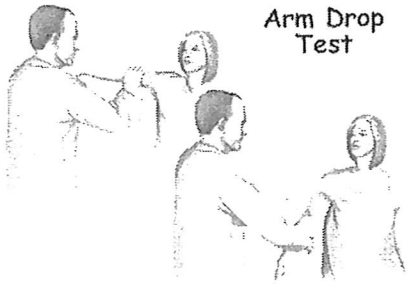
Remarks:

Apprehension test



In supine the patient is positioned with the scapula supported by the edge of the examining table. The arm is positioned in 90 °abduction and external rotation. With increasing external rotation the examiner watches for apprehension on the part of the patient. This test is often performed in sitting in the clinic setting and the examiner exerts an anterior translatory force with their thumb placed posteriorly on the humerus. However their fingers are anterior to control any sudden instability episode that may occur.

Drop arm test

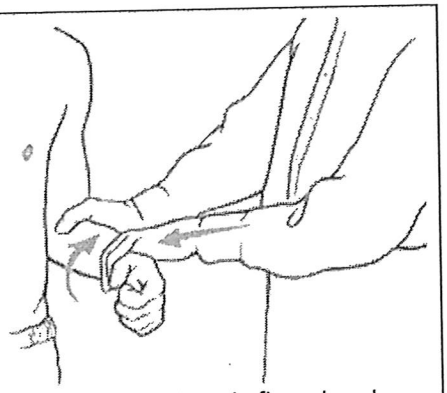


A test used to identify tears of the rotator cuff muscle group, esp. supraspinatus. With the patient sitting or standing, the painful shoulder is fully abducted by the examiner and released. The patient actively lowers the arm without support from the examiner. In the presence of rotator cuff tears, the arm will fall uncontrollably to the side from a position of about 90 degrees of abduction

Speed test

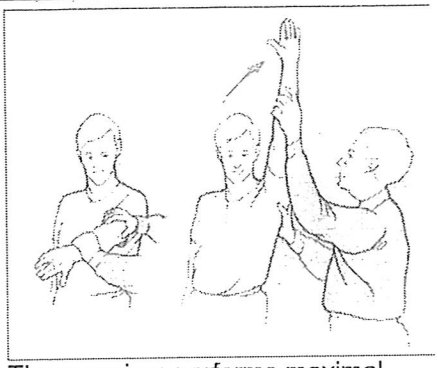
The patient's elbow is extended, forearm supinated and the humerus elevated to 60°. The examiner resists humeral forward flexion.
(positive)
Pain located to bicipital groove. This is commonly interpreted as suggestive of inflammation or lesions related to the long head of biceps or biceps/labral complex.

Yergeson test



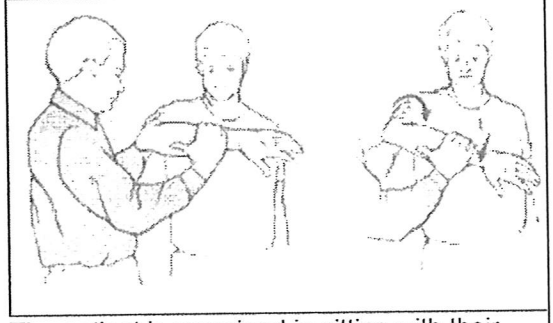
The patient's elbow is flexed and their forearm pronated. The examiner holds their arm at the wrist. Patient actively supinates against resistance.
(Positive)
Pain located to bicipital groove area suggests pathology in the long head of biceps in its sheath

Neer Test



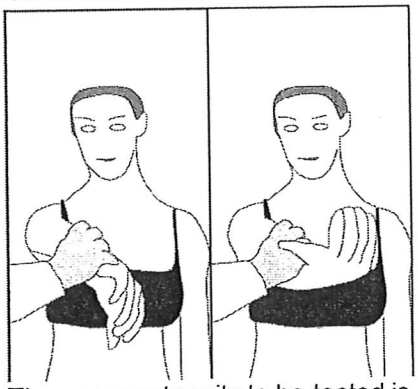
The examiner performs maximal passive abduction in the scapula plane, with internal rotation, whilst stabilizing the scapula.
Pain located to the sub-acromial space or anterior edge of acromion .(Positive)

Hawkins test



The patient is examined in sitting with their arm at 90° and their elbow flexed to 90°, supported by the examiner to ensure maximal relaxation. The examiner then stabilizes proximal to the elbow with their outside hand and with the other holds just proximal to the patient's wrist. They then quickly move the arm into internal rotation.

Obrien's (empty can) test



The upper extremity to be tested is placed in a positon of 90° of shoulder flexion and 10° of horizontal adduction. The patient then completely internally rotates at the shoulder and pronates at the elbow. The practitioner then provides distal stabilizing force as the patient is instructed to apply upward force. The procedure is then repeated in a shoulder and forearm neutral position. A positive test occurs with pain reproduction or clicking in the shoulder with the first position and reduced/absent with the second position

ELBOW

Anatomical landmarks:

Lateral epicondyle	Lateral supra-condylar line
Medial epicondyle	Lateral supra-condylar line
Olecranon	Olecranon fosse
Radial head	proximal ulna

Prominent muscles & tendons

Movements: active, passive & against resistance

Normal range of movement of:

Flexion: 140°

Extension: -15° -0°

Pronation: 75°

Supination: 70°

Special tests:

Stablitity

Collateral ligaments stability: stress verus and valgus test

Muscular and Tendinopathy

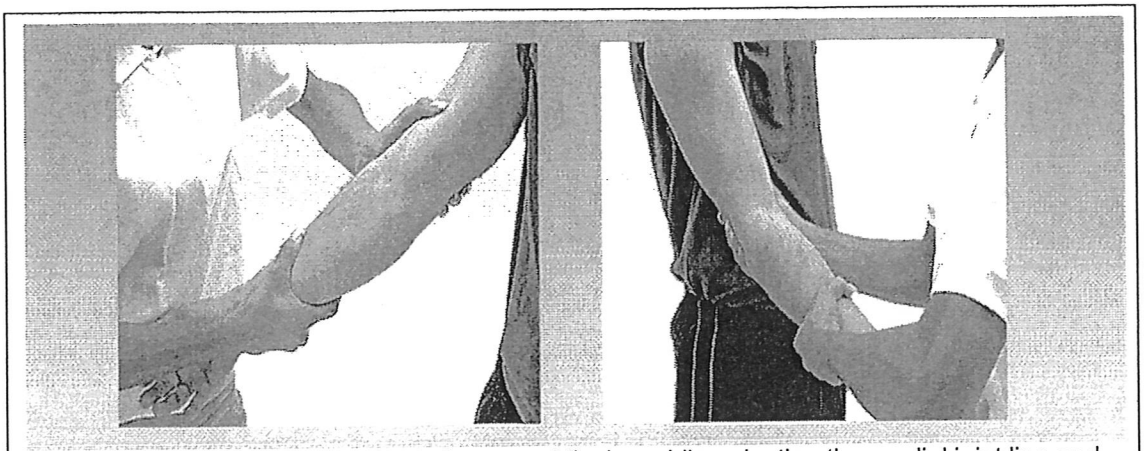
Tennis and Golfer test)

Nerve

Tinel's sign

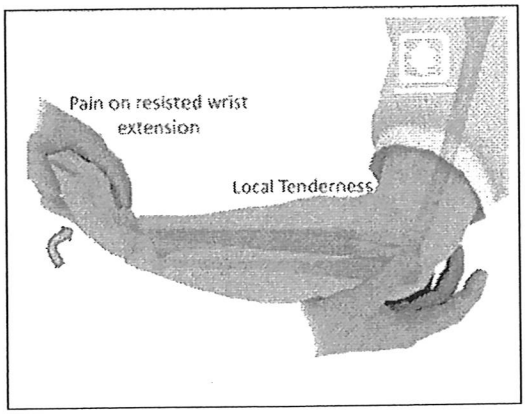
Remarks:

Stress verus and valgus test

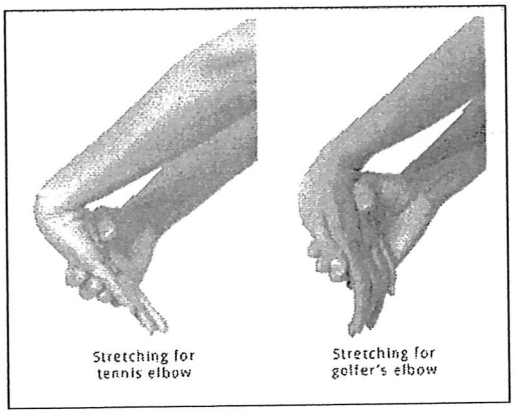


Patients elbow in approximately 20 degrees of flexion while palpating the medial joint line and stabilizing the distal humerus with one hand and applying a valgus stress to the elbow with the other hand. The test is considered positive if the patient experiences pain or excessive laxity is noted compared to the contralateral side. As with the varus stress test, this test can be repeated in varying degrees of elbow extension to test different portions of the MCL

Tennis elbow (cozen's)



Tennis and golfers elbow



WRIST & HAND

Anatomical landmarks:

Radius	Radial styloid process
Ulna	Ulnar styloid process
Anatomical snuff-box	Palpable carpal bones
Metacarpal bones	Phalanges

Prominent muscles, tendons & ligaments

Wrist movements: active, passive & against resistance

Normal range of movement of:
Dorsiflexion: 75°
Palmar flexion: 75°
Radial deviation: 20°
Ulnar deviation: 35°

Fingers & thumb movements:

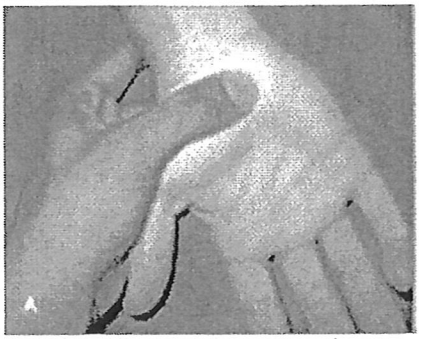
Flexion
Extension
Abduction
Adduction
Opponent

Special tests:

Carpal tunnel syndrome: e.g. Phalen's test & direct pressure
Integrity of flexor digitorum sperficialis & profundus
Integrity of the median, ulnar & radial nerve

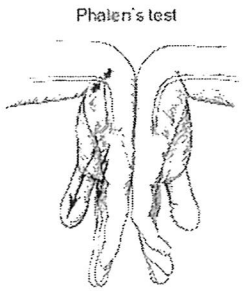
Remarks:

Compression Test



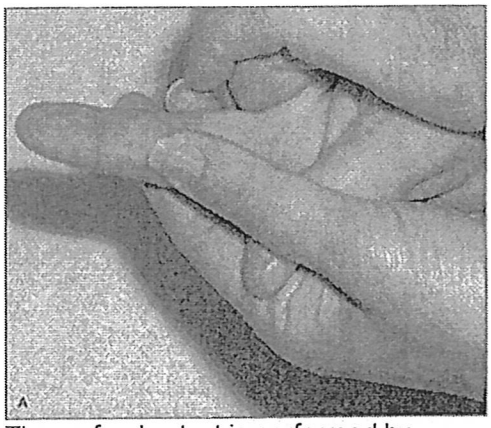
Applying direct pressure on the median nerve at the carpal tunnel with his or her thumb . The result is positive if symptoms appear within 30 seconds and disappear when pressure is released

Phalen's Test



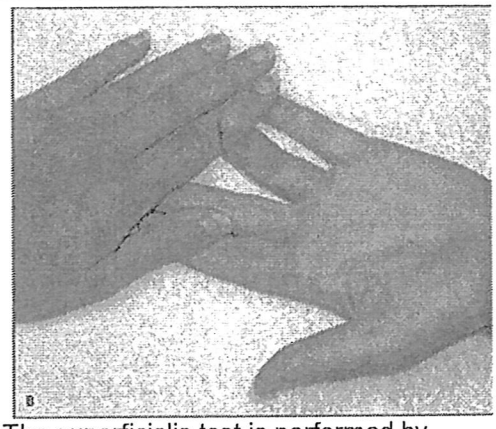
The Phalen wrist flexion test (eliminate elbow flexion to prevent compression of the ulnar nerve at the cubital tunnel,) The result is positive if symptoms are reproduced after the wrist is held in a flexed position for 60 second

Integrity of Flexor Digitorum Sperficialis



The profundus test is performed by holding the affected finger's MCP and PIP joints in extension and asking the patient to flex the DIP joint. The other fingers should be flexed at the MCP and PIP joints.

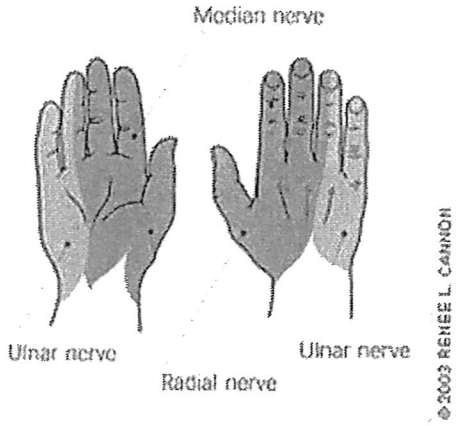
Integrity of Exrensor Digitorum Profundus



The superficialis test is performed by holding the unaffected fingers in extension and asking the patient to flex the injured finger

Integrity of the median, ulnar & radial nerve

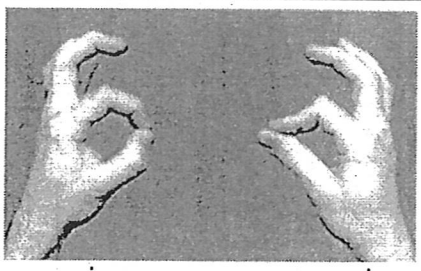
SENSATION



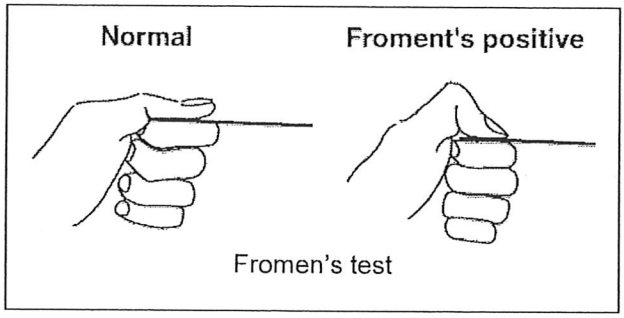
Ulanr nerve injury


Claw finger

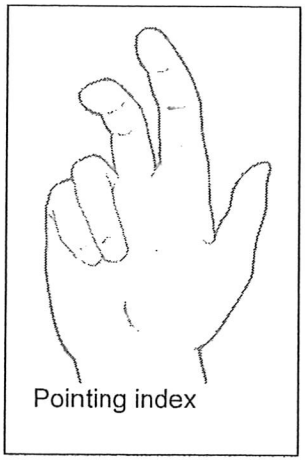
MEDIAN NERVE INJURY

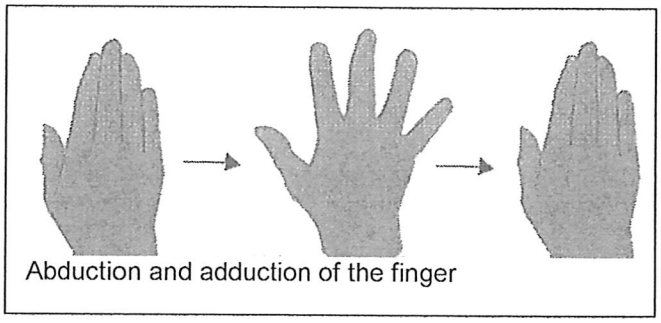

-ve sign +ve sign

Okay sign Test



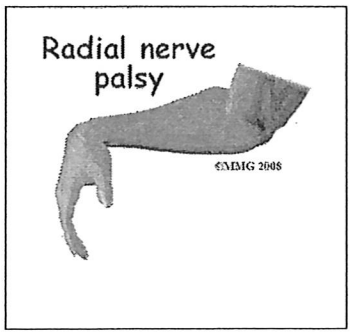
Fromen's test


Pointing index

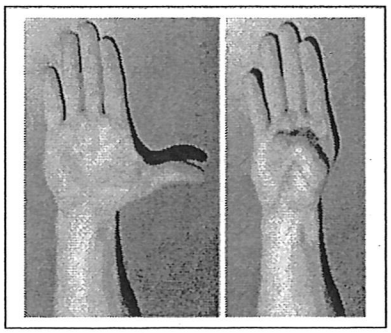

Abduction and adduction of the finger

Radial nerve

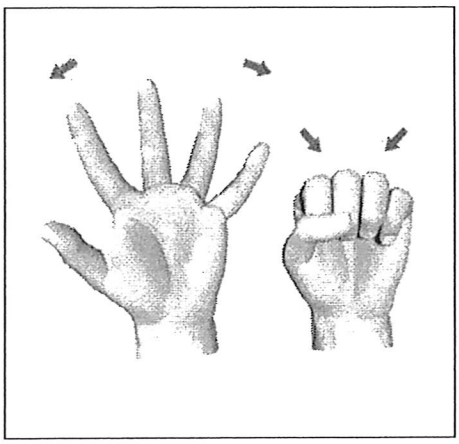
Wrist drop



thumb extension



Single test to rule out all 3 hand nerve injury



HIP

Anatomical landmarks:

Anterior superior iliac spine
Posterior superior iliac spine
Greater trochanter
Prominent muscles & tendons
Iliac tubercle
Iliac crest
Ischial tuberosity

Movements: active, passive & against resistance

Normal range of movement of:
Flexion: 120°
Extension: 20°
Abduction: 40° extended hip
Adduction: 25° extended hip
Ext. rotation: 45° in 90° hip flexion
Int. rotation: 45° in 90° hip flexion
Circumduction

Special tests:

Thomas test for flexion deformity
Tests for Developmental Dysplasia of the Hip (DDH /CDH):
e.g. Ortolani & Barlow tests
Galeazzi
Trendelenburg test

Remarks:

THOMAS' TEST

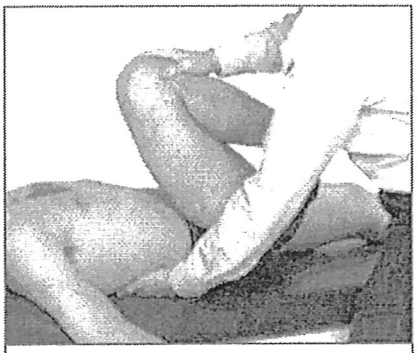
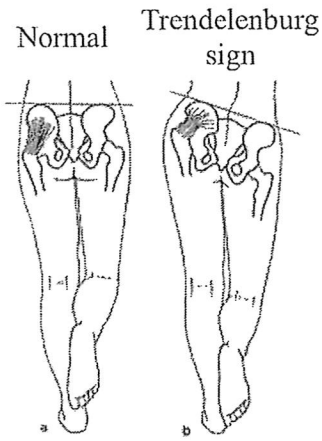
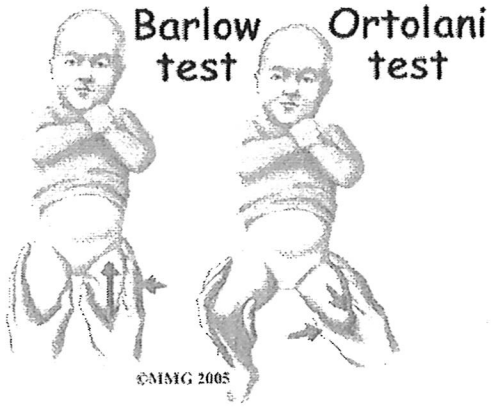


Figure 13. Thomas' test for fixed flexion deformity of the hip. Keep one hand under the patient's back to ensure that there is no lumbar lordosis. Fully flex one hip. If the opposite leg lifts off the couch there is a fixed flexion deformity. (As the pelvis tilts a normal hip would extend allowing the leg to remain on the couch.)

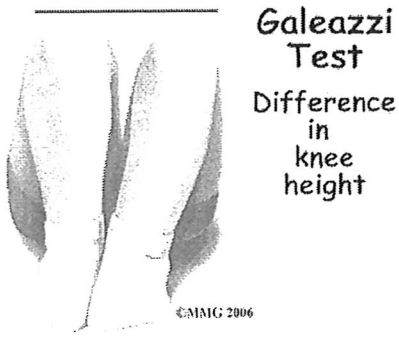
Telendelenburg Teast



The patient stand with their weight evenly placed on both feet. Then, have them put their hands on their hips. As the examiner stand behind them to observe. Ask the patient to lift their leg opposite of the side being tested. If the pelvis lowers on the nonweight bearing side, the patient is showing a positive sign of gluteus medius weakness.



Abducts the hips by moving the bent hips and knees apart. If the hip feels like it can be pushed out the back of the socket, this is considered abnormal. This is called a positive Barlow's Test and is a sign of instability in the hip. As the hip is abducted further, the doctor might feel the ball portion (the femoral head) slide forward as it slips back into the socket. This is called a positive Ortolani Maneuver and is also a sign of hip instability



The child is placed in the supine position with the hips and knees bent and the feet flat. The examiner looks for any unevenness between the knees. If one knee is lower than the other, there may be a dislocated hip on the lower side.

KNEE

Anatomical landmarks:

Medial femoral condyle
Lateral femoral condyle
Tibial tubercle
Upper tibia
Adductor tubercle
Patella
Head of the fibula

Prominent muscles, tendons & ligaments
Identification of articulations:

A. Patello-femoral
B. Tibio-femoral

Movements: active, passive & against resistance
Normal range of movement of:

FLEXION: 135°
EXTENSION: 0°
Ext. rotation
Int. rotation

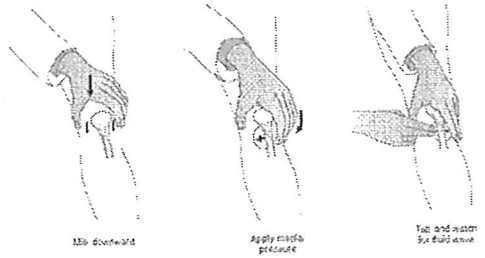
Special tests:

Knee effusion (Patellar tap test and Fluid displacement test)
Ligaments stability
- Stress verus and valgus test for collateral ligaments
- Drawing tests for anterior & posterior cruciate ligaments
- Lachman test

Patella dislocation (Apprehension test for)
Test for the meniscus (McMurry test and compression)

Remarks:

Knee Effusion test

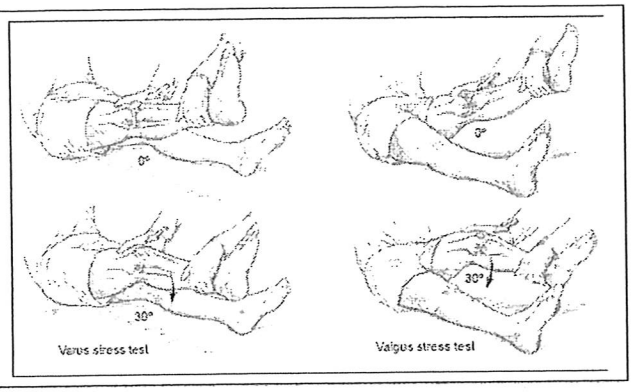


Bulge, wipe or stroke test / Fluid displacement test
The patient in supine, with the knee in an extended position. The physiotherapist strokes upwards with the edge of the hand on the medial side of the knee to milk the fluid ca. 10 cm proximal of the patella into the lateral compartment, and continues pushing the fluid downwards on the lateral side.

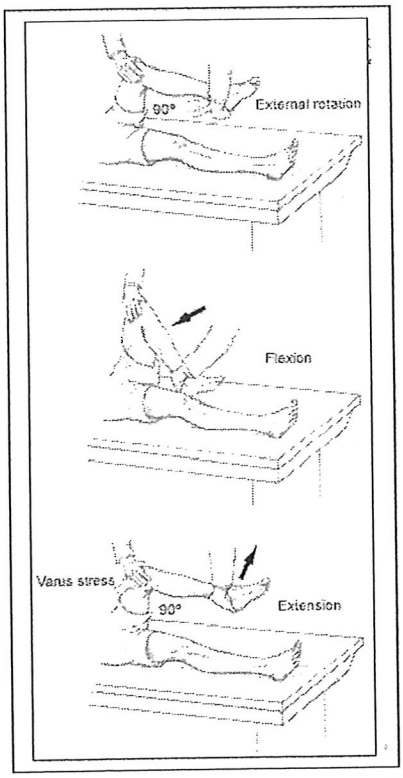
The test is positive if the physiotherapist sees fluid moving towards the medial side of the knee.

stability

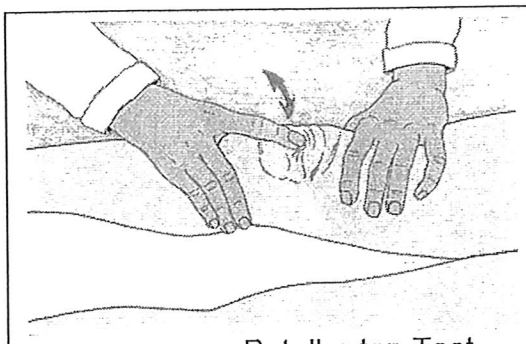
collateral ligament



Mcmurry meniscus

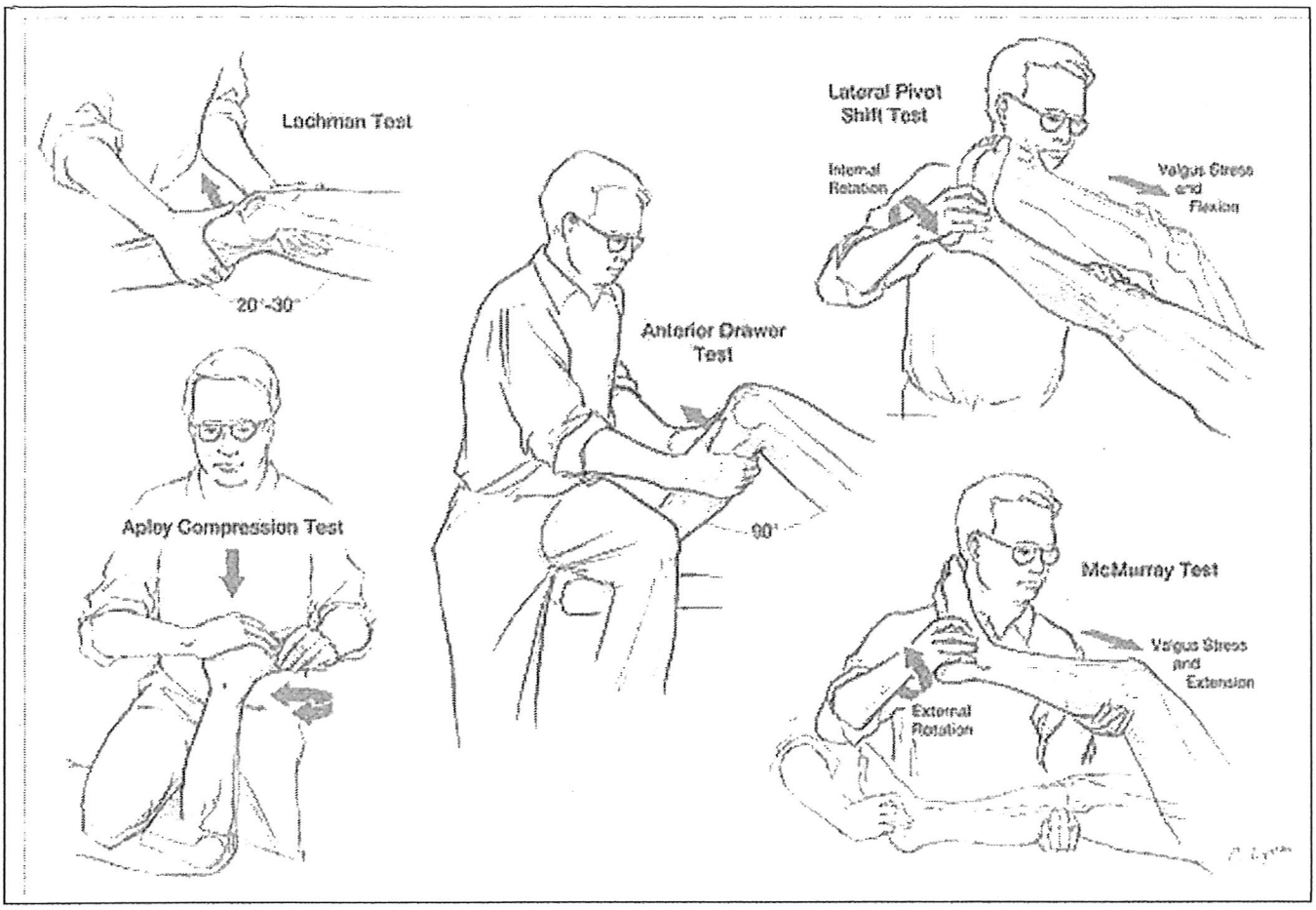


McMurray test to assess the medial meniscus. (Top) The test is performed with the patient supine and the knee flexed to 90 degrees. To test the medial meniscus, the examiner grasps the patient's heel with one hand to hold the tibia in external rotation, with the thumb at the lateral joint line, the fingers at the medial joint line. (Middle) The examiner flexes the patient's knee maximally to impinge the posterior horn of the meniscus against the medial femoral condyle. (Bottom) A varus stress is applied as the examiner extends the knee.

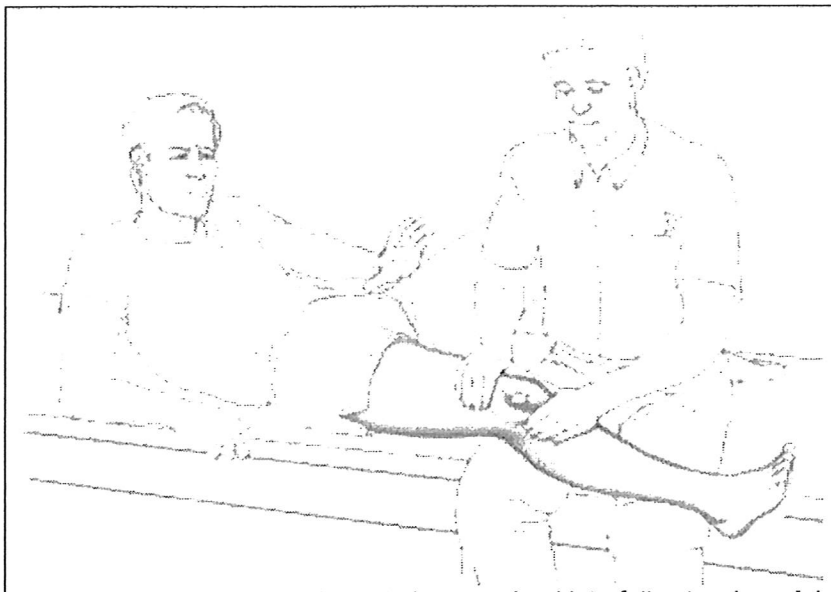


Patellar tap Test

The fluid can be moved under the patella while maintaining the pressure on the suprapatellar pouch Tapping down the patella with the index to create an upward and downward movement and a palpable 'click' as the patella hits the underlying femur.



Apprehension patellar test



The examiner places the knee to be examined into full extension. A lateral force is applied to the patella with the examiners thumb. The examiner then moves the knee from full extension to 90 degree of flexion and then returning to full extension while maintaining the laterally applied force on the patella. A positive test consists of orally expressed apprehension

ANKLE & FOOT

Anatomical landmarks:

- Medial malleolus
- Lateral malleolus
- Tarsal bones
- Metatarsal bones
- Phalanges
- Prominent muscles & tendons

Movements: active, passive & against resistance

Normal range of movement of:

- Dorsiflexion of the ankle: 20°
- Planter flexion of the ankle: 50°
- Inversion: 30°
- Eversion: 20°
- Supination: 30°
- Pronation: 20°
- Movements of the toes

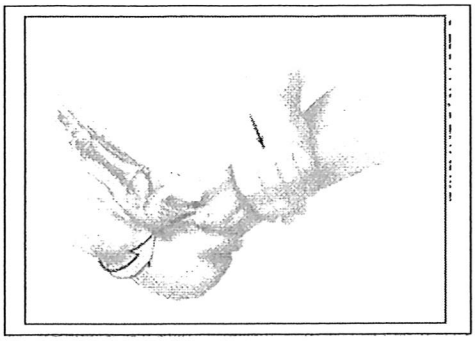
Special tests:

- Ankle joint stability
- Integrity of Achilles tendon (Thompson)

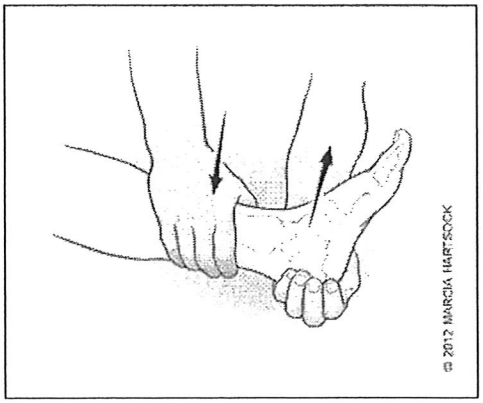
Remarks:

Ankle joint stability test

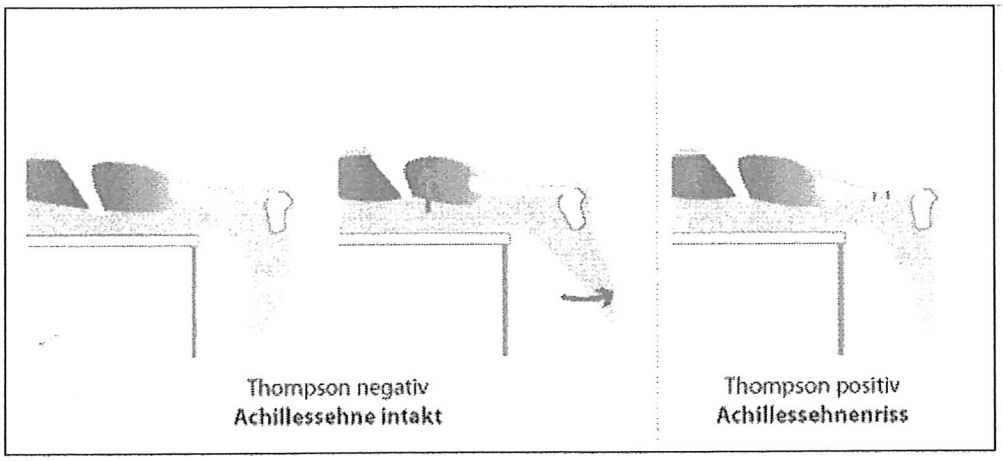
Collateral ligaments



Anterior and posterior test



Integrity of Achilles tendon (Thompson)



SPINE

Anatomical Landmarks:
Most of the spinous processes of the vertebrae are easily palpable. The same is applied to para-spinal muscles along each side of the spinous processes.

There are good ranges of movements taking place at the cervical and lumber vertebrae. However, that does not apply to the thoracic and sacral regions.

On the posterior aspect of the spine, it is required to identify:

- The occiput
- The spinous processes
- Level of iliac crest in relation to the lumbar vertebrae
- Prominent muscles

On the anterior aspect of the neck, it is required to identify:

- Hyoid bone
- Thyroid cartilage
- Cricoids rings

Movements in the cervical & lumbar regions:

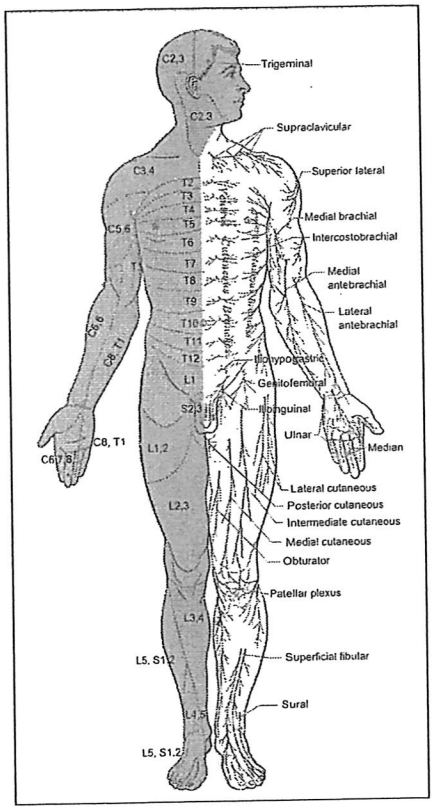
- Flexion
- Extension
- Rotation to the right and to the left sides
- Lateral bending to the right and to the left sides

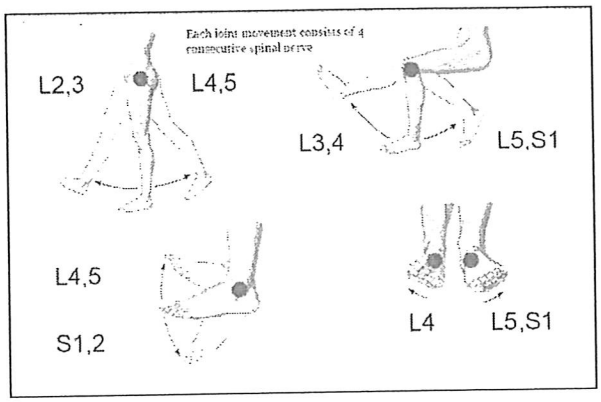
As for the principles of musculoskeletal examinations, in the spinal examination, it is important to assess the patient, walking, standing and lying down.

Neurological examination is needed. The students should to able examine for the following:

- Brachial plexus
- Dermatomes/ myotomes
- Reflexes
- Major peripheral nerves
- Straight leg raise & Sciatic stretch test

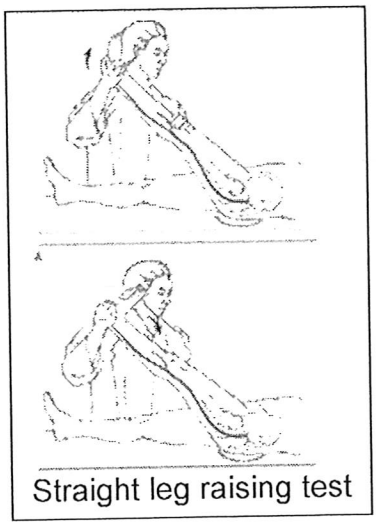
ACTION	MUSCLE	NERVE	ROOT
Shoulder Abduction	Deltoid	Axillary	C5
Elbow Flexion	Biceps	Musculocutaneous	C5,6
Elbow Extension	Triceps	Radial	C7,8
Wrist Extension	Extensors	Radial	C7,8
Wrist Flexion	Flexors	Median and Ulnar	C6,7
Finger Flexion	Flexors	Median and Ulnar	C6,7,8
Finger Extension	Extensors	Posterior Interosseous	C7,8
Finger Abduction	Dorsal Interossei	Ulnar	T1
Finger Adduction	Palmar Interossei	Ulnar	T1
Thumb Abduction	Abductor Pollicis Brevis	Median	T1
Thumb Adduction	Adductor Pollicis	Ulnar	T1





Reflexes

Ankle	S1,2
Knee	L3,4
Biceps	C5,6
Triceps	C7,8


Straight leg raising test