

# Physical examination

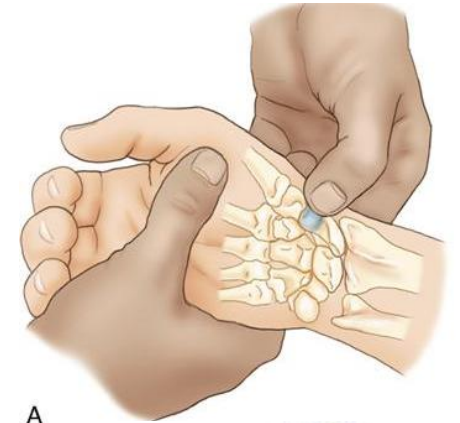
- 1) Examine the patient's overall appearance for features such :
  - Pallor, rash, skin tightening and hair changes.
  - Special postures
- 2) Use Look , Feel and move method

# Physical examination

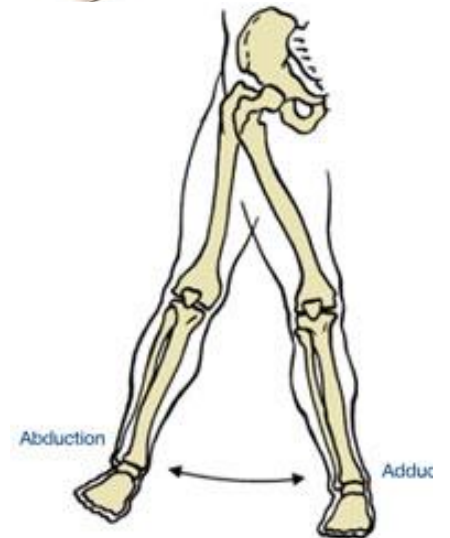
Rather than inspection → auscultation, in MSS we:

- Look (inspect for any deformity and abnormality)
- Feel (palpate each structure)
- Move (active and passive )

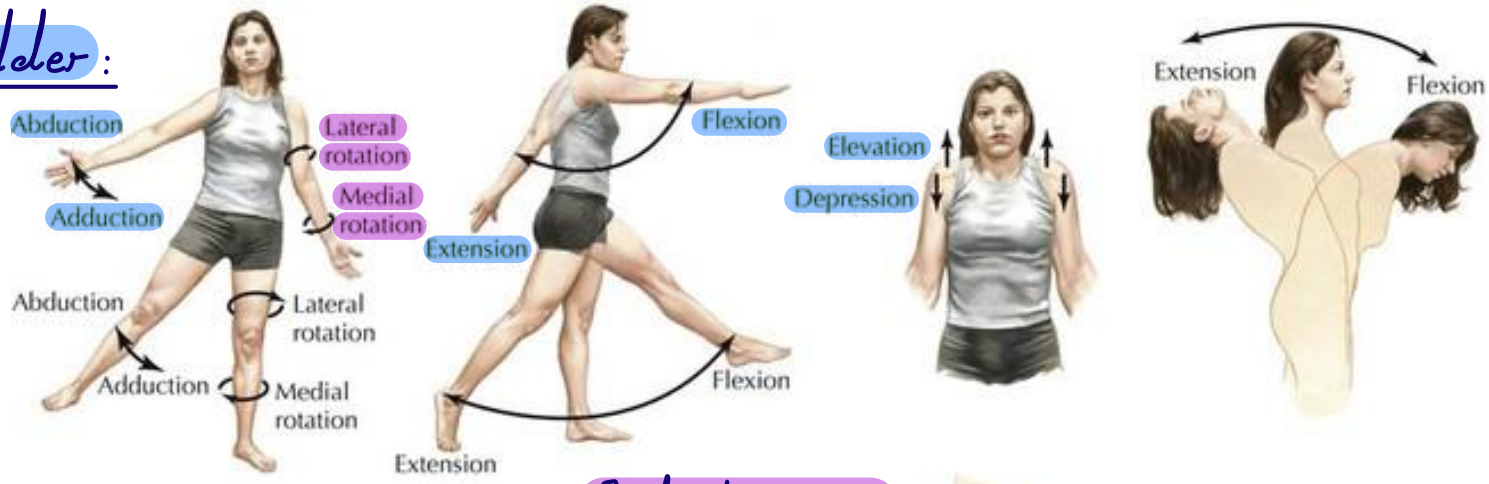
Active then passive!



A



# Shoulder:



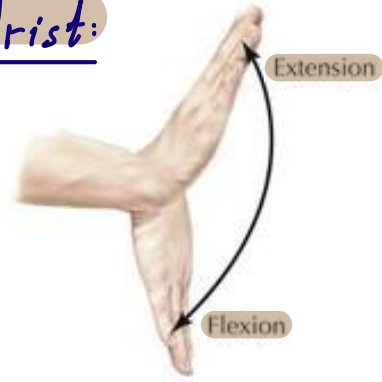
Movements of Different Joints

# Elbow:



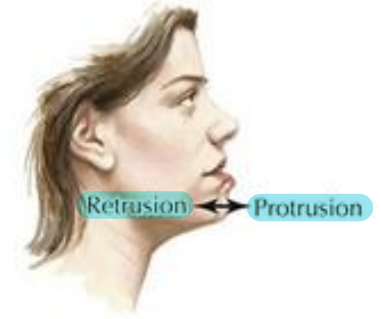
# Radioulnar joint:

# Wrist:



C. Machado M.D.

# Jaw:



# Knee:

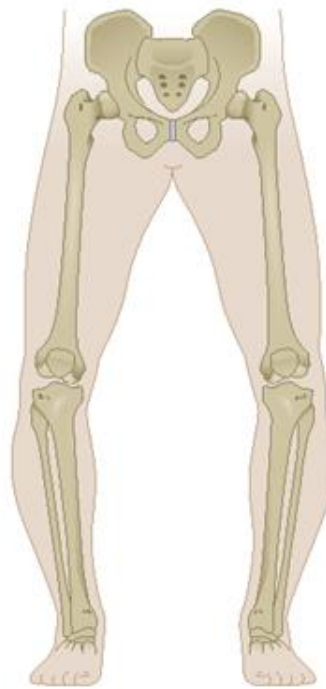


# Ankle:

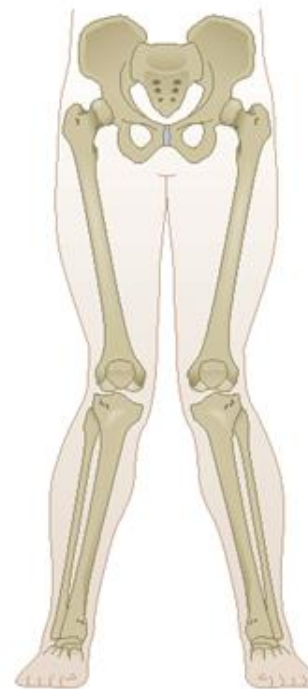




Normal



Varus



Knock knees (valgus)

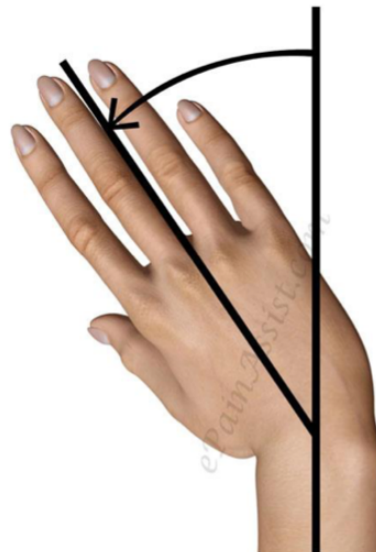
To describe **altered limb position due to joint/bone deformity**, use:

- valgus: the distal part deviates away from the midline
- varus: the distal part deviates towards the midline.

In the wrist and hand, use:

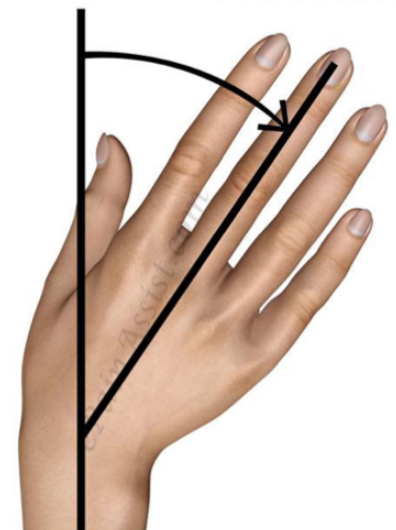
- radial deviation: the distal part deviates towards the radial side
- ulnar deviation: the distal part deviates towards the ulnar side.

ePainAssist.com



Radial Diviation

ePainAssist.com



Ulnar Diviation

Common findings !

# Skin, nail and soft tissues :

## General hints

The skin and related structures are common sites of associated lesions. The skin changes of psoriasis may be hidden, in the umbilicus, natal cleft or scalp (p. 286), for example. The rash of SLE is found across the cheeks and bridge of nose. Nail pitting and onycholysis occur in psoriasis (p. 24).

## Psoriasis :

*Rash*



*Pitted nails, Onycholysis*



- Systemic sclerosis:

*Telangiectasia*



*Skin tightening*



In systemic sclerosis, the thickened, tight skin produces a characteristic facial appearance (see [Fig. 3.30C](#)). In the hands, flexion contractures, calcium deposits in the finger pulps ([Fig. 13.6](#)) and tissue ischaemia leading to ulceration may occur. The telangiectasias of systemic sclerosis are purplish, blanch with pressure and are most common on the hands and face. In the fingers, the pallor of Raynaud's phenomenon, pulp atrophy or ulceration may be evident.

# Systemic lupus erythematosus:

## Butterfly rash



Small, dark-red spots due to capillary infarcts occur in rheumatoid arthritis, SLE and systemic vasculitis. Common sites are the nail folds (Fig. 13.5, often seen in rheumatoid arthritis), and the lower legs in systemic vasculitis (p. 288).

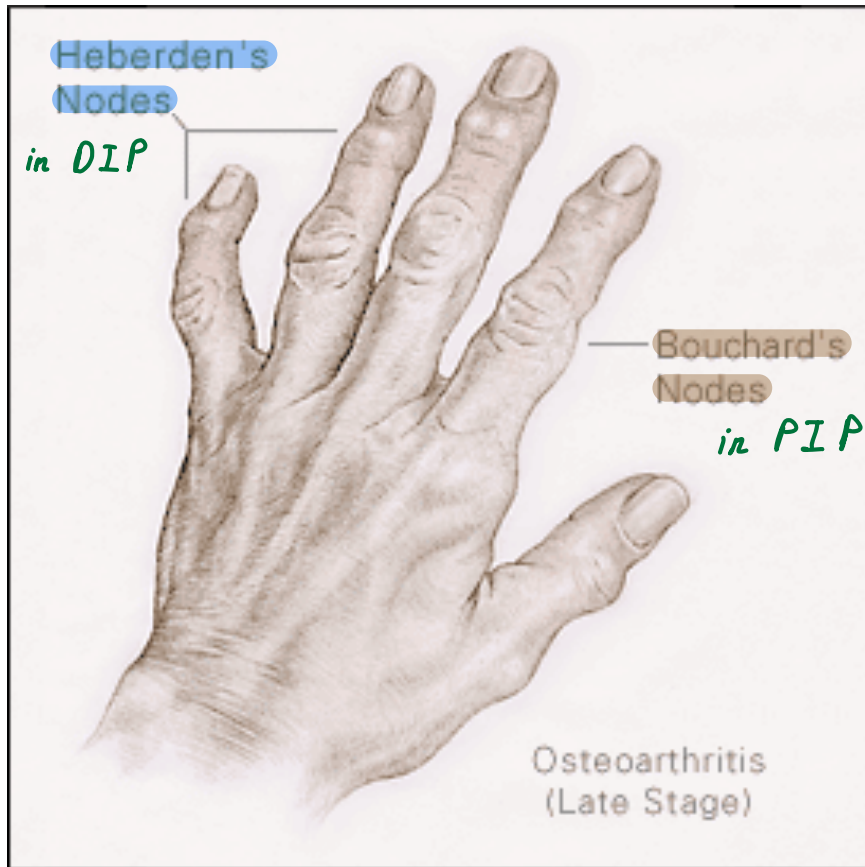


# Nodules

The firm, non-tender, subcutaneous nodules of rheumatoid arthritis most commonly occur on the extensor surface of the forearm (Fig. 13.7), sites of pressure or friction such as the sacrum or Achilles tendon, or in the lungs. Multiple small nodules can occur in the hands. Rheumatoid nodules are strongly associated with a positive anti-cyclic citrullinated peptide (anti-CCP) antibody or rheumatoid factor.

Bony nodules in osteoarthritis affect the lateral aspects of the DIP joints (Heberden's nodes) or the proximal interphalangeal (PIP) joints (Bouchard's nodes, Fig. 13.8). They are smaller and harder than rheumatoid nodules.

## Osteoarthritis



## Rheumatoid arthritis

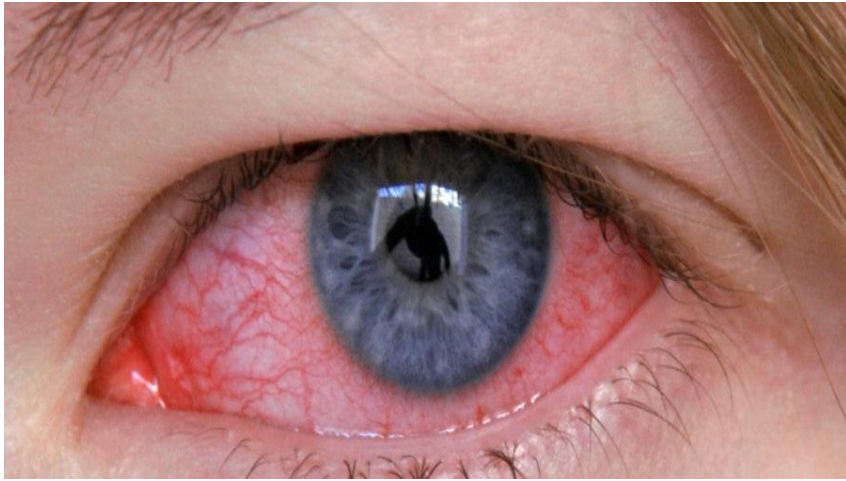


- Gout Tophi (Monosodium urate monohydrate )

Gouty tophi are firm, irregular subcutaneous crystal collections (monosodium urate monohydrate). Common sites are the olecranon bursa, helix of the ear and extensor aspects of the fingers (Fig. 13.9), hands, knees and toes. If superficial, they may appear white, and may ulcerate, discharge crystals and become secondarily infected.



- Eye presentations:



### Reactive arthritis

Red eyes, could be due to:

- Conjunctivitis
- Scleritis
- Episcleritis
- Iritis

### Osteogenesis imperfecta

Blue sclerae:

Choroid plexuses are not covered by collagen I, thus their blue color is visible

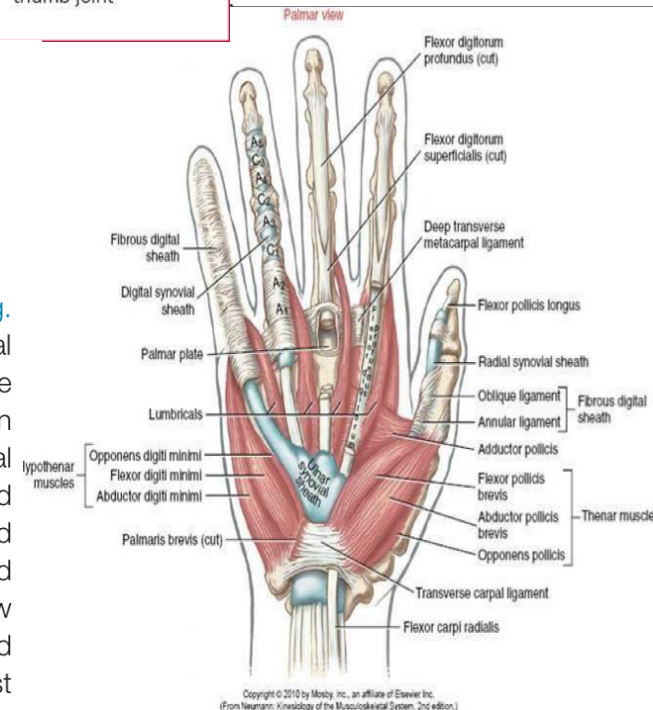
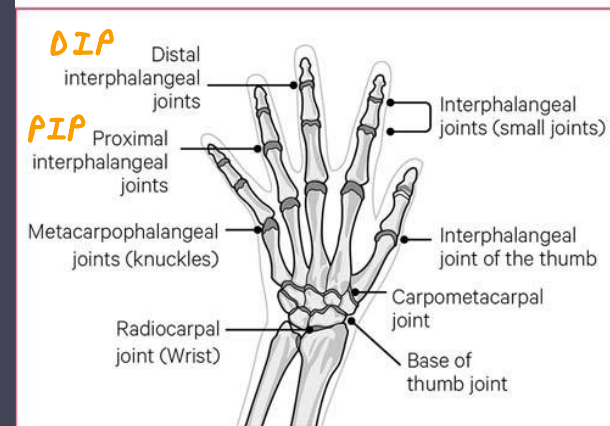
Redness of the eyes may be due to conjunctivitis in reactive arthritis or 'dry eyes' in Sjögren's syndrome, rheumatoid arthritis and other connective tissue disorders. Scleritis and episcleritis occur in rheumatoid arthritis and psoriatic arthritis. An acutely painful, very red eye due to iritis occurs in axial spondyloarthritis (p. 262). The sclerae are blue in certain types of osteogenesis imperfecta (see Fig. 3.30A) and in the scleromalacia of longstanding rheumatoid arthritis.

# **Hand and Wrist**

# Hand and wrist joint

- Wrist joint: metacarpocarpal, intercarpal, ulnocarpal, radiocarpal
- PIP and DIP hinge joints
  - Allow only flexion/extension
- MCP joint allow adduction and abduction in addition to flexion/extension

Joints of the hand and wrist



Motor and sensory innervation of the hand is shown in Fig. 7.27. The wrist joint has metacarpocarpal, intercarpal, ulnocarpal and radiocarpal components. There is a wide range of possible movements, including flexion, extension, adduction (deviation towards the ulnar side), abduction (deviation towards the radial side) and the composite movement of circumduction (the hand moves in a conical fashion on the wrist). Always name the affected finger (index, middle, ring and little) in documentation to avoid confusion. The PIP and DIP joints are hinge joints and allow only flexion and extension. The MCP joints allow flexion and extension, and some abduction/adduction, which is greatest when the MCP joints are extended.

- The patient will often localize complaints of **pain, stiffness, loss of function, contractures, disfigurement** and **trauma**.

→ *e.g., Swelling*

- If symptoms are more vague or diffuse, then consider **referred pain** or a **compressive neuropathy** (e.g. median nerve in carpal tunnel syndrome).

- **Functionality is very important** *including range of motion*

**Fig. 13.22 Advanced rheumatoid arthritis.** Small muscle wasting, subluxation and ulnar deviation at the metacarpophalangeal joints, boutonnière deformities at the ring and little fingers, and swelling and deformity of the wrist.

## Look:

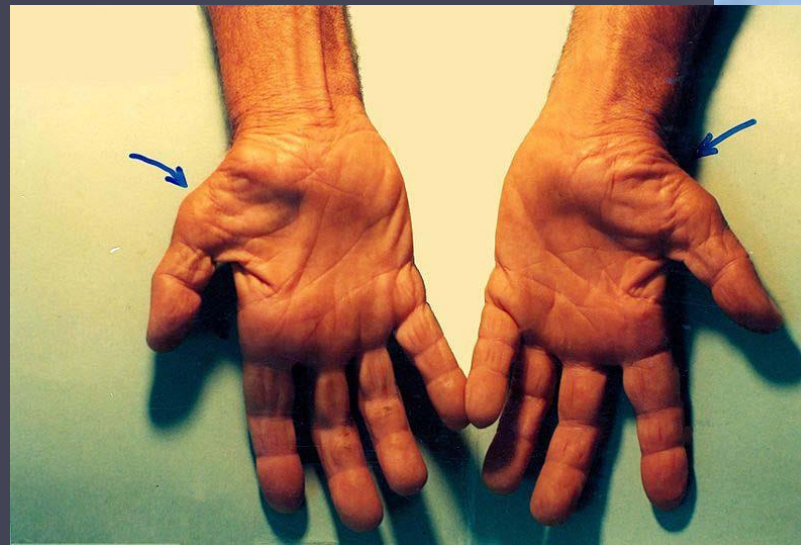
- *Colour change*
- *Swelling*
- *Deformity*
- *Small muscle wasting*
- *Vasculitis of the fingers*
- *Palmar erythema*
- *Nail changes*
- *Ulnar deviation*



PIP  
swelling



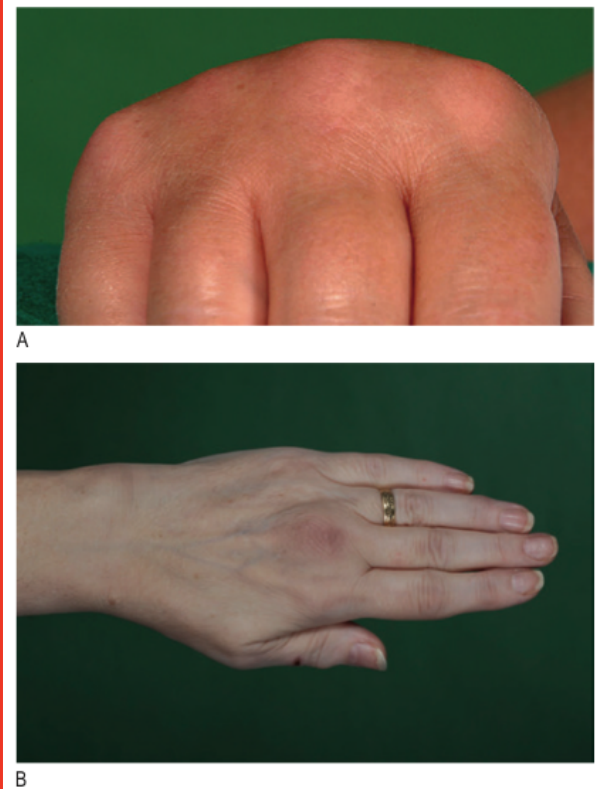
Thenar  
muscle  
wasting



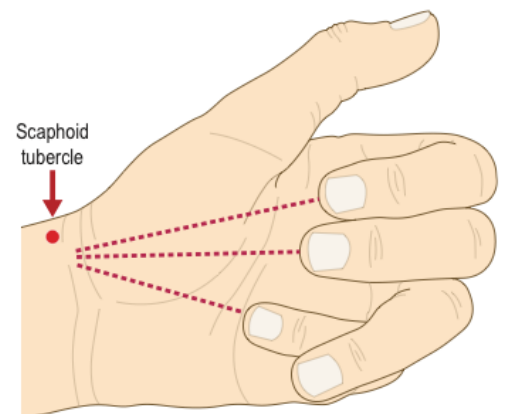
- Erythema suggests acute inflammation caused by soft-tissue infection, septic arthritis, tendon sheath infection or crystal arthritis. Palmar erythema is associated with rheumatoid arthritis.
- Swelling of MCP joints due to synovitis produces loss of interknuckle indentation on the dorsum of the hand, especially when the MCP and interphalangeal joints are fully flexed (loss of the normal 'hill-valley-hill' aspect; Fig. 13.19A). 'Spindling' (swelling at the joint, tapering proximally and distally; Fig. 13.19B) is seen when the PIP joints are affected.
- Deformity of phalangeal fractures may produce rotation. Ask the patient to flex the fingers together (Fig. 13.20) and then in turn. Normally, with the MCP and interphalangeal joints flexed, the fingers should not cross, and should point to the scaphoid tubercle in the wrist.
- The fingers are long in Marfan's syndrome (arachnodactyly, see Fig. 3.21B).
- Boutonnière (or buttonhook) deformity is a fixed flexion deformity at the PIP joint with hyperextension at the DIP joint. 'Swan neck' deformity is hyperextension at the PIP joint with flexion at the DIP joint (Fig. 13.21).
- At the DIP joints (Fig. 13.21) a 'mallet' finger is a flexion deformity that is passively correctable. This is usually caused by minor trauma disrupting terminal extensor expansion at the base of the distal phalanx, with or without bony avulsion.
- There may be subluxation and ulnar deviation at the MCP joints in rheumatoid arthritis (Fig. 13.22).
- Bony expansion of DIP, PIP joints of the fingers and CMC joint of the thumb is typical of osteoarthritis (see Fig. 13.8).
- Anterior (or volar) displacement (partial dislocation) of the wrist may be seen in rheumatoid arthritis.

### Extra-articular signs

- Dupuytren's contracture affects the palmar fascia, resulting in fixed flexion of the MCP and PIP joints of the little and ring fingers (see Fig. 3.5).
- Wasting of the interossei occurs in inflammatory arthritis and ulnar nerve palsy. Carpal tunnel syndrome causes wasting of the thenar eminence. T1 nerve root lesions (Fig. 13.23) cause wasting of all small hand muscles.
- Look for nail-fold infarcts, telangiectasia, palmar erythema, psoriasis, scars of carpal tunnel decompression, tendon transfer or MCP joint replacement.
- Nail changes, such as pitting and onycholysis (raising of the nail from its bed), occur in psoriatic arthritis (Fig. 3.7A).



**Fig. 13.19** Swelling of the metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints. **A** Ask the patient to make a fist. Look at it straight on to detect any loss of the 'hill-valley-hill' aspect. **B** Swelling and erythema of the middle finger MCP joint and index and middle finger PIP joints. Note also small muscle wasting.

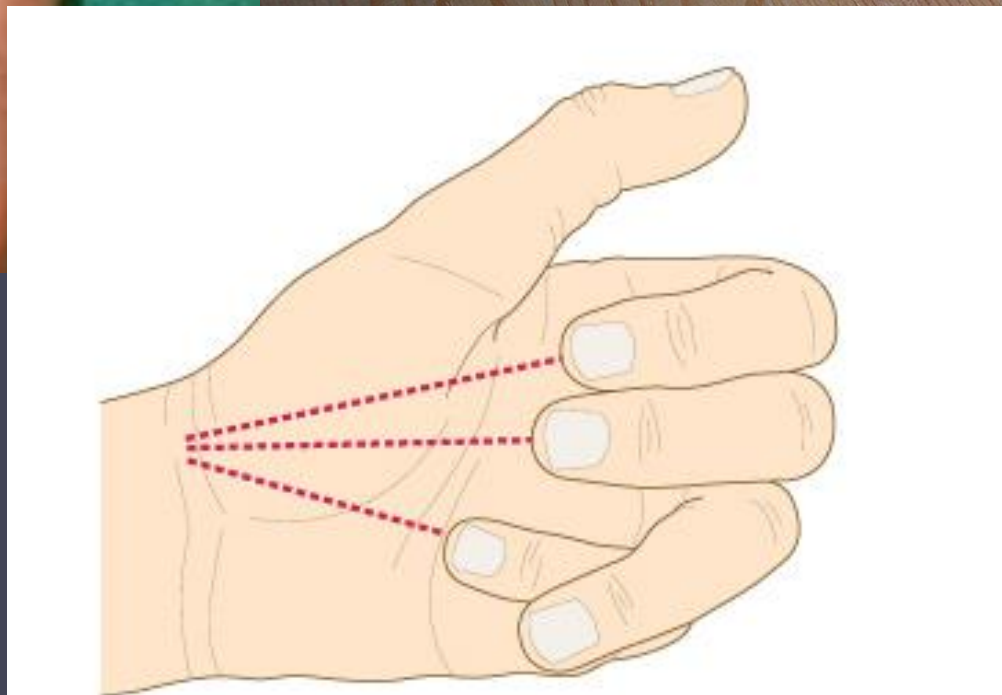
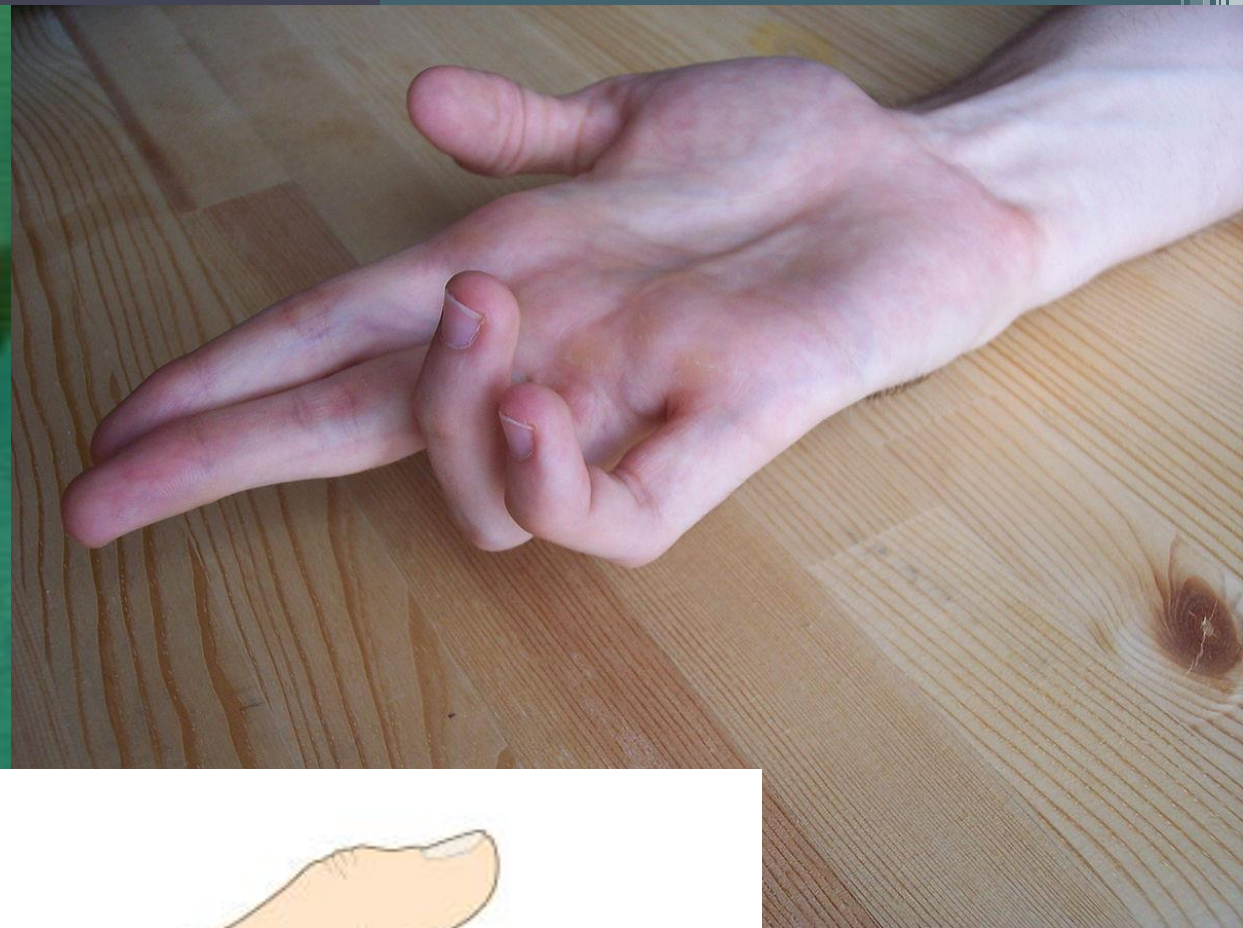


**Fig. 13.20** Flexion of the fingers showing rotational deformity of the ring finger.



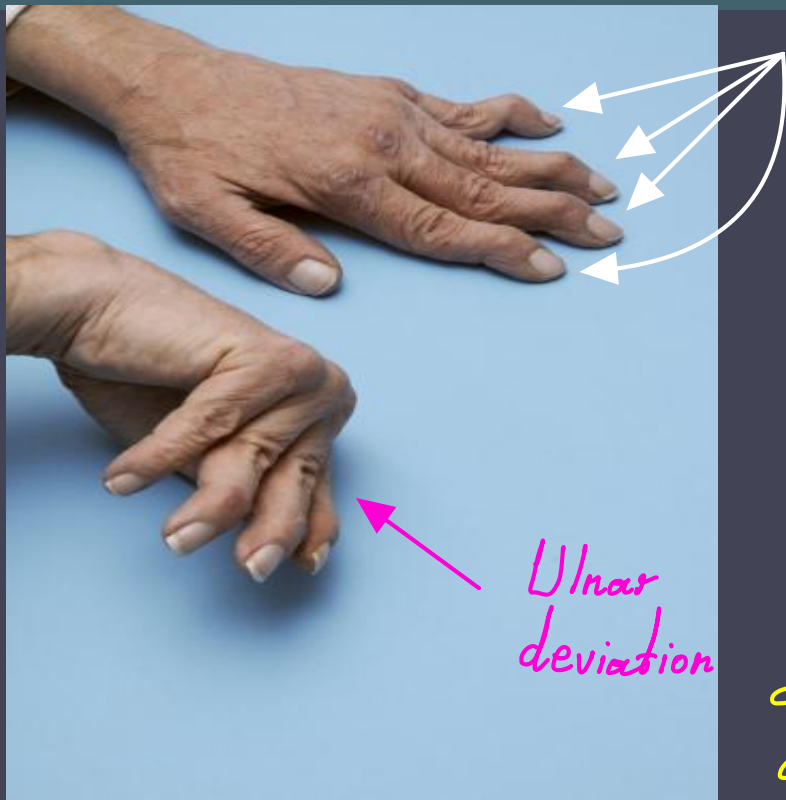


Dupuytren's  
contracture



Dupuytren's  
contracture

Rotational  
deformity

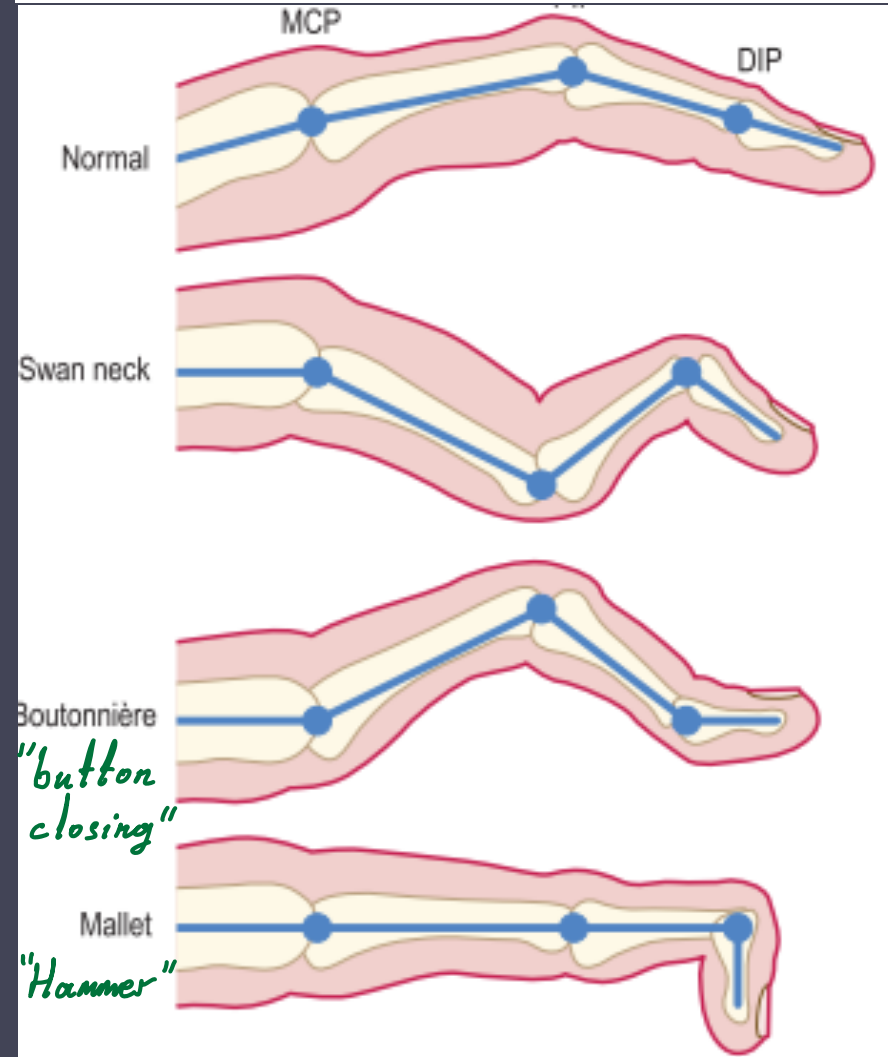


Swan-neck deformity

Ulnar deviation

Swan-neck deformity

**Fig. 13.21 Deformities of the fingers.** Swan neck and boutonnière deformities occur in rheumatoid arthritis. Mallet finger occurs with trauma. DIP, distal interphalangeal; MCP, metacarpophalangeal; PIP, proximal interphalangeal.



Boutonnière  
"button closing"

Mallet  
"Hammer"

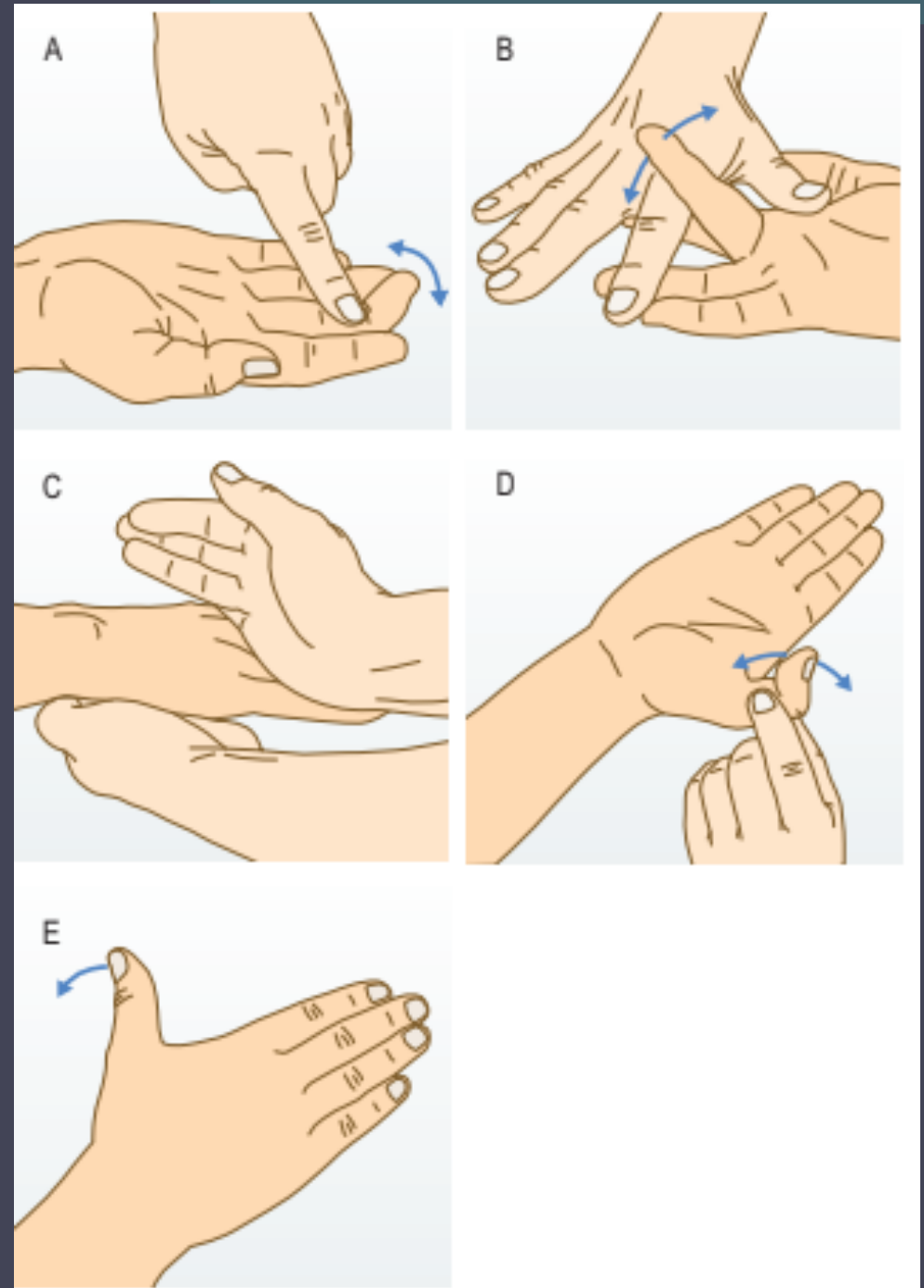
# Feel

- *Temperature*
- *Tenderness along joints and tendons*
- *Hard swellings: Heberden's and Bouchard's nodes of OA.*
  - Hard swellings are bony; soft swellings suggest synovitis.
- *Soft spongy swellings suggesting synovitis, palpate joints and flexor tendon sheaths (swelling and tenderness).*
- *Trigger fingers.*
- *De Quervain's tenosynovitis. >>Finkelestein test.*

• De Quervain's tenosynovitis causes swelling, tenderness and crepitus (a creaking sensation that may even be audible) of the tendon sheaths of abductor pollicis longus and extensor pollicis brevis. Symptoms are aggravated by movements at the wrist and thumb.

# Move

- Wrist and small joints.
- Don't forget to test grip.
- Assess function of each tendon alone in patients with cut wounds.
- Thumb on tabel?



- Flexor digitorum profundus: ask the patient to flex the DIP joint while you hold the PIP joint in extension (Fig. 13.24A).
- Flexor digitorum superficialis: hold the patient's other fingers fully extended (to eliminate the action of flexor digitorum profundus, as it can also flex the PIP joint) and ask the patient to flex the PIP joint in question (Fig. 13.24B).
- Extensor digitorum: ask the patient to extend their fingers
- Flexor and extensor pollicis longus: hold the proximal phalanx of the patient's thumb firmly and ask them to flex and extend the interphalangeal joint (Fig. 13.24D).
- Extensor pollicis longus: ask the patient to place their palm on a flat surface and to extend their thumb like a hitch-hiker (Fig. 13.24E). Pain occurs in de Quervain's disease.
- Insert your index and middle finger from the thumb side into the patient's palm and ask them to squeeze them as hard as possible to test grip.
- Ask the patient to put the palms of their hands together and extend the wrists fully – the 'prayer sign' (normal is 90 degrees of extension, see Fig. 13.10A).
- Ask the patient to put the backs of their hands together and flex the wrists fully – the 'reverse prayer sign' (normal is 90 degrees of flexion, see Fig. 13.10B).
- Check pronation and supination, flexion and extension, and ulnar and radial deviation (Fig. 13.25).

# Carpal tunnel syndrome

3 tests?

Most sensitive test is the compression test

Mnemonic:

Funnel = Flexion

Tunnel = Tap

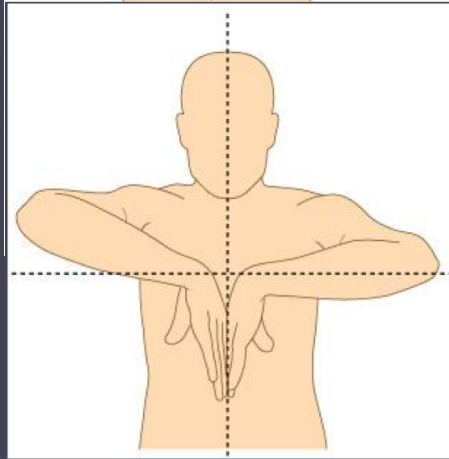
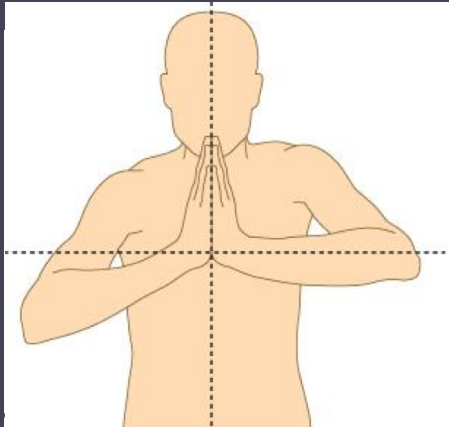
Dorsal = Direct compression

Mnemonic:

Direct compression test → Distal to the wrist crease

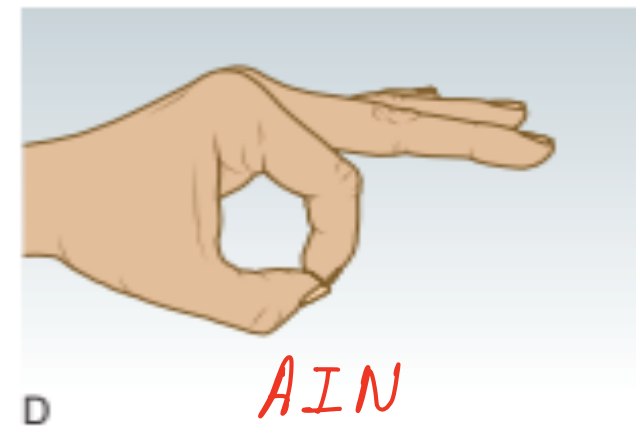
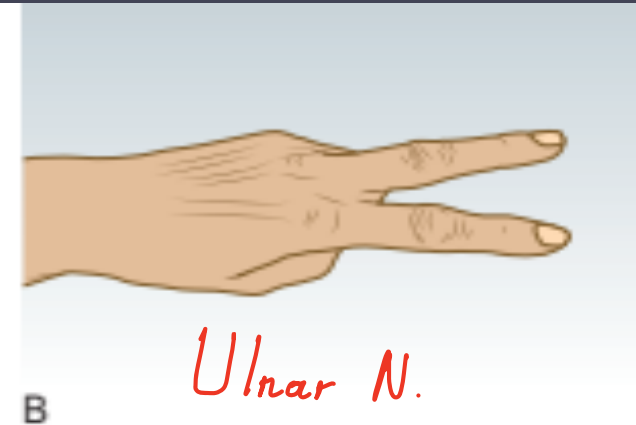
Tinel's test → Tapping

Phalen's test → Flexion of both wrists (reverse prayer sign)



# Median, ulnar and radial nerve exam

- Paper-scissors-stone
- OK sign for AIN



- AIN: anterior interosseous nerve

# The Knee Joint

**Hinge joint**

**Extensor apparatus**

**Capsule**

**Stability**

**Bursae**

The knee is a complex hinge joint with tibiofemoral and patellofemoral components. It has a synovial capsule that extends under the quadriceps muscle (the suprapatellar pouch), reaching 5 cm above the superior edge of the patella. The joint is largely subcutaneous, allowing easy palpation of the patella, tibial tuberosity, patellar tendon, tibial plateau margin and femoral condyles. The knee depends on its muscular and ligamentous structures for stability (Fig. 13.38).

The hamstring muscles flex the knee. Extension involves the quadriceps muscles, quadriceps tendon, patella, patellar tendon and tibial tuberosity. Any disruption of this 'extensor apparatus' prevents straight-leg raising or produces an extensor lag (a difference between active and passive ranges of extension).

The medial and lateral collateral ligaments resist valgus and varus stress, respectively. The anterior cruciate ligament (ACL) prevents anterior subluxation of the tibia on the femur, and the posterior cruciate ligament resists posterior translation. The medial and lateral menisci are crescentic fibrocartilaginous structures that lie between the tibial plateaux and the femoral condyles.

There are several important bursae around the knee:

- anteriorly: the suprapatellar, prepatellar (between the patella and the overlying skin) and infrapatellar bursae (between the skin and the tibial tuberosity/patellar ligament)
- posteriorly: several bursae in the popliteal fossa (Fig. 13.38D).

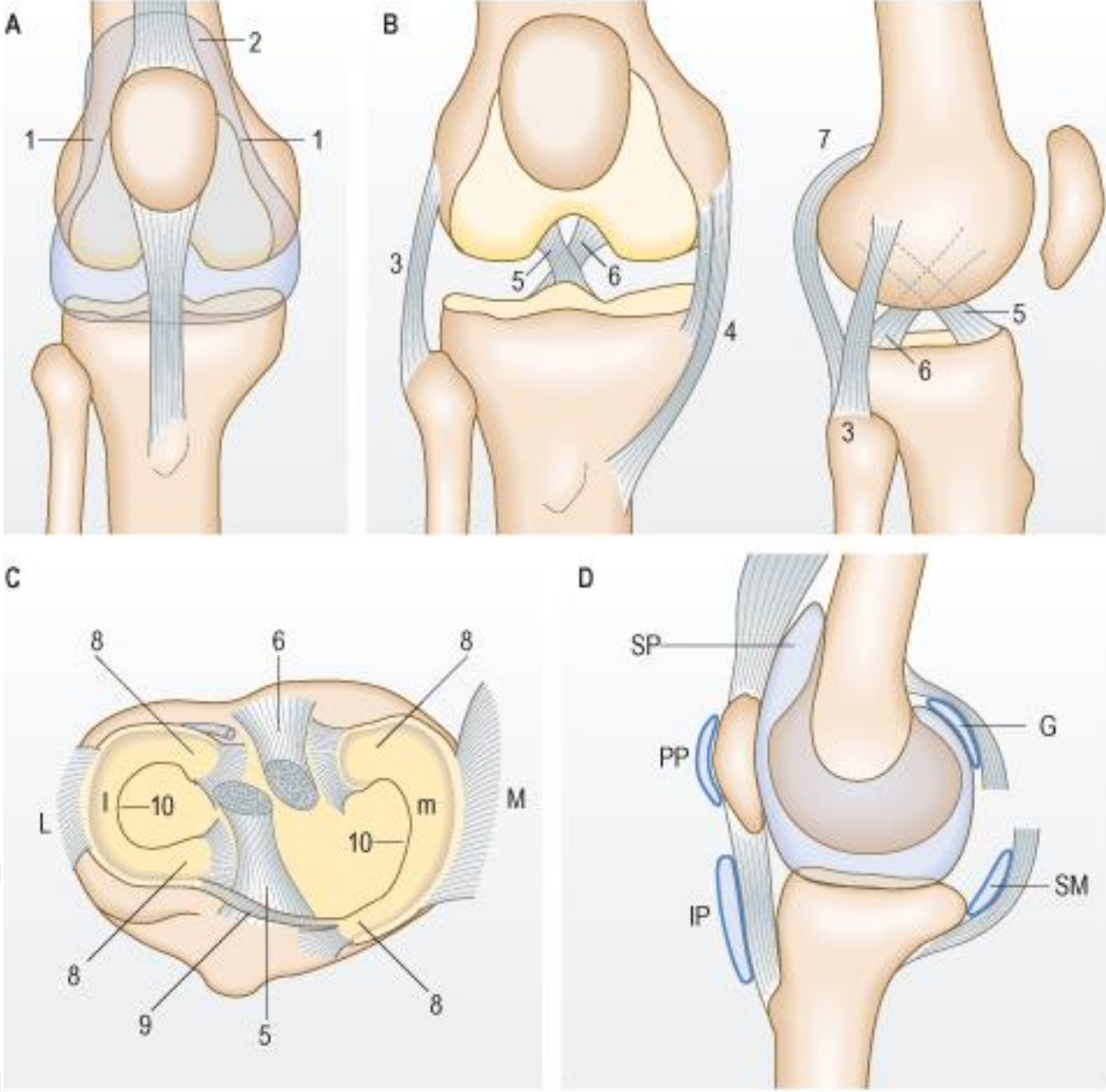


# The Knee Joint

## Key

- |    |  |   |   |    |   |
|----|--|---|---|----|---|
| G  | Bursa under the medial head of gastrocnemius | 1 | Extensions of synovial sheath on either side of patella | 7  | Posterior ligament                          |
| IP | Infrapatellar bursa                          | 2 | Extension of synovial sheath at upper pole of patella   | 8  | Horns of lateral (l) and medial (m) menisci |
| L  | Lateral tibiofemoral articulation            | 3 | Lateral ligament } <i>collaterals</i>                   | 9  | Connection of anterior horns                |
| M  | Medial tibiofemoral articulation             | 4 | Medial ligament } <i>collaterals</i>                    | 10 | Unattached margin of meniscus               |
| PP | Prepatellar bursa                            | 5 | Anterior cruciate ligament } <i>cruciates</i>           |    |   |
| SM | Semimembranosus bursa                        | 6 | Posterior cruciate ligament } <i>cruciates</i>          |    |   |
| SP | Suprapatellar pouch (or bursa)               |   |   |    |   |

**Fig. 13.38 Structure of the right knee.** **A** Anterior view, showing the common synovial sheath. **B** Anterior and lateral views, showing the ligaments. **C** Plan view of the menisci. **D** Bursae.





Knee Joint Anatomy

All hinge joints have collaterals

Menisci increase bony congruence

# Abnormal Findings

Pain

## Pain

Generalised knee pain is likely to be due to pathology in the tibiofemoral joint (Box 13.18). Anterior knee pain, particularly after prolonged sitting or going downstairs, suggests patellofemoral joint pathology. Medial or lateral pain could come from the collateral ligaments or meniscal tears.

Pain in the knee may be referred from the hip.

Swelling

## Swelling

The normal volume of synovial fluid is 1–2 mL and is clinically undetectable. An effusion indicates intra-articular pathology. Haemarthrosis (bleeding into the knee) is caused by injury to a vascular structure within the joint, such as a torn cruciate ligament or an intra-articular fracture. The menisci are predominantly avascular and do not cause a haemarthrosis, unless torn at their periphery, or in conjunction with some other internal derangement.

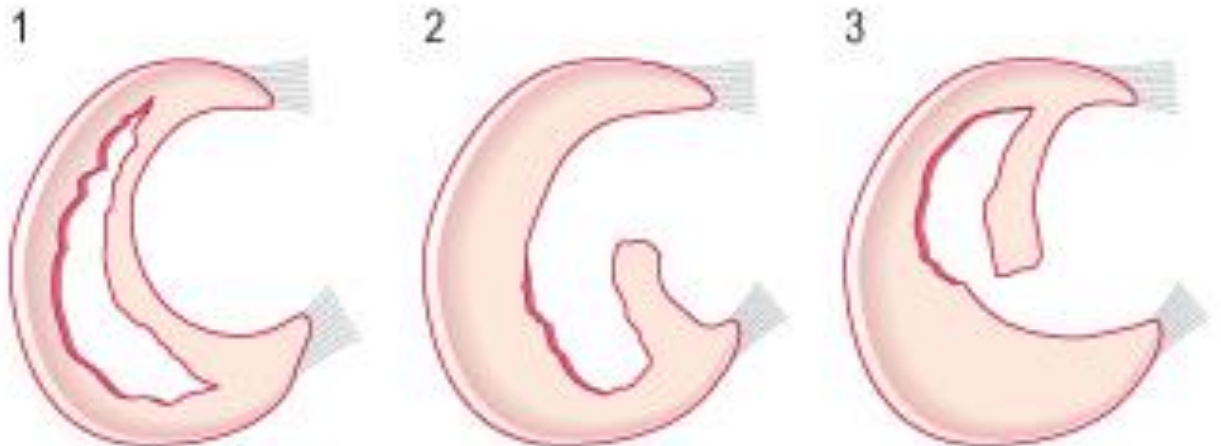
Locking

Giving way

*Housemaid's knee*



*Meniscal tears:*



# Abnormal Findings

Pain

Swelling

Locking

Giving way

## Locking

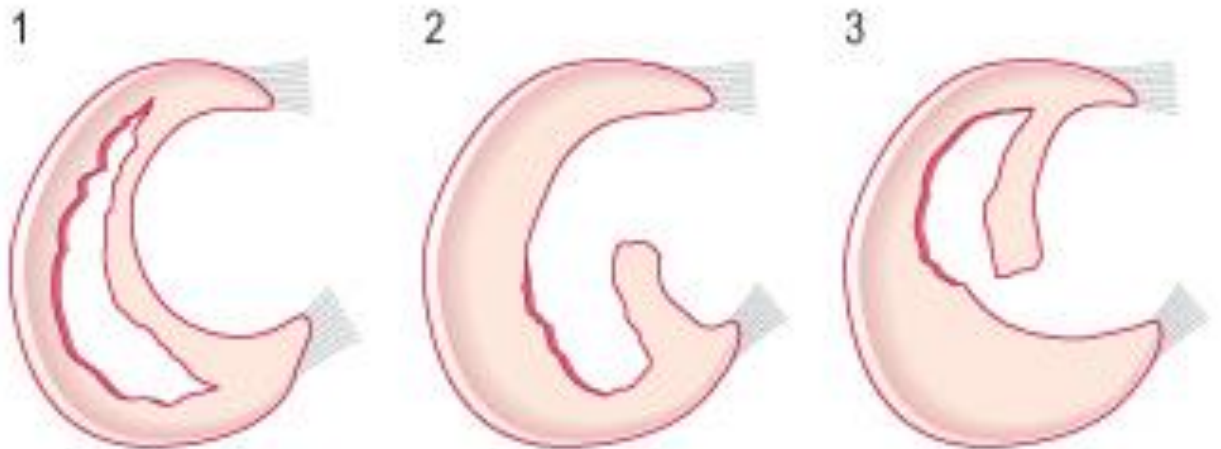
Two common causes in the knee are a loose body, such as from osteochondritis dissecans, osteoarthritis or synovial chondromatosis, and a meniscal tear. Bucket-handle and anterior beak meniscal tears are especially associated with locking. Posterior horn tears commonly cause pain and limit movement in the last few degrees of flexion. Meniscal tears also cause local joint-line tenderness. Congenital discoid meniscus may present with locking and clunking.

## Instability ('giving way')

Any of the four main ligaments may rupture from trauma or become incompetent with degenerative disease. The patella is prone to dislocate laterally because the normal knee has a valgus angle.



## Meniscal tears:

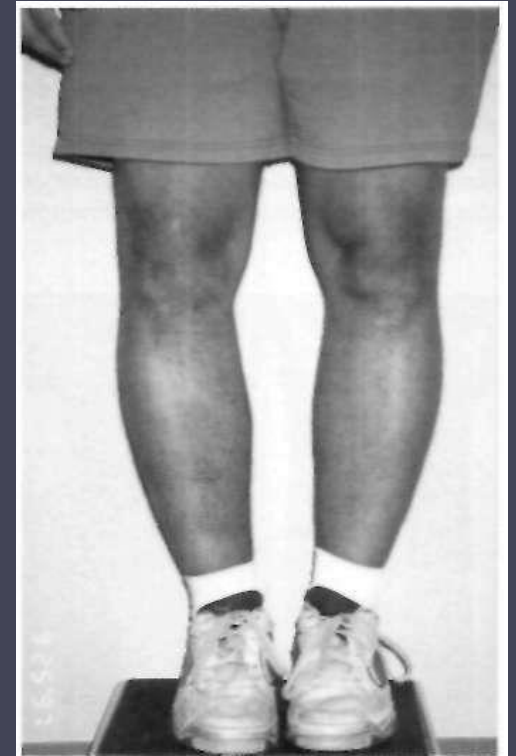


# Examination Sequence

## Look:

- ❖ Gait
- ❖ Scars, sinuses, redness or rashes
- ❖ Deformities
- ❖ Muscle wasting (measure)
- ❖ Leg length discrepancy
- ❖ Flexion deformity
- ❖ Swelling: effusion, bursae
- ❖ Baker's cyst Vs. aneurysm

- Flexion deformity: if the patient lies with one knee flexed, this may be caused by a hip, knee or combined problem.
- Swelling: look for an enlarged prepatellar bursa ('housemaid's knee') and any knee joint effusion. Large effusions form a horseshoe-shaped swelling above the knee. Swelling extending beyond the joint margins suggests infection, major injury or rarely tumour.
- Baker's cyst: bursa enlargement in the popliteal fossa.



Thigh muscle wasting (Quadriceps)



↙ Knee Swelling ↘



↙ This is an effusion! ↘

Baker's cyst (in the popliteal fossa)



Mild knee swelling

Redness, Swelling  
↓  
Inflammation  
Possibly septic arthritis



Swelling in the marked area = Patella  
↳ Prepatellar bursitis possible



**Important; discussed in the lecture:**  
The Kocher criteria for diagnosing septic arthritis is divided into the following variables:  
-Fever higher than 38.5°C  
-ESR above 40 millimeters per hour (mm/hour)  
-White blood cell (WBC) count greater than 12,000 cells/mm<sup>3</sup>.

# Examination Sequence

## Feel:

Warmth

Joint lines, patella , tibial tuberosity

Patellar tendon

Effusion

Parapatellar hollow

The 'ripple test' (Bulge, Milking)

The patellar tap

Synovitis: sponginess

Joint lines



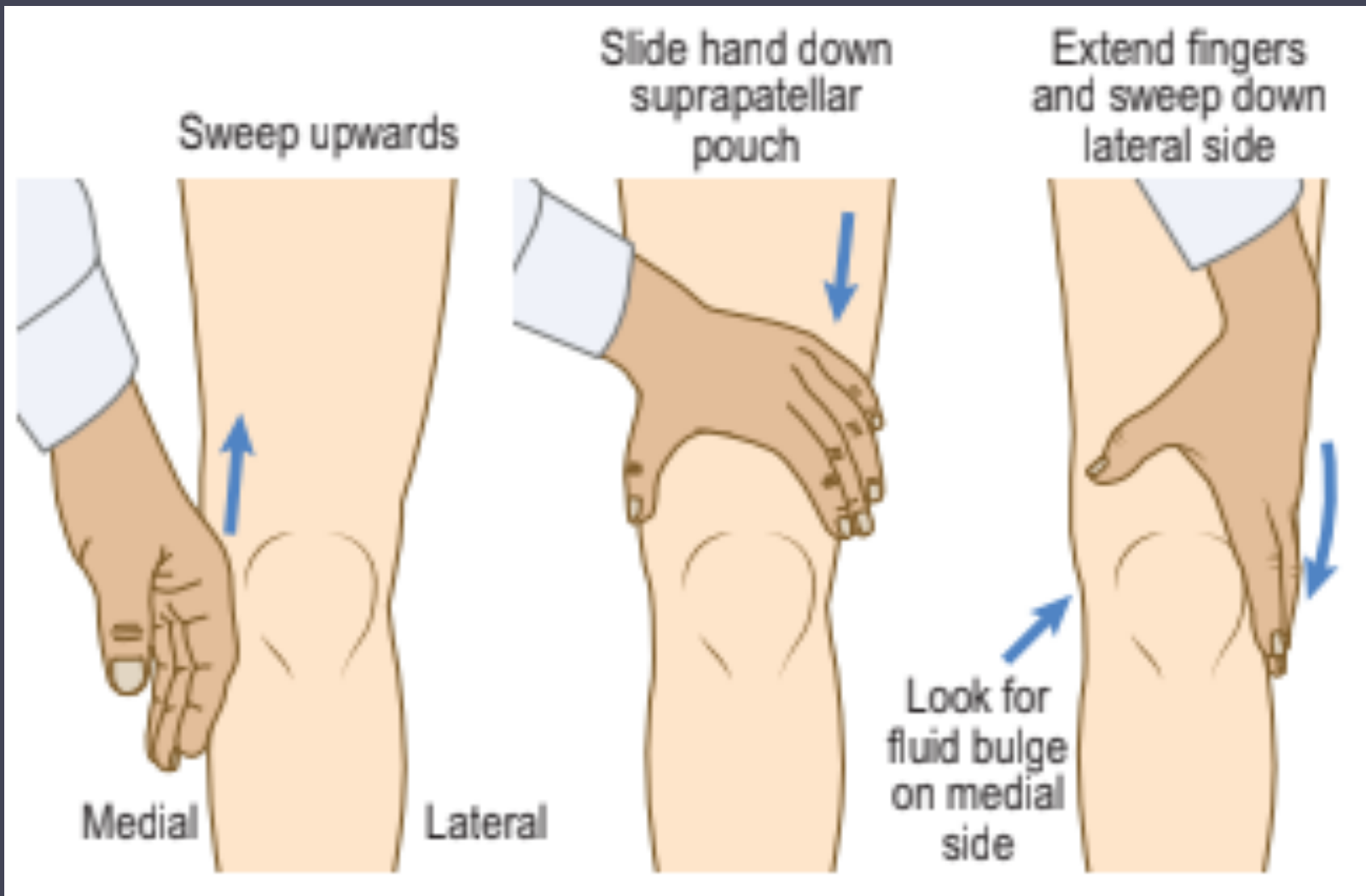


## Feel

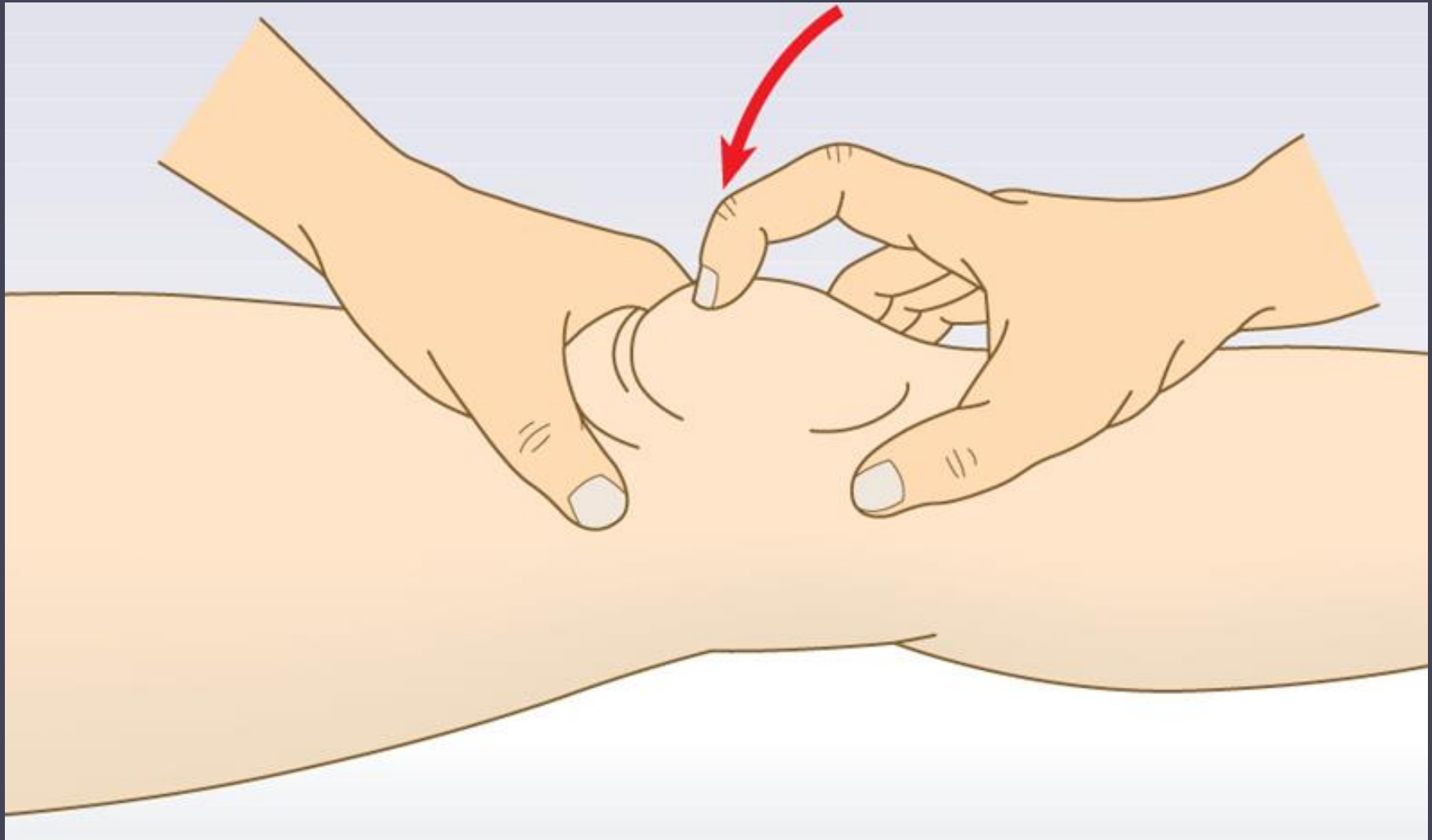
- Warmth: compare both sides.
- Effusion.
- Patellar tap:
  - With the patient's knee extended, empty the suprapatellar pouch by sliding your left hand down the thigh until you reach the upper edge of the patella.
  - Keep your hand there and, with the fingertips of your right hand, press briskly and firmly over the patella (Fig. 13.39).
  - In a moderate-sized effusion you will feel a tapping sensation as the patella strikes the femur.
- 'Bulge' or 'ripple' test (Fig. 13.40):
  - Extend the patient's knee and, with the quadriceps muscles relaxed, empty the medial compartment into the suprapatellar bursa and lateral side by stroking the medial side of the knee (Fig. 13.40A).
  - Empty the suprapatellar bursa by sliding your hand down the thigh to the patella (Fig. 13.40B).
  - Without lifting your hand off the knee, extend your fingers (or thumb) to stroke the lateral side of the knee (Fig. 13.40C).
  - The test is positive if a ripple or bulge of fluid appears on the medial side of the knee. It is useful for detecting small amounts of fluid but may be falsely negative if a tense effusion is present.
- Synovitis: with the patient's knee extended and the quadriceps relaxed, feel for sponginess on both sides of the quadriceps tendon.
- Joint lines: feel the medial and lateral joint lines. If there is tenderness, localise this as accurately as possible. In adolescents, localised tibial tuberosity tenderness suggests Osgood–Schlatter disease, a traction osteochondritis.

*Checklists  
are better ;)*

# Ripple Test



# Patellar Tap



# Move . . .

- Active flexion and extension:

*Patient's position:* Supine

*Normal range of motion:* 0-140 *The knee could extend more*

*With your hands at the joint lines:* Feel for crepitus *in some people*

- Extensor apparatus (SLR) Vs. Fixed flexion deformity

*Straight Leg Raise test: To test the functionality of the extensor apparatus. It detects fixed flexion deformity.*

- Passive flexion and extension:

Genu recurvatum-10 is normal

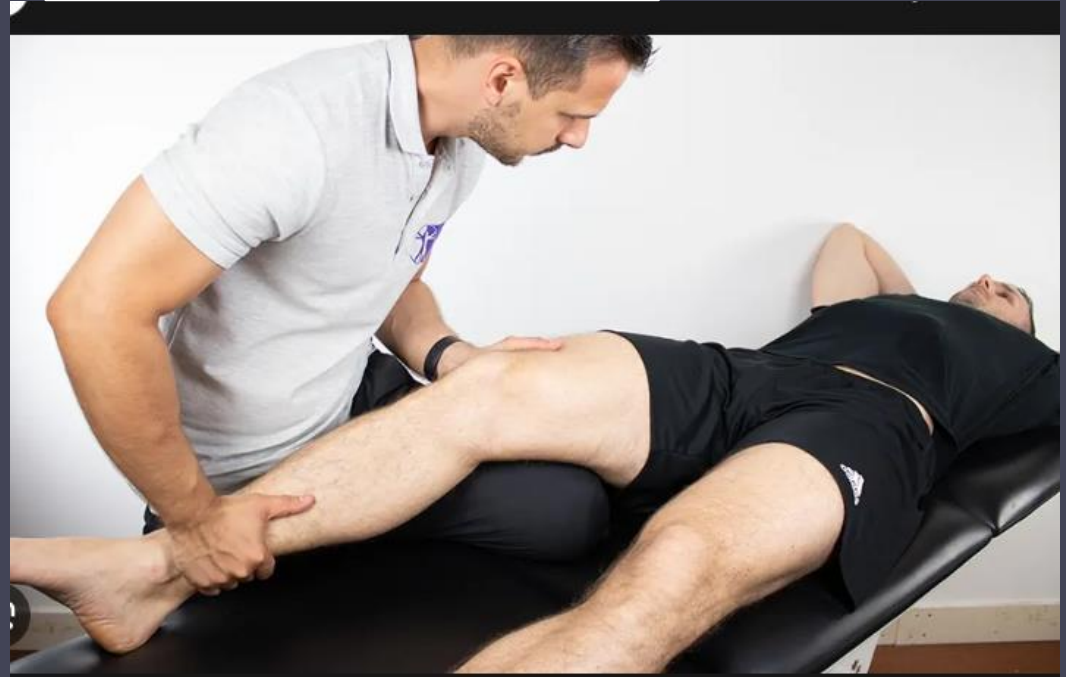
# Special Tests:

Key:

ACL = Anterior Cruciate Ligament  
PCL = Posterior Cruciate Ligament  
MCL = Medial Collateral Ligament  
LCL = Lateral Collateral Ligament

## Collateral Ligaments:

Varus & valgus stress tests  
At ~~20~~<sup>0 and 30</sup> degrees flexion



Varus stress test at 0°

For LCL, ACL, and PCL

Valgus stress test at 0°

For MCL, ACL, and PCL

Varus stress test at 30°

For LCL only

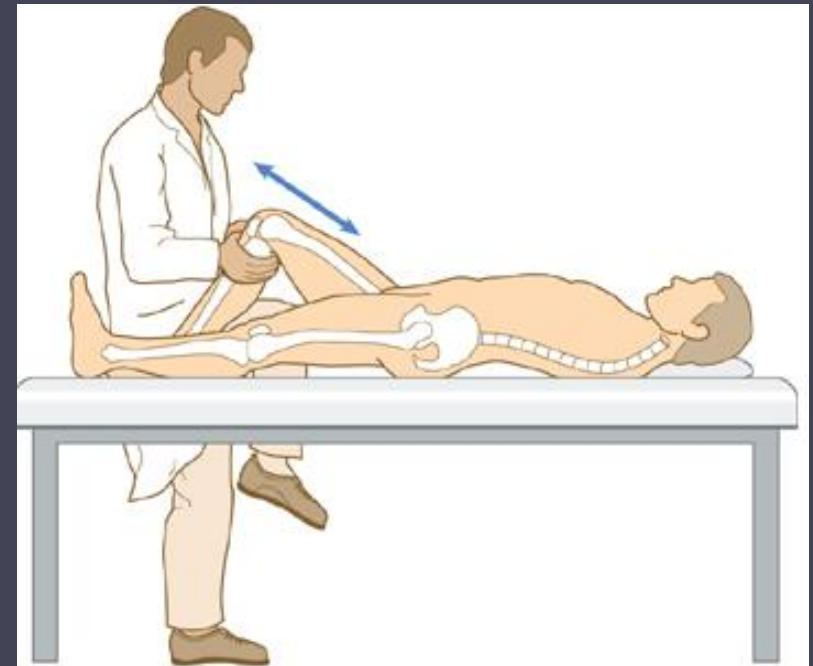
Valgus stress test at 30°

For MCL only

# Special Tests:

**Cruciate  
Ligaments:**

**Anterior  
drawer (ACL)**

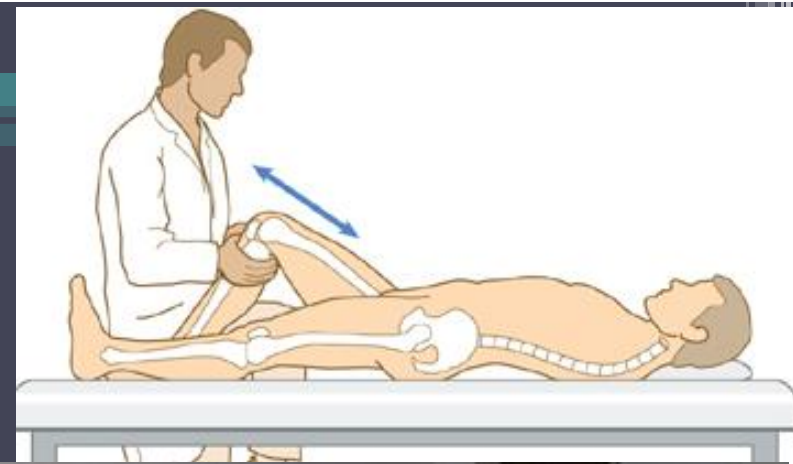


# Special Tests:

Cruciate  
Ligaments:

Anterior  
drawer (ACL)  
At 20 and 90

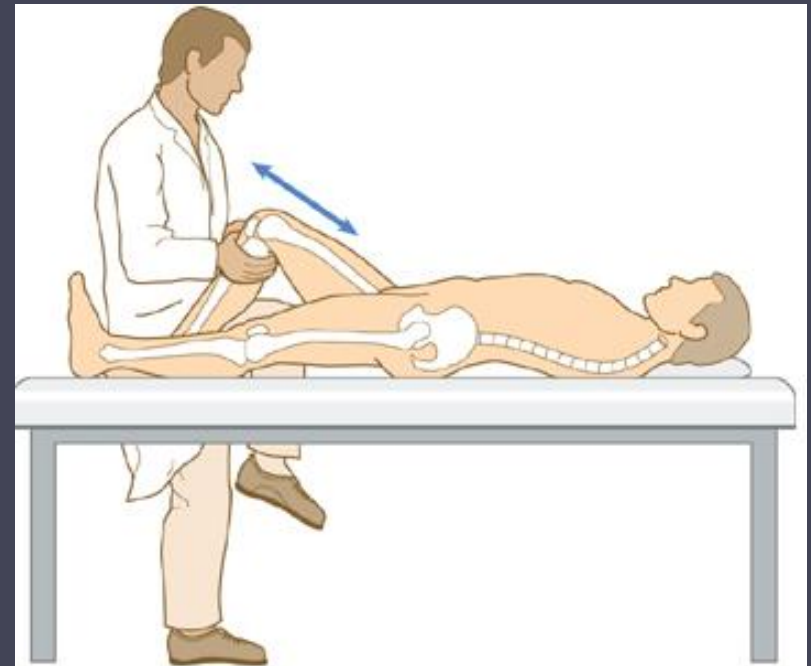
*Isolates  
ACL*



# Special Tests:

**Cruciate  
Ligaments:**

**Posterior  
drawer (PCL)**





# Special Tests:

**Medial Meniscal tears:**

**Medial McMurray test**

Test in valgus position:

For MCL



# Special Tests:

**Lateral Meniscal tears:**

**Lateral McMurray test**

Test in varus position:

For LCL



# Special

## Tests:

### Patellar apprehension test

#### Patella

#### Examination sequence



- Look for prepatellar bursa swelling.
- Feel around the patella for tenderness suggestive of enthesitis or tendonitis.

#### Patellar apprehension test

- With the patient's knee fully extended, push the patella laterally and flex the knee slowly. If the patient actively resists flexion, this suggests previous patellar dislocation or instability.

Other tests for patellofemoral pathology are unreliable and may be positive in normal individuals.



A



B

THANK  
YOU

