

CHAPTER 1.

MUSCULOSKETLETAL ULTRASONOGRAPHY IN CRICKET

1.1 INTRODUCTION

- Ultrasound is sound having a frequency above the audible range (> 20 kHz).
- Frequencies range of million of cycles per second.
- Ultrasound is used in medicine for diagnostic purposes.
- Diagnostic ultrasound uses the principle that ultrasound is reflected by an interface between media of different acoustic impedances.
- The image is produced by the display of the echoes returning to the transducer. The image is composed of pixels varying in light intensity, which depends on the intensity of the reflected echo.
- The reflection depends on the density of the media and subsequently various structures produce specific images depending on the acoustic mismatching of the reflected sound waves.
- In musculoskeletal imaging a linear probe is used to assess structures.

MUSCLE SONOGRAPHY

- Ultrasound is an inexpensive modality compared to MRI and it is easily accessible.
- Ultrasound is useful for staying and allows determination to expected time of return to competition.

Muscle Pathology

FIGURE 1-1

- **A**, R Rectus Abdominus muscle strain: Transverse view of rectus abdominus muscle. Muscle strain demonstrated by white arrow as hypoechoic area in muscle. Grade I strain.
- **B**, Normal L rectus abdominus muscle on contralateral side.

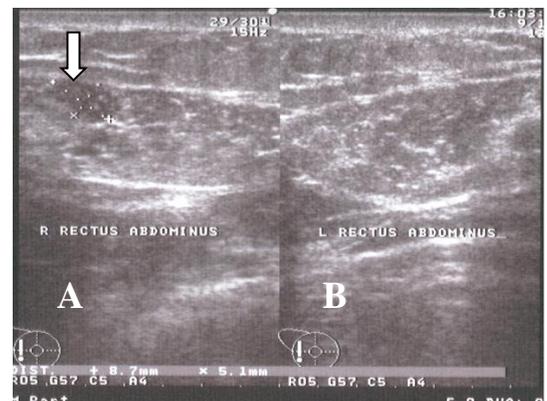


FIGURE 1-2 Longitudinal Rectus Abdominus

- Longitudinal tear of R Rectus Abdominus muscle.
- **A**, Longitudinal view demonstrating a hypoechoic area centrally within the rectus abdominus muscle. Grade II muscle strain.
- **B**, Transverse sonogram. Same patient as in (A).
- **(i)** White arrows demonstrating muscle strain.

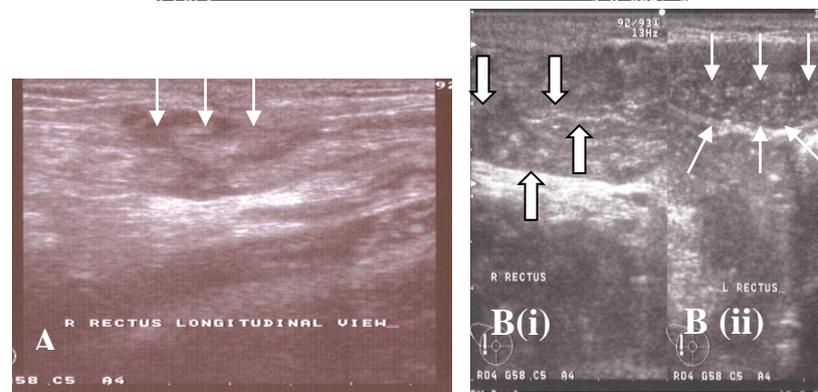


FIGURE 1-3

- Rectus Abdominus muscle strain complicated by abscess formation. Transverse sonogram of rectus muscle strain (thick arrows).
- Abscess formation with performance through the fascial sheath (thin arrow).

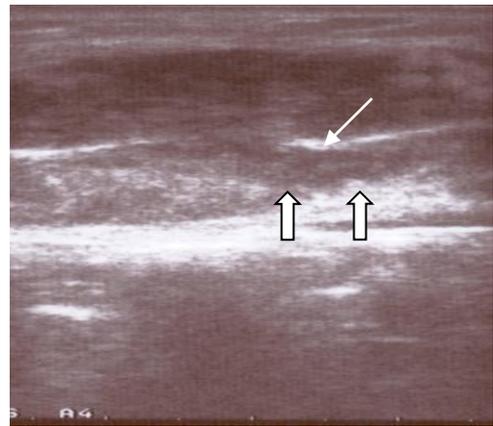


FIGURE Lateral gastrocnemius

- **A**, Lateral gastrocnemius muscle strain: Longitudinal Sonogram showing a fusiform haematoma in R Lateral gastrocnemius muscle.
- **B**, Normal L Gastrocnemius muscle.

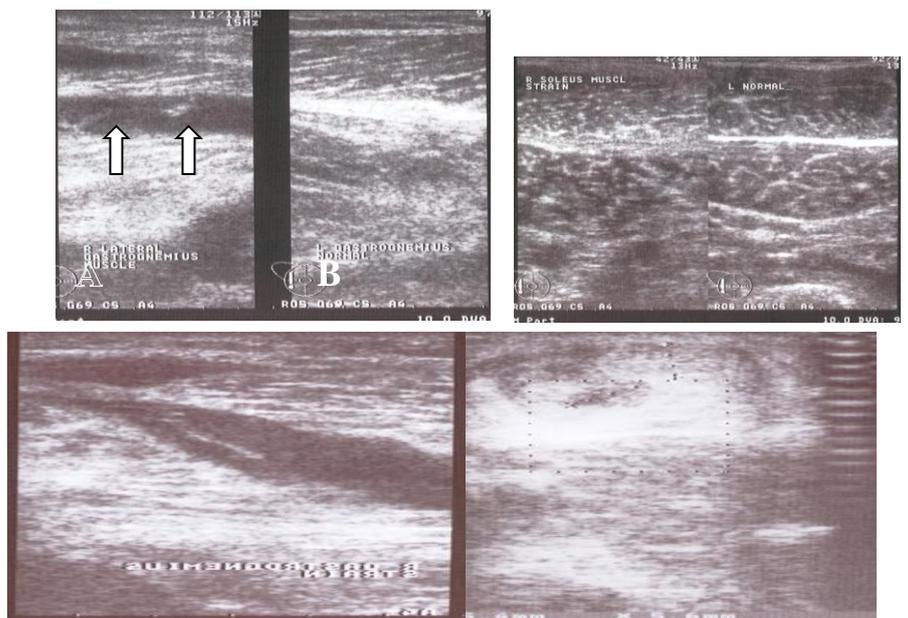


FIGURE Hamstring muscle strain

- L Hamstring muscle strain: Longitudinal ultrasound.
- **A**, Acute L Hamstring muscle injury. Anechoic area (Asterisk) surrounded by torn muscle tissue.
- **B**, Longitudinal R Hamstring muscle normal.

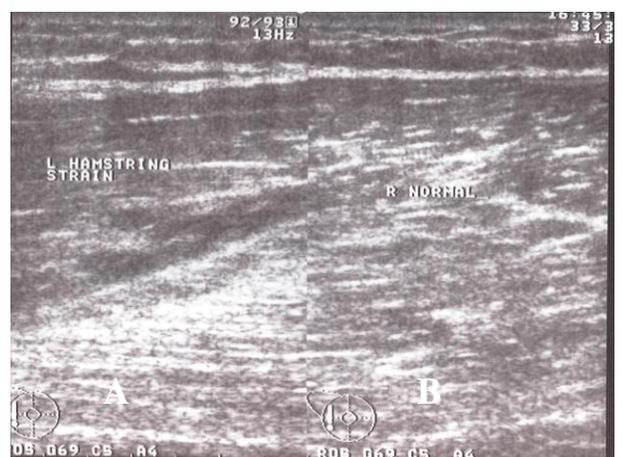


FIGURE Right quadriceps complete tear.

- A, Longitudinal sonogram of R quadriceps demonstrating complete tear (thick arrows). Retracted muscle (thin arrow).

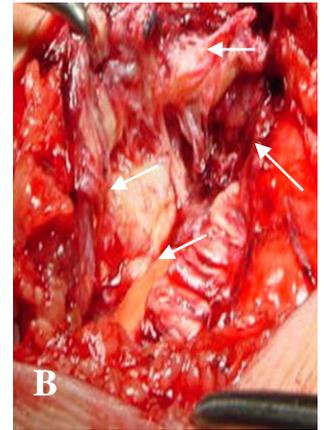
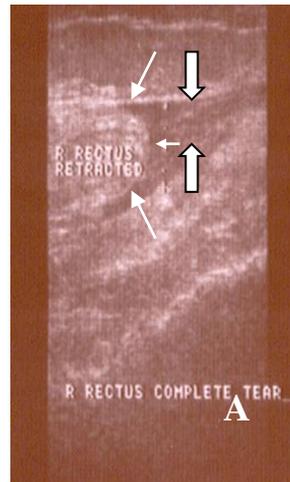


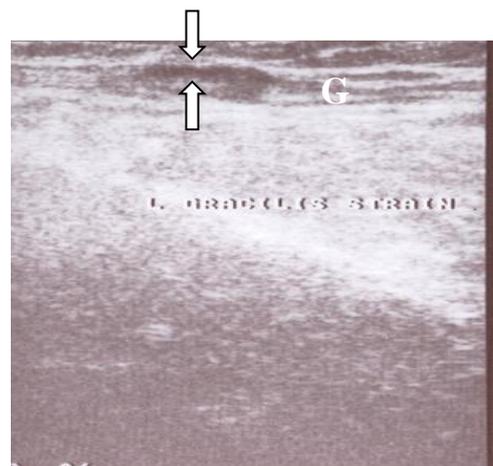
FIGURE Adductor Muscle Strain

- R Chronic Adductor magnus muscle strain: Longitudinal view of chronic R Adductor muscle strain at the insertion to pubis. Sclerosis and calcification (arrow) demonstrating chronic injury.



FIGURE

- L Gracilis muscle strain: Longitudinal sonogram of L Gracilis muscle with muscle strain shown by arrows.

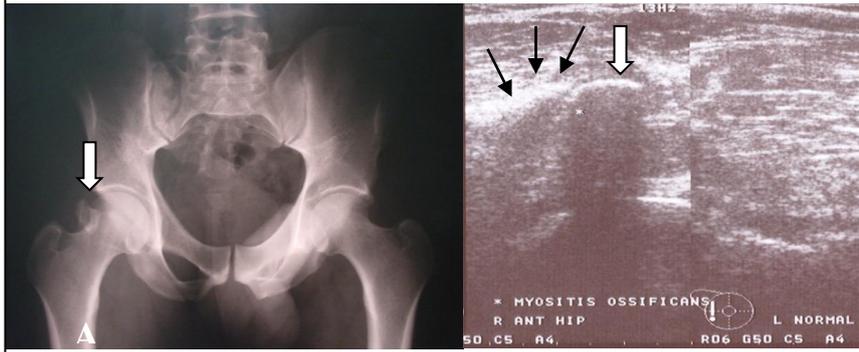


MYOSITIS OSSIFICANS

- Myositis ossificans is a condition where haematoma calcification and then ossification (bone formation) occurs in muscle after an injury.
- The presentation is decreased range of motion with pain localized to the injury site.
- Clinical examination reveals a palpable soft tissue mass.
- Ultrasound will reveal soft tissue mass and calcification in muscle.

FIGURE Myositis ossificans

- **A**, X-Rays changes of myositis ossificans: Antero – posterior x-ray demonstrating myositis ossificans in anterior hip muscle.
- **B**, Ultrasound detection of myositis ossificans: Same patients as in A. Longitudinal view shows calcification (solid arrows) with Linear hyperechoic strands (white arrow) representing ossification along fibro-fatty septa.



KNEE SONOGRAPHY

- Ultrasound useful for confirmation of knee pathology for acute and overuse injuries.

(A) ANTERIOR KNEE PATHOLOGY

1. Infrapatella tendinopathy

Example1 : fast bowler presenting with anterior knee pain, pain-full resisted knee extension.

Clinically: infrapatella tendinopathy.

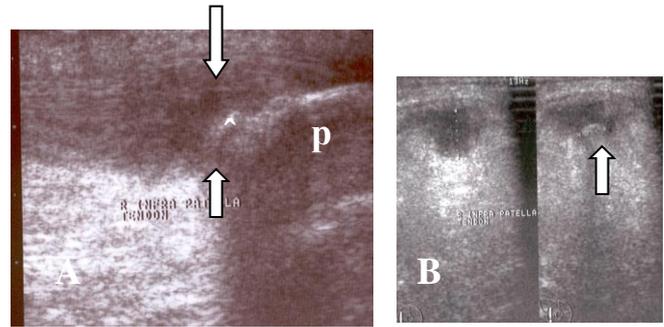


FIGURE

- Longitudinal ultrasound image of normal infrapatella tendon.

FIGURE Patellar tendinopathy.

- **A**, Longitudinal sonogram of fast bowler with infrapatella tendinopathy. Thickening of infrapatella tendon (white arrow), calcification (arrow head) demonstrating overuse injury.
- **B**, Transverse view of same athlete, showing calcification 'ossicle'.



2. Sinding Larsen Johansson Syndrome

Sinding Larsen Johansson Syndrome is an overuse injury to the apophysis of distal pole of the patella in a growing child.

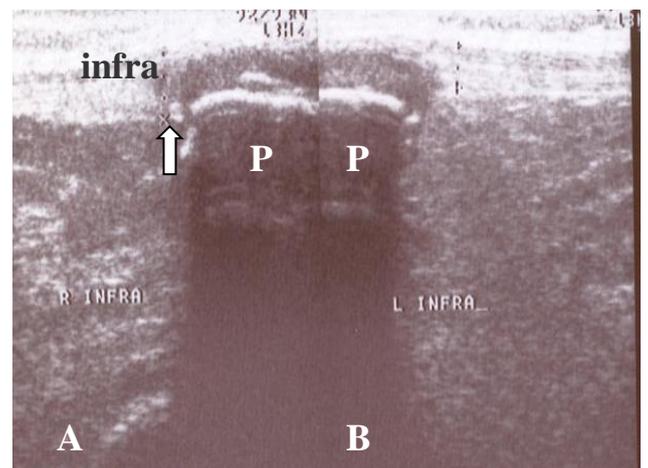
Example: Adolescent cricket presented to clinic with progressive anterior knee pain localized to the inferior patellar area.

Clinically: tender at inferior patellar pole.

Ultrasound:

FIGURE Sinding Larsen Johansson Syndrome.

- **A**, Longitudinal sonogram of distal patella (P). Microtrauma at the attachment of infrapatella tendon (infra) to the distal patella. Ossicles are pulled away from normal site (white arrow) and may grow as separate ossification centres.
- **B**, Asymptomatic, Normal contralateral image of the same patient.

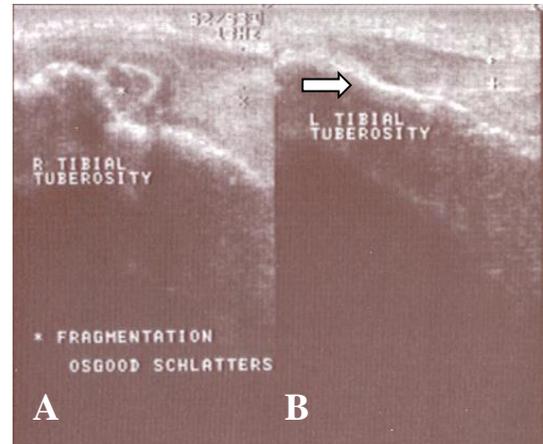


3. Osgood Schlatters

- Adolescent presented to clinic with pain at tibial tuberosity.
- Clinically: swelling at ischial tuberosity.
- Ultrasound

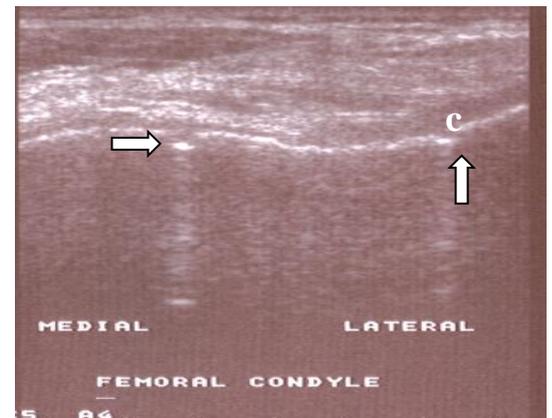
FIGURE Osgood – Schlatter Disease:

- **A**, Longitudinal sonogram through the distal patella tendon. Sonography shows small avulsions from the apophyseal cartilage (asterix). The avulsions calcify and may grow as separate ossification centres.
- **B**, Normal contralateral distal patella tendon. No avulsion injury present at insertion site (white arrow).



(L) Patellofemoral Syndrome

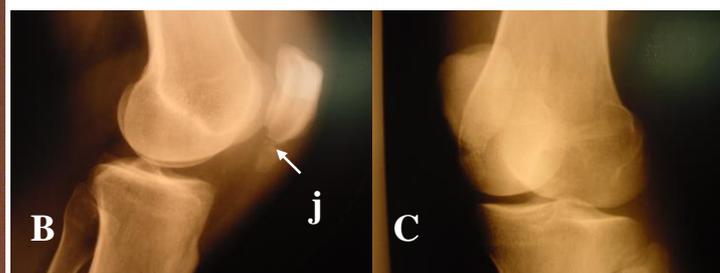
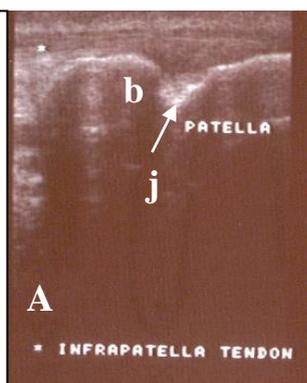
FIGURE Patellofemoral syndrome:
Coronal image of distal femoral condyle that articulates with patella. subchondral sclerosis shown (white arrows). C = cartilage.



(M) Bipartite Patella

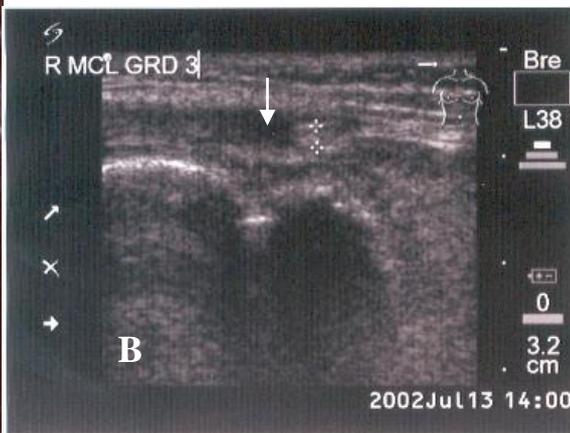
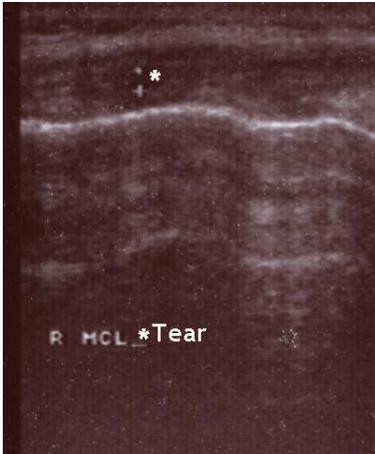
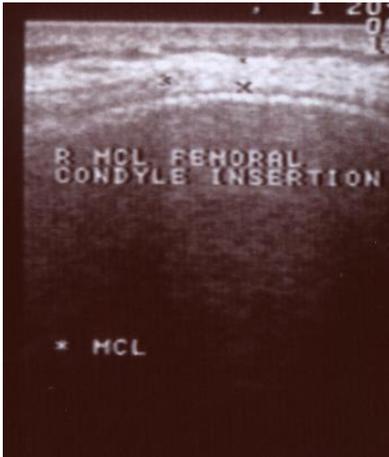
FIGURE Bipartite patella:

- **A**, Longitudinal sonogram of patella showing separate patella fragment (b) with joint (J). Inferior bipartite patella represents 5% of bipartite type.
- **B**, Lateral X – Ray of same athlete.

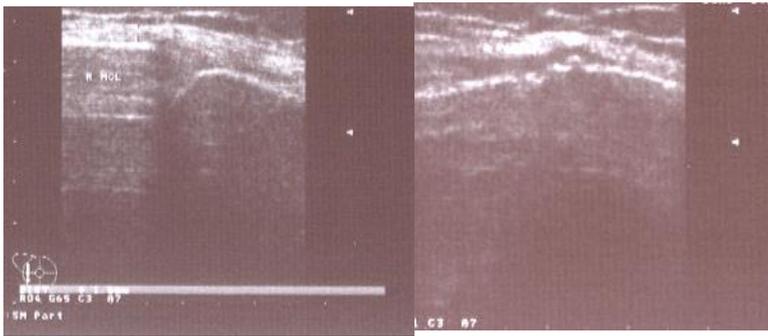


(B) MEDICAL KNEE STRUCTURES

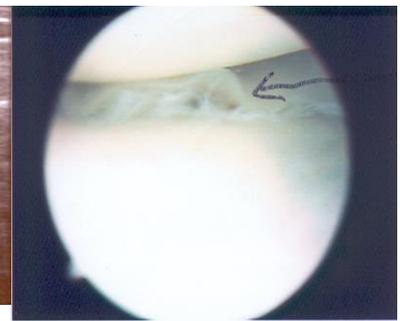
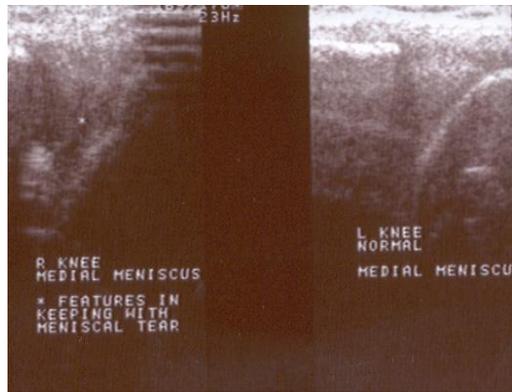
- Medial Collateral ligament injuries.



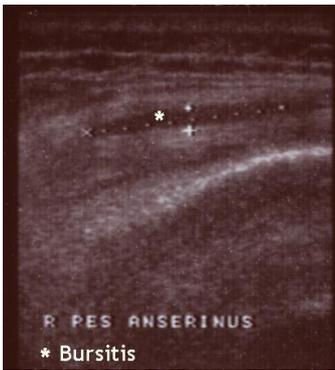
FIGURE



- MEDIAL MENISCAL INJURIES

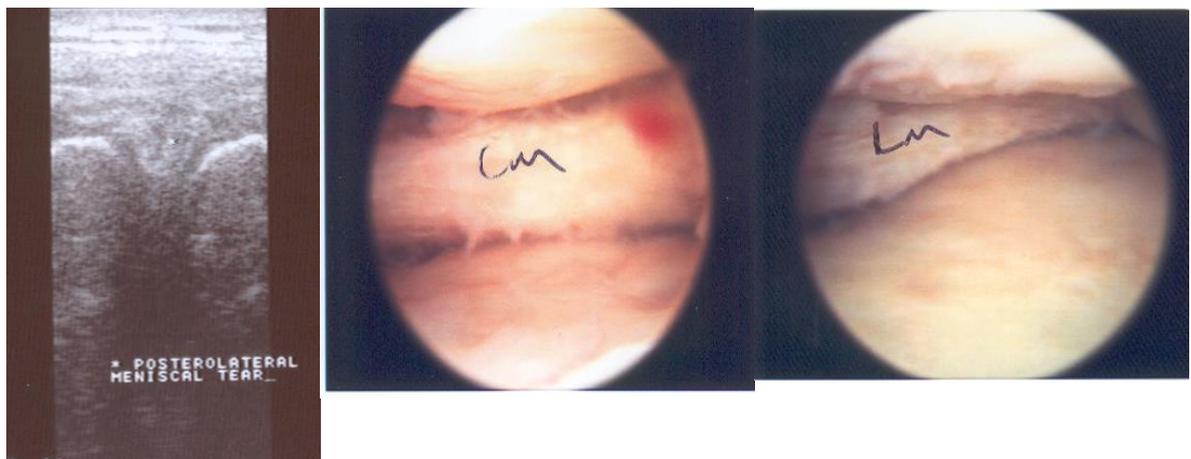
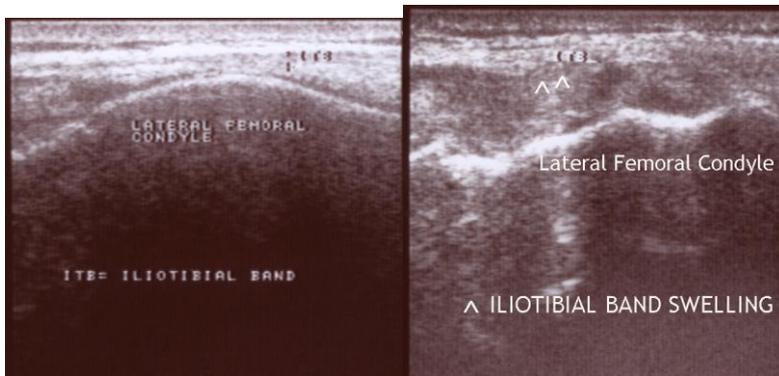


- PES ANSERINUS



(C) LATERAL KNEE STRUCTURES

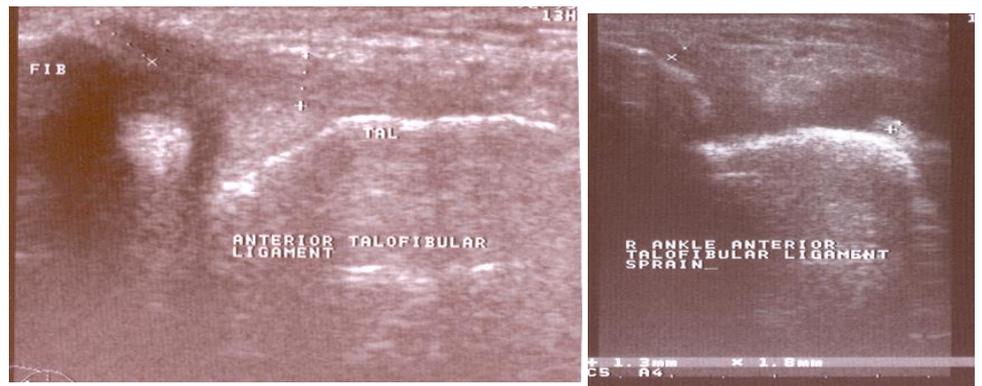
ITB SYNDROME



ANKLE SONOGRAPHY

LATERAL ANKLE PATHOLOGY:

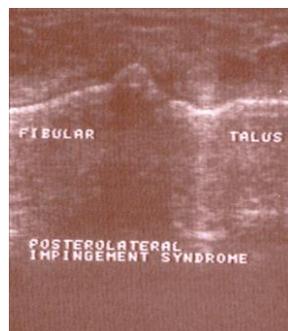
- Lateral ankle sprains



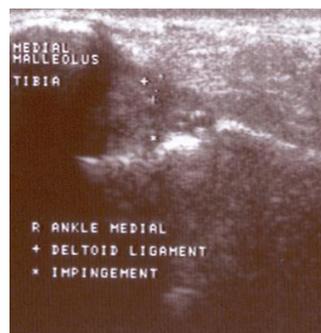
- Medial ankle sprain



- Lateral ankle impingement syndrome



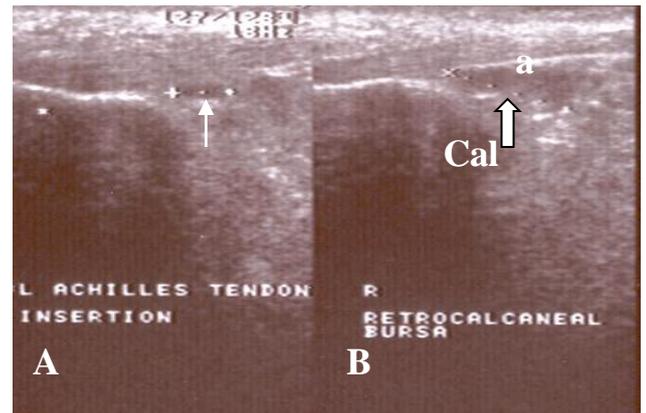
- Medial ankle impingement syndrome



- **POSTERIOR HEEL PAIN**

FIGURE

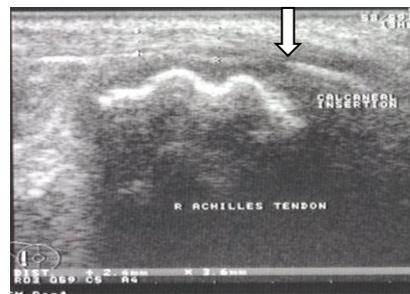
- **A**, Asymptomatic L Retrocalcaneal bursa (dark arrow).
- **B**, Retrocalcaneal bursa (open arrow) seen as a hypoechoic, fluid – filled sac between the Achilles tendon (a) and the calcaneus (cal).



- Haglunds

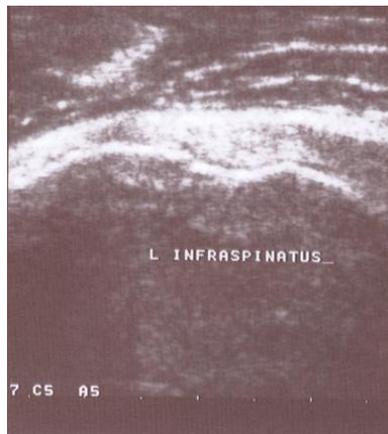
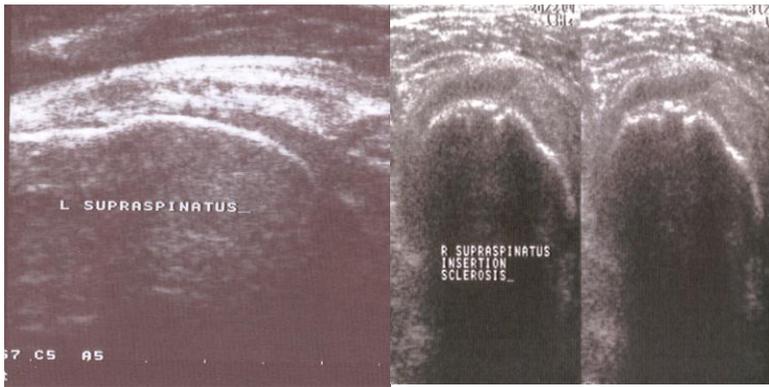
FIGURE

- Haglund's disease: Longitudinal sonogram. Thickening of Achilles tendon with thickening of overlying skin and subcutaneous tissues.



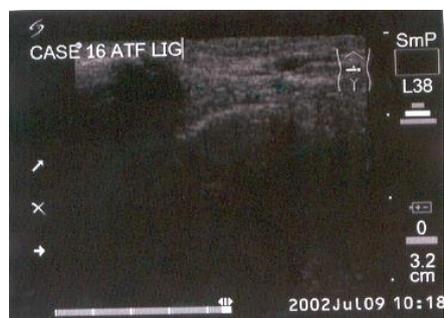
SHOULDER PATHOLOGY

- ROTATOR CUFF PATHOLOGY

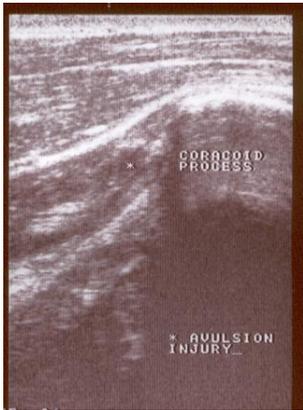
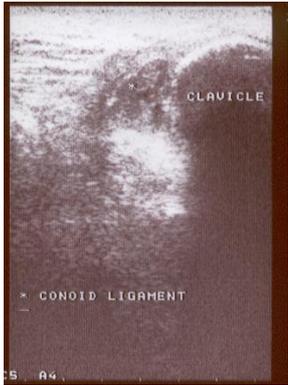
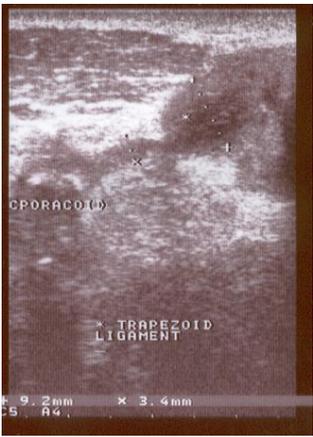


ACROMOCLAVICULAR

- Acromoclavicular joint sprain

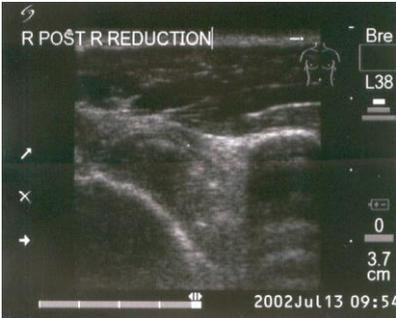


- AC joint dislocation



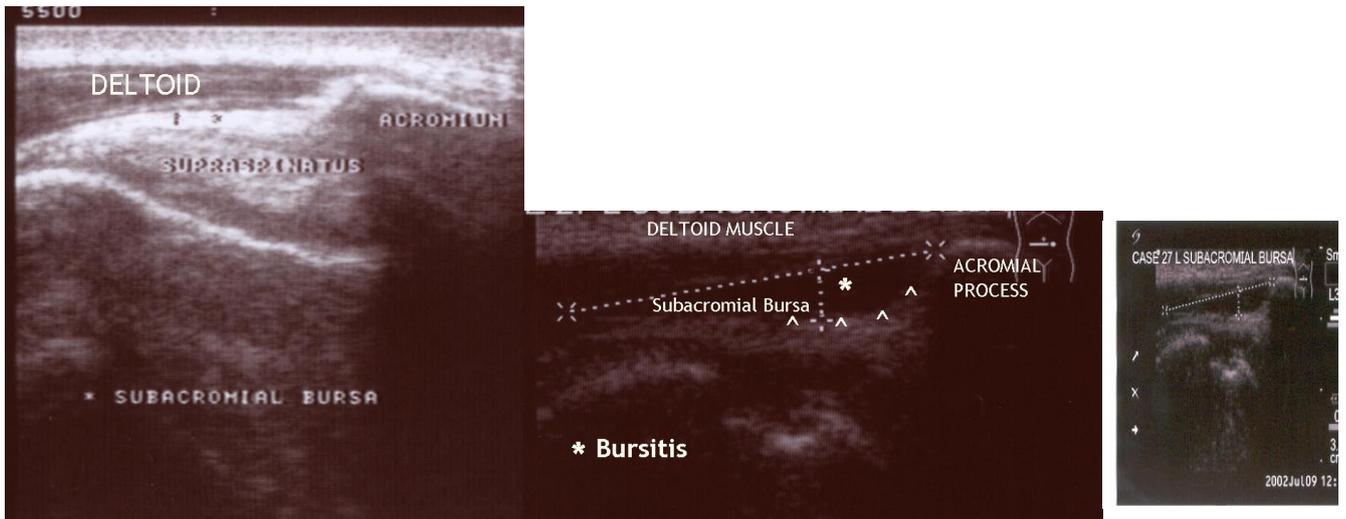
SHOULDER JOINT DISLOCATION

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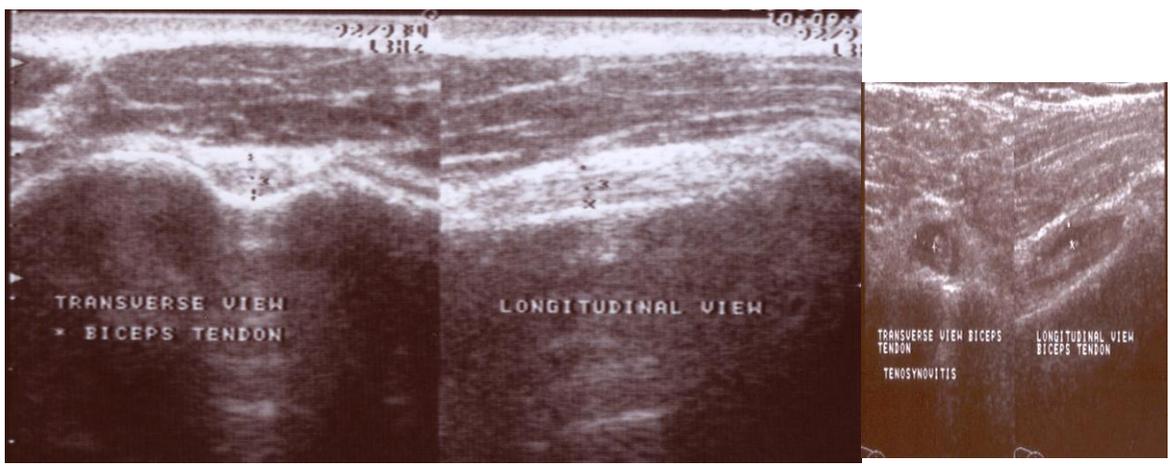


SUBACROMIAL BURSTITIS

Impact injury where humerus drives against the acromion with haematoma formation and bursitis.



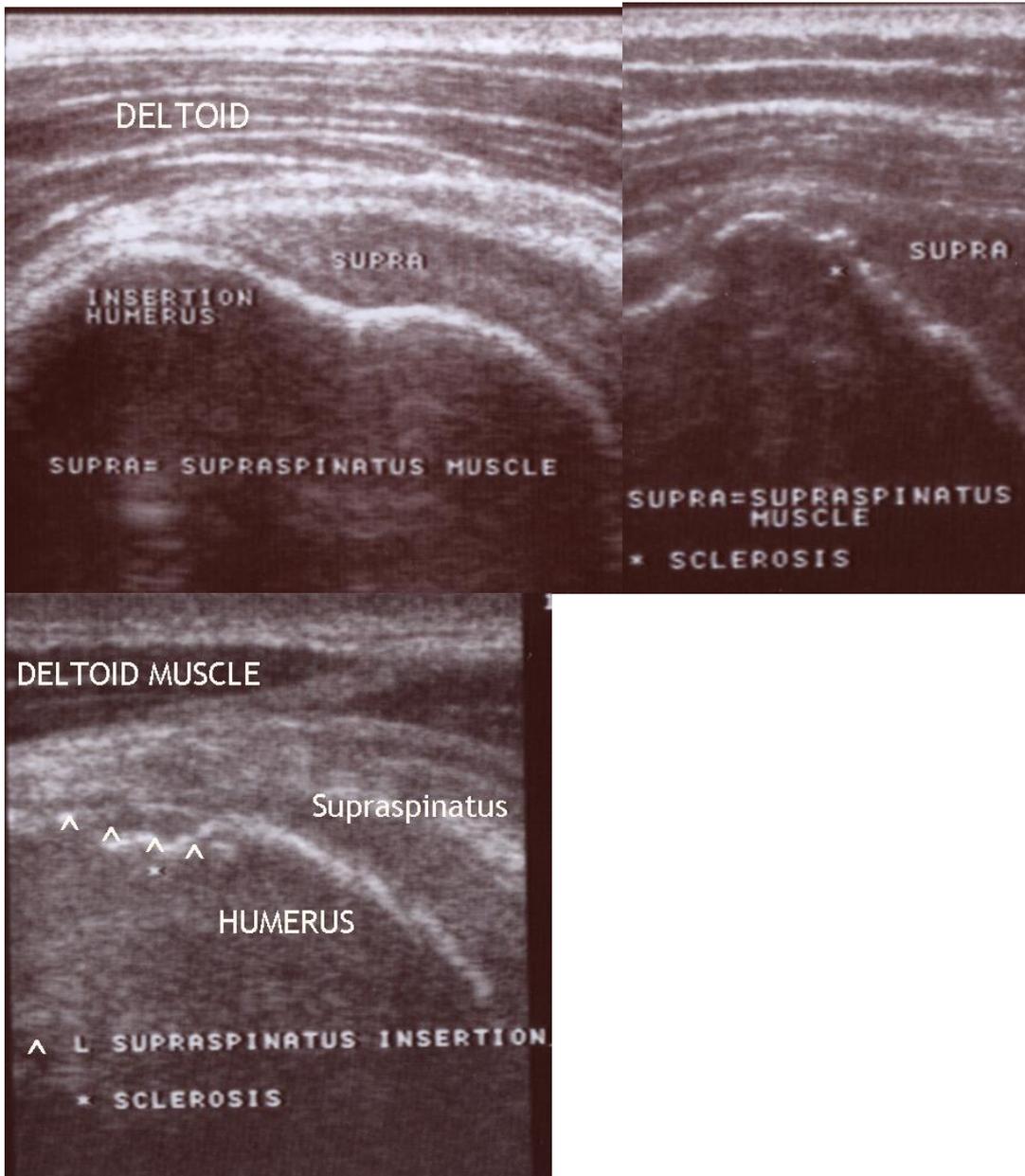
- Biceps tenosynovitis



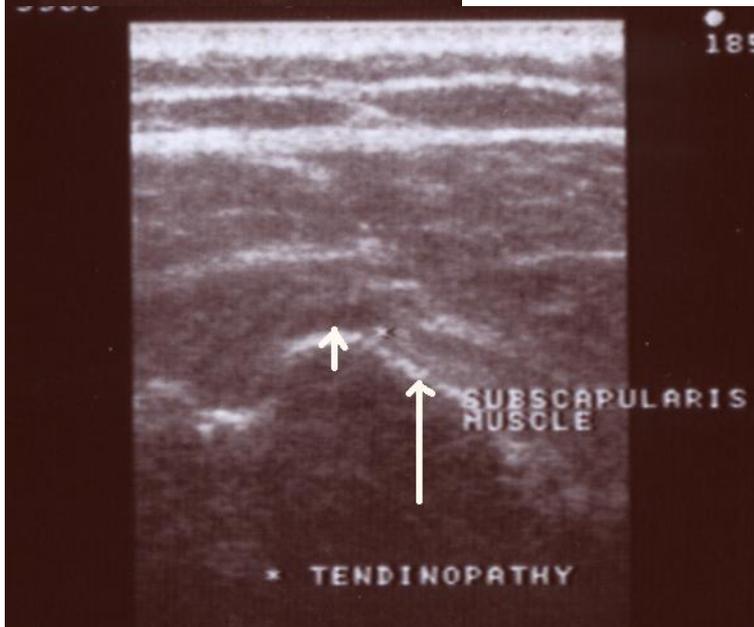
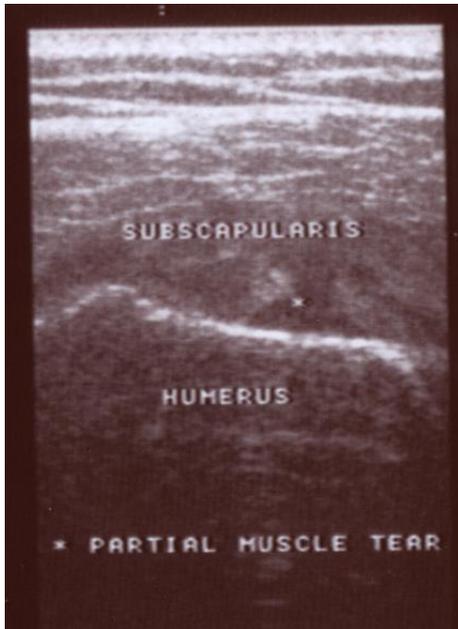
IMPINGEMENT SYNDROME

ROTATOR CUFF TENDINOPATHY

- Supraspinatus tendonopathy



- Subscapularis tendinopathy



- Infraspinatus tendinopathy



