Superficial Lumps and Bumps: Ultrasound Assessment

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1. Posterior knee

1. Baker’s Cyst

Synovial Cyst/Bursa
- Synovial-lined
- Synovial cyst: extrusion of joint fluid
- Bursa: synovial-lined potential space between osseous surfaces, ligaments or tendons

Baker’s Cyst

Posterior knee

Septations, internal debris, peripheral Doppler flow

SM: Semimembranosus
MGas: Medial head of gastrocnemius
Iliopsoas Bursitis
Anterior hip
Peripheral Doppler flow - synovitis
IPs: Iliopsoas

Subacromial/Subdeltoid Bursitis
Anterior shoulder
BT: Biceps tendon

Bicipitoradial Bursa
Antecubital fossa
BT: Biceps tendon
Rad: Radius
Peripheral/intratendinous Doppler flow

2.
Finger, near proximal phalanx
Mucoid/myxomatous degeneration of periarticular connective tissue → dominant cyst

Result of repetitive microtrauma
Common in hand/wrist, foot/ankle
Close association with joint or tendon sheath

Scapholunate Ganglion Cyst
Dorsal radial wrist
Contiguous with scapholunate ligament
S: Scaphoid
L: Lunate

Scapholunate Ganglion Cyst
Dorsal radial wrist
Scapholunate ligament tear
Peripheral Doppler flow
S: Scaphoid
L: Lunate

Scapholunate Ganglion Cyst
Dorsal radial wrist
Contiguous with scapholunate ligament
Slightly complex, collapsed
S: Scaphoid
L: Lunate

Radiocarpal Ganglion Cyst
Volar radial wrist
Non-compressible
Visible neck in only 25-35%
S: Scaphoid
L: Lunate

Internal Doppler flow?
Radiocarpal Ganglion Cyst

Pitfall: artifactual flow from adjacent radial artery
RA: radial artery
FCR: flexor carpi radialis

Superficial Lipoma

- Mature adipocytes and uniform nuclei identical to normal adult (white) fat
- Arise within subcutaneous tissue
- 80% <5 cm; 99% ≤ 10 cm

MJ Kransdorf et al., Radiology 2002;224:99–104
MD Murphey et al., RadioGraphics 2004;24:1433–1466

Periscapular region
Parallel to skin surface
Elliptical
Linear echogenic striations
No internal Doppler flow ≤5 cm

Supraclavicular region
May be hyperechoic, isoechoic, or hypoechoic
Uniform echogenicity

Anterior knee
Parallel to skin surface
Elliptical
Linear echogenic striations

Supraclavicular region

**Superficial Lipoma**
Radial aspect elbow
- Compressible
- Parallel to skin surface

**Deep Lipoma**
Shoulder
- Parallel to skin surface
- Linear echogenic striations
- Slightly heterogeneous
- Deep (intramuscular) → Needs additional imaging

**Shoulder**
- Linear echogenic striations
- Variable echogenicity
- Deep (intramuscular) → Needs additional imaging

**Deep Lipoma**

**Dedifferentiated Liposarcoma**
Medial anterior thigh
- Heterogeneous
- Deep (intramuscular) → Needs additional imaging

**Lower back**
- Heterogeneous
- >10 cm
- Exuberant Doppler flow
- Needs additional imaging
Epidermal Inclusion Cyst

- Epithelial-lined, keratin-containing cysts
- Causes:
  - Squamous metaplasia
  - Deep growth after obstruction of hair follicle
  - Post-traumatic implantation into dermis

HK Kim et al., Skeletal Radiol (2011) 40:1415–1419

Epidermal Inclusion Cyst

- Upper back
- Ovoid, sharply margined
- Curvilinear echogenic keratin
- Hypoechoic clefts
- May scallop overlying skin

Epidermal Inclusion Cyst

- Tip of finger
- Hypoechoic
- No internal Doppler flow
- Cortical disruption

Epidermal Inclusion Cyst
5. Morel-Lavallée Lesion

- Proximal lateral thigh
- Degloving injury of proximal thigh
- Separation of fascia from subcutaneous tissue and vascular/lymphatic disruption
- Collection containing blood, lymph, fat

Morel-Lavallée Lesion

- Proximal lateral thigh
- Chronic: fusiform, hypoechoic
- Globules of echogenic fat
- No internal Doppler flow
- May be complex
- Globules of echogenic fat
- No internal Doppler flow

Morel-Lavallée Lesion

- Proximal calf, near knee
- Morel-Lavallée also observed about the knee
- Acute: may be lobulated, heterogeneous
- Globules of echogenic fat

6. Venous Malformation
Proximal forearm

Vascular Malformation
- Congenital vascular lesion resulting from aberrant vessel angiogenesis
- High flow: arterial component
- Low flow: venous malformation = hemangioma
- Bluish discoloration of overlying skin

7. Giant Cell Tumour of Tendon Sheath
Dorsal wrist

Giant Cell Tumour of Tendon Sheath
- Pigmented villonodular tenosynovitis
- Localized synovial proliferation

Venous Malformation
Dorsal to metacarpal

Venous Malformation
Lateral Knee

Hypoechoic vascular channels
Echogenic phleboliths
Doppler flow
Deep, intramuscular lesions → MRI

Vascular Malformation
Congenital vascular lesion resulting from aberrant vessel angiogenesis
- High flow: arterial component
- Low flow: venous malformation = hemangioma
- Bluish discoloration of overlying skin
Volar Thumb
- Hypoechoic
- Peripheral flow
- Longitudinal contact with tendon
- Does not move with digital flexion/extension

Volar finger
- Hypoechoic
- Longitudinal contact with tendon
- Circumferential contact with tendon

Sole of foot
- PF
- Ledderhose disease (feet)
- Dupuytren’s contracture (hands)
- Benign proliferation of fibrous tissue

Superficial Fibromatosis
- Left plantar midfoot
  - Fusiform, hypoechoic
  - Continuous with plantar fascia
  - No internal Doppler flow
Superficial Fibromatosis

Plantar midfoot

May be multiple

Long axis

Short axis

Superficial Fibromatosis

Volar ring finger

Fusiform, hypoechoic
Palpable
Superficial to flexor tendon

Long axis

Short axis

Superficial Fibromatosis

Volar distal palmar crease near 4th MCP joint

Irregular, hypoechoic plaque
Superficial to flexor tendon

Volar forearm

9. Peripheral Nerve Sheath Tumour

- Neoplasms of Schwann cell origin contained within nerve epineurium
- Malignant lesions:
  - >5cm
  - Ill-defined margins
  - Central necrosis

Peripheral Nerve Sheath Tumour

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**Peripheral Nerve Sheath Tumour**

- **Lateral hindfoot**
  - Hypoechoic fusiform mass continuous with nerve
  - Solid masses may show no internal Doppler flow

  SN: sural nerve


- **Volar ulnar wrist**
  - Focal fusiform nerve thickening
  - Anechoic, posterior acoustic enhancement
  - No internal Doppler flow

  UN: ulnar nerve
  UA: ulnar artery
  FCU: flexor carpi ulnaris

**Peripheral Nerve Sheath Tumour**

- **Posterior thigh**
  - Heterogeneous
  - Large, >5cm
  - Central necrosis

  MR for complete assessment
  Histology for Benign vs. malignant

**Intraneural Ganglion**

- **Proximal calf**
  - Communication with tibio-fibular joint
  - Compresses peroneal nerve

  PN: peroneal nerve

**Intraneural Ganglion**

- **Proximal ulnar aspect of forearm**
  - Anechoic
  - No internal flow
  - Extends along ulnar nerve

  Difficult distinction from peripheral nerve sheath tumour

**10.**

- **Along patellar tendon**
  - Proximal – long axis
  - Distal – short axis
  - Distal – long axis

  PAT: patellar tendon
**10. Gout**

- Monosodium urate crystal deposition in joints, cartilage, soft tissues
- Erosion, synovitis, effusion, tophus

**Gout**

- **Suprapatellar knee**
  - Amorphous, hyperechoic tophus
  - Posterior shadowing

- **Proximal patellar tendon (same patient)**
  - Heterogeneous tophus, hypoechoic halo
  - Suprapatellar region
  - Intra-articular tophus

- **Dorsal midfoot**
  - Hyperechoic, shadowing tophus
  - Achilles tendon

- **Distal quadriceps**
  - Calcified, shadowing tophus
Gout
MCP joint

Periarticular erosion
Urate icing


Myositis Ossificans

- Heterotopic ossification in muscle
- Thigh, buttocks, elbow, calf, shoulder
- Time course:
  - Early/active: <2-4 wks
  - Subacute/intermediate: 4 wks-6 mos
  - Mature: >6 mos

Myositis Ossificans

- Several months later

- Intramuscular
- Hypoechoic, centrally hyperechoic
- Uninterrupted muscle fibers
Peripheral flow in early myositis ossificans
Ultrasound findings predate radiographic findings

Two months later

Intramuscular
Hypoechoic, centrally hyperechoic
Uninterrupted muscle fibers

Dense peripheral calcification
Posterior acoustic shadowing

Synovial sarcoma
Schwannoma
**Solid Masses**

- Finger - angiomyoma
  - Posterior acoustic enhancement does not imply cyst!
  - MH Lee et al., Skeletal Radiol 2010:981-986
- Finger - venous malformation

**Summary:**
- Gray scale appearance often nonspecific
- Lesion location is helpful
- Relation of lesion to joint, bursa, tendon, or nerve is helpful

**Summary: Solid Lesions**
- May show no internal colour/Power Doppler flow
- May show posterior acoustic enhancement
- Predicting histology based on ultrasound difficult

**Summary: Superficial Lipoma**
- Entirely superficial
- Parallel to skin surface
- Linear echogenic striations
- Uniform echogenicity
- <10 cm

**Summary: Correlative Imaging**
- MRI
  - Large, infiltrative lesions
  - Deep solid lesions
- CT/Plain Film
  - Calcification/ossification
  - Bone erosion
**Assessment Question #1:**

A Baker's cyst extends between which two structures?

A) Semimembranosus and medial head of gastrocnemius  
B) Semitendinosus and medial head of gastrocnemius  
C) Semitendinosus and sartorius  
D) Semitendinosus and gracilis  
E) Sartorius and gracilis

**Assessment Question #2:**

Which of the following is LEAST helpful in ultrasound assessment of a focal mass lesion?

A) Relationship to joint, nerve, or tendon  
B) Presence of internal flow on colour/power Doppler  
C) Posterior acoustic shadowing  
D) Posterior acoustic enhancement  
E) Lesion location

Thank you.