Objectives

• Review several common and a few unusual pediatric emergency presentations.
• Discuss differential diagnoses and highlight important findings to reach most likely diagnosis.

Case 1

• 17 day old neonate
• Palpable deformity of the scalp
• Not regressing
• Firm on palpation
• Prolonged delivery

• Mass does not cross beyond the sagittal suture line (blue arrow)
• Soft tissue periosteal elevation (yellow arrow)
• No skull fracture
• Sharply demarcated soft tissue density parietal

Mirror image artifact can be confusing regarding underlying brain and possible epidural process
Later presentation – same diagnosis

Outer border may calcify as a rim

Differential diagnoses

1. Caput succedaneum
2. Subgaleal hemorrhage
3. Cephalohematoma
4. Soft tissue tumour NYD

Caput Succedaneum

• Occurs immediately after vaginal delivery
• Subcutaneous hemorrhage requiring no intervention
• Typically not imaged – clinical diagnosis
• Not limited by suture lines
• Typically soft puffy swelling
• May be associated with discoloration/bruising
• Heals spontaneously within a few days

Subgaleal hemorrhage

• Bleeding into the subaponeurotic space from rupture of emissary veins
• Crosses suture lines
• Covers a larger area typically compared with cephalohematoma
• Potentially life-threatening
• Associated with vacuum assisted delivery
Cephalohematoma
- Soft tissue periosteal elevation
- No skull fracture
- Sharply demarcated soft tissue density
- Mass does not cross suture line
- Continuity of the outer periosteum with peripheral calcification
- Outer border may calcify as a rim
- May take many months to regress

Soft tissue tumour
- Many prenatally diagnosed
- Variable presentations depending on type of tumour
- Hemangioma in this case with flow voids, vascular tumour and phleboliths

Case 2
- 3 month old with torticollis
- Palpable mass in neck
- Noticed shortly after birth
- Gradual increase in size
- No skin discoloration

Ultrasound Right Neck
- Subcutaneous
- Echogenic
- Heterogeneous
- No calcification
- Lobulated well-defined, soft tissue mass

T1-weighted MR
- Defined, lobulated subcutaneous lesion
- No flow voids/large vessels
- Fat tissue within
- Heterogeneous intermediate to low T1 SI tissue/fibrous septa
Differential diagnoses

- Subcutaneous fat necrosis
- Lipoblastoma
- Fibromatosis colli
- Infantile fibrosarcoma

Subcutaneous Fat Necrosis

- Usually history of difficult delivery
- Firm palpable masses appear days to weeks after birth
- Can have increased vascularity
- Moderately well-defined margins
- Lobulated, hypoechoic areas
- Can be complicated by hypercalcemia – nephrocalcinosis/ nephrolithiasis

Echogenic, lobulated, subcutaneous fat

Normal contralateral subcutaneous tissues
Lipoblastoma
- Typically subcutaneous, well-defined
- Variable soft tissue and mature fat
- Can be indistinguishable from a lipoma or liposarcoma
- Immature and fibrous components are low T1, high T2 SI and enhance
- Macroscopic fat does not enhance
- Usually < 3 years of age at presentation

Fibromatosis Colli
- Benign manifestation of infantile fibromatosis
- Mass-like fusiform enlargement of the sternocleidomastoid muscle
- Ipsilateral torticollis
- Can be associated with shoulder dystocia
- Proximal and distal muscle fibers extend into the lesion
- Mildly hypervascular
- No calcifications or cystic areas

Infantile Fibrosarcoma
- Solitary, rapidly enlarging firm mass
- Frequently involves a striated muscle
- May have areas of hemorrhage or necrosis
- Vascular
- Relatively homogeneous mass with equal to minimal increased T1 signal intensity compared to muscle
- Increased T2 signal intensity compared to both muscle and fat
- Avidly enhances post gadolinium
Infantile Fibrosarcoma of the SCM

T1 W MR

T1 W MR + Gad

Case 3

- 18 month old
- 1 month of neck pain and decreased ROM
- No trauma
- Head tilt
- No fever

- Destructive lesion involving C4 vertebral body with vertebra plana
- Fracture dislocation of right C4 lamina
- Permeative appearance of the right sided posterior elements

- Soft tissue component anterior to the vertebral body
- Mild indentation of the thecal sac at T4

- Expansile, exophytic, soft tissue involving the right lateral process, pedicle and lamina of the C4 vertebral body
- Displaces the right vertebral artery

- Flattening of the C4 vertebral body
- Permeative bone
- Displacement of C3/4 at the spinolaminar line
- Straightening of physiologic lordosis
- Prominent anterior soft tissues
Differential diagnoses

- Metastatic disease
- Langerhans Cell Histiocytosis (EG)
- Fracture
- Osteomyelitis

Diffuse metastatic disease

- Neuroblastoma metastases
- Leukemic involvement
- Other childhood primary lesions with invasion
- Sclerotic margins not usually a feature of metastatic disease

Langerhans Cell Histiocytosis

- Lytic lesions with geographic margins
- Unifocal or multifocal osteolysis +/- path #s
- Not typically confluent
- Associated bone edema
- Lesions enhance
- Bone scan: lesions may be hot or cold

Beveled edges of the lytic skull lesions

Radiolucent areas with endosteal erosion (+/- periosteal reaction)

Vertebra plana
Differential Diagnosis of Vertebra Plana

“FETISH”

F – Fracture  
E – EG (Langerhans’)  
T – Tumour (mets eg. NBL or other)  
I – Infection  
S – Steroid Use  
H - Hemangioma

Case 4

• 5 year old boy  
• Right flank pain  
• Fever  
• Possible renal mass on outside ultrasound

• Ill-defined, echogenic region within kidney  
• Relatively reduced perfusion  
• Some mass effect  
• No cystic region or calcification

Right kidney lesion

Normal parenchyma  
upper pole  
Mid-pole lesion
Differential diagnoses

- Acute pyonephrosis
- Mesoblastic nephroma
- Renal abscess
- Focal pyelonephritis

Acute pyonephrosis

- Infected, obstructed urinary tract
- May be due to UPJO, stone or potentially bladder outlet (PUV)
- Requires decompression
- Potential need for nephrostomy tube, depending on level of obstruction

Acute pyonephrosis - PUV

- Debris within the dilated collection systems
- Perinephric fluid
- Bilateral process
- Echogenic parenchyma
- Hydronephrosis

Acute pyonephrosis - PUV

- Bladder trabeculation
- Circumferentially thick wall
- Dilated posterior urethra
- Small caliber anterior urethra on VCU}

Mesoblastic Nephroma

- Commonly found in the neonatal period (less than 3 months of age)
- Hamartomatous lesion
- Commonly mimics Wilm’s tumour
- No malignant potential
- Usually a large, non-tender mass at presentation
- Can be heterogeneous if hemorrhage or necrosis

Mesoblastic Nephroma
**Mesoblastic Nephroma**

- STIR
- T1
- T1 FS + Gad

**Renal Abscess**

- Well defined region
- Avascular component with necrosis
- Progress from focal pyelonephritis
- +/- Perinephric fluid

**Early abscess formation – fluid component, avascular**

**Further necrosis, abscess**

**Focal Pyelonephritis**

- Pseudo-mass with ill-defined margins
- Indistinct cortical-medullary differentiation
- No cystic change within region
- Renal size discrepancy may be greater than 1 cm
- Focal area with relatively reduced vascularity
- +/- Perinephric fluid
- Can lead to focal renal scarring
Case 5

- Rapid onset scrotal swelling
- Very painful to touch
- Reddish discoloration
- Bilateral
- Afebrile

Differential Diagnoses

- Acute idiopathic scrotal edema
- Testicular torsion
- Leukemic infiltration
- Appendix testis torsion

Acute Idiopathic Scrotal Edema

- Erythema and swelling of the scrotum
- Usually bilateral, may be asymmetric
- More common in children than adults
- Ultrasound is diagnostic
- Increased blood flow in the scrotal soft tissues and on colour Doppler – “fountain sign”
- Not associated with dysuria – self limiting

Acute Testicular Torsion

- True surgical emergency
- Often in peripubertal boys, young adults
- Often associated with reactive hydrocele and thickening of scrotal skin (surrounding regions may be hyperemic)
**Acute Testicular Torsion**

- If the grey scale appearance is normal, testis is likely viable
- Abnormal echotexture may indicate edema/infarction
- Twisted cord can be seen as a heterogeneous mass superior to the testis (torsion knot)
- Absent or decreased vascularity relative to normal side

**Leukemic Infiltration of Testes**

- Enlarged, hypoechoic testicles
- Asymmetric, may be heterogeneous texture
- May have associated slightly red scrotum (hyperemia)
- Hypervascular on Doppler exam
- Clinical history of leukemia (ALL, etc.)
Torsion of the Appendix Testis

- Diminished or avascular hypoechoic mass typically near the epididymal head
- May have reactive hyperemia of the epididymis and testis
- May have associated hydrocele
- Self limiting
- Unilateral

Case 6

- Fall on outstretched hand
- Elbow pain
- Limited range of motion
- Assess for fracture

CRITOL

Capitellum
Radius
Internal (medial) epicondyle
Trochlea
Olecranon
Lateral epicondyle
Differential Diagnoses

- Medial epicondyle avulsion
- Supracondylar fracture
- Monteggia fracture
- Lateral condyle fracture

Medial epicondyle avulsion

- Intra-articular displacement of avulsed medial epicondyle
- Pseudo trochlea ossification center

Supracondylar Fracture

Most common elbow fracture in children

Effusions around the joint elevate fat pads, raise concern for intra-articular fracture

Monteggia Fracture

- Fracture ulna – dislocation radial head
- Orthogonal views to assess radius – capitellum relationship

Lateral Condyle Fracture

- Oblique views may best demonstrate
- Fracture cleft may not be apparent initially
- Suspect intra-articular fracture due to effusion

Thanks for your attention!
Suggested Reading


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