Ultrasound of Herniae

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Session overview

- Abdominal wall hernia, what? Types
- History, technique, different types of imaging
- Abdominal wall anatomy
- Upper abdominal wall hernia and other pathology

- Groin anatomy
- Inguinal canal and inguinal herniae
- Femoral hernia

- Differential diagnosis
- Reporting tips

- Practical
Anterior abdominal wall hernia

A hernia occurs when an internal part of the body pushes through a weakness in the muscle or surrounding tissue wall.

• Can occur at any site where there is weakness in a fascia
• Anywhere post surgical
• Most common inguinal
• Congenital predisposition
• Sex M>F
• Age
• BMI > 30
• Lifting
• Prolonged coughing
• Constipation
• Ascites
• Inter-peritoneal dialysis
Types of hernia

- Epigastric
- Umbilical / Paraumbilical
- Incisional – anywhere
- Spigelian – Semilunar line
- Inguinal – direct / indirect
- Femoral
Important to take history

- Location, point to it
- Duration of symptoms
- Type of pain—dragging, sharp, fullness
- Constant/intermittent
- Exacerbating conditions/movements
- Previous surgery—traumatic/acquired hernia
- Scrotal swelling/pathology
- Any other ongoing illness, treatment—lymphadenopathy, radiotherapy
- Sports injury/strain
Why image?

- To assist where there is clinical uncertainty
- An obvious hernia does not require imaging
- Location of hernia
- Contents – fat, bowel, fluid, vascularity, cystic lesions
- Size of neck opening and volume/size of sac
- Reducibility
- Differential diagnosis
Types of imaging

Fluroscopic herniography

- Water soluble contrast injected into the peritoneum
- Maneuver patient & Valsalva to try and fill sac

Useful for less-specific groin pain

Particularly when hernia not expected

Computer Tomography (CT)

- Good for large incisional herniae
- Assess bowel
- Confirm size of defect

Magnetic Resonance Imaging (MRI)

PROS:
- Dynamic and interactive with patient
- Allows for wider diagnosis of differentials
- Can scan supine/erect
- Sensitivity: 86-100%
- Specificity: 82-97%

CONS:
- Habitus challenged
- Operator dependent
- Patient’s inability to engage in Valsalva technique

Ultrasound
Technique

• Check previous
• Get good clinical history from patient
  – How long has the lump been there
  – Is painful? , getting bigger, any trauma

• Scan with the patient in different positions, lay , stood etc

• For suspected hernia, instruct patient to strain, raise head, raise legs, cough

• Use probe to vary pressure to assess hernia

• Colour Doppler for vascular localisation

• Contra-lateral side for comparison

• Always other imaging modalities, ask for help etc
2 groups of muscles

Flat muscles
- Lateral margin
- External obliques
- Internal obliques
- Transversus abdominis

Ventral muscles:
- Central
- Rectus abdominis
  ("Six pack")

Aponeurosis (broad sheet like tendon)
- Rectus sheath
- Inguinal canal
Anterior abdominal wall anatomy

Cross section

Anterior

External oblique aponeurosis

Rectus sheath, anterior layer

Rectus abdominis

Superficial abdominal fascia

Transversus abdominis aponeurosis

Transversalis fascia and parietal peritoneum

Linea alba

Parietal peritoneum

Transversalis fascia

Skin

Internal oblique

Posterior
Ultrasound anterior abdominal wall anatomy
Rectus abdominis and linea alba
Anterior abdominal wall
Anterior abdominal wall
Epigastric hernia
Spigelian hernia
Incisional type hernia

Incisional hernia
• Through scar or defect
• Risk increased with age > poor healing
• Obesity
• Post op complications – infection, haematoma
• Steroid therapy
• Radiotherapy
Divarication of the rectus abdominis muscles
Seroma
Abscess
Groin anatomy

Groin contains the soft tissues of the inguinofemoral region between the ASIS and the symphsis pubis.

- Femoral vessels
- Lymph nodes
- Inguinal ligament
- Inguinal canal located deep and medial to the inguinal ligament.
Formation of inguinal canal

Forms future inguinal canal

Processus vaginalis closes off

Tunicavaginalis
Inguinal canal anatomy

Deep ring located just medial at the point the inferior epigastric vessels meet the femoral vessels

D - deep ring, S – superficial ring, IC – inguinal canal, IL – Inguinal ligament, R – rectus abdominis,
Ultrasound Anatomy - finding the inguinal canal

Step 1 – find the inferior epigastric vessels
Step 2 – track the inferior epigastric vessels inferiorly and laterally to the point they joint the femoral vessels.
Step 3 –

At the point the inferior epigastric vessels meet the femoral vessels, the deep ring of the inguinal canal can be found.
Ultrasound Anatomy- finding the inguinal canal
Inguinal canal transverse section
Inguinal canal longitudinal
Inguinal hernia

• Male > Female

• In UK, 2011-12, 60,000 inguinal hernia repairs

Two types of inguinal hernia

**Indirect** - (most common) abdominal contents protrude through the deep inguinal ring into the inguinal canal

**Direct** – abdominal contents enter into the inguinal canal through a weak point in the posterior wall

Also: Sportman’s hernia/Gilmores groin/ pre hernia.
Indirect inguinal hernia – short axis

Inguinal hernia – indirect: Contents enter the inguinal canal through the deep /internal ring
Indirect inguinal hernia - longitudinal
Direct inguinal hernia

Medial

Lateral

Left groin
Femoral canal

- Inguinal ligament
- Femoral artery
- Femoral vein
- Femoral canal

Lateral

Right thigh

Medial
Femoral Canal – Transverse section
Femoral hernia

- Defect in the transversalis fascia overlying the femoral ring
- 4:1 female : male
- Risks - obesity, constipation
- Contents pushed inferiorly through femoral canal into groin
- Medial of femoral vessels, inferior and lateral to pubic tubercle
Femoral Canal

Right FEM

STRAIN
Femoral hernia
Femoral hernia
Differential diagnosis

• Seroma
• Haematoma
• Abscess
• Cord lipoma
• Undescended testes
• Lymph nodes
• Ovarian
• Bowel masses
• Iliopsoas bursitis
• Adductor tendinopathy
• Urinary bladder issues
• Vascular – aneurysm, DVT, varicose veins.
• Nothing
Reporting tips - Hernia

Reports should be concise and clear including relevant information that will allow easy assessment of the need and priority for subsequent surgical referral.

Include:
Side
Site (inguinal, femoral, umbilical etc.)
Type (indirect or direct)
Reducibility
Size of the hernia neck/fascia defect
Contents
The end

Useful websites:

E-learning for health

Ultrasound cases

You tube videos of herniae

Books:

Practical Musculoskeletal Ultrasound – E, McNally

Articles:

http://www.ijri.org/article.asp?issn=0971-3026;year=2007;volume=17;issue=4;spage=290;epage=298;aulast=Gokhale

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3932585/