Pictorial review demonstrating the imaging findings of abdominal internal hernias : revisiting the relevant peritoneal compartments and anatomy.

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Introduction

- Internal hernias involve protrusion of the abdominal viscera through an opening/aperture in the peritoneum or mesentery within the abdominal compartment
- Classifications of apertures can be confusing depending on what is viewed as an abnormal recess or a normal variant. However generally they fall into the following groups:
 - Anatomical foramen/fossae e.g. foramen of Winslow
 - Congenital foramen/fossae secondary to anomalies of rotation and peritoneal fusion
 - Acquired foramen/fossae secondary to surgery, trauma, inflammation

Relevance

- Clinical diagnosis is **challenging** due to the diverse range in presentation:
 - Symptom duration relates to the duration and reducibility of the hernia and the presence or absence of incarceration and strangulation
 - If the obstruction can reduce spontaneously patients will often complain of intermittent abdominal pain
 - Alternatively patients can present acutely with non specific features or clinical features of small bowel obstruction with strangulation which can rapidly progress to bowel necrosis. Mortality is reported to exceed 50% if strangulation is present

Learning Objectives

- Internal herniation is not a uncommon cause of small bowel obstruction but it can be particularly difficult to diagnose on imaging
- The altered anatomy secondary to internal herniation can be difficult to appreciate on CT, particularly on axial sequences
- In addition the foramen and fossae which lead to internal herniation are not directly visualised and indirect signs are needed to help identify these
- Improved awareness of the relevant anatomy and radiological appearances of the types of IH will aid in radiological diagnosis
- We present example cases of surgical proven or radiologically suspected IH from our institute from 2006-2017, reviewing the radiological signs with reference to the relevant anatomy

Epidermiology

- The overall incidence of hernias (IH) is approximated at 0.2–0.9%
- The incidence of small bowel obstruction secondary to internal herniation is reported up to 6%
- Prevalence is rising, specifically trans-mesenteric type due to increased utilisation of Roux-en-Y technique. In this subset of patients internal hernias are reported to account for 50% of cases of small bowel obstruction which is equal to obstruction secondary to adhesions

Signs to help identify an internal hernia

- Identifying a closed loop obstruction, which is the most crucial presentation of IH is key
- Abnormal location of bowel loops
- Displacement of key anatomical structure
- Displacement of a vessel

Classification

- Traditionally described by Meyers based on location:
 - Paraduodenal (53%)
 - Pericaecal (13%)
 - Foramen of Winslow (8%)
 - Transmesenteric and Transmesocolic (8%)
 - Sigmoid related (6%)
 - Tranomental (1-4%)
 - Supravesical and pelvic (6%)

Aetiology

- Peritoneal recesses/fossae are related to rotation of the gut and attachment of abdominal viscera to the posterior abdominal wall during foetal development. In addition the presence of vessels raise segments of serosal folds
- The majority of internal hernias result from congenital anomalies of peritoneal fusion +/- congenital anomalies of intestinal rotation

Contents

- This educational exhibit demonstrates nine cases of internal herniation including:
 - Right and left para-duodenal internal herniation
 - Pericaecal internal hernia
 - Transmesenteric and transomental
 - Combined lesser sac internal hernia
 - Sigmoid related internal hernia
 - Broad ligament internal hernia

Conclusion

- Internal hernias can be difficult to diagnose on imaging
- Understanding of the relevant anatomy and location of hernia orifices will improve accuracy in diagnosis
- Despite IH being an important complication post Roux En Y there were no examples of post Roux En Y IH identified and it may be that these IH can spontaneously reduce easily

Example Case: Pericaecal Internal Hernia

Figure 1 : demonstrating beaking of the afferent loop as it enters the hernia sac (arrow). A second transition point situated inferiorly (arrow) which is the efferent loop. Two transition points therefore denotes a closed loop obstruction. Obstructed small bowel loop situated laterally within the hernia (asterix).

We hope you find the educational exhibit helpful in your continued learning.