The role of Ultrasound in the differential diagnosis of palpable abdominal wall lesions

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Poster 6
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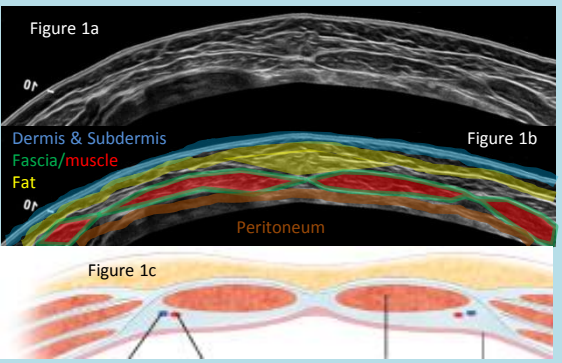
Introduction - Abdominal wall masses can develop insidiously or acutely and as such present to primary care or a variety of secondary care specialities. Ultrasound is often the first line investigation and in many cases the only imaging modality undertaken. Ultrasound is an important tool in assessing abdominal wall lesions. High frequency linear transducers allow detailed assessment of anatomy and high quality imaging of superficial pathology. The exact location of lesions with respect to the layers of the abdominal wall can be determined. Below we describe the anatomy of the anterior abdominal wall and present the differential diagnosis pictorially with 12 illustrative cases. The masses are considered in respect to the layer of the abdominal wall from which they originate.



Anatomy - Figure 1a depicts a panoramic ultrasound of the appearance of the anterior abdominal wall with the layers highlighted in figure 1b. The layers of the abdominal wall are well-demonstrated by extended field of view using a high frequency linear transducer and the image is comparable to the classic 'textbook' drawing (figure 1c).

The most superficial layer of the abdominal wall is the **dermis** with the **subdermis** deep to this.

A variable amount of **subcutaneous fat** lies deep to the dermal layers, this layer includes Camper's fascia.

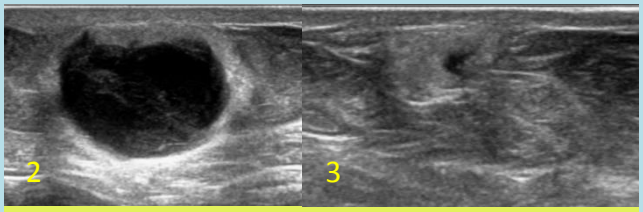
Scarpa's **fascia** is a membranous layer which can be seen sonographically overlying the **abdominal wall muscles**. Laterally there are three muscles – external oblique, internal oblique and transversalis abdominis (superficial to deep). These are surrounded by **fascia** with an aponeurosis forming medially to surround the rectus abdominis. In the midline a thick aponeurosis is known as the Linea alba.

The inferior epigastric vessels ascend with the rectus sheath muscles, as such this compartment is particularly prone to rectus sheath haematoma (see cases 7 and 8 below).

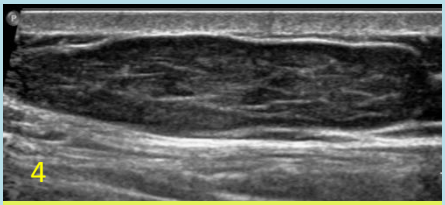
Deep to the posterior fascia of the transversalis abdominis and the aponeurosis surrounding the rectus sheath is a second layer of fat.

This lies immediately superficial to the parietal **peritoneum** which lines the abdominal cavity.

Case 1 **Sebaceous cyst** originating from the dermis of the abdominal wall. They demonstrate through-transmission but no vascularity. A punctum extending to the skin is often (but not always) visible.



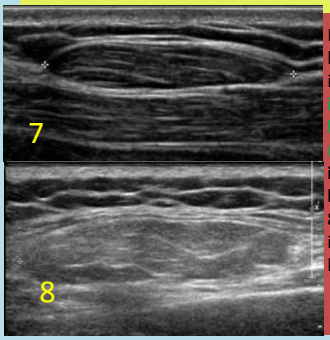
Cases 2 and 3 Two different cases of **heparin injection sites** presenting as painful abdominal mass. The abnormality is seen lying within the subcutaneous fat deep to the site of injection.



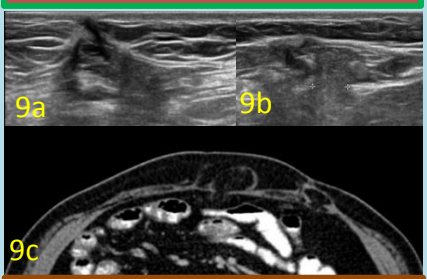
Case 4 (above), 7 & 8 (below)
Superficial lipoma (case 4 above), within the subcutaneous fat. This demonstrates sonographic features of fat but is encapsulated. Abdominal wall lipomas are most commonly small and superficial but require further investigation and/ or referral to a sarcoma service if they are greater than 7cm or extend deep to the fat layer.

Case 5, figures a and b Panoramic US showing a **rectus sheath haematoma** in a middle-aged man, presenting after lifting a heavy object.

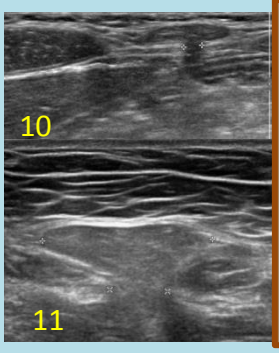
Case 6
Rectus sheath haematoma in a young female patient taking warfarin. Panoramic ultrasound shows the haematomas expanding the rectus sheath with fluid-fluid levels. As detailed in the anatomy description (above), the inferior epigastric vessels can be the source of rectus sheath haematomas.



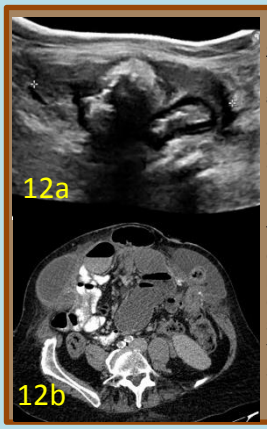
Deeper lipomas include **interfascial lipoma** (case 7), **intermuscular lipoma** (case 8, below) or intramuscular lipoma.



Case 9 figure a-c **Incisional hernia** bulging from the peritoneum into the abdominal wall at the site of previous surgery. US (a and b) can demonstrate gas within bowel or simply intra-abdominal fat, as shown on CT (c).



Cases 10 and 11 **Epigastric hernia** (case 10) with intra-abdominal fat protruding through a tiny defect in the fascia between the rectus sheath muscles. **Spigelian hernia** (11) containing intra-abdominal fat protruding from the peritoneal cavity lateral to the rectus muscles into the subcutaneous fat layer. Valsalva manoeuvre allows dynamic assessment of hernias.



Case 12, figures a & b
Figure a demonstrates gas within the bowel protuding into the abdominal wall adjacent to a previously-formed ileostomy.
The bowel was obstructed within the **parastomal hernia** as demonstrated on the selected slice from the subsequent CT scan (figure b).

Discussion

The role of ultrasound in characterising masses and determining whether further imaging is required is becoming increasingly useful. Having recently seen several cases of abdominal wall haematoma we present the spectrum of their appearance. The differential diagnosis of an abdominal wall mass is shown with emphasis on the first principles of sonographic imaging characteristics and the detailed anatomy of the abdominal wall appreciated by ultrasound, which is shown to be a useful initial test and often sufficient to provide diagnosis and direct subsequent management.