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Hemoperitoneum: Beyond Trauma

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LEARNING OBJECTIVES

- 1) To recognize the manifestations of hemoperitoneum on imaging, including active extravasation.
- 2) To review and categorize non-traumatic causes of hemoperitoneum.
- 3) To identify imaging characteristics that potentially alter patient management.

BACKGROUND

The causes of hemoperitoneum are numerous. However, history and imaging clues usually rapidly narrow the differential in the atraumatic setting. In this representative pictorial review, we show various causes of hemoperitoneum on multiple imaging modalities, with an emphasis on CT.

VASCULAR

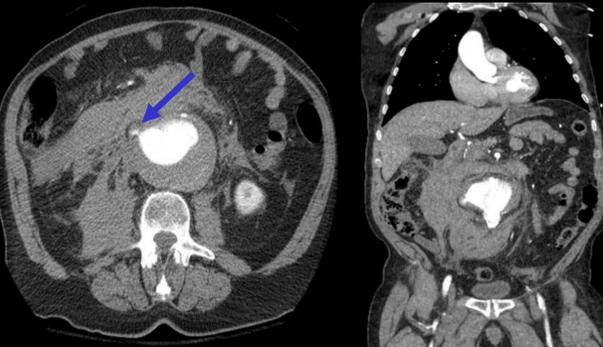
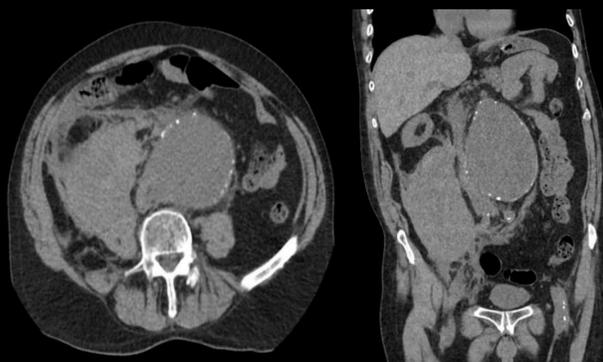


Figure 1: CTA showing a ruptured infra-renal aortic aneurysm

Elderly males presenting with significant abdominal pain of acute onset. Figure 1 reveals a focus of contrast outside the lumen of the aortic aneurysm, consistent with aortic rupture (blue arrow). Both patients have substantial hemoperitoneum which extends into the pelvis.

Figure 2: Non-contrast CT showing a ruptured infra-renal aortic aneurysm



IATROGENIC

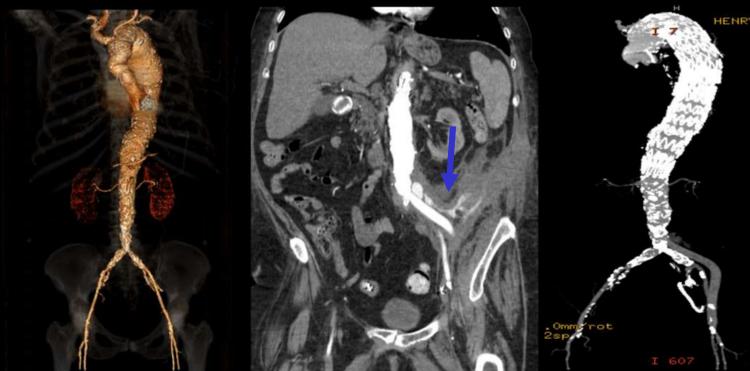


Figure 3: Thoracic aortic aneurysm repair with subsequent distal abdominal aortic injury

Figure 3: Elderly female who presented for endovascular thoracic aortic aneurysm repair (left image shows pre-procedural reconstruction). After undergoing repair, patient was noted to be in unstable condition with dropping hemoglobin. CT angiography revealed a distal aortic injury at the left common iliac origin with contrast extravasation and significant hemoperitoneum.

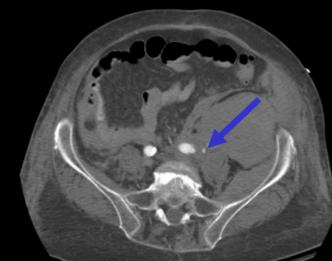
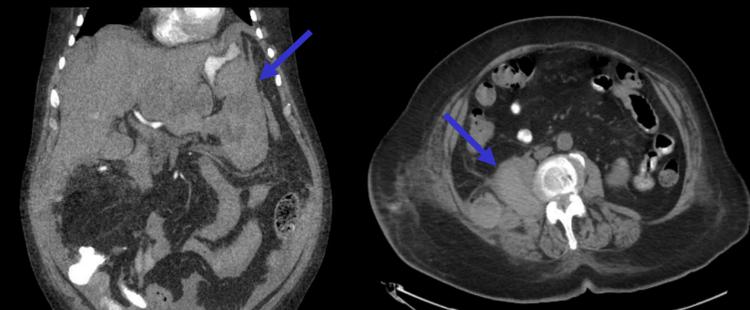


Figure 4: Post TAVR common iliac artery injury

Figure 4: Elderly male 24 hours following transcatheter aortic valve replacement, presenting with hypotension and dizziness and dropping serial hemoglobin levels. CT angiography of the abdomen and pelvis shows puddling of contrast material within a large hyperdense collection consistent with active contrast extravasation and hemorrhage.



Figures 5a (left) and 5b (right): Spontaneous hemoperitoneum on anticoagulation

Figure 5: Two elderly patients on anti-coagulation therapy with spontaneous hemoperitoneum. Figure 5a depicts a hemorrhage originating from the greater curvature with hyper- and hypodense components and extending into the pelvis. Figure 5b shows a similar finding however originating at the psoas and quadratus lumborum musculature.

GYNECOLOGICAL

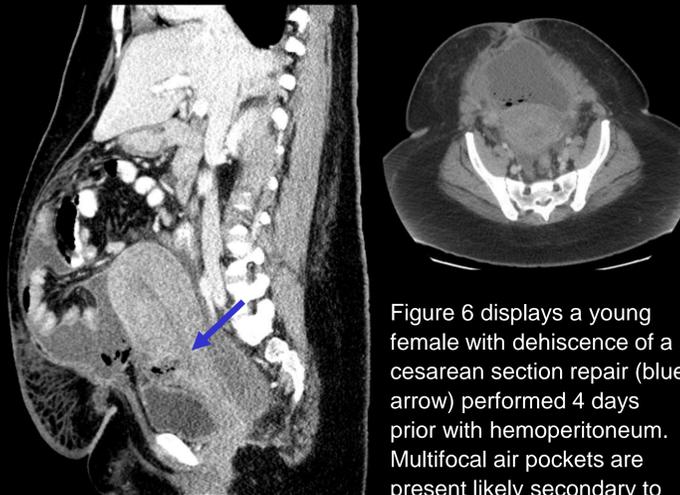


Figure 6: Cesarean section dehiscence

Figure 6 displays a young female with dehiscence of a cesarean section repair (blue arrow) performed 4 days prior with hemoperitoneum. Multifocal air pockets are present likely secondary to communication with vaginal canal.



Figure 7a (left) and 7b (right): Ruptured tubal ectopic pregnancies

Figures 7a and 7b both present young females with severe acute pelvic pain. Sonographic findings display thickened and irregular gestational sac (blue arrows) with the left (7a) and right (7b) adnexas with surrounding fluid containing low level echoes. Both patients were taken to the operating room which revealed ruptured ectopic pregnancies with hemoperitoneum.

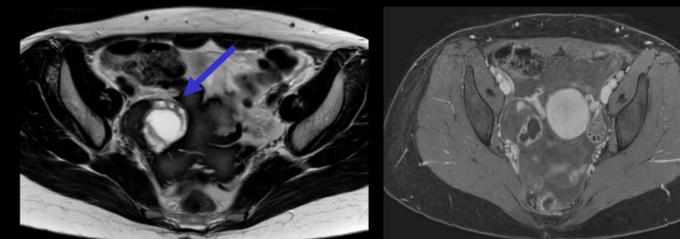


Figure 8: Hemoperitoneum secondary to ruptured hemorrhagic cyst versus corpus luteum

Figure 8: T2 (left) and post-contrast T1 (right) MR in a young female. Follicular activity is present within the right ovary (blue arrow) with T2 hypointense and heterogeneous signal on T1 fluid surrounding the ovary and extending into the pelvis compatible with acute/subacute hemoperitoneum likely secondary to a ruptured hemorrhagic cyst or corpus luteum.

NEOPLASTIC



Figures 9a (left) and 9b (above) : Spontaneous rupture of hepatic adenomas in two young patients with resulting hemoperitoneum

Figures 9a and 9b: Young female (9a) and male (9b) patients presenting with sudden-onset severe abdominal pain in the setting of known hepatic adenomas. CT examinations showed ruptured adenomas with resultant hemoperitoneum. A high-density component in the perihepatic collection (arrow, 9b) is consistent with sentinel clot.

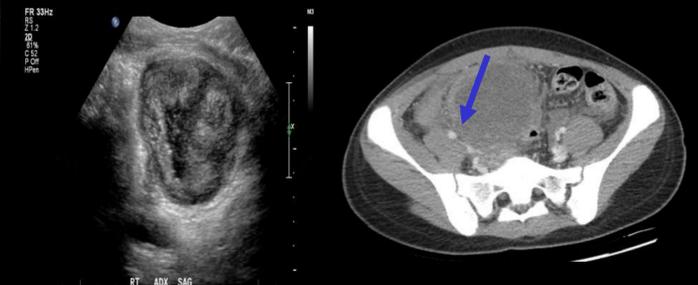


Figure 10: Rhabdomyosarcoma with hemoperitoneum

Figure 10: Young female initially presenting with worsening chronic lower quadrant pain. Initial ultrasound showed a heterogeneous mass within the adnexa with internal vascularity. Follow-up contrast-enhanced CT reveals a heterogeneously enhancing mass with a small amount of adjacent hemoperitoneum (blue arrow).

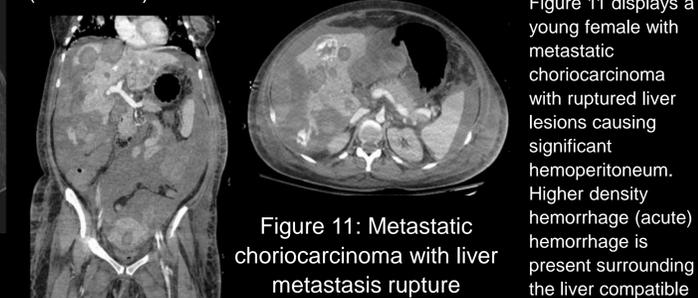


Figure 11: Metastatic choriocarcinoma with liver metastasis rupture

Figure 11 displays a young female with metastatic choriocarcinoma with ruptured liver lesions causing significant hemoperitoneum. Higher density hemorrhage (acute) is present surrounding the liver compatible with known source.

SUMMARY

Hemoperitoneum has numerous causes. In particular, imaging with CT (the modality of choice), permits accurate and rapid diagnosis. By using specific imaging features, the source of hemorrhage can be determined and a differential diagnosis can be generated.