Cystic artery pseudoaneurysm: a rare but fatal complication

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Section: Abdominal imaging
Area of Interest: Abdomen Adrenals
Procedure: Diagnostic procedure
Technique: Ultrasound
Technique: CT
Technique: CT-Angiography
Technique: MR
Special Focus: Aneurysms Acute Case Type: Clinical Cases
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Patient: 70 years, male

Clinical History:

A 70 year old male patient with type II diabetes mellitus and hypertension, presented with right upper quadrant pain and high grade fever. There was no history of hematemesis, melena or yellow discoloration of urine/stool.

Imaging Findings:

Positive sonographic Murphy’s sign with thickened gall bladder with wall thickness approximately 6mm with hypoechoic content intraluminal content. A well defined anechoic cystic area was noted in the fundus of the gall bladder which on colour doppler revealed a classical turbulent or disorganized flow within the anechoic structure with a “yin-yang” configuration.Hyperemia of the GB wall was also noted.
NCCT revealed hyperdense material in gall bladder lumen with a focal water density area within the lumen. Hyperdensity also noted in the CBD lumen. On contrast, corresponding to the area of water density on NCCT, focal, rounded area of contrast enhancement equal in attenuation to adjacent vessels was noted in all the three phases – arterial, portal and delayed. There was associated gallbladder wall thickening and hyperemia.Washout was noted on the delayed phase. Maximum intensity projection and 3D reconstructed image confirmed a pseudoaneurysm supplied by the posterior branch of cystic artery.

Discussion:

Aneurysmal disease of visceral arteries is uncommon, and it usually involves branches of the hepatic and gastroduodenal arteries [1]. Pseudoaneurysms are characterised radiologically by aneurysmal dilatation in the setting of otherwise normal artery. Pseudoaneurysm of the cystic artery is a rare complication of calculous cholecystitis, occurring more commonly as a result of post-operative complication or following trauma[2]. It carries the potential to cause tremendous hemorrhagic shock, and thus should be detected earlier for better prognosis [3]. End stage of acalculous cholecystitis is hemorrhagic cholecystitis characterised by necrosis of the gallbladder wall and pseudoaneurysm formation of the cystic artery with subsequent rupture and frank hemorrhage/acute bleeding into the gall bladder [4]. This is a potentially fatal complication requiring urgent surgical intervention.
The clinical presentation is nonspecific, although biliary colic, hematemesis, jaundice, and melena [5]. Pseudoaneurysms may be asymptomatic and detected only incidentally during radiologic investigation. Abdominal
ultrasonography remains the first investigation but conventional angiography remains the standard of reference for diagnosis. In unstable patients with this life-threatening condition, emergent CT angiography is the study of choice [6].

On greyscale, pseudoaneurysm appears as an anechoic or hypoechoic, single or multilobed structure adjacent to the parent artery. Intraluminal calculi, concentric layers of mural thrombi and clots may also be noted. On colour doppler, the yin yang sign is highly specific for a aneurysm [7]. The hallmark of diagnosis is the communicating neck between the sac and feeding artery with a “to-and-fro” waveform at duplex Doppler US. A water density structure is noted at the expected site of pseudoaneurysm on non enhanced CT. Adjacent to it, hyperdense calculi and hemobilia may also be noted. On CT angiography, the pseudoaneurysm fills with contrast with contrast attenuation same as that of adjacent vessels. Delayed scans show complete washout, thus differentiating the pseudoaneurysm from extravasation, in which contrast persists. MR angiography does not add to diagnosis and is time consuming, thus not preferred in emergency settings. Conventional angiography remains the standard reference, which in addition to diagnosis, provides an option for endoluminal management [8].

A complete work-up to determine the location and relevant vascular anatomy is essential in the selection of the treatment technique. As a result of technologic advances in US-guided and endoluminal management of pseudoaneurysms, there is an ongoing paradigm shift toward minimally invasive management of pseudoaneurysms.

Early detection by CT and angiography facilitates appropriate management with TAE or surgery.

Written informed patient consent for publication has been obtained.

**Differential Diagnosis List:** Pseudoaneurysm of cystic artery with hemobilia with acute haemorrhagic cholecystitis., Extravasation of contrast in gallbladder lumen, Acute acalculus cholecystitis.

**Final Diagnosis:** Pseudoaneurysm of cystic artery with hemobilia with acute haemorrhagic cholecystitis.

**References:**


(2005) Pseudoaneurysms and the Role of Minimally Invasive Techniques in Their Management. radiographics
Description: Anechoic structure (arrow) within the GB lumen in close proximity to the thickened GB wall (arrowhead) Origin: Department of Radiology, SMS Medical College, Jaipur, India
**Description:** Classical YIN YANG sign noted on colour doppler within the anechoic cystic structure lying inside the GB lumen with adjacent hypoechoic material - likely thrombus or clot. **Origin:** Department of Radiology, SMS Medical College, Jaipur, India
**Figure 2**

**a**

Description: Axial sections of NCCT and corresponding arterial phase of TPCT show focal contrast enhancement (arrowhead) on CECT in the area of water density (HU 36) on NCCT with surrounding hyperdense (HU 63) material. **Origin:** Department of Radiodiagnosis, SMS Medical College, Jaipur, India

**b**

Description: Rounded area of contrast enhancement equal in attenuation to adjacent vessels is noted in all the three phases – arterial, portal and delayed. Washout is noted in the delayed phase, favoring pseudoaneurysm. **Origin:** Department of Radiodiagnosis, SMS Medical College, Jaipur, India
Description: GB wall thickening of 6.53 mm is noted along with GB wall hyperemia. This is suggestive of acute cholecystitis. Origin: Department of Radiodiagnosis, SMS Medical College, Jaipur, India
**Figure 3**

**a**

Description: 3D Maximum intensity projection images in sagittal, coronal and axial planes showing the pseudoaneurysm being supplied by the posterior branch of the cystic artery. **Origin:** Department of Radiodiagnosis, SMS Medical College, Jaipur, India

**b**

Description: 3D reconstructed image showing pseudoaneurysm being directly supplied by posterior branch of cystic artery, which originates from hepatic artery proper. **Origin:** Department of Radiodiagnosis, SMS Medical College, Jaipur, India