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TITLE:

Endovascular embolisation of a giant hepatic artery aneurysm

RUNNING HEAD:

Giant hepatic artery aneurysm

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Tables: 0

Introduction

Primary hepatic artery aneurysms (HAAs) are rare and account for approximately 20% of all visceral aneurysms¹. Due to their esoteric nature, there is no clear consensus on the management of HAAs and the size threshold by which intervention is warranted. Here we present our case of a patient with a large symptomatic HAA who underwent successful endovascular treatment.

Case Presentation

Our patient is an 85-year-old man presenting with non-specific upper abdominal pain occasionally radiating to the back. Liver function tests were normal apart from rise in gamma-glutamyl transferase (GGT) at 143 units per litre (normal range 0 – 40 units per litre), which, in isolation, was deemed to be non-specific and not clinically significant. Abdominal ultrasound (US) revealed a large vascular mass around the porta hepatis. Computerised tomography (CT) angiography of the abdominal aorta revealed a 41mm right HAA with some displacement of the portal vein and extrahepatic bile ducts.

The patient was electively admitted for selective coeliac angiography and the aneurysm was coil embolised with four Penumbra (Alameda CA, USA) Ruby Coils supplemented by an Atrium (Hudson NH, USA) Advanta V12 PTFE- covered stent placed across the base. At completion arterial flow was preserved along with significant collateral supply to the liver.

Discussion

Hepatic artery aneurysms are an uncommon condition with a reported mortality reaching 70% from rupture². Due to their rarity, there is a paucity of evidence to guide management of this disease process. True HAAs may result from atherosclerotic, infectious and inflammatory processes, and manifest more commonly in men in their sixth decade of life^{1,3-5}. There is an increasing incidence of hepatic artery pseudoaneurysm due to trauma and the rise of hepatobiliary interventions such as transhepatic biliary drainage^{2,3,6}.

Diagnosis is often incidental, but patients may also present with abdominal pain or haemobilia in their vomitus, jaundice and gastrointestinal haemorrhage^{3,4,6}. The natural history of HAAs is poorly understood however progressive enlargement is thought to lead to increasing risk of rupture and death. Diagnosis is usually achieved via ultrasound, computed tomography or magnetic resonance angiography^{1,4,7}.

The current literature suggests repair of HAAs in cases where the aneurysm is greater than 2cm, as well as all pseudoaneurysms, due to the elevated risk of rupture^{3-5,8,9}. Other considerations for intervention include aetiology, symptoms and rate of growth^{3,8,10}.

Conventionally, open surgical repair, including ligation, aneurysmorrhaphy and bypass grafting, has been the standard treatment for HAAs^{1,2,4,5,10}. Endovascular surgery now presents an alternative, minimally invasive means using techniques such as coil embolisation, stent grafts and percutaneous thrombin injections^{3,5,6,8,10}. The technical success of endovascular repair of HAAs is very high, up to 98% in some reports^{4,9}. Potential complications include hepatic infarction, dissection, thromboembolic events, pseudoaneurysms and contrast-induced nephropathy⁴. Shula et al (2015) suggest from their series of 181 cases that there is no outcome difference between open and endovascular treatment of intact

visceral artery aneurysms, though endovascular may be superior for ruptured aneurysms⁷.

Endovascular repair is advantageous in high-risk patients with multiple comorbidities. Nevertheless, factors such as the location and anatomical features of the HAA need to be considered^{4,6,9}. Aneurysms of the common hepatic artery may be fully coil embolised if collateral flow via the gastroduodenal artery or right gastric artery is adequate¹⁰. A wide aneurysm neck often precludes the use of thrombin injection and may require stent- or balloon-assisted coil embolisation³.

This case report is one of only a few that details a large aneurysm arising from the right hepatic artery^{3,6,10}. Open repair in cases of intra-hepatic aneurysms is difficult, and requires parenchymal resection¹⁰; as such, an endovascular approach was used. Due to the wide aneurysm neck, an increased risk of coil displacement in embolisation was foreseen and mitigated via the use of stent assistance to maintain patency of the parent artery. This case illustrates a successful and minimally invasive approach to repairing large HAAs with limited accessibility and difficult anatomy.

Conclusion

Hepatic artery aneurysms are an important differential diagnosis in patients presenting with abdominal pain, jaundice or gastrointestinal haemorrhage. However, due to the rarity of this pathology, the current literature is still limited to small single-centre reports and case series. This case report highlights the benefits of an endovascular approach in treating HAAs. A multi-centre review is the next step in establishing definite guidelines for the management of this important condition, and the long-term outcomes of open and endovascular intervention.

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Figure Legends

Figure 1: Pre-operative 3D reconstruction of the 41mm right hepatic artery aneurysm in relation to the coeliac trunk and aorta.

Figure 2: Digital subtraction angiogram illustrating the 41mm right hepatic artery aneurysm prior to intervention. The aneurysm is filled with mural thrombus, with the exception of two areas of contrast filling, which results in a bilobular appearance (black dotted line).

Figure 3: Intra-operative digital subtraction angiogram following deployment of embolisation coils (Penumbra Ruby Coils, Alameda CA, USA) to fill the aneurysm (black dotted line); placement of a PTFE-covered stent (Atrium Advanta V12 Stent, Hudson NH, USA)(black arrow).

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Figure 1 R1.jpg

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Figure 2 R1.jpg

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Figure 3 R1.jpg