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Hepatic artery aneurysm: A case report of a novel approach to an age old problem

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ABSTRACT

INTRODUCTION: Visceral artery aneurysms are a relatively uncommon but potentially devastating pathology. The most common site is the splenic artery followed by the hepatic (Stanley et al., 1986) [1]. In the event of rupture, mortality has been estimated at anywhere between 20% and 100% (Schweigert et al., 2011) [2]. Emergency surgery in such a scenario has previously been dependent on an open approach with high morbidity and mortality associated (Schweigert et al., 2011) [2]. The advent of endovascular techniques may improve both short and long term outcomes as highlighted in this case.

PRESENTATION OF CASE: We present the case of a ruptured common hepatic artery aneurysm presenting with acute abdominal pain and haemodynamic instability. Minimally invasive surgery in the form of endovascular repair via two covered stents from the coeliac trunk in to the splenic artery (excluding flow in to the common hepatic artery aneurysm) allowed for immediate management without the significant morbidity and mortality with which open surgery is associated.

DISCUSSION: This resulted in resolution of acute haemorrhage while liver perfusion was maintained via the portal vein and arterial collaterals. Follow-up highlighted both short and medium term success.

CONCLUSION: This case highlights that endovascular management in the case of visceral artery aneurysm rupture is a viable option while also portraying several important anatomic considerations essential to hepatic perfusion.

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1. Introduction

Visceral artery aneurysms (VAAs) are uncommon but potentially devastating [1,2]. Previously, they presented as symptomatic lesions with acute abdominal pain and haemodynamic instability. However, with the increased prevalence of radiological investigation, they are now more typically identified as an incidental finding. The most common site for a VAA is the splenic artery closely followed by the hepatic artery [3]. Of hepatic artery aneurysms, the majority affect the common hepatic artery while atherosclerosis is the most common aetiology [4]. If symptomatic, they typically present with acute onset epigastric or right upper quadrant (RUQ) pain and nausea.

The management of this rare pathology is based on several observational studies without a consensus guideline. Traditionally, rupture of a VAA would have been managed via open surgery secondary to familiarity and availability. However, in this case of a ruptured common hepatic artery aneurysm at our tertiary centre, endovascular intervention has highlighted a satisfactory short and

medium term outcome while portraying the importance of an in-depth appreciation of the vascular anatomy of the visceral organs. This work has been reported in line with the SCARE 2018 criteria [5].

2. Presentation of case

A 58-year-old caucasian male presented via ambulance to his regional hospital with acute onset generalised abdominal pain and two associated syncopal episodes. This was on a background history of gastro-oesophageal reflux disease as well as excessive alcohol consumption while he was an ex-smoker. He denied any previous similar episodes with nil history of abdominal trauma delineated. The patient was not aware of any specific history of familial disease while he had otherwise been well prior to symptom onset on the day of presentation.

Upon presentation, he was assessed by emergency department staff and found to be hypotensive with a systolic blood pressure of 80 mmHg despite a relatively normal heart rate of 90 beats per minute (bpm). He appeared pale and diaphoretic with cool peripheries while, on abdominal examination, he was notably tender to the epigastric region. A bedside ultrasound highlighted intra-peritoneal free fluid. He had a rapid response to intravenous crystalloid with a rise in systolic blood pressure to 105 mmHg. He

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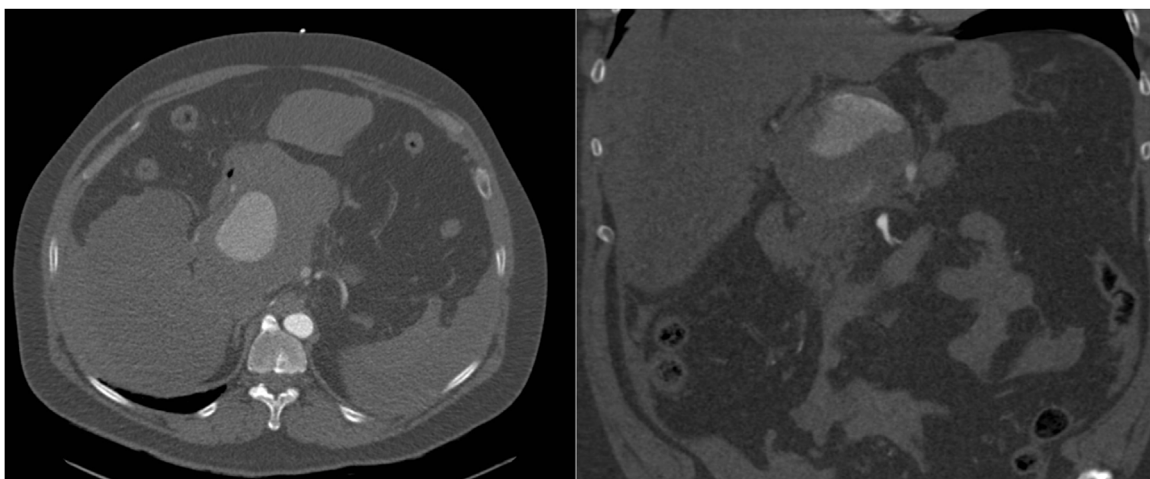


Fig. 1. Ruptured hepatic artery aneurysm.

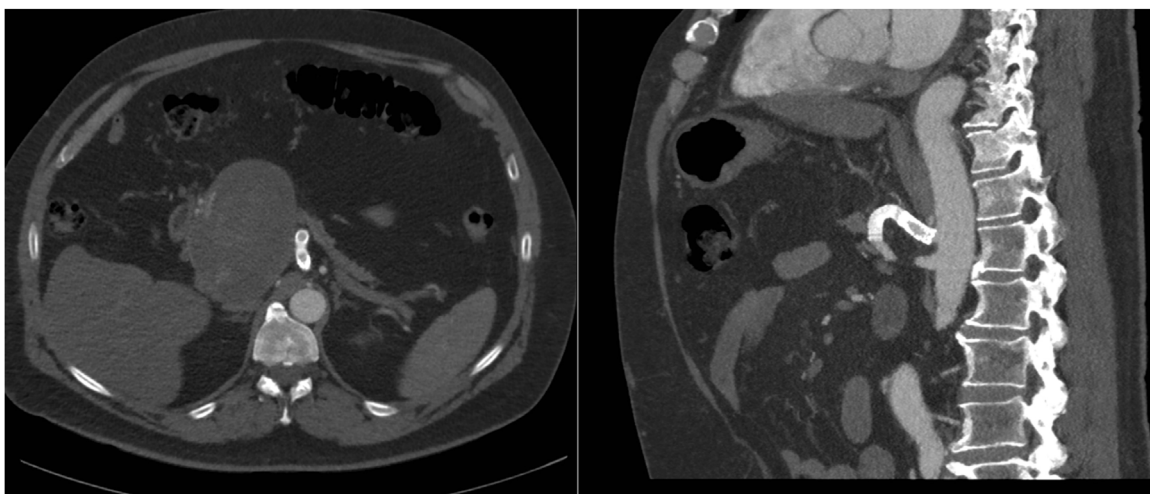


Fig. 2. Covered stents extending from origin of coeliac trunk in to the splenic artery (excluding flow in to hepatic artery aneurysm).

was subsequently transferred to the radiology department for an urgent computed tomography (CT) of the abdomen.

CT angiogram highlighted a ruptured hepatic artery aneurysm (aneurysm of the common hepatic artery with conventional hepatic artery anatomy) with active extravasation indicative of intra-abdominal haemorrhage (Fig. 1). The patient was immediately referred to the on call vascular team and acutely transferred to the tertiary centre.

The vascular team advised permissive hypotension during transfer while they assessed the CT angiogram to decide upon the most appropriate management strategy. Endovascular management was deemed preferable to open due to the reduced morbidity and mortality associated with minimally invasive surgery. Coil embolization of the common hepatic artery aneurysm was considered but the proximity of the aneurysmal common hepatic artery to the coeliac trunk was deemed to be a contraindication to such an approach. Endovascular aneurysm repair (EVAR) via covered stents from the coeliac axis in to the splenic artery with exclusion of flow in to the common hepatic artery aneurysm was deemed the most appropriate as a first line management strategy (Fig. 2).

Upon arrival, the patient was urgently brought to the hybrid interventional suite to facilitate conversion to open repair if required. Under a general anaesthetic, in a supine position, the

vascular consultant on call performed a digital subtraction angiography (DSA) via ultrasound guided right common femoral artery retrograde percutaneous access. This allowed for delineation of accurate aneurysm location with subsequent EVAR via stenting of the coeliac trunk extending in to the splenic artery via two covered stents, an 8 × 50 mm Gore Viabahn and a 10 × 27 mm Bentley BeGraft. Embolization of aneurysm outflow was not performed as minimal distal flow was identified on DSA with the liver being thought to be viable via arterial collaterals as well as portal vein perfusion. Upon completion, a closure device in the form of the Star-Close SE Vascular Closure System was utilised to the femoral access site while he subsequently returned to the vascular in-patient ward. Serial liver function tests were utilised to assess for an ischaemic insult post-operatively with nil derangements identified indicating sufficient liver perfusion. He had an uneventful recovery and was subsequently discharged home day three post-operatively with a lifelong antiplatelet in the form of aspirin prescribed.

Follow-up identified complete resolution of symptomatology related to aneurysm rupture while serial imaging highlighted exclusion of the aneurysm over a 36-month period with ongoing reduction in size (Fig. 3). Consultation by the upper gastrointestinal surgeons revealed a pseudocyst secondary to chronic pancreatitis as the likely aetiology of the common hepatic artery aneurysm (via



Fig. 3. Follow-up imaging at 36 months with ongoing reduction in size of aneurysm with nil vascularity.

magnetic resonance cholangiopancreatography). This was conservatively managed without the necessity for further intervention and he was discharged from the care of the general surgeons.

3. Discussion

Visceral artery aneurysms (VAA) are extremely rare with a documented prevalence of 0.1–2% [6]. Presentation due to acute VAA rupture is seldom documented in the modern era of radiological investigations with the majority being identified incidentally. Hepatic artery aneurysms represent a proportion of such cases with a significant preponderance for males [7].

In both the emergency and elective setting, management strategies are changing. Previously open surgical intervention was the modality of choice involving aneurysm ligation and resection with revascularisation. However, endovascular intervention is becoming more frequently utilised involving either coil embolization or stent graft insertion. This case exemplifies such strategies in the previously unexposed realm of acute hepatic artery aneurysm rupture with a successful outcome.

An interesting consideration in the utilisation of endovascular therapies for the arrest of life-threatening haemorrhage is where and how to utilise these adjuncts. In regards to anatomic considerations, coil embolization versus stent grafting must be assessed. Unsurprisingly, coil embolization of a ruptured superior mesenteric artery aneurysm would not be appropriate as bowel perfusion must be maintained. However, in the case of a hepatic artery aneurysm, exclusion of arterial flow may not result in a perfusion deficit due to the portal vein and multiple arterial collaterals which also supply the liver. This has been highlighted by Kim et al. with transcatheter embolization resulting in successful outcome without significant impact upon hepatic function [8]. In this case of conventional hepatic artery anatomy with a common hepatic artery aneurysm, the proximity of the aneurysm to the coeliac axis excluded coil embolization leading to the novel treatment management of exclusion via stenting into the splenic artery.

This case highlights the successful utilisation of endovascular intervention in a life-threatening presentation which would previously have been managed via an open approach. Increasing surgical expertise as well as ongoing endovascular graft design advances will undoubtedly lead to increasing utilisation in such scenarios.

4. Conclusion

This case highlights the life-threatening presentation of a ruptured hepatic artery aneurysm and the ongoing evolution of endovascular interventions in such acute presentations. It also outlines the perfusion dynamics of the liver and how portal vein

perfusion may maintain liver viability without common hepatic artery inflow.

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Ethical approval

This study is exempt from the requirement for ethical approval at my institution.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author's contribution

Ian Barry was responsible for the study concept, methodology, data collection, data curation, and writing the paper – Original Draft.

Brendan Stanley was responsible for reviewing/editing the original draft, project supervision, and project administration.

Registration of research studies

N/A.

Guarantor

The guarantor is the corresponding author, Dr Ian Patrick Barry. I accept full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

Provenance and peer review

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Declaration of Competing Interest

The authors report no declarations of interest.

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