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A RARE CONFLUENCE: HEPATIC ARTERY ANEURYSM AND INFECTIVE ENDOCARDITIS IN A PATIENT WITH A MITRAL VALVE PROSTHESIS

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ABSTRACT

Introduction: Hepatic artery aneurysm (HAA) is a rare condition, comprising only 0.1% of all arterial aneurysms, yet it is the most common visceral pseudoaneurysm with a 20% prevalence among such cases. Mycotic HAA in the context of infective endocarditis is uncommon and results from microbial invasion and arterial wall damage.

Case description: A 73-year-old woman with coronary artery disease, atrial fibrillation, repaired mitral valve prolapse and on warfarin presented with sudden left lower quadrant abdominal pain. She was hypotensive (BP 60/45 mmHg) and exhibited periumbilical tenderness. Laboratory findings included white blood cell count 18,000 cells/µl, haemoglobin 7.7 g/dl, platelets 1,023,000/µl, aspartate transferase 509 U/l, alanine transaminase 313 U/l and positive SARS-CoV-2. Non-contrast CT of the abdomen/pelvis revealed haemoperitoneum, rectus sheath haematoma and a hypodense hepatic lesion. Contrast-enhanced CT confirmed a left hepatic lobe pseudoaneurysm, supported by Doppler ultrasound. Coil embolisation of the pseudoaneurysm stabilised the patient's haemodynamics. Blood cultures grew *Staphylococcus epidermidis*, prompting treatment with meropenem and vancomycin due to her prosthetic mitral valve. Transthoracic echocardiogram showed valve vegetation, though a transoesophageal echocardiogram later revealed no vegetations. Follow-up imaging showed a stable thrombosed pseudoaneurysm. The patient remained stable and was transferred for mitral valve replacement. Blood cultures remained negative, but antibiotics were continued for six weeks. Warfarin was resumed without further bleeding.

Conclusion: Mycotic HAAs – though rare – can be life-threatening, especially in anticoagulated patients with prosthetic valves. They often present only upon rupture. Prompt diagnosis, vascular intervention and empirical antibiotic therapy are essential for successful outcomes.

KEYWORDS

Hepatic artery aneurysm, infective endocarditis, vascular complication, mitral valve prosthesis, septic embolism

LEARNING POINTS

- Hepatic artery aneurysm is a rare vascular entity that typically presents with non-specific symptoms, making early diagnosis challenging.
- One notable aetiology is septic embolisation resulting from infective endocarditis.

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INTRODUCTION/BACKGROUND

Hepatic artery aneurysm (HAA) is a rare and potentially life-threatening condition, accounting for less than 0.002% of all aneurysms. It is the most common type of visceral pseudoaneurysm and the second most frequent type of aneurysm after splenic artery aneurysms, constituting approximately 20% of visceral aneurysms. These aneurysms are usually asymptomatic; however, when they do present symptoms, these can include abdominal pain, haemorrhage or rupture, which may be life-threatening.

The pathophysiology of HAAs related to infective endocarditis is believed to involve microbial infiltration of the arterial wall, leading to weakening and the subsequent formation of aneurysms. Although infective endocarditis is a rare cause of HAA, it has been documented in several case studies. In these instances, bacterial emboli can cause infection and destruction of the arterial wall, increasing the risk of aneurysm formation and rupture.

CASE DESCRIPTION

We present the case of a 73-year-old female with a complex medical history that includes coronary artery disease for which she underwent coronary artery bypass grafting. She also had chronic atrial fibrillation resulting from mitral valve prolapse, for which she received a bioprosthetic mitral valve repair. Additionally, her medical history includes hypertension, hyperlipidaemia, anxiety, depression and chronic obstructive pulmonary disease. The patient was admitted to the emergency department due to experiencing left lower quadrant abdominal pain for the previous three days. The patient experienced sudden abdominal pain that was sharp in nature and rated as 8 out of 10 in intensity. The pain was constant, non-radiating and worsened with movement. Additionally, the patient reported having a dry cough for the previous few days.

Her medical history includes the use of warfarin at a dosage of 3 mg daily for atrial fibrillation, with regular monitoring of her international normalised ratio (INR). Recently, she was admitted to the hospital due to supratherapeutic INR levels, and follow-up tests revealed elevated platelet levels.

During the examination, the patient appeared pale and exhibited significant tenderness around the periumbilical region on the left side of the abdomen. Blood pressure was recorded at 60/45 mmHg, and heart rate was 84 beats per minute. Laboratory tests showed an elevated white blood cell count of 18,000 cells/µl, a haemoglobin level of 7.7 g/dl (decreased from 11.4 g/dl three months prior) and a platelet count of 1,023,000/µl (increased from 852,000/µl). Additionally, liver enzymes were elevated, with aspartate transferase at 509 U/l and alanine transaminase at 313 U/l; lactic acid was measured at 1.4 mmol/l. The urinalysis indicated moderate blood and red blood cells, suggesting possible haematuria. A respiratory panel returned positive for COVID-19.

Blood cultures were obtained, and the patient was started on empiric antibiotics with piperacillin/tazobactam. A CT scan of the abdomen and pelvis revealed moderate haemoperitoneum, a large rectus sheath haematoma measuring 16.8 cm and a hypodense lesion in the left hepatic lobe. Warfarin therapy was temporarily paused, and Surgery was consulted for further management. They recommended a contrast-enhanced CT scan of the abdomen and an evaluation by interventional radiology for possible embolisation due to the patient's haemodynamic instability. The patient received one unit of packed red blood cells and was transferred to the ICU for further care.

The following day, a contrast-enhanced CT of the abdomen was performed, revealing a stable rectus sheath haematoma and a pseudoaneurysm in the left hepatic lobe. This finding was confirmed with a Doppler ultrasound of the liver, which showed blood flow consistent with a pseudoaneurysm. Consequently, coil embolisation of the pseudoaneurysm in the left hepatic artery was performed by interventional radiology without any immediate complications.

Post-embolisation, the patient's vital signs and haemoglobin levels stabilised. However, later that evening, she began to experience severe pain in the right upper quadrant of her abdomen. Her blood pressure dropped to the 50s/40s mmHg range, and her heart rate increased to over 110 beats per minute. Additionally, her haemoglobin level had decreased from 9.0 to 6.7 g/dl since the morning, while her lactic acid level rose to 4.5 mmol/l, indicating possible ongoing haemorrhage or sepsis. To stabilise her haemodynamic status, fluid resuscitation and blood transfusion were initiated, and she was transferred to interventional radiology for an arteriogram to locate the source of the bleeding.

The arteriogram showed no significant findings, but a subsequent CT scan revealed new large perihepatic and perisplenic haemoperitoneum, along with stable rectus sheath haematomas and moderate ascites. Due to persistent hypotension, vasopressor support with norepinephrine and vasopressin was initiated, and the patient was intubated for respiratory support.

Blood cultures grew *Staphylococcus epidermidis*, which is likely a contaminant. However, given her prosthetic mitral valve and a high suspicion of infective endocarditis, the patient was started on empiric treatment with meropenem and vancomycin. A transthoracic echocardiogram revealed a mobile echo density on the prosthetic mitral valve leaflet, consistent with vegetation as shown in *Fig. 1*. Due to her COVID-positive status, a transoesophageal echocardiogram could not be performed.

The antibiotic treatment was narrowed to vancomycin alone after positive cultures indicated the presence of Staphylococcus epidermidis. A follow-up imaging study revealed stable thrombosis of the left hepatic artery pseudoaneurysm. Due to her atrial fibrillation, the patient was placed on a heparin drip for anticoagulation. Throughout her hospitalisation her haemoglobin levels remained stable, and her condition gradually improved. Eventually, she was transferred to a university hospital for further evaluation and management of her prosthetic mitral

valve. A transoesophageal echocardiogram performed at the university hospital did not reveal any vegetations, and the mitral valve leaflets appeared clear. Blood cultures remained negative; however, due to the suspicion of endocarditis, the patient continued on antibiotics. Warfarin was resumed once her INR was within the therapeutic range of 2–3. No new haematomas or bleeding were observed during this time, and the patient successfully completed six weeks of vancomycin therapy. She was then discharged to a rehabilitation facility for further recovery.

DISCUSSION

HAAs are rare vascular anomalies that often present with non-specific symptoms such as abdominal pain or shock due to haemorrhage. They can arise from various underlying conditions including trauma, atherosclerosis, infections or congenital defects. When associated with infective endocarditis, HAAs can develop due to septic embolism stemming from bacterial endocarditis. This infection of the arterial wall leads to the weakening of the vessel, forming a pseudoaneurysm that is at high risk of rupture and severe haemorrhage[1,2].

The pathophysiology of HAAs in the context of infective endocarditis is primarily understood through septic embolism. Bacterial emboli originating from valvular vegetations in the heart can travel through the bloodstream and lodge in smaller vessels, including those of the liver. This results in localised inflammation and bacterial colonisation, which weakens the arterial wall and increases the likelihood of aneurysm formation[3].

Several studies have emphasised the role of septic embolism in the development of HAAs. *Staphylococcus aureus* and *Staphylococcus epidermidis* were the causative organisms, leading to the formation of pseudoaneurysms due to embolic phenomena. The pathophysiology of HAA in the context of infective endocarditis highlights that septic emboli can lead to vessel damage and pseudoaneurysm formation, particularly in patients with prosthetic valves or other predisposing conditions such as atrial fibrillation[4].

The patient in this case had a complex medical history, including a prosthetic mitral valve, atrial fibrillation and anticoagulation therapy – all known risk factors for the development of infective endocarditis and associated vascular complications. The use of warfarin in particular increases the risk of haemorrhage, complicating the management of aneurysms and pseudoaneurysms. Detection of the aneurysm was accomplished through imaging studies, including contrast-enhanced CT and Doppler ultrasound, which are vital for diagnosing visceral aneurysms, especially in haemodynamically unstable patients. These imaging modalities not only identify the aneurysm but also assist in planning interventions such as embolisation, which is the preferred treatment for pseudoaneurysms in visceral arteries[5].

Interventional radiology plays a pivotal role in managing visceral pseudoaneurysms. Coil embolisation, as performed in this case, is a minimally invasive technique shown to be highly effective in controlling bleeding and preventing rupture in patients with visceral artery aneurysms. Interventional radiology techniques, including embolisation, have become the standard of care for managing HAAs, particularly in cases complicated by infection or rupture[6].

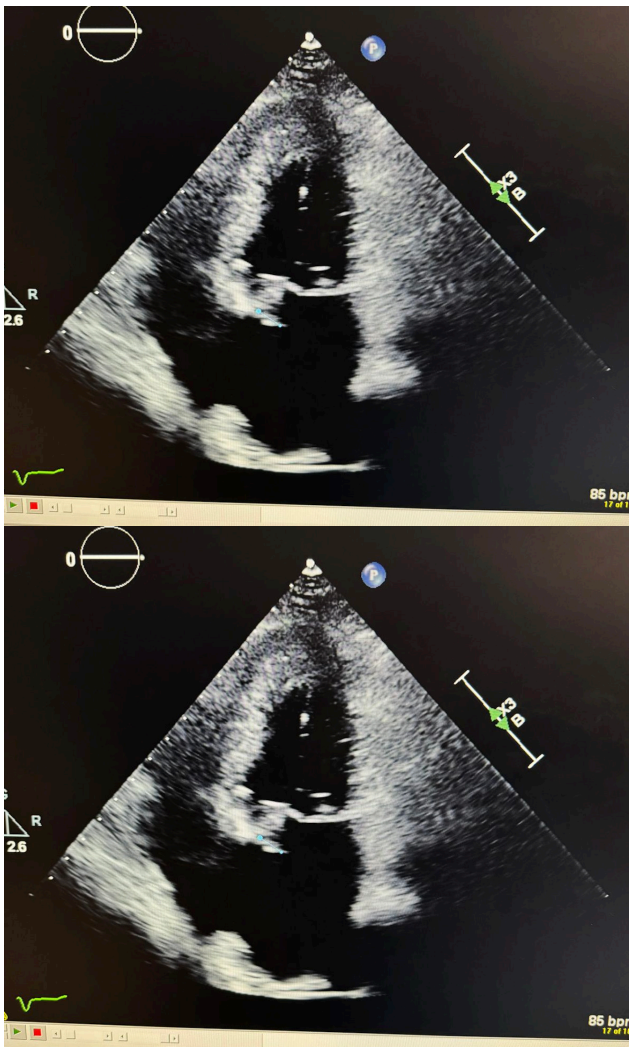


Figure 1. A transthoracic echocardiogram revealed vegetations on mitral valve.

Prolonged antibiotic therapy, typically lasting 4–6 weeks, is essential to address the underlying infection and prevent complications such as septic embolism or further aneurysm formation. Antibiotics, for example vancomycin, are crucial for treating Staphylococcus species, which are frequently implicated in infective endocarditis and related vascular complications[7]. The patient's eventual improvement and successful discharge highlight the importance of early detection and comprehensive management, including appropriate antibiotic therapy and interventional radiology.

CONCLUSION

HAAs are rare but serious complications, particularly when associated with infective endocarditis. Early recognition and management, including appropriate imaging and use of interventional radiology, are crucial for preventing life-threatening haemorrhage. This case highlights the

importance of considering HAAs in patients with known risk factors, such as infective endocarditis and anticoagulation therapy, who present with abdominal pain and signs of haemodynamic instability. Timely interventions and a multidisciplinary approach are essential for improving patient outcomes.

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