

CASE REPORT

A case of shock due to compression of the right atrium by the liver after postoperative bleeding

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Abstract

This report describes the case of a 36-year-old woman who presented to our intensive care unit in profound refractory shock after a complicated laparoscopic cholecystectomy. Transoesophageal echocardiography showed an extrapericardial mass blocking venous return and computed tomography showed an intra-abdominal haematoma with displacement of the liver. The patient was diagnosed with extrapericardial tamponade caused by compression of the right atrium by the liver due to a large intra-abdominal haematoma. Decompression via explorative laparotomy was performed, resulting in a quick and full recovery of the patient. We conclude that extrapericardial tamponade should be considered in patients presenting with refractory shock after abdominal surgery.

Background/Introduction

Gallstone disease is a common condition in the Western world with an estimated prevalence of 10-20%.^[1,2] Recent literature shows that asymptomatic or incidental gallstones can be managed conservatively.^[3,4] Most patient below the age of 70, with recurrent symptomatic gallstones, seem to prefer operative treatment, and laparoscopic cholecystectomy remains a commonly performed surgical intervention.^[4] Laparoscopic cholecystectomy is considered to be a safe and effective procedure.^[5] Possible complications are superficial wound infections, deep wound infections and bile leakage. Bile duct injury is the most feared complication and occurs in about 1% of laparoscopic cholecystectomies.^[6,7] Although major vascular injuries are rare, with a reported incidence of 0.11%,^[8,9] they can cause serious complications with detrimental effects for the patient.

Case report

A 36-year-old woman was transferred via a mobile intensive care unit to our hospital, with refractory hypotension after

laparoscopic cholecystectomy for symptomatic cholelithiasis. Her medical history included morbid obesity (estimated BMI 41.5 kg/m²).

A day before referral she underwent a laparoscopic cholecystectomy. In the post-anaesthesia care unit she complained of increasing abdominal pain and her blood pressure dropped to 80/40 mmHg, with a tachycardia of 140 beats/min. Emergent re-laparoscopy was performed, with evacuation of an estimated 2 litres of blood (clots). No bleeding sites were found and a drain was left in the foramen of Winslow. After the procedure the patient remained haemodynamically unstable, with a tachycardia of 120 beats/min and a blood pressure of 80/40 mmHg. Computed tomography angiography (CTA) was performed and bleeding from the left hepatic artery was found; this was successfully coiled. Despite these efforts the patient had ongoing tachycardia and hypotension, refractory to medical treatment (1500 ml of crystalloids, 500 ml of colloids, 13 units of red blood cells, 7 units of fresh frozen plasma, 3 g of tranexamic acid, 100 mg of hydrocortisone). Without an explanation for her ongoing shock she was transferred to our hospital. On admission, the patient was intubated, sedated, pale, hypothermic, oliguric, hypotensive (90/60 mmHg) with a tachycardia of 147 beats/min and requiring the administration of high doses of norepinephrine (0.95 µg/kg/min). Physical examination was difficult because of the patient's morbid obesity. On cardiac auscultation, no murmur was heard. Arterial blood gas analysis showed a persistent metabolic acidosis with a raised lactate of 8 mmol/l. Central venous oxygen saturation was 45%. Apart from a slightly elevated prothrombin time of 13.1 seconds (normal range 9.7-11.6 seconds), the coagulation tests were all in the normal range. The haemoglobin level was stable and the electrocardiogram showed sinus tachycardia

with no suspicion of acute pulmonary embolism or myocardial ischaemia. The intra-abdominal pressure was measured indirectly by using intravesical (bladder) pressure to screen for abdominal compartment syndrome, which was normal (12 mmHg). Transoesophageal two-dimensional and real-time echocardiography was performed and revealed a normal-sized heart with a hyperdynamic left and right ventricle and no pericardial effusion. A rounded extracardiac mass projecting to the right atrium was detected that was almost completely blocking all venous return (*figure 1 a+b*). For further assessment of the suspicious extrapericardial mass, contrast-enhanced computed tomography was performed, which showed extensive intra-abdominal free fluid (haematoma), with medial and cranial displacement of the liver with compression of the right atrium and vena cava inferior. Bilateral pleural effusion with atelectasis was present (*figure 2 a+b*). Surgical consultation was immediately obtained, ultimately resulting in the decision to perform a laparotomy with direct evacuation of the haematoma, in order to achieve decompression of the right atrium. During the explorative laparotomy the surgeons found a large haematoma on the lateral side of the liver, pushing the liver medially and cranially. Five litres of blood were evacuated. A transoesophageal echocardiogram was performed in the operating room, which showed improved filling of the right atrium after decompression. Following decompression her blood pressure normalised and the norepinephrine could be reduced significantly (0.06 $\mu\text{g}/\text{kg}/\text{min}$). The patient recovered uneventfully and was discharged to the intensive care unit of the referring hospital three days postoperatively.

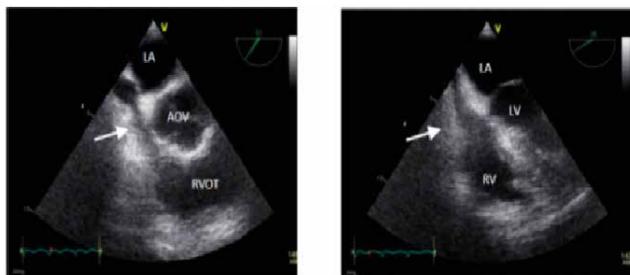


Figure 1. Preoperative transoesophageal echocardiography (A) Mid oesophageal short-axis view: showing compression of the right atrium (white arrow) (B) Mid oesophageal four-chamber view: showing compression of the right atrium (white arrow)

Discussion

To the best of our knowledge, we are the first to report a case of extrapericardial tamponade caused by upward displacement of the liver after laparoscopic cholecystectomy. We found one publication, where the writers reported cardiac tamponade due to a liver haematoma in a pregnant woman with HELLP syndrome.^[10] Compression of isolated cardiac chambers by

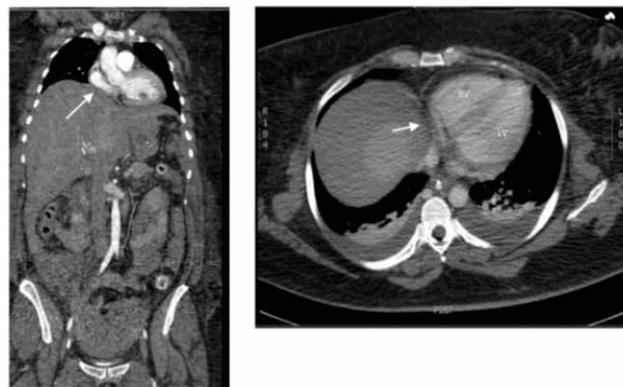


Figure 2. Contrast-enhanced computed tomography: (a) Longitudinal CT scan of the abdomen (with intravenous contrast) demonstrating massively enlarged liver by a haematoma with compression of the right atrium (white arrow); (b) Axial CT scan of the abdomen (with intravenous contrast) demonstrating massively enlarged liver by a haematoma with compression of the right atrium (white arrow)

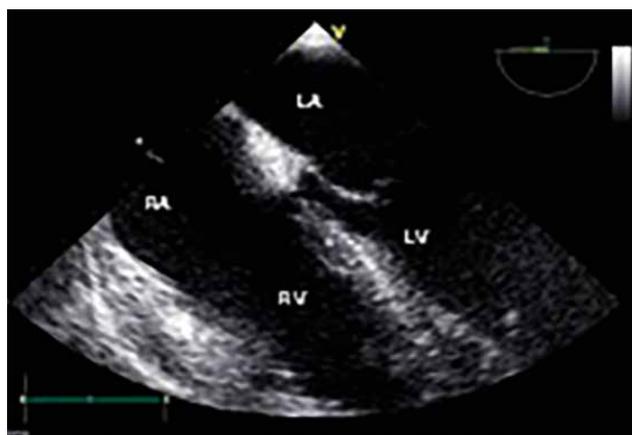


Figure 3. Intraoperative transoesophageal echocardiography performed after decompression of the haematoma: mid-oesophageal four-chamber view: demonstrating reduced compression of the right atrium (comparable part of cardiac cycle)

extrinsic haematoma is much less common than intrapericardial tamponade.

The differential diagnosis of extrinsic atrial compression is broad and includes thoracic aortic aneurysm, oesophageal mass, hiatal hernia, bronchogenic carcinoma, and other posterior mediastinal masses including mediastinal haematoma.^[12] Several diagnostic modalities are available. Transthoracic echocardiography is useful and noninvasive, but can have significant limitations in the morbidly obese patient. Transoesophageal echocardiography can be helpful in providing an excellent view of the cardiac situation. Computed tomography is particularly useful to identify the nature of the compression and helps to plan the surgical approach. The

relatively low bladder pressure firstly reassured us of the absence of abdominal compartment syndrome. Since it remained unclear what was causing her ongoing shock an echocardiography was performed to rule out cardiogenic shock. Surprisingly it showed us that the patient was suffering from an obstructive shock due to extrapericardial compression.

The potential life-threatening consequences of major abdominal arterial and venous injury during laparoscopic cholecystectomy are well known. On the other hand, obstructive shock due to a large haematoma after a bleeding complication is not. Transoesophageal echocardiography has not only been proven to be useful for the detection of compression of the atrium, with the help of intraoperative transoesophageal echocardiography, we were also able to confirm that the pressure on the right atrium was relieved. The patient's quick and full recovery after decompression confirmed the clinical diagnosis that the patient was suffering from extrapericardial tamponade.

Disclosures

All authors declare no conflict of interest. No funding or financial support was received.

Informed consent was obtained from the patient for publication.

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