Case report

Challenges Beyond Calot's triangle: Post Cholecystectomy Right Hepatic Artery Aneurysm

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Abstract

Cholecystectomy is a very common surgical procedure with approximately increase from 55,31,860 to 71,61,339 cholecystectomies in South Asian region per year (from 2019 to 2022)[1]. Given this, despite development of rules to address safety of this frequented procedure, there are outliers where difficulties maybe faced both intra and post operatively. We present such a case of open cholecystectomy with intraoperative variant anatomy followed by the development of right hepatic artery aneurysm post operatively. Intrahepatic pseudo-aneurysm is a rare but potentially life-threatening complication following cholecystectomy. It is crucial for both surgeons and radiologists to recognize its symptoms promptly. Currently, the preferred treatment approach is minimally invasive, radiology-guided procedures, with trans-arterial embolization being the most effective therapeutic option.

Keywords: Cholecystectomy, Calot's triangle, Hepatic Artery Aneurysm.

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1. Introduction

Cholecystectomy is a very common procedure in general surgery operating rooms, reflecting its significant disease burden[1]. This involves removing the gallbladder safely from the liver bed after careful dissection in the Calot's triangle. Despite protocols to reduce both intraoperative and post-operative complications, aberrant vascular and ductal anatomy poses challenges beyond the Calot's triangle[2].

These challenges may develop both intra and post-operatively. Vascular compromise may occur in 0.8% of the time[3]. This is brought upon by physical trauma or electrocautery[4]. Of these, a drastic complication may be hepatic artery pseudo aneurysm. According to literature, it is usually unreported after surgery and manifests later[5]. Hemobilia may be a sign of its occurrence. Vascular problems linked with biliary injury may occur in 25% of the cases[6]; however, an incidence of post cholecystectomy pseudo aneurysm with hemobilia is a rare finding in literature[7].

2. Case Presentation

Our case is of a 65 year male, known hypertensive, who was electively admitted for cholecystectomy. He underwent an open cholecystectomy. As a routine for the procedure, cystic duct and artery were identified in Calot's triangle and clipped. However, while removing gall bladder from the liver bed, bleeding was observed from aberrant vessel, which was intraoperatively suspected to arise from right hepatic artery. This was controlled by hemostatic suture. Bile leak was observed for which T-tube was placed in CBD with a plan of post-operative T-tube cholangiogram.

Post-operative course was uneventful till the 10th day when he showed apprehension and in agitation attempted to pull his tubes. Massive bleeding from T-tube site and sub-hepatic drain was noted. Subsequently he went into hypovolemic shock with drop in Hb (from 10g/dl to 7g/dl) and was resuscitated. T-tube output showed blood tinged picture for the next 5 days. Ultrasound abdomen revealed hypo-echoic area measuring 5ml at porta hepatis. To further investigate this, doppler ultrasound was performed that showed mixed arteriovenous flow on CDI around the catheter in gall bladder fossa. CT angiography incidentally displayed a variant anatomy (replaced right hepatic artery from the celiac trunk). There was a large intrahepatic pseudo-aneurysm noted in this vessel (26.7X26.8X24 mm^3). Another episode of bleed within the T-tube and around the insertion site resulted in a significant drop in Hb. Patient was vitally stabilized and urgent intervention by trans-arterial embolization via coiling was done.

Interventional radiologist passed a 4 Fr C2 catheter via Right femoral access. Wire was advanced into the distal right hepatic artery and embolization was done with a long 6mm coils distally and proximally.

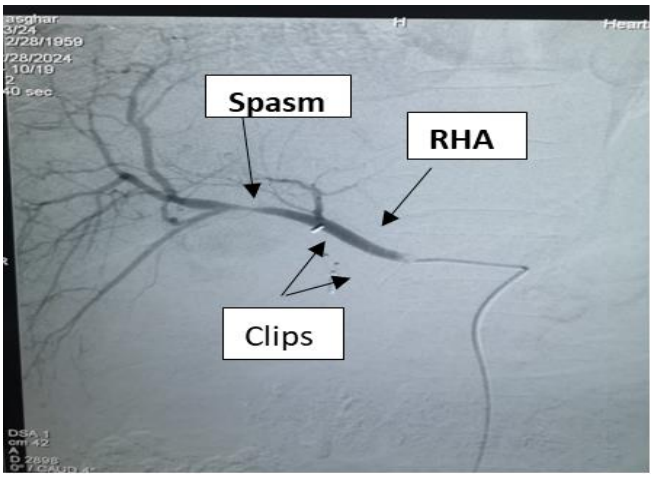

Figure 1. Pre embolization angiogram of the right hepatic artery shows focal spasm of the RHA at the site of the pseudo aneurysm.

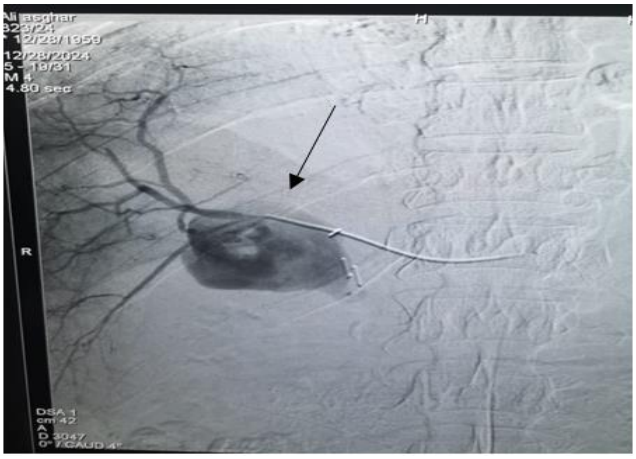

Figure 2. The pseudo aneurysm filling up with contrast.

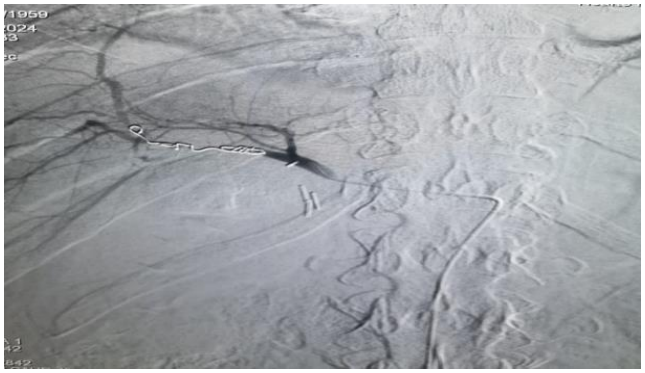

Figure 3. Post embolization angiogram shows no filling of the pseudo aneurysm with filling of the distal right hepatic artery branches via collaterals. Coiling was done, distal and proximal to the neck of the pseudo aneurysm.

Post procedure course was uneventful and a subsequent improvement in his liver function was noted. T-tube was removed after an unremarkable cholangiogram. Patient was discharged and no complaints were noted on his 1 month follow up.

3. Discussion

Hepatic artery pseudo-aneurysms are uncommon but a possibly fatal consequence. It is frequently linked to iatrogenic trauma, vascular damage, and cholecystectomy[8]. A locally contained heamatoma that develops following vascular damage is known as a false aneurysm and is held in place by the surrounding tissue of the damaged vessel. It differs from a real aneurysm, which includes dissecting and sub adventitial aneurysms and is contained by the vessel wall or one of its layers. Occlusion, transections, lacerations, and false aneurysms are examples of vascular problems[9].

A case of right hepatic artery pseudo aneurysm after open cholecystectomy is presented in this report which is a rare occurrence in literature. It can develop in the right hepatic artery, common hepatic artery and cystic artery[10]. The symptoms and indicators vary including discomfort in the abdomen, anemia, jaundice, bleeding, and there have been reports of acute abdomen[11]. In 90% of the cases, hemobilia may manifest as upper gastrointestinal hemorrhage and melena, in 70% as abdominal pain and 60% as Jaundice[11], but in our case it appeared as heamorrage in T-tube placed in common bile duct. The devastating effects of impending rupture involving right hepatic artery pseudoaneurysm, mandate urgent and lifesaving intervention. It was attempted with multidisciplinary facilitation to the best of our ability within and outside our institution.

The diagnosis of the bleeding aneurysm can be made by directly observing bleeding from the ampulla of vater using endoscopic retrograde cholangiopancreatography or endoscopic inspection[12]. The pulsatile aneurysm with bleeding into the biliary tracts can be found using Doppler ultrasonography[13, 14].

Additionally, the CT scan can be used to delineate the celio-mesenteric tree, to identify the arterial pseudo aneurysm and its rupture in the presence of a high density of surrounding tissue[14]. Davies and colleagues saw a dense region next to the metallic clips on CT scans and they decided to do angiographic procedure through trans femoral route to confirm the diagnosis and permit embolization in the same location[15]. The possible progression of pseudo aneurysms towards rupture necessitates prompt and flexible therapy. In this indication, interventional radiology has taken the place of surgery. Coils are used for embolization of the

pseudo aneurysm, if selective endovascular catheterization is feasible[15]. Our case is also treated via trans-femoral artery embolization of RHA by coiling distally and proximally.

A direct trans hepatic access to the pseudo aneurysm under the guidance of ultrasound or fluoroscopy enables its embolization with thrombin or coils if endovascular approach is unsuccessful[16]. The distant and intrahepatic nature of the fake aneurysm here limits complications associated with the endovascular use of this embolic agent[16]. According to the published research, the rate of recanalization of splanchnic aneurysms treated by radiological intervention ranges from 1% to 15%[4]. In this case, four weeks follow up was mandatory.

4. Conclusion

A rare but potentially dangerous side effect of cholecystectomy is intrahepatic pseudo aneurysm. Surgeons and radiologists should be aware of its symptoms. Our case study emphasizes the value of early diagnosis using imaging methods such as IV-contrast CT angiography. Nowadays, the standard of care is minimally invasive procedures guided by radiology, since trans-arterial embolization is the most effective therapeutic option.

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