CASE REPORT

Management of hepatic artery aneurysms

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Abstract: Background: Hepatic artery aneurysm (HAA) is a rare clinical entity that can lead to potentially life threatening complications. We reported our personal experience of 4 cases, in which we used different procedures. Methods: The first case had a pseudo-aneurysm involving the right hepatic artery. The second case had a pseudo-aneurysm, which was localized distal to the accidentally ligated right hepatic artery from the previous cholecystectomy operation. The third case had multiple aneurysms with accompanying dissecting abdominal aortic aneurysm. The fourth case had a pseudo-aneurysm originating from the proper hepatic artery. A covered stent was successfully placed in the case 1. In the second case, the right hepatic artery was ligated distal to the aneurysm. In the third case, vascular structures were not appropriate for vascular reconstruction, and a covered stent placement and embolization were unsuccessful. In the fourth case, ligation of the proper hepatic artery and cholecystectomy was performed. Results: The third case with multiple aneurysms died from multi-organ failure due to sepsis. The remaining cases (case 1, 2, and 4) are disease free and alive. Conclusion: HAAs are more commonly observed clinical entities, and their treatment should be handled for each patient separately. Computerized tomography-Angiography and intraoperative Doppler ultrasound are useful radio-diagnostics for determination of aneurysm and planning the operative procedure (Fig. 5, Ref. 15). Full Text in PDF www.elis.sk.
Key words: pseudo-aneurysm, covered stent, embolization, angiography.

Hepatic artery aneurysm (HAA) is a rare clinical entity that can lead to potentially life threatening complications when it ruptures. Among visceral artery aneurysms, HAAs are the second most common site after splenic artery aneurysms and make up 12–20% of them. The most frequently associated condition with HAA is atherosclerosis. Hypertension is the most common co-morbid disease followed by malignancy, peptic ulcer disease, peripheral artery disease, obesity and chronic obstructive pulmonary disease. There seems to be a strong association with tobacco and alcohol consumption (1).

The first surgical approach to treat HAA was ligation of the proper hepatic artery by Kehr in 1903 (2). Since then, many other treatment options evolved such as transarterial embolization, covered stent placement, resection of the aneurysm with or without vascular reconstruction, arterial by-pass and hepatectomy.

HAAs have become more commonplace. This change likely reflects the increased use of percutaneous diagnostic and therapeutic biliary procedures, as well as increased use of diagnostic computed tomography (CT) (3). But, even today, there is still not a standard treatment modality for HAA. We reported our personal experience of 4 cases with HAA, in which we used different procedures and compared our results to literature.

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Case reports

Case 1

A 29-year-old female patient was re-admitted 4 weeks after laparoscopic cholecystectomy (LC) operation for an acute upper gastrointestinal bleeding and persistent jaundice. An emergent upper endoscopy was performed and no primary focus was detected. Hemobilia and benign biliary stricture was found during endoscopic retrograde pancreatoc-choledangiography (ERCP) and a nasobiliary drainage catheter (NBDC) was placed simultaneously. Upon the blood transfusions the patient continued to bleeding and an angiography was performed. An isolated pseudo-aneurysm 3 cm in diameter originating from the right hepatic artery was found. A 5x25 mm covered stent (Gore Viabahn, USA) was placed successfully to close the aneurysmal neck (Fig. 1). The patient recovered

Fig. 1. a) Angiography shows a pseudo-aneurysm from the right hepatic artery. b) A covered stent was successfully placed to close the aneurysmal neck.
rapidly in the following days, jaundice improved and bleeding stopped. Control angiography showed a patent right hepatic artery with exclusion of the aneurysm. The NBDC was removed and the patient was discharged after her symptoms disappeared and biochemical parameters went down to normal levels.

Case 2
A 49-year-old male patient was admitted with acute biliary pancreatitis two weeks after a conversion cholecystectomy operation. Under follow up in the clinic with conservative medications cholestatic liver enzymes increased and the patient began to suffer from hematemesis on the twelfth day. No primary focus was detected during upper endoscopy but bleeding from the biliary system through papilla into the duodenum was seen. The stones in the common bile duct were removed and a NBDC was placed. An angiography was performed and a 4x5 cm aneurysm was found just distal to the accidentally ligated right hepatic artery from the previous cholecystectomy operation. The aneurysm had multiple collaterals in association with left hepatic and other arteries in the vicinity (Fig. 2). Endovascular covered stent placement was found unsuitable for this patient, because there were multiple tortuous collaterals, which were of inappropriate size for applying the covered stents currently available in the market. Coil embolization was also unsuccessful due to wide neck of the aneurysm with its multiple collaterals. The patient was re-operated. During the surgery, we observed that the right hepatic artery was found clipped proximal to the aneurysm and feeding of the aneurysm was provided by the left hepatic artery through multiple collaterals. We ligated the right hepatic artery distal to the aneurysm. Intraoperative Doppler ultrasound was used to decide whether hepatic collateral flow is sufficient or not when aneurismal collaterals are ligated. After clamping the aneurismal collaterals for 15 minutes, hepatic inflow was unchanged by Doppler ultrasound. The collaterals were also ligated without the need of vascular reconstruction. The Doppler ultrasound was repeated on the first and seventh postoperative days and showed normal hepatic inflow with an excluded aneurysm. Patient’s condition improved rapidly and he is now disease free during follow up.

Case 3
A 58-year-old male patient was admitted with complaints of right abdominal pain, jaundice and melana more than one week’s duration. Patient’s total bilirubin levels were 24 mg/dl with 18 mg/dl of direct component. A magnetic resonance cholangiopancreatography (MRCP) was performed and dilatation of the right and left intrahepatic biliary ducts with no visualization of the distal common bile duct was defined. A percutaneous transhepatic cholangiography (PTC) was performed; hemobilia was detected and an external drainage catheter was inserted. A dissecting abdominal aortic aneurysm was found by abdominal computed tomography-angiography (CT-angio) which began from descending aorta up to 5 cm distal to the origin of the renal arteries. The dissection fléb extended to the celiac, hepatic and proximal part of the splenic arteries. A 6x6.7 cm measured thrombosed aneurysm originating from common hepatic artery was also found. Furthermore, a fusiform aneurysm of the right hepatic artery measuring 1.9 cm, a fusiform aneurysm of the left hepatic artery measuring 2.1 cm, an aneurysm of the splenic artery measuring 1.3 cm and a thrombosed aneurysm of the proximal part of the superior mesenteric artery (SMA) measuring 0.8 cm were detected (Fig. 3). The dissection fléb involved the proximal part of the SMA. An angiography was planned but the patient began to bleed rapidly through the biliary drainage catheter during this period. An emergent abdominal laparotomy was performed and a 9x8x7 cm measured aneurysm with hematoma of the gastrohepatic region was detected. No surgical intervention could be performed due to bleeding of the aneurysm.
in the form of oozing during dissection and the remaining vascular structures were not appropriate for reconstruction due to multiple aneurysms. A covered stent was placed to occlude the aneurysm by endovascular approach on the day after the surgery. An embolization was applied to the aneurysm and its collaterals. But one day later, persisted collateral flow to the aneurysm was seen by control Doppler ultrasound. The patient did not allow any surgical attempt due to his hypotensive status and died in a few days from multi-organ failure due to sepsis.

Case 4

A 68-year-old male patient was admitted with complaints of epigastric pain and jaundice last more than two weeks. The ultrasound (US) revealed dilatation of the intrahepatic biliary ducts within a contracted gallbladder and a 5.2x4.8 cm measured cystic mass beneath the upper edge of the pancreatic head. CT-angio showed a 6x7 cm measured aneurysm originating from the proper hepatic artery and multiple collateral connections from the celiac trunk to the liver (Fig. 4). Covered stent placement was found unsuitable for this patient because of tortuous vessel with a decreased caliper in size due to compression or spasm of the pseudo-aneurysm. We thought that these factors did not allow catheterization and we performed an explorative laparotomy. The collateral flow from the celiac truncus to the hepatic parenchyma was evaluated by intraoperative Doppler ultrasound before dissecting the ligaments and other structures of the hepatoduodenal region. The collateral flow to the liver seemed quite enough even when the hepatic artery was clamped just proximal to aneurysm. Thus, we ligated the hepatic artery just proximal and distal to the aneurysm. Collateral branches feeding the aneurysm were also ligated. After the ligation, hepatic parenchymal circulation was reevaluated by Doppler ultrasound and adequate intrahepatic arterial flow was observed. A cholecystectomy was applied because of the risk of possible ischemic event related to the proper hepatic artery ligation. The Doppler ultrasound was repeated on the first postoperative day and showed exclusion of the aneurysm without leakage. The patient was discharged on the ninth postoperative day and is disease free until now.

Except of the third case, the remaining three patients are alive with normal liver function tests. Control CT-angio was performed for each patient after twelve months and shrinkage of the thrombosed aneurysm with disappearing of compressing sings and normal hepatic flow was observed.

Discussion

HAA’s are rare and usually solitary lesions (90 %), which are more common among males over 60 years. HAA’s are localized in the extrhepatic region in 75 % of cases, and from these 63 % involved the common and proper hepatic, 28 % the right hepatic, 5 % the left hepatic and 4 % both hepatic arteries (4). Pseudo-aneurysms should be differentiated from extrhepatic aneurysms. Histopathological findings have shown that up to 50 % of HAA’s are pseudo-aneurysms (1). This high rate is a natural result of the widespread and increasing usage of invasive percutaneous proce-
Aneurysms that are localized distal to the gastroduodenal artery. If preoperatively by arteries, pericholedochal arteries, and arteries from the round or such as the inferior panctreatico-duodenal arc, left or right gastric

Doppler ultrasound can be helpful at this point to evaluate the he-

About the adequacy of the collaterals, the surgical team should be prepared for vascular reconstruction. The intraoperative use of Doppler ultrasound gives valuable information about the hepatic collateral flow, which facilitates decision making for an intraoperative plan.

**References**


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