Case Report

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Venous graft for replacement of an aneurysm-bearing right hepatic artery

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Autologer Ersatz einer aneurysmatragenden Arteria hepatica mittels Veneninterponat

Zusammenfassung. *Grundlagen:* Leberarterienaneurysmata sind relativ selten und werden oft zufällig diagnostiziert. Diese Aneurysmata können in die Bauchhöhle rupturieren und zu einem lebensbedrohlichen Hämoperitoneum und Schock führen oder in die Gallenwege, die Pfortader oder den GI-Trakt perforieren.

Methodik: Bei einer 66-jährigen Frau mit Rechtsoberbauchsymptomatik wurde ein Aneurysma der Arteria hepatica dextra diagnostiziert. Zudem entsprang die rechte Leberarterie aus der Arteria mesenterica superior. Nach Resektion des aneurysmatragenden Anteils der Arterie wurde ein Veneninterponat zwischen Arteria gastrica sinistra und der Arteria hepatica dextra angelegt. Das Follow-up betrug 8 Jahre. Detaillierte Beschreibung des Falles, der Operationstechnik und Literaturübersicht.

Ergebnisse: Die Gesamt-Okklusionszeit der Arteria hepatica betrug 50 Minuten. Es wurden keine Erythrozytenkonzentrate benötigt. Der postoperative Verlauf war unauffällig. Die Leberfunktionsparameter (Serum Bilirubin, Alkalische Phosphatase und Serum Glutamat-Oxalazetat-Transaminase) stiegen postoperativ nicht an. Bei Nachuntersuchungen 6 und 8 Jahre postoperativ war die Patientin beschwerdefrei und die Leberfunktionsparameter in der Norm. Im Ultraschall zeigte sich ein Interponat mit 6 mm Durchmesser ohne Aneurysmabildung und ein physiologisches leberarterientypisches Flussspektrum.

Schlussfolgerungen: Unser vorliegender Fall zeigt, dass ein elektiver autologer Ersatz einer aneurysmatragenden Arteria hepatica mittels Veneninterponat sicher durchgeführt werden kann, mit gutem Langzeiterfolg.

Schlüsselwörter: Aneurysma, Arteria hepatica, Veneninterponat, Langzeitergebnisse.

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Summary. *Background:* Hepatic artery aneurysms are rare and are often diagnosed accidentally. These aneurysms can rupture into the peritoneal cavity resulting in life-threatening hemoperitoneum and shock, or perforate into the biliary tree, the portal vein or the GI-tract.

Methods: A 66 year old women with right upper quadrant pain was diagnosed with an aneurysm-bearing right hepatic artery originating from the superior mesenteric artery. After resection of the aneurysm-bearing segment, a venous graft was anastomosed from the left gastric artery to the right hepatic artery. Follow-up for eight years. Detailed description of the case-history, the operative technique and review of the literature.

Results: Total time of hepatic arterial occlusion was 50 minutes. No blood transfusion was required. The postoperative course was uneventful. No rise of liver function parameters (serum bilirubin, alkaline phosphatase and serum glutamic oxaloacetic transaminase) was noted postoperatively. In a follow-up examination six years and eight years postoperatively the patient had no abdominal complaints. Liver function tests were within normal limits and abdominal ultrasound revealed a patent graft with a diameter of 6 mm without aneurysmatic dilatation and a physiologic hepatic artery flow-spectrum.

Conclusions: The current study demonstrates that elective venous grafting for replacement of an aneurysm-bearing right hepatic artery originating from the superior mesenteric artery can be performed safely, with a good long-term outcome.

Key words: Aneurysm, hepatic artery, venous graft, long term.

Introduction

Hepatic artery aneurysms are rare lesions and constitute 20 % of all splanchnic artery aneurysms. They are life-threatening when perforation occurs. Rupture can occur into the peritoneal cavity resulting in hemoperitoneum and shock, but hepatic artery aneurysms may perforate into the biliary tree, the portal vein and the GI tract.

This is a report about a patient who was diagnosed with an aneurysm-bearing right hepatic artery originating from the superior mesenteric artery, who underwent elective surgical repair.

Methods

Case: For three months, a 66-year-old woman suffered right upper abdominal pain, which she related with meal intake, and subsequently lost eight kilograms. On physical examination malnutrition was noted. There were no other pertinent findings in laboratory investigations, standard x-rays and upper GI endoscopy. Abdominal ultrasound revealed a 3 cm big spherical mass in the upper abdomen with arterial signals in Doppler ultrasound. A visceral artery aneurysm was suspected. Selective arteriography (Fig. 1) revealed elongation of the abdominal aorta. A replaced right hepatic artery that arose from the superior mesenteric artery (SMA) bore a 3 cm big saccular aneurysm 2 cm away from its origin.

From a right subcostal incision a cholecystectomy was performed. The intraoperative cholangiogram was normal. The lesser omentum was dissected. The left gastric artery gave rise to two small left hepatic arteries. There was no celiac hepatic artery. The right hepatic artery was caudate the common bile duct. The dissection of the aneurysm from the surrounding structures was difficult. Finally the aneurysm and the right hepatic artery at its origin from the SMA could be isolated without significant blood loss.

After systemic anticoagulation with 5000 units of heparin the right hepatic artery was clamped, divided and ligated at its origin from the SMA and the aneurysm-bearing segment was resected. Only dripping arterial backflow from the stump in the hilum of the liver was noted.

A 3 cm segment of reversed saphenous vein harvested from the right groin was anastomosed to the left gastric artery and to the vascular stump of the right hepatic artery (Fig. 2).

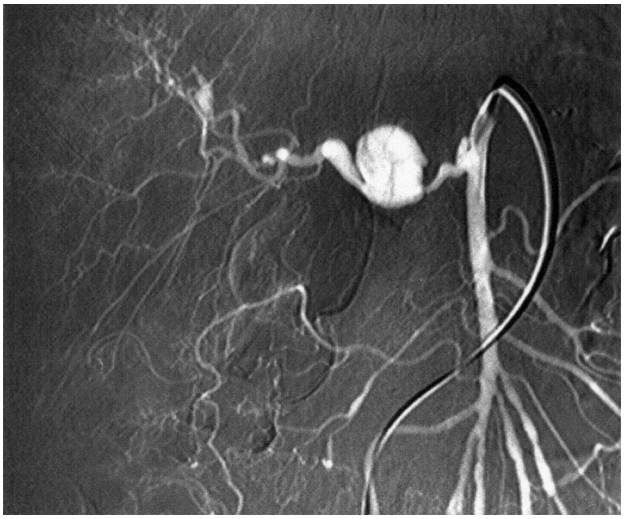

Fig. 1. Selective superior mesenteric arteriography: Elongation of the abdominal aorta, replaced right hepatic artery arising from the SMA and bearing a 3 cm big saccular aneurysm 2 cm distal to its origin

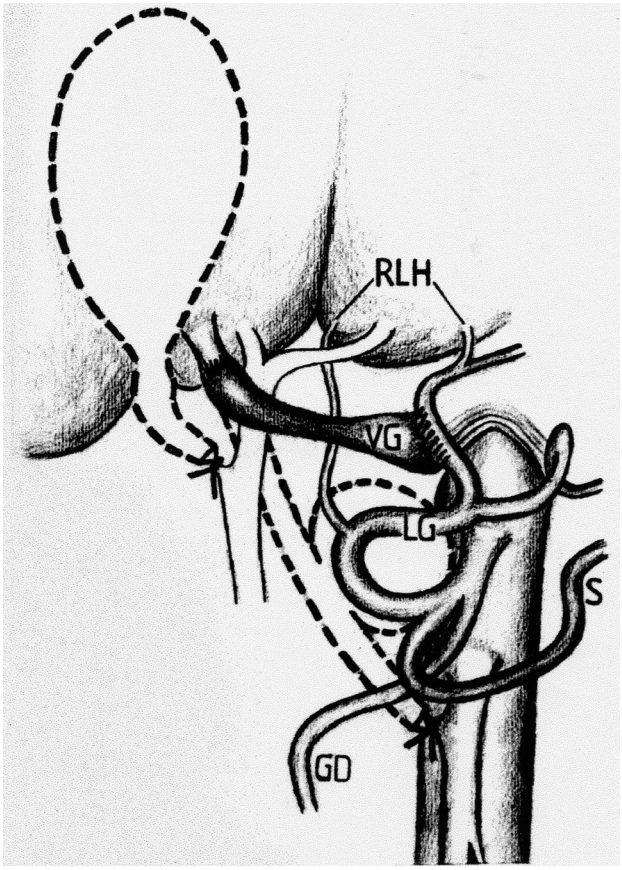

Fig. 2. The vascular reconstruction: Venous graft (VG), left gastric artery (LG), replaced left hepatic arteries (RLH), gastroduodenal artery (GD), splenic artery (S)

Postoperatively, 20.000 units of heparin daily over 5 days were given. Overlapping oral anticoagulation with acenocoumarol was started.

Results

Total time of hepatic arterial occlusion was 50 minutes. No blood transfusion was required. No rise of liver function parameters (daily serum bilirubin, alkaline phosphatase and serum glutamic oxaloacetic transaminase) was noted. A slight elevation of serum amylase up to 130 units (normal value less than 70) was noted, declining to normal limits by the fourth postoperative day. The postoperative course was uneventful. Histopathology revealed a non-calcified true arterial aneurysm with mural thrombus without signs of inflammation. One year after surgery oral anticoagulants were quit, a selective celiac arteriogram revealed patency of the venous graft with normal blood flow to the liver.

The author saw the patient six years and eight years after the operation. She had no abdominal complaints. Liver function tests were within normal limits and abdominal ultrasound revealed a patent graft with a diameter of 6 mm without aneurysmatic dilatation and a physiologic hepatic artery flow-spectrum (Fig. 3).

Discussion

The majority of hepatic artery aneurysms are extrahepatic and atherosclerotic in origin [33]. Mycotic aneu-

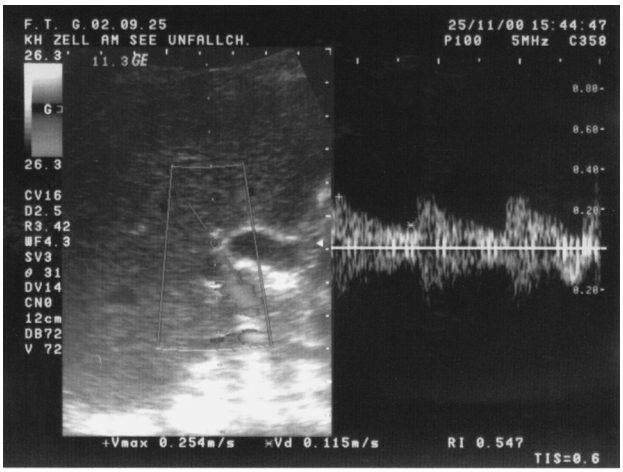

Fig. 3. Ultrasound of the liver (eight years after operation) shows a normal spectrogram and a normal Resistance-Index of the right hepatic artery

rysms following infective endocarditis [32] decrease in number, whereas posttraumatic false aneurysms resulting either from crush injury [33], a penetrating wound [13], a surgical procedure [14], ,liver transplantation [31] or following percutaneous transhepatic cholangiography or liver puncture [11, 37] become more frequent. Visceral artery aneurysms can also appear with cystic medial necrosis, necrotising vasculitis, Ehlers-Dahnlos syndrom, Marfan syndrome, Takayashu's arteritis [6,7] and panarteritis nodosa [2, 25].

Stanley et al. [33] viewed 162 cases, 75 % were extrahepatic, 63 % of them involved the common and proper hepatic, 28 % the right hepatic, 5 % the left hepatic and 4 % both hepatic arteries. Atherosclerotic aneurysms were almost entirely extrahepatic and 96 % of them found in the proper or common hepatic artery. The remaining 25 % were intrahepatic aneurysms, which were usually false aneurysms following vascular injury.

Hepatic artery aneurysmatic rupture into the peritoneal cavity results in hemoperitoneum and shock. Rupture may also present as a fistulation into the biliary tree, causing the classic three main features of hemobilia, namely gastrointestinal bleeding, biliary colic and jaundice [27]. Fistulation may occur in the portal vein and lead to portal hypertension [21] whereas penetration into the stomach or duodenum presents a rare source of gastrointestinal haemorrhage.

Most hepatic artery aneurysms are asymptomatic before rupture occurs. Some patients may complain about upper abdominal pain radiating to the back or symptoms mimicking cholelithiasis. Rarely a pulsating mass is palpable or a localized abdominal bruit can be ausculted.

A calcified rim on a plain abdominal x-ray in the upper quadrants should lead to suspicion of a visceral artery aneurysm [4, 33]. With the nowadays liberal use of abdominal ultrasound [23, 34] and CT scanning the diagnosis will be achieved more frequently.

In order to get exact information about the vascular architecture, the size and localisation of a suspected aneurysm and the adequacy of collateral circulation, selective visceral arteriography is mandatory.

Since the first description of a hepatic artery aneurysm in 1819 [38] and the first successful treatment in 1903, when Kehr [16] ligated and divided the common hepatic artery because of a ruptured right hepatic artery aneurysm communicating with the cystic duct, about 300 cases of hepatic artery aneurysms have been reported, with only about 60 of those successfully surgically treated [17]. Although occasionally even rupture into the peritoneal cavity [30, 33], the biliary tree [1, 9], the portal vein [21] or the gastrointestinal tract have been managed successfully, the majority of patients did not survive rupture or postoperative complications [2, 12, 36] and most of the time the diagnosis was revealed post mortem [8].

In the last decade the endovascular approach to visceral artery aneurysms has become safe. There are several reports about successful catheter embolisation or stenting [6, 7, 20, 28, 35]. However there is no larger series reporting on the complication rate and the long-term results of endovascular procedures. For intrahepatic aneurysms catheter embolisation is the therapy of choice.

There is agreement that an aneurysm-bearing common hepatic artery can be ligated when a patent gastroduodenal artery provides sufficient arterial flow to the liver [2, 33]. If the aneurysm involves the proper, the right or left hepatic artery or the whole hepatic arterial tree, blood flow to the liver must be restored after aneurysmatic elimination in order to avoid hepatic dysfunction or necrosis despite the fact that a great potential of early collateralisation exists.

For surgical hepatic artery aneurysm repair many techniques have been described including restorative endo-aneurysmorhaphy, excision and end-to-end anastomosis, splenohepatic anastomosis, interposition of a prosthetic graft [19] and interposition of autogenous saphenous vein performed with good results in the past three decades [5, 17, 18, 24, 29]. The aneurysm of the patient of the current study was repaired with autologous tissue. The interposition of saphenous vein could be performed without intraoperative complications. 8 years after the procedure the function of the venous graft is excellent.

Conclusion

This study demonstrates that a venous graft in the hilum of the liver may remain patent for eight years. Aneurysmatic dilatation of the graft has not occurred. The elective surgical repair of a right hepatic artery aneurysm can be performed safely, and with a good long-term outcome.

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