

Successful embolization assisted by covered stents for a pseudoaneurysm following pancreatic surgery

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Received: March 11, 2010 Revised: July 12, 2010

Accepted: July 19, 2010

Published online: September 27, 2010

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Key words: Covered stent; Hemorrhage; Pancreatic surgery; Hepatic artery; Pseudoaneurysm

Peer reviewer: John P Hoffman, MD, Department of Surgery, Fox Chase Cancer Center, 333 Cottman Avenue, Philadelphia, PA 19111, United States

Tanaka K, Ohigashi H, Takahashi H, Gotoh K, Yamada T, Miyashiro I, Yano M, Ishikawa O. Successful embolization assisted by covered stents for a pseudoaneurysm following pancreatic surgery. *World J Gastrointest Surg* 2010; 2(9): 295-298 Available from: URL: <http://www.wjgnet.com/1948-9366/full/v2/i9/295.htm> DOI: <http://dx.doi.org/10.4240/wjgs.v2.i9.295>

Abstract

Delayed intra-abdominal hemorrhage after pancreatic surgery is a potentially lethal complication. Transarterial coil embolization and/or the placing of an endovascular stent are minimally invasive and effective procedures. An artery that is extensively eroded and rendered friable due to operative skeletonization or postoperative inflammation sometimes contributes to delayed intra-abdominal hemorrhage or rebleeding after coil embolization. This report presents a case of successful management of postoperative hemorrhage in a 74-year-old Japanese male. He experienced bleeding from a pseudoaneurysm of the brittle hepatic artery following total pancreatectomy. Initially the pseudoaneurysm was successfully treated with covered coronary stent-grafts, but rebleeding occurred 1 mo later due to the brittleness of the artery. Rebleeding was definitively managed by the complete packing of the stent by coil embolization. He remains stable at 18 mo following the final embolization. A stent graft can be used for protecting a brittle artery to avoid injury by coil embolization.

INTRODUCTION

Perioperative mortality of pancreatic surgery has declined to between 0% and 5% due to advances in surgical techniques and critical care management^[1]. Delayed massive intra-abdominal hemorrhage is one of the most serious complications and occurs in 1% to 8% of all pancreatic resections and accounts for 11% to 38% of the overall mortality^[2-4]. Though transarterial embolization has been advocated as a minimally invasive treatment for a ruptured pseudoaneurysm with a high success rate, unsuccessful hemostasis or rebleeding after embolization are not rare^[5,6]. The artery is occasionally damaged by surgical skeletonization or postoperative inflammation due to an abdominal abscess or pancreatic leakage. An artery that is extensively eroded and rendered friable cannot withstand pressure from the packing of an aneurysm lumen using endovascular coils and the brittle arterial wall may prevent a successful hemostasis and lead to death resulting from uncontrollable bleeding. This report presents a case of a bleeding from a pseudoaneurysm of the hepatic artery. The pseudoaneurysm and friable common hepatic artery

were successfully treated with a covered coronary stent-graft, and then were definitively managed 1 mo later by the complete packing of the stent in order to treat a recurrence of bleeding.

CASE REPORT

A 74-year-old Japanese male presented with acute abdominal pain 10 mo after undergoing a total pancreatectomy for pancreatic adenocarcinoma. An intra-abdominal tumor was suspected. He was transferred to our hospital for further examination. Computed tomography revealed a narrow and irregular common hepatic artery and a 7.0 cm × 7.0 cm huge mass with no contrast extending into the ventral and cranial aspect of the constriction of the common hepatic artery (Figure 1). The diagnosis was a pseudoaneurysm arising at the common hepatic artery with no active bleeding. The following 6 d were uneventful, but he developed a melena and experienced a sudden drop of blood pressure on the 7th day. The patient was thought to have severe damage to the arterial wall because a digital subtraction angiogram revealed a pseudoaneurysm arising at the common hepatic artery (Figure 2A) and the arterial lumen was markedly irregular and enlarged. A balloon-expandable coronary stent-graft was placed in the common hepatic artery to avoid unsuccessful hemostasis with endovascular coils. A guide wire was advanced past the pseudoaneurysm and a 4 mm × 14 mm covered stent (Jostent Graft master, Abbott vascular) was deployed (Figure 2B). An additional stent-graft was considered because the extravasation of contrast medium from the proximal edge of the covered stent continued. A 3 mm × 19 mm covered stent (Jostent Graft master, Abbott vascular) was placed in the friable hepatic artery partly under lapping the first stent (Figure 2C and D). His blood pressure recovered and angiography confirmed that the two covered stents had arrested the hemorrhage in the common hepatic artery and preserved the blood flow to the liver (Figure 3). No liver damage, such as an elevation of glutamic oxaloacetic transaminase, glutamic pyruvic transaminase and total bilirubin, was seen after stent grafting.

One month later, he presented with melena and hemodynamic shock. Emergency angiography revealed a pseudoaneurysm arising at the bifurcation of the common hepatic artery and proper hepatic artery (Figure 4A). Therefore, the aneurysm was packed with micro coils (3 Trufill coils; Cordis Endovascular Systems, Johnson & Johnson). Additional coiling was performed in the proper hepatic artery, because extravasation of the guide wire occurred at the distal portion of the hepatic artery during the coiling procedures. The blood flow *via* the hepatic artery was blocked by Microcoil embolization (10 Trufill coils and 6 Diamond coils; Cordis Endovascular Systems, Johnson & Johnson) in the lumen of the covered stent because of the vulnerability of the proper hepatic artery and the strong possibility of rebleeding. An arteriogram confirmed the complete exclusion of the common hepatic artery, cessation of bleeding and blood flow to the liver *via* the anastomotic branch of the left gastric artery (accessory left gastric artery) (Figure 4B). There was no liver damage after arterial embolization.



Figure 1 Abdominal computed tomography. Narrowing of the common hepatic artery and a 7.0 cm × 7.0 cm huge mass with no contrast (arrowheads) extending into the ventral and cranial aspect of the constriction of the common hepatic artery (arrows).

The patient was thereafter discharged and remains stable at 18 mo following the final embolization.

DISCUSSION

Massive arterial bleeding can occur late in the postoperative course of patients undergoing hepatobiliary pancreatic surgery. Delayed bleeding occurs mainly due to a pseudoaneurysm of a major visceral arteries or gastroduodenal arterial stump^[6,7]. An urgent laparotomy to control bleeding is rarely successful due to the extensive inflammation, thus it has a high mortality rate and does not eliminate the risk of rebleeding^[8,9]. Alternatively, selective angiography and transarterial embolization is now considered the standard therapeutic management. Angiography enables the precise localization of the pseudoaneurysm, which allows selective microcoil embolization^[7]. The reported success rate of transarterial embolization for a visceral artery pseudoaneurysm is 63% to 100%, with a morbidity of 14% to 25% and a mortality of 0% to 14%^[6-8]. Either recanalization or rebleeding may occur in up to 37% of the patients^[5,6] and an interruption of the hepatic arterial flow is usually warranted for effective hemostasis^[7,9,10].

Recently, stent grafts have been employed for the treatment of pseudoaneurysms^[11-14]. This technique has the advantage of providing continued perfusion to the end-organ. Therefore, it seems to be safer to manage bleeding from the common hepatic artery after a pancreaticoduodenectomy by a stent graft rather than coil embolization especially when the collateral arteries cannot be confirmed.

The collateral arteries were available in the current case, and the patient was a candidate for embolization with coils. However, angiography showed an irregular and dilated arterial lumen which suggested the artery was extensively eroded and friable. Embolization with endovascular coils in a friable artery can consequently cause a rupture of the artery or subsequent rebleeding can occur after temporary hemostasis. In our hospital, incomplete hemostasis or rebleeding was experienced in cases who were treated by embolization with endovascular coils alone when irregular and enlarged artery or extravasation of the guide wire were

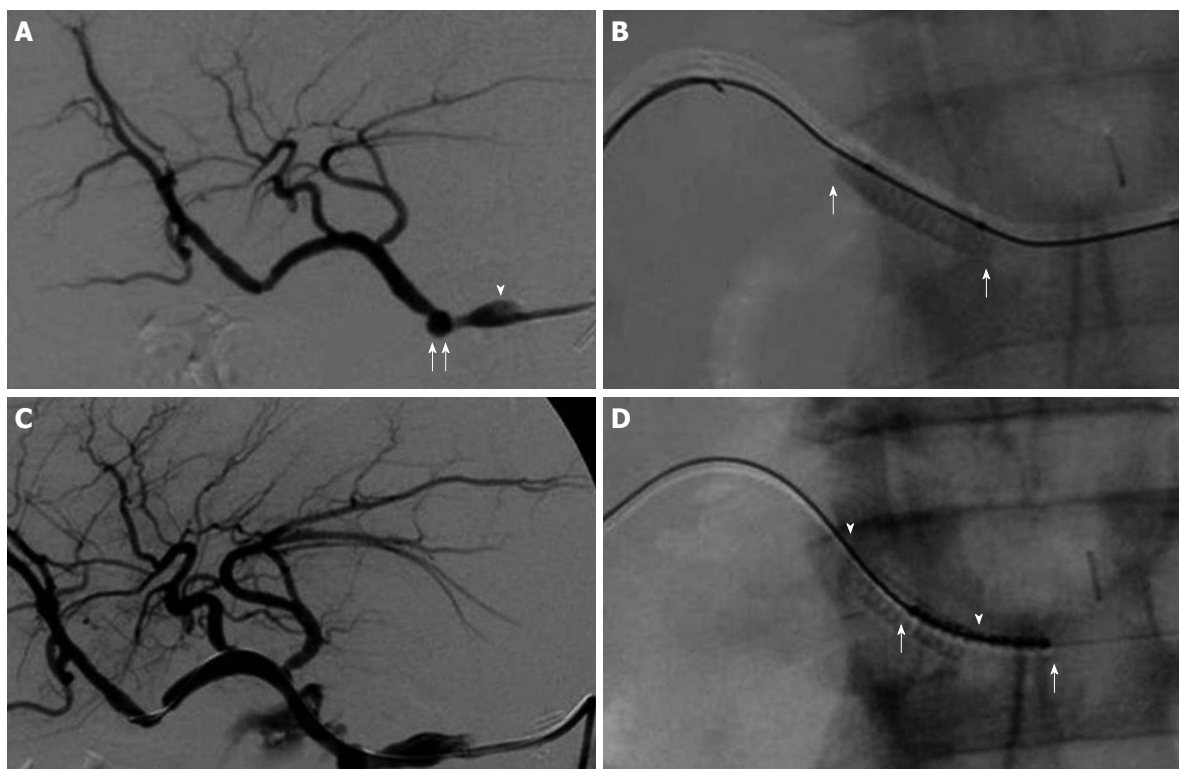


Figure 2 Placement of covered stent graft for pseudoaneurysm of common hepatic artery. A: Angiography revealed a pseudoaneurysm arising at the common hepatic artery (white arrows) and the dilated lumen of the common hepatic artery (arrowheads); B: A guide wire was advanced past the pseudoaneurysm and a 4 mm x 14 mm covered stent was deployed (arrows); C: Angiography revealed extravasation of contrast medium from the proximal edge of the covered stent (arrow). A dehiscence seemed to occur at the fragile arterial wall; D: An additional covered stent (arrows) was placed partly underlapping the first stent (black arrows).



Figure 3 Both hemostasis and blood flow to the liver was confirmed by angiography.

revealed by angiography. This case suggests that a stent may therefore be effective for protecting the fragile artery rather than for preserving the blood flow to the liver. The placement of stent-grafts following coiling should therefore be considered in some selected cases when the arterial wall appears to be fragile.

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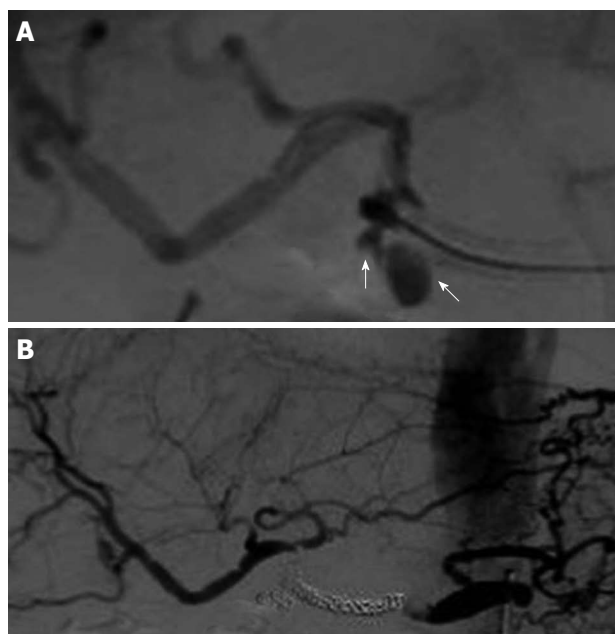


Figure 4 Microcoil embolization in the lumen of the covered stent. A: Angiography revealed a pseudoaneurysm in the proper hepatic artery at the distal edge of the covered stent (arrows); B: Arteriogram shows the complete exclusion of the common hepatic artery, complete cessation of bleeding and blood flow to the liver via the anastomotic branch of the left gastric artery.

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S- Editor Wang JL **L- Editor** Hughes D **E- Editor** Yang C