Clinics in Surgery

Case Report
Published: 13 Jun, 2019

Ischemic Jejunum Stricture: Lesson from Controlling Gastro Jejunostomy Bleeding by *Coli* Embolization after Pancreaticoduodenectomy: A Case Report and Literature Review

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Abstract

A 72-year-old female underwent pancreaticoduodenectomy for pancreatic carcinoma in Oct; 2016. The patient developed an episode of hemorrhage from the nasogastric tube at the first 24 h after surgery. Endoscopy failed to find the source of the bleeding. Emergency angiography showed an active bleeding site in jejunal side of gastrojejunostomy at 36 h after surgery. *Coli* embolization was performed to the branches of jejunal artery to save the life-threatening hemorrhage. After embolization, the patient experienced abdominal pain, fullness and weigh loss. The endoscopy and digestive tract iodine contrast showed severe stricture in the gastrojejunostomy, input segment as well as output segment. In the 50th day after embolization, the patient underwent surgical re-look procedure. In procedure, about 100 cm proximal jejunum was narrow severely without passing any food. Distance between gastrojejunal and Brown anastomosis was less than 5.0 cm. Another gastrojejunostomy was performed. The patient recovered smoothly and can eat ordinary diet in the 10th day after the second operation. The patient was in good condition and underwent no postoperative adjuvant therapy. Extensive liver metastasis was found at the 6th month after the second operation and she died 2 months later.

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Received Date: *29 Apr 2019*
Accepted Date: *07 Jun 2019*
Published Date: *13 Jun 2019*

Citation:
Wu W, Zhao L, Yu Y, Hu H, Liu X, Sun H. Ischemic Jejunum Stricture: Lesson from Controlling Gastro Jejunostomy Bleeding by Coli Embolization after Pancreaticoduodenectomy: A Case Report and Literature Review. Clin Surg. 2019; 4: 2471.

Introduction

Post-Pancreatectomy Hemorrhage (PPH) refers to an emergency situation in which bleeding from the surgical site accompanied by a drop in hemoglobin concentration of >3 g/dl with peripheral circulatory impairment requiring medical intervention. If the hemorrhage occurs <24 h after surgery, it is classified as early PPH, and if >24 h, it is late PPH [1]. PPH is closely associated with morbidity and mortality, and often need further preserve, interventional or even surgical treatment [2,3]. In recent years, interventional radiology has become the first-line in controlling PPH and is associated with a significant reduction in PPH-associated mortality [4,5]. Literatures about PPH mainly focus on the late stage, especially the delayed PPH arising from pseudoaneurysm of the gastro duodenal artery stump or pancreatic jejunal anastomosis [6-8]. Early PPH is rarely reported. Here we report a case of early PPH that was controlled by Transcatheter Arterial Embolization (TAE). The point of the importance in this case is that the bleeding was from gastrojejunal anastomosis, which was seldom concerned after pancreatectomy by clinicians. More important, after coil embolization of branches in jejunal artery, the life-threatening hemorrhage was controlled successfully. However, the occurrence of a long stricture in ischemic jejunum led to the patient underwent second-look operation 50 days after *coli* embolization and hence, lost the opportunity of adjuvant chemotherapy.

Case Presentation

A 72-year-old female underwent pancreaticoduodenectomy as an initial treatment for pancreatic carcinoma in Oct, 2016. The tumor was 3.0 cm in diameter and located in the head of pancreas. Whipple' operation was performed and in the procedure, gastrojejunostomy was stapled. The nasogastric tube was placed at input segment of jejunum. Histopathological examination showed moderate differentiation adenocarcinoma infiltrating to bile duct. There was 2/15 regional lymph nodes showed positive and all margins, including retroperitoneal margin

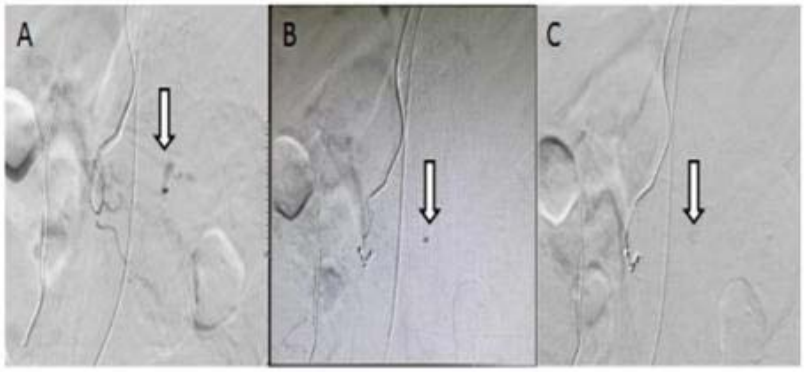

Figure 1: A) Selective angiography of superior mesenteric artery showed an active bleeding sign in branches of jejunal artery and the source located in the jejunal side of the gastrointestinal anastomosis (white arrowed). **B)** After *Coli* embolism the main branches of jejunal artery, the bleeding decreased but not disappeared because of the collateral vessels (white arrowed). **C)** The bleeding disappeared completely after the *coli* embolization of the collateral vessels (white arrowed).

Figure 2: Gastro scope examination revealed that gastrojejunostomy: **A)** The input segment, **B)** As well as output segment, **C)** Were severe stricture.

were histopathological negative. The pathological stage of the tumor defined as T2 N1 M0. After surgery, there was slow but continuous blood drain aged from nasogastric tube, but the patient showed stable pulse and blood pressure. The clinical impression of the bleeding was from gastrojejunostomy. However, at 20 h after surgery, the patient suddenly felt itchy and difficulty in breathing. There was lots of erythema in her sin when she was infused with ribonucleic acid for injection, an agent that is capable of anti-tumor effect. Monitor showed accelerated heart rate and hypotension. Allergic shocked was diagnosed and adrenaline was injected subcutaneously and other rescue measures were also performed simultaneously. The general condition turned to be better, whereas, the blood in nasogastric tube increased and reached to 1200 ml at 24 h after surgery. More unfortunately, the patients experienced sudden atrial fibrillation and the heart rate reached to 180 to 200 times/min. The preserved therapy was continue, including octapeptide vasopressin pumping in and blood infusion; however, the drain aged bloody fluid increased gradually. The hemodynamics couldn't keep stable. Endoscopist failed to find bleeding site under endoscopy. In the 36 h postoperatively and after 8 units of packed RBC infusion, an emergency angiography using standard Seldinger technique performed. A selective superior mesenteric artery angiogram showed that there was an active bleeding sign in branches of jejunal artery (Figure 1). The source located in the jejunal side of the gastrointestinal anastomosis, but the proximal artery was rather slim and difficult to select the terminal vessel. Finally, *coli* were applied to embolism the main branches of jejunal artery and its collateral vessels. The hemorrhage was stopped, whereas the regional blood supply to jejunum near the anastomosis also disappeared completely. After TAE, the general condition became better and the hemodynamic turned to be stable. Except for slight to mild abdominal pain between xiphoid and umbilical, the patient recovered smoothly and could eat half-flow food when she discharged 15 days after embolization. Ten days later, she returned to hospital for erythema happened again in her whole body. She was diagnosed as Henoch-Schonlein Purpura and received anti-allergic medicine in no time. The erythema disappeared quickly; however, she felt abdominal pain, fullness, and nausea and weight loss. Gastro scope examination showed that gastrojejunostomy, the input segment as well as output segment was severe stricture (Figure 2). Meanwhile, linear stricture also demonstrated in same place by digestive tract iodine contrast (Figure 3). Conservative therapy, including gastric lavage (warm saline water, 250 ml/time, twice a day), complete parenteral nutrition, was used to improve her general condition. One week later, the second-look of the digestive tract iodine contrast also showed linear stricture in the input and output jejunal segment, which was no any visible change compared to that in the first time. It was organic stricture and need reconstruct the digestive tract. Unfortunately, pneumothorax occurred when she underwent deep vein catheterization from right subclavian vein. We had to wait a long time until the effective ventilation of her right lung. In the 50th day after embolization, the patient's general condition and nutrition status was better enough, so she underwent the second surgical procedure. In procedure, we found that proximal jejunum, including gastrojejunal anastomosis; the whole input segment, and output segment between gastrojejunal anastomosis and Brown anastomosis, as well as the corresponding mesangial, were contracture severely.

Figure 3: Linear narrows have been demonstrated by digestive tract iodine contrast.

The jejunum looked pale, less glossy, lack of vitality. The jejunal wall was thicker a lot than normal, and the cavity became severe narrow so that no any food could pass through, even water. Pulse in mesangial can hardly touch. Distance between gastrojejunal and Brown anastomosis was less than 5.0 cm, this was only 1/4 to 1/3 of the usual distance in the Whipple operation (Figure 4). About 5.0 cm adjacent to the gastrojejunal anastomosis, another gastrojejunostomy was performed. Operation lasted for 2 h. The patient recovered smoothly and discharged at 10th day after the second operation. She could eat ordinary diet and felt no uncomfortable at her discharge. She was in good condition and underwent no postoperative adjuvant therapy. However, extensive liver metastasis was found at the 6th month after the second operation and she died 2 months later.

Discussion

Incidence of early PPH was about 1.1% to 1.9%, in which bleeding from gastric jejunostomy is a common reason [9,10]. Preserve treatment, including hemostatic drugs and blood infusion, often used firstly and be effective in some patients with slight or mild hemorrhage. Emergency endoscopic hemostasis provides a new way to control hemorrhage. Endoscopist can choose clamp, electrocoagluation hemostasis, local injection of epinephrine or sclerotherapy agents, or spraying specific hemostasis agents to control bleeding [11,12]. However, if the hemorrhage is surging or hidden, endoscopy may often fail to identify the site of bleeding. Furthermore, unidentified local therapy or other gastric disease, such as erosive gastritis, can be dangerously misleading and result in a delayed intervention, and even death. In this case, endoscopy failed to find the bleeding origin, so that could not to give any treatment locally. Surgical procedure was once the first and best choice to control hemorrhage in the last decades after pancreaticoduodenectomy. For the huge trauma and high mortality, the surgical re-intervention rate decreased significantly in these years. Meanwhile, the radiology intervention, with the advantage of immediate arteriography to identify the site of bleeding and subsequent treatment, became the first-line therapy gradually. Though TAE and stent placement showed a significant successful rate to control massive hemorrhage and a reduction of morality and mortality, the insufficient and damage should not be neglected [13,14]. Hemorrhage from artery with a big diameter, such as pseudo aneurysms in gastro duodenal artery, common or proper hepatic artery, are better indication for stent placement. However, for artery with small diameter, super selective angiography is often difficult or even impossible. Occlusion by TAE sometimes causes

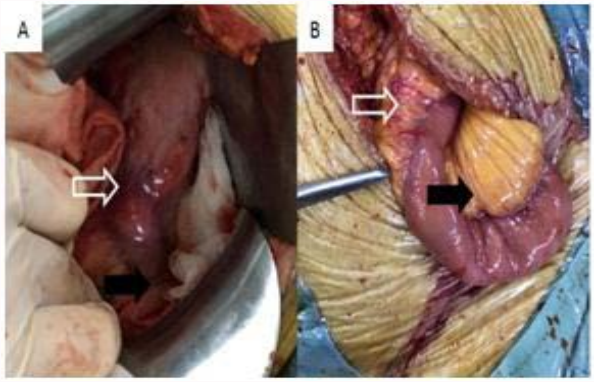

Figure 4: Proximal jejunum, including gastrojejunal anastomosis, the whole input segment, and output segment between gastrojejunal anastomosis and Brown anastomosis, as well as the corresponding mesangial, were contracture severely. Distance between gastrojejunal and Brown anastomosis was less than 5.0 cm. **A)** Gastrojejunal anastomosis (white arrowed) and Brown anastomosis (black arrowed). **B)** Contracture mesangial (white arrowed) and normal mesangial (black arrowed).

distal end-organ damage, even though bleeding has been controlled. In this case, angiography identified the bleeding site was in a certain branch of jejunal artery. It was a terminal vessel with a small diameter in which stent placement was complete impossible. TAE seemed the only method to control bleeding. Selective TAE is often successful in controlling hemorrhage from branches of celiac stump and don't lead to infraction, because liver, spleen or stomach have rich collateral circulation and better tolerance to ischemia [13-15]. Whereas, if the bleeding origins from the superior mensteric artery, it may be extremely difficult or even impossible to preserve mesenteric arterial flow, even though successful outcomes was once reported [16]. Jejunum is supplied from straight vessels, which are terminal branch of jejunal artery and lack of collateral circulation. The bowel is easily developed to ischemia when occlusion occurs in superior mensteric artery and/or its branches. In one hand, the anatomic position changed striking after operation because jejunum is often cut and sewn with other organs. In the other hand, after massive blood loss, the end-artery would be spasm or contraction. In this situation, it is very difficult to adopt super selective angiography. If the vessel is occlusion suddenly, the supplied bowel would inevitably be ischemia, leading to acute perforation or chronic bowel stricture. In this case, angiography demonstrated a visible bleeding point, which was in the jejunal side and near to gastrojejunal anastomosis. However, the superfine catheter could not reach close to the site. Meanwhile, there was a fine collateral vessel also gave blood supply to the bleeding. The radiologist had to embolism branches of jejuna artery in emergency situation. The bleeding was controlled successfully, whereas, blood supply to regional jejunum disappeared under angiography. The outcome is disappointed. Due to severe ischemia, about 100 cm jejunum was in linear narrow without passing any food. The patient experienced sustained epigastric pain, weight loss and re-look surgery. This is a painful lesion. Firstly, jejunum can't tolerate complete arterial embolization because of its insufficient collateral pathways. Secondly, in emergency situation, absorbable embolic agent, such as gelatin sponge, but not *coli*, is better to embolism branches of super mesenteric artery because the former can be absorbed and the blood supply may be restored in some days after embolization. How to prevent bleeding from gastrojejunal anastomosis and which is better in decreasing bleeding? Hand-sewn or stapled? This is also in controversial [17- 19]. As we known, technical defect in sewing is

the main reason contributing to the hemorrhage in early stage. Tight or loose of ligation by hand-sewn often lead to local bleeding. Stapler may be avoiding this status. However, instrument compression, over or under pressure in stapling, or excessive tissue under tubular stapler, may often bring about tissue injury and bleeding. Furthermore, tissue edema and vessels around anastomosis edge also easily lead to vascular injury. Hence, either hand-sewn or stapled has merits and drawbacks; the simple but feasible way to avoid hemorrhage is to inspect the anastomosis by finger or a piece of white gauze. If blood stains exist, measures should be taken to stop the bleeding. For us, an over-sewn to the anastomosis after stapler is generally performed to eliminate hidden bleeding point.

Conclusion

Bleeding from gastrojejunal anastomosis is a common reason in early PPH. *Coli* embolization is not recommended because it maybe leads to jejunal ischemia.

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