Case Report

The First Successful Laparoscopic Whipple Procedure at Hat Yai Hospital: Surgical Technique and a Case Report

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Whipple procedure is the most complex abdominal surgical procedure to treat periampullary carcinoma. With the benefit of minimally invasive approach, many institutes attempt to do Whipple procedure laparoscopically. However, only 146 cases of laparoscopic Whipple procedure have yet been reported in the literature worldwide between 1994 and 2008. The authors reported the first laparoscopic Whipple procedure at Hat Yai Hospital in December 2009. The patient was a 40-year-old, Thai-Muslim female, with the diagnosis of ampullary carcinoma. The operating time was 685 minutes. The patient was discharged on postoperative day 14 without serious complication. The surgical technique and postoperative progress of the patient were described.

Keywords: *Laparoscopic Whipple procedure, Pancreaticoduodenectomy, Periampullary carcinoma*

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Whipple procedure, or pancreaticoduodenectomy, is a complex surgical procedure to treat periampullary lesions. It is considered the most challenging procedure for minimally invasive surgeons. Recently, the first laparoscopic Whipple operation was successfully performed at Hat Yai Hospital, to treat ampullary carcinoma. The case and procedure was reported herein.

Case Report

The patient was a 40-year-old, Thai-Muslim female, who presented with progressive jaundice. Her initial blood work showed total bilirubin of 32.1 mg/dl with direct bilirubin 10.8 mg/dl, and CA 19-9 111.8 u/ml. She underwent Endoscopic Retrograde Cholangio Pancreatography (ERCP), which revealed an obstructing tumor at the ampulla of Vater as shown in Fig. 1. Papillotomy and biopsy were done and a biliary stent was placed. Subsequent histopathology reported adenocarcinoma. She was scheduled for exploration 3 weeks later, at which time her total bilirubin was 1.8 mg/dl with direct bilirubin 0.8 mg/dl.

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Surgical Technique

Position and ports

The modified lithotomy with reverse Trendelenburg position was applied with thigh parallel to the ground. The operating surgeon and the assistant surgeon stood on each side of the patient but could be alternated during the operation. The

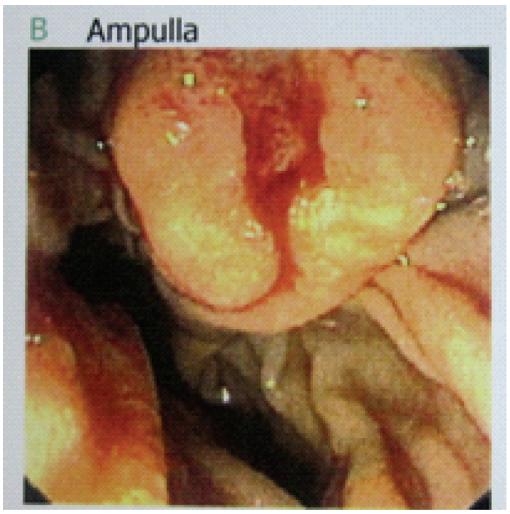

Fig. 1 Tumor at ampulla of Vater

camera surgeon stood between the legs of the patient. The port positions are demonstrated in Fig 2.

The procedure began with resection and followed by reconstruction part.

Resection

1. The lesser sac was entered and pancreatic head and body exposed using ultrasonic dissector (Autosonix®).

2. Kocherization was done and duodeno-jejunal flexure was mobilized. Pancreatic neck was dissected to assess for resectability.

3. The first part of the duodenum was divided using endolinear cutter (Endo-GIA® Linear cutter), just distal to the pyloric ring.

4. The duodenojejunal flexure was mobilized and divided using endolinear cutter (Endo-GIA® Linear cutter).

5. Pancreatic neck was cut using Autosonix® and Ligasure to stop bleeding as revealed in Fig. 3.

6. Uncinate process was dissected from retro peritoneum.

7. Common bile duct was cut just above pancreatic border to leave adequate length for anastomosis. Gallbladder was removed in this step.

Then specimen was completely separated from surrounding organs.

Reconstruction

1. Pancreaticogastrostomy was constructed intra-corporeally with duct togastric mucosa technique. A 5-F drainage tube was used to stent the anastomosis as shown in Fig. 4. It was secured with 3-0 polygalactin (Vicryl®) suture.

2. Distal jejunum was passed to the supracolic compartment under the root of mesentery (retrocolic) for anastomosis.

3. The end of common bile duct was trimmed freshly and an end-to-side choledochojejunostomy was performed over 14-gauge drain tube with single layer interrupted 3-0 polygalactin (Vicryl®) suture using duct to mucosa technique.

4. Penrose tube drains were placed, one in the Morrison's pouch and one at the pancreatico-gastrostomy anastomosis.

5. The left subcostal port was then removed and the incision was extended about 6-7 cm to remove the specimen. Side-to-side gastrojejunostomy was done using GIA™ staple through this incision.

The complete reconstruction is shown in Fig. 5.

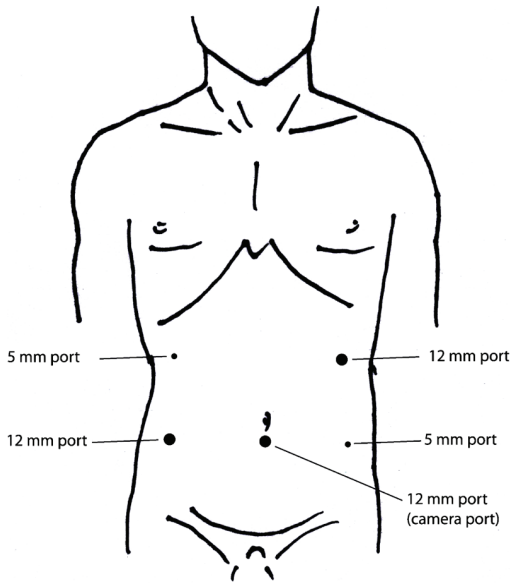

Fig. 2 Port positions

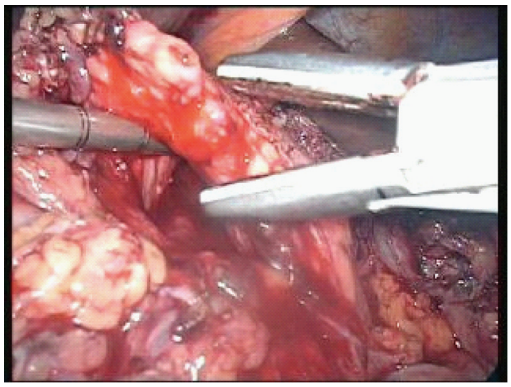

Fig. 3 Neck of pancreas and superior mesenteric vein below

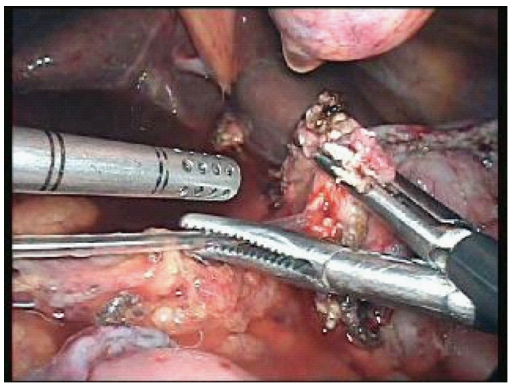

Fig. 4 Cannulation of pancreatic duct with 5-French stent

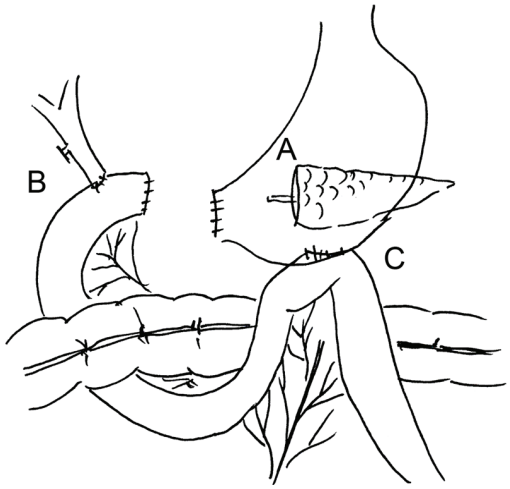

Fig. 5 Diagram of reconstruction
A: Pancreaticogastrostomy
B: Choledochojejunostomy
C: Gastrojejunostomy

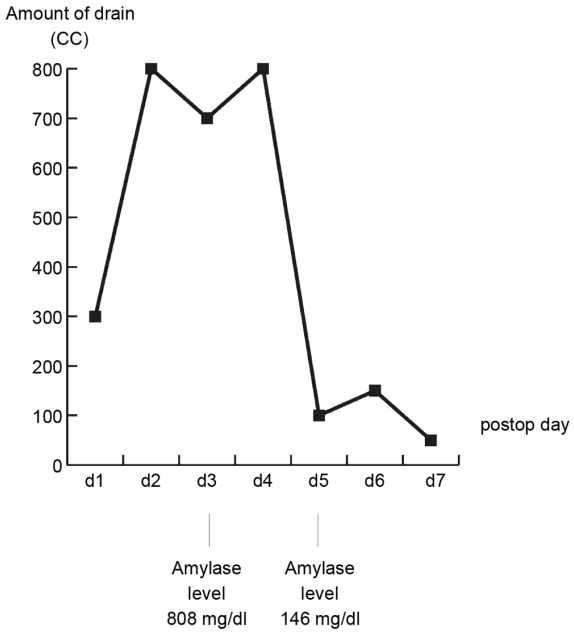

Fig. 6 Amount of drainage (ml) per day

The operation was performed at Hat Yai Hospital in December 2009. The operating time was 685 minutes. The intraoperative blood loss was 800 ml with no intraoperative blood transfusion. At intensive care unit, she required intravenous morphrine drip for the first 3 days postoperatively with pain score between 2 to 5 out of 10. Amount of drainage and amylase level is demonstrated in Fig. 6. The left intercostal drainage was performed on day 5 due to increasing pleural effusion, and then removed on day 8 postoperatively, as well the nasogastric tube. The respirator was weaned off on day 7, while the low-grade fever, of 37.4 to 38.2°C, appeared in the first 7 days, postoperatively.

Afterward the patient was transferred to the regular ward, and thereafter the fever of 38.5 to 38.8°C was developed in postoperative day 10 to day 11, owing to peripheral thrombophlebitis. The fever was resolved after changing the site of the catheter, and the patient was eventually discharged in the next few days. Pathologic examination showed well-differentiated adenocarcinoma of common bile duct, and located within duodenal wall with free margins. The general condition of the patient had been keeping well. The abdominal wounds at the third postoperative week were satisfactory, as shown in Fig. 7.

Discussion

Whipple procedure remains a standard surgical procedure for ampullary carcinoma[1]. Since the first laparoscopic cholecystectomy in 1989, minimally invasive surgery has become the alternative approach to conventional open surgery in many abdominal procedures[2]. In early laparoscopic years, most surgeons used only diagnostic laparoscopy to evaluate periampullary malignancies or staging pancreatic cancer[3]. With the benefit of minimal invasive surgery and new advances in technology and instrumentation, some surgeons began to apply it to more sophisticated procedures such as Whipple procedure[4]. Gagner and Pomp reported the first laparoscopic Whipple procedure in 1994[5]. However,

Fig. 7 The abdomen wounds at 3-week follow-up

because of the technical difficulty, not many laparoscopic Whipple procedures were performed. There have been only 146 laparoscopic Whipple procedures published between 1994 and 2008[6].

In Thailand, although open Whipple procedure has been performed with good results[7,8], there has been no report thus far on minimally invasive approach to this procedure. The present report presented the first laparoscopic Whipple successfully performed in December 2009 at Hat Yai Hospital. Although the operative time of the case was longer, compared to the other study, however, the length of hospital stay was comparable or shorter[6,9]. The patient did not require blood transfusion during the operation. Postoperatively, the patient needed narcotic analgesia intravenous drip for 3 days with acceptable pain score between 2 to 5 out of 10.

Two of the authors (AK and JB) previously gained additional experiences, observing Whipple procedure performed with the daVinci Robotic System at the Valley Institute for Robotic and Minimally Invasive Surgery, the Valley Hospital in Ridgewood, New Jersey, USA. The involvement helped the authors to design the surgical procedure, especially the reconstructive part [10]. The pancreaticogastrostomy was used because of closer anatomy and ease to perform. Several prospective randomized trials showed no difference in leakage and fistula rate between pancreaticogastrostomy and pancreatico jejunostomy[11-13]. The duct to mucosa technique was utilized for both pancreaticogastrostomy and hepaticojejunostomy. Such a technique showed low or at least the same rate of leakage compared to the conventional method[14,15]. A large amount of drainage was observed in the first 4 days, but gradually decreased by day 7 postoperatively. Decreasing amylase level in drainage fluid in a few days suggested no anastomotic leakage[16].

Two major concerns that anticipate early adoption of laparoscopic Whipple comprised of the difficult surgical technique, resulting in a long operative time, as well the oncologic question about the adequacy of the laparoscopic operation[4,17].

To shorten the learning curve of laparoscopic approach, the hand-assisted hybrid technique had been used with favorable results. Recently, robotic Whipple using the da Vinci System has also been shown to be feasible and efficient[18].

For oncologic concern, the procedure was performed using the same principles as the open surgery, including en bloc resection of tumor with adequate margins. The extensive node dissection had not been performed according to the rate of lymph node metastasis has been low in ampullary cancer[19] and has not prolonged the patient survival[6]. The additional benefit of minimally invasive procedure is it can keep the normal immune defense mechanism better than the open approach, and that may be one of the important advantages toward the cancer patients[20]. In conclusion**,** laparoscopic Whipple represents one of the most advanced laparoscopic procedures. It is a technically challenging operation. In selected patients and good planning, it is safe and feasible with acceptable results.

Acknowledgement

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ความสำเร็จของการผ่าตัด Whipple ผ่านกล้องรายแรก ณ โรงพยาบาลหาดใหญ่: เทคนิคการผ่าตัดและรายงานผู้ป่วย 1 ราย

อารยะ ไข่มุกด์, จุมพต บ่อเกิด, ศักดา อัลภาชน์

การผ่าตัด Whipple เป็นการผ่าตัดในช่องท้องที่มีความซับซ้อนมากที่สุด ในการรักษามะเร็งของบริเวณรอบรูเปิดท่อน้ำดีจากประโยชน์ของการผ่าตัดแบบบาดเจ็บน้อย ทำให้มีหลายสถาบันพยายามทำการผ่าตัด Whipple ผ่านทางกล้อง อย่างไรก็ตามมีรายงานการผ่าตัดผู้ป่วยด้วยวิธี Whipple ผ่านทางกล้องจำนวน 146 คน ทั่วโลกเท่านั้น ในช่วงตั้งแต่ปี พ.ศ. 2537 ถึง พ.ศ. 2551 ผู้นิพนธ์รายงานผู้ป่วยหญิงไทยมุสลิมอายุ 40 ปี เป็นผู้ป่วยมะเร็งบริเวณรอบรูเปิดท่อน้ำดี การผ่าตัดใช้เวลา 685 นาที ผู้ป่วยสามารถกลับบ้านได้ในวันที่ 14 หลังผ่าตัดโดยไม่มีภาวะแทรกซ้อนรุนแรง เทคนิคการผ่าตัด และการเปลี่ยนแปลงของผู้ป่วยหลังผ่าตัดได้อธิบายไว้ในรายงาน