Single Incision Laparoscopic Pancreas Resection for Pancreatic Metastasis of Renal Cell Carcinoma

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ABSTRACT

Background: Transumbilical single incision laparoscopic surgery (SILS) offers excellent cosmetic results and may be associated with decreased postoperative pain, reduced need for analgesia, and thus accelerated recovery. Herein, we report the first transumbilical single incision laparoscopic pancreatectomy case in a patient who had renal cell cancer metastasis on her pancreatic corpus and tail.

Methods: A 59-year-old female who had metastatic lesions on her pancreas underwent laparoscopic subtotal pancreatectomy through a 2-cm umbilical incision.

Results: Single incision pancreatectomy was performed with a special port (SILS port) and articulated equipment. The procedure lasted 330 minutes. Estimated blood loss was 100mL. No perioperative complications occurred. The patient was discharged on the seventh postoperative day with a low-volume (20mL/day) pancreatic fistula that ceased spontaneously. Pathology result of the specimen was renal cell cancer metastases.

Conclusion: This is the first reported SILS pancreatectomy case, demonstrating that even advanced surgical procedures can be performed using the SILS technique in well-experienced centers. Transumbilical single incision laparoscopic pancreatectomy is feasible and can be performed safely in experienced centers. SILS may improve cosmetic results and allow accelerated recovery for patients even with malignancy requiring advanced laparoscopic interventions.

Key Words: Single incision, Pancreas, Resection.

INTRODUCTION

Pancreatic surgery is an extremely challenging field, and the management of pancreatic diseases continues to evolve. The application of laparoscopic surgery for the treatment of pancreatic diseases is only recently gaining widespread popularity, owing, in no small part, to the retroperitoneal location of the pancreas. Studies involving small numbers of patients suggest that it is as safe as open surgery, with the additional advantages of a shorter hospital stay and a faster return to normal activity.1 Although the laparoscopic approach decreases surgical morbidity, it still requires 3 to 4 incisions each at least 1cm to 2cm in length. In addition, each working trocar has morbidity risks of bleeding, hernia, visceral organ damage, or all of these, and incrementally decreases cosmesis.2,3 Improvement of a new minimally invasive technique called “single incision laparoscopic surgery” (SILS), which is less invasive than standard multiport laparoscopy, is a challenging idea. SILS has several unique difficulties for the laparoscopic surgeon. First, triangulation and retraction are significantly limited. The introduction of a camera and several instruments parallel to each other results in decreased range of motion and “clashing” of instruments. This decreased freedom of motion increases the technical complexity of the operation and results in a significant learning curve for performing SILS. Critics also mention the need for new and specialized instrumentation, thereby increasing the cost of the operation.4 We are the team that performed the first SILS splenectomy, and we now present the first SILS subtotal pancreatectomy case.

CASE REPORT

A 59-year-old woman was admitted to our clinic for abdominal pain. In her medical history, she had previously undergone a left radical nephrectomy for clear cell renal cancer 11 years earlier. Laboratory tests were totally normal including the tumor markers CEA and CA 19-9. Ultra-
sonography (US) revealed 2 hypodense lesions in the corpus and the tail of the pancreas. A computerized tomography (CT) scan of the abdomen revealed 2 hypervascular lesions, 30mm x 22mm in the body and 15mm x 14mm in the tail of the pancreas (Figure 1). In addition, positron emission tomography also revealed pancreatic involvement, increasing the suspicion of malignancy in the pancreas. Because splenectomy would be added to pancreas resection, the patient was vaccinated against pneumococci (Pneumovax 23, Boehringer) 2 weeks before the operation, and received 1g of sulbactam/ampicillin intravenously as a preoperative prophylaxis. The patient was informed about the details of the surgical procedure, and informed consent was obtained.

Surgical Technique

The patient was placed in a supine and reverse Trendelenburg position (30 degree) with open legs. The surgeon stood between the legs; the first assistant was on the left side of the patient with the monitor placed on the patient’s cranial side. With the patient under general anesthesia, a completely transumbilical 2-cm skin incision was performed. A special SILS port having 4 working channels was placed through this abdominal incision of the umbilicus. Pneumoperitoneum was applied through this port. After the maintenance of 12mm Hg CO₂ pneumoperitoneum, the three 5-mm cannulas were inserted inside this special SILS port (Figure 2). We used a rigid 30-degree, 5-mm laparoscope, and 2 standard rigid but articulating 5-mm laparoscopic instruments for all SILS procedures. Once the laparoscope, grasper, and dissector were placed, the overall procedures were similar to the procedures performed in a 5-port laparoscopic pancreatectomy. The most difficult part of this technique was that the working instruments were crossing each other and roticulated. The 5-mm telescope is introduced under both of the working instruments and sometimes over them, changing according to the surgical step of the procedure. After less invasive entry into the abdomen, nothing different from the multi-trocar laparoscopic pancreatectomy technique was performed. During all these steps, at least one of the pieces of equipment, roticulated grasper and dissector, was used. Following a diagnostic laparoscopy, the lesser sac was entered by dividing the gastrocolic ligament using the advanced LigaSure probe (Valleylab, Boulder, CO, USA). The whole pancreatic body and tail were exposed, and the 2-cm lesion on the corpus was defined. Before starting pancreatic dissection, we placed a loop encircling the stomach corpus by crossing the lesser curvature and greater curvature for preoperative continuous retraction. We prepared the loop by using polypropylene suture covered with a plastic tube of IV serum set to prevent a possible stomach injury. Two tips of this suture were taken out of the abdominal cavity with a suture passer placed under the xiphoid process. During the entire procedure, stomach retraction was provided with this tensed loop Prolene securing the stomach. The “medial-to-lateral” technique for tumors in the body and proximal tail of the pancreas was the chosen method. The peritoneal lining along the inferior edge of the pancreas was dissected at the point where transection of the pancreas would be carried. An adequate window was created; a roticulated grasper was passed around the body of the
The splenic vein was identified and ligated with LigaSure at this level (Figure 3). One of the 5-mm trocar sites on a Simport device was replaced by a 15-mm trocar to be able to introduce a linear stapler. The pancreas was then transected by using two 45-mm Endo-GIA staplers (US Surgical Corp, Norwalk, CT, USA) (Figure 4). Dissection of the pancreas from the pancreatic bed was started after ligation of the splenic artery near the celiac trunk. Dissection was carried out in a medial-to-lateral fashion from the tail towards the hilum of the spleen. Retroperitoneal dissection took time because of dense fibrosis of the region caused by a previous left nephrectomy. In this manner, the distal portion of the pancreas containing the tumor was removed together with splenic vessels and the spleen itself and its retroperitoneal attachments and thus freed. Once the distal pancreas was mobilized, the stapled closure of the proximal pancreatic stump was reinforced with fibrin glue. The splenic part of the specimen was retrieved using the Endo-Catch 15 (US Surgical Corp, Norwalk, CT, USA) by morcellation, and then, the pancreatic part of the specimen was delivered through the umbilical port site as an intact piece. A closed suction drain was placed in the lesser sac. The umbilical site was sutured with 0 polypropylene, and the skin was closed with a stapler (Figure 5).

**Postoperative Period**

The patient started oral intake at the sixth postoperative hour. She had a low-volume (20mL/day) pancreatic fistula, for 35 days that ceased spontaneously with only a drain. She was discharged on the seventh postoperative day with her drain. Pathology results revealed the 2 foci of clear cell type renal cell cancer metastases in pancreatic tissue. Surgical margins were clear 1.5cm away from the tumor. During the 2-month follow-up, we did not identify any complications from the surgical procedure.

**DISCUSSION**

The laparoscopy revolution in the early 1990s changed standard procedures in the treatment of human diseases. Surgeons aimed at limiting the number of ab-
dominal incisions (as in SILS) or eliminating them completely (as in natural orifice transluminal endoscopic surgery [NOTES]). The first attempts at single-incision laparoscopic cholecystectomy were performed by Navarra et al (1997) and Piskun & Rajpal (1999). A single incision was made through the umbilicus and two trocars or ports were inserted through the opening with a bridge of fascia (soft connective tissue) between them. In addition, recent reports of single incision donor nephrectomies and other urologic applications have been described, as well as single incision sleeve gastrectomies for morbid obesity. SILS poses unique challenges for the laparoscopic surgeon. First, triangulation and retraction are significantly limited. The introduction of a camera and several instruments parallel to each other results in decreased range of motion and “clashing” of instruments. This decreased freedom of motion increases the technical complexity of the operation and results in a significant learning curve for performing SILS.

Laparoscopic distal pancreatectomy is an acceptable treatment option for most benign and indolent tumors located in the body or tail of the gland, but the current techniques describe transection of the pancreas at the region of the body regardless of the actual location of the tumor. The advantage of a more proximal transection is that the splenic vessels have not branched considerably at this point, and there is theoretically a lower risk of hemorrhage from small splenic branches. The disadvantage of such a proximal transection, however, is that for very distal lesions, a large amount of normal pancreatic tissue must be sacrificed. In this case, due to 2 suspected tumoral foci, we performed a subtotal pancreas resection including splenectomy. Although this patient had previously undergone a nephrectomy, we were able to perform a SILS pancreatectomy. This may mean that technically a surgical procedure could be easier and shorter in undo cases.

Today, single incision is becoming popular and serves both for the less minimally invasive procedure wishes of surgeons and the more cosmesis requests of patients. As clinical experience with SILS increases, it is imperative that we critically evaluate important questions: First, does SILS compromise on current standards of surgical care? Second, are the true benefits of SILS restricted to only improved cosmesis, or are there benefits with respect to convalescence and postoperative recovery? And third, can advanced procedures be performed with this technique.

The major problem with the SILS technique is that all instruments are closely packed together; clashing of instruments and the laparoscope is common. SILS has a unique learning curve, principally in navigating the instruments within a limited range of motion and it requires significant coordination between the surgeon and the camera holder. The surgeon also has to be adapted to counterintuitive movements due to frequent crossing of the instrument shafts at the point of entry into the abdominal cavity. Other than nephrectomy, prostatectomy, gastrectomy, sigmoidectomy, adrenalectomy, and splenectomy have also been successfully performed. A randomized controlled trial not only to document safety and feasibility but also patient satisfaction, postoperative pain, and cosmesis should be performed to clarify the feasibility of the technique. Application of SILS in solid organ surgery like nephrectomy and splenectomy can be accomplished. After gaining sufficient experience in SILS splenectomy, we decided to perform SILS pancreatectomy. Herein, we describe a single incision pancreatectomy performed in a previously nephrectomized renal cell cancer patient. To our knowledge, this is the first SILS pancreatectomy case reported in the literature. Single-port or single incision laparoscopy, even with flexible instrumentation, is technically more challenging than straight laparoscopy.

Performed by expert hands, SILS pancreatectomy is equally as efficacious as conventional laparoscopic pancreatectomy without compromising surgical standards of care. Although pancreas surgery itself is a risky and difficult procedure, SILS pancreatectomy may offer a subjective cosmetic advantage. Validated patient-outcome data are required to more objectively address this final comment. Prospective comparison between SILS and conventional laparoscopic procedures is sine qua non to more clearly define the certain benefits of single incision surgery. This report can only declare that even pancreas resection together with splenectomy could be performed technically in well-experienced tertiary referral centers. However, a question like “Should it be applied?” is another topic of debate that could be solved after evaluation of long-term results of SILS cases.

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