

Single Incision Laparoscopic Splenectomy: The First Two Cases

Umut Barbaros · Ahmet Dinççağ

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Abstract

Aims Single incision laparoscopic procedures are presumed to be as a step towards pure natural orifice transluminal endoscopic surgery. However, loss of requirement of any perforation of visceral organ and endoscopic equipment make this technique more popular and easily performable. Herein we report two splenectomy cases where single incision surgery (SILS) technique was performed.

Cases Two females of 28 years old and 22 years old with the diagnoses of ITP underwent single incision laparoscopic splenectomy. Preoperatively with the receipt of steroid therapy, thrombocyte counts were $92,000/m^3$. A 2-cm umbilical incision was used for the placement of three (5 mm) trocars. One 5-mm videoscope (30°) and roticulated laparoscopic dissector/grasper were the main tools during surgical procedure. Spleen was removed with a plastic removal bag through the umbilical trocar incision. The whole procedure ended in 110 and 150 min in both cases without any problem.

Results Two patients were discharged on third and second postoperative days with the thrombocyte counts of $174,000/m^3$ and $400,000/m^3$, respectively.

Conclusion Although there were some procedures performed with single incision technique like cholecystectomy, prostatectomy, and partial nephrectomy, as far as we are concerned this is the first report about laparoscopic splenectomy performed with single incision surgery technique.

Keywords Single incision surgery · Splenectomy · Laparoscopy

Laparoscopic surgery is a well-established alternative to open surgery across disciplines. Although the magnitude of impact varies by procedure, in general, the benefits of laparoscopy on postoperative pain, cosmesis, hospital stay, and convalescence are widely recognized. Current efforts are aimed at further reducing the morbidity associated with minimally invasive surgery. To this end, two recent innovations are being developed, either pure or hybrid: natural orifice transluminal endoscopic surgery (NOTES), whereby intraperitoneal access is gained through the mouth, anus, vagina, or urethra and the

viscus-of-entry is perforated to reach the surgical target; and embryonic natural orifice transumbilical endoscopic surgery (E-NOTES), wherein the surgical scar is virtually concealed within the umbilicus, an embryonic natural orifice.^{1,2} Transumbilical surgery either can be performed with one port having three working channels or three separate trocars introduced through the same umbilical incision. The latter technique is entitled laparoendoscopic single site incision (LESS) or single incision laparoscopic surgery (SILS).³

Our institution began performing LESS since January 2009, and subsequently we developed a technique for laparoendoscopic single site splenectomy. To our knowledge, we herein report the first SILS splenectomy cases.

Cases

All patients were vaccinated against pneumococci (Pneumovax 23, Boehringer) 2 weeks prior to the operation, and

U. Barbaros (✉) · A. Dinççağ
Department of General Surgery, Istanbul Faculty of Medicine,
Istanbul University,
Capa,
Istanbul, Turkey
e-mail: umutbarbaros@yahoo.com

received 1 g sulbactam/ampicillin intravenously as a preoperative prophylaxis. All patients were informed about the details of the surgical procedure and informed consents were taken.

The first case was a 28-year-old female patient with the diagnosis of ITP. Both cases underwent single incision splenectomy. Preoperatively with the receipt of steroid therapy, thrombocyte counts were $92,000/\text{mm}^3$. The second case was a 22-year-old female, again with the diagnosis of ITP. Her preoperative thrombocyte counts were $100,000/\text{mm}^3$. Preoperative abdominal computerized tomography of both cases was normal and did not reveal any accessory spleen.

Surgical Technique

Patients were placed in a semilateral position on the right side with left arm fixed over the head and a cushion placed under the right side. The surgeon and the assistant stood on the right side of the patient with the monitor placed on the opposite side of the patient. Under general anesthesia, a 2-cm complete umbilical skin incision of 2 cm was made. Pneumoperitoneum was performed through the umbilicus with a Veress needle in closed technique. After the completion of 12 mmHg CO₂ pneumoperitoneum, the “three ports” with the size of 5 mm were placed into the abdominal cavity through this 2-cm umbilical incision (Fig. 1). The patient was then put in a reverse Trendelenburg position with the right side rotated down. We have routinely used a rigid 30°, 5-mm laparoscope and a standard rigid 5-mm laparoscopic instrument for all procedures. Once the laparoscope, grasper, and dissector were placed, the overall procedures were similar to the procedures performed in a three-port laparoscopic splenectomy. The most difficult part of this technique was working instruments that were crossing each other and roticulated.



Figure 1 Transumbilical three 5-mm trocars.



Figure 2 One of the 5-mm trocars replaced with a 15-mm trocar for the final hilum ligation with endoscopic vascular stapler.

The 5-mm telescope was introduced under both instruments and over both instruments changing according to the surgical step of the procedure. Nothing different from the three-trocar laparoscopic splenectomy technique was performed. The first step was the liberation of the inferior pole of the spleen with the dissection of the splenicocolic ligament. As the second step, gastrosplenic ligament was opened and lesser sac was explored to expose the splenic hilum. During all these steps, at least one of the roticulated grasper and dissector equipment was used. Including these tools, a 5-mm Ligasure standard laparoscopic straight hook was also used. Following the completion of splenic hilum dissection, one of the 5-mm trocars was replaced with a 15-mm trocar to be able to introduce the endoscopic stapler with white cartridge (Fig. 2). At this time, the whole spleen was dissected and liberated other than hilum a small piece of phrenosplenic ligament. Finally, the hilum was ligated and cut with this stapler (Fig. 3) and the spleen was

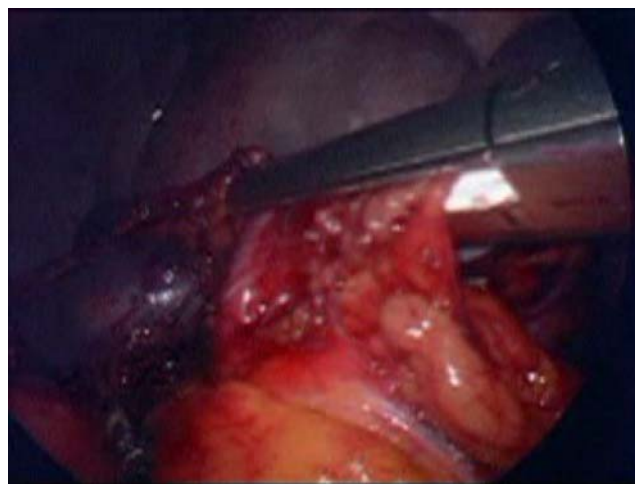


Figure 3 Hilum ligation with an endoscopic vascular stapler.

removed with a retrieval bag that was introduced through the same 15-mm trocar. The spleen was morcellated in this bag before removal. An aspirative silicone drain was placed in splenectomy lodge through the other 5 mm trocar and finally the 15 mm trocar site closed with a polypropylene (no. 0) suture.

Postoperative Period

Patients received oral food at postoperative eighth hour and mobilized. Drains of both cases were removed on the first postoperative day. The first and the second cases were discharged on the third and second postoperative days, respectively. Postoperative pain was assessed by visual analog scale.⁴ Postoperative pain scores of the cases on the first postoperative day were 2/10. Although pain seemed to be minimized compared with the regular laparoscopic approach, the number of patients was too small to make any conclusions. Postoperative follow-up did not reveal any umbilical wound complication (Fig. 4).

Discussion

The introduction of laparoscopy in the early 1990s ushered in a new era in the surgical treatment of human diseases. Evolution of minimally invasive techniques has furthered an impulsion in the surgical community to reduce the invasiveness of laparoscopic surgery. To achieve this goal, surgeons have anticipated limiting the number of abdominal incisions (as in SILS) or eliminating them completely (as in natural orifice transluminal endoscopic surgery [NOTES]).⁵

To date, however, experience with SILS is still in its infancy, with fewer than 80 published cases reported for all

indications and no splenectomy cases. As clinical experience with SILS increases, it is imperative that we critically evaluate two 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?

Raman's findings in single incision nephrectomy cases underscore that, in the hands of an experienced laparoscopic surgeon, SILS nephrectomy is equally efficacious to conventional laparoscopic nephrectomy without compromising on surgical or postoperative outcomes.⁶ Interestingly, despite this series representing their initial SILS experience, they noted no differences in any operative variables compared to conventional laparoscopy. Anecdotally, they observed no increased difficulty in their cases compared to radical nephrectomy, although they presume that there may be future cases in which dense retroperitoneal inflammatory reaction may prove a challenging obstacle.

In SILS, since all instruments were closely packed together, clashing of instruments and the laparoscope was common. It has a unique learning curve, principally in navigating the instruments within a limited range of motion and needs 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 was also successfully performed by Kaouk et al. They performed single-port laparoscopic radical prostatectomy in four patients diagnosed with prostate cancer.⁷ Patients with early-stage prostate cancer (T1c), no previous pelvic surgery, and a body mass index $<35 \text{ kg/m}^2$ were selected for single-port laparoscopic radical prostatectomy. A multichannel port was inserted transperitoneally through a 1.8-cm umbilical incision. No additional extraumbilical instruments or ports were inserted. Urethrovaginal anastomosis was performed using free-hand interrupted suturing and extracorporeal knot tying. One of their patients developed a rectourethral fistula that was noted 2 months after surgery and was managed with a mucosal advancement flap.

The sleeve gastrectomy is routinely performed using five and up to seven laparoscopic trocars with enlargement of one of the trocar sites for extraction of the gastric specimen. Kevin et al. described the first case of laparoscopic sleeve gastrectomy performed through a single laparoscopic incision.⁸ Hodgett et al. recommend single incision cholecystectomy for patients with uncomplicated gallbladder pathology and biliary anatomy not distorted by inflammation.⁹ After comparison of 29 cases of standard multiport laparoscopic cholecystectomy with SILS, they



Figure 4 Postoperative umbilical wound site.

concluded that it is a safe alternative to standard laparoscopic cholecystectomy and can be done with comparable operative times. Randomized controlled trial to document not only safety and feasibility but also patient satisfaction, postoperative pain, and cosmesis should be performed to be able to comment on.

Minimal invasive splenectomy history started with Delaitre in 1991 and widened its range including massive splenomegaly cases.¹⁰ The ultimate point in minimal invasiveness was three-trocar laparoscopic splenectomy. Application of SILS in solid organ surgery like nephrectomy led us to our laparoscopic splenectomy experience in SILS splenectomy. Herein we performed single incision splenectomy in two cases of ITP successfully without sacrificing the standard principles of splenectomy. To our knowledge, these are the first SILS splenectomy cases reported in literature.

Single-port laparoscopy has had a positive effect on standard laparoscopy. Undoubtedly, single-port or single incision laparoscopy, even with flexible instrumentation, is technically more challenging than straight laparoscopy; however, we are still in the initial learning curve. This new technique of single-port surgery has brought to light various extra aspects of standard laparoscopy and seems to have facilitated these cases as well.

In experienced hands of minimally invasive surgery, SILS splenectomy is equally efficacious to conventional laparoscopic splenectomy without compromising surgical standards of care. Although SILS splenectomy 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 mandatory to more clearly define the exact impact of single incision surgery.

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