Hybrid Single-incision Laparoscopic Restorative Proctocolectomy with Ileal Pouch Anal Anastomosis for Ulcerative Colitis

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Abstract Single-incision laparoscopic surgery is a rapidly evolving field as a bridge between traditional laparoscopic surgery and natural orifice transluminal endoscopic surgery. We report one of the initial clinical experiences from India for Laparoscopic Restorative Proctocolectomy and Ileal Pouch Anal Anastomosis (RPC IPAA) with this new technique. A SILSTM port was used through the curved intra-umbilical 25-mm incision. A 12-mm port was placed in the right iliac fossa at the ileostomy site. Another 5 mm port was placed in the left iliac fossa at the drain site. 10 mm 0 degree lens was used through the SILS port. Two 5 mm port were placed from the SILS port. Right iliac fossa port was the surgeon's right hand port and left hand port was 5 mm SILS port. Left iliac fossa port and 5 mm SILS port were used by the assistant surgeon for retraction. The specimen was delivered through the umbilical incision by extending the incision for 1.5 cm on either side. Ileal J Pouch was created extracorporeally and then anastomosed to the anal canal with the circular stapler laparoscopically. The diverting loop ileostomy was brought out through the right iliac fossa 12 mm port. The pelvic drain was brought out through the left iliac fossa port. The procedure was completed without any perioperative complications. Operative time was 256 minutes. Postoperative follow-up did not reveal any umbilical wound complication.

Till date we have performed 26 Laparoscopic RPC with IPAA and this was the first Single Incision Laparoscopic RPC with IPAA. For experienced laparoscopic colorectal surgeons, single incision laparoscopic colectomy (SILC) is feasible. Single-incision laparoscopic colectomy is a promising alternative method as minimally invasive abdominal surgery for the treatment of patients requiring colectomy.

Keywords Laparoscopic surgery · Incision · Single-incision laparoscopic colectomy · Single incision laparoscopic surgery

Introduction

Restorative Proctocolectomy with Ileal pouch-anal anastomosis (RPC IPAA) has become the surgical procedure of choice for chronic ulcerative colitis. Technological innovations and increased surgical experience with laparoscopy have advanced the field of complex laparoscopic surgery to include operations such as the RPC IPAA procedure. While the laparoscopic approach decreases surgical morbidity, it still requires three to four incisions each ≥ 1 –2 cm long. In addition each working port risks morbidity from bleeding, hernia and/or internal organ damage, and incrementally decreases cosmesis. In an effort to reduce these sequelae of laparoscopy, the concept of natural orifice transluminal endoscopic surgery (NOTES) was introduced [1], which removes transabdominal incisions completely, but NOTES is technically challenging and current instruments need to be further improved. As a bridge between traditional laparoscopic surgery and NOTES, the recent focus has been on the development of single-incision laparoscopic surgery (SILS) to further minimize the invasiveness of laparoscopic surgery by reducing the number of incisions.

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The guiding principle is operating through a single transumbilical incision, and removing the colonic specimen by the same small incision [2]. Compared to classic laparoscopic colectomy, the potential advantages of the SILS are believed to be decreased postoperative pain & improved cosmesis [3].

We report our initial experience with one patient who underwent single-incision laparoscopic RPC IPAA and modified the technique by using the ileostomy port and the drain site port for the completion of the surgery. This can be considered as a modification of the SILS technique—the Hybrid SILS technique.

Material & Method

We had performed a SILS procedure for a 30 year female with chronic ulcerative colitis and compared the results with previous cohort of 26 patients operated for laparoscopic RPC IPAA.

Data were collected by operative details, immediate patient pain score and follow up on personal visits at an outpatient clinic.

Bowel Preparation Given.

Surgical Technique

The patient was placed in a lithotomy position. Both shoulders are also fixed with a pad to prevent movement in a Trendelenberg position. Veress needle pneumoperitoneum was created at infraumbilical position followed by insertion of 10 mm flap trocar for 0 degree telescope. The abdomen was explored for adhesions and then decided to perform the SILS procedure. A SILS™ port was used through the curved intra-umbilical 25-mm incision. A 12-mm port was placed in the right iliac fossa at the ileostomy site. Another 5 mm port was placed in the left iliac fossa at the proposed drain site (Fig. 1). 10 mm 0 degree lens was used through the SILS port. Two 5 mm port were placed from the SILS port. Right iliac fossa (RIF) port was the surgeon's right hand port and left hand port was 5 mm SILS port. Left iliac fossa port and 5 mm SILS port were used by the assistant surgeon for retraction.

After identification of right ureter, dissection was started as peritoneal incision from sacral promontory to Duodeno jejunal junction to reach superior haemorrhoidal vascular pedicle. Artery is clipped with hemolock locking clip and vein with ligaclip 300. Further dissection done from medial to lateral aspect to identify left ureter & left gonadal vessels with white line of Todd. Left colon & mesocolon were dissected from Gerota's fascia through posterior avascular

Fig. 1 Showing port placement fo Hybrid SILS proctocolectomy

embryonic plane up to splenic flexure. Left colon is dissected from lateral peritoneal attachments. Now dissection of the rectum is performed anteriorly on both lateral aspects & posterior avascular plane with total mesorectum excision & preservation of autonomic nervous plexus. Rectum is divided at the level of pelvic diaphragm with use of roticulator endostapler passed from the RIF 12 mm port.

Right colon is also dissected from medial to lateral aspect from peritoneal incision at root of the mesentery. Mesenteric lengthening performed. All dissection performed with spatula and monopolar electrocautery whereas ultrasonic energy was used at splenic flexure, hepatic flexure and both lateral aspect of the rectum. The specimen was delivered through the umbilical incision by extending the incision for 1.5 cm on either side and transverse colonic & right colonic pedicles were ligated extracorporeally. Ileal J Pouch was created extracorporeally from the terminal ileum (15 cm) with linear cutter stapler and then anastomosed to the anal canal with the circular stapler laparoscopically. Great care is taken not to twist the mesentery & bowel. The diverting loop ileostomy was brought out through the right iliac fossa 12 mm port. The pelvic drain was brought out through the left iliac fossa port (Fig. 2).

Fig. 2 Showing final scar at completion

Post operative course was uneventful.

Result

Comparison of the Results

Parameters	Laparoscopic RPC IPAA	SILS RPC IPAA
No. of Ports	Total 26 patients	One patient
	5ports or additional 5 mm port at suprapubic region for bladder retraction	3 port(one SILS port, one 5 mm port and one 12 mm port)
Operative time	210–380 min, (mean 262.9 min)	256 min
Operative blood loss	80–100 ml	100 ml
Incision size	5–7 cm	5 cm
Midline vertical	(mean 5.13 cm)	
Ileostomy started functioning on	Average 2nd POD	2nd POD
Ambulation started on	1st POD	1st POD
Oral intake started	2nd POD	2nd POD
Hospital stay	6–14 days (mean 8.1 days)	7 days
Requirement of analgesics	5–12 days (mean 6.9 days)	4 days

The final scar of the procedure is shown in Fig. 3 and compared to the scar seen in Fig. 4 for traditional laparoscopic proctocolectomy.

Discussion

Laparoscopic surgery is a well-established alternative to open surgery across disciplines. Although the magnitude of impact varies by procedure, generally the benefits of laparoscopy on postoperative pain, cosmetics, hospital stay, and convalescence are recognized widely. Many surgeons have attempted to reduce the number and size of ports in laparoscopic surgery to decrease parietal trauma and improve cosmetic results, and recently two innovations have been developed: NOTES, which removes transabdominal incisions completely and SILS, which completes laparoscopic procedures by trocars located at one umbilical incision. In recent years, SILS has been focused upon as a bridge between NOTES and traditional laparoscopic surgery. SILS enables the application of a wide range of already existing instruments using a single incision.

This report documents the feasibility of single-incision laparoscopic RPC IPAA. As seen by the results, the decisive parameters were comparable favorably with multiport laparoscopic colectomy in our patients. That suggests

Fig. 3 Showing scar at 2 weeks after surgery

that Single Incision Laparoscopic Colectomy (SILC) may be as fast and safe as multiport laparoscopic colectomy, albeit in selected cases performed by experienced surgeon. The clinical advantages of this approach may eventually require a randomized controlled trial to compare it with conventional laparoscopic colectomies. The major advantage of this method is improved cosmetics, without any visible abdominal scars. Disadvantages of SILS include the conflict between the operative instruments, and the camera and the smaller degree of instrument triangulation compared to that of conventional laparoscopic surgery. Some of these disadvantages may be overcome with the use of the semi-flexible endoscopic camera system and crossed-over articulating instruments. Despite the limitations of SILS, we were able to perform our operation in this case with comparative results to the conventional laparoscopic procedure as shown in our results.

Fig. 4 S/o scar after traditional laparoscopic proctocolectomy

Cost of SILS is also an issue in the current health care climate. The use of trocars through a SILS port, multiple laparoscopes, curved instruments, and robotic-assistance, make it very difficult to demonstrate any cost benefit for this approach in comparison with standard multiport laparoscopic surgery. Only an improvement in recovery, hospital stay or complications would make SILS cost effective [4]. We have tried to reduce the cost by using standard straight instruments for this procedure. Although the early experience of SILS is promising, experienced laparoscopic skills are essential for the safe and effective completion of surgery. Instrument collision, both internally and externally, is a constant challenge. As such, coordination between the surgeon and the camera driver is essential and more important than standard multiport laparoscopic surgery. Notably, SILS does readily permit the introduction of other transabdominal conventional laparoscopic ports to aid completion of the surgical procedure should there be an intraoperative complication or failure of progression.

Proponents of SILS suggest that in addition to benefits for cosmesis, there is the possibility of less associated perioperative pain and morbidity. Comparison of short-term measures of convalescence to that of NOTES and traditional laparoscopic surgery are needed to better address this issue. Finally, exploring other potential applications for SILS with the hopes of optimizing surgical, aesthetic and patient-orientated outcomes is necessary.

Conclusion

The early experience of SILS is promising, but advanced laparoscopic skills are essential for the safe and effective completion of surgery. At present from this single case it would be best to conclude that Restorative Proctocolectomy with IlealPouch Anal Anastomosis is feasible by SILS technique in the hands of an experienced laproscopic surgeon. The safety and advantages in terms of pain, analgesic requirement, cosmesis and other issues can only be resolved by a randomized trial in well matched patients.

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