Single Access Laparoscopic Colorectal Surgery: Lights and Shadows

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Introduction: To minimize the complications related to conventional multiport laparoscopic surgery, the single access laparoscopic surgery has been developed. Some results of case series and case-controlled studies are supporting the feasibility and safety of Single Access Laparoscopic Colectomy (SALC). Materials and Methods: Since January 2009 we performed all kind of colorectal procedure by a single access laparoscopic approach. We began with right colectomy that represent the only procedure in which we did not reproduce the same surgical steps of multiport laparoscopic surgery. During this, we used to perform an intracorporeal side-to-side ileo-colic anastomosis. In our experience this step is too much difficult during a single access laparoscopic procedure. So we used to mobilize the right colon after vascular ligation and section intracorporeally. We continued with specimen extraction through the umbilicus and we concluded the procedure with resection and extra-corporeal anastomosis. The intracorporeal reconstructive step is prevented by the position of the stapler in the umbilicus respect to the anastomosis site.

Materials and Methods

We start our experience in SALS with cholecystectomy procedure. After ten cases we start with colorectal procedure. Since January 2009 we performed all kind of colorectal procedure by a single access laparoscopic approach. We began with right colectomy that represent the only procedure in which we did not reproduce the same surgical steps of multiport laparoscopic surgery. During this, we used to perform an intracorporeal side-to-side ileo-colic anastomosis. In our experience this step is too much difficult during a single access laparoscopic procedure. So we used to mobilize the right colon after vascular ligation and section intracorporeally. We continued with specimen extraction through the umbilicus and we concluded the procedure with resection and extra-corporeal anastomosis. The intracorporeal reconstructive step is prevented by the position of the stapler in the umbilicus respect to the anastomosis site.

In contrast, we reproduce the same surgical technique of multiport colorectal resection during a left or rectal single access laparoscopic procedure as well as total colectomy.

Several studies were reported in many surgical specialities. Single port laparoscopic cholecystectomy (SPLC) is a new concept in laparoscopic surgery. A review of existing results was performed to evaluate critically the current state of SPLC with specific reference to feasibility, safety, learning curve, indications and cost-effectiveness. After selection, 24 studies including 895 patients were analysed. SPL cholecystectomy seems feasible, but standardization, safety and real benefits for patients need further assessment. Uncontrolled wide adoption of this approach may be responsible for a rise in biliary complications. In colorectal surgery, the application of SALS was first reported by Remzi et al. and Bucher et al. in 2008.
SURGICAL TECHNIQUE

All patients underwent a single incision laparoscopic bowel resection using the device "QuadPort Access System"® (Advanced Surgical Concept, Tokyo, Japan).

A 3-4 cm vertical incision was made in the umbilical fold. Anterior rectus fascia and peritoneum were incised and the umbilicus was suspended with two sutures. "QuadPort Access System"® was inserted and the pneumoperitoneum was obtained with CO₂ gas. We used a new deflectable laparoscopic optic (Olympus Medical System Corp, Tokyo, Japan) and straight laparoscopic instruments.

The subsequent step-by-step dissection followed exactly a standardized colorectal laparoscopic procedure.

We used the "QuadPort Access System"® (Advanced Surgical Concept, Tokyo, Japan). A 3-4 cm vertical incision was made in the umbilical incision of the Treitz muscle (the artery is 2 cm over the mesenteric vessels and the left ureter was identified. The inferior mesenteric vessels were isolated and transected after the incision of the Treitz muscle (the artery is 2 cm over the aorta and the vein is at the anterior margin of the pancreas). In case of sigmoid colon disease, the upper rectum was dissected and divided intracorporeally with endo-GIA stapler.

In case of rectal disease, during mobilization of the mesorectum, care was taken to avoid any damage to the underlying hypogastric nerve plexus and to leave the Heald’s Fascia undamaged. The rectum was divided intracorporeally with endo-GIA stapler. The rectal anterior resection was performed extracorporeally after umbilical extraction, and the head of the 33 mm circular stapler was inserted to the proximal colonic segment using a purse string of polypropylene. The T-T stapled colorectal anastomosis was performed extracorporeally according to the Knight-Griffen technique and checked by hydropneumatic test. The umbilical fascia was closed with continuous suture and the skin was closed with Dermabond glue (Ethicon Inc., Cincinnati, OH).

DISCUSSION

Laparoscopic Surgery has been showed its doubtless advantages respect to the Open Surgery. Subsequently, the results of case series and case-controlled studies also are showing the feasibility and safety of applying Single Access Laparoscopic Colectomy (SALC).

A recent randomized controlled study compared the operative outcome of patients who underwent SALC and Conventional Laparoscopic Colectomy (CLC). Patients who had small cancer (<4 cm) or adenomatous polyproplpy re-quiring colectomy were randomized to have SALC or CLC. The patients were blinded to the procedures and the postoperative pain was used as the primary outcome measure. All patients had patient-controlled analgesia with intravenous morphine after the operation and the nominal rating score on days 1-3 and day 14 were recorded by research staff which did not known the types of operations. Other operative outcomes of the two groups of patients also were recorded prospectively and compared. There were 25 patients in each group. The patients’ demographics, tumour characteristics, operating time, blood loss, complication rate, number of lymph nodes harvested, and resection margin have no statistically significant difference between the two groups. There was no operative mortality in both groups. The SALC group had consistently lower median pain score than CLC group in the whole postoperative course and the difference was statistically significant on day 1 (0 (0-5) vs. day 3 (0-6) respectively; p=0.002) and day 2 (0 (0-3) vs. 2 (0-8) respectively; p=0.014). The median hospital stay in the SALC group also was shorter than the CLC group. Authors concluded that in a selected group of patients with small tumour and good operative risk, SILC is a safe alternative to CLC. Single port laparoscopic colectomy also is associated with the benefits of less postoperative pain and shorter hospital stay than CLC.

A recent systematic review showed that in early series of highly selected patients, SALC appears to be feasible and safe when performed by surgeons who are highly skilled in laparoscopy. Despite technical difficulties, there may be potential benefits associated with SALC over CLC or Hand Assisted Laparoscopic Colectomy but it is yet to be proven objectively.

Our experience in SALC was preceded by the use of single access laparoscopic surgery for cholecystectomy. However we left this approach because of many difficulties. We felt that it was very complicated to expose clearly the Calot’s Triangle, exposing the patient to a higher risk of biliary tract lesion than multipor laparoscopic surgery.

During the first colorectal procedure, we tried to use dedicated instruments, like articulating forceps and camera. However we left the use of articulating forceps for the difficult to obtain adequate triangulation. In the same way, we found very useful the use of deflectable camera which permit to reduce the instrument clashing and the nuisance between the hands of the operators.

Our point of view is in contrast with Spana et al. They report that the primary problems encountered while doing SALS are the loss of instrument triangulation and instrument clashing. Closely situated instruments create clashing of the instruments and scope both internally and externally. These problems are ameliorated to some extent by the use of fixed-shaft bent instruments, lower profile camera, and criss-crossing the instruments. The loss of triangulation can be improved by the use of specialized bent shaft instruments, 2-mm needle-scopic instruments, and actively articulating instruments. One important limitation frequently encountered with these instruments is the lack of strength sufficient for firm tissue retraction. Instrument and scope clashing are exacerbated by the use of a standard laparoscopic lens. Low profile lenses and flexible tip lenses are available for use in SALS, which minimizes scope and instrument clashing.

We are agree with these Authors about the necessitates that the surgeon cross his hands, with the right-hand instrument crossing over to the left side and the left-handed...
instrument crossing over to the right side. As reported, surgeons experienced in SALS describe a process of "re-programming" where one learns how to operate with crossed instruments. The problem of clashing instrument could be overcome by the use of robotic surgery. We had a preliminary experience of robotic single access laparoscopic surgery and we actually found an improvement in the freedom motion and in movement ergonomics.

According to Spana et al, the improved ergonomics provided by the da Vinci system, could elevate robotics as the platform of choice for the future of reconstructive single access laparoscopic surgery.

Many uncertainties remain about costs and transferability of single access laparoscopic colorectal surgery.

Doubtless, the SALT cost could be higher than multiport laparoscopic colorectal surgery because of the use of dedicated instrument and disposable devices. The reimbursement for colorectal procedures is equal even if it is performed by laparotomic or laparoscopic approach. So, the economical issue could be taken in consideration as well as others parameters. We think that in future, manufacturers will find a good value accommodation in order to promote these approaches.

About the transferability of SALT, programs of training need to focus on safety and techniques. We believe that only high laparoscopic skills surgeon can perform SALT.

We are not sure that it may be accessible to most surgeons considering that to date also traditional laparoscopic colectomy has low adoption rate. In the same way, it’s mandatory to evaluate outcomes and cost-effectiveness of SALT respect to multiport laparoscopic colectomy using randomized trials.

As reported by Diana et al. despite preliminary oncological results showing the feasibility of single access laparoscopic surgery, it is necessary to standardize the technique and carefully evaluate its application in onco-surgery under ethical committee control along with definition of the optimal learning curve.

CONCLUSION

In conclusion, in order to avoid unusual exaltation or denigration of SALT, we believe it is important to remember what happened in the past with the introduction of the laparoscopic cholecystectomy in the daily clinical practice. We would like to report extract of an editorial entitled "Laparoscopic Cholecystectomy: Threat or Opportunity" published in 1990. The Author explained about many concerns on laparoscopic cholecystectomy, doubts that after many years have been resolved. Hopefully, this time, history teaches us something.

"The procedure is now being performed in several communities and university hospital in the United States and has aroused great interest among the medical and lay communities, along with alarm and concern among some surgeons. There is a number of precedents (such as arthroscopic knee surgery, laparoscopic tubal ligation, and percutaneous renal lithotripsy) in recent surgical history that should provide a framework for working through the process of accepting this new procedure into the armamentarium of general surgery? Concerns have been raised in relation to the new procedure in several areas. For example, it is difficult to perform a thorough examination of the perympullary area and retroperitoneum by the laparoscopic method. Also, it is more difficult to do routine cystic duct cholangiography and, thus, there is a possibility of overlooking unsuspected bile duct disease. There is also concern about the extension of indications for the procedure to the number of asymptomatic patients. In addition to these concerns related to patient safety, many surgeons have fears of being "shutout,"ie, not being able to be trained or being trained so late that their competitors have a superior edge. In addition, some surgeons find the technique too difficult or too time-consuming for their practice."

SUMMARY


Ključne reči: laparoskopska jednoportna hirurgija, minimalno invazivna hirurgija, kolorektalna hirurgija.

REFERENCES