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LAPAROSCOPIC TECHNIQUE OF MODIFIED EXTRAPERITONEAL (RETROTRANSVERSALIS) END COLOSTOMY FOR ABDOMINO-PERINEAL RESECTION

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ABSTRACT

AIM

To describe the technique of a modified extraperitoneal retrotransversalis end colostomy as part of a laparoscopic abdomino-perineal resection (APR).

METHOD

The colostomy site is preoperatively chosen and intraoperatively used for a trocar. After the rectum has been mobilized the descending colon is freed. The peritoneal margin is gently grasped and the parietal peritoneum, extraperitoneal together with the transversalis fascia are separated from the transverse abdominal muscle fibres upwards for 3-4 cm aiming at the trocar site to form the extraperitoneal retrotransversalis canal. The stoma site trocar is partially withdrawn and its head is turned laterally until its tip is positioned in the layer between abdominal wall muscles and underlying transversalis and extraperitoneal fascia together with parietal peritoneum. The CO₂ source can be attached so that the gas helps to separate the layers. After that the colostomy trephine is formed at the site of the trocar, the grasper is inserted to gently deliver the blunt end of the descending colon through the canal and the end colostomy is formed in a usual way.

RESULTS

No procedure specific complications were noted in 39 patients who had laparoscopic APR with extraperitoneal retrotransversalis end colostomy from 2009 to 2016. In 23 patients who survived 3.7 ± 1.7 years after surgery there were no clinical or CT signs of parastomal hernia or prolapse.

CONCLUSION

This single institution retrospective case series demonstrate that laparoscopic extraperitoneal retrotransversalis end colostomy is feasible, safe, and effective in preventing parastomal hernias and stomal prolapse

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What does this paper add to the existing literature?

This paper presents a new technique of creating an end colostomy while performing a laparoscopic APR that is feasible and helps effectively prevent parastomal hernia in the long term.

Introduction

Regardless of the myriad of available sphincter-preserving techniques, abdomino-perineal resection (APR) still remains an important option in the curative treatment of low rectal cancer. Although optimal oncologic techniques have been described in great detail, considerably less attention is paid to the techniques of colostomy formation. However, it is the colostomy that mainly affects patients' quality of life after the APR. A recent meta-analysis [1] and a randomized controlled trial [2] demonstrated that the traditional "intraperitoneal" (also called "transperitoneal") method of end descending or sigmoid colostomy creation, harbours a very high risk of parastomal hernia and prolapse. These complications dramatically reduce patients' quality of life [3] and often demand complex reconstructive surgery. The latest European Hernia Society Guidelines [4] strongly suggest that prophylactic synthetic non-absorbable meshes are used to prevent parastomal hernias in patients planned to have permanent colostomy. Another method to reduce the rate of parastomal hernia and stoma prolapse is the extraperitoneal approach of end colostomy formation that was first proposed in late 1950s by Goligher [5], long before the meshes became the standard of incisional hernia prevention and treatment. Subsequently, advantages were demonstrated in a number of retrospective series, two randomized controlled trials [6,7] and two meta-analyses [1,8]. In addition, the most popular technique recommended to repair paracolostomy hernias may be the Sugarbaker method which in essence reproduces the extraperitoneal technique by substituting the mesh as the innermost layer [9]. Despite these facts, extraperitoneal end colostomy formation still hasn't gained wide-spread acceptance. In theory, using the procedure to prevent rather than to repair a paracolostomy hernia would be preferable. Recently single reports have described the technique of laparoscopic extraperitoneal end colostomy [10,11] that encompass separation of only the parietal peritoneum layer to create the extraperitoneal canal for the colon.

Hence, herein, we describe the technique of a modified extraperitoneal retrotransversalis end colostomy as part of a laparoscopic APR.

Method

The colostomy site is marked before the operation. The optimal position is chosen based on anatomical landmarks (umbilicus, the costal margin and iliac spine), the abdominal wall structure and the patient's preferences. The site is ideally located just lateral to the lateral border of left rectus abdominis muscle at the level or slightly above the level of umbilicus (Fig. 1). This mark is subsequently used for trocar placement to reduce the number of abdominal incisions.

An extralevator APR is performed, the rectum is fully mobilized and the colostomy is formed laparoscopically. The patient is then carefully turned to the prone jack-knife position to perform the perineal part of the operation.

During the abdominal phase of the operation, the descending colon is divided at the optimal level to allow sufficient length of the colon for the tension-free end colostomy at the assistant trocar site. Usually, the descending colon is mobilized 4-5 cm higher than the level of the colostomy trephine to ensure there is no kinking of the colon when it enters the extraperitoneal canal. The peritoneal margin is grasped and the complex of parietal peritoneum, extraperitoneal and transversalis fascia is being separated from the transverse abdominal muscle fibres upwards for 3-4 cm aiming at the assistant trocar site to form the extraperitoneal retrotransversalis canal (Fig. 2). This manoeuvre can be done bluntly or using an energy source if needed. The trocar is gently withdrawn and its head is turned laterally until its tip gets in the layer between abdominal wall muscles and underlying transversalis and extraperitoneal fascia together with parietal peritoneum. The trocar can be gently pushed in this plane in the direction of previously formed extraperitoneal retrotransversalis canal. To facilitate the formation of the extraperitoneal retrotransversalis canal we usually attach the CO₂ source to this trocar so that the gas helps to separate the layers. After the peritoneum in complex with extraperitoneal and transversalis fascia are fully separated from the underlying transverse muscles, the extraperitoneal retrotransversalis canal is created to fit the descending colon, the colostomy trephine is formed at the site of the assistant trocar. To perform that step the skin and underlying fat are circumferentially incised, the assistant's trocar is removed and two narrow retractors are placed in the wound. The aponeurosis lateral to the rectus abdominis muscle is exposed and incised in a cruciate manner and the underlying muscle fibres are gently separated with retractors. At this stage, it is essential not to pinch the transversalis and extraperitoneal fascia together with the peritoneum, rather, enter the extraperitoneal retrotransversalis canal formed previously. After that the grasper is inserted in the canal to take the blunt end of the descending colon and pull it through the extraperitoneal retrotransversalis canal. Laparoscopic manipulation is required to avoid leaving excess length of colon in the peritoneal cavity, twist or placing too much tension in the stoma. The excess of cranial peritoneal incision, if present, should be closed to prevent pouch formation and internal herniation.

The colon is divided at the level of 1.5-2.0 cm above the skin, and the stoma is constructed with 8-12 absorbable sutures.

Results

A total of 39 patients have undergone a laparoscopic APR with extraperitoneal retrotransversalis end colostomy in the period of 2009-2016. The mean time needed for this step is 15.6 ± 6.3 min. There were no procedure-specific intraoperative complications associated with this part of the operation. In one patient, inadvertent perforation of the transversalis fascia/extraperitoneal fascia/peritoneum complex was made while creating a colostomy trephine, which was closed with a non-absorbable stitch. There was no major bleeding while forming the extraperitoneal retrotransversalis canal and minor bleeding was successfully managed with an energy source.

All patients had at least one CT scan as part of their follow-up protocol. In 23 patients who survived 3.7 ± 1.7 years after surgery there were no clinical or CT signs of parastomal hernia or prolapse.

Comparison with other methods

Different techniques of retroperitoneal end colostomy as a part of laparoscopic APR has been previously reported [6,11-13]. Unlike our approach, in these methods the retroperitoneal canal is formed just above the parietal peritoneum which is not usually a sufficiently thick layer. Also, in slim patients, it can be technically difficult to separate it without tears. Accordingly, we suggest mobilising parietal peritoneum with the extraperitoneal and transversalis fascia to form a retrotransversalis canal. Another advantage is that the stoma is created at the site of a trocar to reduce the number of abdominal wall incisions. Lastly, we propose that the colostomy trephine is formed after the retroperitoneal canal is fully created which prevents the loss of pneumoperitoneum. However, if the colostomy trephine is being made first and the retroperitoneal canal is subsequently formed [11,13], additional manipulations like closing the stoma trephine with a glove, are needed to maintain pneumoperitoneum. Even in cases of alternate ventral and dorsal retroperitoneal canal formation, a large stoma trephine leads to loss of pneumoperitoneum and the surgeon's fingers are used to close the defect [6,12].

Conclusion

This single institution retrospective case series demonstrate that laparoscopic extraperitoneal retrotransversalis end colostomy is feasible, safe and effective in preventing parastomal hernia and stomal prolapse. There are limitations of this series which are related to its retrospective nature, single centre experience and relatively short follow-up. Multicentre randomized controlled trial is needed to judge the real value of this technique.

Supporting information: video

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Figure 1: Trocar placement

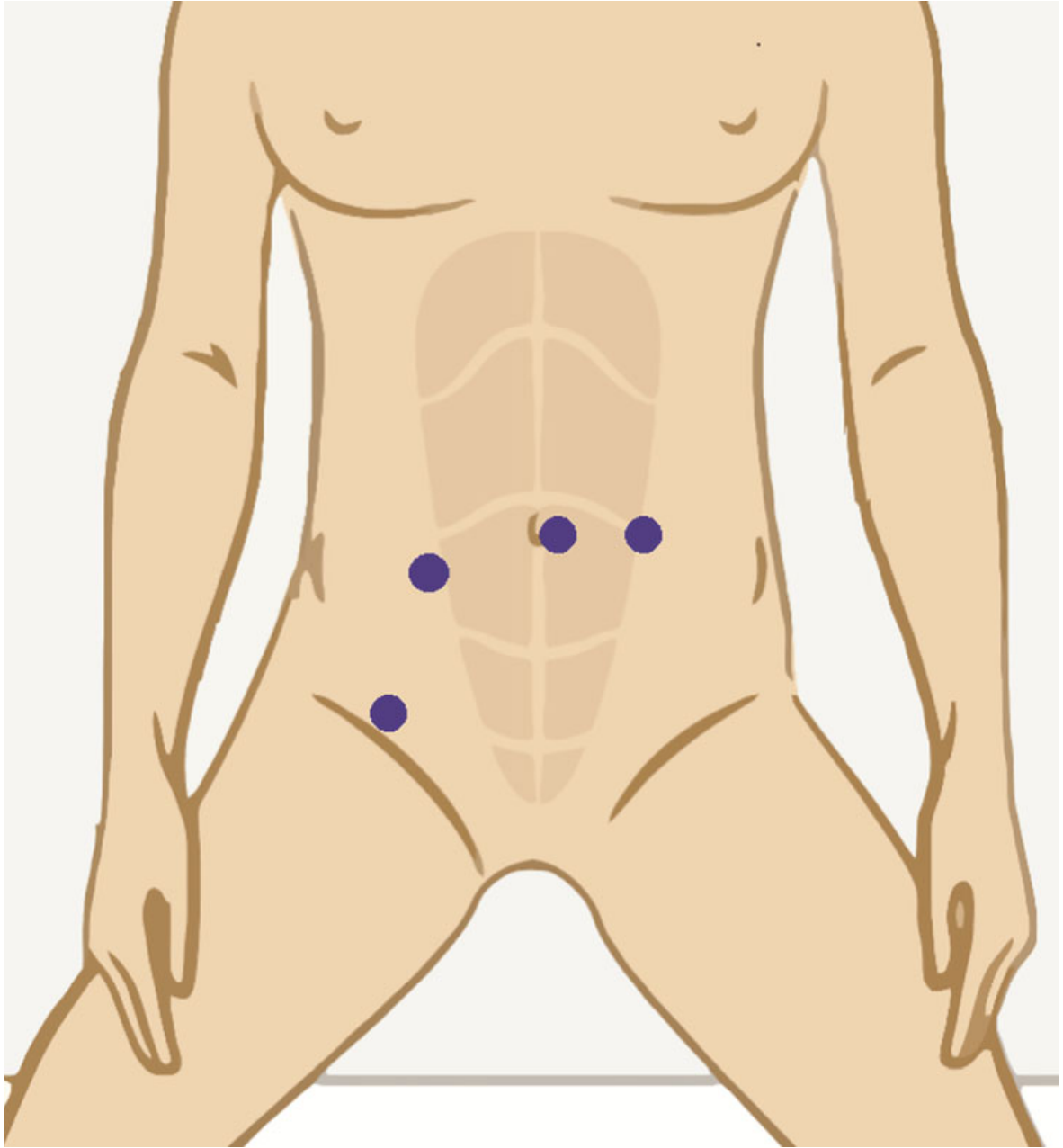


Figure 2: Cross-section of abdominal wall at the level of the retroperitoneal canal

1 – skin, 2 – subcutaneous fat, 3 – anterior fascia of m. transversus abdominis, 4 – m. transversus abdominis, 5 – posterior fascia of m. transversus abdominis, 6 – parietal peritoneum, 7 – colostomy trephine, 8 – fixation to skin, 9 – colon in retroperitoneal canal, 10 – fascia renalis, 11 – m. rectus abdominis.

