

Department of Surgery and Cancer Specimen Extraction Site (midline vs. Pfannenstiel incision in laparoscopic colectomy)

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Abstract:- Laparoscopic surgery “key-hole surgery” is a preferable surgical intervention nowadays and this is attributed to the recent advances over the past decades that allows the surgeons to perform complex interventions through this minimally invasive technique. Owing to its benefits when compared to traditional open surgery, laparoscopic colonic resections has become a corner-stone in management of colon cancer. In order to maintain the continuity of GI tract by performing bowel anastomosis and to extract the resected specimen, an incision (mini-laparotomy) is essential to achieve this. Various incisions has been proposed and used in the current practice as periumbilical incision, Pfannenstiel incision, stoma site extractions incision (SSE) and natural orifice specimen extraction (NOSE). These incisions have different incidences of development of incisional hernias and surgical site infections (SSI). In this article review, we included different specimen harvest incisions after laparoscopic colonic resections and we recommend the use of Pfannenstiel incision as the it has showed to have the lowest risk of development of incisional hernia.

I. INTRODUCTION

Bowel cancer is the 4th most common cancer in the UK, accounting for 11% of all new cancer cases in 2017. There are around 42,300 new bowel cancer cases in the UK every year, that's more than 110 every day in 2015-2017 (1). Surgical resection of this cancer is often achieved by laparoscopic or open approach. Compared with open surgery, laparoscopic surgery achieves the same oncological outcomes, accelerates postoperative recovery and shorter length of stay at the hospital. (2-4)

After laparoscopic colon resection, an incision—also known as a mini-laparotomy—is usually essential for two main reasons: maintain continuity of GI tract (intestinal anastomosis) and for the purpose specimen harvest(5). The size and location of the mini-laparotomy poses a special challenge to operating surgeons, due to the size of the specimen and the desire to keep the retrieval incision as small as

possible to retain the advantages of laparoscopic surgery. In addition, the potential problems of dissemination of tumour cells, implantation of tumour cells in the wound; metastasis, wound contamination and incisional hernias must be kept in mind during the process of specimen retrieval as this factors have profound impact on short and long- term recovery after laparoscopic colorectal surgery (6,7). Due to the aforementioned concerns, there is a growing desire among surgeons to optimise the size and location of the specimen extraction incision in order to retain the maximum advantages of a minimally invasive procedure. These include extension of the umbilical port incision in midline, Pfannenstiel incision, stoma site extraction (SSE) and natural orifices specimen extraction (NOSE)—such as through the anus or vagina—has also been reported as a relatively preferable solution.

The objective of this article is to review the various specimen retrieval techniques for laparoscopic colonic resection reported in the medical literature.

II. MATERIAL AND METHODS

Peri-umbilical midline incision :

In this technique, an endobag is introduced into the abdomen and the specimen is placed in it while the abdomen is inflated. The port site is extended by an incision formed along the circumference of the umbilicus and extended three to five cm in the midline. The subcutaneous fat is dissected down the lineaalba which is then incised. The peritoneum is then breached and the bag is retrieved with no risk of neoplastic implantation. Alternatively, the wound is covered with a wound protector and the specimen is extracted without an endobag (8).

The advantage of this method is its rapidity and a separate incision is not needed for the extraction of the specimen. The cosmetic advantage of this approach depends on specimen's size as it might not be an appropriate approach for the extraction of a specimen greater than 6 or 7 cm (9). Moreover, there's a high rate of subsequent incisional hernia 10.6%(10).

Pfannenstiel incision:

This technique was first described by Pfannenstiel in the beginning of the 20th century(11). It is a low abdominal transverse incision which is made above the symphysis pubis over the skin crease. The subcutaneous tissues are then dissected and the anterior rectus sheath is opened transversely. Afterwards, the rectus muscles are mobilised away from midline, and the peritoneum is incised. A wound protector is then applied and the specimen is retrieved. The incision is then closed in layers using absorbable or non-absorbable sutures depending on surgeon's discretion.

This method has potentially lower incidence of incisional hernia 0% to 2% (12,13), and has proven to have less rates of post-operative ileus, shorter length of hospitalisation and low incidence of surgical site infections (12,14).

However, specimen extraction through Pfannenstiel incision is often not feasible if extracorporeal anastomosis is needed in right colonic excisions as the anastomosis site would be distant from the specimen extraction site. But in case of left colonic excisions, extracorporeal anastomosis could be performed via Pfannenstiel incision due to its proximity to the left colon, sigmoid and rectum.

Stoma Site Extraction (SSE) incision:

In patients who are planned to have a stoma, this technique could be adapted. In this procedure, anterior and posterior sheaths are divided vertically with blunt spreading of the rectus muscle layers and incision of the peritoneum. This technique can be used if to perform single-port laparoscopic resection (SPLR) or for specimen extraction and/or performing extracorporeal anastomosis. In case of large tumours, extension of the incision maybe required to extract the specimen. In such cases, the anterior rectus sheath could tightened around the stoma to adapt the smaller stoma size.

SSE can be problematic as it is associated with higher rates of stoma-related complications such as paraneural hernias, stoma retraction, prolapse or even stenosis(15). Higher rates of SSI were also recorded. Therefore, in patients planned to have permanent stomas, this technique should be used with great caution.

Natural Orifices Specimen Extraction (NOSE) NOSE is a technique in which the specimen is retrieved via a visceral organ that has a natural external opening. The most common extraction sites are through the anus and vagina. The main features of NOSE in colorectal surgery are complete intra-peritoneal anastomosis and specimen extraction from natural orifice (16-19).

NOSE significantly reduces the surgical trauma and post-operative pain as it eliminates the need of a separate incision for the specimen harvest (20). Moreover, when compared to standard laparoscopic colorectal resection, NOSE has more advantages in terms of postoperative recovery, aesthetics, and complications (20). As a new technique for specimen extraction, this approach is associated with longer operative time(20), it disturbs an otherwise

healthy organ, and the potential for seeding an unaffected organ during extraction of a neoplastic tissue(21). Also, this technique may not be suitable for bulky specimens and another incision to retrieve the specimen may be required (22,23).

III. DISCUSSION

There are various approaches used for the purpose of specimen retrieval in patients undergoing laparoscopic colorectal resections. The ideal location for specimen extraction remains controversial. The incidence of development of incisional hernia was 10.6% in midline incision, 0% - 2% in Pfannenstiel incisions. In patients who underwent SSE technique, parastomal hernia was reported in 10.1% of patients(15). Transanal and transvaginal approaches are associated with higher risk of SSI(24), prolonged operation timing and they require a skilful surgeons to perform complete intracorporeal anastomosis.

IV. CONCLUSION

Colorectal surgeons employ numerous approaches to retrieve specimens following laparoscopic colorectal resection. The most common of these are periumbilical midline incision, Pfannenstiel incision, stoma site extraction and NOSE. The incidence of incisional hernia was found to be the highest when periumbilical incision is used. The literature supports the use of the Pfannenstiel incision as an ideal extraction site after laparoscopic colonic resection. NOSE technique is an emerging new technique that requires a skilful surgeon who is able to perform high-level of laparoscopic skills and it should be used with selected cases.

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