

Review Article

Plastic wound protectors in laparoscopic colorectal surgery

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ABSTRACT

Plastic wound protectors are used in colorectal surgery to reduce incidence of post-operative wound infection and port site metastasis. The aim of this study is to determine if this practice has research currency based on the available literature. A systematic literature search enabled critical appraisal of retrieved studies. Six studies focusing on the topic of interest were retrieved and rigorously analysed. Analysis of these studies revealed adequate support for this practice especially in reducing incidence of post-operative wound infections. Plastic wound protectors serve as a useful tool in preventing post-operative wound infections, but there is paucity of evidence to support its role in preventing port site metastasis.

Keywords: Colorectal surgery, Plastic wound protector, Abdominal wall recurrence, Wound infection, Mini-laparotomy, Laparoscopic surgery

INTRODUCTION

A mini laparotomy defined as a complete resection performed through a skin incision less than 7 cm in length during a laparoscopic assisted bowel surgery is a well-known method of retrieving resected disease segment of the gastrointestinal tract.¹ It is also useful during extracorporeal intestinal anastomosis. However during this process there is a high chance of wound contamination with intestinal bacteria and seeding of tumour cells into the wound in oncological bowel surgery. This can lead to significant increase in postoperative morbidity and mortality of the patient through wound infection and wound site or port site tumour recurrence.

The incidence of abdominal wall or port site metastasis in colorectal malignancies have been documented to range between 1.5% to 21%.² The incidence of post-operative wound infection for laparoscopic colectomy ranges between 11-14% depending on the type of wound.¹ Post-operative wound infection has been defined as the

presence of purulent discharge, a culture-positive wound discharge, pain/tenderness, localised swelling, erythema or cellulitis which occurred within 30 days of surgery.^{1,3}

In order to reduce these post-operative complications to the barest minimum, use of plastic wound protectors to separate the minilaparotomy incision from the diseased bowel during retrieval of resected bowel and extra corporeal anastomosis has been a common practice. This practise looks on face value to be the common-sense approach to managing this problem, but it has been documented in the literature that there are other variables that are contributory to development of these complications.^{4,5} Therefore there is need to determine if there is any evidence in the literature to support this practise and if there is, how strong and contemporaneous they are as a basis for clinical practice. The aim of this study is to analyse the literature available on the use of plastic wound protector in minilaparotomy incisions during laparoscopic assisted bowel surgery and its effect, if any, on post-operative wound infection or port site metastasis.

SEARCH STRATEGY

Several databases were searched, via the OVID gateway to identify relevant literature. Abdominal wall recurrence, port site recurrence, wound infection, mini-laparotomy, laparoscopic surgery and colorectal surgery were used. The inclusion dates were 2000-2015.

Abstracts from the search were reviewed for relevance to the study. Six studies focusing on wound infection, laparoscopic bowel resection and use of plastic wound protectors have been included.

The use of plastic or impermeable wound edge protectors to prevent surgical site infection been described by many authors with varying results. There are different makes, but all have two basic characteristics in common; they are impervious and tend to separate the incision site from the bowels during resection. Sookhai et al defined a wound edge protector as "a device which consists of an impermeable plastic drape with four adhesive patches that fits onto the abdomen.³ There is a hole in the middle with a semi-rigid plastic ring that fits into the abdominal wound and protects the wound edge from contact with viscera, visceral contents, contaminated instruments, and gloves". The following analysed studies have been done to determine if these characteristics are of major significance in reducing surgical site infection during laparoscopic assisted bowel resection.

Kercher et al conducted a retrospective case control study to determine the effect of plastic wound protectors on wound infection and tumour wound recurrence during laparoscopic assisted colectomy.¹ This study recruited 141 patients who underwent laparoscopic assisted colectomy between February 1999 and November 2002. The authors concluded that although the wound protector is a useful tool for mechanical retraction of small wounds, it does not significantly diminish the rate of wound infection. The study aim was clear and concise and the literature review was extensive. However the effect of multiple confounders on the study, which was rightly acknowledged by the authors and the inherent drawbacks of retrospective studies, makes the conclusion open to debate.

Horiuchi et al conducted a randomised control trial to assess whether plastic wound protectors would prevent surgical site infection.⁶ This study recruited 221 patients from September 2003 to August 2004 and concluded that a wound protective retractor may help reduce the incidence of wound infection at incision sites especially in patients undergoing colorectal surgery.

The aim of this study was clear, and the inclusion and exclusion criteria were reliable. All patients in the study had similar preoperative management, the surgical technique was similar and the operation was performed by senior surgeons or registrars under their direct supervision, which eliminated a significant confounder.

The follow up and data collection was thorough, all patients were accounted for, and the definition of wound infection in the study was explicit. This is a well conducted RCT with a low risk of bias and can be classified as level 1+ evidence, thereby giving the conclusion strong validity.

Sookhai et al conducted a randomised control trial to determine if impervious wound edge protector reduces postoperative wound infection in patients undergoing abdominal surgery, 352 patients were recruited into this study, and the allocation was 170 for wound edge protector and 182 with no wound edge protector.³ The authors came to the conclusion that the use of an impervious wound edge protector reduced postoperative wound infections. This is also a well conducted RCT, with significant elimination of bias giving it excellent rigour and reliability. This study can be classified as level 1+ evidence.

Nakagoe et al developed a plastic wound protector (Lap-protector) to resolve the problem of postoperative wound infection and port site recurrence and also conducted an uncontrolled trial on the wound protector to address the issue.⁷ 36 patients were involved in the study, with 28 of them having surgery for colon cancer and 8 for gastric cancer. The study was done between January and September 1999. It was concluded that the Lap-protector is a safe and useful device that may help to prevent infection and cancer cell contamination of the mini laparotomy wound. The authors of this study had a declared interest in the product which inserted a significant bias in their eventual conclusion.

Mohan et al conducted a prospective, observational, multi-centre study to assess the effect of exposing surgical incision site to bacteria using a plastic ring wound retractor in gastrointestinal surgery.⁸ The authors concluded that plastic wound retractors reduce wound exposure to enteric bacteria in gastrointestinal surgery. This study showed that enteric organisms were cultured twice as much from the inside of the wound retractor compared to the outside surface close to the skin.

This was a well conducted trial with good validity and rigour, although it was not specifically focused on laparoscopic colorectal resections, the authors' assertion in their conclusion can serve as a premise to base a change in practice on.

DISCUSSION

Surgical site infection is a major complication of any surgical procedure, but more especially in procedures involving entry into the gastrointestinal tract. Plastic wound protectors have been used by various practitioners to act as a barrier to wound contamination and infection with varied results. Maxwell et al was the first to comprehensively describe the theory behind the use of impervious wound protectors in 1969.⁹ Since then there

has been concerted efforts to produce the ideal equipment that can reduce wound site infection to the barest minimum. Laparoscopic colorectal surgery has been confirmed as a less invasive alternative to conventional open surgery, hence its popularity in current practice.¹⁰ Studies have confirmed the importance of impervious wound protectors in open colorectal surgery.^{11,12} From the critical review of the available literature, it is clear that there is a significant reduction in surgical site infection in laparoscopic assisted bowel resection through a minilaparotomy incision when a plastic wound protector is used. It is reasonable to conclude from the available evidence, that plastic/impervious wound protectors are useful not only for retraction, but are able to reduce incidence of surgical site infection in clean contaminated wound which is usually the case during laparoscopic assisted bowel resection.

CONCLUSION

Surgical site infection is a major bane of gastrointestinal surgery. Although laparoscopic colorectal surgery reduces risk of this complication, its occurrence is still well documented.¹³ This review is a confirmation that use of impervious wound protector during retrieval of specimen and extracorporeal anastomosis significantly reduces the risk of post operative wound infection. The evidence supporting reduction of port site metastasis when used is sparse.

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