

Port assisted closure of laparoscopic wound: A safe and feasible technique

This paper was presented as an abstract in Liver Update and is available as a supplement in the Medical Journal of Malaysia; December 2011: Vol. 66, p19.

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ABSTRACT

Objective: Various techniques and instruments have been developed to provide safe and secure closure of laparoscopic wounds. Herein we describe a simple method to close laparoscopic supraumbilical wounds with the aid of a laparoscopic port.

Method: This was a retrospective review of prospective data, which were from 151 patients who underwent laparoscopic cholecystectomy for symptomatic gallstone disease from December 2009 to December 2010 in Sultanah Bahiyah Hospital. A senior consultant hepato-pancreato-biliary (HPB) surgeon and two HPB trainee surgeons performed the operations. Postoperatively, all patients were followed up at 4 weeks.

Results: All patients successfully underwent closure of the supraumbilical wound with the assistance of a 5mm laparoscopic port. None of the patients had incisional hernia on follow up.

Conclusion: Port assisted closure of supraumbilical laparoscopic wounds is a feasible and safe technique.

KEY WORDS:

Port assisted closure, laparoscopic wound closure, laparoscopic cholecystectomy, trocar closure, laparoscopic umbilical wound

INTRODUCTION

Various techniques and instruments have been developed to provide safe and secure closure of laparoscopic wounds. Broadly, they can be divided into closure by means of intra-abdominal manipulation of special needles, extracorporeal wound closure under direct visualisation from within the abdomen utilising different devices, and closure during insufflation and after desufflation with carbon dioxide.¹ The single most crucial aspect of any method is the prevention of incisional hernia. Herein we describe a simple method to close supraumbilical wounds that involves use of laparoscopic port to assist in closure of the abdominal fascia.

MATERIALS AND METHODS

Study design

The objective of this study was to develop an alternative, safe, and feasible technique to close the fascial (linea alba) layer of laparoscopic supraumbilical wounds with the aid of a 5 mm laparoscopic port. This was a retrospective review of prospective data from 151 patients who underwent laparoscopic cholecystectomy (LC) for symptomatic gallstone disease from December 2009 to December 2010 in Sultanah Bahiyah Hospital. Laparoscopic cholecystectomies performed include two-incision three-port LC (TILC) and three-incision three-port LC. Informed consent was obtained from each patient and the study was approved by the hospital ethics committees. In all patients, the 1.5 to 2 cm supraumbilical wound was closed with the help of a 5 mm port. Post operatively, all patients were followed up at 4 weeks when the wound was evaluated by the HPB surgeons. Other parameters studied were the patient's demography, American Society of Anaesthesiology (ASA) classification and presence of diabetes mellitus (DM). SPSS version 18.0 was used for data entry and analysis.

Operative technique

Once the gallbladder was retrieved, ports were removed under direct visualisation. Carbon dioxide insufflation was stopped and the abdomen was decompressed. The wound was washed with normal saline. A J-needle Vicryl 0 (Johnson and Johnson, USA) was used to close the supraumbilical wound with the assistance of a 5 mm laparoscopic port under direct visualisation. During the procedure, the assistant stood on the patient's right side and the surgeon was on the patient's left side. The assistant's left hand retracted the wound with a Langenbach retractor, and the port was inserted into the wound with the right hand. The right hand then lifted the upper lip of the wound using the port and drew out the edge of the linea alba (Figure 1) with a small backward movement while maintaining upward traction. This manoeuvre, allowed the bowels and omentum to drop into the peritoneal cavity and avoid being caught by the needle (Figure 2). In the next step, the needle was driven into the visible edge of the upper lip of the linea alba. The needle can literally hit onto the port, which acted as a protector

This article was accepted: 3 August 2015

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Table I: Demographic characteristics

	n (%)			
Age (years) (range)	19 - 82			
Gender	Male	Female		
	58 (38.4%)	93 (61.6%)		
Race	Malay	Chinese	Indian	Others
	111 (73.5%)	30 (19.9%)	7 (4.6%)	3 (2.0%)
	Co-Morbidities			
	No DM	DM		
ASA	Class I	Class II		
	88 (58.3%)	63 (41.7%)		
Complications	No	Yes		
	150 (99.3%)	1 (0.07%)		

ASA: American Society of Anaesthesiology, DM: diabetes mellitus



Fig. 1: Retraction and lifting of the upper lip of the wound using the 5mm laparoscopic port.

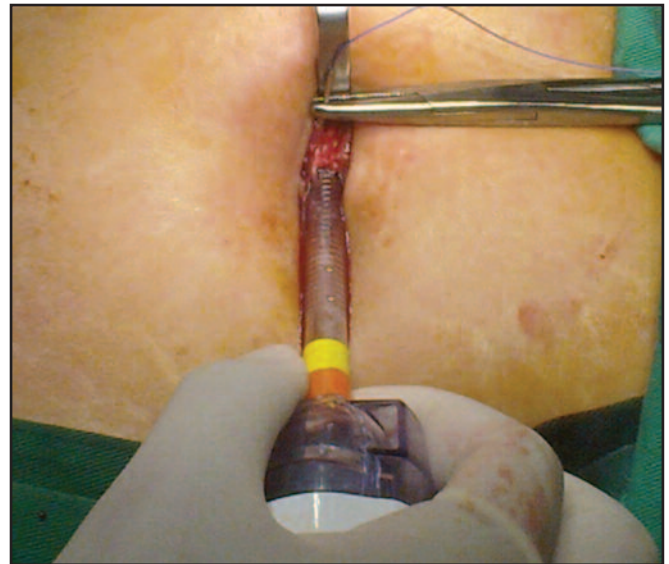


Fig. 2: The 5mm port is used to elevate the linea alba and to protect soft tissue from injury during suturing.

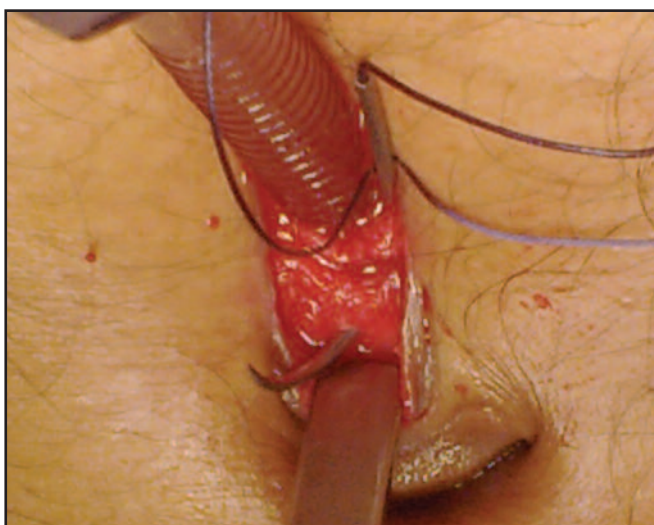


Fig. 3: Suturing the fascial edge of lower lip of the supraumbilical wound with upward traction of the port.

against the internal organs. The same process was repeated for the lower lip of the wound. The assistant then changed his or her hand for the similar manoeuvre (Figure 3). The 5 mm port could easily slide from side to side for stitching the fascia if the wound was bigger. The principle objective here was to close the linea alba sufficiently in order to prevent the occurrence of hernia. To do so, a figure-of-eight suturing and tie on the linea alba either interrupted or continuous method was used.

RESULTS

A total of 151 patients (93 females, 58 males) successfully underwent closure of the supraumbilical wound using a 5 mm laparoscopic port. The youngest patient was 19 years old and the oldest was 82 years old. Malay patients (n = 111) accounted for 73.5% of the subjects, followed by Chinese (30, 19.9%), Indian (7, 4.6%) and others (3, 2.0%). One hundred twelve (74.2%) of the patients had DM. Eighty-seven (58.3%) patients were ASA class I and 63 (41.7%) were ASA class II.

Only one (0.7%) patient developed post-operative wound infection, and it healed completely with dressing (Table I). There was no occurrence of incisional hernia noted at one-month follow up of any patient. We attempted to determine the long-term complication after 5 years of wound closure. The patients were contacted via telephone from February 2015 to May 2015. A total of 71 patients were contacted and all did not have swelling over the supraumbilical wound. The rest of the subjects were not contactable. They were called at least twice during the 3 months duration using different telephone number.

DISCUSSION

Many methods of port site closure after laparoscopy surgery have been described in the literatures. In his review article, Shaher categorised the techniques into three groups.¹ Techniques in the first group entail intra-abdominal manipulation of needles under direct visualisation to avoid visceral injuries and tools include the Maciol needles,² the Grice needle,³ catheter or spinal needles,^{4,6} the Endoclose device,⁷ and the Gor-Tex suture passer.⁸ Basically, these techniques involve manipulation of a set of needles that run through the fascia from one corner of the wound to another inside the abdomen under the guidance of a laparoscope and approximation of the wound using techniques such as the vertical mattress or purse-string suturing.

Closure techniques in the second group involve extracorporeal wound closure under direct visualization from within the abdomen. These methods include the Carter-Thomason CloseSure System,^{7,9} the Endo-Judge wound closure device,¹⁰ the disposable Tahoe Surgical Instrument ligature device,⁷ the eXit Disposable Puncture Closure device,⁷ the Auto Suture Mini Port Introducer¹¹ and simple closure aided by a 5 mm telescope.¹²⁻¹³ With these methods, special gadgets are used to manoeuvre the needles within the peritoneal cavity to close the wound under direct visualisation.

Techniques in the last group are also conducted under direct visualisation, and they can be used during insufflation and after desufflation with carbon dioxide. The suture carrier,^{14,15} the dual hemostat technique,^{16,17} the Lowsley retractor,⁷ Reverdin¹⁸ and Deschamps¹⁹ ligature needles, and the standard technique of hand-sutured closure using a CT-1 hernia type needle⁷ belong to this group of methods.

The advantage of the alternative technique described herein is that it requires only a simple laparoscopic port, routine operative instruments, and a non-complicated suturing method for wound closure. The required instruments are a 5 mm port, needle driver, Langenbach retractors, tooth forceps and absorbable Vicryl suture. The port serves as a wound retractor that protect vulnerable structures such as the omentum and small bowels from being injured during the wound closure process. The fascial edge can be visualised clearly with upward and backward traction movement prior to placing a stitch. The majority of techniques described above require use of special instruments or devices, and some of the technical skills required can be demanding. In our technique, carbon dioxide insufflation is not needed and the abdomen is decompressed prior to wound closure. Therefore, the duration of pneumoperitoneum is shortened which allows the anesthesiologist to prepare the patient for reversals of general anesthesia more quickly.

There was no incidence of hernia at short-term follow up in our study. Similar result was reported by the authors study on two-incision three-port laparoscopic cholecystectomy.²⁰ Nevertheless, we attempted to study the long-term complication over a 5-year period, but only approximately 50% of the patients were able to be contacted. The rest of the patients were lost to follow up. Of all the contacted subjects none has incisional hernia. As this is a limitation of the study, we hope to study the long-term complication of this technique in our subsequent studies on laparoscopic cholecystectomy. In conclusion, using laparoscopic port to assist closure of supraumbilical laparoscopic wounds is easy to learn. The technique is feasible and safe.

ACKNOWLEDGEMENTS

The authors would to express their heartfelt gratitude to the institutions and the patients who participated in this study.

CONFLICT OF INTEREST

The authors declare that there was no financial support or relationship that may pose conflict of interest in the execution of this study.

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