ORIGINAL ARTICLE

Outcomes of a modified open technique of umbilical camera port insertion in laparoscopic cholecystectomy

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Abstract

Objective: The aim of the study was toassess the safety and efficacy of a modified open technique of umbilical camera port insertion in laparoscopic cholecystectomy.

Material and Methods: This descriptive, observational study was carried out in a general surgery unit of Khyber Teaching Hospital, Peshawar over a period of two years, from January 2016 to December 2017. The modified open technique of camera port insertion was performed on 197 consecutive patients undergoing laparoscopic cholecystectomy. Patients were followed up for 6 months. Intraoperative complications (bowel and vascular injury) and postoperative complications (port site infection and port site hernia) were observed and documented on a structured proforma.

Results:Out of 185 cases, 3 cases (1.5%) were converted to open cholecystectomy and 9 cases (4.56%)were lost to follow up. Among the remaining 185 cases,72%(134) were females and 28%(51) were males. All patients belonged to the adult age group with the age varying between 20-65 years and mean age being 42.51±7.86 SD. Average time taken for trocar insertion was 1-2 minutes. No case of intraoperative bowel or vascular injury upon primary trocar insertion was observed. Two cases (1.08%)of port site infection and a single case (0.54%) of port site hernia were observed at 10 days and 6 months follow up respectively.

Conclusion: The outcomes of our study suggest that the modified open technique of umbilical camera port insertion is a safe and simple means of access to the peritoneal cavity and is promising in terms of fewer intraoperative and postoperative complications and cosmetically acceptable scars.

Keywords: Laparoscopic cholecystectomy, modified open technique of umbilical camera port insertion, vascular and bowel injury, port site infection, port site hernia

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Introduction:

To this date, laparoscopy remains one of the greatest achievements in the field of surgery.[1-3] Rapid recovery, reduced post-operative pain, fewer complications and cosmetically acceptable scars are few of its noteworthy benefits.[2,3] Prof Dr Erich Muhe of Germany (1985) and Mouret of France (1987); the pioneer surgeons to perform a laparoscopic cholecystectomy, laid the foundation of modern surgical practice.[4,5]

Laparoscopic cholecystectomy begins with gaining access to the peritoneal cavity by the creation of pneumo-peritoneum.[6,7] It is this crucial step which is fraught with complications, some of which may be life-threatening.[1-2,7-9] The two most common methods of primary port (camera port) insertion for peritoneal entry are the closed technique by Verres needle and the open or Hasson technique through an infra-umbilical or supra-umbilical incision. The former is routinely practiced and favoured by surgeons worldwide despite it's high rate of associated complications.[7,9-12] A consensus is yet to be established as to which is the more superior method.[7,13]

Figure 1:

Figure 2:

Figure 3:

In our study we report the outcomes of a modified open technique which utilizes the umbilical cicatrix for primary (camera) port insertion. The aim of our study was to analyze the safety and efficacy of this novel technique.

Operational definations:

1. Modified open technique: A surgical technique in which the primary trocar for the camera port is introduced through the umbilicus for the creation of pneumoperitoneum in laparoscopic cholecystectomy.[6,10]

2. Intra-operative Complications: Injury caused by trocar to the bowel or blood vessels at the time of surgery presenting as perforated gut and hematoma respectively in the first 24 hours after surgery.

3. Post-operative complications: The umbilicus will be observed for port site infection and port site hernia at 2 weeks and 6 months follow up respectively.

- Port site infection is defined as "incisional" Surgical Site Infection (SSI) which may be superficial; involving only skin and subcutaneous tissue or deep; involving fascia and muscle occurring within 30 days of surgery according to standard National Nosocomial Infections Surveillance (NNIS) System definitions given by the Centers for Disease Control and Prevention (CDC).[15]

- Port Site Hernia is defined as the development of an incisional hernia at the cannula insertion site and is of the late onset type presenting many months after surgery.[5]

Materials and Methods:

This descriptive observational study consisted of 197 patients who underwent laparoscopic cholecystectomy for symptomatic, uncomplicated cholelithiasis. They were operated by a single surgeon over a period of two years from January 2016 to December 2017. Patients with a previous history of lower midline laparotomy and those in whom laparoscopic cholecystectomy was converted to open were excluded from the study. All patients underwent conventional four-port laparoscopic cholecystectomy with application of the modified open technique of camera port insertion i.e. camera port inserted through umbilicus.

After the induction of anesthesia and proper positioning of the patient, the abdominal wall was prepared and draped. The umbilicus was meticulously cleaned with 10% povodine. The base of the umbilicus was grasped with a towel clip and by means of upward traction, the abdominal wall was lifted, thus everting and stretching the umbilicus.(figure-1) A small transverse incision with a 15mm blade was made within the scar of the umbilicus followed by cutting of the taut umbilical fascia.(figure-2) By means of an artery forceps, deep dissection was done under direct vision until the peritoneum became visible, which was then carefully breached with the artery forceps, whilst upward traction was being applied on the skin of the abdominal wall, thus ensuring that bowel and omentum were out of harm's way. A 10mm port with trocar was then inserted through the opening created in the umbilicus and pneumoperitoneum established. (figure-3) The port was fixed with Vicryl 2/0 suture. At the end of the surgery, the defect was closed with prolene 2/0 and integrity of the umbilical tissue was restored. The wound was dressed with antiseptic dressing.

Outcomes were defined in terms of intra-oper-

ative complications such as vascular and bowel injury at the time of port insertion and post-operative complications including port site infection and umbilical port site hernia at 10 days and 6 months follow up respectively. Findings were recorded on a structured proforma. Results were analysed using SPSS version 22. Frequencies were calculated for categorical variables while mean and standard deviation were calculated for continuous variables.

Resaults:

Out of 197 patients, three cases (3/197) were converted to open cholecystectomy. The reason for conversion was dense adhesions in the Calot's triangle leading to difficult dissection in two cases and bleeding from the gall bladder bed in the third case. Nine cases (9/197) did not come for follow up. These 12 patients were excluded from the study. Out of the remainder 185 cases, two-thirds of the population was females (134; 72%) and one-third males (51;28%). All patients were adults between the ages 20-65 years with a mean age of 42.51±7.86 SD. Average time taken for trocar insertion at the umbilical port was 1-2 minutes. No intra-operative complications (major vascular and visceral injury) were observed in the first 24 hours after surgery. Two cases (1.08%) of umbilical port-site infection were observed at 10 days follow up which resolved with empiricial oral antibiotics and regular wound wash. A single case of port site hernia (0.54%) was observed at 6 months follow up which was corrected surgically.

Discussion:

The utilization of the umbilical scar for the insertion of the primary (camera) port is a simple and safe technique. The basis of the technique lies in the anatomy and embryology of the umbilicus.[6] The umbilicus is the site of attachment of the umbilical cord; the main connection between the mother and the baby during intrauterine life. With the physiological herniation of the gut loops, the umbilical defect closes to form a narrow umbilical ring.[14] At the umbilicus, the peritoneum and the linea alba are fused together forming a single layer, making this area the thinnest part of the anterior abdominal wall. This explains the easy and rapid insertion of the trocar as was noted in our study.[6,14]

Furthermore, the scanty subcutaneous tissue and absence of muscle at the umbilicus[14] along with the presence of the umbilical stalk (a tough structure connecting the umbilicus to the linea alba and composed of obliterated umbilical vessels and urachus) make this area a relatively avascular zone;[1,6,10] hence the reduced incidence of vascular injury upon primary trocar insertion. No such complication was noted in our study. In the technique we described, continuous upward traction at the umbilicus with subsequent elevation of the abdominal wall while introducing the trocar, is itself a safety maneuver as it protects the underlying bowel from inadvertent injury.[6,10]

Literature is studded with comparisons done between the Verres technique and the Open Hassons technique of umbilical port insertion in terms of intra-operative complications.[6] A review published in the British Journal of Surgery reported rates of visceral and vascular injury to be 0.083% and 0.075% in the Verres technique and 0.048% and zero in the open technique respectively, thus establishing that the open method is safer to practice.[12] Similarly, in a meta analysis of 760,890 closed laparoscopy cases and 22,465 open laparoscopy cases, the incidence of vascular and bowel complications were reported to be 0.44% and 0.7% in the closed laparoscopy group and 0% and 0.5% in the open laparoscopy group respectively concluding that the Hasson technique should be used for primary port insertion.[7] We also utilized the open method but modified it to trans-umbilical instead of supra or infra-umbilical insertion with favourable results.

In the context of complications related to the umbilical port, studies reveal that the umbilical port-site is less favoured by surgeons as it is a source of infection[14] owing to its rich microbial flora[18] and a site for post-operative hernia formation.[2,3,20] In a study of 570 patients, out of the 3% who had port-site complications, 47% of them involved the umbilical port with port site infection being the commonest (10 cases; 5 in um-

bilical port) and hernia (1 case) being the rarest of complications.[2] In another study, umbilical port-site infection in cholecystectomy was reported to be 9%.[18]

Limited evidence is available on the modified open technique which we employed in our study as it is a new technique. In one study the transumbilical camera port insertion was performed on 284 children showing no intra-operative complications, a port site infection rate of 0.4% and hernia rate of 0.7%.[14] Another study reported zero intra-operative complications, seven cases of umbilical sepsis and zero cases of port site hernia out of the 80 cases subjected to the modified open technique.[10] Yet in another study done on 811 consecutive patients who underwent laparoscopic cholecystectomy, no intra-operative complications were observed.[6]

We report an infection rate of 1.08% in our study which is comparable to literature where rates are reported to be <2%. In a local study, it was found that infection rates were more in the epigastric port as compared to the umbilical port, despite it being notorious for harbouring flora responsible for infection.[15,18] The causes of umbilical port site infection are multifactorial[15] and can be addressed with proper preoperative sterilization techniques.[11,14] In our study a single case (0.54%) of port site hernia was observed; which literature also describes as a rare complication of laparoscopic surgery as evident by a systematic review which reported an incidence of 1.7% (range 0.3% to 5.4)[4] and a local study reporting a 1.1 % incidence of port site hernia.[16]

The umbilical cicatrix being burried, can easily conceal a surgical scar thus the trans-umbilical port insertion technique utilized in our study, had an added benefit of being scar less as compared to the infraumbilical and supraumbilical incision used in routine practice.[14,16]

Conclusion:

The modified open technique of primary port insertion utilizing the umbilical cicatrix is a promising technique owing to its simplicity and ease of access. The technique has proven to be safer and more efficientthan the closed method (Verres needle) of creating pneumoperitoneum. Moreover, it leaves practically no scar. If strict sterilization techniques are followed and the wound closure properly done, the incidence of post-operative infection and hernia can also be avoided.

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Role and contribution of authors:

Dr Attaullah Khan, Conception and design& acquisition of data.

Dr Tufail Ahmad, Literature search, Study design, wrote the introduction.

Dr Hizbullah Jan, Data collection, analysis and interpretation.

Dr Irum Sabir Ali, Data analysis anddrafting, helped in final approval.

Dr Misbah Riaz, Data management & interpretation, wrote the references.

Dr Mah Muneer Khan, final revision and critical evaluation of intellectual content

References:

1. Pryor A, Gracia G. Abdominal access techniques used in laparoscopic surgery. UpToDate. 2015.
2. Karthik S, Augustine AJ, Shibumon MM, Pai MV. Analysis of laparoscopic port site complications: A descriptive study. J Minim Access Surg. 2013;9(2):59-64
3. Bhutta AR, Waheed M, Mohsinali S, Abid KJ. Port Site Wound Hernias after Laproscopic Cholecystectomy. Biomedica. 2004;20(2):104,105
4. Bunting DM. Port-Site Hernia Following Laparoscopic Cholecystectomy. JSLS. 2010 ; 14(4): 490–497
5. Tonouchi H, Ohmori Y, Kobayashi M, Kusunoki M. Trocar site hernia. Arch Surg. 2004;139(11):1248-56.
6. Sadhu S, Jahangir TA, Sarkar S, Dubey SK, Roy MK. Open port placement through the umbilical cicatrix. Indian J Surg. 2009;71(5):273-5
7. Toro A, Mannino M, Cappello G, Di Stefano A, Di Carlo I. Comparison of two entry methods for laparoscopic port entry: technical point of view. Diagn Ther Endosc. 2012;2012:305428.
8. Ahmad G, Gent D, Henderson D, O'Flynn H, Phillips K, Watson A. Laparoscopic entry techniques. Cochrane Database Syst Rev. 2015;8:CD006583
9. Vilos GA, Ternamian A, Dempster J, Laberge PY. No. 193-Laparoscopic Entry: A Review of Techniques, Technologies, and Complications. J Obstet Gynaecol Can. 2017;39(7):e69-e84

10. Singh S, Rhezhii D. Laparoscopic Surgery: Results of a Modified Open Technique of Umbilical Port Insertion. World J Lap Surg 2015;8(3):72-74.
11. Lal P, Singh L, Agarwal PN, Kant R. Open Port Placement of the First Laparoscopic Port: A Safe Technique. JSLS. 2004; 8(4): 364–366
12. Bonjer HJ, Hazebroek EJ, Kazemier G, Giuffrida MC, Meijer WS, Lange JF. Open versus closed establishment of pneumoperitoneum in laparoscopic surgery. Br J Surg. 1997;84(5):599-602.
13. Merlin TL, Hiller JE, Maddern GJ, Jamieson GG, Brown AR, Kolbe A. Systematic review of the safety and effectiveness of methods used to establish pneumoperitoneum in laparoscopic surgery. Br J Surg. 2003;90(6):668-79
14. Smith CM, Tsang T. The ScarlessUmbilical Port Insertion (SUPI) Technique forLaparoscopic Surgery in Children. J Pediatr Surg.2015;9(3):13-16
15. Jan WA, Ali IS, Shah NA, Ghani A, Khan M, Khan AS.The frequency of the port site infection in laparoscopic cholecystectomies. J Postgrad Med Inst. 2008;22(1):66-70
16. Jamil M, Falah SQ, Marwat AA, Soomro MI. Port site hernia: a complication of minimal access surgery. Gomal J Med Sci 2016;14: 92-4.
17. Bakhteyar AK, Kumar B, Kumar P, Kumar S, Jawed S, Ansari H, et al. Scarless umbilical camera port incision in laparoscopic cholecystectomy. Int J Curr Res.2017;9,(12):63347-63349.
18. Neri V, Fersini A, Ambrosi A, Tartaglia N, Valentino TP. Umbilical Port-Site Complications in Laparoscopic Cholecystectomy: Role of Topical Antibiotic Therapy. JSLS. 2008;12(2):126-32.
19. Jansen FW, Kolkman W, Bakkum EA, de Kroon CD, Trimbos-Kemper TC, Trimbos JB. Complications of laparoscopy: an inquiry about closed- versus open-entry technique. Am J Obstet Gynecol. 2004; 190(3):634-8.
20. Agaba EA, Rainville H, Ikedilo O, Vemulapali P. Incidence of port-site incisional hernia after single incision laparoscopic surgery. JSLS. 2014;18(2):204-10