

Comparison of Periumbilical versus Intraumbilical Incision in Laparoscopic Appendectomy

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ABSTRACT

Objective: To compare the rate of wound complication of perforated appendicitis in intraumbilical versus periumbilical incision for laparoscopic appendectomy.

Study Design: Randomized Control Trail study.

Place and Duration of Study: This study was conducted at the General Surgery Department Bakhtawar Amin Hospital Multan, and Nishtar Hospital, Multan from 20 February 2018 to January 2019.

Materials and Methods: This randomized control has been performed upon 200 patients. They have been further categorized into intraumbilical (IU) and periumbilical (PU) group. Then the perioperative and post-operative outcomes of each group was determined and compared.

Results: The mean operative time, post-operative hospital stay, morphine equivalent, and visual analogous scale of IU group was 75.93 ± 2.87 minutes, 8.09 ± 3.06 days, 4.75 ± 1.37 mg and 4.94 ± 1.38 respectively. Wound infection, incisional hernia and internal organ injury was observed in $n=9$ (9.0%), $n=3$ (3.0%) and $n=5$ (5.0%) respectively. While, the mean operative time, post-operative hospital stay, morphine equivalent, and visual analogous scale of PU group was 81.20 ± 1.92 minutes, 6.54 ± 3.11 days, 4.09 ± 1.45 mg and 4.59 ± 1.80 respectively. Wound infection, incisional hernia and internal organ injury was observed in $n=5$ (5.0%), $n=6$ (6.0%) and $n=10$ (10.0%) respectively.

Conclusion: There is no difference in the rate of wound complication of intraumbilical or periumbilical incision. Nevertheless, the intraumbilical incision appears to be safer and expedient substitute for periumbilical incision which can be performed with more ease and yields better cosmetic results.

Key Words: Intraumbilical, Periumbilical, Laparoscopic Appendectomy, Wound Infection, Appendicitis.

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INTRODUCTION

One of the extensively adopted and largely accepted methods in the field of general surgery is the technique of general surgery¹. Creating pneumoperitoneum and placing the initial trocar safely are believed to be salient feature in the laparoscopic surgery. For the purpose of approaching laparoscope inside the abdominal cavity, a paraumbilical incision is usually is in practice². The incision is commonly U-shaped into the skin with the facial incision being linear. The site of incision is above or below the umbilicus. It pierces skin, subcutaneous fat and fascia.

Whereas in case of para umbilical incision, a linear vertical incision is made that extends from skin to fascia only up till the length of umbilical ring³. As there is only division of skin and fascia, the intraumbilical incision requires lesser time, lesser trauma and more ease in performing. The intraumbilical incision is in more frequent use being widely adapted for "single incision laparoscopic surgery" (SILS)⁴. This surgery is believed to be practical substitute of customary laparoscopic surgery providing more desirable cosmetic outcomes⁵.

As the umbilicus is placed at a deeper level than neighbouring abdominal wall it contains a greater number of bacteria⁶. Recently it has been found that there are about 1400 types of bacteria residing in umbilical bacterial culture. Previously, no study was done to compare the efficacy and rate of complications of intraumbilical and per-umbilical incision⁷. It has been hypothesized that after preparation for surgery, the inner part of umbilical ring as aseptic as the outer skin of umbilicus and rate of wound infection does not differ⁸. Also, the hypothesis was made regarding adequate closure of wound will lead to no aberration in the occurrence rate of incisional hernia^{9,10}.

It is seen that complication of wound of perforated appendicitis are greater than that of other simple

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laparoscopic procedures inclusive of non-perforated cases.

MATERIALS AND METHODS

The nature of study was Randomized Control Trial done on 200 patients of perforated appendicitis. The duration of study was from February 2018 to January 2019 in General surgery department of Bakhtawar Amin Hospital and Nishtar Hospital, Multan, by Consultant surgeons. Patients were allocated to periumbilical or intraumbilical group according to the surgeon's choice. Height, weight, BMI, gender, age and comorbidities of patients were recorded. The comorbidities included diabetes, hypertension, COPD, coronary artery disease. The outcome variables included length of hospital stay, rate of wound complication, intensity of pain in the patient assessed by visual analogue scale, quantity of analgesics required on first postoperative day.

Postoperative umbilical complications included any cases of wound infection, incisional hernia, and hematoma formation. Wound infection was defined as a state of localized erythema, edema, or heat, accompanied by subjective pain, with or without purulent discharge. An incisional hernia was defined as a protrusion or bulge present at or near the umbilical incision.

The recording of post-operative pain was done at 24 hours after the surgery. The evaluation of results was done by student's t-test or Chi-Square test. A P-value ≤ 0.05 was considered significant. The approval from Ethics committee was obtained.

Surgical Technique:

Before initiation of anesthesia, all the patients were administered 1st generation cephalosporins IV. Patients were again given antibiotics after termination of surgery. For intraumbilical incision, the umbilical was thoroughly cleaned with the help of cotton swabs by using alcohol. The evacuation of debris was done manually. With the help of betadine, skin preparation was made. Within the depression of umbilicus, a midline incision was given. Skin was retracted slightly on both sides with tissue forceps. The incision was then made till whole length of umbilicus. Since fascia lies directly beneath the skin of umbilicus, by minimal further dissection, approach to peritoneal cavity was made. 11mm trocar was easy to insert as no umbilical ring is more than 10mm in diameter. Laparoscopic using customary techniques was performed. Prevention from contamination of fascia or skin was done by retrieving the appendix from peritoneal cavity with the help of Lap-bag. Single absorbable suture was enough for closing the wound, not needing additional suturing for skin or subcutaneous fat. Full layer suture was made. The approximation of layers was assisted by single suture. A roll of gauze was inserted into the umbilicus, after which bandage was done. In case of periumbilical incision, a U-shaped incision was made

below the umbilicus. The dissection of subcutaneous fat was done and fascia was opened with electro-coagulation. After that, direct trocar was inserted or after insufflation with the help of Veress needle, the trocar was inserted. After completion of appendectomy, wound was closed in a layer to layer manner, while closing fascia, skin and subcutaneous fat separately. A drain was put into the pelvic cavity in case of perforation.

RESULTS

Two hundred patients were enrolled in this study, both genders. We further categorized the patients as intraumbilical, IU group and periumbilical, PU group. The mean age and BMI of IU group was 33.17 ± 2.22 years and 22.60 ± 1.81 kg/m² respectively. Gender distribution observed as n=73 (73%) males and n=27 (27%) females. Hypertension and diabetes was revealed in n=32 (32%) and n=12 (12%) patients for IU group, respectively. While, the mean age and BMI of PU group was 37.28 ± 3.01 years and 22.58 ± 1.81 kg/m² respectively. Gender distribution observed as n=29 (29%) males and n=71 (71%) females. Hypertension and diabetes was revealed in n=23 (23%) and n=14 (14%) patients for PU group, respectively. The difference was statistically insignificant except age (p=0.000). (Table. I).

The mean operative time, post-operative hospital stay, morphine equivalent, and visual analogous scale of IU group was 75.93 ± 2.87 minutes, 8.09 ± 3.06 days, 4.75 ± 1.37 mg and 4.94 ± 1.38 respectively. Wound infection, incisional hernia and internal organ injury was observed in n=9 (9.0%), n=3 (3.0%) and n=5 (5.0%) respectively. While, the mean operative time, post-operative hospital stay, morphine equivalent, and visual analogous scale of PU group was 81.20 ± 1.92 minutes, 6.54 ± 3.11 days, 4.09 ± 1.45 mg and 4.59 ± 1.80 respectively. Wound infection, incisional hernia and internal organ injury was observed in n=5 (5.0%), n=6 (6.0%) and n=10 (10.0%) respectively. The difference was statistically significant except visual analogous score (p=0.125), incisional hernia (p=0.306) and internal organ (p=0.179). (Table. 2).

Table No.I: Demographic Characteristics among the groups

Variable	IU Group n=100	PU Group n=100	P-value
Age (years)	33.17±2.22	37.28±3.01	0.000
BMI (kg/m ²)	22.60±1.81	22.58±1.81	0.938
Gender			
Male	n=73 (73%)	n=29 (29%)	0.753
Female	n=27 (27%)	n=71 (71%)	
Hypertension			
Presence	n=32 (32%)	n=23 (23%)	0.154
Diabetes			
Presence	n=12 (12%)	n=14 (14%)	0.854

*IU intraumbilical, PU= periumbilical, BMI=body mass index

Table No.2: Demographic Characteristics among the groups

Variable	IU Group n=100	PU Group n=100	P-value
Operative time (minutes)	75.93±2.87	81.20±1.92	0.000
Post-operative hospital stay (days)	8.09±3.06	6.54±3.11	0.000
Morphine equivalent (mg)	4.75±1.37	4.09±1.45	0.001
Visual analogous score	4.94±1.38	4.59±1.80	0.125
Wound infection	n=9 (9.0%)	n=5 (5.0%)	0.030
Incisional hernia	n=3 (3.0%)	n=6 (6.0%)	0.306
Internal organ	n=5 (5.0%)	n=10 (10.0%)	0.179

DISCUSSION

There are various management options for the acute appendicitis. Out of the options for surgery of acute appendicitis, the technique of laparoscopic appendectomy has beneficial effects over the conventional surgery says Sauerland S et al¹¹. It is believed that where resources and expertise are present and available, diagnostic laparoscopy as well as laparoscopic appendectomy is superior to open appendectomy. There are some trivial clinical effects of this technique, but they are minute and can be ignored. The authors recommend the use of laparoscopy for the diagnosis and surgery of acute appendicitis unless it is contraindicated or not available. It is suggested particularly in obese patients, in young females, and patients who are employed.

Single incision laparoscopy is widely being adapted in the field of surgery. The most common site for access into the abdominal cavity is through umbilicus. However, its shape and anatomy are modified during the procedure. A majority of the population is sensitive and concerned about the physical aspects of their umbilicus. Therefore, it is advised by Iranmanesh et al¹² care must be taken in selecting the patients for the laparoscopic procedure and minimally invasive surgical procedures should be performed in concerned patients. Peritoneal access is crucial step in laparoscopic surgery. It has been observed that intraumbilical incision is convenient and rapid to make. Nonetheless, due to greater risk of wound complication, the periumbilical incision is still in use. A study was done to compare the outcomes of these incisions in laparoscopic cholecystectomy¹³. The operating time and the cosmetic survey score were better in the intraumbilical incision. It was concluded that intraumbilical incision was “safe

and feasible method” to access the peritoneal cavity and it decrease the operating time while providing better cosmetic results to the patients.

Recently the technique of transumbilical laparoscopic assisted appendectomy (TULAA) has been introduced. A study¹⁴ has been performed in pediatric group who were suffering from appendicitis including advanced appendicitis, appendicoliths and retrocecal appendix. As a result, the patients’ average duration of stay in hospital was 1.2 days. There were no postoperative complications. It was cost effective and safe method as compared to conventional laparoscopy.

In the modern era, cosmesis and minimally invasive surgery are gaining more importance. In order to decrease the abdominal trauma and ameliorate the cosmetic effects, surgeons are now using single port laparoscopic appendectomy for acute appendicitis. A study was done upon 43 cases of appendectomy in which the umbilical incision was either infraumbilical or transumbilical¹⁵. It was observed that although the single port appendectomy needs more operative time, it produces better cosmetic outcomes. It is a feasible technique and can be used as an alternative for treatment of acute appendicitis.

A study by Cloutier AB et al¹⁶ was conducted comparing the efficacy of transumbilical versus periumbilical incision for laparoscopic appendectomy. In terms of postoperative cosmetic outcomes and operative time, no significant difference was observed in both the techniques. The results were alike for all tested outcomes.

When the technique of single incision transumbilical laparoscopy was put to test in appendectomy, it was found that this technique was successful in 73.1% of patients¹⁷. There was no need to convert it into open surgery. Whereas the time for surgery was recorded as 45.9 minutes and hospital stay was of 1.1 day on average. The rate of wound complication was only 1%. This technique of single incision transumbilical laparoscopy was rendered “safe, feasible and reproducible”.

A similar study was performed by Lee SY et al¹⁸ demonstrating the safety and efficacy of TOPLA (Transumbilical One Port Laparoscopic Appendectomy) over OA (open Appendectomy). The results showed remarkable reduction in operating time (6.15 min) as well as post-operative complications (0%) of TOPLA in comparison to OA which was 118 minutes and 9.8% respectively. Likewise, the need for IV analgesia was also lesser in TOPLA than OA. The technique was established as safe and effective for the surgeon in terms of simplicity and time efficacious as well as for patients in terms of better cosmetic outcomes.

As the umbilicus is deeper than its surrounding structures, it is known to have abundant number of bacteria. Hence, become a risk factor in post-operative complications of laparoscopic appendectomy. Lee JS Et

al¹⁹ compared the rate of wound complications and adverse effects of intraumbilical versus periumbilical incision for laparoscopic appendectomy. The results depicted no differences in the rate of operative time, hospital stay or analgesic requirements among the two groups. Whereas, one case was complicated by wound infection in intraumbilical and three cases were complicated in the periumbilical incision group. It was determined that although these two groups show no aberrations in results, however the technique of intraumbilical incision is regarded as “safe and feasible alternative” for periumbilical incision which is easy to perform and has satisfactory cosmetic outcome.

Similar results were obtained when Gogoi et al²⁰ conducted a study on this comparison. The technique of intraumbilical incision was once again declared safe and feasible, relatively easy to perform with better cosmesis.

CONCLUSION

There is no difference in the rate of wound complication of intraumbilical or periumbilical incision. Nevertheless, the intraumbilical incision appears to be safer and expedient substitute for periumbilical incision which can be performed with more ease and yields better cosmetic results.

Author's Contribution:

Concept & Design of Study: Muhammad Amjad Khan
 Drafting: Humara Gul
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 Revisiting Critically: Muhammad Amjad Khan, Humara Gul
 Final Approval of version: Muhammad Amjad Khan

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