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Original Research Article

COMPARISON OF POST-OPERATIVE HOSPITAL STAY IN PERIUMBILICAL AND INTRAUMBILICAL INCISION IN LAPAROSCOPIC APPENDECTOMY

REHMAN ZU[1], FAIZ U[2], BIBI B[3], KHAN MH[4], KHAN AB [5]

*[*1]Department of General Surgery, Saidu Medical College and Teaching Hospital, Swat, Pakistan*
[2]Department of General Surgery, Combined Military Hospital Peshawar, Pakistan
[3]Department of General Surgery, Health Inn Medical Centre, Peshawar, Pakistan
[4]Jinnah Medical College, Peshawar, Pakistan
[5]Bacha Khan Medical College/Mardan Medical Complex, Mardan, Pakistan
**Corresponding author email address: drziakhan82@gmail.com*

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ABSTRACT

Background: *Laparoscopic appendectomy is a common surgical procedure, and the choice of umbilical incision type may influence postoperative recovery. While intraumbilical (IU) and periumbilical (PU) incisions are both widely used, comparative evidence regarding their impact on hospital stay and patient outcomes remains limited.* ***Objective:*** *To compare the postoperative hospital stay between intraumbilical and periumbilical incisions in patients undergoing laparoscopic appendectomy.* ***Study Design:*** *Comparative study.* ***Setting:*** *Department of General Surgery, Saidu Medical College and Teaching Hospital, Swat, Pakistan.* ***Duration of Study:*** *July 2024 to January 2025.* ***Methods:*** *A total of 150 patients aged 18 years and above undergoing laparoscopic appendectomy were enrolled and randomly allocated into two groups: Group A (n = 75) received intraumbilical (IU) incisions, while Group B (n = 75) underwent periumbilical (PU) incisions. Standardized laparoscopic techniques were used across both groups. IU incisions were made vertically within the umbilicus, and PU incisions were placed curvilinearly above or below the umbilicus. Primary outcome measured was length of postoperative hospital stay. Secondary outcomes included operative time and postoperative pain scores (measured using a visual analogue scale). Statistical analysis was performed using independent sample t-tests, with $p < 0.05$ considered statistically significant.* ***Results:*** *The mean hospital stay in Group A (IU) was 5.52 ± 0.87 days, compared to 5.55 ± 0.94 days in Group B (PU) ($p = 0.85$). Mean operative time was 86.40 ± 3.55 minutes in Group A and 86.32 ± 3.76 minutes in Group B ($p = 0.89$), indicating no significant difference. Pain scores were slightly higher in Group A (3.69 ± 0.91) than in Group B (3.40 ± 0.91), reaching borderline statistical significance ($p = 0.05$).* ***Conclusion:*** *Intraumbilical and periumbilical incisions yield comparable clinical outcomes in laparoscopic appendectomy, with no significant differences in hospital stay or operative time. Although pain scores were marginally higher in the intraumbilical group, both techniques can be safely and effectively utilized based on surgeon preference and patient-specific considerations.*

Keywords: Laparoscopic Appendectomy, Intraumbilical Incision, Periumbilical Incision, Postoperative Outcomes, Surgical Complications

INTRODUCTION

Appendicitis symbolizes a frequently encountered surgical emergency. The lifetime risk for disease in United States is about 8% as well as seems to be rising in numerous low along with middle Human Development-Index Countries (1). Since its invention, appendectomy has emerged as one of most frequently performed emergency abdominal surgeries. Laparoscopic appendectomy (LA), which first became available in the early 1980s is linked for shorter hospital stays as well as reduced complication rates when compared with traditional appendectomy to uncomplicated appendicitis (2-4). The advantages of LA continue to be obvious in high-risk patient populations, such as obese as well as elderly individuals, as well as those with medical comorbidities (5). Numerous surgical societies presently endorse LA as the primary therapy for appendicitis (6).

A periumbilical incision is a frequently utilized technique for initial entry of laparoscope into abdomen (7). The periumbilical incision usually appears as U-shaped at skin, accompanied by linear incision in fascia. It is situated below or above the umbilicus, and it also penetrates skin, subcutaneous fat, and fascia. The intraumbilical incision is vertical linear incision that goes from skin to fascia, covering only length of the umbilical ring. As only skin as well as fascia require division, intraumbilical incision could be quicker, simpler to execute, as well as theoretically less invasive. The intraumbilical incision has become more utilized, particularly with rise in single incision laparoscopic surgery, and that has recently proven its viability as a favorable a substitute to conventional laparoscopic surgery providing enhanced cosmetic advantages (8-12). LA is a commonly utilized surgical method for addressing acute appendicitis featuring different techniques for specimen extraction, such as periumbilical and intraumbilical incisions. There is a scarcity of data that directly compares these both techniques effects on post-operative recovery, especially regarding the length of hospital stay; a vital measure of patient recovery, resource use, and healthcare expenses. This study seeks to assess and contrast the post-operative hospital stay associated with periumbilical and intraumbilical incisions in laparoscopic appendectomy, with the goal of identifying any significant benefits in terms of promoting quicker recovery and earlier discharge.

METHODOLOGY

The study was conducted as a comparative study at the department of Surgery from July 2024 to January 2025 Saidu Medical College and Teaching Hospital, Swat, Pakistan. In this study 150 patients aged 18 years or above who underwent laparoscopic appendectomy were selected. Patients were allocated into two groups based on the incision technique: intraumbilical (Group A n=75) and periumbilical (Group B n=75). Inclusion criteria encompassed patients who were diagnosed

with acute appendicitis confirmed through clinical evaluation laboratory findings and imaging studies. Patients with previous abdominal surgeries complicated appendicitis (e.g. perforation or abscess formation) immunosuppressive conditions or those requiring conversion to open surgery were not included. Surgical procedures were standardized and performed by experienced laparoscopic surgeons to maintain consistency. In Group A, a vertical intraumbilical incision was made within the umbilical depression allowing direct access to the fascia with minimal subcutaneous dissection. For Group B, a curvilinear periumbilical incision was placed either superior or inferior to the umbilicus followed by layered dissection through the subcutaneous tissue and fascia. Pneumoperitoneum was established using a Veress needle in both groups followed by trocar placement under direct visualization to minimize visceral injury. For all patients operative time was recorded. Postoperative monitoring included regular assessment of vital signs, pain scores using the visual analog scale (VAS) and documentation of complications such as wound infection and incisional hernia. Hospital stay duration was recorded from the day of surgery until discharge. Hospital stay was the primary outcome.

Data were analyzed with SPSS 24, with continuous variables expressed as mean ± standard deviation and categorical variables evaluated as frequencies and percentages. Independent t-tests and chi-square tests were employed for comparative analysis with a p-value of less than 0.05 considered statistically significant.

RESULTS

Our study included 150 patients undergoing laparoscopic appendectomy evenly divided into two groups, intraumbilical incision in group A and periumbilical incision in group B. Demographic characteristics were comparable between the groups. Mean age of patients in Group A was 39.13±12.94 years while Group B had a slightly younger cohort with 37.55±11.21 years. Body mass index (BMI) was similar across both groups averaging 24.40±1.63 kg/m² in Group A and 24.60±1.62 kg/m² in Group B.

Gender distribution revealed a male predominance with 45 (60.0%) males in Group A and 48 (64.0%) in Group B. Females accounted for 30 (40.0%) and 27 (36.0%) of the cohorts respectively (Figure 1). Comorbidities such as hypertension and diabetes were present in 20 (26.7%) and 12 (16.0%) of Group A patients compared to 14 (18.7%) and 13 (17.3%) in Group B (Table 1).

Postoperative outcomes demonstrated no notable differences in operative duration, which was nearly identical averaging 86.40±3.55 minutes in Group A and 86.32±3.76 minutes in Group B (p=0.85). The mean hospital stay was 5.52±0.87 days for Group A and 5.55±0.94 days for Group B (p=0.89). However pain scores on the visual analog scale (VAS) were marginally higher for Group A 3.69±0.91 compared to Group B 3.40±0.91, with a borderline statistical significance (p=0.05) (Table 2).

Wound infections occurred in 9 (12.0%) patients in Group A and 6 (8.0%) in Group B. Incisional hernias were rare observed in 4 (5.3%) and 3 (4.0%) of Groups A and B respectively (p=0.64) (Table 3).

Table 1: Demographics and comorbidities

Demographics and comorbidities		Groups			
		Group A (IU)		Group B (PU)	
		N	%	N	%
Gender	Male	45	60.0%	48	64.0%
	Female	30	40.0%	27	36.0%
Socioeconomic status	Low	10	13.3%	17	22.7%
	Middle	55	73.3%	42	56.0%
	High	10	13.3%	16	21.3%
Residence	Urban	47	62.7%	40	53.3%
	Rural	28	37.3%	35	46.7%
Hypertension	Yes	20	26.7%	14	18.7%
	No	55	73.3%	61	81.3%
Diabetes	Yes	12	16.0%	13	17.3%
	No	63	84.0%	62	82.7%

Table 2: Comparison of postop hospital stay between both groups

	Groups	N	Mean	Std. Deviation	P value
Operative time (Mins)	Group A (IU)	75	86.40	3.556	0.89
	Group B (PU)	75	86.32	3.764	
Postoperative hospital stay (Days)	Group A (IU)	75	5.52	.875	0.85
	Group B (PU)	75	5.55	.949	
Pain on VAS	Group A (IU)	75	3.69	.915	0.05
	Group B (PU)	75	3.40	.915	

Table 3: Complications

Complications	Groups				P value
	Group A (IU)		Group B (PU)		
	N	%	N	%	
Wound infection	9	12.0%	6	8.0%	0.64
Incisional hernia	4	5.3%	3	4.0%	
No complication	62	82.7%	66	88.0%	

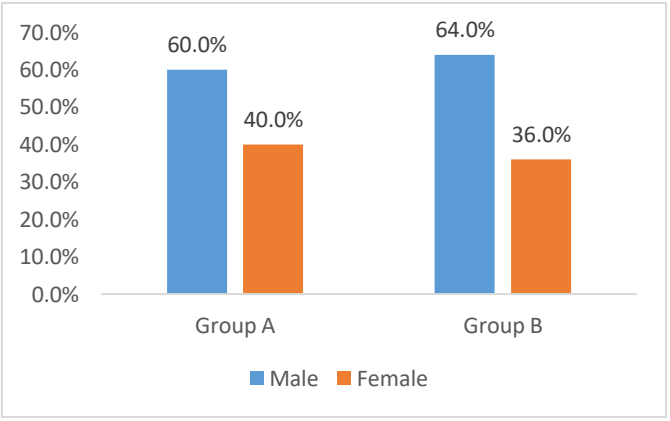

Figure 1: Gender distribution

DISCUSSION

Our results showed no notable difference in postoperative hospital stay between IU (5.52±0.87 days) and PU (5.55±0.94 days) groups, which is consistent with the findings of Athar et al who reported similar durations (IU: 6.17±1.84 vs. PU: 6.34±1.91 days p=0.531) (14). However Khan et al observed a slightly longer stay in the IU group (8.09±3.06 days) compared to PU (6.54±3.11 days p=0.000) possibly due to differences in patient selection or postoperative care protocols (15). Operative time in our study was nearly identical between groups IU: 86.40±3.55 vs. PU: 86.32±3.76 minutes, corroborating with Athar et al. who found no notable difference between operating time in both groups (14). In contrast Lee et al.

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reported marginally shorter operative duration for IU (74.9 minutes) compared to PU (80.8 minutes), though this did not reach statistical implication (p=0.073) (16). These variations may stem from surgical expertise patient demographics or methodological differences.

Pain assessment via the visual analog scale (VAS) revealed marginally higher scores in the IU group compared to PU. This aligns with Athar et al. where pain scores were similar across the groups but slightly higher in IU group (14). However Khan et al reported higher pain scores in IU than PU though not statistically notable (p=0.125) (15). The slight elevation in pain in our IU group may relate to the incision's deeper placement within the umbilicus potentially affecting nerve endings more than the PU approach. Nevertheless the clinical relevance of this difference remains debatable as analgesic requirements were not notably different in our study or others.

Wound infection rates in our study were 12.0% for IU and 8.0% for PU (p=0.64) aligning with Athar et al. (2022) who reported 13.9% in IU group and 11.8% in PU group (p=0.655) (14). Lee et al reported 0.6% in IU group and 2.5% (p=0.319) in PU group.[16] Khan et al reported a different trend 9.0% in IU and 5.0% in PU group (p=0.030). The slightly higher infection rates in IU groups across studies may be attributed to the umbilicus's bacterial load. However proper preoperative sterilization as emphasized can mitigate this risk.

Incisional hernia rates were low in our study (IU: 5.3% vs. PU: 4.0%), which is consistent with Athar et al. they reported 6.1% in IU vs. 7.1% in PU group (14). Khan et al. reported 3.0% in IU group vs. 6.0% in PU group (15). These findings suggest that both techniques are comparable in terms of hernia risk provided fascial closure is meticulous.

Although our study did not evaluate cosmesis, in their research, Maity et al demonstrated superior cosmetic outcomes with IU incisions (17). Lee et al also highlighted IU's aesthetic advantage as scars remain concealed within the umbilical folds (16). Technically IU incisions may be simpler due to their direct fascial access as noted by Lee et al. who reported easier peritoneal entry with IU (16).

Our findings alongside prior studies suggest that IU and PU incisions exhibit comparable outcomes in laparoscopic appendectomy. The lack of notable differences in hospital stay, operative time and major complications supports the safety of both techniques.

CONCLUSION

In conclusion, both IU and PU incisions are viable options for laparoscopic appendectomy with no clinically notable differences in hospital stay along with operative efficiency or complication rates. The choice between techniques should consider surgeon experience patient anatomy and cosmetic preferences. Our study reinforces the safety of both approaches while highlighting areas for further refinement in pain management and infection control.

DECLARATIONS

Data Availability Statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned. (IRBEC_24)

Consent for publication

Approved

Funding

Not applicable

CONFLICT OF INTEREST

The authors declared an absence of conflict of interest.

AUTHOR CONTRIBUTION

ZIA UR REHMAN (Assistant Professor)

Conception of the study, development of research methodology, study design, critical revision of the manuscript, and final approval of the manuscript.

Final approval of the manuscript and provided significant intellectual input.

UMER FAIZ (Resident Surgeon)

Data entry, Data Analysis, Study design, and Critical Input Interpretation of data.

BAREERA BIBI (Medical Officer)

Manuscript revisions and critical review for important intellectual content.

MIAN HAIDER KHAN (Demonstrator)

Review of literature

ABDUL BASIT KHAN (Trainee Medical Officer)

Critical Input and literature review

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