

## A PROSPECTIVE STUDY TO COMPARE THE POST-OPERATIVE PAIN AND POST-OPERATIVE COMPLICATIONS IN CONVENTIONAL GRID IRON AND TRANSVERSE CREASE COSMETIC INCISION APPENDECTOMY

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### ABSTRACT

**Objective:** The objective of our study is to compare the conventional grid iron incision with transverse crease cosmetic incision in terms of post-operative pain, mean operating time, duration of hospital stay, and post-operative complications.

**Methods:** This is a prospective and comparative study and was carried out between December 2021 and November 2022. During the study period, 50 patients presented to surgical outdoor and emergency at PBM hospital, Bikaner, with clinical presentation and eventual radiological diagnosis of acute appendicitis were enrolled in the study and were randomly allocated to two groups including grid iron=25 and transverse crease=25. All patients were contacted 1 week and 2 months after surgery and the efficacy of grid iron and transverse crease incision in terms of post-operative pain, mean operating time, duration of stay in hospital, and post-operative complications.

**Results:** Post-operative pain, duration of stay in hospital (mean stay for grid iron group=4.32 vs. transverse crease group=2.16 days), and operating time (mean operating time for grid iron group=33 min vs. transverse crease group was 20.3 min) were significantly lower in cases of transverse crease incision as compared to grid iron cases. Post-operative complications were lesser in transverse crease incision but were not very significant as compared to grid iron incision.

**Conclusion:** Open appendectomy using transverse crease cosmetic incision was superior to conventional grid iron incision in terms of post-operative pain, operating time, duration of hospital stay, blood loss, and post-operative complications.

**Keywords:** Appendectomy, Conventional, Transverse crease cosmetic incision.

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### INTRODUCTION

Acute appendicitis is one of the most common causes of acute abdomen encountered in surgical practice, requiring emergency surgery. The lifetime risk of acute appendicitis for men and women is 8.6% and 6.7%, respectively. The lifetime rate of appendectomy is 12% in men and 25% in women [1,2]. Most patients with acute appendicitis are managed by prompt surgical removal of the appendix. The operative treatment of appendicitis was first performed over a 100 years ago (McBurney, 1894).

The general technique of open appendectomy has changed only in minor details over the years. Mc Burney's grid iron incision for Appendectomy remained incision of choice even after more than one century since it was devised. Subsequently, few more incisions have been devised such as Rocky Dave's, Rutherford Morison's, Battle's incision, and lately Lanz incision.

The strong desire of patients especially females to avoid abdominal scar has encouraged many surgeons to use a variety of incisions for abdominal visceral surgery that is hidden from exposure [3]. To outline the benefits of conventional grid iron incision and transverse cosmetic crease incision, we are presenting a comparative study between the two incisions in terms of duration of surgery, post-operative pain, post-operative complications, and post-operative hospital stay duration.

### Aims and Objectives

The aim of the study was to compare the post-operative pain and post-operative complications in conventional grid iron and transverse crease cosmetic incision appendectomy.

### METHODS

This is a prospective and comparative study carried out between December 2021 and November 2022 at the Department of General Surgery, Sardar Patel Medical College and associated group of hospitals, Bikaner. Fifty patients (with 15–65 years of age) were included in the study who presented to surgical outdoor with clinical presentation and eventual radiological diagnosis of acute appendicitis.

Patients were randomly divided into two groups with 25 patients in each group and were operated for open appendectomy. One group labeled as Group G was operated through conventional grid iron incision and another group labeled as Group L was operated through transverse cosmetic crease incision. Patients were followed up for 3 months. Comparison was done on the basis of the mean operating time, post-operative pain scores, post-operative duration of analgesics used, post-operative duration of hospital stay, and post-operative complications experienced in two groups. All adult patients diagnosed with acute appendicitis concluded by clinical evaluation and confirmed by USG of abdomen requiring operative intervention, after obtaining the consent to be included in the study.

Patients with associated gynecological disease, patient age <12 years, appendicular abscess, and appendicular lump were excluded from the study.

### Operative technique

In conventional grid iron group, we used the standard grid iron incision 6–8 cm in length and the procedure was completed with standard steps. Whereas in transverse crease group, 2–3 cm length incision was made at the point 2 cm below umbilicus centered on the midclavicular-midinguinal line and the rest of the procedure was performed with standard steps.



Transverse cosmetic crease incision

The investigation was started after receiving ethical approval from the institute. Written informed consent was obtained from all the study subjects.

## RESULTS

After analysis of the data obtained from the two groups on various parameters, following results were obtained.

In our study, we observed that the mean operating time was 33.0 min in the case of Group G and 20.64 min in the case of Group L (Table 1).

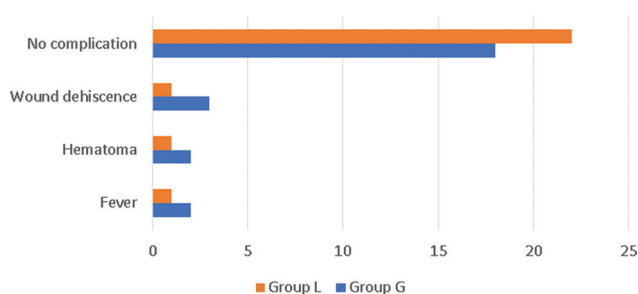
It was observed in our study that the average pain score on 1<sup>st</sup> post-operative day for Group G was more as compared to patients in Group L. Whereas the average pain score for patients in Group G was same as in Group L when the patient was discharged from the hospital (Table 2).

The results seen in our study showed that the number of days for which the patient was administered, analgesic was more in the case of Group G with average being 3.4 days whereas it was 1.44 days in the case of Group L (Table 3).

Our study depicts that the average duration of stay in the hospital during the post-operative period was more in the case of patients in Group G than patients in Group L. Average duration of post-operative hospital stay was 4.60 days in the case of Group G and 2.12 days in the case of Group L (Table 4).

In our study, we observed that the complications reported in the case of Group G patient was more as compared to Group L. Fever as a post-operative complication was reported in two patients in Group G as compared to one patient in Group L. Hematoma as a complication was reported in two patients of Group G and only one patient of Group L. Wound dehiscence was reported in three patients of Group G and only one patient of Group L. No complication was reported in 18 patients of Group G and 22 patients of Group L (Table 5).

**Comparison of cases according to postoperative complications experienced in the two groups**



**Table 1: Comparison of cases according to operating time between the two groups (n=50)**

Operating time (in minutes)	Mean (SD)		p-value
	Group G	Group L	
	33.00 (4.17)	20.64 (3.97)	<0.001

SD: Standard deviation

**Table 2: Comparison of cases according to pain scores between the two groups at each interval (n=50)**

VRS score	Median (IQR)	
	Group G	Group L
Pain on first POD	3.00 (3.00–4.00)	2.00 (2.00–3.00)
Pain on discharge	1.00 (1.00–1.00)	1.00 (1.00–1.00)

**Table 3: Comparison of cases according to duration of IV analgesics administered between the two groups (n=50)**

Duration of IV analgesics administered (in days)	Mean (SD)		p-value
	Group G	Group L	
	3.20 (0.96)	1.44 (0.77)	<0.001

SD: Standard deviation

**Table 4: Comparison of cases according to duration of hospital stay between the two groups (n=50)**

Duration of hospital stay (in days)	Mean (SD)		p-value
	Group G	Group L	
	4.60 (1.32)	2.12 (1.05)	<0.001

SD: Standard deviation

**Table 5: Comparison of cases according to post-operative complications experienced in the two groups (n=50)**

Presenting complaint	Number of cases		p-value
	Group G	Group L	
Fever	2	1	0.551
Hematoma	2	1	0.551
Wound dehiscence	3	1	0.297
No complication	18	22	0.157

## DISCUSSION

In our study, we compared the two incisions in terms of average operating time, post-operative pain score, post-operative duration of hospital stay, and post-operative complications.

We observed in our study that the average operating time of transverse crease incision patients was 20.64 min against the 33.00 min in patients operated through the conventional grid iron incision. The results were similar to the study by Bhasin *et al.* [4] where the average operating time for mini appendectomy was 11.4 min against the 26.4 min in conventional grid iron incision but the results were different from the study by Selvarajan [1] where the operating time for Group A conventional grid iron was 54.6±12.4 min against the 58.6±11.7 min in Group B small incision appendectomy patients.

In our study, the mean post-operative pain score (0–4) was recorded at the end of 24 h for conventional grid iron group was 3.16±0.32 and for transverse crease group appendectomy was 2.72±0.28. The parameter

difference was significant with  $p < 0.0001$ . Similar results were seen in Selvarajan study where the post-operative pain score (visual analog scale) on day 1 was reported to be higher ( $5.7 \pm 0.34$ ) in conventional group as compared to the small incision group ( $4.4 \pm 0.21$ ).

In our study, we also found out that the duration of analgesics used was more in the case of conventional grid iron group with average 3.20 days which was more as compared to the transverse crease group with average 1.44 days, this difference was statistically significant with  $p < 0.001$ . Similar results were seen in Bhasin *et al.* study where analgesics used in mini appendectomy were less, that is, 2.13 doses against 4.2 doses in conventional appendectomy group. Similarly in Javadi *et al.* [5] study, the amount of analgesics administered during the hospital stay in small access group ( $110 \pm 29.2$  mg) was lower than the conventional appendectomy group ( $134 \pm 29.7$  mg).

The post-operative duration of hospital stay was also compared between the two groups in our study. The duration was significantly lower in the transverse crease group with an average of 2.12 days as compared to an average stay of 4.60 days in the case of conventional appendectomy group. The difference was statistically significant with  $p < 0.001$ . The study by Selvarajan also similar results was seen where the average stay in the case of conventional group was  $3.6 \pm 1.2$  days compared to  $2.7 \pm 1.1$  days in the case of small incision appendectomy. In the study by Bhasin *et al.*, results were similar to those of our study where the average hospital stay was 2.14 days in patients of mini appendectomy against the 4.34 days in case of conventional appendectomy.

The overall incidence of post-operative complications was quite comparable in both the groups in our study. In total eight patients in Group G and three patients in Group L suffered from post-operative complications. Two patients (8%) in conventional grid iron group and 1 patient (4%) in transverse crease group reported of post-operative fever and p-value being 0.551. Whereas in Bhasin *et al.* study, 10 patients (5%) in conventional group and 3 patients (1.5%) in mini appendectomy group had post-operative fever.

Hematoma as a post-operative complication was reported in 2 patients (8%) of grid iron incision group and 1 patient (4%) of transverse group in our study with p-value being 0.551. Whereas in study by Bhasin *et al.* only 1 patient (0.5%) of mini appendectomy group had hematoma as a complication and no patient of conventional group reported hematoma as a complication.

In our study, wound dehiscence and infection was reported in 3 patients (12%) of grid iron incision group and 1 patient (4%) of transverse crease group with p-value being 0.297. In Selvarajan study, wound infection was reported in 2 patients (5%) patients of Group A and 1 patient (2.5%) of Group B also 1 patient of Group A had wound dehiscence whereas no patient of Group B reported dehiscence as a post-operative complication. In Javadi *et al.* study, wound infection as a post-operative complication was reported in 2 patients (5%) of small access group and 1 patient (3%) of conventional group.

## CONCLUSION

In this study, a total of 50 patients were evaluated. The average operating time was lesser for transverse crease group patients as compared to the grid iron group patients. The mean post-operative score at the end of 24 h was lesser in transverse crease group patients as compared to the grid iron group patients. The post-operative duration of hospital stay was significantly lower in patients operated through the transverse crease group as compared to grid iron group. The overall incidence of post-operative complications such as wound dehiscence or infection, hematoma, and fever was comparable in both the groups with slightly higher incidence of complications in grid iron group patients as compared to those operated through transverse crease group.

We conclude that the transverse crease incision of appendectomy is better than the grid iron incision method for acute or recurrent appendicitis, with less post-operative pain, reduced duration of analgesics used, shorter duration of hospital stay, and lesser average operating time.

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## AUTHORS' CONTRIBUTION

All the authors have contributed equally.

## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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