

## A COMPARATIVE STUDY ON LAPAROSCOPIC APPENDICECTOMY VERSUS OPEN APPENDICECTOMY IN A TERTIARY CARE CENTRE OF NORTH EASTERN PART OF INDIA

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### Abstract

**Background:** Acute appendicitis is not only the most common abdominal emergency worldwide but also most common cause of abdominal surgeries in all the age groups. The surgical approach is mainstay but better outcome is absolute hence we planned a study to compare the surgical outcomes of two different methods; laparoscopic (LA) and open appendectomy(OA) in acute appendicitis in north eastern part of India.**Materials and Methods:** It was a Prospective comparative study with duration of One year (from Mar 2023 to Feb 2024) at Department of General Surgery, Jorhat Medical College, Jorhat, Assam. Total 80 patients of both sexes were included in the study. **Results:** LA was associated with shorter hospital stay ( $3.1 \pm 0.49$  days in LA vs  $4.32 \pm 0.65$  days in OA) with lesser need for analgesia ( $2.8 \pm 0.72$  doses in LA vs  $4.9 \pm 1.08$  doses in OA) and also lesser post-operative complications (5% in LA vs 25% in OA). However operative time was significantly shorter in OA as compared to LA ( $34.7 \pm 4.12$  minutes in OA vs  $55.05 \pm 4.5$  minutes in LA).e. **Conclusion:** Our study showed that LA emerges as a favorable option for the management of acute appendicitis in north eastern part of indian tertiary care setting. It offers patients faster recovery, fewer complications, and higher satisfaction rates compared to open surgery.

## INTRODUCTION

Appendicitis is the inflammation of the vermiform appendix.<sup>[1]</sup>Acute appendicitis (AA) is not only the most common abdominal emergency worldwide but also most common cause of abdominal surgeries in all the age groups.<sup>[2]</sup>Appendicitis has an overall lifetime risk of 8.6% in men and 6.7% in women.<sup>[2]</sup>The first appendectomy was reported in 1735 by a French sur- geon, Claudius Amyand, who identified and successfully removed the appendix of an 11-year-old boy that was found within an inguinal hernia sac. The first formal description of the disease process, including the clinical features and a recommendation for prompt surgical removal, was in 1886 by Reginald Fitz.<sup>[3]</sup>Since its description by McBurney, of his classical muscle splitting incision and technique of removal of appendix in 1894, open appendectomy (OA) has become the procedure of choice for acute appendicitis.<sup>[4]</sup> The field of surgery has dramatically changed since the

advent of laparoscopy. Laparoscopic appendectomy (LA) was first introduced by Kurt Semm in 1982, though he advocated not using in acute inflammation, but due to better availability of technology and instruments and growing emphasis on minimally invasive surgery, appendectomy can be safely performed in both acutely inflamed and non-inflamed appendix. It has gained much popularity among surgeons because of the use of minimally invasive techniques, but some remain skeptical about its use instead of open appendectomy.<sup>[5]</sup>Those who criticize LA cite the increased operative costs of using disposable instruments. Other criticisms of laparoscopic appendectomy target the increased operating time and increased incidence of intra-abdominal abscesses, particularly in cases of a perforated appendix.<sup>[6]</sup>Proponents of LA claim the procedure yields improved wound healing, reduced postoperative pain, and earlier discharge from the hospital, with an earlier return to normal activities.

The aim of this study is to compare the clinical outcome (operation duration, hospital stay, analgesia requirement, post-operative complications) between OA versus LA.

## MATERIALS AND METHODS

A prospective comparative study of patients admitted in a single institute (Department of General surgery, Jorhat Medical College and Hospital, Jorhat, Assam) between March 2023 to February 2024 with the diagnosis of Acute or recurrent appendicitis in the age group of both sexes 13 to 55 years was conducted. Pregnant women, hemodynamic unstable patients, patients with chronic medical illness (CAD, COPD), generalized peritonitis patients were excluded. The decision on the type of operation was made according to the preference of the patient and experience of the surgical team.

The study protocol was approved by Institutional ethics committee at Jorhat medical college and Hospital Jorhat, Assam, India (Approval No. SMEJ/JMCH/MEU/841/Pt-2/2011/965, Dated 17/02/2023). Informed consent was taken from each enrolled patient of the study. A total of 80 patients who met the inclusion criteria was chosen for the study, and were divided into two groups: OA group and LA group. Both groups were prepared for operation according to the standard protocol of the hospital and relevant data was collected including: demographic data, initial laboratory findings, operation time, post-operative hospital stay, post-operative pain, amount of analgesia and post-operative complications. OA was performed through a standard McBurney Grid iron incision. After incision, abdomen is opened in layers to deliver the appendix and removed after ligating the mesoappendix and base of appendix with non-absorbable sutures. For LA, a 3-port technique was

used, pneumoperitoneum (12-14mm Hg carbon dioxide) was created by peri-umbilical Hasson's open technique and a 10mm port inserted, two 5mm port was made one each in right and left iliac fossa. Mesoappendix divided with bipolar forceps or ultrasonic scissor, the base ligated with 1-0 catgut endoloop and specimen was retrieved using a retrieval bag via the 10mm umbilical port, using 5mm telescope through RIF port. Oral feed started on return of bowel movements, and patients were discharged once they are able to take oral meal, afebrile, and pain is under control with oral medications.

## RESULTS

Out of 80 patients with appendicitis, 40 patients underwent OA and 40 patients underwent LA. Comparison between the two groups in terms of demographics (age and sex) showed male more than female. [Table 1]

In our study we found the mean  $\pm$  standard deviation (SD) of 55.05  $\pm$  4.5 min for the LA group was longer than the mean operative time of 34.7  $\pm$  4.12 min for OA group. ( $p < 0.0001$ ). [Table 2]

The Laparoscopy group required fewer doses of parenteral analgesics in the post-operative period compared with open group ( $p < 0.0001$ ). [Table 3]

We observed a higher rate of complication in Open group as compared with the laparoscopy group. A total of 2 complication (vomiting, paralytic ileus, intra-abdominal abscess, wound infection and hemoperitoneum) occurred in the laparoscopy study group of 40, while 10 patients had complications in the open group. ( $p < 0.0122$ ). [Table 4]

Hospital stay was significantly shorter in laparoscopy group with a mean of 3.1  $\pm$  0.49 days compared with 4.32  $\pm$  0.65 days in open group. ( $p < 0.0001$ ). [Table 5]

**Table 1: Distribution of mean Duration of operative procedure (minute): Type of Surgery**

Sex	open appendectomy (40)	laparoscopic appendectomy (40)	Total (80)
Male	26	29	55 (68.75%)
Female	14	11	25(31.25%)

**Table 2: Distribution of mean Duration of operative procedure (minute): Type of Surgery**

Duration of operative procedure (minute)		Number	Mean	SD	Minimum	Maximum	Median	p-value
		Laparoscopic Appendectomy	40	55.050 0	4.5118	45.0000	67.0000	
Open Appendectomy	40	34.700 0	4.1275	29.0000	47.0000	35.0000		

**Table 3: Distribution of mean Post-operative analgesia (number of dosage): Type of Surgery**

Post-operative analgesia (number of dosage)		Number	Mean	SD	Minimum	Maximum	Median	p-value
		Laparoscopic Appendectomy	40	2.875 0	.7228	2.0000	5.0000	
Open Appendectomy	40	4.950 0	1.084 9	3.0000	8.0000	5.0000		

**Table 4: Association between Post-operative complications: Type of Surgery**

Post-operative complications	Type of anesthesia			Statistic finding
	Laparoscopic Appendicectomy	Open Appendicectomy	TOTAL	
Absent	38	30	68	Chi-square value: 6.2745;p- value:0.0122 Oddsratio:6.3333 (1.2891, 31.1158)
Present	2	10	12	
TOTAL	40	40	80	

**Table 5: Distribution of mean Duration of hospital stay (in days): Type of Surgery**

Duration of hospital stay (in days)		Number	Mean	SD	Minimum	Maximum	Median	p-value
Duration of hospital stay (in days)	Laparoscopic Appendicectomy	40	3.100 0	.496 1	2.0000	4.0000	3.0000	<0.000 1
	Open Appendicectomy	40	4.325 0	.655 8	3.0000	6.0000	4.0000	

## DISCUSSION

The standard approach of a LA is via a 3-port system but single port appendicectomy has also been reported in recent times, with 2-port technique has been recorded in literature (Meyer et al, 2004,<sup>[5]</sup>Baik et al, 2013,<sup>[6]</sup> In the current study, the mean age of the patient undergoing OA and LA was  $29.60 \pm 7.5$  years and  $28.67 \pm 7.09$  years respectively. Deshmukh SN et al (2020),<sup>[7]</sup> found the mean age of patients in open and laparoscopy group was 29.67 years and 31 years respectively. Wani IA et al (2020),<sup>[8]</sup> found the mean age of patients was  $30.1 \pm 11.82$  years in OA group and  $33.9 \pm 13.78$  years in LA group. Operative time is dependent on the surgeon competence and experience, in our study we found the duration of operation in laparoscopy group  $55.05 \pm 4.5$  minutes was higher in comparison to the open group  $34.7 \pm 4.12$  minutes. Similar finding has been also seen in the studies done by Srivastava et al (2019),<sup>[9]</sup> who found the operative time in laparoscopy group 58.22 minutes was significantly higher than the open group 43.65 minutes; The mean operative time in LA is 31% longer, however operative time can decrease significantly with experience (Chung et al, 1999.<sup>[11]</sup> In this study we found that the doses of analgesia were significantly lower in laparoscopy group ( $2.8 \pm 0.72$  doses) as compared to open group ( $4.9 \pm 1.08$  doses). Similar findings were also reported by Resutra R et al (2020),<sup>[12]</sup> Deshmukh SN et al (2020) 7; Kumar M et al (2021),<sup>[13]</sup> in their studies and concluded that LA can significantly lower pain thus requiring lesser amount of post-operative analgesia. In the study conducted by Srivastava et al (2019),<sup>[9]</sup> found that surgical site infection in open group (25%) is higher than in laparoscopy group (13.9%) and also by Nazir et al (2019),<sup>[10]</sup> found frequency of wound infection rate is higher in open group (27.69%) in comparison to laparoscopy group (10.77%). This is comparable to the findings in this study where we found that the rate of post-operative complication is higher in open group in comparison to laparoscopy group i.e 25% and 5% respectively with  $p < 0.0122$ .

In this study the mean duration of hospital stay was  $3.1 \pm 0.49$  days in LA which was significantly lower in comparison to  $4.32 \pm 0.65$  days in OA ( $p < 0.0001$ ); these findings have also been reported in literature by studies done by Jain VK et al (2016),<sup>[14]</sup> and Resutra R et al (2020).<sup>[12]</sup>

In this study we observed that LA is better in comparison to OA in terms of post-operative pain, post-operative complication and duration of hospital stay. Furthermore we found a considerable preference (during collection of consent) of patients and a higher satisfaction in laparoscopy group. However, it must be also noted that this comes with a significant higher operative time, but can be reduced substantially with expertise and experience. Provided adequate availability of proper equipment and also surgeon expertise, LA can be considered safe and equally effective and should be undertaken as the first procedure of choice for most cases of appendicitis. Since there is no consensus to the best approach, both procedure are still being done depending on the preference of the surgeon and the patient. In future with further gathering of data driven research, LA may be accepted as the standard treatment for patients with appendicitis and undiagnosed abdominal pain.

## CONCLUSION

Our study showed that LA emerges as a favorable option for the management of acute appendicitis in north eastern part of Indian tertiary care setting. It offers patients faster recovery, fewer complications, and higher satisfaction rates compared to open surgery.

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