



## A COMPARATIVE STUDY OF OPEN VERSUS LAPAROSCOPIC APPENDECTOMY IN A TERTIARY CARE HOSPITAL

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**ABSTRACT** Although laparoscopic surgery has been available for a long time and laparoscopic cholecystectomy has been performed universally, it is still not clear whether open appendectomy (OA) or laparoscopic appendectomy (LA) is the most appropriate surgical approach for appendectomy. This study is to compare results of open appendectomy with laparoscopic appendectomy in terms of following parameters: Operating time, post-operative pain, time until resumption of diet, rate of wound infection, duration of postoperative hospital stay. Methodology: the study was conducted in IMS & SUM Hospital, Bhubaneswar involving 60 patients who were diagnosed to have appendicitis and requiring surgical intervention. Patients were randomized to either OA group or LA group. Statistical analyses were performed using SPSS version 10.0. Results: After randomization, thirty patients each in LA group and OA group were analyzed. The mean age of patients undergoing LA and OA were 24.81 years and 24.98 years respectively. The mean duration of surgery in the laparoscopic group was 54.45 minutes compared to 42.74 minutes in the open group ( $p=0.042$ ). Visual analog scale for pain in the postoperative period for laparoscopic group was 4.00 as compared to 5.53 in the open group ( $p<0.000$ ). Mean number of doses of parenteral analgesics required in the postoperative period for laparoscopic group was 2.13 as compared to 3.81 in the open group ( $p<0.000$ ). Oral feeds were resumed earlier in the laparoscopic group (12.77 hours) as compared to the open group (26.71 hours),  $p<0.000$ . Rate of wound infection was nil in the laparoscopic group as compared to 12.90 % in the open ix group ( $p=0.04$ ). Duration of postoperative hospital stay was 1.13 days in the laparoscopic group as compared to 3.26 days in the open group ( $p<0.000$ ). Conclusion: laparoscopic appendectomy was better than open appendectomy with respect to pain score, lesser use of parenteral analgesics, duration of postoperative hospital stay, earlier resumption of oral feeds and wound infection rate.

**KEYWORDS :** appendectomy; laparoscopic appendectomy; open appendectomy

### Introduction

Appendicitis is one of the most common intra-abdominal inflammatory conditions requiring emergency surgery, with lifetime risk of six to seven percent and appendectomy considered as the most frequently performed abdominal surgery (1, 2). Appendicitis is commonly observed in patients in their second through fourth decades of life with a slight male: female preponderance (1.2-1.3: 1) (3, 4, 5). The treatment of appendicitis remained essentially unchanged since its initial description by Charles McBurney in 1889 before New York Surgical Society (6). Open appendectomy performed by McBurney's gridiron incision remained the gold standard for nearly a century until 1983 when Kurt Semm, performed the first laparoscopic appendectomy (7, 8). Laparoscopic cholecystectomy is now considered the gold standard for cholelithiasis & has virtually replaced open cholecystectomy. However this is not the scenario in appendicitis, the role of laparoscopic appendectomy being not clearly defined. This is perhaps due to the emergency nature of disease, often operated by junior staff in odd hours when laparoscopic equipment and expertise may not be available in all hospitals. And the cost of the equipment adds to the limiting factor. In an era where patient comfort is a greater consideration and in an attempt to improve the diagnostic accuracy and outcome of patients with appendicitis, laparoscopic appendectomy has gained popularity in recent years and has become one of the most commonly performed procedures using the laparoscope (9). This study is aimed to compare the benefits of laparoscopic appendectomy over open appendectomy in proven cases of appendicitis.

### Materials and methods

The study subjects of this dissertation consist of 60 patients who have undergone appendectomy at IMS & SUM Hospital, Bhubaneswar for suspected appendicitis. Randomized controlled trial was designed for this study and the period was in between Aug 2015 to Jun 2017. To

compare results of open appendectomy with laparoscopic appendectomy in terms of following parameters from patients were collected: operating time, post-operative pain, time until resumption of oral feeds, rate of wound infection, duration of postoperative hospital stay. Patients presenting with features of appendicitis to Department of Surgery, IMS & SUM Hospital were taken as subjects for the study. Diagnosis of appendicitis was based on clinical findings, total counts and ultrasonography. To subjects whom surgical intervention was required, appendectomy was planned. Risks, benefits and possible outcomes of each operation were fully explained and written consent was obtained from respective subjects/guardians. Patients were taken up for open and laparoscopic appendectomy alternatively.

### RESULTS

Analysis of age groups revealed a high incidence of appendicitis among adults between 21-30 years (51.7%) Analysis of sample according to sex revealed incidence of appendicitis in males as 60.0% and in females as 40.0%. The difference in incidence between these two groups was not found to be statistically significant. In the present study the mean duration of surgery is 42.74 min in OA and 54.45 min in LA. The difference was statistically significant ( $p<0.042$ ) **Table 1**. The mean VAS score was 5.53 in the open group as compared to 4.00 in the laparoscopic group. The difference was statistically significant ( $p<0.000$ ) **Table 2**. In the present study mean number of doses of parenteral analgesics in the postoperative period for patients in the open group was 3.81 as compared to 2.13 in the laparoscopic group. The difference was statistically significant ( $p<0.000$ ). The results reveal that laparoscopic appendectomy is associated with significant reduction in the need for postoperative parenteral analgesics **Table 3**. In the present study, it took an average of 12.77 hours to resume oral feeds in laparoscopic group as compared to 26.71 hours in the open group. The difference was statistically significant ( $p<0.000$ ) **Table 4**. In present study the mean duration of post operative hospital stay was

3.26 days in the open group as compared to 1.13 days in the laparoscopic group. The difference was statistically significant ( $p<0.000$ ) **Table 5**. In the present study there were no postoperative complications in the laparoscopic group. Four patients (13.33%) in the open group developed postoperative complications, all of which were wound infections. The difference was statistically significant ( $p<0.04$ ) **Table 6**.

**Table 1. Mean duration of surgery**

Method	No.	Operating time (mins)	Standard deviation
LA	30	54.45	6.48
OA	30	42.74	8.15

**P=0.042**

**Table2. Postoperative pain score (VAS)**

Method	No.	Mean VAS	Standard deviation
LA	30	4.00	0.58
OA	30	5.53	1.18

**P<0.000**

**Table 3. Number of doses of parenteral analgesic injections in the postoperative period**

Method	No.	Mean no. of injection	Standard deviation
LA	30	2.13	1.23
OA	30	3.81	3.81

**P<0.000**

**Table 4. Duration of resumption of oral feed after surgery(FAS)**

Method	No.	Mean FAS(hours)	Standard deviation
LA	30	12.77	2.99
OA	30	26.71	5.97

**P<0.000**

**Table 5. Postoperative hospital stay**

Method	No.	Mean post op. stay(days)	Standard deviation
LA	30	1.13	0.43
OA	30	3.26	0.77

**P<0.000**

**Table 6. Postoperative wound infection**

Wound infection	Method		Total
	LA	OA	
Absent	30	26	56
Present	0	4	4
Total	30	30	60

**P=0.04**

## Discussion

With the advent of new surgical techniques the quest has been raised for minimally invasive techniques for treatment of various surgical ailments. In this respect the most popular ones have been the procedures with minimum hospital stay, less surgical trauma and a better quality of life. This idea is the driving force behind the use of laparoscopic surgery to perform appendectomy. In 1983, Kurt Semm performed the first laparoscopic appendectomy (10). Despite its use predating laparoscopic cholecystectomy, laparoscopic appendectomy has not gained the same wide spread popularity and enthusiasm. The relatives' advantages and disadvantages of laparoscopic and open appendectomy are described in terms of duration of the procedure, treatment of coexisting pathology, intraoperative and postoperative complications, need for conversion to open appendectomy, postoperative pain and recovery, cost factors involved and return to

normal life. In the present study the mean age for LA group was 24.81 years and for OA was 24.98 years. The male to female ratio was same in both the groups. The mean duration of surgery in the laparoscopic group was 54.45 minutes as compared to 42.74 minutes in the open group ( $p<0.042$ ). Similar observations of laparoscopic appendectomy taking longer duration have been reported by other studies (11-15). This difference in duration could be due to the inclusion of additional steps like adjusting different tubes, video apparatus and cables around the patient, trocar entry under direct vision, time taken for insufflation, diagnostic laparoscopy. In teaching institutions, time spent teaching the residents slows the progress of the surgery and also participating residents generally have less experience. Laparoscopic operating time should improve with increasing experience. There was no co-existing pathology in the study series. There was no conversion of laparoscopic appendectomy to the open procedure in the present study in contrast to a higher conversion rate of Penderson AG et al 10. There were no intraoperative complications observed during either of the procedures. Pain assessment made by VAS score was 4.00 in the laparoscopic group as compared to 5.53 in the open group ( $p<0.000$ ). These results are comparable with most of the studies performed earlier (16-20). This is mainly attributed because of longer incision and stretching or cutting of muscles during open appendectomy.

In the present study parenteral analgesic requirement in the postoperative period was less in the laparoscopic group in comparison with that of the open group. Mean parenteral analgesic requirement in the postoperative period for patients of the laparoscopic group was 2.13 doses as compared to 3.81 doses for patients of the open group ( $p<0.000$ ). Similar results have been observed by other studies (20-21). During the postoperative period, oral feeds were resumed after surgery on an average of 12.77 hours in the laparoscopic group compared to 26.71 hours in the open group ( $p<0.000$ ). Similar results have been observed by previous studies (20-21).

Postoperative complications in the form of wound infection was none in the laparoscopic group as compared to 4 (12.90%) in the open group ( $p=0.04$ ). No other postoperative complications were observed in the study series. Higher wound infection rate in the open group has been observed by other studies (17, 20-22).

In the present study the average duration of postoperative hospital stay was 1.13 days in the laparoscopic group as compared to 3.26 days in the open group ( $p<0.000$ ). Other studies have also reported longer postoperative hospital stay following open appendectomy in comparison to laparoscopic appendectomy (16, 17, 19, 21, 22).

## Conclusion

The present study shows that laparoscopic appendectomy provides considerable benefits over open appendectomy including a shorter hospital stay, less postoperative pain, less parenteral analgesia requirement, earlier resumption of oral feeds and reduced wound infection rate. Overall laparoscopic appendectomy can be safely recommended for appendicitis in hospitals where laparoscopic expertise and equipment are available unless laparoscopy itself is contraindicated.

## References

- Adiss DG, Shaffer N, Fowler BS, Tauxe RV. The epidemiology of appendicitis and appendectomy in the United States. *Am J Epidemiology* 1990; 132: 910-925.
- O. Connell PR. The Vermiform Appendix. In: Norman WS, Christopher JKB, O. Connell PR (eds.). *Bailey and Love Short Practice of Surgery*, 26th ed. London; Arnold 2013: 1199-1214.
- Jaffe BM, Anel Berger DH. The Appendix. In: Brunicaudi F, Anderson DK, Biliar TR, Dunn, Hunter JG, Jeffrey BM, Pollock RE(eds.). *Schwartz's Principle of Surgery*, 9th ed. McGraw-Hill; New York 2010:1073-1092.
- Flum DR, Morris A, Koepsell T, et al: Has misdiagnosis of appendicitis decreased over time? A population-based analysis. *JAMA* 2001;286:1748. [PMID: 11594900].
- Richards W, Watson D, Lynch G, et al. A review of the results of laparoscopic versus open appendectomy. *SurgGynecolObstetr.* 1993; 177:473-480.
- Schroder DM, Lathrop C, Lyold LR, et al. Laparoscopic appendectomy for acute appendicitis: is there really any benefit? *Am Surg.* 1993; 59:541-547.
- McBurney C: The incision made in the abdominal wall in cases of appendicitis. *Ann Surg* 1894; 20:38 [PMID: 17860070].
- Attwood SEA, Hill DK, Stephens RB. A prospective randomized trial of laparoscopic versus open appendectomy. *Surgery* 1992; 112:497-501.
- Pradeep Kumar Chowbey. *Laparoscopic Appendectomy: Minimal access surgery.* July 2002:79-80.
- Radford-Smith GL, Edwards JE, Purdie DM, et al. Protective role of appendectomy on onset and severity of ulcerative colitis and Crohn's disease. *Gut* 2002;51:808. [PMID: 12427781].
- Utpal De. Laparoscopic versus open appendectomy: an Indian perspective. *Journal of minimal access surgery* 2005; 1 (1):15-20.
- Kathouda N, Mason RJ, Towfigh S, Gevorgyan A, Essani R: Laparoscopic versus open appendectomy: a prospective randomized double-blind study. *Ann Surg* 2005; 242:439-450.

13. Wei Hongbo, Wei HB, Huang JL, Zheng ZH, Wei B, Zheng F, Qiu WS et al.: Laparoscopic versus open appendectomy: a prospective randomized comparison. *Surg Endosc* 2010; 24:266-9.
14. Khalil J, Muqim R, Rafique M, Khan M. Laparoscopic versus open appendectomy; a comparison of primary outcomes measures. *Saudi J Gastroenterol* 2011; 17:236-240.
15. Sunil Kumar, Basavaprabhu A, Soundarya M. Comparative study of laparoscopic appendectomy and open appendectomy in a tertiary care hospital in South Karnataka, India. *International Journal of Anatomy, Radiology and Surgery* 2012; 1(1):12-16.
16. Lintula H, Kokki H, Vanamo K. Single blind randomized clinical trial of laparoscopic versus open appendectomy in children. *Br J Surg* 2001; 88:510-514.
17. Feng Zerong. Prospective, randomized comparative study of laparoscopic appendectomy and operative appendectomy. *Journal of Surgery coloproctological* 2002;3:150-152.
18. Milewicz M, Michalik M, Ciesielski M: A prospective, randomized, unicenter study comparing laparoscopic and open treatments of acute appendicitis. *Surg Endosc* 2003, 17:1023-1028.
19. Utpal De. Laparoscopic versus open appendectomy: an Indian perspective. *Journal of minimal access surgery* 2005; 1(1):15-20.
20. Deepak J, Prakash A. *J Indian Assoc Pae Surg* 2008; 3:97-100.
21. Yasmin Vellani, Shaheena Bhatti. Evaluation of Laparoscopic Appendectomy vs. Open Appendectomy: A Retrospective Study at Aga Khan University Hospital, Karachi, Pakistan. *JSLC* 2009; 13(4): 574-580.
22. Sunil Kumar, Basavaprabhu A, Soundarya M. Comparative study of laparoscopic appendectomy and open appendectomy in a tertiary care hospital in South Karnataka, India. *International Journal of Anatomy, Radiology and Surgery* 2012; 1(1):12-16.