



A Comparative study of Laparoscopic versus Open Appendicectomy in a Tertiary Hospital of Lucknow.

KEYWORDS

Acute appendicitis, Laparoscopic appendicectomy, Open appendicectomy

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ABSTRACT

Background: Appendicitis is a common cause of acute abdomen and appendectomy is the treatment of choice, which can be done either by open or laparoscopic approach. Laparoscopic appendicectomy (LA) has struggled to prove its superiority over the open technique. Objectives: This study aimed to compare the surgical outcomes and cost efficiency of laparoscopic versus open appendectomy. Material and Methods: This study was done in a tertiary care medical hospital in Lucknow, India. 150 consecutive patients who were diagnosed to have appendicitis and requiring surgical intervention were selected after obtaining their informed consent to participate in the study. 75 patients each were randomly chosen to undergo either open or laparoscopic appendectomy. Data was collected from each patient on the basis of clinical, preoperative findings as well as postoperative recovery and follow up. Statistical analysis was done using SPSS Version 17.0. Results: 63% of patients were male and 58.6% were under 25 years of age. Nausea and vomiting were the common symptoms. Laparoscopic appendectomy took more time than open appendectomy (45 mins Vs 55 mins). Pain was significantly lower in laparoscopic appendectomy compared to open appendectomy. Post operative complications, length of stay, time to return back to work were all lesser among patients who underwent laparoscopic appendectomy. Conclusion: As laparoscopic appendectomy is associated with fewer complications, shorter hospital stay, almost similar operative time, lower rate of intraabdominal abscess and marginally higher cost of treatment when compared to open appendicectomy, it can be recommended as the preferred approach of treatment for acute appendicitis.

Introduction:

Appendicitis is the most common cause of surgical abdomen in all age groups¹ with a lifetime risk of 6%.² Open appendicectomy (OA), first described in 1894 by McBurney, performed through the right lower quadrant muscle splitting incision has for long been applied as the Gold standard procedure.³ This procedure has mainly remained unchanged for about 100 years due to its favorable efficacy and safety. In 1983, Kurt Semm, a German gynaecologist, introduced the use of laparoscopic techniques with the first large study of laparoscopic appendicectomy (LA) reported by Pier et al in 1991.^{4,5} Although initially a controversial procedure, accumulating evidence supports the use of laparoscopic appendicectomy for the treatment of appendicitis.^{2,6} The putative advantages of laparoscopic approach are quicker and less painful recovery, early oral intake, fewer postoperative complications and better cosmesis.⁴ It also allows better assessment of other intra abdominal pathologies.

But nevertheless, its superiority over OA is still being debated as most of the advantages are of limited clinical relevance due to the small sample sizes and the high risk of type II errors (failing to observe a difference when in truth there is one).⁷ Intra-abdominal abscesses are a concern when performing laparoscopic appendectomies in case of complicated appendicitis. A meta analysis conducted on children with appendicitis revealed that intra abdominal abscess formation was more common following LA, although this was not statistically significant.⁸ In adults, LA has been associated with a higher rate of intra abdominal abscesses with a consequent higher rate of readmission and interventions.⁹ However one study using a nationwide inpatient sample database in the US revealed that laparoscopic appendectomies were associated with lower morbidity, lower mortality, shorter hospital stay and a reduction in hospital charges.¹⁰

Aim and Objectives:

This study was conducted with the aim of comparing patient's duration of postoperative hospital stay, pain, recovery, complications between open and laparoscopic appendicectomy.

Material and Methods:

The study subjects consisted of 150 patients, who underwent appendicectomy at a tertiary care hospital in Lucknow, India for

appendicitis. These patients were divided into two groups of 75 each on random basis, Open or Conventional appendectomy (OA) and Laparoscopic appendectomy (LA). Informed consent was taken from all patients.

Approval was obtained from the institutional ethics committee before commencing the study. Diagnosis of appendicitis was based on clinical findings, blood counts and ultrasonography. Data was collected from each patient on the basis of clinical, preoperative findings as well as postoperative recovery and follow up.

After ruling out other differential diagnosis and concluding preoperatively as appendicitis, treatment was planned. Preoperative preparation consisted of bed rest, nil per oral, intravenous fluids, and preoperative dose of antibiotics. Anaesthesia was either general or spinal. In open appendectomies, abdomen was opened either by Mcburney's or lanz incision or occasionally by right paramedian incision. In some cases appendicular stump was ligated and invaginated and in some others stump was ligated alone. In laparoscopic appendectomies base of appendix was ligated using end loop (catgut) and the specimen delivered out using endobag. Intraoperative findings were noted down. The final diagnosis of appendicitis was confirmed by histopathology report. The appendicular specimen was examined and reported by the pathologist.

Post operatively patients were managed as follows: parenteral antibiotic, intravenous fluids, analgesics, parenteral nutrition until bowel activity returned, monitoring of temperature, pulse, blood pressure and respiratory rate. Operating time (time from initial incision to closure), intraoperative findings and complications were recorded. Postoperative pain was quantified 24 hours after the surgical procedure using Visual Analogue Scale (VAS, 0 to 100, 0 being no pain and 100 unbearable pains). Time of resuming oral feeds and length of postoperative hospital stay were recorded. Stitches were removed on 7th postoperative day. On discharge patients were advised for regular follow-up. Time until return to work or normal activities was determined by the examination of the discharge summary sheet or outpatient cards and 3-4 weeks postoperative follow up.

The data was analyzed using Statistical package for social services (SPSS, version 17.0). Continuous variables like age, hospital stay and operative duration were presented as Mean + SD, while categorical variables such as gender and postoperative complications were expressed as frequency and percentages using 95% confidence interval.

Results:

In our study, as per [Table 1] attack of appendicitis was seen in patients aged less than 25 years constituting 58.6% of all study subjects.

Table 1: Distribution of sample size by age

Age group in years	Method		Total
	OA	LA	
<15	08	05	13
16-25	35	40	75
26-35	17	20	37
36-45	10	08	18
46-55	05	02	07
Total	75	75	150

In our study, the difference in incidence of appendicitis among male and female patients was not statistically significant, as shown in [Table 2]. Incidence was 63% in male patients and 37% in female patients.

Table 2: Distribution of sample size by sex

Sex	Method		Total
	OA	LA	
Male	55	40	95
Female	20	35	55
Total	75	75	150

In the study conducted, presence of nausea or vomiting was found in 80% of patients. Nausea alone was a predominant symptom constituting 50% as mentioned in [Table 3].

Table 3: Distribution of sample size according to signs and symptoms.

Symptoms	Method		Total
	OA	LA	
None	10	20	30
Nausea	40	35	75
Vomiting	25	20	45
Total	75	75	150

Pain score was 50.50 in the open group as compared to 30.50 for laparoscopic appendectomy that is highly significant ($p < 0.001$) as mentioned in [Table 4].

Table 4: Qualitative pain assessment (VAS) during post operative period

Method	N	Mean VAS	Standard deviation
OA	75	50.5	14.80
LA	75	30.5	9.20

As per [Table 5], there were no postoperative complications in the laparoscopic group. Whereas 10 patients in open appendectomy group had postoperative complications all of which were wound infections.

Table 5: Post operative complications

Post-operative complications	Method		Total
	OA	LA	
None	65	75	140
Wound infection	10	0	10
Total	75	75	150

The mean duration of postoperative hospital stay was 6.0 days in

open group as compared to 3.8 days for laparoscopic group that is highly significant ($p < 0.000$) as shown in [Table 6].

Table 6: Duration of Post operative stay

Method	N	Post operative stay	Standard deviation
OA	75	6.0	2.49
LA	75	3.8	0.89

Discussion:

Excellent results following laparoscopic appendectomy and easier availability of instruments for laparoscopic surgery in recent years has made laparoscopic appendectomy a popular choice of surgery amongst many patients for both simple and complicated cases of acute appendicitis. The rate of LA between 1998 and 2008 increased from 20.6% to 70.8%, becoming the prevalent approach to treat acute appendicitis since 2005.¹¹

The mean duration of surgery in the laparoscopic group was 55.0 minutes as compared to 45.0 minutes in the open group ($p < 0.000$). Similar observation of laparoscopic appendectomy taking more time have been reported by other studies^{4,11}. Tate JJ et. al.¹², 67.03 v/s 46.5 min; Vallina et. al.¹³ 61±41 min and 43±2.9 min for laparoscopic and open appendectomy respectively).

In our study, there was no conversion of laparoscopic appendectomy to open in contrast to higher conversion rate of Penderson AG et.al.¹⁴, (65 out of 282 patients) and 14(20%) reported by Tate JJ et. Al¹².

Wound infection rate in our study was 10 (13.3%) in the open group and none in the laparoscopic group ($p < 0.022$), with no other intraoperative or postoperative complications. Austin et. al.⁴ have reported infection rate of 11% in open and 4% in laparoscopic group. Higher wound infection has also been reported in open group by other^{6,11}.

Pain score (VAS) was 50.50 in open group as compared to 30.50 in laparoscopic appendectomy ($p < 0.001$), because of longer incision, stretching or cutting of muscles and wound infection. Similar observations have also been reported by other authors⁸.

Duration of postoperative hospital stay was 6.0 days v/s 3.8 days in open and laparoscopic group respectively ($p < 0.000$). Austin et al⁸ has reported mean postoperative stay as 4.8 days and 2.2 days for open and laparoscopic group respectively. Other workers^{5,6,9,14} also have reported longer postoperative hospital stay in open group as compared to laparoscopic group.

Limitations of study:

As it was a single centre study the results cannot be generalized to entire population. Furthermore comprehensive and multicentric studies including meta analysis of various earlier studies should be done, to have a more meaningful and high impact results.

Conclusion:

In our study, we compared the outcomes between laparoscopic and open appendectomy for treatment of acute appendicitis in a Tertiary Health Care setup in Lucknow. Laparoscopic surgery was found to be superior in terms of lesser post-operative pain, shorter hospital stay, fewer wound infection and cases of intra-abdominal abscess. The length of both procedures was not significantly different and fewer readmissions were seen in the LA group.

The only disadvantage of LA was the marginally higher cost to OA group, but the hidden costs increases the total cost of treatment in OA group both in terms of expenditure and delayed return to work.

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