Original Article

Comparative Study on Short Term Outcome Between Laparoscopic Appendectomy and Open Appendectomy in Patients Attending a Rural Tertiary Care Hospital

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Abstract

Background : Appendicitis continue to be one of the most common acute abdominal conditions that require immediate surgical treatment. Like other minimal invasive surgeries the laparoscopic approach for treating appendicitis is getting popular nowadays. In cholecystitis, the laparoscopic approach has emerged as the clear gold standard. However, in appendectomy different schools of thought exist regarding the method to be followed.

Aims and Objectives : To compare the short-term outcome between Laparoscopic Appendectomy and Open Appendectomy in patients with acute appendicitis attending Bankura Sammilani Medical College and Hospital.

Materials and Methods : A hospital based prospective comparative study was conducted in the Department of General Surgery BSMCH with a time frame of about one and half years. A total no of 34 patients admitted in the Department of General Surgery with the diagnosis of acute appendicitis and underwent Appendicectomy (Open or Laparoscopic) has been studied.

Result : Seventeen (50%) patient underwent Laparoscopic Appendicectomy. Rest 17 (50%) underwent Open Appendicectomy. There are no statistically significant difference between these two groups in terms of Duration of Operation (P=0.2810). But the Return of bowel function (P=0.0265), Pain score (p=0.008521), Hospital stay (P=0.0092) and Return to work (P=0.0261) significantly in favour of Laparoscopic Appendicectomy.

Summary and Conclusion : Laparoscopic Appendectomy is a safe and effective procedure in the treatment of appendicitis with shorter hospital stays, significantly less postoperative pain, early return of bowel function than Open Appendectomy. As a result, the patient is able to return to work in the earliest opportunity.

Key words : Laparoscopic Appendicectomy, Open Appendicetomy, Bowel Function, Pain Score.

"Forgettable, yet not so forgotten" This underdeveloped residuum of the caecum has no known function and is commonly termed as a "vestigial" organ, yet diseases of the appendix loom large in surgical practice and appendicitis continue to be one of the most common acute abdominal conditions that require immediate surgical treatment[1,2].

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Editor's Comment :

- Unlike laparoscopic cholecystectomy for cholecystitis, laparoscopic appendectomy has not been considered as gold standard treatment for acute appendicitis till date. But due to advantages like less post operative pain, less chance of wound infection, shorter duration of hospital stay and early return to work, over open appendicectomy, laparoscopic appendicectomy needs to be considered as a safe and effective choice for emergency appendicectomy.

Approximately 7-10% of the general population develops acute appendicitis with the maximal incidence being in the second and third decades of life[3].

An appendectomy may be performed as a laparoscopic or as an open operation. Open Appendectomy (OA) has been the gold standard for more than a century as far as surgical removal of the appendix is concerned[4].

Minimal-invasive surgery has rapidly evolved as a major specialty in the past decade[5].

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Recently, several authors proposed that Laparoscopic Appendectomy (LA) should be preferred for the treatment of appendicitis. Advantages of LA such as less pain, faster recovery, fewer wound infections, improved cosmesis, and less postoperative morbidity are obvious from the various randomized trial conducted worldwide comparing OA and LA. A review of the world literature suggests that definitely, the trend is moving from open to LA[6].

Overall morbidity in Appendectomy depends on the severity of appendicitis rather than the operative approach. Even after several independent studies and Meta-analyses the final word has not yet been said. Contrary to Laparoscopic Cholecystectomy, Laparoscopic Appendectomy is still in its nascent state of standardization[7].

Bearing in mind that Laparoscopic Appendectomy unlike other laparoscopic procedures, has not been found superior to open surgery for appendicitis, we designed the present study to determine any possible benefits of the laparoscopic approach[8].

Aims and Objectives

General :

Comparative study on the short-term outcome between Laparoscopic Appendectomy and Open Appendectomy in patients with acute appendicitis attending Bankura Sammilani Medical College and Hospital.

Specific :

To estimate the duration of surgery between two groups

To compare the effectiveness and Postoperative outcome between two groups

To measure the length of stay in hospital between two groups of the patients.

Materials and Methods

Prospective comparative study in the Department of General Surgery, BSMCH, Bankura among all patients undergoing Appendectomy for acute appendicitis after clinical and radiological confirmation. The Study conducted for a period of one and half yrs (March 2021 to August 2022) after Institutional Ethical Committee clearance. Patients have been divided into two groups according to their preference.

Both arms are in control of each other.

Estimated sample size for this study is 34 .

So, 17 cases went for Laparoscopic Appendectomy and another 17 underwent Open Appendectomy for acute appendicitis.

Inclusion Criteria :

Patients with appendicitis are advised for undergoing Appendectomy in the age group of 11-75 years. Patient with equivocal Alvarado score but USG findings are showing NON inflamed appendix and at the same time excluding any other pathology for abdominal pain also included for appendectomy on clinical grounds

Exclusion Criteria:

(1) Patients not willing to give consent.

(2) Patients with pregnancy, shock on admission, known coagulation disorder and history of major lower abdominal operation.

(3) Patients with an appendicular lump, appendicular abscess and generalized peritonitis.

(4) Patients in whom laparoscopy is contraindicated like a severe cardiopulmonary disease.

(5) Patients with Severe co-morbidities like uncontrolled Diabetes, Hypertension and Renal Failure.

Data has been collected via interview, clinical examination, radiological findings and scrutinizing relevant medical records. A pre-designed and pre-tested questionnaire is used for data collection. Informed consent has been sought from each patient before collecting data. Each patient has been followed up after operation. Data has been summarized for estimating various parameters like mean duration of surgery and hospital stay, pain score, requirement of analgesics, post op complications and return to work after surgery etc.

Result and Observation

Thorough observation and analysis of all parameters of the patients included in the study are as follows.

Out of a Total of 34 patients who underwent Appendicectomy 21 were females and 13 were males.

Of 21 Females who underwent Appendectomy, 13 had undergone Laparoscopic Appendicectomy (LA=76%) and 8 had Open Appendicectomy (OA=47.06%).

Of 13 Males who underwent Appendicectomy, 4 had undergone Laparoscopic Appendicectomy (LA=23.53%) and 9 had Open Appendicectomy (OA=52.94%).

The majority of study population was in the age group of 21-30 years, of which Open Appendicectomy was preferred in the age group of 11-20 years (83.33%). In the age group of 21- 30 years, most of the patients opted for Laparoscopic Appendicectomy (69.23%).

In 5 patients Open Appendicectomy was done within 40 mins, while in 1 patient had the procedure of Laparoscopic Appendicectomy done within 40 mins. 12 patients had Open Appendicectomy with operative time around 40-60 mins, whereas 14 patients had the procedure of laparoscopic done within the same duration. Only 2 patients had Laparoscopic Appendicectomy with an operative time of more than 60 mins. Duration of surgery is not significant statistically (p=0.2810) between the two methods (Table 1).

In 9 patients who had Bowel function returned to normal within 6-12 hours and had undergone Laparoscopic Appendicectomy, whereas only 3 patients with Open Appendicectomy had the same. 10 patients had their bowel function back to normal in the Open Appendicectomy group within 12-17 hours whereas 6 patients had their bowel function back to normal in the laparoscopic appendicectomy group within 12-17 hours. Only 2 patients in Laparoscopic Appendicectomy had bowel function return to normal in 18-24 hours and 4 patients in Open Appendicectomy had bowel function return to normal in 18-24 hours.the difference between this two group was statistically significant (P=0.0265).

In 15 patients had Post op VAS pain scoring of 2-3 in the Laparoscopic Appendicectomy group compared to 8 patients in the Open Appendicectomy group. 9 patients had post-op VAS pain scoring of 4-5 in the open Appendicectomy group compared to only 1 patient in the Laparoscopic Appendicectomy group. 1 Patient in Laparoscopic Appendicectomy had a Post-op VAS pain scoring for 5-6.significant P value of 0.008521 (Table 2).

Only 2 patients in the Laparoscopic Group had wound infection compared to 15 patients with no infection. 6 Patients had wound infections in Open Appendicectomy compared to 11 patients with no infection.

14 Patients had a Hospital Stay of 2 Days in Laparoscopic Appendicectomy groups. 5 Patients had a hospital stay of 2 Days in Open Appendicectomy groups. 6 people had Open Appendicectomy with a duration of Hospital Stay of around 3 days whereas 1 patient had a hospital stay of 3 days. 4 Patients had a hospital stay of around 4 Days for an Open Appendicectomy. Only 1 patient with an Open appendicectomy had a hospital stay of 6 days. Duration of hospital stay statistically signicant with a P value of 0.0092 (Table 3).

The majority of the patients were able to return to work postoperatively within 2-3 days (Laparoscopic = 15 and Open = 11). 5 patients in the Open appendicectomy Group had taken more than 6 days to return to work compared to 1 patient in the laparoscopic appendicectomy postoperatively (p value 0.0261)(Table 4).

Table 1 — *Relation between Duration of Surgery and Type of Procedure*

Operative time	Laparoscopic	Open	Grand Total
20-39	5	1	6
40-60	12	14	26
>60		2	2
Grand Total	17	17	34

Table 2 — *Relation Between Post-operative VAS Pain Scoring and Type of Procedure*

Post Op VAS Pain Scoring	Laparoscopic	Open	Grand Total
2-3	15	8	23
4-5	1	9	10
6-7	1		1
Grand Total	17	17	34

Table 3 — *Relation between Length of Hospital Stay and Type of Procedure*

Hospital Stay (Days)	Laparoscopic	Open	Grand Total
2	14	5	19
3	1	6	7
4	1	1	2
5	1	4	5
6		1	1
Grand Total	17	17	34

Table 4 — *Relation between Return to Work and Type of Procedure*

Return to work (Days)	Laparoscopic	Open	Grand Total
2-3	15	11	26
4-5	1	1	2
6-7	1	5	6
Grand Total	17	17	34

Discussion

A total of 34 patients underwent surgery for appendicular pathology between March, 2021 to August, 2022. All patients who underwent LA were included in the study. There were 13 male patients while female patients were 21. Of the 13 male patients, 4 patients underwent LA while 9 patients underwent OA. 13 female patients underwent LA, while 8 female patients underwent OA.

The patient ages ranged from 11-75 years. The majority of the patients who underwent LA were in the age group 21-30 years and it was the same for OA. In a review by Schreider LD; Zimmermann et al. noted the average age for patients undergoing LA was 25.3 years, which compares well with the study[9]. The youngest patient in the study underwent OA. This is comparable to the result obtained in a study carried out by Paya K, Fakhari M, *et al* in which LA was not performed in the pediatric age group due to a more difficult technique, expected risk, and suspected high rate of complication[10]. There were eight patients with appendicitis in the age group >51 years in the study groups.

The duration of operation was Longer in the LA group compared to the OA group but statistically non significant. The median operation time for the LA was 30-60 minutes while that of OA was 20-40 minutes. These findings are similar to those of Long KH; Bannon MP, *et al*[11]. A review by Puser Jochanan G; Greenberg Dan noted/found that operation time was longer in the OA group compared to LA but the difference was not statistically significant[12]. The long operating time could be attributed to the learning curve. Most of the personnel involved, the nurses and other support staff are not trained in laparoscopic surgery and instrument handling.

Return of Bowel function is seen to be earlier in Laparoscopic Surgery around 6-11 hours. There was significant difference statistically (p=0.0265) as by 12-17 hours majority of the patients in both the laparoscopic and open appendectomy groups had their bowel function return back to normal. Only in 6 cases, it was observed that the return of bowel function took 18-24 hours (Lap group = 2 and Open group = 4)[13].

Patients who underwent LA had a shorter hospital stay compared to the OA group with a statistically significant p value of 0.0092. The average duration of hospital stay for the LA group in the study was 3 days while for the OA group was 5 days. When compared with a study by Puser Jochanan G; Greenberg Dan found that the average hospital stay was 2.5 days in the LA group and 2.7 days in the OA group and there was no statistical difference[12].

There were very few complications noted in the study. In the LA group, only 2 patients (5.88%) developed wound infection which was managed conservatively and resolved. For those undergoing OA, the most common is wound sepsis, which occurred, in 17.65% of the patients. These results compare well with the study done by Anderson DG; Edelman DS in that there were minimal complications after LA. Jochanan G; Greenberg Dan[12] in their review noted that there were no significant differences in intra and postoperative complications. The rest of the patients, in LA - 97% and OA - 97.6% had resolution of symptoms.

Most of the patients in the Laparoscopic Appendicectomy and Open Appendicectomy groups were able to return to work in 2-3 days. But in Open Appendicectomy, 5 patients took more than 6 days to return to work due to Postoperative pain compared to 1 patient in the laparoscopic appendicectomy group. The findings are significant (p=0.0261) and synchronous with the findings of the study by Anderson DG; Edelman DS[14].

The pain score in this study was higher in open (10.12±3.9) than in laparoscopic (4.79±4.1) which was due to longer incision stretches of the muscles and wound infection and this was found to be statistically significant at a p-value less than 0.05. Although classic open appendectomy is simple and effective, it has some drawbacks including wound sepsis, delayed recovery and the possibility of unnecessary appendectomies[15]. In this study, Laparoscopy significantly improved the postoperative wound infection rate which is in concordance with the study done by Marzouk M, *et al*[16].

Pain score and duration of Analgesic used were found to be less in the Laparoscopic group ie, (3.2±1.4) & (4.79±4.1) and (4.1±1.8) & (10.12±3.9) in the open group respectively and this difference was found to be statistically significant at $p<0.05$ which is in agreement with another study[17].

Conclusion

We concluded that Laparoscopic Appendectomy is a safe and effective procedure in the treatment of acute

appendicitis. It has shorter hospital stays and significantly less postoperative pain than Open Appendectomy. Laparoscopic Appnedicectomy leads to early return of bowel function, and it also reduces the rate of postoperative wound infection as compared with open appendectomy. As a result, the patient is able to return to work in the earliest opportunity. But the timing of operation in odd hours and the cost-effectiveness of a laparoscopic procedure need to be considered.

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