

A Comparative Evaluation of Two-Port, Three-Port and Open Appendicectomy at a Tertiary Care Teaching Hospital

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ABSTRACT

Background: Appendicectomy is the most common surgical procedure performed in emergency surgery. Because of lack of consensus about the most appropriate technique, Appendicectomy is still being performed by both open (OA) and laparoscopic (LA) methods. In this comparative analysis, we aimed to compare the efficacy of Open Appendicectomy, Two-port Appendicectomy and Three port Appendicectomy in the treatment of acute appendicitis.

Materials and Methods: Of the 135 patients included in the study, 36 patients were in the open Appendicectomy (OA) group, 59 in two-port and 40 patients were included in the three-port group. The three groups were compared for operative time, length of hospital stay, postoperative pain, complication rate and return to normal activity. Obtained data were compared with cases of open, two and three-port Appendicectomy.

Results: The mean operative time was 39.7, 31.94, and 68.14 min for open, two-port, and three-port Appendicectomy groups respectively. Mean length of stay was 3.14, 2.01, and 2.63 days for open, two-port, and three-port Appendicectomy groups respectively. Eleven patients develops surgical site infection, 6 in the open and 2 in the two-port and 3 in three-port Appendicectomy group and one in open group developed post-operative ileus. No mortality was recorded.

Conclusion: Patients who underwent two port Appendicectomy had a cosmetically better appearing scar with rapid recovery as compared to three port Appendicectomy and open cases. For uncomplicated appendicitis, the two-port Appendicectomy technique significantly reduces operative time as well as length of hospital stay. It also reduces surgical site infection as compared to open and three- port Appendicectomy group.

Keywords: Laparoscopic Appendicectomy, Two-port, Post-Operative Recovery, LA Versus OA.

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INTRODUCTION

Appendicitis is an inflammation of the vermiform appendix. It is one of the most common cause of surgical abdomen in all age groups.¹ Approximately 8–10% of the general population develops acute appendicitis with the maximal incidence being in the second and third decades of life. It is mostly caused by obstruction of the lumen due to hyperplasia of the lymphoid follicles.

Lawson Tait performed the first planned Appendicectomy for appendicitis in 1880.² Hereafter, immediate surgery for appendicitis was recommended in 1886 by Reginald Fitz.³ Appendicectomy was further popularised by Charles McBurney who introduced, in 1889, a operating technique by performing Appendicectomy with the use of a less invasive muscle splitting incision and by describing in 1894 the McBurney incision also known as grid iron incision.^{4,5} Other incisions includes Lanz

incision, Rutherford morrision and Paramedian incision. At present time, Appendicectomy is the most common abdominal operation because of their high lifetime risk of men [9.1%] and women [7.3%] for developing appendicitis.⁶ Despite OA being associated with low morbidity and mortality rates, two-port and three-port showed more advantages such as less wound infection, less pain, and faster recovery in the cost of more operating time.⁷ LA can have extra benefits for female patients as decreasing adhesions and fertility problems and better cosmetic results.^{8,9} With this background and considering the few studies comparing two, three-port and open Appendicectomy in third-world countries this study was designed to compare the prospective outcomes in terms of operating time, postoperative pain, hospital stay, time to resume the normal activity, intra and post operation complications.^{10,11}

MATERIALS AND METHODS

This comparative study was performed in the hospital among 135 patients who underwent Appendectomy, divided into 3 groups, 36 patients were in the open group, 59 in two-port and 40 patients were included in the three-port group. The merits and drawbacks of procedure were explained to all of the patients with diagnosis of appendicitis. Patients who gave their informed consent were divided into 3 groups. The study was approved by local Ethics Committee.

Patients underwent Appendectomy under general anesthesia by surgeons qualified in doing Appendectomy. OA was performed through standard McBurney incision or grid iron incision.¹² Lab findings mainly includes complete blood counts, and ultrasonography report. Operative time, length of hospital stay and postoperative complications were noted down. Antibiotics were administrated preoperatively for gram- negative and anaerobic organisms (ceftriaxone 1 gram, every 12 hours and

metronidazole 500 mg, every 8 hours). Post-operative the patients were not given oral feed until they were fully recovered from anesthesia and had their bowel sounds returned when clear fluids were started. Soft diet was introduced when the patients tolerated the liquid diet and had passed flatus. Patients were discharged once they were able to take regular diet, and had good pain control. The operative time (minutes) for the procedures was counted from the skin incision to the last skin stitch applied. The length of hospital stay was determined as the number of nights spent at the hospital postoperatively. Wound infection was defined as redness or purulent or seropurulent discharge from the incision site.¹³ Patients were discharged after remaining afebrile for 24 hours and after they could tolerate normal diet and exhibit a decrease in the white blood cell count to the normal level. The patients were followed up in the outpatient clinic at 1 week, 2 weeks, and at 1 month intervals for 3 months.

Table 1: Demographic details of patients

Parameters	Open Appendectomy (n=36)	Two-Port Appendectomy (n=59)	Three-Port Appendectomy (n=40)
Mean age	26.43	24.33	25.41
Males	23	35	26
Females	13	24	14
WBC count (per mm ³)	14978±4423	15342±4782	13367±5742
Medical history (diabetes, hypertension)	4	5	3

Table 2: Clinical data

Variables	Open Appendectomy (n=36)	Two-Port Appendectomy (n=59)	Three-Port Appendectomy (n=40)
Operative time (minutes)	39.7	31.94	68.14
Duration of hospital stay(days)	3.14	2.01	2.63
Surgical site infection	6 (4.44%)	2 (1.48%)	3 (2.22%)
Post-operative bleeding	6	2	4
Intra operative complications	2	Nil	Nil
Post-operative ileus	1	-	-
Return to normal activity (days)	9	6	7

RESULTS

Out of 135 patients with acute appendicitis, 36 patients underwent open Appendectomy and 59 patients underwent two-port and 40 three-port Appendectomy. Demographic data and preoperative clinical feature between OA group and LA group are showed in Table 1. There were no significant differences with respect to age and associated co-morbidities.

The mean age of patients under study was 25.39 years which includes 51 females and 84 males. The mean operative time was 39.7, 31.94, and 68.14 min for open, two-port, and three-port Appendectomy groups respectively (table 2). Mean length of stay was 3.14, 2.01, and 2.63 in days for open, two-port, and three-port Appendectomy groups respectively. Surgical site infection was significantly lower in laparoscopy group as compared to that in open Appendectomy group. Eleven

patients develops surgical site infection, 6 in the open and 2 in the two-port and 3 in three-port Appendectomy group and one in open group developed post-operative ileus. Post-operative bleeding is seen in 12 patients. No mortality was recorded. Positive medical history (diabetes and hypertension) was seen in 12 out of 135 patients. Total WBC count was also calculated.

DISCUSSION

Acute appendicitis is the most common intra-abdominal condition requiring emergency surgery.¹⁴ The possibility of appendicitis must be considered in any patient presenting with an acute abdomen, and a certain preoperative diagnosis is still a challenge.¹⁵ Laparoscopic (two and three-port) and open Appendectomy have been compared several times, since the

introduction of minimally invasive technique as a diagnostic as well as a therapeutic measure, in an effort to establish the supremacy of one above the other.^{12,16} While the case has been strong enough for laparoscopic cholecystectomy as the preferred method of treatment for symptomatic gall stone disease, it has not been the same for laparoscopic Appendectomy.¹⁷ In complicated appendicitis, LA can benefit a patient compared with OA because it minimizes the tissues trauma, allows better visualization of abdominal spaces and meticulous peritoneal irrigation, avoids wound incision and extension, and is associated with less exposure of wound surface area to contaminated fluids.¹⁸

In our study the mean operative time was 39.7, 31.94, and 68.14 min for open, two-port, and three-port Appendectomy groups respectively. In a study, by Wang et al reported that the operative time in LA (three-port Appendectomy) was significantly longer than that in OA.¹⁹ This longer duration was due to the fact that the manipulation of inflamed tissues with laparoscopic instruments is more difficult, making the dissection slower, to avoid the risk of visceral injury. Adhikary et al have reported a mean operative of 23.3 min.²⁰ Generally, the lack of experience of surgeons in the laparoscopic approach may contribute to a longer duration of the operation. Length of stay in hospital represents a critical factor that directly influences the economy and the well-being of the patient. We found that hospital stay was significantly shorter in two-port Appendectomy group (2.01 days).

There is always a concern about the high risk for postoperative intra-abdominal collection in complicated appendicitis. In our study, the postoperative complications were observed in two (1.48%) patients. Menezes et al published a retrospective study of 118 children with complicated appendicitis: they stated that the incidence of postoperative complications in LA was lower than that in OA (2.5 and 5.8%, respectively).²¹ Similarly, Kwok et al. found a similar incidence (3.7 vs. 4.3%).²² This may be due to the fact that laparoscopy gives the surgeon the privilege to explore the whole intra-abdominal recesses and to aspirate any visible collection. A few studies show that laparoscopic Appendectomy is safe and effective for treatment of appendicitis.²³ Two-port technique has an added advantage of minimal tissue trauma. Traditional laparoscopic Appendectomy (three-port) did not offer much advantage over the open Appendectomy due to prolonged operative time and higher cost.²⁴ Open Appendectomy still confers benefit in terms of lesser incidence of intraabdominal abscess. However, post-operative pain is on an average more intense after open Appendectomy. The mortality rate was nil in our study. The low mortality rates reported in previous research (0.05 % and 0.3 % rate in laparoscopic and open groups indicated that Appendectomy, especially in absence of complicated disease, is a safe procedure regardless of the technique used.²⁵ Currently, two-port Appendectomy is widely practiced for the management of appendicitis in developed countries, still there are many questions regarding the advantages and disadvantages of this approach in the treatment of appendicitis. Several controlled trails have been conducted, some in favor of two-port Appendectomy and other not.²⁶

Limitations of our study included the lack of evaluation of surgery in obese patients, as we did not collect data on body mass index (BMI) and follow up period was only limited to two weeks after hospital discharge. Moreover cost of each procedure is not taken into consideration.

CONCLUSION

The two-port Appendectomy is feasible, safe and efficient operative procedure in Appendectomy and it provides clinically beneficial advantages over open and three-port method (including shorter hospital stay, decreased operative time, decreased postoperative complications, earlier return to work, better cosmetic results, lower rate of wound infection and acceptable postoperative morbidity).

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