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### Surgical outcomes in patients with complicated appendicitis treated in medical college & hospital

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#### Abstract

**Background and Aim:** Complicated appendicitis has got good overall prognosis. Overall mortality rate of complicated appendicitis is less than 1%. Appendectomy is the most common surgical procedure done worldwide. Hence the aim of the present study was to assess the safety and efficacy of laparoscopic appendectomy in complicated appendicitis.

**Materials & Methods:** Total of 60 patients was include in the study. Data of the patients with age, sex, symptoms were tabulated. The documentation of the clinical findings, biochemical and imaging findings were done. Ultrasonography of the abdomen and pelvis was done in all the children. CT as ordered in those cases where the USG was found to be inconclusive.

**Results:** Wound infection was managed conservatively with daily dressings. Late complication in the form of adhesive obstruction was seen in 10 patients. Adhesive obstruction was seen between 6 weeks to 6 months post-surgery. Four patients required re-surgery for adhesive obstruction. In 6 children, adhesive obstruction was managed conservatively with intravenous fluids, antibiotics and nil per oral.

**Conclusion:** Early surgery makes the patient to get back to normal activities sooner and also reduces financial burden on family. Preliminary results show that our experiences with Laparoscopic appendectomy in Complicated Appendicitis in children have been encouraging. In conclusion having found less morbidity with laparoscopic approach we advocate the use of laparoscopy in children even with complicated appendicitis.

**Keywords:** Adhesive obstruction, appendicitis, laparoscopy, wound infection

#### Introduction

Acute appendicitis is acute inflammation and infection of the vermiform appendix, which is most commonly referred to simply as the appendix. The appendix is a blind-ending structure arising from the cecum. Acute appendicitis is one of the most common causes of abdominal pain and is the most frequent condition leading to emergent abdominal surgery in children<sup>[1]</sup>.

Appendicitis is the most common surgical emergency<sup>[2]</sup>. The lifetime risk of developing appendicitis is approximately 9% in males and 7% in females. Nearly about 30% of children present with complicated appendicitis. Appendicitis is most commonly seen in second decade of life. It can be divided into two main categories: uncomplicated and complicated. The proportion of complicated acute appendicitis varies, and it can reach up to 50% in some reports<sup>[3]</sup>.

A delay in the diagnosis of appendicitis is associated with rupture and associated complications, especially in young children<sup>[4]</sup>. Often the presentation is of peritonitis when only a high index of suspicion and a detailed history would help in arriving at the correct diagnosis. Improvements in detecting complications have been made with advanced radiologic imaging. Appendicitis with or without complications, is a clinical diagnosis, with imaging used to confirm equivocal cases<sup>[5]</sup>. The management of simple appendicitis is straight forward. Its appendectomy, either open or through laparoscopy. Complicated appendicitis was traditionally managed with immediate surgery<sup>[6]</sup>. But in 1980 conservative management was described. As per this approach, patients with complicated appendicitis were initially treated with intravenous antibiotics followed by interval appendectomy after a period of 4 to 16 weeks<sup>[7]</sup>.

Complicated appendicitis has got good overall prognosis. Overall mortality rate of complicated appendicitis is less than 1%<sup>[8]</sup>. However it is associated with higher morbidity than simple appendicitis. Appendectomy is the most common surgical procedure done worldwide. Hence the aim of the present study was to assess the safety and efficacy of laparoscopic appendectomy in complicated appendicitis.

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## Materials & Methods

The present study was conducted in the surgery department of the medical college. All the patients with complicated appendicitis were included in the study. All those with simple appendicitis were excluded from the study. Total of 60 patients were included in the study. Data of the patients with age, sex, symptoms were tabulated. The documentation of the clinical findings, biochemical and imaging findings were done. Ultrasonography of the abdomen and pelvis was done in all the children. CT as ordered in those cases where the USG was found to be inconclusive.

All the routine investigations were completed within 24 hours of admission and surgery was planned thereafter. The patients were informed about the procedure and the informed consent was obtained before the start of the surgery. All the patients underwent either open or laparoscopic appendectomy. Open appendectomy was done by infraumbilical transverse incision. In case of abscess/perforation the pus was drained, appendectomy done followed by a thorough lavage. Laparoscopic appendectomy was done by standard three port technique. Port sites were infraumbilical, left and right iliac fossa. Similar to open technique, pus was drained followed by appendectomy and lavage. Perioperative & postoperative antibiotics are administered for a period of 5-7 days depending on the severity of the disease process.

Postoperative analgesic requirement, duration of antibiotic administration, complications if any, such as port site infection, persistent fever, prolonged paralytic ileus, development of adhesive obstruction, postoperative intraabdominal abscesses are documented. The children would be followed up till suture removal. Ultrasound would be done for children in suspected cases to look for intra-abdominal collection.

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean  $\pm$  SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance.

## Results

Out of the total 200 patients with appendicitis in the study period. Patients of age more than 20 years were included in the study. Total of 34 males and 26 female patients were studied. Sixty patients with complicated appendicitis were included in the study, of which 38 patients were having perforated appendix and 22 patients were having gangrene. (Table 1)

**Table 1:** type of the complicated appendix

Type of appendix	No. of patients
Perforated	37
Gangrene	22
Total	60

Time range for operating was 60 – 90 mins. Maximum of 36 patients were treated in 60 mins time slot and minimum of 6 patients were treated in 90 mins slot. The extended intra operating time was because of identifying the cause as Perforated Appendix in cases with generalized peritonitis, dilated bowel loops making it technically difficult, adhesiolysis etc. Parenteral antibiotics were given for a period of 5 days for all patients, i.e., 85% of patients received antibiotics for 5 days whereas 16% of patients who had persistent fever received antibiotics for an extended period of 1 week.

**Table 2:** Distribution of operating time

Operating time in mins	No. of patients
60 mins	36
70 mins	12
80 mins	6
90 mins	6
Total	60

Wound infection in immediate post-operative period was seen in 15% of the patients (Table 6). Wound infection was managed conservatively with daily dressings. Late complication in the form of adhesive obstruction was seen in 10 patients. Adhesive obstruction was seen between 6 weeks to 6 months post-surgery. Four patients required re-surgery for adhesive obstruction. In 6 children, adhesive obstruction was managed conservatively with intravenous fluids, antibiotics and nil per oral. So overall the re-surgery rate in children undergoing early surgery for complicated appendicitis was 5.28%. No mortality was recorded in the present study.

**Table 3:** Post op complications distribution

Complications	No. of patients
Uneventful recovery	41
Immediate	9
Late	10
Mortality	0

## Discussion

Complicated appendicitis is a common surgical emergency in children. In the era of minimal access surgery there is still a controversy regarding the modality of treatment for complicated appendicitis - whether open appendectomy or LAP appendectomy should be done. In many centres across the world LAP appendectomy has been a routine for simple appendicitis in children<sup>[9]</sup>.

Although laparoscopic appendectomy is well accepted for treatment of non-complicated appendicitis there has been concerns about its use in case of complicated appendicitis, particularly about the longer duration of surgery, surgical site infection, Intra-abdominal abscess etc<sup>[10]</sup>. Various risk factors have been studied for the increased risk of perforation. These include extremes of age, male sex, rural locality, delayed presentation, delay in diagnosis, presence of appendicolith, elevated blood parameters namely neutrophils<sup>[11]</sup>.

There are several reports which state that if gangrene or perforation is found at the time of laparoscopic appendectomy then the procedure should be converted. Frazee and Bohannon published a retrospective analysis of 15 patients with gangrenous appendicitis and 19 patients with perforated appendicitis who underwent laparoscopic appendectomy<sup>[12]</sup>. They found a 7% rate of postoperative intra-abdominal abscess in the gangrenous group and a 26% rate of postoperative intra-abdominal abscess in the perforated group. Tang *et al.* found a postoperative intra-abdominal abscess rate of 11% for perforated appendicitis treated laparoscopically compared with a rate of 3% treated by the open method. However in our study it was seen that there was no incidences of post-operative intra-abdominal abscess<sup>[12]</sup>.

With respect to timing of surgery for complicated appendicitis controversy exists between early or delayed surgery. In delayed group, children with complicated appendicitis were initially treated conservatively with intravenous antibiotics/percutaneous

drainage of abscess followed by interval appendectomy after a period of 4 to 16 weeks. Early surgery reduces the time away from normal activity. In our study mean duration of stay was about 7.4 days. In a study done at America the overall length of stay was 10 days.

### Conclusion

Controversy exists about the ideal time for surgery in complicated appendicitis. Early surgery in complicated appendicitis is safe, feasible. The complication rate is acceptable and most of them can be managed conservatively. Early surgery makes the patient to get back to normal activities sooner and also reduces financial burden on family. Preliminary results show that our experiences with Laparoscopic appendectomy in Complicated Appendicitis in children has been encouraging. In conclusion having found less morbidity with laparoscopic approach we advocate the use of laparoscopy in children even with complicated appendicitis.

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