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Clinical study of laparoscopic appendectomy for acute appendicitis in children

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Abstract

Background: Acute appendicitis is the most common cause of surgical abdomen in childhood. Minimal access surgery has been proved to be a useful surgical technique. Present study was aimed to study laparoscopic appendectomy for acute appendicitis in children at a tertiary hospital. **Material and Methods:** Present study was retrospective, observational study, conducted in medical records of children of age 5-14 years, either gender, admitted to pediatric surgical ward underwent laparoscopic appendectomy at our institute. **Results:** In present study, 32 children were studied. Mean age 9.3 ± 2.4 was years. Majority were male (56.25 %) & common presenting symptoms were fever (100 %), abdominal pain (90.63 %), nausea & vomiting (34.38 %), loose stools (25 %) & others (18.75 %). Intraoperative appendix findings were unruptured appendix (71.88 %), ruptured appendix with localised peritonitis (18.75 %) & ruptured appendix with diffuse peritonitis (9.38 %). Mean duration of surgery was 45.43 ± 21.45 min, mean time to oral intake was 16.56 ± 6.34 hours, mean duration to return to normal activity was 1.64 ± 0.45 days & mean hospital stay was 2.56 ± 1.23 days. Complications noted were fever (12.5 %), prolonged ileus (>24 hours) (9.38 %), conversion to abdominal (6.25 %), intra-abdominal abscess (3.13 %) & reoperation due to intestinal leakage (3.13 %). **Conclusion:** Laparoscopic approach for managing acute appendicitis in children is safe and effective with respect to the less hospital stay, early recovery and cosmesis. The added advantage of laparoscopic appendectomy is its improved diagnostic ability.

Keywords: Laparoscopic appendicectomy, acute appendicitis, children, early recovery

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Introduction

Acute appendicitis is the most common cause of surgical abdomen in childhood.[1] Acute Appendicitis (AA) is an acute inflammation of the appendix that results in serious complications if not promptly and accurately diagnosed and treated.[2] The delay in the diagnosis of acute appendicitis has been attributed to nonspecific presentations, overlap of symptoms with many other common childhood illnesses, together with inability child to express and difficult abdominal examination in children.

Appendectomy is performed by various techniques, such as open, laparoscopic assisted, laparoscopic multiport, and single-incision laparoscopic approach.[3] Laparoscopic appendectomy has been shown to be feasible and safe in randomized comparisons with open appendectomy.

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Laparoscopic appendectomy has improved diagnostic accuracy along with advantages in terms of less surgical trauma, less postoperative pain, fewer postoperative infections, shorter hospitalization, better cosmesis, and earlier recovery.[4] On the contrary, laparoscopic appendectomy consumes more operating time and is associated with increased hospital costs.[5] Minimal access surgery has been proved to be a useful surgical technique. The application of the recent technology and skills can now provide a better and a cheaper choice of treatment. Present study was aimed to study laparoscopic appendectomy for acute appendicitis in children at a tertiary hospital.

Material And Methods

Present study was retrospective, observational study, conducted in Department of Surgery, MIMSR Medical College & Hospital, Latur and Lotus Children Hospital & advanced laparoscopy centre, Latur, India. Study duration was of 5 years (January 2017 to December 2021). Study approval was obtained from institutional ethical committee. Medical records of children of age 5-14 years, either gender, admitted to pediatric surgical ward underwent laparoscopic appendectomy at our institute in the period from January 2017 to December 2021 with a diagnosis of acute appendicitis were considered for present study.

Demographic & clinical data including age at presentation, sex, signs and symptoms, duration of symptoms, physical examination findings, radiological findings (abdomen Xray/ultrasonography/ CT scan), laboratory findings (CBC, WBC, LFTs, RFTs) were noted. Pre-operative all children kept NBM, received intravenous fluids, administration of analgesia for pain control and obtaining a signed informed consent from the parents after explaining for them the whole procedure and its possible complications.

Appendectomy was performed under general anesthesia via laparoscopic approach in supine position. Supraumbilical incision is performed, veress needle is introduced and CO2 insufflated with a pressure of 8-12 mmHg to create pneumoperitoneum, another two incisions in right upper quadrant and left iliac fossa for working trocars are performed, identification and dissection of mesoappendix using ligasure, base of appendix is secured using either endoloop or endoclipper and finally appendix is removed through trocar or via retrieval bag.

Intraoperative findings, immediate postoperative course, histopathological result, hospital stay and post operative complications were noted in case record proforma. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

Results

In present study, 32 children were studied. Mean age 9.3 ± 2.4 was years. Majority were male (56.25 %) & common presenting symptoms were fever (100 %), abdominal pain (90.63 %), nausea & vomiting (34.38 %), loose stools (25 %) & others (18.75 %).

Table 1: General characteristics

	No. of patients/ Mean ± SD	**Percentage**
Mean age (in years)	9.3 ± 2.4	
Gender		
Male	18	56.25
Female	14	43.75
Presenting symptoms		
Fever	32	100
Abdominal pain	29	90.63
Nausea & vomiting	11	34.38
Loose stools	8	25
Others	6	18.75

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Intraoperative appendix findings were unruptured appendix (71.88 %), ruptured appendix with localised peritonitis (18.75 %) & ruptured appendix with diffuse peritonitis (9.38 %). Mean duration of surgery was 45.43 ± 21.45 min, mean time to oral intake was 16.56 ± 6.34 hours, mean duration to return to normal activity was 1.64 ± 0.45 days & mean hospital stay was 2.56 ± 1.23 days.

Table 2: Operative & post-operative characteristics

Characteristics	**No. of patients/ Mean ± SD**	**Percentage**
Operative Appendix findings		
• Unruptured	23	71.88
• Ruptured with localised peritonitis	6	18.75
• Ruptured with diffuse peritonitis	3	9.38
Duration of surgery (min)	45.43 ± 21.45	
Time to oral intake (hours)	16.56 ± 6.34	
Hospital stay (days)	2.56 ± 1.23	
Returned to normal activity (days)	1.64 ± 0.45	

In present study, complications noted were fever (12.5 %), prolonged ileus (>24 hours) (9.38 %), conversion to abdominal (6.25 %), intra-abdominal abscess (3.13 %) & reoperation due to intestinal leakage (3.13 %).

Table 3: Complications

Complications	**No. of patients**	**Percentage**
Fever	4	12.5
Prolonged Ileus (>24 hours)	3	9.38
Conversion to abdominal	2	6.25
Intra-abdominal abscess	1	3.13
Reoperation due to intestinal leakage	1	3.13

Discussion

Early surgery leads to inadequate evaluation of acute abdominal pain and negative appendectomy, whereas delayed surgery leads to appendicitis perforation complications.[6] Delayed diagnosis leads to various complications, including perforation, peri-appendicular abscess, wound infection, and intra-abdominal adhesion.[7]

Laparoscopic appendectomy has now gained a favourable reputation uniformly. Several Meta analyses and comparative studies have shown that it retains the traditional advantages of the minimally invasive approach in terms of decreased wound pain, shorter length of hospital stay, lesser incidence of wound infection, quicker return to work, and improved cosmesis.[8]

In study by Mohammad G et al.,[9] 390 children were studied, mean age was 12.04 years in group A and 12.2 in group B. The mean operative time in the laparoscopic group was 56.4 min; while in the conventional group was 63.42 min. LA was a suitable, effective and safe procedure in complicated cases that did not involve the base. It was associated with lower complications rate with all the advances of minimal invasive surgery when compared to the conventional open appendectomy.

Tom R et al., [10] noted that average age of the children in LA vs. OA group was 9.63±2.70 vs. 9.16±2.91 respectively. Postoperative complications were detected in 1 (0.90%) of LA patients and 3 (4.11%) of OA patients with no significant association. Analgesics' treatment received 57 (51.35%) of the children from LA group and all of the children from OA group. Conversion from LA to OA happen only in 1 (0.54%) child. The evaluation of

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parents/guardians related to the satisfaction from the cosmetic appearance of the scar the significantly higher level of satisfaction from the scare after LA compared to OA intervention.

In study by Zenon P et al.,[11] median length of hospital stay was 3 days in laparoscopic group compared to 6 days in open group (P<0.001). The amount of analgesics used was lower in patients with laparoscopic appendectomy compared to patients who underwent open procedure (P=0.042). Significantly higher number of wound infections was recorded in the open group (n=21; 3.9%) compared to laparoscopic group (n=3; 1%) (P=0.014). The frequency of re-operation in both groups was equal (1.3%). The median duration of surgery was shorter in the group of patients with laparoscopic appendectomy compared to the open approach (30 vs. 45 min; P<0.001). In five-year period, the proportion of laparoscopic appendectomies increased by 21.5%.

Certainly, the laparoscopic approach facilitates the complete inspection of the abdominal cavity and identification of all septic foci or any significant pathology. Thus, laparoscopic approach increases the precision of diagnosis, avoiding additional complications. It has been suggested that, with increasing operative experience, the operative time required for LA will decrease significantly.[12]

The increase in cost is attributed to increased operative time for laparoscopic procedures, as well as to the higher cost of specialized instrumentation such as endoscopic stapler, endoscopic clip, Ligasure,and Harmonic scalpel. The cost of surgery also increases by the use of commercially available pre-tied endo-loop ligature for securing the appendicular stump.[13]

Laparoscopic appendicectomy has been evolving since then and there have been several modifications in order to achieve better cosmetic results, reduction in costs, shorter recovery period, and less hospital stay. These newer techniques are appendectomy by laparoscopy-assisted approach, two-port laparoscopic approach, transumbilical single-port laparoscopic conventional appendectomy, and transumbilical single-incision laparoscopy-assisted approach.[14,15]

Conclusion

Laparoscopic approach for managing acute appendicitis in children is safe and effective with respect to the less hospital stay, early recovery and cosmesis. The added advantage of laparoscopic appendectomy is its improved diagnostic ability.

Conflict of Interest: None to declare
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