Research Paper

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Outcomes of Laparoscopic Appendectomy in Complicated Pediatric Appendicitis

Medical Sciences

KEYWORDS : appendicitis, Laparoscopic appendectomy. Perforated appendicitis.

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ABSTRACT

OBJECTIVES

To assess the safety and efficacy of Laparoscopic appendectomy in complicated appendicitis in children.

METHODS:

All children admitted with diagnosis of acute appendicitis were evaluated.

All children suspected to have complicated appendicitis are subjected to clinical examination and imaging.

All children would be subjected to Laparoscopic appendectomy.

RESULTS

In our study it was seen that there was no incidence of post operative intra abdominal abscess.

Lower incidence of post operative adhesions compared to open appendectomy.

Lower incidence of infections, wound haematoma and post operative bowel paralysis when compared to open appendectomy.

CONCLUSION

Our results have indicated the feasibility, safety and efficacy of laparoscopic appendectomy in complicated appendicitis in children. The incidence of post-operative intra abdominal abcess was nil in our study probably due to the efforts taken to give a thorough peritoneal lavage and also an adequate course of higher antibiotics. Duration of surgery was dependent on the severity of the peritonitis and the associated paralytic ileus with dilated bowel loops which made the procedure technically challenging. Surgical site infection in our study though not significant could have been avoided with the use of endobag .

Although the number of patients enrolled in this study thus far is small , preliminary results show that our experiences with Laparoscopic appendectomy in Complicated Appendicitis in children has been encouraging .In conculsion having found less morbidity with laparoscopic approach we advocate the use of laparoscopy in children even with complicated appendicitis.

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. Common symptoms of acute appendicitis include abdominal pain, fever, and vomiting. The diagnosis of appendicitis can be difficult in children because the classic symptoms are often not present.

A delay in the diagnosis of appendicitis is associated with rupture and associated complications,especially in young children. 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.

The definitive treatment for appendicitis is appendectomy. Key to any evaluation and treatment plan are the following: relieve the patient's pain and discomfort early and consistently; communicate with the patient and family about the plans; repeat the examination often; adjust the differential diagnosis as appropriate; and keep the patient for observation if a firm diagnosis is not made.

AIMS & OBJECTIVES

To assess the safety and efficacy of laparoscopic appendectomy in complicated appendicitis in children

METHOD OF COLLECTION OF DATA :

All children who are admitted with the diagnosis of acute appendicitis between July 2012 and July 2014 would be evaluated. All children suspected to have complicated appendicitis would be subjected to clinical examination and imaging that includes ultrasonography in all cases computed tomography in selected cases. All the children would be subjected to laparoscopic appendectomy. The children confirmed to have complicated appendicitis by the following features.

(1) CLINICAL EXAMINATION :

- History of acute onset of right lower abdominal pain, vomiting and fever
- Abdominal examination reveals the presence of a tender mass in the right iliac fossa, or generalized guarding and rigidity.

(2) ULTRASOUND FINDINGS OF PERFORATED APPENDICITIS :

Perivesical mass without peristalsis, pericecal or perivesical free fluid or an echogenic fluid collection, an appendix greater than 6 mm in diameter, thickened bowel loops with reduced peristalsis, an appendicolith, interloop fluid collections, fluid collections in the subhepatic or subdiaphragmatic spaces

(3) COMPUTERIZED TOMOGRAPHIC FINDINGS OF PERFORATED APPENDICITIS

Fat streaking,an appendix more than 6 mm in diameter and focal caecal apical thickening, appendiocliths, abscesses, an arrowhead sign, pockets of fluid in the pericecal area, pelvis etc.

(4) WHITE BLOOD CELL COUNT :

If white blood cell count exceeds 15,000 cells /uL, the patient is more likely to have a perforation.

PROCEDURE DONE :

Laparoscopic Appendectomy – This procedure is done under general anesthesia (GA) ; port placement consists of a 5 mm – 10 mm port in the umbilicus as an optic port, two 5 mm working ports, one in the left lower abdomen and the other in the su-

prapubic region. Presence of gangrenous / perforated appendix, appendicular mass / abscess, localized or generalized peritionitis are documented. Appendectomy is done followed by a thorough peritoneal levage with warm saline.

Perioperative & postoperative antibiotics are administered for a period of 5-7 days depending on the severity of the disease process.

FOLLOW UP

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 intraabdominal collection.

INCLUSION CRITERIA :

1. Patients in the age group of 2-15 years
2. All cases of complicated appendicitis

EXCLUSION CRITERIA :

1. Non complicated acute appendicitis
2. Gross peritonitis with tense abdomen, patients with low cardiopulmonary reserve where creating a pneumoperitoneum would be a risk
3. Moribund patients who would be a risk for laparoscopic surgery
4. Previous abdominal surgeries with significant adhesions

Table 1: Age distribution of patients studied

Age in years	Number of patients	%
2-5	6	20.0
6-10	20	66.7
>10	4	13.3
Total	30	100.0

Table 2: Gender distribution of patients studied

Age in years	Number of patients	%
Male	17	56.7
Female	13	43.3
Total	30	100.00

Table 3: Type of appendix of patients studied

Age in years	Number of patients	%
Perforated	19	63.3
Gangerene	11	36.7
Total	30	100.00

Table 4: Distribution of Operating time in minutes of patients studied

Operating time in minutes	Number of patients	%
60 minutes	18	60.0
70 minutes	6	20.0
80 minutes	3	10.0
90 minutes	3	10.0
Total	30	100.0

Table 5: Distribution of Parental antibiotic given in days of patients studied

Parental antibiotic given in days	Number of patients	%	95%CI
5 days	25	83.3	44-92.66
7 days	5	16.7	34-33.35
>7 days	-	-	-
Total	30	100.0	-

Table 6: Distribution of fever of patients studied

Parental antibiotic given in days	Number of patients	%	95%CI
No	26	86.7	32-94.99
Yes	4	13.3	31-29.66
Total	30	100.0	-

Table 7: Distribution of Port site infection of patients studied

Parental antibiotic given in days	Number of patients	%	95%CI
No	26	86.7	32-94.99
Yes	4	13.3	5.31-32.68
Total	30	100.0	-

Table 8: Distribution of Feeds started on post op day of patients studied

Parental antibiotic given in days	Number of patients	%	95%CI
Day 1	18	60.0	32-75.41
Day 2	12	40.0	9.51-37.31
Total	30	100.0	-

Table 9: Distribution of Intra abdominal abcess of patients studied

Parental antibiotic given in days	Number of patients	%	95%CI
No	30	100.0	88.85-100.00
Yes	-	-	-
Total	30	100.0	-

Table 10: Distribution of Re-operation of patients studied

Parental antibiotic given in days	Number of patients	%	95%CI
No	30	100.0	88.85-100.00
Yes	-	-	-
Total	30	100.0	-

Table 11: Distribution of Discharge on post op day of patients studied

Parental antibiotic given in days	Number of patients	%	95%CI
Day 8	24	80.0	62.69-90.49
Day 11	6	20.0	9.51-37.31
Total	30	100.0	-

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.51 In many centres across the world LAP appendectomy has been a routine for simple appendicitis in children.52 However the role of laparoscopic approach in Complicated Appendicitis is still debatable because few articles published say that there is increased incidence of post op intraabdominal abcess with this modality of treatment.53, 54 The reasons quoted were that the pneumoperitoneum created in laparoscopic approach helps the localized infected contents to spread throughout the peritoneal cavity and also that in open appendectomy appendix is divided outside the abdominal cavity and stump is inverted after division, possibly decreasing the incidence of intra-peritoneal contamination, whereas dissection of appendix in LAP appendectomy occurs within the abdominal cavity which may result in the spillage of infected contents into the peritoneal cavity.

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 abcess etc.

However laparoscopic appendectomy in complicated appendicitis provides the advantage of panoramic view with increased magnification, ability to visualize the hidden corners (various pouches & intraperitoneal spaces) and clearance of purulent material by giving a thorough saline wash. In open surgery, laparotomy with a large incision would be required in order to obtain the same effect.In open surgery, atypical location of appendix may require an extended or second incision ,laparoscopic avoids this and gives an aesthetically acceptable scar and less post operative pain.

Surgical site infection are less in laparoscopic appendectomy as the use of suction and irrigation helps to reduce this whereas multiple abdominal layers opened in conventional technique i.e open appendectomy allowed infected material to collect between these layers thus promoting wound infection.

Also in case of appendicular mass where the appendix is stuck to the caecum, bowel or the omentum and with parietal wall adhesions laparoscopy facilitates easier dissection as compared to open appendectomy.

In almost all the literature the operating time of laparoscopic appendectomy was found to be more than that of open appendectomy. The difference in mean operating time ranged from 8.3 to 29 minute.

In general the time should be calculated from the insertion of first trocar to the end of skin suturing. Cox et al. defined operating time as the time from incision to wound closure.68 Tate et al calculated the time as use of anaesthesia to the administration of a reversal agent.69 Generally all laparoscopic procedures are more time consuming for the following reasons.

1. Inherent nature of slow manoeuvre of laparoscopic techniques
2. Time taken by careful slow insufflation.
3. Routine diagnostic laparoscopy before starting any laparoscopic procedure.

In our study it was seen that the mean operating time ranged from 60 to 90 mins as shown in the graph.

The risk of wound infection is less in laparoscopic appendectomy compared to the open procedure. A meta-analysis of randomised controlled trials has been reported with outcomes of 2877 patients included in 28 trials. Overall complication rates were comparable, but wound infections were definitely reduced after laparoscopy (2.3% to 6.1%).70 Rohr et al reported higher wound infection rates after laparoscopic appendectomy, but most of the literature supports the view that wound infection is less common after a laparoscopic procedure.

In our study, there were a few port site infections (umbilical port) from which the appendix was retrieved. Though not statistically significant it could have been avoided with the use of endo bag.

Due to the risk of intra-abdominal abscess formation there is a strong controversy among surgeons regarding the use of the laparoscopic procedure in complicated appendicitis (gangrenous or perforated).

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. 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.

Paya et al published a prospective study of 75 children with perforated appendicitis. Ten underwent laparoscopic appendectomy and the remainder underwent open operation. There were no postoperative abscesses in the laparoscopic group but 2 (3.1%) of 65 patients who had open appendectomies developed postoperative intra-abdominal abscesses.

The incidence of post op intra abdominal abscess after laparoscopic appendectomy in children with complicated appendicitis varies from 5.8% to 41%. A high degree of clinical suspicion in a child with persistent fever post-opeartively and liberal use of imaging techniques can help identify this complication at the earliest.

However in our study it was seen that there was no incidences of post- operative intra abdominal abscess.

In Laparoscopic appendectomy intestinal wall hematoma and post op bowel paralysis is less in comparison with open appendectomy because of minimal bowel handling which helps in initiation of oral feeds earlier as compared to the convectional technique.

Another advantage of laparoscopic approach is that there is a lower rate of post-operative adhesions, this is seen in our children too although the period of follow-up has not been long enough.

CONCLUSION

Our results have indicated the feasibility, safety and efficacy of

laparoscopic appendectomy in complicated appendicitis in children. The incidence of post-operative intra abdominal abcess was nil in our study probably due to the efforts taken to give a thorough peritoneal lavage and also an adequate course of higher antibiotics. Duration of surgery was dependent on the severity of the peritonitis and the associated paralytic ileus with dilated bowel loops which made the procedure technically challenging. Surgical site infection in our study though not significant could have been avoided with the use of endobag .

Although the number of patients enrolled in this study thus far is small , preliminary results show that our experiences with Laparoscopic appendectomy in Complicated Appendicitis in children has been encouraging .In conculsion having found less morbidity with laparoscopic approach we advocate the use of laparoscopy in children even with complicated appendicitis.

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