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RESEARCH ARTICLE

Laparoscopic Appendectomy in Children is it Equal or Superior To Open Appendectomy (single center experience)

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Abstract

Introduction: Appendicitis is one of the most common acute abdominal conditions encountered by pediatric surgeons. With evolution of minimally invasive surgery, the operative approach toward acute appendicitis has shifted from a traditional open approach to a multiport laparoscopic technique. Several studies have demonstrated equivalent or improved outcomes for patients in terms of shorter hospitalization, less post operative pain and fewer complications(1).

Aim of the work: The aim of the work is to study that if laparoscopic appendectomy in children can be a safe alternative to open appendectomy in case of acute appendicitis?

Patients and methods: One hundred twenty patients with acute appendicitis (complicated and non complicated) are retrospectively studied in the period between Jan 2012 to Jan 2013, in pediatric surgery unit in Zagazig University Hospitals. Sixty five patients were subjected to laparoscopic appendectomy and fifty five patients were subjected to open appendectomy, operative and postoperative analysis was done.

Results: The study was included 120 patients with acute appendicitis, 100 patients with non complicated appendicitis, 20 patients with complicated appendicitis (15 patients with gangrenous appendicitis and 5 patients with perforated appendicitis).laparoscopic appendectomy was done for 65 patients, from which 60 patients with non complicated appendicitis and 5 patients with complicated appendicitis and 2 patients was converted from laparoscopic to open and their results remain in the laparoscopic group. 55 patients were subjected to open appendectomy.

Conclusion: Laparoscopic appendectomy can be a safe alternative to open appendectomy in children with non complicated acute appendicitis.

INTRODUCTION

Acute appendicitis is a common pediatric intra abdominal pathology requires urgent and appropriate management. Otherwise it may progress to complicated intra abdominal inflammatory lesions(2).Laparoscopic appendectomy was described in 1983 (3), Since first described there has been an ongoing debate vs. risks ,some advocate that the advantage of laparoscopic appendectomy include, better exposure, increased diagnosis of intra abdominal pathology, efficient intra peritoneal lavage ,decreased risk of stay in hospital, earlier resumption of diet, and reduced need for analgesia(4).Other showing that laparoscopic appendectomy increase vascular and bowel injuries, stump release, longer operating and setup times, more frequent complications (especially abscess) ,more expense and fewer opportunities to perfect these skills in pediatric populations(5). This study was done to show if laparoscopic

appendectomy can be a safe alternative in case of acute appendicitis whether complicated or none complicated in children.

Patient and methods:

Retrospective study was done on the records of 120 children who had acute appendicitis either complicated (perforated or gangrenous) or none complicated between Jan 2012 to Jan 2013 in pediatric surgery unit in Zagazig University Hospitals. The diagnosis was based on physical examinations, laboratory tests and radiology. Perforated appendicitis was defined as free perforation with intra abdominal purulence and gangrenous appendicitis and gangrenous appendicitis was defined as transmural necrosis of the appendix. A case diagnosed as apppendicular masses was excluded from the study. Data collected include age, sex, technique of appendectomy (laparoscopic, open or converted), duration of operation, duration of hospitalization and postoperative complications. The decision to perform laparoscopic or open appendectomy was made by each attending surgeon. In laparoscopic appendectomy, carbon dioxide insufflations was performed using a verses needle to a maximum of 12 to 15 mmHg .A 3- port technique was used, placing two 5 mm ports in the left lower quadrant and the suprapubic site and 10 mm port in the umbilicus. A5 mm laparoscope was used, the mesoappendix was identified, controlled using clips or cautery, and divided .The mesoappendix was removed through 10 mm umbilical Port with or without a retrieval bag. The abdomen and the pelvis were irrigated with warmed normal saline and suction. In open technique we use traditional muscle splitting incision. In both open and laparoscopic appendectomy the peritoneal cavity was irrigated with normal saline and drain was put in selected cases with severe abdominal infection with purulence. The regime of preoperative and post operative antibiotics therapy were decided at the discretion of the attending surgeon. The patients were discharged when there is no fever and with normal bowel movement and no signs of complications. Statistical analysis was done.

Results:

The study was included 120 patients with acute appendicitis, 100 patients with non complicated appendicitis, 20 patients with complicated appendicitis (15 patients with gangrenous appendicitis and 5 patients with perforated appendicitis).laparoscopic appendectomy was done for 65 patients, from which 60 patients with non complicated appendicitis and 5 patients with complicated appendicitis and 2 converted from laparoscopic to open and their results remain in the laparoscopic group. 55 patients were subjected to open appendectomy. Characteristic of patients with appendicitis was listed in table 1.

characteristic	**Open appendectomy (n=55)**	**Laparoscopic appendectomy (n=65)**	**P value**
Age	4-15(8)	7-18(12)	
Sex (male: female)	35/25	30/35	
Laboratory parameters **WBC** **CRP**	 7,000-22,000 1-45(7-5)	 6,000-15,000 1-25(2.5)	
Generalized peritonitis	9(16.4%)	5(7.7%)	
Pathological finding **Catarrhal** **Gangrenous OR** **perforated phlegmonus**	 30(54.5%) 15(27.3%) 10(18.2%)	 35(53.8%) 5(7.7%) 25(38.5%)	
Mean operating time (minutes)	20-120	45-180	<0.5
Lavage(ml)	200-500	500-1000	
Drain	10	5	
Complications **Intra abdominal abscess** **Wound infection** **Small bowel obstruction** **Stitch abscess**	 3(5.5%) 15(27.3%) 1(1.8%) 10(18.8%)	 6(9.2%) 5(7.7%) 0(0%) 4(6.1%)	
Regular diet (days)	2	1	
Hospitalizations(days)	1-6 days	1-3 days	>0.5

Parental analgesic	2 days	1.5 days	0.6
Oral analgesic	7 days	4 days	0.5
Return to normal activities	21 days	12 days	<0.42

The age of the patients in open appendectomy was ranged from 4 to 15 years with median age 8 years, and the age for laparoscopic appendectomy ranged from 7 to 18 years with median age 12years. Male to female ratio was 35:25 for open appendectomy and 30:35 for laparoscopic appendectomy .For laboratory parameters WBC was ranged from 7,000 to 22,000 in open cases and 6,000 to 15,000 in laparoscopic cases.CRP was ranged from 1-45 in open cases and 1-25 for laparoscopic cases. Generalized peritonitis was showed in 9(16.4%) patients in open appendectomy and in 5(7.7%) patients with laparoscopic appendectomy. The mean operating time in open appendectomy was 20 to 120 minutes and in laparoscopic appendectomy was 45 to 180 minutes with p value less than 0.5 with significant difference. We put drain in 10 patients with open appendectomy and in 5 patients with laparoscopic appendectomy. Parental analgesic was given for 3 days for open appendectomy compared to 2 days for laparoscopic appendectomy. And oral analgesic was given for 7 days in open cases and for 4 days in laparoscopic cases. Regular diet was started after 2 days in open appendectomy and after 1 day for laparoscopic appendectomy. Return to normal and full activities after 21 days in open appendectomy and after 12 days for laparoscopic appendectomy with significant difference p value <0.42. Post operative complications was noticed in open appendectomy as follow 3(5.5%) patients with intra abdominal abscess which drained by aspiration under ultrasound, and 15(27.3%) patients with wound infections which treated conservatively ,1(1.8%) patient with bowel obstruction 3 months post operative and he treated by open adhesolysis and 10(18.8%) patients with stitch abscess which drained under local anesthesia .In laparoscopic appendectomy post operative complications as follow 6(9.2%) patients with intra abdominal abscess which treated conservatively by antibiotics ,5(7.7%) patients with wound infection treated conservatively. And 4 (6.1%) patients with stitch abscess which treated by drainage under local anesthesia. There are no patients with bowel obstruction in this study after laparoscopic appendectomy. In patients with open appendectomy the patient return to normal diet within 2 days and for laparoscopic appendectomy after one day post operative. Parental analgesic was needed for 2 days in open cases and for 1 day in laparoscopic cases and oral analgesic was taken for 7 days in open and for 4 days in laparoscopic cases. Return to full activities within 21 days in open cases and within 12 days in laparoscopic cases with significant difference p value <0.42.

Discussion:

Laparoscopic appendectomy was first described by semm (3) in the early 1980s. Since that initial report, several groups have suggested a significant advantage with the laparoscopic approach compared with the traditional open technique noting a reduction in post operative convalescence (6, 7). analgesic requirements, and duration of hospital stay (8), in addition visualization of peritoneal cavity and superior cosmetic results(9).Our study was done, revising the 120 patients with acute appendicitis,100(83.3%) patients with non complicated appendicitis and 20 (16.6%) patients with complicated appendicitis(gangrenous or perforated) ,laparoscopic appendectomy was done for 65 patients (54.2%) and open appendectomy was done for 55 patients(45.8%).For complicated appendectomy only 5 patients was done by laparoscopic technique from which 2(3%) patients converted to open appendectomy, this conversion rate is lower than conversion rate in other series in which the conversion rate was 11% in Mustafa et al(10) . These results was matched with another study which suggest that avoiding laparoscopic appendectomy in children who receive a pre operative diagnosis of complicated appendicitis ,they also suggest early conversion from laparoscopic to open appendectomy in children discovered to have complicated appendicitis at the time of laparoscopy(Jeffrey et al) (11).From our study we found that there is significant difference in operative time between open and laparoscopic appendectomy in which the laparoscopic appendectomy take more operative time but with increase the experience curve the operative time of laparoscopic appendectomy nearly equal to open method. Martein et al (9) in prospective study of 169 patients, found no difference in operating time for patients who had perforated appendicitis that underwent laparoscopic appendectomy compared with those that underwent an open procedure. In our study there is shorter post operative stay in the hospital in laparoscopic appendectomy compared to open procedure. According to post operative complications we found that, 3 patients with intra abdominal abscess in open appendectomy and 6 patients in laparoscopic method, 15 patients with wound infection in open appendectomy compared to 5 patients in laparoscopic appendectomy, small bowel obstruction was observed in one patient with open appendectomy which treated by open adhesolysis, stitch abscess was happened in 10 patients with open appendectomy and in 4 patients with laparoscopic method. These results matches with study done by yeungs et al (12), in which the study include 436 children randomized between open and laparoscopic appendectomies, wound

infections seem to be more in the open appendectomy group, there were no intra abdominal abscess in 4 of the 5 randomized studies, making it hard to draw conclusion regarding the incidence of intra abdominal abscesses in the pediatric populations (13). In our study the need for analgesia for laparoscopic patients is less than for the open procedure. And there is rapid return to normal activity in laparoscopic appendectomy compared to open methods. From our study the laparoscopic appendectomy can be a safe alternative to open appendectomy in children. Another barrier to the widespread acceptance of laparoscopic appendectomy has been high morbidity , especially in cases of perforated appendicitis .current recommendation from a recent Cochrane review (14)suggest that laparoscopic appendectomies be reserved for acute appendicitis or special circumstances such as those involving obese patients or women of reproductive age because of the diagnostic and therapeutic advantage. This systemic review also suggests that laparoscopic appendectomy not recommended in cases of perforated or gangrenous appendicitis because of the 3 fold increase of abscess formation as seen in adults.

Conclusion:

From our study we conclude that, laparoscopic appendectomy can be a safe alternative to open appendectomy in children with non complicated acute appendicitis.

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