

APPENDECTOMY IN PEDIATRICS: OPEN OR LAPAROSCOPIC?

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Background: Appendicitis takes the first place among all the abdominal emergencies in pediatrics. This is because of its frequency and potential gravity. Appendectomy is the most common and most effective abdominal operation. Laparoscopic appendectomy, though emerged more than twenty years back, has not gained a universal acceptance among pediatric surgeons to be an option for treating this problem.

Patients & Methods: Over a period of two years (September 2002 - August 2004), a total of 67 patients with the diagnosis of acute appendicitis were treated by the corresponding author, either open or laparoscopically. In the open technique, the incision used was located in the skin crease at the Mc Burney's point, in all but in one case with peritonitis where a midline incision was done. In the laparoscopic group, the laparoscopic "in" technique was the routine where the whole procedure was executed laparoscopically before taking the appendix out. All specimens retrieved were sent for histo-pathological examination as a routine. Cases were studied retrospectively.

Results: The median age of patients included was 9.2 years (age range: from 4 to 13 years). Thirty cases were treated by the open surgery technique (14 males and 16 females) and 37 cases using the laparoscopic technique (24 males and 13 females).

Nine cases among the open group were perforated (30%), whereas 18 cases among the laparoscopic group were perforated (49%). Four cases in the laparoscopic group were converted to open surgery during the procedure (conversion rate=11%). All specimens sent for histo-pathological evaluation came back as inflamed appendix in all, but in four cases (negative appendectomy rate=6%). No difference was noticed between the two groups as regards length of hospital stay (LOS), wound infection rate, and return of bowel habits. Intra-abdominal abscess rate was higher in cases of perforated appendicitis treated with laparoscopy.

Conclusion: Laparoscopy and conventional surgery should be complementary methods in matters of appendectomy. If any other pathology is present, it could be diagnosed rather easier with laparoscopy. This could be also treated using the same technique. However, awareness of the advantages and disadvantages of both, as well as when to convert to open, are important points to consider.

Keywords: Appendicitis, abdominal pain, laparoscopic appendectomy.

INTRODUCTION

In 1889 Charles Mc Burney presented a report on early operative intervention in acute appendicitis to the New York surgical society.⁽¹⁾ Five years later he formalized the procedure and described Mc Burney's incision. For almost a century thereafter, the treatment of acute appendicitis remained essentially unchanged.

The first laparoscopic appendectomies were carried out at the beginning of the 1980's by a German gynecologist from Kiel, Kurt Semm⁽²⁾ and by a French surgeon and gynecologist from Lyon, Philippe Mouret.⁽³⁾

When only the size of the scar is compared,

laparoscopy seems to have few advantages over the Mc Burney incision. This view of things, in conjunction with its reputation as a minor operation probably explains why laparoscopic appendectomy has not met the same success as laparoscopic cholecystectomy, even though the latter was described some years later.⁽⁴⁾

PATIENTS AND METHODS

Between September 2002 and August 2004, a total of 67 patients with the diagnosis of acute appendicitis were treated by the corresponding author. When the overall picture was convincing or highly suspicious of the diagnosis, the patient was taken to theater after informed consent was signed by the parents. Otherwise, observation

and frequent re-assessment over a period of 24-hours was the usual practice. In the open technique, the incision was done in the skin crease at the Mc Burney's point,⁽¹⁾ in all, but in one case of peritonitis where a midline incision was done for proper exploration. In the laparoscopic group, the laparoscopic "in" technique⁽⁴⁾ was the routine where the whole procedure was executed laparoscopically before taking the appendix out. In all the cases, the appendix looked inflamed during surgery, whether open or laparoscopic. However, regardless of the appearance of the appendix during laparoscopy, formal exploration of the peritoneal cavity was done before tackling the appendix. A perforated appendix was defined by the operative evidence of a hole in the appendix or the presence of free pus or an abscess cavity noted during surgery. Cases where appendix perforation occurred during intra-operative manipulations were not included.

All specimens retrieved were sent for histo-pathological examination. Cases were studied retrospectively.

RESULTS

The median age of patients included was 9.2 years (age range: from 4 to 13 years). Thirty cases (45%) were treated by the open surgery technique (14 males and 16 females) and 37 cases (55%) using the laparoscopic technique (24 males and 13 females).

Nine cases had perforations among the open group (30%), whereas 18 cases were perforated among the laparoscopic group (49%). Four cases of the laparoscopic group were converted to open surgery during the procedure (conversion rate 10.8%). This was because of advanced localized peritonitis in one case, marked adhesions in another and insecurity regarding hemostasis in two, with suspected vascular injury in one of them. All specimens sent for histo-pathological evaluation came back as inflamed appendix in all but in four cases (negative appendectomy rate of 6%). The diagnosis reported for these cases was follicular hyperplasia with no acute

inflammation seen. Three cases were among the open group and one in the laparoscopic group. One case of the open group had to be taken back to theater on the 5th postoperative day because of volvulus of an ileal loop around an adhesion band that was overlooked during appendectomy. Table 1 shows the different outcomes of both techniques in relation to different variables.

DISCUSSION

The advantages of laparoscopy versus a small right iliac fossa incision seem obvious in the field of diagnosis.^(5,6) If a disease other than appendicitis is brought to view, it could be managed by laparoscopy using the same trocars.^(7,8) In one case of the open group in our study, the child had to be taken back to theater in the 5th postoperative day because of an ileal loop twist around a congenital band. This was overlooked during the 1st operation where the appendix looked severely inflamed. This was confirmed by histo-pathological examination. Probably this associated double pathology would not have been missed with laparoscopy

Using laparoscopy, the parietal abscess rate after non-complicated appendicitis is as low as 0.08%.⁽⁴⁾ This is very good result and can be explained by the lack of contact between the appendix and abdominal wall, by the reduced parietal trauma, small incision, no dissection of various layers, no ischemia due to retractors and no/or little suture material left behind. In our study, wound infection in the form of mild wound gaping and minimal discharge, which responded well to simple dressing, was observed in three cases of perforated appendicitis treated with laparoscopy (16.6%) versus two in the open technique (22%). In non-perforated appendicitis, one case developed wound infection in the laparoscopic group (5%) versus one case in the open group (4.8%). In the lap group, the site of infection was the right port, where the appendix was taken out in three cases and in the left port site, away from the site of appendix retrieval, in one case.

Table 1. Open versus laparoscopic appendectomy (n=67cases)

	Open n = 30 (45)		Laparoscopic n = 37 (55)	
	NP 21 (70)	P 9 (30)	NP 19 (51)	P 18(49)
OR duration	30	45	50	75
LOS	2.7	4	3.3	4.6
Wound infection	1 (4.8)	2 (22)	1 (5)	3 (16.6)
Intraabdom. Abscess	-	-	-	3 (16.6)
Reoperation	1 (4.8)	-	-	-
Postop. Fever >48hs	1 (4.8)	4 (44)	1 (5)	8 (44)
Postop. Ileus >48hs	1 (4.8)	2 (22)	2 (11)	4 (22)

OR duration: operative duration in minutes, LOS: length of hospital stay in days postoperatively, NP: non perforated, P: perforated cases. n: number of cases (%).

.Some authors^(10,11) showed, on the other hand, that the intra-abdominal abscess rate was higher after laparoscopy. This disappointing difference seems paradoxical because laparoscopy is renowned for providing a better and more extensive peritoneal lavage than a right flank incision. Tang suggested that laparoscopic appendectomy in advanced peritonitis may be associated with a significant learning curve.⁽¹¹⁾ Another explanation for this relatively high residual abscess rate probably lies in the lack of drainage.⁽¹²⁾

In our study, The higher incidence of perforation among the laparoscopic group (49% versus 30%) is thought to be due to better visualization of the peritoneal cavity where any minimal fluid collection could be seen easily. This might not be clearly evident during open surgery. Three cases in the lap group with perforated appendicitis developed intra-abdominal abscess and non in the open group (16.7% Vs 0%). In two of them, no drain had been left behind. Both responded well to conservative treatment in the form of antibiotics. In the third case, a 12 -year-old girl, an abscess developed although a drain was left behind. As she did not respond well to the conservative management, CT guided aspiration of that abscess had to be done. In only three cases of the laparoscopic group with perforated appendicitis, a drain was left behind, passed out through the right port incision. In these cases, although thorough peritoneal lavage was done, yet the severity of peritonitis seemed to deserve drainage. However, we still believe that good peritoneal wash is more important than drain in such cases. Routine abdominal drainage after appendectomy is not beneficial and should be reserved for patients with appendicular abscess.⁽¹³⁾

The operative time varies according to the surgeon's training and temperament; some are fast, others are slow. In our study the mean operative time for non-perforated appendicitis was 30 minutes and 50 minutes for the open and laparoscopic, respectively, and for the perforated appendix it was 45 minutes and 75 minutes for the open and laparoscopic, respectively. However, as the learning curve goes on the operative duration for the laparoscopic technique gets shorter.

The argument that rapid return to "work" is worthless in children is not agreed by all. A cessation of school activity often has repercussion on child's life. Moreover, when both parents work, one must stop working to look after the child at home during recovery in most of the cases.

Some authors showed that laparoscopic appendectomy, in cases of uncomplicated appendicitis, was associated with less postoperative pain and shorter hospital stay.^(9,14) Others showed no significant difference.^(15,16) In our study, there was no difference, in non-perforated cases, regarding early postoperative pain, LOS (2.7 Vs 3.3 days for the open and

laparoscopic respectively) as well as oral feeding.

The economic evaluation of laparoscopic appendectomy is quite difficult because there're numerous pros and cons to consider; the cost of the equipment, maintenance, operative duration, cost of the disposable material and in counterbalance, the reduction in the hospital stay, though not approved by all, complications and earlier recovery.

There's a belief that laparoscopic. appendectomy is less likely to cause intra-peritoneal adhesions than open surgery. However, as this is unsupported statistically, Puri et al.,^(17,18) recommended longer follow up studies to assess the relative incidences of adhesive obstruction following both techniques.

Laparoscopy and conventional surgery should be complementary methods in matters of appendectomy. During laparoscopy, any other pathology that comes to view could be diagnosed rather easier and dealt with in the same time. However, awareness of the advantages and disadvantages of both, as well as when to convert to open, are important points to consider.

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