Original Article

Annals of Pediatric Surgery
Vol. 6, No 3,4 July, October 2010, PP 140-143

Two-Port Versus Three-Port Laparoscopic Appendectomy In Children

Ahmed Khairi [a,d], ***Magdi Lolah*** [b], ***Ahmed A. Khalaf*** [c,d], ***Mostafa Tolba*** [d]

Pediatric Surgery Units, Departments of Surgery, a: Alexandria Faculty of Medicine, Alexandria and b: Monofya Faculty of Medicine, Monofya, c: Department of Surgery, Ein-Shams Faculty of Medicine, Cairo, Egypt, d: Department of Surgery, Dallah hospital, Riyadh KSA

Background/Purpose: *Laparoscopic appendectomy is the routine technique for management of acute appendicitis in children in many centers. In this study, the classic three-port technique is compared to the two-port technique in the non-complicated non-difficult acute appendicitis.*

Materials & Methods: *This is a retrospective study of the cases of non-complicated acute appendicitis treated laparoscopically between June 2003 and June 2009. Cases treated by the two-and three -port techniques were compared regarding the operative duration, operative and postoperative complications and the length of hospital stay.*

Results: *During the study period, 85 children (45 males and 40 females) had laparoscopic appendectomy for acute non-complicated appendicitis; 48 children by the Three-port technique (group I) and 37 children by the Two-port technique (group II).The mean age was 9.7 years (range 4 – 13). The mean operative duration was 40 minutes (range 30-70) in group I and 25 minutes in group II (range 17-35). Operative bleeding occurred in 9 cases (19%) (group I) and 8 cases (22%) group II, operative rupture of the appendix in 1(2%) , Port site infection (redness or discharge) in 3 (6%) in group I and none in group II, Postoperative ileus (> 48 hours) 3 (6%) in group I and 1(2.7%) in group II. The mean length of hospital stay was 2.3 days in group I and 2 days in group II. Three cases in group II were converted to total laparoscopic appendectomy because of residual long stump (conversion rate 8%).*

Conclusion: *The Two-port laparoscopic appendectomy had less operative duration and length of hospital stay than the three-port technique in non-complicated non-difficult acute appendicitis in children. However, the operative and post operative complications were almost the same.*

Index Word: *Laparoscopy, appendectomy.*

INTRODUCTION

Among the causes of acute abdominal pain, acute appendicitis is by far the most common surgical pathology. Laparoscopy is the best tool of management [1-4]. Its exploratory nature offers both diagnosis as well as treatment. Laparoscopic appendectomy is the routine technique for management of acute appendicitis in children in many centers. In this study, the classic three-port technique is compared to the two-port technique in the non-complicated acute appendicitis

PATIENTS AND METHODS

This is a retrospective study of the cases of non-

Correspondence to: *Ahmed Khairi, MD*. Pediatric Surgery Department, Alexandria University, Alexandria, Egypt

complicated non-difficult acute appendicitis treated laparoscopically during the period from June 2003 to June 2009. The complicated cases were defined as those with perforation, gangrene or mass formation; and the difficult ones were defined as those with marked adhesions (congenital or inflammatory) or difficult lies (retrocecal, postileal, subserous) . Prophylactic preoperative IV antibiotics are routinely given (Metronidazole 10 mg/kg and Cefuroxime 25 mg/kg). The three port technique entails an umbilical port (for the camera) and two working ports mostly in both iliac fossae [1-4]. In the two port-technique [5,6], umbilical and right iliac fossa ports, the appendix is retrieved from the abdominal cavity under vision through the right port *(bird's on)* (Fig. 1) helped by deflation of the pneumoperitoneum, and the rest of the procedure (control of the vessels and tying the base) is done outside the abdomen as in the open technique (Fig. 2,3). The right port is reinserted again, the abdominal cavity is re-inflated, and the suction irrigation of the abdominal cavity and exploration for any other pathology are carried out as in the classic three-port technique (Fig. 4). Cases treated by the two- and three -port techniques were compared regarding the operative duration, operative complications (bleeding & rupture of the appendix), postoperative complications (prolonged ileus & port site infection) and length of hospital stay.

Statistical analysis was done using SPSS ® version 11 (Chicago, Il, USA). *Chi-Square* test was used for categorical variables and the *Student T-test* for continuous scale variables. A P value of less than 0.05 was considered significant. Where appropriate, data are reported as mean ± SD.

RESULTS

During the study period, 85 children (45 males and 40 females) had laparoscopic appendectomy for acute non-complicated, non-difficult appendicitis; 48 children were done by the three-port technique (group I) and 37 children were done by the two-port technique (group II).The age ranged from 4 to 13 years (mean 9.7). Three cases in group II were converted to total laparoscopic appendectomy because of residual long stump (conversion rate 8%). None of both groups had postoperative intra-peritoneal collection. Table 1 summarizes the results.

Fig. 1: The appendix is retrieved through the port channel

Fig. 2: The appendix outside the abdominal cavity, helped by deflation of the pneumoperitoneum. Note the mesoappendix is already tied and cut

Fig. 3: The appendix base is already crushed and tied and ready for excision. The cecum is seen at the base

Fig. 4: Suction & irrigation under direct vision. Exploration for any other possible pathology could also be done

Table I: *Three-* versus *two*-port laparoscopic appendectomy for non-complicated appendicitis in Children (n=85)

	Three-ports (group I) (n=48)	Two-ports (group II) (n=37)
Operative Duration	30-70 min. (mean=40)	17-35 min. (mean=25)
Operative Bleeding	9 (19%)	8 (22%)
Operative Rupture of the appendix	1(2%)	0
Postoperative infection	3 (6%)	0
Postoperative ileus*	3 (6%)	1 (3%)
Postoperative hospital Stay (days)#	Mean=2.3	Mean=2

*: Delayed oral tolerance >48 hours #: Difference is statistically significant (P<0.05)

DISCUSSION

During laparoscopy for acute appendicitis, the appendix does not need much or any dissection in many cases. The tip could be raised easily, its mesentery is freely mobile and because of the small peritoneal cavity, it even passes *non-intentionally* through the channel of the right port during the procedure. With deflation of the peritoneal cavity and good relaxation, the rest of the procedure could be done easily extracorporeally. Though this could be carried out through 5 mm right port, we recently use 10 mm port as a routine to facilitate the procedure more. There is no need for a 3rd port, which is an advantage to the child, also saving time as well as the cost (of another port, endo-loopes, and vascular clips) [7,8]. Although not reaching statistical significance, the operative duration was less in the two-port group (25±6.5 minutes Vs 40±6, in group I). Mild operative bleedings (group I: 19% Vs group II: 22%, *NS*), mostly from improper primary control of the mesoappendix, were controlled by electro coagulation in both groups. This could be done easily whether from a single (group II) or two working ports (group I). As mentioned before, we give preoperative prophylactic intravenous antibiotics routinely. We had no port site infection in the two-port group despite the contact of the inflamed appendix with the abdominal wall. After removing the appendix, we soaked the port in betadine solution before reinsertion, which seems to *disinfect* the port track. Surprisingly, and although non significant statistically ($\times^2 = 2.39$; P>0.05), 3 cases (6%) in group I had port site infection and not in group II, *as one might expect*. This was in the form of mild skin gaping and redness that healed with repeated dressing.

The length of hospital stay was significantly less in the two-port group (2.3 ±0.8 Vs 2 ±0.4 days in group I, $P < 0.05$). Although the absence of a 3rd port wound is not enough to explain this difference, however, *together* with the less time of pneumoperitoneum (with less postoperative shoulder pain), and the extracorporeal nature of the technique with less bowel manipulation can explain that difference.

For cases of undiagnosed acute abdominal pain, the two port technique is still an exploratory. We found that looking for other pathologies (as Meckel's diverticulum, adnexal pathologies in girls etc..) was feasible using a single instrument and assisted by proper positioning of the child.

CONCLUSION

The Two-port laparoscopic appendectomy is safe and feasible in children. It had less operative duration and length of hospital stay than the three-port technique. However, the operative and the post operative complications were almost the same. We recommend starting with two ports, assessing for its feasibility before inserting a 3rd working one. A controlled prospective study is still needed .

REFERENCES

1. Valla JS, Steyaert H. Laparoscopic appendectomy in children. In Bax NMA, Georgeson KE, Najmaldin AS, Valla JS (Eds.) Endoscopic surgery in children: Springer, pp:234-253.

2. Leape L, Ramenosky ML. Laparoscopy in infants and children. J pediatr Surg 1977;12: 75-81.

3. Varlet F, Tardieu D, Limonne B et al. Laparoscopic versus open appendectomy in children. Comparative study of 403 cases. Eur J pediatr surg 1994; 4:333-337.

4. Lintula H, Kokki H and Vanamo K. Single-blind randomized clinical trial of laparoscopic Vs open appendectomy in children. Br J of Surg 2001;88:510-514.

5. Tekin H.A., Kurtoğlu C. Video-Assisted Extracorporeal

Appendectomy. JLaparoendosc Adv Surg Tech 2002;12:57-60.

6. Fazili FM, Al-Bouq Y, El-Hassan OM, et al. Laparoscopic–assisted appendicectomy in adults: the two trocar technique. Ann Saudi Med 2006;26:100-104.

7. Konstadoulakis MM, Gomatos IP, Antonakis PT. et al. Two trocar laparoscopic assisted appendectomy versus conventional laparoscopic appendectomy in patients with acute appendicitis. J Laparoendosc Adv Surg Tech A2006;16:27-32.

8. Suttie SA, Seth S, Driver CP, Mahomed AA. Outcome after intra-and extra-corporeal laparoscopic appendectomy techniques. Surg Endosc2004; 18:1123-1125.