

## LAPAROSCOPIC APPENDECTOMY AS A CARE MODEL OF "FAST TRACK SURGERY"

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**Introduction:** "Fast track surgery" is a model of care pathway that is gradually replacing and incorporating all the other models so far applied in surgery. In particular, this is possible thanks to minimally invasive procedures widely disseminated for the several benefits they offer. The authors present a preliminary study of laparoscopic appendectomy using endo-GIA as a model of fast track surgery. **Material and methods:** At the Department of Pediatric Surgery of the University of Siena, from December 2008 to May 2009 were carried out 10 surgery procedures of laparoscopic appendectomy. Patients were subjected to emergency surgery for acute appendicitis diagnosed by clinical examination, laboratory tests and ultrasound study. The mean age was 10.8 years (range 7-14 years). All procedures were performed under general anesthesia with the patient in supine decubitus and using three trocars. The first 12 mm, was introduced through the umbilical incision with "open" approach, the second, 12 mm in the left iliac fossa and the third, 5 mm, in sovrapubic seat. In each patient the appendectomy was carried out with endo-GIA (a linear stapling device) that can be used for the section of appendix and vessels. **Results:** Any patient needed to convert to "open surgery". The duration of surgery procedure was in mean 80 minutes (range 60-90 minutes). In any case intraoperative complications were observed. In 1 patient (10%) further surgery procedure with technique "open" was necessary due to presence of purulent exudate in peritoneal cavity, depending to severity of endo-abdominal infection. The hospitalization was in mean 4.3 days (range 3-10 days) with intestinal canalization on the 1st post-operative day. **Conclusion:** Laparoscopic appendectomy is a feasible and safe method with advantages for patients such as lower incidence of septic complications (better toilet of peritoneal cavity and possible placement of drainage), reduced time of hospitalization and convalescence, better control of postoperative pain, and better aesthetic results. Binder/section of appendix with endo-GIA appears more secure in severe peritonitis compared to other systems of ligation, preventing the spread of faecal material, as the apyretic trend in postoperative shows. In conclusion, beyond the known advantages of VLS, the use of Stapler allows further decrease of hospitalization that amortizes the modest increase in cost of instruments and the comfort for the surgeon.

**Key words:** Laparoscopic appendectomy; fast track surgery; endo-GIA.

### INTRODUCTION

The term "fast-track surgery" was established by the Danish surgeon, Helmut Kehlet [1,2], in the 1990s and represents a comprehensive program for optimization of perioperative care in elective surgery, reducing stress and discomfort and speeding up convalescence. Fast-track concepts include immediate postoperative feeding and mobilization, use of minimally invasive techniques, and avoiding drains, tubes, and catheters.

Fast-track surgery is used for specific procedures in children, such as appendectomy [3-5], nephrectomy, pyelolithotomy, and pyeloplasty [6,7].

In recent years, minimally invasive techniques have gained wide acceptance and may be potentially useful in establishing fast-track surgery in children [8]. Appendicitis is the most common surgical emergency in childhood. Moreover, 30-50% of children under 6 years of age presents with perforation, which carries significant morbidity [9,10].

Laparoscopic appendectomy (LA) is progressively accepted as the treatment of choice for acute appendicitis. Numerous randomized trials and metaanalyses have shown less postoperative pain, reduced wound infections, faster recovery, and shorter hos-

pital stay after laparoscopic appendectomy [11].

For these reason LA in the children is a model of fast trak surgery because the procedure offers reduced postoperative pain, earlier recovery, shortened length of stay, and decreased intra-abdominal scarring [12].

The authors present a preliminary study of laparoscopic appendectomy using endo-Gia sutured as a model of fast track surgery.

### MATERIAL AND MEHTODS

From December 2008 to May 2009 10 patients, with diagnosis of acute appendicitis, underwent laparoscopic surgery at the Division of Pediatric Surgery of the University of Siena.

In all patients the diagnosis of acute appendicitis was based on physical examination, laboratory and diagnostic testing, which included white blood count, c-reactive protein and ultrasound evaluation. After this stage the patients underwent to laparoscopy appendectomy in an urgent setting. The mean age was 10.8 years (range 7-14 years).

All procedures were performed under general anaesthesia and the patient was placed supine. Before the operation a nasogastric tube was placed, and

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catheterization of the bladder was made routinely. Laparoscopic appendectomy usually involves a three trocar technique. A 12 mm cannula was placed in the umbilicus through a infraumbilical incision with "open approach", for the passage of the laparoscopic telescope and in some cases the endo-GIA (a linear stapling device), then the pneumoperitoneum was induced with carbon dioxide. A 0- or 30-degree laparoscopic telescope was introduced through this port, and the abdominal and pelvic cavities were directly visualized with the laparoscope to inspect other possible pathologies. The patient was repositioned in a Trendelenburg position and right-side up. Next, under direct vision, a 5-mm working port were introduced in the suprapubic region and a 12-mm working port in left iliac fossa for the passage of the endo-GIA. The appendix was identified and grasped. Endo-GIA was introduced through 12-mm port in the left iliac fossa and it was placed across to

the base of the appendix and mesoappendix, after checking that both sides of the mesoappendix and base of appendix were within the cut margins of the stapler (Fig.1-2). The divided appendix was removed within a specimen bag. In presence of pus or reactionary fluid in the abdominal cavity, regional peritoneal aspiration or lavage only was respectively performed. Then the insufflated gas was released. All ports were removed under direct visualization, and the fascia was reapproximated to prevent future incisional hernia occurrences. All skin incisions were closed.

## RESULTS

We didn't never need to convert to "open surgery". The duration of surgery procedure was been mean 80 minutes (range 60-90 minutes). There was no mortality or intraoperative complications. The hospitalization was mean 4.3 days (range 3-10 days) with intestinal canalization on the 1st post-operative day.

Another surgery procedure with technique "open" was necessary in only 1 patient (10%), due to presence of purulent exudate in peritoneal cavity, depending of severity of endo-abdominal infection. Any complication was observed in the follow-up. Today all patients have an excellent health and they perform the regulary activities.

## DISCUSSION

Right-lower quadrant abdominal incisions have stood as the gold standard approach for appendectomy for decades. In recent years, laparoscopic appendectomy has gained wide popularity and has been shown to improve patients' outcome in multiple reports [13,14]. This trend may be attributable to surgeon's perception of a better visualization, a more precise dissection, and better hemostasis [15].

In the early 1990s, a French group reported their large series of laparoscopic appendectomy in children and established that this procedure was a reasonable alternative in the treatment of appendicitis in pediatric population [14]. The reported advantages of laparoscopic appendectomy, compared to open surgery, in children are similar in the adult and include shorter hospitalization, fewer wound infections, earlier return to normal activities, better cosmesis, more effective lavage, and better visualization of the peritoneal cavity [10,14,15,16,17].

What seems to be more controversial is its application in complicated appendicitis. The concern for greater incidence of intra-abdominal abscess, following the laparoscopic approach, was reported in some studies [18], but not supported by others [10,16]. Most studies comparing laparoscopic and open appendectomies report significant advantages in the laparoscopic group. However, there have been concerns about the use of laparoscopy for the treatment of complicated appendicitis in children. Previous studies have suggested an increased rate of postoperative complications following laparoscopic



Fig.1: Intraoperative image; cut of mesoappendix by endo-GIA

Fig.2: Intraoperative image; cut of mesoappendix by endo-GIA



appendectomy in children [18]. Possible theories for this have been suggested such as, spread of infected contents throughout the abdominal cavity during pneumoperitoneum or intraperitoneal contamination during division of the appendix within the peritoneal cavity. More recent studies have been advocates for the use of laparoscopy in complicated appendicitis in children and have shown no significant difference in complication rates [19]. Technical advantages of LA over OA (open appendectomy) in complicated appendicitis in children include better cosmesis, technical easy particularly in obese children and the ability to explore entire abdomen and sufficiently lavage the contaminated peritoneal cavity with saline. In addition, fear of contamination of the peritoneal cavity during division of the appendix and it's removal is not warranted [10]. We, like others authors [10,15,19], found that if dissection and division of the appendix is performed carefully, it minimizes the chances of peritoneal contamination and in addition the appendix itself does not touch the port sites but is extracted through the port, thus minimizing the chances of wound infection.

But one disadvantage of LA besides the longer operative time is its cost [5]. An important element that contributes largely to its elevated cost is the disposable equipment used during the procedure. The use of the Endo-GIA is common in LA. Because simple coagulation of the appendix stump generally is not recommended, an alternative to the expensive linear stapler would be suture ligation of the appendiceal base.

The laparoscopic approach to appendicitis has improved the outcome of appendectomy, but requires laparoscopic skills of the surgical team [21]. Appendectomy is performed by surgical teams with varying experience in laparoscopic surgery [22]. The routine use of staplers to secure the appendiceal stump during laparoscopic appendectomy can contribute to reduction in the complexity of the procedure [21]. This was confirmed by the current study, which showed a decrease in operating time when the appendiceal stump was closed with a stapling device.

An adequate learning curve and a standardized use of endo-GIA allows the minimization of surgery times, which become unchangeable. For this reason just the time of hospitalization may change; the laparoscopic approach allows a reduction of time spent in hospital because it promotes a more rapid recovery of patients, especially in presence of minor complications. Reducing the time of hospitalization, it emerges as consequence a general reduction of costs. The operating time is similar to the open procedure and can be done on outpatient basis.

## CONCLUSION

Laparoscopic appendectomy for acute appendicitis is safe and effective in treating children with suspected appendicitis. It may be safely performed as fast-track-surgery. Important is an adequate learning curve.

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