

Advancement in the Role of Laparoscopy in Complicated Appendicitis

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ABSTRACT

Background: The role of laparoscope in management of complicated appendicitis is increasing. **Methods:** 30 patients with complicated appendicitis underwent laparoscopic appendectomy were studied. Patients undergoing laparoscopic appendectomies were evaluated according to patient safety, postoperative outcome as regard Analgesia use, length of hospital stay, return to normal oral feeding and postoperative complications. **Results:** laparoscopy is efficient in management of complicated appendicitis, diagnose and treat associated diseases and less post-operative complications. **Conclusions:** laparoscopic appendectomy is a safe and efficient method in management of complicated appendicitis. It could tried first for every case of complicated appendicitis.

Key words: Laparoscopy— appendicitis— Complicated.

INTRODUCTION

Appendectomy is the most common surgical operation performed in general surgery with a life-time risk about 6%⁽¹⁾. The progress in technology and surgical experience gave laparoscopy a great push in surgery and laparoscopic appendectomy has become the first choice in the treatment of complicated appendicitis⁽²⁾.

Acute appendicitis complicated with mass, perforation, abscess, gangrene or chronicity are present in a large number of cases⁽³⁾. Laparoscopic appendectomy in complicated appendicitis is associated with minimal surgical trauma that results in significantly short hospital stay, low postoperative pain, rapid return to daily activities and good cosmetic outcome that make laparoscopic surgery for complicated appendicitis very attractive.⁽⁴⁾

Laparoscopic appendectomy (LA) has many advantages like good access and good visualization of the peritoneal cavity through small incisions⁽⁵⁾.

Aim of Work:

The aim of this study is to assess the role of laparoscopy in complicated appendicitis .

PATIENT AND METHODS

Patient:

Thirty patients underwent laparoscopic appendectomy for complicated appendicitis from

January 2014 to August 2015 at Zagazig university hospital. Patients with diagnosis other than appendicitis were excluded.

Inclusion criteria:

- (I) Patients of complicated appendicitis.
- (II) Age group above 20 years old.

Exclusion criteria:

- Patients with problems that is contraindicated with laparoscopy as major pulmonary pathology or coagulopathy
- Young patient below 20 years of age .

Method of the study:

** to prove the presence of complicated appendicitis

- Complete history tacking from the patient with special concern about the time of starting pain
- General examination to exclude general problems contraindicating laparoscopy
- Local examination to ensure the presence of appendicitis and if any mass can be palpated

Investigations :

- General investigations as CBC, liver and kidney function tests, PT, PTT and INR with special concern about total leucocytic count and differential leucocytic count
- Ultrasonography is a cornerstone in diagnosis of complicated appendicitis

Operative steps:

- Preoperative antibiotics and intravenous fluids were given
- Under general anesthesia with endotracheal tube and the patient in supine position

pneumoperitonum via either Verrus needle or Hasson open technique was obtained

- 3 trocars were used, first trocar was 10mm periumbilical trocar for the camera and second trocar was 5mm in the suprapubic area in the midline and the last one was another 10mm trocar between the previous 2 trocars.
- The site of appendix is explored to detect the type of complicated appendix (**fig 1**) (**Fig 2**).
- Control of the meso-appendex was done either by electro-cautery or clips or both while control of the base of the appendix was done by either endoloop ligation (**Fig 3**) or clips.
- Removal of the appendix was done either by endocatch bag or through the 10mm trocar.
- Peritoneal lavage using warm saline was done until the wash fluid became clear, tube drain was left either in appendicular bed or the pelvis

Post-operative care:

- post-operative intravenous fluids, analgesia, antibiotics (3rd generation cephalosporin) and metronidazole was given to the patient.
- early postoperative follow up of pulse and blood pressure and oxygen saturation until complete recovery
- the patient were discharged as soon as they regained intestinal sounds.

Follow up the patient:

All patients were instructed at discharge time to contact us if any abnormality occurred as vomiting, distention, constipation or fever otherwise the patients were instructed for follow up in outpatient clinic after 1 week, 2 weeks and 1 month to rule out any problems and manage any complication occurred .

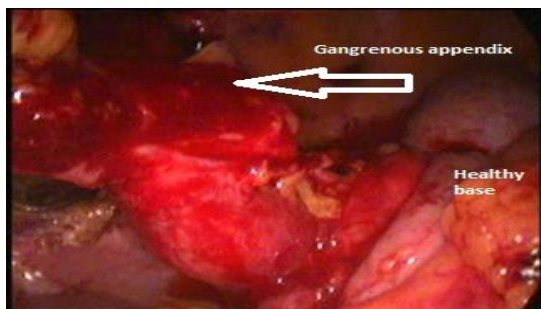


Fig.1: Gangrenous appendix with healthy base

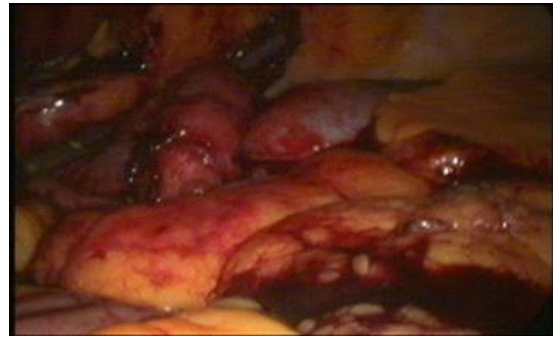


Fig.2: Appendicular mass

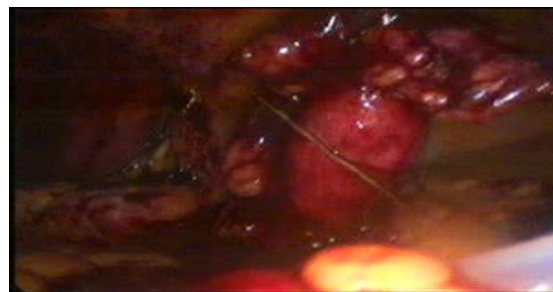


Fig. 3: Ligation of appendicular stump by endoloop.

Statistical Analysis

Categorical variables were expressed as a number (percentage). All data were analyzed using SPSS 22.0 for windows (SPSS Inc., Chicago, IL, USA).

RESULTS

Twenty four patients(80%) were under 40 years and 6 patients(20%)were over 40 years. Most patients were male patients(63.3%) (**table 1**).

Table (1): Demographic data.

<i>Demographic data</i>	<i>All studied patients (N=30)</i>	
	No.	%
<u>Age</u>		
20-30 years	14	46.7%
31-40 years	10	33.3%
>40 years	6	20%
<u>Sex</u>		
Male	19	63.3%
Female	11	36.7%

Four patients underwent laparoscopic appendectomy had previous surgery. The first patient underwent uterine myomectomy, second patient underwent ovarian endocystectomy, third patient underwent urinary bladder stone removal and the last patient underwent localized resection of the left colon (**table2**).

Table (2): Previous surgery.

<i>Previous surgery</i>	<i>All studied patients (N=30)</i>	
	No.	%
Uterine and ovarian	2	6.7%
Urinary bladder	1	3.3%
Lt Colonic	1	3.3%

According to intraoperative data, 14 patients(46.7%) had appendicular masses, 6 patients(20%) had appendicular abscesses, 3 patients(10%) had perforation with generalized peritonitis, 2 patients(6.7%) had gangrenous appendicitis and 5 patients(16.7%) had chronic appendicitis.

Most cases took 90 minutes to complete surgery(76.7%) while 7 cases(23.3%) took more than this. During induction of pneumoperitoneum, we used Verrus needle in 28 patients(93.3%) and in 2 patients(6.7%) we performed Hasson technique to create pneumoperitoneum, one of them that underwent previous colonic surgery. Mesoappendix control using diathermy was in 19 patients(63.3%), and clips in 11 patients(36.7%).

After appendectomy was performed, the appendix was removed from the abdomen directly through trocar site in 6 patients(20%) and 24 patients(80%), the appendix was

extracted using endocatch bag(we used gloves). Accidental intraoperative findings were 7 cases, three cases(10%) had accidental simple ovarian cyst that were drained only. One patient had a complicated ovarian cyst with hemorrhage that was treated with endocystectomy. One case had a subserous myoma of uterus that was treated by laparoscopic myomectomy. one case had pelvic endometriosis and the last case had Crohn's disease of the ileum. Intraoperative injuries occurred in 4 cases, two cases had caecal injuries, one had serosal tear that was repaired laparoscopically while the other case had a full thickness tear that requires conversion and treated by right hemicolectomy. One case had serosal ileal tear that was treated laparoscopically. one case had full thickness urinary bladder injury that required conversion. Conversion occurred in 4 cases, caecal tear, urinary bladder tear and two cases with appendicular masses (**table 3**).

Table (3): Intraoperative data.

<u>Intraoperative data</u>	<u>All studied patients (N=30)</u>	
	No.	%
<u>Types of complicated appendicitis</u>		
Mass	14	46.7%
Abscess	6	20%
Perforation	3	10%
Gangrenous appendicitis	2	6.7%
Chronic appendicitis	5	16.7%
<u>Operative time</u>		
50-60 minutes	9	30 %
60-90 minutes	14	46.7%
>90 minutes	7	23.3 %
<u>Induction of pneumoperitoneum</u>		
Verrus needle	28	93.3%
Hasson technique	2	6.7%
<u>Control of mesoappendix</u>		
Diathermy	19	63.3%
Clips	11	36.7%
<u>Control of appendix</u>		
Endoloop	22	73.3%
Extracorporeal ligature	2	6.7%
clip	6	20%
<u>Removal of appendix from abdomen</u>		
Through trocar site	6	20%
Endocatch bag	24	80%
<u>Accidental intraoperative findings</u>		
Simple ovarian cyst	3	10%
Complicated ovarian cyst	1	3.3%
Subserous myoma of uterus	1	3.3%
Pelvic endometriosis	1	3.3%
Crohn's disease	1	3.3%
<u>Intra-operative injuries</u>		
Caecal injury	2	6.7%
Ileal injury	1	3.3%
Urinary bladder injury	1	3.3%
Conversion cases	4	13.3%

Most cases (80%) stayed < 3 days in hospital while 6 patients (20%) stayed >3 days. Most cases(76.7%) received analgesic for less than 2 days while 7 cases(23.3%) took analgesic for 2 days or more.

Most cases (83.3%) started oral feeding on the 2nd postoperative day, while only 2 cases developed ileus that improved later by Ryle and I.V fluids.

Postoperative complications were in 5 patients, one had trocar site infection that was treated with

antibiotics and dressings. One developed an intra-abdominal abscess at the site of the appendectomy that was treated conservatively first, but the abscess persisted and we drained it laparoscopically. Two cases developed hematomas at the site of the appendectomy, it was small and treated conservatively. one case developed port site hernia and treated by anatomical repair (**table 4**).

Table (4): Postoperative data.

<i>Postoperative data</i>	<i>All studied patients (N=30)</i>	
	No.	%
<u>Hospital stay (days)</u>		
<2 days	6	20%
2-3 days	18	60%
>3 days	6	20%
<u>Analgesic use(days)</u>		
< 2 days	23	76.7%
2-3 days	3	10%
>3 days	4	13.3%
<u>Start of Oral feeding</u>		
2nd postoperative days	25	83.3%
>2nd postoperative days	3	10%
Postoperative ileus	2	6.7%
<u>Postoperative complications</u>		
Trocar site infection	1	3.3%
Intra-abdominal abscess	1	3.3%
Intra-abdominal Haematoma	2	6.7%
Port site hernia	1	3.3%

DISCUSSION

In our study, post-operative complications were low occurred in 5 cases(16.7%).

Katkhouda et al.⁽⁶⁾ in his prospective randomized double-blind study and **Sauerland**⁽⁷⁾ in his Cochrane Review of 45 studies reported a low wound infection, high operating time & high incidence of intra-abdominal abscess (IAA) for laparoscopic appendectomy.

Similarly **Yau et al.**⁽⁸⁾ and **Pokala et al.**⁽⁹⁾ reported lower wound infection rate and higher rate of intra-abdominal abscesses. Whereas **Markides et al.**⁽¹⁰⁾ in his systematic review on Twelve retrospective case-control studies, **Di Saverio et al.**⁽¹¹⁾ with analysis of 112 unselected consecutive cases of complicated acute appendicitis and **Quezada et al.**⁽¹²⁾ in his single center experience reported no significant differences in intra-abdominal abscess rates. **Taguchi et al.**⁽¹³⁾ concluded that nothing is definitively well established, even after 81 randomized trials.

In our study, most cases (86.7%) required analgesic less than 3 days. **Kirshtein et al.**⁽¹⁴⁾ identified reduced analgesia requirements as an advantage of minimally invasive surgery for uncomplicated appendicitis, the current study supports the use of the laparoscopic technique for all cases of appendicitis.

Although the complication rate in this study is comparable with that in most other series, the conversion rate occurred in 4 cases(13.3%) and the operating time mostly < 90 minutes in 76.7% of cases. This is likely because of extensive experience in laparoscopic surgery. A surgeon's experience has been shown to correlate with the rate of conversion to open procedures⁽¹⁵⁾.

In our study, laparoscopic appendectomy complications are low and is safe.

On the basis of their experience in managing cases of gangrenous or perforated appendicitis, **Fukami et al.**⁽¹⁶⁾ concluded that laparoscopic appendectomy is safe and beneficial for such patients.

In a large series of such cases, **Garg et al.**⁽¹⁷⁾ convincingly showed that abdominal wall complications including wound infections, abscesses, haematoma, and bleeding were low with laparoscopic appendectomy.

In our study, laparoscopic appendectomy helped us to diagnose accidental findings during the operations.

It is precisely in complicated appendicitis that the well-known advantages of LA can benefit a patient: thorough inspection of the entire peritoneal cavity, debridement, irrigation and lavage under direct visualization, avoidance of large abdominal incisions, less immunologic compromise and fewer pulmonary complications⁽¹⁸⁾.

In our study, LA group had low incidence of postoperative wound infections. This may be due to removal of the perforated appendix through a plastic bag thus avoiding direct contact with the trocar wounds. The infected fluid was aspirated thoroughly in the laparoscopic approach.

In our study, most cases took 90 minutes duration, it may be due to time taken for peritoneal lavage and suturing the base of the appendix. A study reported significantly low operating time in LA group⁽⁷⁾

Ball et al.,⁽¹⁹⁾ strongly emphasized that appendectomies frequently are performed as an emergency procedure during the night, and if the resident staff does not have the experience, skills, and guidance to perform such surgery, then residual sepsis will follow. Sometimes, when technical difficulties appear, an inexperienced surgeon will choose an “early conversion,”.

CONCLUSION

Laparoscopic management of complicated appendicitis is a safe and effective method of management and it is better to manage complicated appendicitis using laparoscope when feasible

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