Laparoscopic Appendectomy between the Advantages and Complications:A Cross Section Study –Jeddah – Saudi Arabia – 2016

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ABSTRACT

Background: Appendectomy is the most common surgical procedure performed in emergency surgery. Laparoscopic appendectomy (LA) for acute appendicitis has several advantages over open appendectomy (OA). In cases of complicated appendicitis, LA is converted to OA at a constant rate, though converting appendectomy (CA). In this study, we aimed to assess the LA complication and the prevalence of CA.

Methods: A cross Sectional survey conducted among 243 patients with acute appendicitis who were suitable for the study between April and July 2016. Operative time, length of hospital stay, post-operative complication return to normal activity has been assessed among the all patients.

Results and Conclusion: Our results showed the advantages of the laparoscopic appendectomy approach including shorter hospital stay, decreased need for postoperative analgesia, early food tolerance, earlier return to work, lower rate of wound infection. Furthermore we found a considerable preference (during the collection of consent) of patients and a high satisfaction after the surgery.

Keywords: appendicitis, appendectomy, laparoscopy, laparotomy.

INTRODUCTION

Appendicitis is the most common cause of surgical abdomen in all age groups [1, 2]. Approximately 7–10 % of the general population develops acute appendicitis with the maximal incidence being in the second and third decades of life [3].The initial description by Semm in 1983, laparoscopic appendectomy (LA) has become an increasingly prevalent intervention [2]. This is in contrast to laparoscopic cholecystectomy, which has promptly become the gold standard for gallstone disease despite little scientific challenge [4]. In fact there is more than a century, open appendectomy (OA) has been the standard surgery for acute appendicitis [5], OA is typically completed using a small right lower quadrant incision and postoperative recovery is usually uneventful. It is the second most common general surgical procedure performed in the United States, after laparoscopic holecystectomy, and the most common intraabdominal surgical emergency, with a lifetime risk of 6%. However, several retrospective studies [3,6,7], several randomized trials [8–13] and meta-analyses [14,15] comparing laparoscopic with open appendectomy have provided conflicting results. There is evidence that he use of small incisions to obtain good quality visualization and access to the abdominal cavity, minimal surgical trauma through laparoscopic approach resulted in significant shorter hospital stay, less postoperative pain, faster return to daily activities in several settings related with gastrointestinal surgery [16,17]. In contrast, the rate of intra-abdominal abscess (IAA), which is one of the most concerning abdominal postoperative complications, occurs almost three times more often in LA than after OA [19].

This study has been done to assess the prevalence of laparoscopic appendectomy with regard to several post-operative variables.

METHODS

A cross Sectional survey conducted among 243 patients with acute appendicitis who were suitable for the study between April and July 2016 in the general surgery department-King Abdulaziz Hospital & oncology center, Jeddah-Saudi Arabia. Operative time, length of hospital stays, post-operative complication return to normal activity had been assessed among the all patients. Patients have been chosen for laparoscopic appendectomy after evaluation of Included and excluded criteria for the study.

Inclusion Criteria

Retrospective study done for patient (16 years of age or older) with acute appendicitis upon the following criteria:

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1. History of right lower quadrant pain or periumbilical pain migrating to the right lower quadrant
2. Nausea and/or vomiting
3. Fever of more than 38°C and/or leukocytosis above 10,000 cells per ml
4. Right lower quadrant guarding, and tenderness on physical examination.

Exclusion Criteria

1. If the diagnosis of appendicitis was not clinically established.
2. Had a history of symptoms for more than 5 days and/or a palpable mass in the right lower quadrant
3. Suggesting an appendicular abscess treated with antibiotics and possible percutaneous drainage.
4. Patients with history of cirrhosis and coagulation disorders, generalized peritonitis, shock on admission.
5. Absolute contraindication to laparoscopic surgery (large ventral hernia, history of laparotomies for small bowel obstruction, ascites with abdominal distension).
6. contraindication to general anesthesia (severe cardiac and/or pulmonary disease)
7. inability to give informed consent due to mental disability
8. Pregnancy.

The qualifying patients were informed of the risk and benefits of each operation and asked to sign a detailed informed consent in their respective native language, approved by the institutional review board (IRB).

Baseline evaluation of the following parameters was performed before randomization once the informed consent was signed: measurement of pain on a visual analog scale (VAS) and measurement of activity using a scoring system. Patients received 1 g of cefoxitin every 8 hours intravenously from the time of diagnosis until surgery.

During Surgery

Residents performed all operations with attending surgeons experienced in open and advanced laparoscopic techniques. The level of expertise in the performance of the standardized LA technique was verified by the senior specialist before the beginning of the trial. Patients found to have a complication (gangrenous or perforated appendicitis) during surgery were treated with "triple antibiotic" coverage: ampicillin (patients allergic to penicillin received vancomycin), gentamycin, and metronidazole until the white blood cell count was within normal limits and the temperature under 37.9°C for 24 hours. All other patients did not receive any antibiotics postoperatively. No urinary catheter was used. Nasogastric tubes were inserted in patients suspected to have a significant postoperative ileus.

LA was performed using 3 ports, with the laparoscope positioned at the umbilicus. Two 10-mm ports were inserted in the right and left lower quadrants. The abdominal cavity was explored to locate the appendix and rule out other possible diagnoses. The appendix and the mesoappendix were divided with an Endolinear Cutter 45 with blue and vascular staples, respectively (Ethicon Endosurgery, Cincinnati, OH). The right lower quadrant, the right colic gutter and the subhepatic space in the case of purulence were irrigated and the fluid was suctioned. The appendix was removed in a laparoscopic bag. Fascial defects in the port sites were closed using 0 Vicryl suture. The skin incisions were closed in every case using 3-0 nylon. Non-suction drainage was left in situ in cases of abscess and residual cavity.

OA used a McBurney muscle-splitting incision 1.5 inches in the right lower quadrant. A double ligation of the stump was performed with an absorbable suture. If the appendix looked normal, it was removed, and the distal ileum was visualized to detect possible Meckel's diverticulitis. The abdomen and pelvis were irrigated with warm saline solution. The skin incision was closed with 3-0 nylon (Ethilon; Ethicon, Somerville, NJ). In the case of a perforated appendix, the skin wound was closed loosely.

At the end of each procedure, 3 wound dressings and an abdominal binder were applied to every patient to blind the patient, the nursing and the medical staff, and the independent data collector as to the nature of the procedure.

Postoperative Course

Strict criteria were followed for the reintroduction of nutrition. Bowel sounds were checked every 12 hours. Once present, the patients were started on a

clear liquid diet and advanced to regular diet when the liquid diet was tolerated and flatus observed. Patients were discharged when they tolerated a regular diet, had a normal white blood cell count under 10,000/mL, and were afebrile for 24 hours.

Recorded Parameters

- Anesthesia time in minutes from the time of induction to reversal and operating time skin to skin in minutes.
- Indications for conversion from LA to OA.
- Complications (intraabdominal abscesses were defined by the presence of fever and elevated WBC and evidenced by computed tomography; wound infections were defined as redness and drainage from the wound requiring opening of the skin incision and packing).
- Pathology based on reports (acute, gangrenous, or perforated appendicitis).
- Time until resumption of diet (clear liquid and regular diet) in hours and hospital stay in days.
- Assessment of resume daily activity

RESULTS

Patient characters reviewed in table 1.

The operative time and the total anesthetic time are mentioned in (table 2). 13 patients were converted to an open procedure (5.34 %). The indications for conversion were inability to insufflate in 1, unclear anatomy or difficult dissection in 8 patients, the remaining 4 due to massive intra-operative bleeding.

There was no mortality in this study. Five major complications were observed in the study postoperative bleedings from an injury to the inferior epigastric artery from the left lower quadrant trocar and the other from the appendiceal artery. An enter-cutaneous fistula was the result of an unrecognized monopolar electrocautery injury to the terminal ileum during a straightforward LA for acute appendicitis. Intraabdominal abscesses were founded in 9 patients who readmitted and treated successfully with antibiotics and CT-guided drainage when the collection was encapsulated. Wound infection and other minor complication observed as summarized in table 3.

Pathology

There were 12 (15.58%) normal specimens, 61(79.22%) acute appendices, and 4 (5.19%) complicated with gangrene or perforation.

Quality of Life

Most of the patients 63 (81.8%) resumed of routine daily activities at day 2 following the operation with the limitation imposed by the surgery on such activities on day 1. At 2 weeks postoperatively, quality of life returned to its normal.

TABLES

Table (1): The Characteristics of the patients attending laparoscopic appendectomy

Patients Characteristics		**Number**
Age(years)*		28 (16 – 59)
Gender	**Women**	113
	men	130
WBCs pre-op*		16.3 (12.3 – 24.2)

* Result as median

Table (2): Operative and postoperative clinical data

Clinical Outcomes	**Duration**
Operative time (min)	80 (60 – 100)
Anesthetic time (min)	125 (100 – 150)
resumption of diet (hours)	8 (6 – 12)
Length of stay (days)	2 (2-4)

***** Result as median

Table (3): Frequency of Minor e major complications among the patients.

Postoperative complications		**Number (n=243)**	**Percentage (%)**
Minor	**Vomiting**	8	3.29%
	Paralytic ileus	2	0.82%
	C diff colitis	4	1.65%
	Wound infection	13	5.35%
Major	**Wound dehiscence**	2	0.82%
	Intra-abdominal abscesss	9	3.70%
	Entero-cutaneous fistula	4	1.65%
	Hemoperitoneum	3	1.23%
	Postoperative bleeding	2	0.82%

DISCUSSION

In last decade, there have been several advancements in laparoscopic surgery and intraoperative instruments. These improvements have contributed to several advantages of LA over

the open technique, including reduced postoperative pain, fewer SSIs, and earlier discharge from the hospital. In the literature, LA has been reported to be associated with less analgesic use, early start of oral nutrient intake, shorter hospital stay, and lower incidence of wound infection and intra-abdominal abscess [9,11,14,19-27]. These findings have been challenged by other authors who observed no significant difference in the outcome between the two procedures, and moreover noted higher costs with laparoscopic appendectomy [3,12-13,26-28]. Anyway, a systematic review of meta-analyses of randomized controlled trials comparing laparoscopic versus open appendectomy concluded that both procedures are safe and effective for the treatment of acute appendicitis [29]. Total operative time in our series was significantly long in the laparoscopic surgery up to 150 min. Generally, the lack of experience of surgeons in the laparoscopic approach may contribute to a longer duration of the operation. By contrast, in the present study the learning curve effect was minimal as the surgeons performing the procedures were highly experienced in laparoscopic procedures, including laparoscopic bariatric surgery and colectomy surgery. So, in our series the longer operation time in laparoscopic appendectomy may be due to additional steps like setup of instruments, insufflation, making ports under vision and a phase of diagnostic laparoscopy. Length of hospital stay represents a critical factor that directly influences the economy and the well-being of the patient. We found that hospital stay was significantly short in laparoscopic surgery; 85% of the patients discharged home at day 2 in good condition with a concomitant early bowel movements leading to earlier feeding. Our findings agree with several studies that demonstrated a significantly short hospital stay for the laparoscopic approach [6,15,25-26,30]. Several studies showed no difference between open and laparoscopic appendectomy with respect to early return to activity and performance of daily activities. However, this issue is still debated because of the different definitions and classifications of "activity" in such studies [13,31-34]. Our results are in agreement with a study by Hellberg *et al.* [35] and other randomized clinical trials and meta-analysis[22, 36]. The mortality rate was nil in our study. The low mortality rates reported in previous research (0.05 % and 0.3 % rate in laparoscopic and open groups [22] indicated that appendectomy, especially in absence of complicated disease, is a safe procedure regardless of the technique used [26]. In the present study, the overall complication rates were 23.9%. Wound infection is more common in complicated appendicitis and may not represent a serious complication per se but has a strong impact for convalescence time and quality of life of patients. Conversely, intra-abdominal abscess is a serious and life-threatening complication. We observed intra-abdominal abscess formation in 9 patients 3.70%. These findings are consistent with other studies that showed an increased risk of intra-abdominal abscess after laparoscopic surgery [25-26]. Several hypotheses have been suggested to find possible explanations: mechanical spread of bacteria in the peritoneal cavity promoted by carbon dioxide insufflation, especially in case of ruptured appendix [35, 37-40], inadequate learning curve [32], the meticulous irrigation, instead of simple suctioning, of the infected area in severe peritonitis, that leads to contamination of the entire abdominal cavity, which is difficult to aspirate latter [25]. However, in our study this finding was not statistically significant. The management of intraabdominal abscesses included percutaneous drainage as first-line therapy, and surgical procedures. Antibiotics were given before and after percutaneous drainage or surgery. Other observed postoperative complications included vomiting, paralytic ileus and Hemoperitoneum (Table 4).

CONCLUSION

Our results showed the advantages of the laparoscopic appendectomy approach including shorter hospital stay, decreased need for postoperative analgesia, early food tolerance, earlier return to work, lower rate of wound infection. Furthermore we found a considerable preference (during the collection of consent) of patients and a high satisfaction after the surgery.

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