

Laparoscopy in non-traumatic emergency general surgery operations

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ABSTRACT

Introduction: Laparoscopic surgery is currently a standard treatment procedure for many elective surgery cases. Laparoscopic surgery has been increasingly preferred in emergency general surgery operations. This study aims to investigate the importance of emergency laparoscopic surgery in a secondary hospital.

Materials and Methods: The study was conducted retrospectively at Yozgat City Hospital General Surgery Service between January 2018 and March 2020. Patients who underwent non-traumatic emergency surgery were included in the study. The cases who underwent laparoscopic surgery were determined.

Results: Of the 768 patients who underwent emergency surgery, 732 were non-traumatic cases. It was found that laparoscopic surgery was performed in 62.8% of appendectomy cases, 75% of cholecystectomies, 66.6% of diverting stoma operations, 8.3% of brid ileus cases, 11.1% of incarcerated/strangulated hernias and 11.1% of peptic ulcer perforations.

Conclusion: Laparoscopic surgery is more preferred in appendectomy, cholecystectomy, and diverting stoma operations. In order for other patient groups to benefit from the advantages of minimally invasive surgery, in the emergency laparoscopic surgical experience of surgeons should be increased during their residency.

Keywords: Acute abdomen; emergency laparoscopy; minimally invasive surgery; secondary hospital.

Introduction

Acute abdomen is a life-threatening condition that often requires urgent surgical intervention. It accounts for 11% of the general surgery operations carried out in the USA. Approximately, 50% of total mortality is seen in these cases.^[1] The traditional approach to treatment is laparotomy. Depending on the technical facilities of the hospital and the surgeon's experience, laparoscopic surgery is also a treatment option. Laparoscopy has been used for diagnostic purposes only for many years since the beginning

of the twentieth century.^[2] Following the definition of laparoscopic appendectomy and cholecystectomy after the 1980s, it has been used by many surgeons for therapeutic purposes.^[3-4] Today, its use in esophagogastric, colorectal, hepato-pancreaticobiliary, bariatric, and metabolic surgery has gradually increased and has become the standard practice. Increasing experience in these areas and technological developments in the instruments used have encouraged surgeons to adopt laparoscopy in emergency surgery. The present study aimed to investigate the impor-



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tance of laparoscopic surgery in non-traumatic emergency general surgery in a secondary hospital.

Materials and Methods

The study was conducted retrospectively in the General Surgery Service of the Yozgat City Hospital between January 2018 and March 2020. From the hospital records, the data on the cases operated due to acute abdomen and stomatal openings due to Fournier gangrene were collected. Age, gender, the ASA (American Society of Anesthesiologists) value of the patients, and the performed operations were recorded. Informed consent was obtained from all patients in accordance with clinical and radiological pre-diagnoses. General anesthesia was applied in all laparoscopic cases. Pneumoperitoneum was provided using a Veres needle or by the open (Hasson) method, depending on the surgeon's preference. Intraabdominal pressure was kept in the range of 12–14 mm Hg. In open cases, general anesthesia or spinal anesthesia was applied. The operations were performed by six general surgeons and one gastroenterology surgery specialist working at different periods. Depending on the preliminary diagnosis, the surgeon took a position to face possible operation localization. Two trocars were used in fecal diversion surgeries. A diverting ileostomy was performed in patients with short sigmoid colon or in those who have obesity. In other operations, 3 or 4 trocars were used. The appendix stump was ligated with intracorporeal or endoloop ligature (Ethicon; Bridgewater, NJ, USA). The peptic ulcer perforation defect was repaired by primary or omentopexy using a 2–0 silk suture. TAPP (Trans-abdominal preperitoneal) repair was performed in laparoscopic inguinal hernias. Patients with strangulation underwent open surgery. The surgeon put a drain on the patients when needed.

Categorical values were expressed as frequency (N) and percentage (%) while parametric values were expressed as median, lower and upper values. In comparison, the Chi-square Test was used in categorical data and the Mann-Whitney U test was adopted since the parametric data did not show normal distribution. The difference was considered statistically significant if the P-value was 0.05 or lower in the 95% confidence interval. All data were analyzed using SPSS 22 (SPSS Inc., Chicago, IL, USA).

Results

Between January 2018 and March 2020, 2857 elective and emergency operations were performed in the Gen-

eral Surgery service. Of the emergency cases, 36 were traumatic and 732 were non-traumatic acute abdominal cases. It was observed that laparoscopic surgery was used in more than half (62.8%, 75%, and 66.6% respectively) of appendectomy, cholecystectomy, and diverting stoma operations. While laparoscopic surgery was performed in 8.3% of brid ileus cases, it was observed that it was not applied in any tumoral obstructions and volvulus cases. It was determined that seven of the abdominal wall hernia cases underwent laparoscopic treatment. In three of these cases, open surgery was initiated due to small bowel segmental necrosis (Table 1).

Approximately 64% of the cases who underwent non-traumatic emergency surgery were laparoscopic appendectomy cases. It was found that laparoscopic appendectomy was preferred in young patients with a low ASA value ($p=0.001$, $p=0.004$ respectively) (Table 2).

Discussion

The experience gained from elective laparoscopic surgery paved the way for laparoscopic operations to be applied in emergency cases and accordingly encouraged the surgeons. The use of laparoscopic surgery in the most common acute abdominal pathologies such as acute appendicitis, acute cholecystitis, ileus, and peptic ulcer perforation has increased significantly in the last decade.^[5] In the present study, it was found that laparoscopic surgery was preferred in most of the appendectomy, cholecystectomy, and fecal diversion operations in our secondary hospital. In the first consensus meeting held by the European Endoscopic Surgery Association in 2006, laparoscopic surgery was accepted as the standard treatment in cases of acute appendicitis and acute cholecystitis.^[6] Today, more than 90% of acute appendicitis is operated, and more than half (51.2%) of these operations comprise laparoscopic appendectomy.^[7] The advantages of minimal invasive surgery such as decreased postoperative pain and hospital stay have been reported in laparoscopic appendectomy cases.^[8] The second most common reason for admitting to emergency departments after acute appendicitis is acute cholecystitis.^[5] The generally accepted approach was to perform early laparoscopic cholecystectomy within three days from the onset of symptoms in patients who are not at high risk for surgery.^[9] Since our hospital serves the rural population, patients usually admit to the emergency room at an advanced stage of cholecystitis. Therefore, with the exception of sac perforation and non-response to medical treatment, the general approach is the elective

Table 1. Distribution of non-traumatic acute abdominal cases

	Open (n=419)	Laparoscopic (n=313)	Total (n=732)	Laparoscopy ratio (%)
Appendectomy	174	294	468	62.8
Acute cholecystitis	2	6	8	75
Brid ileus	33	3	36	8.3
Ileus			29	0
Obstructive colon tumor (Hemicolectomy, subtotal colectomy)	22	0	22	
Unresectable obstructive colon tumor	3*	0	3	
Volvulus	4	0	4	
Incarcerated/strangulated hernias			140	2.9
Inguinal	69**	2	71	
Femoral	3	1	4	
Incisional	34	1	35	
Umbilical	24	0	24	
Epigastric	6	0	6	
GIS perforations			36	11.1
Peptic ulcer	27	4***	31	
SI (meckel) diverticulum	2	0	2	
Large intestine (tumor or colon diverticulum perforation)	3	0	3	
Mesenteric ischemia			12	0
SI segmental resection	8	0	8	
Subtotal SI and colon resection	4	0	4	
Fournier gangrene (ileostomy, colostomy)	1	2	3	66.6

SI: Small Intestine; *: One patient underwent Open Low anterior resection after Neoadjuvant CRT; **: Laparoscopy was initiated in three of the patients, however it was switched to open surgery due to small bowel necrosis; ***: Closed perforation was detected in one of the patients, aspiration and drainage was performed in this patient.

Table 2. Demographic and perioperative properties of appendectomy cases

	Laparoscopic (n=294)	Open (n=174)	p
Appendectomy			
Sex (M/F)	110/184	71/103	0.47*
Age (years)	31 (18–75)	35.5 (18–85)	0.004&
ASA			0.001*
I	232	114	
II	56	44	
III	5	15	
IV	1	1	
Operation duration (minutes)	60 (25–120)	55 (20–125)	0.3*
Anesthesia type			0.001&
General anesthesia	294	136	
Spinal anesthesia	0	38	

ASA: American Society of Anesthesiologists; *Chi-square test, & Mann-Whitney U test.

cholecystectomy after conservative treatment, rather than early cholecystectomy. This approach is also reflected in emergency cholecystectomy rates.

A vast majority of emergency cases requiring hospitalization consist of ileus patients. The main causes of ileus include postoperative adhesions, abdominal wall hernias (incarcerated or strangulated), malignancy, and volvulus. The traditional approach is to perform laparotomy in patients who do not respond to conservative treatment. Laparoscopic surgery is also a suitable option in selected cases. The success rate will increase when patients with single-band adhesion, low comorbidity, and with no perforation, diffuse peritonitis, and advanced abdominal distention are preferred.^[10] Otherwise, laparoscopic surgery increases intraoperative and postoperative complications.^[11] In our hospital, ventral and groin hernias comprised the most operated group of patients after appendectomy. In these cases, the general treatment approach was the laparotomy. The application of emergency laparoscopic treatment has not been clarified in incarcerated or strangulated hernias.^[20] The success of laparoscopic surgery in these patients depends on the surgeon's experience and suitable patient selection.^[12]

Another important reason for the acute abdomen is peptic ulcer perforations (PUP). Of the cases, 49.4% form at the bulbous anterior wall, and the diameter of the perforation defect is generally less than 5 mm.^[13] This indicates that approximately half of these patients are suitable for a simple laparoscopic suture without the need for extensive laparotomy incisions. Different operation techniques such as laparoscopic primary repair, omentopexy, or falfiformopexy have been described in the literature.^[14] In PUP, laparoscopic surgery has been shown to offer advantages such as reductions in post-operative comorbidity, mortality, hospital stay, and postoperative pain.^[15] In our hospital, primary repair or omentopexy repair has been performed depending on the surgeon's preference in the treatment of PUP.

Other than acute abdomen, perineal necrotizing fasciitis (Fournier gangrene) comprises the less common patient group of general surgery clinics that requires urgent intervention. Rapid and aggressive tissue debridement is the basic approach, however, fecal diversion is required in 25% of patients.^[16] The operation can be in the form of a loop ileostomy or loop colostomy, depending on the anatomical structure of the patient and the sigmoid colon. Considering that this patient group is obese and has

high comorbidity, it is clear that opening a stoma with a minimal invasive method will provide an important advantage. In a retrospective study, the laparoscopic fecal diversion has been shown to reduce hospital stay and postoperative complications compared to laparotomy.^[17] In the present study, the cases consisted of patients with obesity and comorbidity, and one of the patients underwent ileostomy while another one underwent colostomy.

The limitations of the present study include a low number of patients, being a retrospective study, and some shortcomings in the perioperative data of the patients related to the fact that our hospital is a service hospital. However, the suitable facilities of the hospital for laparoscopic surgery had facilitated the realization of the study.

In our secondary service hospital, laparoscopic surgery is less preferred in emergency surgery operations other than acute appendicitis, acute cholecystitis, and diverting stoma. For this patient group to benefit from the advantages of minimal invasive surgery, the emergency laparoscopic experience of surgeons should be increased during their residency training.

Disclosures

Ethics Committee Approval: Retrospective study.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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