

Why diagnostic laparoscopy?

Dlaczego laparoscopia diagnostyczna?

Authors' Contribution:

A – Study Design
B – Data Collection
C – Statistical Analysis
D – Manuscript Preparation
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ABSTRACT:

Introduction: Abdominal pain requires rapid diagnosis and treatment, especially in emergency circumstances. Sometimes the diagnosis of the disease cannot be accomplished with laboratory and imaging methods, and an invasive procedure such as diagnostic laparoscopy may be required to obtain a diagnosis. Although diagnostic laparoscopy can be performed for post-diagnosis treatment purposes, laparotomy is inevitable in some cases.

Aim: The aim of the study is to evaluate the role of diagnostic laparoscopy in diagnosis and treatment and to retrospectively examine the factors that force the surgeon to perform a laparotomy.

Material and methods: Patients over the age of 18 who underwent diagnostic laparoscopy in the general surgery clinic of Sakarya University Training and Research Hospital between January 2013 and December 2019 were retrospectively evaluated. Patients under 18 years of age and patients diagnosed before surgery were excluded. Demographic data of the patients, whether there was a conversion from laparoscopy to laparotomy, postoperative morbidity, and mortality were recorded.

Results: The data of 347 patients in total were evaluated retrospectively between the specified dates. As many as 216 of the patients were previously diagnosed, with laparoscopic procedures performed for staging purposes and they were not included in the study. The remaining 131 patients were included in the study. Sixty-eight patients were women and 63 were men. In total 79.4% of the patients had diagnostic laparoscopies performed due to emergency circumstances, and 20.6% for abdominal pain evaluation. While the procedure was concluded laparoscopically in 64.9% of the patients, the operation was continued by performing laparotomy in 35.1%.

Conclusion: Despite the increase in the variety and frequency of imaging modalities used, laparoscopic intervention is an essential approach in both diagnosis and treatment when the diagnosis is doubtful, especially in appropriate emergency cases.

KEYWORDS:

diagnostic laparoscopy, laparoscopy, surgery

STRESZCZENIE:

Wstęp: Ból brzucha wymaga szybkiej diagnostyki i leczenia, szczególnie w nagłych przypadkach. Niekiedy niemożliwe jest zdiagnozowanie choroby za pomocą metod laboratoryjnych lub obrazowych; wymagane jest wtedy wykorzystanie metody inwazyjnej, której przykład stanowi laparoscopia diagnostyczna. Mimo że może być ona z powodzeniem wykorzystywana w celach terapeutycznych już po postawieniu rozpoznania, niektórzy pacjenci wymagają dodatkowo przeprowadzenia zabiegu laparotomii.

Cel: Zamierzeniem niniejszej pracy jest ocena znaczenia laparoskopii diagnostycznej w procesie diagnostycznym i terapeutycznym oraz retrospektywna analiza czynników, które zmuszają chirurgów do podjęcia decyzji o laparotomii.

Materiał i metody: Przedmiotem analizy retrospektywnej byli pacjenci powyżej 18. r.ż., którzy zostali poddani laparoskopii diagnostycznej w Klinice Chirurgii Ogólnej Szpitala Klinicznego Sakarya od stycznia 2013 r. do grudnia 2019 r. Z badania wykluczono osoby poniżej 18. r.ż. oraz takie, u których rozpoznanie zostało postawione przed zabiegiem laparoskopowym. Udokumentowano również dane demograficzne dotyczące pacjentów, tj.: przypadki zmiany techniki operacyjnej z laparoskopii na laparotomię oraz pooperacyjne komplikacje i zgony.

Wyniki: Dane 347 pacjentów zostały poddane retrospektywnej ocenie na przestrzeni wspomnianych powyżej lat. Spośród tej grupy 216 pacjentów zostało już wcześniej zdiagnozowanych, dlatego nie włączono ich do badania. Procedury laparoskopowe wykonywane w celu oceny stopnia zaawansowania choroby również nie są uwzględnione w badaniu. Pozostała grupa, licząca 131 pacjentów, została zakwalifikowana do badania; liczba kobiet wynosiła 68, natomiast mężczyzn – 63. Diagnostycznej laparoskopii w trybie pilnym zostało poddanych 79,4% osób, podczas gdy pozostałe 20,6% zabiegów laparoskopowych wykonano w trybie planowym w celu diagnostyki bólów brzucha. U 64,9% badanych procedura diagnostyczna została wykonana wyłącznie przy użyciu laparoskopii, podczas gdy u 35,1% zabieg został poszerzony do laparotomii.

Wnioski: Mimo ciągłego rozwoju technik obrazowania oraz rosnącej częstotliwości wykorzystywania badań obrazowych, laparoscopia pozostaje kluczowym postępowaniem zarówno w diagnostyce, jak i leczeniu pacjentów z niepewnym rozpoznaniem, ze szczególnym uwzględnieniem stanów nagłych.

SŁOWA KLUCZOWE: chirurgia, laparoscopia diagnostyczna, laparoscopia

ABBREVIATIONS

- GI** – gunshot injuries
PID – pelvic inflammatory disease
PSIs – penetrating stab injuries

INTRODUCTION

The first step of competent treatment is rapid and accurate diagnosis. Reliance on clinical and laboratory data may sometimes only delay treatment and cause unnecessary interventions [1]. Given the remarkable development in technology, radiological evaluations have gained on popularity. However, diagnostic (and therapeutic) laparoscopy may be valuable for patients for whom radiological data are inadequate [2]. Laparoscopy is invasive; determining of appropriate indications is essential. Diagnostic laparoscopy is common in emergency cases. Diagnostic and therapeutic laparoscopies facilitate intra-abdominal lymph node sampling and, if necessary, removal, and peritoneal biopsy of patients with abdominal pain [3]. Early laparoscopy is of high diagnostic utility and improves the quality of life of patients with nonspecific abdominal pain [4]. Laparoscopy is safe and effective in patients with hemodynamically stable, penetrating abdominal trauma [5]. Laparoscopy is more cost-effective than laparotomy and causes less patient discomfort [6].

MATERIALS AND METHODS

We retrospectively reviewed the records of all patients operated on in the Sakarya University Training and Research Hospital, General Surgery Clinic, between January 2013 and December 2019. After physical examination, laboratory tests, radiological evaluation (ultrasound and abdominal tomography), and all necessary consultations, some patients still lacked definitive diagnoses and thus underwent diagnostic laparoscopy. Laparoscopies for staging of cancer patients and for evaluation of patients under 18 years of age were excluded. Patients whose preoperative diagnoses were uncertain were included. As the postoperative diagnoses varied widely, they were evaluated under six main headings:

1. Gynecological: Pelvic inflammatory disease (PID), ovarian cyst rupture, uterine fundus perforation, tubular ovarian abscess, ectopic pregnancy rupture, myoma degeneration and vaginal cuff rupture, and ovarian cyst rupture after a non-vehicle accident;
2. Perforation-related: Peptic ulcer perforation; perforations caused by diverticulitis, appendicitis, iatrogenic small bowel injury, gall bladder injury, and stabbings;
3. Non-perforation-associated infections: Plastron and acute appendicitis, omental torsion, epiploic appendagitis, terminal ileitis, inflammatory bowel disease, and Meckel diverticulitis;
4. Mechanical intestinal obstruction: Brid and bezoar ileus; ileus caused by hemorrhage of the small intestinal mesentery; and small intestinal stenosis caused by radiotherapy, invagination, mesenteric ischemia, internal herniation, or a femoral hernia;
5. Biopsy-related injuries: Carcinomatosis peritonei, intra-abdominal ascites, granulomatous disease, and lymphoma-induced para-aortic lymphadenopathy excision;
6. Negative on laparoscopy: Penetrating stab injuries (PSIs), gunshot injuries (GIs), no obvious intra-abdominal pathology.

All procedures were performed with patients under general anesthesia using disposable laparoscopic instruments. A 10-mm camera port was placed below the umbilicus when diagnostic laparoscopy was performed; other ports were created as required by the therapeutic procedures. We recorded whether intervention was urgent or elective, any difficulties in diagnosis, the reasons for diagnostic laparoscopy, any shift from laparoscopy to laparotomy, and postoperative mortality and morbidity.

RESULTS

A total of 347 patients were evaluated, of whom 216 of the patients were previously diagnose. Laparoscopies performed for staging purposes were not included. The remaining 131 patients were included. Sixty-eight were female and 63 male, of mean ages 42.70 ± 16.53 and 45.49 ± 18.56 years, respectively (Tab. I). Of all patients, 79.4% were emergency cases and 20.6% complained of non-specific abdominal pain. Laparoscopy only was employed in 64.9%, and additional laparotomy in 35.1% (mostly emergency cases; Tab. I. and II.). The data were not normally distributed. The Kruskal-Wallis test revealed a significant difference between the groups ($P < 0.01$). After Bonferroni correction, conversion to open surgery of patients with perforations and ileus was more common than for other patients ($P < 0.001$). Also, a significant difference was evident between those with perforations and gynecological disease ($P < 0.006$); the former patients were more commonly converted to laparotomy.

The postoperative diagnoses included 21 diseases of gynecological origin, 19 intra-abdominal perforations, 22 intra-abdominal infections (excluding gynecological infections), and 23 mechanical bowel obstructions. Biopsies were performed on 27 patients with internal conditions or abdominal pain, but no pathology was evident in 19 cases (Tab. II.).

Gynecological diseases: ovarian cyst ruptures in 10 patients, PID in four, a uterine fundus perforation in one, tubular ovarian abscesses in two, an ectopic pregnancy rupture in one, a degenerate myoma in one, vaginal cuff rupture in one, and an ovarian cyst rupture after a traffic accident in one.

Perforation-induced: Seven peptic ulcer perforations, six perforations caused by appendicitis, two perforations caused by diverticulitis, two gall bladder perforations, one iatrogenic small bowel perforation, and one small bowel perforation caused by stabbing.

Infections: Seven acute appendicitis cases, five plastron appendicitis cases, four cases of appendix epiploica necrosis, three cases of terminal ileitis, two instances of omentum torsion, and one case of Meckel diverticulitis.

Intestinal obstructions: Single-band ileus in 10, Brid ileus in three, invaginations in two, mesenteric ischemia in two, ileus caused by hemorrhage of the small intestinal mesentery in two, an inguinal hernia in one, ileus caused by a bezoar in one, small intestinal stenosis caused by radiotherapy in one, and ileus caused by a femoral hernia in one. Resection anastomoses were performed on nine patients, bezoar removal via enterotomy on one patient, and an ostomy on one.

Negative on laparoscopy: Acute abdominal findings in ten, stab injuries in six, firearm injuries in two, and a non-vehicle accident in one.

Tab. I. Demographic characteristics and comparison of patients who were completed laparoscopically and patients who were converted to laparotomy (mean \pm std deviation).

		Laparoscopic ended	Conversion to open surgery	Sum	P
Female	n	49	19	68	0.75
	Age (year) mean \pm std deviation	41.40 \pm 16.90	46.05 \pm 15.48	42.70 \pm 16.53	
Male	n	36	27	63	
	Age (year) mean \pm std deviation	42.52 \pm 18.61	49.45 \pm 18.08	45.49 \pm 18.56	
Acute abdomen %		61	43	104 (79.4%)	0.03
Evaluation of pain % (abdominal)		24	3	27 (20.6%)	
Sum %		85	46	131 (100%)	
mean \pm std deviation		(41.88 \pm 17.48)	(48.04 \pm 16.95)	(44.02 \pm 17.46)	

Tab. II. Conversion from laparoscopic surgery to laparotomy according to main disease groups.

		Laparoscopic surgery	Conversion to open surgery	Sum n (%)	P
Perforation related	Female (n)	2	5	19 (14.5%)	< 0.01
	Male (n)	2	10		
Mechanical intestinal obstruction	Female (n)	5	4	23 (17.6%)	
	Male (n)	3	11		
Non-perforation-associated infections	Female (n)	7	3	22 (16.8%)	
	Male (n)	8	4		
Gynecological	Female (n)	16	5	21 (16.1%)	
	Male (n)	-	-		
Biopsied	Female (n)	15	1	27 (20.6%)	
	Male (n)	9	2		
Negative on Laparoscopy	Female (n)	4	1	19 (14.5%)	
	Male (n)	14	-		
Sum		85 (64.9%)	46 (35.1%)	131 (100%)	

The patients diagnosed with mesenteric ischemia and uterine fundus perforation died. Wound infections developed in 13 patients who underwent laparotomy. There was no other early surgical complication.

DISCUSSION

Laparoscopy is widely used both diagnostically and therapeutically [7]. Diagnostic laparoscopy is often performed when an emergency features acute abdominal issues [8], and changes the anticipated treatment in 25% of cases [9]. We found that diagnostic laparoscopy aided treatment decisions, minimized unnecessary laparotomies, and suggested an optimal incision if conversion to open surgery was required.

Of all diagnostic laparoscopies, 66–80% did not require a switch to laparotomy [10]. The success of therapeutic laparoscopy depends on the surgeon's experience, the procedure, and the operating

room facilities [11]. In 64.9% of our patients, all procedures were performed laparoscopically. In 35.1%, laparotomy was required.

A transition to laparotomy was more common in patients with perforations and ileus. Although successful laparoscopic treatment of perforations is possible [12], surgeons with little experience in emergency laparoscopy are recommended to transit to laparotomy if intra-abdominal blood and intestinal contents are evident laparoscopically [13]. Laparotomy was performed in 79% of patients with perforations because (a) the intra-abdominal perforation could not be laparoscopically found; (b) perforation was delayed (most patients); and, (c) associated (widespread) abdominal abscesses were detected.

Surgeons are reluctant to perform laparoscopy in patients with mechanical small bowel obstructions; the rate can attain 50% [12, 14–16]. The obstruction causes the intestine to expand and become fragile, and the intestine fills the abdominal cavity. Laparoscopic

exploration becomes difficult, and maneuvering of surgical instruments is restricted [17]. However, especially in occlusions caused by a single band, the aim is to cut the band, and a laparoscopic approach is thus ideal [18]. Therapeutic laparoscopy was performed on almost all patients with ileus caused by a single band. Laparotomy was preferred in cases requiring resection, enterotomy, and enterostomy. Intra-abdominal adhesions, plastron appendicitis, exploration difficulties, and technical reasons were also cited as reasons for conversion to laparotomy.

Acute appendicitis is the cause of abdominal pain in 40 to 60% of cases undergoing diagnostic laparoscopy [10, 19, 20]. The proportion of patients so diagnosed was 5.3%. We attribute this low rate to the more effective use of diagnostic imaging in recent times. Patients diagnosed (via imaging) with acute appendicitis who then underwent laparoscopic appendectomy were not included.

A diagnosis of abdominal pain in a female is more complicated; a gynecological disease may be in play. In a laparoscopic study of female pelvic pain, 42% of all problems were gynecological in nature [20]. Of our emergency patients, 40.4% of females who underwent diagnostic laparoscopy had gynecological disorders, consistent with the literature.

Elective diagnostic laparoscopic procedures are aimed at exploring fever of unknown cause or chronic abdominal pain, or to stage

cancer patients [3]. Of all our patients, 20.6% underwent elective laparoscopy to seek out the source of abdominal pain.

False-negative abdominal ultrasonography and abdominal computed tomography results are common in patients with bowel perforations and diaphragm injuries. Diagnostic laparoscopy is recommended for selected cases with abdominal and thoracoabdominal stab wounds [5, 21]. In recent years, the numbers of patients undergoing diagnostic laparoscopy have fallen because of improvements in, and the wider availability of, imaging [22]. Today, patients with abdominal trauma prefer a conservative approach; such patients give surgeons nightmares [23]. Diagnostic laparoscopy is still recommended to patients with uncertain diagnoses because this allows direct visualization of the injury (unlike ultrasound and CT) [24]. In high-level trauma centers, laparoscopy has reduced the numbers of unnecessary laparotomies and associated complications, the hospital stay, and patient recovery time [6, 25, 26]. No pathology was detected laparoscopically in 14.5% of our patients. They exhibited no surgical complication.

We retrospectively analyzed our experience with diagnostic laparoscopy. Many emergency and elective procedures are performed laparoscopically in our center. Here, we focused on laparoscopies performed in patients with uncertain diagnoses. When faced with an acute abdomen, laparoscopy may yield a definitive diagnosis and reduce the need for (negative) laparotomy. In experienced hands, laparoscopy is reliably therapeutic, with enormous potential.

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