

LAPAROSCOPY AS A DIAGNOSTIC TOOL IN ABDOMINAL PROBLEMS

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ABSTRACT

Laparoscopy has been used for decades now in the treatment of various abdominal pathologies in general surgery, urology, gynecology and pediatric surgery. The use of laparoscopy in establishing the diagnosis when other modalities have failed is also well known. The aim of this study was to assess the uses of laparoscopy as a diagnostic tool in various abdominal problems in Mosul City hospitals and its benefits in achieving the accurate diagnosis. Between the year 2009 and 2019, Laparoscopy was used as a diagnostic tool in Mosul City hospitals for 200 patients with various abdominal problems The patients were classified into five categories including abdominal trauma, acute and chronic abdominal and pelvic pain, cirrhosis and hepatitis, malignancies and intra-abdominal testes.

Keywords, Laparoscopy, diagnostic laparoscopy (DL), trauma, pain

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1. Introduction

The most important step in treating any patient is to reach the accurate diagnosis. To do so, many investigations are utilized according to the patient's scenario. Noninvasive modalities like laboratory investigations and imaging should always be used in the first steps and usually they are sufficient enough to reach the diagnosis. Nevertheless, there are certain patients in who despite using all the above mentioned investigations, the diagnosis remain obscure and the next step remains cloudy. Diagnostic laparoscopy may help in providing the accurate diagnosis, avoiding unnecessary laparotomy, and help in planning the optimal therapy in these selected patients.

DL has been used for decades now in the diagnosis of abdominal trauma [1-3]. The main indication for (DL) in abdominal trauma is suspected but unproven intra-abdominal

injury after blunt or penetrating trauma, whilst the main contraindications are: hemodynamic instability(systolic blood pressure <90 mm Hg), known or obvious intra-abdominal injury, posterior penetrating trauma with high likelihood of bowel injury and limited laparoscopic expertise [4,5] . The most important thing to mention is that diagnostic laparoscopy should only be done in stable patients and in the presence of a well-equipped theatre and an expert laparoscopic personnel.

Despite the daily improvements in laboratory and imaging facilities, acute abdominal condition remain a diagnostic challenge for the surgeon with a significant rate of negative laparotomies which carried a burden on the patient and on the health resources.[6-8]

In many cases of chronic abdominal and pelvic pain, despite the use of various laboratory and imaging investigations, the diagnosis remains cloudy. Surgeons are consulted when the pathology is unclear or tissue diagnosis is required, in these cases, DL can be the savior. Being chronic in nature, these conditions have a great effect on the patient's quality of life, performance and psychological condition.

Clinically, small, metastatic foci in the peritoneum or liver cannot be accurately diagnosed using the traditional ultrasound, CT or MRI, in some cases[9]. DL should be considered when percutaneous biopsy is either not possible or inadequate to make therapeutic decisions and to diagnose the primary tumor. Non-invasive imaging may misjudge the stage of lymphoma, while laparoscopy can correctly identify the stages of abdominal lymphoma.[10]

The accurate diagnosis of hepatic diseases is crucial in the treatment and follow up. The type of hepatitis for example determines the type of the treatment. Also in cases of liver cirrhosis, the diagnosis and staging is so important in both the treatment and the prognosis, that's why liver biopsy is the key in these patients' work up. DL can be so accurate in the diagnosis and staging by both directly seeing the gross appearance of the liver and by taking multiple biopsies with a relatively high sensitivity. [11]

Laparoscopy has proved to be the best available procedure for diagnosis and management of impalpable undescended testes. [12,13] it also has the advantage of therapeutic intervention in term of orchidopexy or orchidectomy.

2.Materials and Methods

Between June 2009 and June 2019, diagnostic laparoscopy was performed in Mosul city hospitals(Al-Jamhoori Teaching Hospital, Ninawa and Al-Zahrawy Private Hospitals) for 200 patients with various abdominal conditions. Of the patients, 113 were males (56.5%) and 87 were females (43.5%). (

Diagnostic laparoscopy was done electively under general anesthesia in 176 patients (88%) and under local anaesthesia in the rest of the patients(12%) . The 1st port was infra-umbilical in all cases and other ports were added accordingly. A nasogastric tube was inserted during the procedure if the stomach was distended. The whole peritoneal cavity, including the pelvis, was thoroughly examined routinely. Multiple biopsies were obtained from the suspected pathology

The patients were classified into five categories including:

- Abdominal trauma (60 patients)
- Acute and chronic abdominal or pelvic pain (88 patients)
- Oncological indications (32 patients)
- Liver cirrhosis and hepatitis (12 patients)
- Intra-abdominal ectopic testes (8 patients)

3.Results and Calculations

Abdominal trauma

From October 2009- October 2013, 60 hemodynamically stable patients with abdominal trauma (48 blunt and 12 penetrating injuries) (Figure 1) underwent DL in the operating theatre of the Emergency Department of Al-Jamhoori Teaching Hospital in Mosul. The mean age of the patients was 25.57 years ranging from 2 to 56 years, 51 males and 9 females.

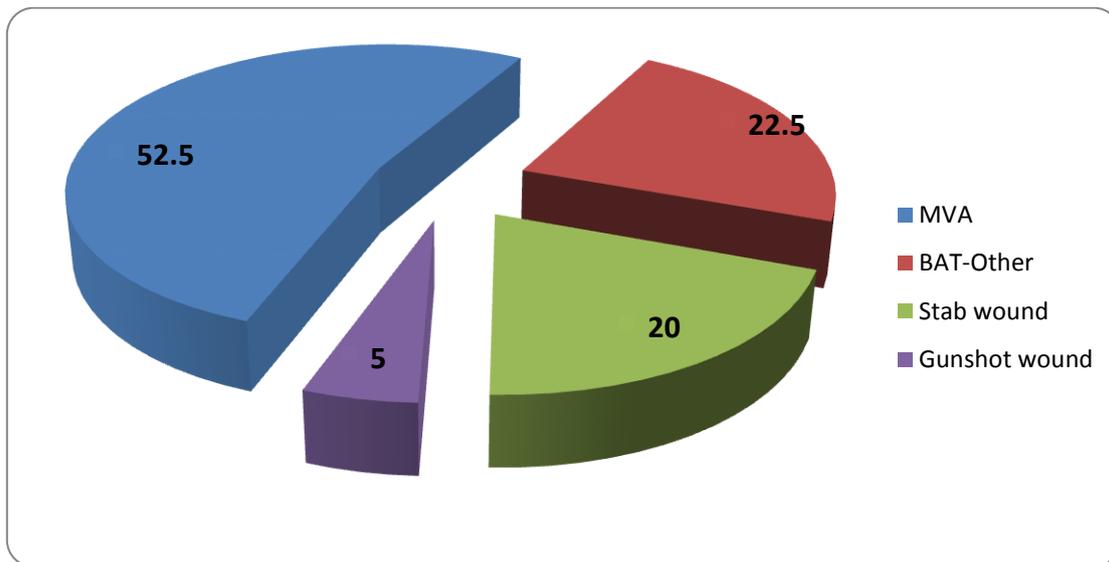


Figure 1: Mode of injury

Criteria for inclusion in the study were: suspected but unproven intra-abdominal injury in patients who were upon arrival, or after initial resuscitation, hemodynamically stable.

Our study demonstrated that unnecessary laparotomy was avoided in 63.3% of the patients. Out of 23 patients with positive (DL), therapeutic laparoscopy was performed in 4 patients (17.4%), including hemostasis of liver, mesentery and omentum (table 1). In 18 patients (78.2%) conversion was necessary because of inadequate examination, injuries that cannot be repaired by laparoscopy, surgeon's lack of experience and clinical instability. All the patients were discharged without morbidity and mortality, and none of the patients reported for complications.

Table 1 : management of 23 patients with positive DL

Intervention after positive DL	No. of patients	Percentage
Therapeutic Laparotomy	18	78
Laparoscopic Intervention	4	17.4
None	1	4.4

Acute and chronic abdominal and pelvic pain

In the same 10 years period, DL was performed for 88 patients with undiagnosed abdominal or pelvic pain. Fifty -seven patients were females and 31 were males.

In 46 of the cases, the presentation was acute; DL was performed to achieve the accurate diagnosis when other modalities like ultrasonography and CT scan failed. Findings are shown in [table 2](#).

Table 2

<u>Findings</u>	Perforated viscus	Gynecological problems	Mesenteric ischemia	Others	Negative DL
<u>No. of patients</u>	13	16	3	5	9
<u>Laparoscope-pic intervention</u>	2	7	None	2	None

In 5 of the cases, the diagnosis was perforated viscus by other investigations, for example abdominal plain X-ray showing free air under the diaphragm, we performed the DL to select the accurate approach and incision. ([Figure 2](#))

A

B



Figure2 : DL performed to select the appropriate incision in perforated DU (A) and perforated appendix(B)

Intervention was done laparoscopically in 11 cases including biopsies, ovarian suturing, and removal of ectopic pregnancies and aspiration of cysts.

In 42 of the patients, the pain was chronic, of these, gynecological problems was diagnosed in 28 patients ([Table 3](#)). They were females with chronic abdominal and pelvic pain not responding to treatment, endometriosis was the most common pathology found.

Tb peritonitis was found in 7 of the cases, Ascitic fluid and multiple biopsies were taken for AFB staining.

Figure (3)

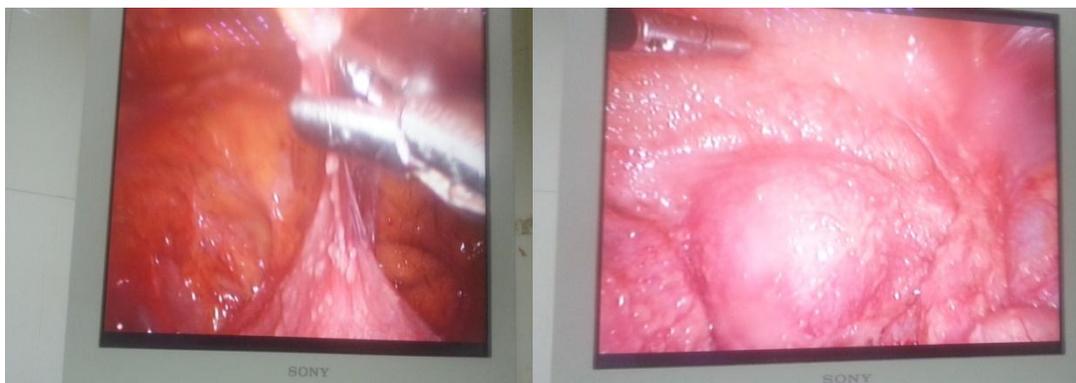


Figure 3 : DL in chronic abdominal pain demonstrated TB peritonitis

In 3 of the cases with chronic undiagnosed abdominal pain, an internal herniation of small bowel was diagnosed. Repair done laparoscopically in 2 patients and immediate laparotomy was performed in the 3rd case because of dense adhesions.

[Table 3](#): findings in patients with chronic abdominal and pelvic pain

<u>Findings</u>	GYNECOLOGICAL	TB	INTERNAL HERNIA	OTHERS
<u>No. of patients</u>	<u>28</u>	7	3	4
<u>Laparosco-pic intervention</u>	<u>8</u>	-	2	2

Oncological indications

Thirty-two patients were referred to us for DL by the oncology doctors with unknown primary malignancy. Seventeen males and 15 females. Metastatic work up did not achieve the diagnosis including CT, MRI and tumor markers.

Ascitic fluid was found in 22 patients, sampled and was sent for cytology (table 4). Liver, omental, peritoneal and mesenteric masses were biopsied (Figure 4) and the final diagnosis was reached in 28 patients (90%).

Table4 : Findings of DL in oncological cases

Findings	Ascites	Secondary spots	Liver hemangioma	Negative DL
No. of patients	22	23	5	3
Laparoscopic intervention	22	28	-	-

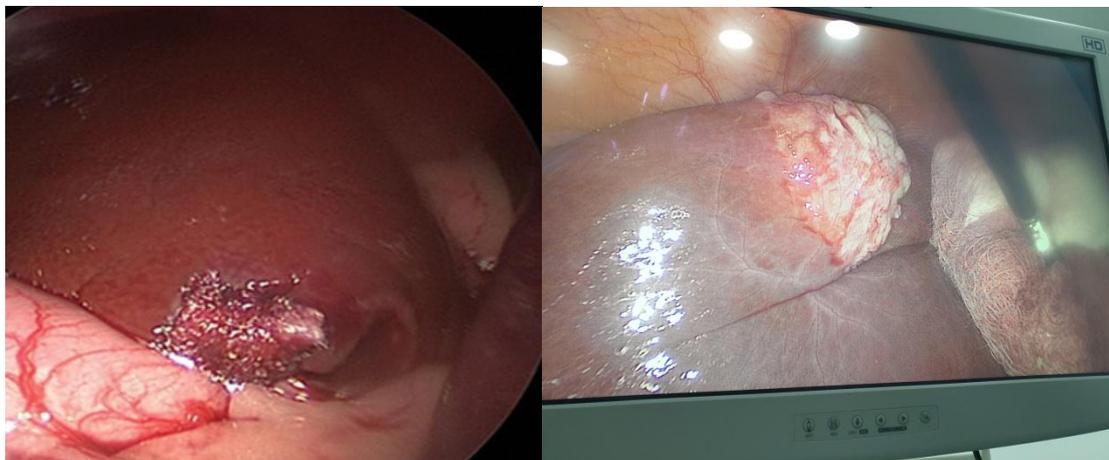


Figure 4: Liver biopsy done laparoscopically

In 5 cases supposed to have liver metastases, DL revealed hemangiomas in the liver rather than metastases. (Figure 5).

In 3 patients (10%) the DL was negative and did not add to the workup.

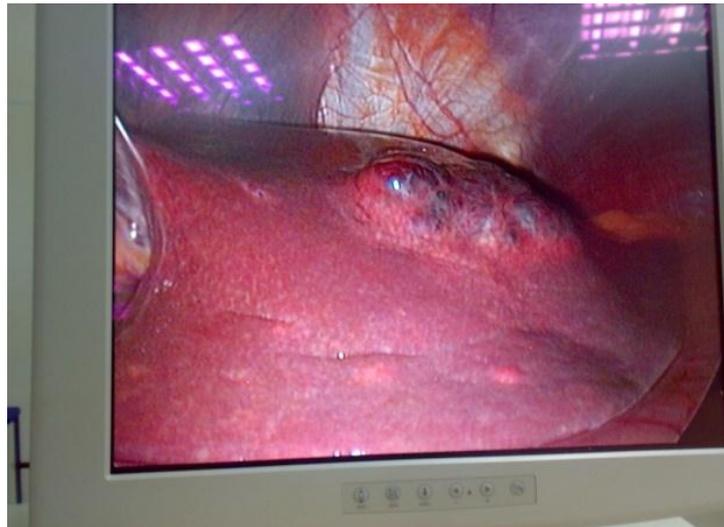


Figure 5: hemangioma found during DL

Liver cirrhosis and hepatitis

Twelve patients were referred to us from the gastroenterologists with the diagnoses of cirrhosis in 7 patients and hepatitis in 5 patients. Six males and 6 females. Multiple biopsies were taken from the liver and sent for histopathology. (Figure 6)



Figure 6: cirrhotic liver biopsy

Intra-abdominal ectopic testes

8 adult patients were referred to us with the diagnosis of undescended testes. The mean age was 26.7 years. MRI determined the position in 5 cases, in the three others it was found during laparoscopy. Re-positioning done in 6 cases, and orchidectomy done in 2 cases (Figure 7) .

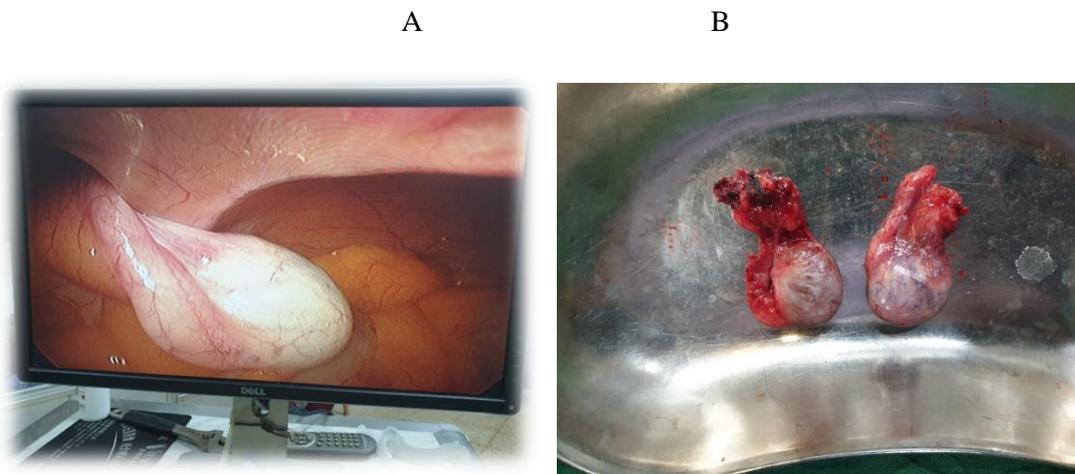


Figure 7: Intra-abdominal testes found during DL (A) and orchidectomy done (B) Conclusion

4. Conclusion

Laparoscopy is a safe, simple and effective diagnostic tool that can be performed in most centers by expert laparoscopic surgeons in various abdominal problems and can aid in achieving the diagnosis when other modalities have failed.

5. Discussion

Taking in consideration the difficult situations in our country in general and especially in our city over the last few years, our patients did not have free access to other diagnostic modalities like imaging devices , especially CT scan and magnetic resonance imaging (MRI) . Thus, DL can be a suitable option in many cases.

Diagnostic laparoscopy is very important for making a definitive clinical diagnosis whenever there is a diagnostic dilemma. Laparoscopy reveals either no abnormality or discovers a disease requiring no surgery for proper management, thus avoiding an unnecessary burden of non-therapeutic laparotomies.[14-16]

We used DL in selected 60 patients with abdominal trauma. Criteria for inclusion in the study were: suspected but unproven intra- abdominal injury in patients who were upon arrival, or after initial resuscitation, hemodynamically stable. They presented normal Glasgow coma scale and limited associated injuries, and surgical team and technical conditions were adequate. All had investigations (like FAST examination or CT scan) with equivocal results. Criteria for excluding patients from the study were: hemodynamic instability despite resuscitation, known or obvious intra-abdominal injury, and posterior penetrating trauma with high likelihood of bowel and retro peritoneal injuries. The most important advantages are the reduction of the negative and non-therapeutic laparotomy rate and shortening of hospitalization.

DL can play a very important role in diagnosing vague cases of acute abdominal and pelvic pain. In our study, we selected 46 patients with acute abdomen in the ER in whom neither physical findings, nor the investigations like US and CT scan could reveal the diagnosis clearly. In the presence of our laparoscopy unit, we found that DL can be very useful in reaching the diagnosis with certainty. Gynecological causes were the most common findings in all the patients (35%), and perforated viscus was the most common finding in male patients (28%), to be mentioned, DL can aid in selecting the approach of surgery or the type of wound in query cases. In 9 cases, the DL was negative, this can be considered a gain for the patients in term of avoiding negative and non-therapeutic operations, Talaat et al[17] for example, found that without laparoscopy, the overall rate of unnecessary appendectomy is high (women 39%; men 15% .(

Cases of chronic abdominal or pelvic pain represent a diagnostic challenge for physicians and surgeons. DL can , in selected cases, solve the problem for these patients. Among 42 patients in our series , the diagnosis was made in more than 90%, with gynecological problems being the most common finding (67%). These young females had a long history of pelvic pain, with a lot of investigations, consultations and medications with no response. Endometriosis and pelvic inflammatory disease was proved with certainty by the

DL. Abdominal tuberculosis sometimes cannot be differentiated from malignancy clinically. Laboratory and radiological investigations can only suggest, but not confirm, the diagnosis[18] . We diagnosed TB peritonitis in 7 cases in whom all TB work up failed to diagnose the condition and were referred to receive the appropriate treatment. Udwardia[19] suggests that the common findings in abdominal tuberculosis are peritoneal or visceral tubercles, varying in size from 2 mm to 1 cm. Small bowel adhesions and strictures can also be seen.

The role of DL in oncological cases is very well established. In our series, the diagnosis of the primary tumor was made in 90% of the cases by directly visualizing the tumor or by biopsies taken from the secondary deposits in the liver, peritoneum, omentum or other organs. In 5 cases referred to us with suspected liver metastases, the diagnoses of hemangiomas were clearly made that were missed by the pre-operative imaging. We had three patients of lymphoma suspected preoperatively by CT scan which were technically difficult for image-guided biopsies preoperatively. We performed DL and took multiple biopsies from mesenteric lymph nodes and from retroperitoneum that proved the diagnosis. Herrera et al. [20], also reported the detection rate of liver lesions and a diagnostic yield up to 95% with laparoscopy.

In the presence of ultrasound, CT- or MRI-scan guided percutaneous liver biopsy , most of suspicious liver lesions can be assessed. Nevertheless, there are cases that were referred to us from the gastroenterologist for assessment . We noticed that DL can play an important role in early diagnosis of cirrhosis. Perdita et al [21] mentioned that all imaging procedures do not allow a direct viewing of the liver. The direct visual inspection of the liver and the abdomen is the privilege of laparoscopy.

It is very well agreed that Laparoscopy is the best way to diagnose impalpable undescended testes. In pediatric surgery it is used routinely for this purpose. We had 8 adult cases with delayed diagnosis of undescended testes. Preoperative localization is usually possible by MRI, but sometimes, as in 3 of our cases, it was only done during DL. The rule is to perform orchiopexy laparoscopically, but in cases of very small atrophied testes, or in the presence of suspicion of malignancy, orchidectomy is the preferred approach. In 2 of our cases orchidectomy was done because of abnormal gross appearance in one case and for the patient's wish in the second one

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