

Role of Diagnostic Laparoscopy in Patients with Acute or Chronic Nonspecific Abdominal Pain

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ABSTRACT

Aim: The aim of our study was to evaluate and establish the role of diagnostic laparoscopy (DL) in unexplained/nonspecific abdominal pain (NSAP) in this era of therapeutic laparoscopy, and thus to analyze and support the theory of minimal access surgery in diagnosing and treating abdominal conditions.

Materials and methods: In this prospective study included patients with abdominal pain of (i) more than 6 hours and less than 6 days duration (acute) and (ii) more than or equal to 6 months duration (chronic) were included whether presenting as a surgical emergency or coming to surgical outpatient department (OPD) in whom a DL was performed after failure to achieve a diagnosis with conventional methods. The study included a total of 168 consecutive patients who fulfilled our inclusion criteria and underwent DL for NSAP. Their demographic and clinical data, admission dates and dates of surgery were noted. Outcome of surgery was recorded and the data were analyzed to ascertain the role and diagnostic yield of laparoscopy in our department, both in acute and chronic abdominal pain of nonspecific nature. Patients were followed postoperative for 3 months for any recurrence of symptoms.

Results: Laparoscopy yielded diagnoses in 161 of these patients giving a diagnostic yield of 95.8%. Appendicitis (39.2%), gynecological pathology (16%) and abdominal tuberculosis (8.9%) were the major findings. Therapeutic procedures were performed in 112 cases (66.6%) where peroperative pathology was identified. In 38 cases (22.6%) where there was strong clinical suspicion of appendicitis and no pathology could be identified peroperative, an appendectomy was performed. Twenty-eight (73.6%) of these appendix specimens were found inflamed on subsequent histologic examination. There were no complications in this series.

Conclusion: This study establishes the role of early DL as a safe procedure with high efficacy. Hence, it is an effective investigative tool in undiagnosed abdominal pain of both acute and chronic nature.

Keywords: Acute appendicitis, Diagnostic laparoscopy, Gynecological pathology.

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INTRODUCTION

In surgical practice, we frequently come across patients with lower abdominal pain who despite frequent routine examination and all major investigations remain undiagnosed. Many undergo appendectomy, some are put on antitubercular therapy (especially in our country) while females mostly end up taking anti-androgens. A vast majority are labeled functional. In short, patients with nonspecific abdominal pain (NSAP) continue to be a frustrating experience for the patient and pose a challenge to the diagnostic capability of the general surgeon.

The traditional three step approach to abdominal pain of nonspecific nature including: (i) history and clinical examination including gynecological examination, (ii) investigations and (iii) therapeutic intervention is tedious and lengthy. Patients are hospitalized, subjected to a battery of costly investigations and often end-up undergoing a laparotomy which may prove unnecessary with no therapeutic benefit.^{1,2} The end result is an unsatisfactory discharge from the hospital after a prolonged stay often without a precise clinical diagnosis.³

Laparoscopy for diagnostic purposes was introduced for the 1st time by Kelling in 1902 and since then has come a long way. Diagnostic laparoscopy (DL) is a minimally invasive surgical procedure that allows the visual examination and documentation of intra-abdominal organs in order to detect any pathology. Elective DL refers to the use of the procedure in chronic intra-abdominal disorders. Emergency DL is performed in patients presenting with acute abdomen.

With increasing the use of laparoscopy, the diagnostic yield in cases of NSAP has tremendously improved, it allows direct visualization of the peritoneal cavity without the need for old fashioned open exploratory laparotomy. It is especially useful in patients with equivocal signs and those who are hemodynamically stable not requiring urgent surgical intervention.⁴

The rapidly increasing popularity of laparoscopy may be attributed to several factors; including its applicability in both emergency and elective setups, high diagnostic yield, therapeutic management in the same setting (in cases where on-table diagnosis is possible), ability to manage most coexisting conditions, low patient morbidity, reduced hospital stay and expenditure.

Diagnostic laparoscopy has a role in many acute abdominal conditions including acute appendicitis, acute intestinal obstruction, acute salpingitis, pelvic inflammatory disease (PID), ovarian torsion, ruptured ovarian cysts, acute gut perforation, penetrating/blunt trauma to abdomen. Also, it has an important role in obtaining diagnosis, allowing therapeutic intervention where needed and establishing histopathologic diagnosis of chronic causes of abdominal pain, especially in cases of abdominal tuberculosis, endometriosis, adhesions due to inflammation and/or surgery.

Our study aims to establish the role of laparoscopy as a diagnostic tool investigating its effectiveness in the setting of acute as well as chronic abdominal pain.

MATERIALS AND METHODS

A total of 168 patients were included in our study who presented with either acute abdominal pain ($n = 81$) or chronic abdominal pain ($n = 87$) over a 12 months period. Only the patients who fulfilled our inclusion criteria were included in our study.

Inclusion Criteria

- Patients between ages of 12 and 65 years
- Abdominal pain lasting less than 6 days in acute cases and more than or equal to 6 months in chronic cases in whom there was no definitive diagnosis after thorough clinical examination (including gynecological examination) and relevant investigations.

Exclusion Criteria

- Precise diagnosis established after evaluation and investigations.
- Patients with clinical evidence of peritonitis and/or hemodynamic instability requiring urgent surgical intervention.
- Pediatric cases.
- The elderly in whom a surgical and/or anesthetic intervention outweighed the theoretic benefits of a diagnostic laparoscopy.
- Local signs of peritonitis.
- Previous major abdominal surgery.
- Prior diagnosis of malignancy or any other chronic disease.
- Patients with any contraindication to pneumoperitoneum.
- Accidents/trauma patients.
- Uncorrectable coagulopathy.
- Patients undergoing any elective abdominal/pelvic surgical procedure.
- Those who did not give consent.

Acute nonspecific abdominal pain was defined as abdominal pain of less than 6 days duration for which no cause was elucidated after thorough clinical examination and investigations. Chronic NSAP was defined as vague abdominal pain/discomfort lasting more than 6 months which remained undiagnosed after repeated evaluations and investigations. Main outcome measure in the series was diagnostic yield of laparoscopy in the setting of NSAP. Other outcomes were length of hospital stay, symptom control on follow-up, readmissions and time lapse between presentation and DL.

After all essential investigations patients with NSAP fulfilling the inclusion criteria were then subjected to DL in 12 to 24 hours in acute abdominal cases and 12 to 72 hours in those with chronic abdominal pain. Laparoscopy was performed under general anesthesia and comprised of a thorough exploration of all abdominal quadrants and the pelvic viscera.

An attempt was made to treat all surgical pathologies diagnosed at laparoscopy without the need for converting to open. In cases where no clear pathology could be identified peroperative and there was clinical suspicion of appendicitis, appendectomy was done on the basis that symptomatic appendicitis is not always evident macroscopically.⁵ Biopsy was taken of suspicious nodules and free peritoneal fluid if any was aspirated. All specimens were sent for histopathological, cytological, biochemical and microbiological analysis.

Follow-up was done at 10 days, 1 and 3 months postoperative. Patients were followed for:

- Results of biopsy specimen
- Improvement or worsening of symptoms
- Readmissions and indications for readmission
- Early and late complications of laparoscopy necessitating open intervention
- Patient compliance if post-laparoscopy medical management was initiated.

RESULTS

Patient demographics are summarized in Table 1. There were a total of 123 females included as against 45 males patients. The majority of the patients were young adults aged 16 to 30 years.

Out of 168 cases of DL performed, on table diagnosis and therapeutic management was possible in 112 (66.6%) cases. Eighty-one (48.2%) of these 168 patients had presented acutely whereas 87 (51.7%) presented with long standing complaint of NSAP.

Out of these 112 cases of positive on-table diagnoses, a majority, i.e. 66 (39.2%) cases showed a macroscopic involvement of appendix and appendectomy was done. Sixty-four

(96.9%) of these appendix specimen subsequent histology confirmed the diagnosis of acute appendicitis. In only two cases, reports of a normal appendix were obtained.

The second major pathology in our study was ovarian cyst. Twenty-seven (16%) cases of ovarian cysts were diagnosed and aspiration and/or cystectomy performed. Subsequent histopathology of the resected cysts revealed benign ovarian cysts in majority of cases, i.e. 17/27 (63%), whereas a diagnosis of endometriosis was established in 10/27 (37%) cases.

Peritoneal nodules were seen in 15 (8.9%) of cases, in all these cases biopsy was taken and sent for histopathology. All these biopsy specimens tested positive for tuberculosis (100%) and therapy was instituted.

In 38 (22.6 %) cases, no pathology could be identified and appendectomy was done [28 (73.6%) of these 38 appendix specimens showed inflammatory changes on histopathology]. Combinations of pathologies were also observed in 3 cases (1.8%) in which coexistence of macroscopic acute appendicitis was seen with ovarian cysts. It was possible to carry out therapeutic intervention in all these cases. One case (0.6%) of a solitary hydatid liver cyst was seen which was missed preoperatively as patient was un-affording and advanced radiological investigation were not carried out. De-roofing of the cyst was done followed by hypertonic saline wash. Drain was left *in situ* and tremendous improvement in patient progress was witnessed later on.

In 11 (6.5%) cases where the peroperative picture was unclear, biopsy/aspiration of suspicious nodules/serous fluid was taken for subsequent histopathological/cytological/microbiological/biochemical analysis. The following diagnoses were later reached based on results of histology and fluid cytology. Early Cirrhosis

in 3 (1.7%), hepatoma in 3 (1.7%), lymphoma in 5 cases (2.97%). These patients were referred for expert opinion and management.

Thus, a diagnosis (either on table or via histopathology) was possible in 161/168 cases (95.8%). In 7 cases (4.1%), there was no diagnosis after DL (appendix specimens were also negative). These patients continued to have abdominal discomfort, however, they reported improvement in their symptoms post DL which may be a psychological phenomenon of 'an intervention' carried out.

The mean hospital stay in our study was 3.36 days, prolonged stay of 4 days or more was seen in a few patients who had initially presented with chronic abdominal pain (Table 2). Majority of patients were discharged on 1 to 3 postoperative day.

Follow-up was done at 10 days, 1 and 3 months post-laparoscopy. A majority of patients showed improvement in their condition in both groups, especially those who had initially presented with acute abdominal pain (Table 4). Medical management was initiated in 7 (4.1%) patients with acute and 22 (13%) patients with chronic abdominal pain (for TB or lymphoma, etc.). A small percentage of patients reported a persistence of their symptoms (2.3% in the acute pain group at 10 days, none thereafter and 5.9%, 2.9% at 10 days, 1 and 3 months respectively in the chronic pain group). This does not include the undiagnosed group. A majority of patients in the acute group (35.1%) underwent DL within 6 to 12 hours of presentation. However, in the chronic group, most DL were carried out in the 12 to 24 hours window (35.7%).

DISCUSSION

Nonspecific abdominal pain is a significant problem in general surgery and accounts for an estimated 13 to 40% of emergency surgical admissions for abdominal pain.^{6,7} Studies have, however, doubted the effectivity of extensive investigations^{8,9} and several authors have documented the utility of DL in the evaluation and management of such patients.¹⁰⁻¹² Sarfati et al¹³ in his review of 203 appendectomies concluded that adjuvant testing was not helpful and showed that outcomes were improved by early

Table 1: Age and sex distribution of patients

n = 168		Number	Percent
Sex	Male	45	26.7
	Female	123	73.2
Age	< 15 yrs	12	7.14
	16-30 yrs	120	71.4
	31-45 yrs	21	12.5
	>45 yrs	15	8.92

Table 2: Presentation and clinical outcomes

Mode of presentation (n = 168)			Time lapse between presentation and surgery (n = 168)			Hospital stay duration (n = 168)		
	Number	Percent	Time (hrs)	Number	Percent	Days	Number	Percent
Acute	81	48.2	<6	10	5.9	2	20	11.9
			6-12	59	35.1	2-4	55	32.7
			>12	12	7.14	>4	6	3.57
Chronic	87	51.7	<12	17	10.1	2	11	6.5
			12-24	60	35.7	2-4	60	35.7
			24-32	10	5.9	>4	16	9.52

surgical intervention. Also in a developing country like ours where advanced radiological investigations are beyond the scope of grass root level medical practice (often not readily available and costly) this approach only serves to increase cost and delay treatment. Diagnostic laparoscopy should, thus, be considered as step II of the management.¹⁴

We were able to identify a pathology in 161/168 patients. Hence, our study reports a diagnostic yield of 95.8% for which is in accordance with other similar reports of high definitive diagnostic rates (between 86 and 100%)¹⁵⁻¹⁸ for early DL Salky, in his study was able to identify pathology in 69 of 70 patients.¹⁹ Sugerbaker et al gave a diagnostic accuracy of 96% and completion time of 20 minutes for DL. The major pathologies diagnosed in our study were acute appendicitis (39.2%), gynecological pathology (16%) and abdominal tuberculosis (8.9%) respectively. Acute appendicitis and gynecological pathology were also the main findings in Salky's series, whereas in an Indian study by Arya PK and associates abdominal

and pelvic tuberculosis were the main pathologic findings followed by appendicitis.²⁰ This was also reported by A Gupta et al who gave a diagnostic accuracy of 92%¹⁵ where abdominal tuberculosis and gynecological pathology were the most common diagnoses. This only serves to confirm the increased prevalence of tuberculosis in the subcontinent. Easter et al,²¹ however, reported a high incidence (47%) of postoperative adhesions; adhesiolysis was done at the same sitting. No case of adhesions was reported in our study which is probably due to meticulous preoperative exclusion of cases with history of abdominal surgery.

Laparoscopy is very sensitive for the diagnosis of appendicitis whether acute or chronic; it not only detects appendicitis but also avoids negative appendectomies.²² An early DL in suspected acute appendicitis reduces the risk of appendiceal perforation, improves diagnostic accuracy and reduces the number of negative laparotomies. It is especially useful in morbidly obese patients where large incisions are required for removing appendix and

Table 3: Presentation as related to diagnoses and their histopathologic outcomes

Acute (n = 81)		Chronic (n = 87)		Presentation (n = 168)			Histologic diagnosis		
Number	Percent	Number	Percent	Diagnosis per DL	Number	Percent	Number	Percent	
10	5.9	28	16.6	None	38	22.6	28/38 cases of appendicitis	73.6	
48	28.5	18	10.7	Acute appendicitis	66	39.2	64/66	96.9	
6	3.5	21	12.5	Ovarian cysts	27	16	Benign	17 63	
							Endometriosis	10 37	
3	1.8	12	7.1	Abdominal tuberculosis	15	8.9	15/15	100	
3	1.8	0	0	Acute appendicitis + ovarian cysts	3	1.8	3	100	
0	0	1	0.6	Hydatid cyst	1	0.6	1	100	
0	0	11	6.5	Biopsy +/- fluid for analysis	11	n/a	Cirrhosis	3 27	
							Hepatoma	3 27	
							Lymphoma	5 45	
0	0	7	4.1	None	0	0	n	n n	

Table 4: Patient progress at follow-up visits

Presentation (n = 168)	Progress	10 Days		1 Month		3 Months	
		Number	Percent	Number	Percent	Number	Percent
Acute (n = 81)	Improved	68	40.4	74	44	70	41.6
	Persistent symptoms	4	2.3	0	0	0	0
	Medical management	7	4.1	5	2.9	1	0.6
	Readmission	2	1.2	0	0	0	0
	Total	81		79		71	
Chronic (n = 87)	Improved	45	26.7	50	29.7	47	27.9
	Persistent symptoms	10	5.9	5	2.9	5	2.9
	Medical management	22	13	23	13.7	20	11.9
	Readmission	0	0	1	0.6	0	0
	Total	77		79		72	
		10 lost, 158 seen		158 seen		Further 15 lost, 143 seen	

chances of wound infection are high. In our study, 92/104 appendix specimen showed inflammatory changes per histopathology (88.4%) although 38 of these were found to be normal macroscopically. Many authors favor the opinion that a normal appendix should be left *in situ*.²³ Twenty-eight out of 38 apparently normal appendix specimens showed inflammatory changes on histopathology in our study (73.6%) and thus, it proves that carrying out an appendectomy is advantageous in cases of negative laparoscopies.

The second most common finding in our study was gynecological pathology and it was possible to deal with all cases at the same setting showing the usefulness of DL in diagnosing and treating gynecological pathologies.²⁴ Ovarian cysts were a common finding in our study at 16%. Literature reports reiterate that any ovarian cysts found during laparoscopy can be treated laparoscopically²⁵ and in a cases of ovarian torsion, laparoscopic surgery may even be superior to open²⁶ and suitable even in pregnancy. Endometriomas were also encountered and were dealt with effectively. However, diagnosing endometriosis during laparoscopy can be difficult and is dependent on the surgeon's level of experience as its appearance can vary widely.^{27,28}

In our study, 15 cases of suspected abdominal tuberculosis were biopsied and all were later proved by histopathology. The main finding was peritoneal +/- visceral tubercles in these cases. A further 11 patients had nonspecific findings (Table 3). Suspicious lesions were biopsied and free peritoneal fluid also aspirated. A histopathologic diagnosis was established in these cases and expert management instituted later on (3 cases of cirrhosis, 3 hepatoma and 5 lymphomas). Hence, these patients were saved from unnecessary laparotomies for nonresectable/nonsurgical pathologies.²⁹ Also DL safely provides adequate tissue for full Histologic evaluation allowing a change in the management of such patients.

We excluded trauma patients from our study as carrying out an immediate DL usually proves difficult due to non-availability of technical expertise at all times but DL has a role in trauma patients as well provided the patient is stable hemodynamically. It has been documented by two randomized studies.^{30,31} However, this is an evolving field.

Mean hospital stay in our study was low as reported by other studies as well.³² Follow-up of our patients showed an improvement in the symptoms in a majority of cases with very interventions needed post-laparoscopy. Chronic cases of abdominal pain also showed an improvement in their symptoms although 4.1% (n = 7) cases remained undiagnosed.

CONCLUSION

Diagnostic laparoscopy is a safe minimally invasive diagnostic cum therapeutic tool which has a high efficacy in diagnosing and managing acute and chronic abdominal conditions. It reduces morbidity, allows diagnosis and treatment in the same setting in a majority of instances, decreases hospital length of stay, decreases the cost of investigations and also the overall cost of treatment and has a degree of positive psychological impact on patients suffering from NSAP of chronic nature. Hence, it can be safely said that diagnostic laparoscopy is a safe and effective alternative to diagnostic laparotomy. There is need to make this modality readily available to the general population especially those in the lesser developed parts of the world.

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