

Role of Diagnostic Laparoscopy in Non-Specific Abdominal Pain (NSAP)

NIHAR U CHANDAK¹, SHREYA N CHANDAK², SATISH D DESHMUKH³, RAJIV K SONARKAR⁴, AMOL M LAHOTI⁵, ANKITA A LAHOTI⁶

ABSTRACT

Introduction: Non-Specific Abdominal Pain (NSAP) is defined as pain in abdomen with uncertain diagnosis after physical examination and baseline investigations which include routine hematological and imaging tests. The traditional three step approach to abdominal pain of non-specific nature including history and clinical examination, various investigations and 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. Laparoscopy has become an emerging diagnostic as well as therapeutic tool in management of NSAP.

Aim: To evaluate the role of laparoscopy as a diagnostic and therapeutic tool investigating its effectiveness in patients with NSAP and find out the cause for it in Central India as there is scarcity of data in Indian scenario.

Materials and Methods: A total of 45 patients were enrolled in this study for a duration of 2 years starting from September 2014 to September 2016. It was a Tertiary Care Hospital

based longitudinal study. The mean age of the patients was 32.53±11.7 years with female preponderance. On laparoscopic examination, maximum patients were found to have some appendicular pathology with other common diagnoses being Koch's abdomen and ovarian cyst.

Results: Out of 45 cases, 36 were accurately diagnosed by laparoscopy with sensitivity of 90%, specificity of 80% and accuracy of 88.9%. No definitive cause of pain could be established in 4 patients in laparoscopy or histopathological diagnosis. No laparoscopic pathologies were found in total 8 patients, out of which prophylactic appendectomies were done in 5 patients and histopathologically confirmed to be appendicitis in 4 patients.

Conclusion: Diagnostic laparoscopy is helpful in confirming a diagnosis made on clinical grounds and radiological evaluation. It is a good tool for diagnosis and therapeutic surgery. For undiagnosed recurrent vague abdominal pain with no specific etiology, diagnostic laparoscopy may be considered as first line operative investigation. By establishing definitive diagnosis, definitive treatment can be initiated early thus reducing patient's suffering.

Keywords: Appendicitis, Minimally invasive, Ovarian cyst

INTRODUCTION

In surgical practice, lower abdominal pain has remained a major problem to diagnose in spite of frequent routine examination and all major investigations. Most of the patients undergo appendectomy, some receive anti-tubercular therapy especially in India while females are eventually put on anti-androgens. Most of them are labelled functional. NSAP remains as a frustrating experience for the patient and a diagnostic challenge for the general surgeon. NSAP is defined as pain in abdomen with uncertain diagnosis after physical examination and baseline investigations which includes routine haematological and imaging tests [1-6]. On the basis of duration, pain is broadly classified as

- Acute - lasting for less than 1 month
- Sub acute - lasting for 1 month to 3 months
- Chronic - lasting for more than 3 months [7].

Laparoscopy has become an emerging diagnostic as well as therapeutic tool in management of non-specific abdominal pain [8]. 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 co-existing conditions, low patient morbidity, reduced hospital stay and expenditure [9].

Diagnostic laparoscopy has 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. It also has a major role in establishing diagnosis and allowing therapeutic intervention where needed [9].

MATERIALS AND METHODS

It was a Tertiary Care Hospital based longitudinal study approved by IEC (Institute of Ethical Committee). A total of 45 patients were enrolled in this study conducted at NKP Salve Institute of Medical Sciences and Lata Mangeshkar Hospital, Nagpur, India at Department of Surgery for duration of 2 years started from September 2014 till September 2016. Informed consent of the patients were taken.

Detailed history was taken from the patients and a thorough clinical and physical examination was done. All cases with pain in abdomen were further subjected to baseline investigation. Baseline investigations included a full blood count, blood urea, serum amylase, serum bilirubin, serum electrolytes, urinalysis, pregnancy test, abdominal radiograph and abdominal ultrasound.

All patients of age group between 18 years to 60 years with pain in abdomen with inconclusive diagnosis after physical examination and initial baseline investigations were included in this study.

Exclusion Criterias were as follows:

- Criteria adopted for Specific diagnosis excluding NSAP [10] [Table/Fig-1].
- Patients with history of abdominal trauma (blunt or penetrating injuries).
- Patients not consenting for investigations or laparoscopy.
- Patient not fit for anaesthesia.

Diagnoses	Criteria
Acute appendicitis	Pain and positive Blumberg sign in right iliac abdomen, T> 38°C, WBC>10,000
Inflammatory bowel disease	Previous diagnosis or US evidence
Ectopic pregnancy	US evidence or positive pregnancy test
Salpingitis	US evidence of collection or salpingeal empyema with clinical evidence
Endometriosis	Previous diagnosis or US evidence of non-homogeneous cysts
Urinary infection, renal colic	Blood or leukocytes at urinalysis or US or radiologic evidence of renal stones or dilatation of urinary tract
Ovarian cyst, uterine fibroma	Were excluded from the study patient with cyst or fibroma >5 cm at US
IUD	Were excluded from the study only patients with IUD and vaginal loss suggestive for endometritis

[Table/Fig-1]: Criteria adopted for Specific Diagnoses excluding NSAP [10].
T: indicates body temperature; WBC: White blood cell; US: Ultrasound; IUD: Intrauterine devices

Pneumoperitoneum of 8 to 10 mmHg with CO₂ insufflation was created using trans-umbilical insertion of the Veress needle. A 30 degree Stryker telescope was employed in umbilical 10 mm port. Abdomen was inspected using three-port approach. Any pathology or free fluid in the abdomen was noted. In order to improve the visualisation of organs, adhesiolysis was performed in some patients. Therapeutic intervention was done wherever indicated. Appendectomy was performed when no abnormality was identified at laparoscopy on the basis that, symptomatic appendicitis is not always evident at macroscopic examination [11].

Patient follow-up was done at the interval of 1 month and 6 months and complications, if any, were noted.

STATISTICAL ANALYSIS

Collected data is presented with the help of mean and standard deviation. Results were graphically represented where deemed necessary. Appropriate statistical software, including but not restricted to MS Excel, SPSS ver. 20 EPI Info Software was used. Graphical representation was done in MS Excel 2016.

Analytical Statistics

The following test of significance were applied-

- Sensitivity test

= True Positive / (True Positive + False Negative)

- Specificity test

= True Negative / (True Negative + False Positive)

- Positive Predictive Value (PPV)

= True Positive / (True Positive + False Positive)

- Negative Predictive Value (NPV)

= True Negative / (True Negative + False Negative)

RESULTS

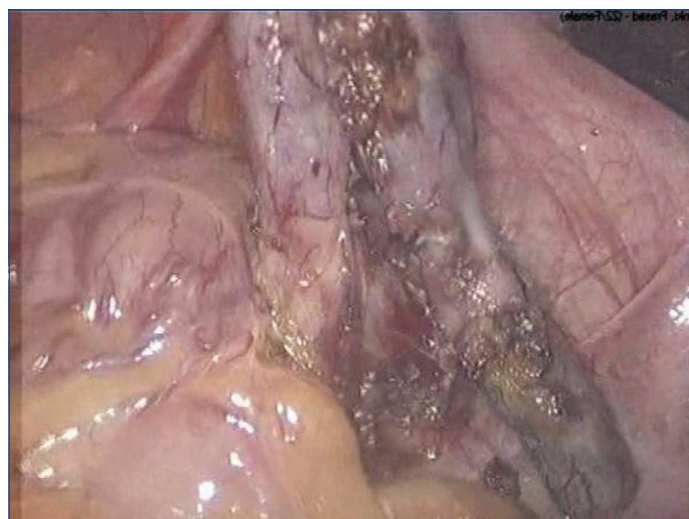
The mean age of the patients was 32.53 ± 11.7 years and range of patients was from 18 years to 60 years. Maximum number of patients (35.5%) were in the age group of 21-30 years. Maximum patients were female that accounted for 62.2% cases while rest 17 (37.8%) patients were male showing female preponderance. The male to female ratio was 1:1.64. Maximum number of patients, 15 (33%), had pain in abdomen for less than 1 week while 24.5% patients had abdominal pain for more than 3 months. Maximum no. of the patients (82.2%) had pain in right iliac fossa alone or in combination with another quadrant.

On ultrasonography, no abnormality was detected in 31 patients (68.9%). Probe tenderness in right iliac fossa was seen in 5 patients (11.1%). Free fluid in abdomen was seen in 3 patients (6.8%).

On laparoscopic examination [Table/Fig-2] maximum patients were found to have some appendicular pathology. Twenty six patients (57.8%) had elongated and inflamed appendix [Table/Fig-3]. 2 patients (4.4%) had appendicular lump and one patient (2.2%) had appendicular perforation. Appendix was seen normal in 16 patients (35.6%) out of which, 8 patients were found to have some other pathologies. Out of remaining 8 patients, prophylactic appendectomy was done in 5 patients where appendicitis was suspected clinically but had normal appendix on gross laparoscopic examination. In rest 3 patients no pathologies were found and were declared inconclusive in spite of laparoscopy done.

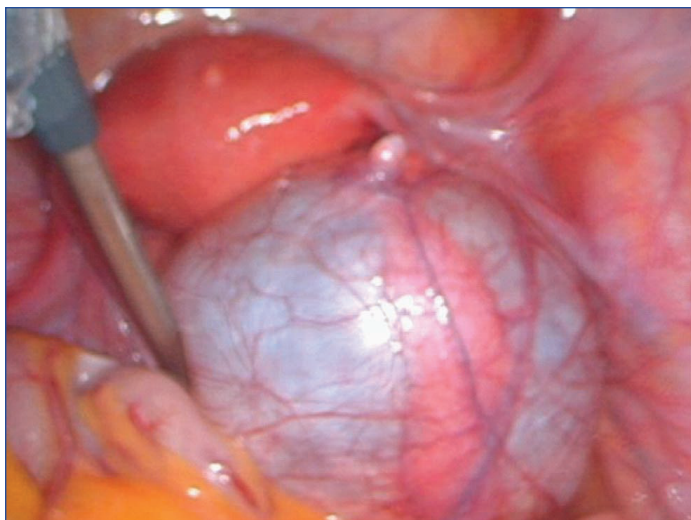
Laparoscopic findings	No of Patients	%
Free Fluid	14	31.1
Appendix		
Inflamed/ elongated appendix [Table/Fig-3]	26	57.8
Perforated appendix	1	2.2
Appendicular Lump	2	4.4
Normal	16	35.6
Adhesions	13	28.9
Others		
Adhesions of adnexa with collection of chocolate coloured fluid	1	2.2
Inflamed Right fallopian tube with collection s/o salpingitis, 2 x 1 cm mesenteric cyst in LIF	1	2.2
Thickened ileum along with e/o tubercles with B/L ovarian cyst	1	2.2
Thickened omentum with ascitis with peritoneal deposits	1	2.2
Cirrhotic liver	1	2.2
Right Ovarian cyst [Table/Fig-4]	3	6.7
Conglomeration on distal part of ileum	1	2.2
Left ovarian cyst	1	2.2
GB perforation with purulent collection	1	2.2
Abdominal Lymphadenopathy	3	6.7
Large cyst in Right Liver lobe with approx. 400 mL pus drained	1	2.2

[Table/Fig-2]: Laparoscopy findings of patients.



[Table/Fig-3]: Image showing an inflamed appendix.

In total 12 patients (28.9%) [Table/Fig-5] laparoscopy was done but required further evaluation for definitive diagnosis. Out of it, in 5 patients prophylactic appendectomy was done mainly in patients who presented with RIF or Right lumbar pain but macroscopically normal appendix. Out of 5, 4 patients were confirmed to have appendicitis histopathologically while 1 patient did not show the picture of appendicitis on histopathological evaluation. In 3 patients, there were no any laparoscopic findings to label for any pathology and were considered inconclusive. Hence, definitive diagnosis could not be done in total of 4 patients with diagnostic laparoscopy done,



[Table/Fig-4]: Image showing right ovarian cyst.

Further Evaluations Done	No. of Patients
Prophylactic appendectomy	5
Inconclusive	3
Lymph node biopsy	2
Omental biopsy	1
Biopsy from tubercle	1
Total	12

[Table/Fig-5]: Patients requiring further diagnostic evaluation after diagnostic laparoscopy.

3 inconclusive and 1 with normal appendix on histopathology. 2 lymph node biopsies, 1 omental biopsy and 1 biopsy from tubercle required further histopathological confirmation to make a definitive diagnosis.

Thirty six cases were accurately diagnosed by laparoscopy (True Positive) with sensitivity of 90%, specificity of 80% and accuracy of 88.9%. No definitive cause of pain could be established in 4 patients in laparoscopic or histopathological diagnosis (True Negative). No laparoscopic pathologies were found in total 8 patients, out of which prophylactic appendectomies were done in 5 patients and histopathologically confirmed to be appendicitis in 4 patients (False Negative) [Table/Fig-6].

		Histopathological Diagnosis		Total
		Present	Absent	
Laparoscopic findings	Present	36	1	37
	Absent	4	4	8
Total		40	5	45

[Table/Fig-6]: Correlation between laparoscopy and histo-pathological findings.

Hence, after diagnostic laparoscopy and histo-pathological correlation, clinical diagnoses could be established in total 41 out of 45 cases of pain in abdomen [Table/Fig-7]. Diagnoses could not be made in 4 patients with pain in abdomen.

DISCUSSION

Diagnostic laparoscopy can be used to reach the diagnosis in many disease processes. Along with biopsy, inclusion of diagnostic laparoscopy may improve the management of NSAPs. It helps in providing early diagnosis, immediate access to treatment, reduced hospital stays and readmission rates and eventually having financial benefits [12]. Therefore, it is safe and effective tool in establishing the etiology and thus providing appropriate interventions [13].

Thirty six cases were accurately diagnosed by laparoscopy which was confirmed histopathologically. No definitive cause of pain could be established in 4 patients in laparoscopy or histopathological diagnosis. No laparoscopic pathologies were found in total 8

Diagnosis	N	%
Appendicitis	25	55.6%
Appendicitis with Ovarian cyst	4	8.9%
Appendicular Lump	2	4.5%
Koch's Abdomen	2	4.5%
Appendicular perforation	1	2.2%
Appendicitis with salpingitis with Mesenteric Cyst	1	2.2%
Koch's Abdomen with Liver Cirrhosis	1	2.2%
Endometriosis	1	2.2%
Ca Right ovary	1	2.2%
Secondaries in abdomen	1	2.2%
Sealed off GB perforation	1	2.2%
Liver Abscess	1	2.2%
No diagnosis	4	8.9%
Total	45	100%

[Table/Fig-7]: Clinical diagnosis of patients.

patients, out of which prophylactic appendectomies were done in 5 patients and histopathologically confirmed to be appendicitis in 4 patients. Thus, diagnostic laparoscopy had a diagnostic accuracy of 88.9% with sensitivity of 90% and specificity of 80%. The positive predictive value came out to be 97.3% while negative predictive value of 50%. This is in agreement to the findings of Ahmad MM et al., Ou CS and Rowbotham R, and Rubbia A et al., [14-16]. All laparoscopic findings were confirmed by histopathology in the study conducted by Ahmad MM et al., [14]. Early laparoscopy also has the advantage of the availability of many therapeutic options [17].

The records of 77 women who were treated for non-traumatic acute abdomen were reviewed by Ou CS and Rowbotham R, with the objectives to determine the effectiveness of diagnostic laparoscopy for non-traumatic acute abdomen and the percentage of cases managed using laparoscopic technique exclusively [15]. Amongst the 77 cases included in the study, with the mean age of 36.5 (range 12-65) years, laparoscopy provided a definitive diagnosis in 76 cases. About 92% of these women were premenopausal. Laparoscopic therapeutic intervention was done in 95% of the patients (72 of 76). The authors noted that a high proportion of women presenting with acute abdominal pain can be managed using a laparoscopic technique exclusively.

The study of Rubbia A et al., in the year 2015 reported that laparoscopy was done in 161 patients gave a diagnostic yield of 95.8% [16]. According to this study, in undiagnosed abdominal pain of both acute and chronic nature, early diagnostic laparoscopy can be used as a safe procedure with high efficacy and hence, it is an effective investigative tool.

LIMITATIONS

In this study, all the patients had to undergo anaesthesia thus leading to inadvertent associated risks. Diagnosis with laparoscopy could not be established in 4 patients with pain in abdomen. Extraperitoneal (e.g. retroperitoneal) pathologies like pancreatitis, causing pain in abdomen, are relatively difficult to diagnose with diagnostic laparoscopy.

CONCLUSION

Diagnostic Laparoscopy is helpful in confirming a diagnosis made on clinical grounds and radiological evaluation. It is a good tool for diagnosis and therapeutic surgery. For undiagnosed recurrent vague abdominal pain with no specific etiology, diagnostic laparoscopy may be considered as first line operative investigation. By establishing definitive diagnosis, definitive treatment can be initiated early thus reducing patient's suffering.

REFERENCES

- [1] De Dombal FT, Leaper DJ, Staniland JR, McCann AP, Horrocks JC. Computer-aided diagnosis of acute abdominal pain. *British Medical Journal*. 1972;2(5804):09-13.
- [2] Sanders DS, Azmy IA, Hurlstone DP. A new insight into non-[2] specific abdominal pain. *The Annals of The Royal College of Surgeons of England*. 2006;88(2):92-94.
- [3] De Dombal FT. Acute abdominal pain – an OGME survey. *Scand J Gastroenterol*. 1979;14(Suppl):29-43.
- [4] Domínguez LC, Sanabria A, Vega V, Osorio C. Early laparoscopy for the evaluation of nonspecific abdominal pain: a critical appraisal of the evidence. *Surg Endosc*. 2011;25(1):10-18.
- [5] MacKay G, Molloy R, O'Dwyer P, editors. *Landmark Papers in General Surgery*. OUP Oxford; 2013 Feb 14.
- [6] Morino M, Pellegrino L, Castagna E, Farinella E, Mao P. Acute nonspecific abdominal pain: a randomized, controlled trial comparing early laparoscopy vs clinical management. *Ann Surg*. 2006;244(6):881-88.
- [7] Thienhaus O, Cole BE. Classification of pain. In: Weiner R. *Pain management: a practical guide for clinicians*. Boca Raton: CRC Press; 2002. ISBN 0-8493-0926-3. p. 28.
- [8] Howard FM. The role of laparoscopy in the chronic pelvic pain patient. *Clinical Obstetrics and Gynecology*. 2003;46(4):749-66.
- [9] Mishra RK. *Textbook of practical laparoscopic surgery*. JP Medical Ltd; 2013 Feb 28.
- [10] Morino M, Famiglietti F. Nonspecific Abdominal Pain. In *The Role of Laparoscopy in Emergency Abdominal Surgery*. 2012 (pp. 153-161). Springer Milan.
- [11] Shah SM, Mushtaq A, Dar HM, Qadir W. Laparoscopic evaluation of nonspecific abdominal pain in females. *Medicine Science*. 2015;4(4).
- [12] Paaianen H, Julkunen K, Waris H. Laparoscopy in chronic abdominal pain. A prospective non randomized long-term follow-up study. *J Clin Gastroenterol*. 2005;39:110-14.
- [13] Onders RP, Mittendorf EA. Utility of laparoscopy in chronic abdominal pain. *Surgery* 2003;134:549-52.
- [14] Ahmad MM, Dar HM, Waseem M, Nazir I, Jeelani A. Role of laparoscopy in nonspecific abdominal pain. *Saudi Surgical Journal*. 2014;2(3):71.
- [15] Ou CS, Rowbotham R. Laparoscopic diagnosis and treatment of non traumatic acute abdominal pain in women. *J Laparoendosc Adv Surg Tech A*. 2000;10:41-45.
- [16] Rubbia A, Faryal GA, Javeria I, Roohul M. Role of diagnostic laparoscopy in patients with acute or chronic nonspecific abdominal pain. *World J Laparosc Surg*. 2015; 8(1):7-12.
- [17] Salky BA, Edey MB. The role of laparoscopy in the diagnosis and treatment of abdominal pain syndromes. *Surg Endosc*. 1998;12:911-14.

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor Department of Surgery, J. J. Group of Hospitals, Mumbai, India.
2. Senior Resident, Department of Obstetrics and Gynaecology, M.G.M Medical College, Navi Mumbai, India.
3. Associate Professor, Department of Surgery, N.K.P Salve Institute of Medical Sciences, Nagpur, India.
4. Associate Professor, Department of Surgery, N. K. P Salve Institute Of Medical Sciences, Nagpur, India.
5. Senior Resident, Department of Radiology, L.T.M.C and Sion Hospital, Mumbai, India.
6. Senior Resident, Department of Ophthalmology, Laxmi Eye Institute, Panvel, N. K. P. Salve Institute of Medical Sciences and Lata Mangeshkar Hospital, Nagpur, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Nihar U Chandak,
B-906, Ravechi Heights, Besides Hotel Royal Tulip,
Sector 7, Kharghar, Navi Mumbai-410210, India.
E-mail: niharchandak@gmail.com

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