

ROLE OF LAPAROSCOPY IN PERFORATION PERITONITIS

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ABSTRACT

BACKGROUND

Laparoscopy has become the preferred surgical approach to different diseases as it allows diagnosis and treatment at the same time. We wanted to evaluate the role of diagnostic & therapeutic laparoscopic surgery in patients of perforation peritonitis and their outcome.

METHODS

This was an observational study done over a period of one and half years from January 2017 to June 2018. All patients diagnosed with perforation peritonitis and those who were stable haemodynamically were included in this study.

RESULTS

94 cases of perforation peritonitis underwent diagnostic and therapeutic laparoscopy. Mean age of patients was 41.62 years. Most common cause was appendicular perforation. 7 patients were diagnosed to have gastroduodenal perforation. Out of 20 patients of small bowel perforation, 7 (35%) were managed laparoscopically, while in 13 (65%), we needed conversion. Out of 26 cases of GB perforation, 24 cases (92.3%) were completed laparoscopically. All cases of sigmoid perforation were managed laparoscopically. Two patients died post operatively and 10 (10.6%) patients had post-operative intra-abdominal collections. 12 (12.8%) patients developed surgical site infection.

CONCLUSIONS

Laparoscopic management is feasible, safe and effective surgical option for patients with perforation peritonitis in properly selected cases with high diagnostic yield, early start of enteral feed and fast postoperative recovery.

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BACKGROUND

Perforation peritonitis is one of the commonest surgical emergencies. Perforation of a hollow viscus may be the result of various causes like structural diseases (e.g. ulcer or cancer), iatrogenic complication during a procedure (e.g. endoscopy), or from a penetrating/blunt trauma.^[1] Clinical symptoms predominantly consist of diffuse abdominal pain but may also include features of nausea and vomiting, ileus, sepsis, and shock. Time of presentation to hospital for definitive management is an important factor for the morbidity associated with these patients. It has been well-reported that majority of patients of perforation peritonitis presents late, usually with well-established generalized peritonitis with purulent or faecal contamination and septicaemia.^[2] The aim remains to obtain some level of physiological stability at the earliest and then plan for definitive surgical intervention either laparoscopy or laparotomy.

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Surgical intervention may include resection of a perforated viscus with re anastomosis or the creation of a controlled fistula. The increased acceptance of laparoscopy due to its proven benefits of less pain, shorter hospitalization and decreased morbidity^[3-6] has encouraged surgeons to use it where it was previously considered a relative contraindication. The laparoscopic approach to patients with acute peritonitis and perforated viscus offers several advantages, including decreased postoperative analgesic requirements, quicker resumption of oral intake, shorter hospital stay, and quicker return to work. Performing a routine laparoscopy as the initial step in treating patients with a suspected perforated viscus has the advantage of identifying an occasionally unexpected pathology. If a favourable intra-abdominal pathology is found in a favourable location, it may be repaired laparoscopically; otherwise, the laparoscopic procedure has to be converted to an open laparotomy but still has the benefit of allowing a more selective and shorter laparotomy incision. We conducted a prospective analysis on outcome of laparoscopic surgery in perforation peritonitis performed in our department of surgery at Dayanand Medical College and Hospital, Ludhiana.

Aims and Objectives

The present study was done to evaluate the role of diagnostic & therapeutic laparoscopic surgery in patients of perforation peritonitis and their outcome.

METHODS

This was an observational study over a period of one and half years from Jan 2017 to June 2018 conducted in the department of surgery, Dayanand Medical College and Hospital, Ludhiana.

Volume resuscitation and the prevention of secondary organ system dysfunction were of the utmost importance in the treatment of patients with perforation peritonitis. Foley catheter was placed to monitor urine output. Invasive hemodynamic monitoring was done in severely ill patients to guide volume resuscitation and inotropic support. Serum electrolyte disturbances and coagulation abnormalities were corrected to the extent possible before any intervention.

Empiric, broad-spectrum, systemic antibiotic therapy was initiated as soon as the diagnosis of perforation peritonitis was suspected, and therapy was subsequently tailored according to the culture results.

Patients with perforation peritonitis having severe abdominal pain, nausea, vomiting, so adequate analgesia and nasogastric decompression was instituted as soon as possible.

In patients with evidence of septic shock or altered mental status, intubation and ventilator support was considered at an early stage to prevent further decompensation.

Informed consent included the need for conversion to open surgery, potential need for several reoperations and enteric diversion, discussing significant morbidities associated with perforation peritonitis when telling these issues to the patient or the family.

Source of Data

All Patients who were admitted to Dayanand Medical College and Hospital, Ludhiana and diagnosed to have perforation peritonitis who underwent laparoscopy and proceed were included in the study. Sample size was taken based on the convenience of the study.

Inclusion Criteria

Patients presenting to Dayanand Medical College and Hospital, Ludhiana, and diagnosed to have peritonitis secondary to -

- Stomach perforation.
- Appendicular perforation.
- Gall bladder perforation.
- Small bowel perforation.
- Large bowel perforation.

Exclusion Criteria

- > 70 years age.
- Cardiac failure.
- Respiratory failure.

Methods of Collection

- All patients presenting to Dayanand Medical College Hospital, Ludhiana and diagnosed to have perforation peritonitis who underwent laparoscopy and proceed were included in the study.
- The inclusion and exclusion criteria were applied to these patients.

- Written informed consent were taken from all the patients and only the consenting patients were included in the study.
- Routine investigations were done for all these patients such as Haemogram, RFT, LFT, Amylase, Lipase, X-ray chest and abdomen, Ultrasound abdomen and CECT Abdomen (If needed)
- These patients underwent laparoscopy – diagnostic or therapeutic.
- Intra-operative findings along with surgical procedure performed were noted.
- Postoperative regular monitoring was done for these patients- maintaining vitals charts, lab investigations and imaging (if needed) during their hospital stay.
- Duration of hospital stay, length of ICU stay, complications if any and condition at discharge was documented.

Number of Cases

Patients diagnosed with perforation peritonitis who underwent laparoscopy and proceed during time period from Jan 2017 to June 2018.

Outcome

To know the outcome in patients diagnosed as a case of perforation peritonitis who underwent diagnostic and therapeutic laparoscopic procedures in terms of -

- Start of enteric feed.
- Operative time.
- Hospital stay,
- Post-operative complications and their management.

Statistical Analysis

The data was described in terms of range; mean \pm standard deviation (\pm SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations were done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows

RESULTS

During the study period, 94 patients (67 males, 27 females) with mean age of 41.62 years (+/- 2). Were diagnosed as having perforation peritonitis who underwent diagnostic and therapeutic laparoscopy and proceed. Maximum patients were diagnosed as having appendicular perforation (35.1%), followed by gall bladder perforation. Out of small bowel perforations, maximum (13.8%) were found to be ileal perforations. Duodenal perforation constituted 7.4% of all the cases. Caecal perforation accounted for 3.2% of all perforations. 68 patients (72.3%) patients were diagnosed preoperatively to be a case of perforation peritonitis on the basis of radiological investigations (air under diaphragm, ultrasound and Computed tomography (CT) findings. In 27.7% diagnosis was made by laparoscopy. In our study only 27.7% of the cases needed conversion to the open surgery. 72.3% cases were completed laparoscopically. Out of 26 cases which required conversion to open surgery, most common cause for conversion was dense adhesions in approximately 57.7%. Only 1 case was converted to open due to large size of perforation. Multiple perforations were reported as a cause of conversion to open in 5 cases (19.2%).

11.5% of cases were converted to open due to gross contamination. In 2 (7.7%), large resection of bowel was done after converting it to open surgery. Common post-operative complications encountered were post-operative ileus in 18.1%, intra-abdominal collections in 10.6% and surgical site infection in 12.8% of patients. Only 1 patient had burst abdomen for which secondary suturing was done. 1 patient had persistent loose stools due to continuous irritation by intra-abdominal drain, which was relieved after removal of drain.

DISCUSSION

Laparoscopic management has become the preferred modality for various surgical diseases due to the possibility of correctly diagnosing & treating them at the same time.^[3-5, 7-8]

In the present study, 94 patients underwent diagnostic & therapeutic laparoscopy. Mean age of patients in our study was 41.62 years, which was slightly lower than the mean age of 46.5 years as per study conducted by Ahmed Khan Sangrasi.^[9] In our study, 71.3% cases constitute the males and 28.7% females. Appendicular perforation was most common cause of peritonitis in our study which is in consistent with study conducted by Dr. H. L. Leuva.^[10] Gall bladder perforation was 2nd most common perforation in our study group followed by small bowel perforation. Out of 94 cases, 13.8% were diagnosed as a case of ileal perforation compared to 15.2% cases diagnosed to be ileal perforations in a similar study by Ahmed Khan Sangrasi et al.^[9] Diagnostic accuracy of laparoscopic exploration is reported to be around 90 percent in study conducted by Navez et al.^[11,12] also as high as 98% as reported by Kirshtein.^[13] We obtained correct diagnosis in all the cases in our study group. Our diagnostic yield is better than as reported by Navez et al.^[14] Only 88% correct diagnosis were made by study conducted by Ahmed Khan Sangrasi et al.^[9] 72.3% of patients were diagnosed preoperatively on the basis of radiological investigations as compared to study by Lagoo S et al.^[12] in which 80-90% were diagnosed to be a case of perforation peritonitis on the basis of radiological investigations.

In our study successful laparoscopic surgery without conversion was done in 72.3%. In study by Sana et al.^[15], this rate was 88%, by Cueto J. et al.^[16], it was 87%, while in study conducted by Ates M et al.^[17], this rate was 85%. Our success rate is slightly lower than these because patients in our institute presented with more contamination due to late presentation.

Appendicular Perforation

Out of 33 cases of appendicular perforation, 5 patients (15.2%) with appendicular perforation required conversion to open surgery, which was consistent with 16% conversion rate in study by Sleem R et al.^[18] and slightly lower compared to 22% as per study conducted by Ahmed Khan Sangrasi.^[9] Similar conversion rate of 22.8% was found in study conducted by Ferdinando Agresta et al.^[19] Our conversion rates were lower than other due to high expertise in this surgery for uncomplicated appendicitis. All of the cases in which we needed conversion was due to dense adhesions. Morbidity and mortality in our study was 18.1% and zero % as compared to 6.2% and zero respectively in study

conducted by Ahmed Khan Sangrasi et al.^[9] versus 9% and 1% respectively by Navez B et al.^[14]

Gastroduodenal Perforation

Mean age of patients presenting with gastro-duodenal perforation in our study was 54.14 ± 14.4 yrs. which was slightly lower than the study conducted by Ferdinando Agresta et al.^[20] and was consistent with age of 59 years as in study conducted by Simone Guadagni et al.^[21] Laparoscopic repair was successful in 4 patients (57.1%) while in 3 patients (42.9%), laparoscopy was converted to midline laparotomy. 2 cases were converted due to gross contamination, 1 case was converted due to large size of the perforation. Ahmed Khan Sangrasi et al.^[9] conducted study where 16 patients were successfully completed by laparoscopic approach and conversion to open surgery was required in eight (33 percent) cases. Our conversion rates in this group were higher than other studies reported by Navez et al and Ferdinando et al which reported conversion rates of 4 and 12 percent respectively.^[19,14] Mean hospital stay in gastroduodenal perforation was 9.57 days in our study which was slightly lower than in study conducted by Ahmed Khan Sangrasi^[17] and Ferdinando Agresta et al.^[19] which was 12 days, and 11.3 days respectively and longer than studies conducted by Minutolo V et al.^[22] and Robertson GS et al.^[23] which shows mean hospital stay as 5.8 days and 5 days respectively.

Gall Bladder Perforation

In our study, 26 patients were diagnosed to have gall bladder perforation, most common site of perforation was found to be fundus (12 cases), and was more common in males (20 cases, 76.9%) as in other studies also in which males more commonly presented with gallbladder perforation.^[24] 24 cases (92.3%) were completed laparoscopically, 2 needed conversion to open approach, both needed conversion due to dense adhesions.

Small Bowel Perforation

Of the 20 patients, there were 12(60%) males and 8(40%) females, in comparison to study conducted by Jignesh Patel^[26] in which there's similar predominance of males (14, 70%) as compared to females (6, 30%). 13 patients out of 20 needed conversion to open laparotomy accounting for 65%. Out of 13 cases, 6 needed conversion due to dense adhesions, 1 due to gross contamination, 1 needed large resection and 5 patients had multiple perforations.

Mean operative time was 2.5 hrs., which in contrast is higher than study conducted by Jignesh Patel et al.^[25] in which mean operating time was 1.5 hrs. There was 1 mortality in our study 7 patients had surgical site infection. Average hospital stay was 13 days in comparison to study conducted by Sinha R et al.^[26] where it was 10 days & higher than in study by Jignesh Patel et al.^[25] where it was 6 days because of low conversion rates.

Colonic Perforations

3 cases of sigmoid colon perforations were reported. Mean age of presentation was 59.33 years. Mean duration of surgery was 2 hrs. Mean Hospital stay in our study was 9 ± 3.4 days in contrast to 7.2 ± 4.1 days as in study conducted by Ferdinando Agresta et al.^[19]

Diagnosis	No. of Cases	Percentage
Appendicular perforation	33	35.1%
Gall bladder perforation	26	27.7%
Small bowel perforation (ileum, jejunum)	20	21.2%
Gastro-duodenal perforation	7	7.4%
Caecal perforation	3	3.2%
Sigmoid perforation	3	3.2%
Meckel's diverticulum perforation	2	2.1%
Total	94	100.0%

Table 1. Site of Perforation

Organ Involved	Total No. of Patients	Managed Laparoscopically	Converted to Open Surgery
Appendix	33	28 (84.8%)	5 (15.2%)
Gastroduodenal	7	4 (57.1%)	3 (42.9%)
Gall bladder	26	24 (92.3%)	2 (7.7%)
Small bowel	20	7 (35%)	13 (65%)
Sigmoid	3	3 (100%)	0
Meckel's	2	1 (50%)	1 (50%)
Caecal	3	1 (33.3%)	2 (66.7%)
Total	94	68 (72.3%)	26 (27.1%)

Table 2. Managing Different Organ Perforations

Diagnosis		Total	Laparoscopy	Converted	
Appendicular	Complication	-	27	25	2
		Collection-percutaneous drainage	1	0	1
		Post-operative ileus	3	3	0
		Post-operative ileus, collection-single time aspiration	1	0	1
		Surgical site infection	1	0	1
Total		33	28	5	
Gastro-duodenal	Complication	-	4	4	0
		Collection-percutaneous drainage	2	0	2
		Post-operative ileus, surgical site infection	1	0	1
Total		7	4	3	
Gall bladder	Complication	-	20	18	2
		Post-operative ileus	3	3	0
		Post-operative ileus, collection-percutaneous drainage	2	2	0
		Post-operative ileus, collection-single time aspiration	1	1	0
Total		26	24	2	
Small bowel	Complication	-	8	3	5
		Post-operative ileus	4	2	2
		Post-operative ileus, collection-PCD	1	1	0
		Post-operative ileus, surgical site infection	2	1	1
		Post-operative ileus, surgical site infection, collection-percutaneous drainage	2	0	2
Surgical site infection	3	0	3		
Total		20	7	13	
Sigmoid	Complication	-	3	3	0
		-	0	0	0
Meckel's diverticulitis	Complication	-	2	1	1
		-	0	0	0
Caecal	Complication	-	1	0	1
		Post-operative ileus, surgical site infection	1	1	0
		Surgical site infection- burst abdomen	1	0	1
Total		3	1	2	

Table 3. Complications Related to Site of Perforation

In our study, 95.7% patients were discharged under satisfactory condition. 2.1% patients were discharged against medical advice. 2 out of 94 patients expired.

CONCLUSIONS

Laparoscopic management is feasible, safe and effective surgical option for patients with perforation peritonitis in properly selected cases, with higher diagnostic yield and a faster postoperative recovery. Laparoscopy offers adequate visualization of the entire abdomen and pelvic cavity in the diagnosis of acute abdomen secondary to perforation peritonitis. Conversion to open laparotomy should be considered as a rational decision and not as a complication of the laparoscopy. Laparoscopic closure of the perforation is technically demanding. It should be considered as a good choice in the presence of reasonable laparoscopic skills and experience. Laparoscopic surgery assures a faster GI recovery and allows for an earlier enteral feeding.

REFERENCES

- [1] Dorairajan LN, Gupta S, Deo SV, et al. Peritonitis in India--a decade's experience. *Trop Gastroenterol* 1995;16(1):33-8.
- [2] Tyagi A, Seelan S, Sethi AK, et al. Role of thoracic epidural block in improving post-operative outcome for septic patients: a preliminary report. *Eur J Anaesthesiol* 2011;28(4):291-7.
- [3] Agresta F, De Simone P, Bedin N. The laparoscopic approach in abdominal emergencies: a single-center 10-year experience. *JLS* 2004;8(1):25-30.
- [4] Agresta F, Piazza A, Michelet I, et al. Small bowel obstruction. Laparoscopic approach. *Surg Endosc* 2000;14(2):154-6.
- [5] Agresta F, Michelet I, Coluci G, et al. Emergency laparoscopy: a community hospital experience. *Surg Endosc* 2000;14(5):484-7.
- [6] Branicki FJ. Abdominal emergencies: diagnostic and therapeutic laparoscopy. *Surg Infect (Larchmt)* 2002;3(3):269-82.
- [7] Cuschieri A. Cost efficacy of laparoscopic vs open surgery. Hospitals vs community. *Surg Endosc* 1998;12(10):1197-8.
- [8] Lau WY, Fan ST, Yiu TF, et al. The clinical significance of routine histopathologic study of the resected appendix and safety of appendiceal inversion. *Surg Gynecol Obstet* 1986;162(3):256-8.
- [9] Sangrasi AK, Talpu KA, Kella N, et al. Role of laparoscopy in peritonitis. *Pak J Med Sci* 2013;29(4):1028-32.
- [10] Leuva HL, Kushwaha MR, Suvera M, et al. Role of laparoscopy in peritonitis. *NJIRM* 2014;5(2):54-5.
- [11] Nagy AG, James D. Diagnostic laparoscopy. *Am J Surg* 1989;157(5):490-3.
- [12] Lagoo S, McMahon RL, Kakihara M, et al. The sixth decision regarding perforated duodenal ulcer. *JLS* 2002;6(4):359-68.
- [13] Kirshtein B, Shapira A, Lantsberg L, et al. The use of laparoscopy in abdominal emergencies. *Surg Endosc* 2003;17(7):1118-24.
- [14] Navez B, d'Udekem Y, Cambier E, et al. Laparoscopy for management of nontraumatic acute abdomen. *World J Surg* 1995;19(3):382-6.
- [15] Sanna A, Adani GL, Anania G, et al. The role of laparoscopy in patients with suspected peritonitis: experience of a single institution. *J Laparoendosc Adv Surg Tech A* 2003;13(1):17-9.
- [16] Cueto J, Díaz O, Garteiz D, et al. The efficacy of laparoscopic surgery in the diagnosis and treatment of peritonitis. Experience with 107 cases in Mexico City. *Surg. Endosc* 1997;11(4):366-70.
- [17] Ates M, Coban S, Sevil S, et al. The efficacy of laparoscopic surgery in patients with peritonitis. *Surg Laparosc Endosc Percutan Tech* 2008;18(5):453-6.
- [18] Padankatti LR, Pramod RK, Gupta A, et al. Laparoscopic versus open appendectomy for complicated appendicitis: a prospective study. *J Indian Assoc Pediatr Surg* 2008;13(3):104-6.
- [19] Agresta F, Ciardo LF, Mazzarolo G, et al. Peritonitis: laparoscopic approach. *World Journal of Emergency Surgery* 2006;1:9.
- [20] Sleem R, Fisher S, Gestring M, et al. Perforated appendicitis: is early laparoscopic appendectomy appropriate? *Surgery* 2009;146(4):731-7.
- [21] Guadagni S, Cengeli I, Galatioto C, et al. Laparoscopic repair of perforated peptic ulcer: single-center results. *Surg Endosc* 2014;28(8):2302-8.
- [22] Minutolo V, Gagliano G, Rinzivillo C, et al. Laparoscopic surgical treatment of perforated duodenal ulcer. *Chir Ital* 2009;61(3):309-13.
- [23] Robertson GS, Wemyss-Holden SA, Maddern GJ. Laparoscopic repair of perforated peptic ulcers. The role of laparoscopy in generalised peritonitis. *Ann R Coll Surg Engl* 2000;82(1):6-10.
- [24] Sahbaz NA, Peker KD, Kabuli HA, et al. Single center experience in laparoscopic treatment of gallbladder perforation. *Wideochir Inne Tech Maloinwazyjne* 2017;12(4):372-7.
- [25] Patel G, Patel P. Laparoscopic approach for small-bowel perforation- early outcome for 20 patients. *Int Surg J* 2016;3(4):2191-5.
- [26] Sinha R, Sharma N, Joshi M. Laparoscopic repair of small bowel perforation. *JLS* 2005;9(4):399-402.