

Accuracy of Diagnostic Peritoneal Paracentesis in Acute Abdominal Condition Requiring Emergency Surgical Intervention

Shrikant Channadasar*, Shankar Lal J.**

*Assistant Professor **Senior Resident, Department of General Surgery, KIMS, Koppal.

Abstract

Introduction: Peritoneal paracentesis is a simple, accurate and bedside procedure. This requires an appropriate sized needle attached to a disposable syringe which is available everywhere. The basic principle is that in many cases of acute abdomen, there is collection of fluid in the peritoneal cavity.

Methodology: All patients who present with acute abdomen including blunt trauma to abdomen and post-operative cases are included for study and those who give consent for study. A total of 50 cases were studied during the period. *Results:* In the present study there were 46 positive taps, among them 35 cases were non-traumatic and 11 cases were traumatic. Out of 35 cases in nontraumatic group, 04 cases were gastric perforation, 20 duodenal perforation, 05 ileal perforation, 02 jejunal perforation, 01 caecal, 01 appendicular perforations, 01 transverse colon and 01 sigmoid colon perforation. Of the 11 cases in traumatic group 08 were due to solid organ injury, 02 gastric perforation and 01 jejunal perforation noted.

Conclusion: Diagnostic abdominal tap is extremely reasonable diagnostic aid

Keywords: Paracentesis; Acute Abdomen; Imaging Modalities.

Introduction

The term "acute abdomen" designates symptoms and signs of intra abdominal disease usually treated best by surgical operation. Many diseases of which,

some do not require surgical treatment produce abdominal pain, thus the evaluation of patient with acute abdominal pain must be methodical and careful. Proper management of the patients with acute pain abdomen requires a timely decision about the need for surgical intervention. This decision requires evaluation of the patient's history, physical findings, laboratory data and imaging tests [1, 2].

Most of the cases of acute abdomen can be diagnosed clinically by the presence or absence of abdominal pain, abdominal tenderness, guarding and rigidity. There should be a certain diagnostic modality which confirms the diagnosis and the surgeon should feel safe and accurate in deciding which patients require surgical intervention. Although imaging modalities like X-rays, USG, CT, MRI etc. are available and can diagnose accurately, these investigations are not available everywhere or not available for 24 hours, in developing countries like India. For these reasons there should be a diagnostic modality which is simple, accurate and available by the bedside. Peritoneal paracentesis is a simple, accurate and bedside procedure. This requires an appropriate sized needle attached to a disposable syringe which is available everywhere. The basic principle is that in many cases of acute abdomen, there is collection of fluid in the peritoneal cavity. Aspirating the fluid and analyzing it will aid in arriving at the diagnosis [3, 4].

The objections to the technique, most often raised had been on the grounds of safety. As the procedure is blind, there are chances of puncturing the bowel. But many clinical and experimental studies have proved beyond doubt that even if bowels are punctured by the needles, subsequent leakage is a very small hazard [5, 6].

In spite of numerous articles advocating the acceptance of this extremely useful diagnostic tool, some continue to deplore it and others have not had

Corresponding Author: Dr. Shrikant Channadasar, Assistant Professor, Department of General surgery, Koppal Institute of Medical Sciences, Hospet Road, Koppal- 583 231 Karnataka.

E-mail: vc.shrikant@gmail.com

sufficient experience in performing this procedure or do not understand the merits and limitations. The present study was undertaken to know the merits and demerits of peritoneal tapping in surgical acute abdomen.

Methodology

In this cross sectional study, all patients with inclusion criteria attending to department of surgery VIMS medical hospital Bellary from December 2010 to December 2011 is included

Study Subjects

Patients with inclusion criteria admitted/ attending to department of surgery are studied

Inclusion Criteria

All patients who present with acute abdomen including blunt trauma to abdomen and post-operative cases are included for study and those who give consent for study

Exclusion Criteria

- All pregnant patients
- All patients suspected of acute intestinal obstruction
- All patients with extensive abdominal scar
- All patients with acute non perforative biliary tract disease.
- All patients with renal or ureteric calculi.
- All patients with diagnosed coagulation disorders

A total of 50 cases were studied during the period. Patients were evaluated in the following ways.

1. Accurate history was taken with respect to the
 - Pain - Onset, type, site, progress, aggravating and relieving factors.
 - Vomiting

Distention of Abdomen

- Bowel and bladder disturbance
 - Menstrual disturbance.
2. Vital signs of the patient were recorded.
 3. Thorough clinical examination was done for the

evidence of abdominal tenderness, guarding, Rigidity, obliteration of liver dullness and peristaltic sounds.

Based on the history and clinical examination, provisional clinical diagnosis was made and routine investigations like CBC, Urine; routine and microscopy and minerals were done in all patients. Specific investigations like erect X-rays abdomen, USG abdomen and pelvis and CT was done depending on provisional diagnosis and their requirement.

Before the patient was subjected to the four quadrant peritoneal tap, erect X-ray abdomen was done, reasons being, the theoretical chances of air being either introduced into the peritoneal or sucked from the peritoneal cavity while performing the procedure.

Requirements of Paracentesis

Peritoneal paracentesis is a very simple bedside procedure, which requires minimal experience. The procedure requires no sophisticated material and can be carried out without much discomfort to the patient. The advantage is that, it can be performed in any ward of the hospital and can be repeated.

All that is Required is

- A 5 or 10 ml disposable syringe to which 18 or 20 gauge or blood transfusion needle is attached.
- An antiseptic swab.
- Procedure of the paracentesis
- Urinary bladder is emptied before the procedure.
- Abdomen is exposed.
- Abdomen is arbitrarily divided into four quadrants.
- The procedure is performed without local anesthesia.
- The site of the paracentesis is located and swabbed with a povidone – iodine followed by spirit.
- The abdomen is always entered lateral to the lateral border of the rectus sheath.
- The first puncture is always made in the right lower quadrant followed by left lower quadrant, right upper and left upper quadrant in that order.
- The syringe with needle is introduced perpendicularly into the abdomen with slow even pressure, sudden loss of resistance will indicate that it has entered the peritoneal cavity.

- Aspiration is done and any return of fluid into the syringe is looked for.
- If nothing aspirated immediately, the vacuum in the syringe is maintained for some time to get a positive tap, when the amount in the peritoneal cavity is small.
- Despite of this, if fluid was not drawn, the needle is withdrawn slowly, maintaining the steady suction within the syringe, as the fluid will be more frequently encountered just beneath the anterior parietal peritoneum than in the depth of the peritoneal cavity.
- Initially tap is performed in the right lower quadrant, if negative, the next site of choice would be the left lower quadrant followed by right upper quadrant and finally in the left upper quadrant. In cases of four quadrant tap being negative, the decision for further management will be based on clinical and radiological investigation. If the decision for surgery is made, peritoneal tap will be done in operating room before inducing the patient.

Criteria for Positive Tap

The tap is regarded as “positive”;

1. If clear fluid in excess of 0.5 ml has been obtained.
2. The fluid is obviously abnormal like pus etc.

Fluid Analysis

The fluid aspirated from the peritoneal cavity was analyzed macroscopically.

Naked eye examination of the nature of the fluid, odor and texture were relied upon to arrive at a conclusion. Depending upon the nature, odor and texture of the fluid, diagnosis of site of pathology was made.

Color

Frank Blood

Withdrawal of pure blood that fails to clot on standing means that a significant intraperitoneal hemorrhage has occurred. Accidental puncture of a blood vessel does occur but can readily be distinguished by the fact that blood from this source clots within few minutes.

Purulent Fluid

This may vary from the offensive frank pus obtained

from a perforated appendix or diverticulitis of the colon, to the thin turbid fluid associated with localized inflammatory disease.

Bile Stained

Bile stained fluid is seen in upper gastrointestinal perforations and biliary tree injuries.

Serosanguinous Fluid

This type of tap is seen in strangulated hernia and acute pancreatitis.

Odor

A feculent smell is due to perforation of large intestine. In intraperitoneal rupture of urinary bladder, there will be a uriniferous odor. Foul smell is seen in primary peritonitis.

Texture

In perforated gastric or duodenal ulcer, the fluid tends to be turbid or purulent with flecks of amorphous fibrinous material. In pancreatitis, the fluid will be turbid with fat globules

Results

A total of 50 cases of acute abdominal emergencies admitted to the emergency surgical ward were studied.

Details regarding the age, sex, occupation, address, presenting symptoms physical signs and the characteristics of the aspirated fluid were studied and analyzed.

Vital signs were examined and a complete systemic examination of the patients was done. The patients were put on nasogastric aspiration, IV fluids, antibiotics, analgesics and antacids. Patients were catheterized depending on the need for the same. Patients presenting in shock were resuscitated. Routine investigations were sent including blood grouping. In suspected perforative peritonitis erect X-ray abdomen was done before the tap.

Table 1: Relations of tap with laparotomy

Tap	No. of Cases	
Positive tap	Laparotomy	46
	No laparotomy	0
Negative tap	Laparotomy	2
	No laparotomy	2

Out of 46 positive study group, all patients were subjected to laparotomy. In every case, pathological fluid in the peritoneal cavity at operation was correlated with the finding of pre-operative paracentesis. Out of 04 negative study group,

laparotomy was done in 02 cases based on the clinical and radiological investigation and the surgery was confirmed. Remaining 02 cases were discharged without laparotomy

Table 2: Positive tap and associated pathology

Non Traumatic Group	No. of Patients	Traumatic Group	No. of Patients
Stomach	4	Splenic laceration	3
Duodenum	20	Liver laceration	4
Jejunal perforation	2	Jejunal perforation	1
Ileum	5	Stomach	2
Caecum	1	Renal	1
Sigmoid Colon	1		
Appendicular perforation	1		
Transverse colon perforation	1		
Total	35	Total	11

Table 3: Negative taps and associated pathology

Pathology	No. of cases	Percent
Appendicular perforation	1	2
Duodenal perforation	1	2

In the present study there were 46 positive taps, among them 35 cases were non-traumatic and 11 cases were traumatic. Out of 35 cases in nontraumatic group, 04 cases were gastric perforation, 20 duodenal perforation, 05 ileal perforation, 02 jejunal perforation 01 caecal, 01 appendicular perforations, 01 transverse colon and 01 sigmoid colon perforation. Of the 11 cases in traumatic group 08 were due to solid organ injury, 02 gastric perforation and 01 jejunal perforation noted.

In the present study we encountered negative taps in 04 cases. Among these, 02 cases were managed conservatively and the patients improved with it. The remaining 02 cases were subjected to laparotomy based on clinical and radiological grounds which were diagnosed as, appendicular perforation in 01 case and duodenal perforation in another 01 cases.

Discussion

In our series we obtained 35 positive taps in non-traumatic acute abdomen.

All of them were true positive i.e. the characteristic fluid aspirated correlated with the intra-operative finding. We did not encounter false positive cases possibly due to exclusion of patients with acute intestinal obstruction and multiple abdominal scars from our study. Although the clinical and radiological picture in majority of visceral perforation is

characteristic, there are some instances, where, the diagnosis is uncertain and in such circumstances abdominal paracentesis proves very helpful.

We encountered few such instances in our clinical study. In two cases we were in diagnostic dilemma between perforative peritonitis and acute pancreatitis. This was because of both patients presented with shock and per abdomen examination revealed tenderness, guarding and rigidity. Erect X-ray abdomen showed only ground glass appearance. Diagnostic aspiration of peritoneal fluid revealed bilious in both the cases. Diagnosis of perforative peritonitis was made and confirmed during laparotomy. Peritoneal paracentesis proved invaluable in these circumstances, as opening, the patient with acute pancreatitis would have been disastrous.

Similar reports were published in the literature.

- Singh J. (1973) encountered three postoperative cases, where peritoneal paracentesis was very useful in arriving at the diagnosis [7].
- Baker W. N. W. (1967) in his article published two postoperative cases where abdominal paracentesis undoubtedly helped the surgeon [8].

In our series we encountered 37 cases of non-traumatic acute abdomen. 37 out of 37 cases were due hollow viscus perforation. Out of 37 visceral perforations 35 cases were positive for abdominal tap, resulting in 94.00% accuracy. Thus, the present study revealed that the utility of abdominal paracentesis is considerably high in hollow viscus perforations. This finding is consistent with the observations of other workers.

- Rao S.P.S. [9] (1977) – 95.00%

- Singh J.[7] (19 73) - 95.00%
- Mahantha H [10] (1993) – 92.00%
- Bhatnagar V. B. [11] (1971) – 100.00%

In our series we had 25 cases of gastro duodenal perforations. Peritoneal paracentesis was positive in 24 of them. This high accuracy (96.00%) was possibly due to the late presentation of patients to the hospital. Average time of onset to the presentation to the hospital in our study was three days. The late presentation allows accumulation of fluid in the peritoneal cavity, resulting high chances of positive peritoneal tap. Thus, peritoneal tap is particularly use full in developing country like India, where patients usually present late to the hospital. The high accuracy in our study was comparable with the observations of

- Bhatnagar V. B. [11] (1971) - 100.00%
- Mahantha H. [10] (1993) - 92.00%

In our series, we had 5 cases of enteric ileal perforations and all 5 cases were positive tap. All positive cases were confirmed during the laparotomy. Analysis of characteristic fluid aspirated helped in locating the nature and to some extent the site of lesion in perforation. In cases of peptic perforations, we could tap, frank bile or turbid green or purulent in late presentations. Of the 25 gastroduodenal perforation 22 were bilious, 2 were purulent and in one case we did not aspirate any fluid.

We noticed that, in perforations distal to the duodenum time aspirate was foul smelling and feculent. In our series, we encountered one case of cecal perforation and another case of sigmoid colon perforation. Peritoneal tap revealed a characteristic feculent smell. Laparotomy confirmed the same fluid with perforations in the caecum and sigmoid colon. This was also an observation by many authors.

- Moretz W. H. [5] 1954.
- Bhatnagar V. B.[11] 1971
- McPartlin J. F[12] in 1971.
- Joginder S.[7] in 1973
- Kosloske M.[13] in 1982.

In our present series, we encountered 13 patients who presented with blunt abdominal trauma and paracentesis was performed in all patients. Positive tap was obtained in 11 cases. All of them underwent laparotomy and had hemoperitoneum with visceral organ injury. 3 out 11 had splenic laceration, 4 had liver laceration, 02 had gastric perforation, 01 had renal laceration and 1 had jejuna perforation. The most common finding in our study was liver laceration. The diagnostic accuracy in our study, with

positive paracentesis rates was 100%.

We encountered 02 negative taps, managed conservatively and the patients responded well to it. Thus, abdominal paracentesis has a high rate of sensitivity and specificity in detecting intra peritoneal hemorrhage preoperatively and can be a useful guide. This was also an observation of many other workers.

- Mansoor T. [14] (2000) performed a study on 50 cases and 12 out of 13 positive were true positive with diagnostic accuracy of 91.2%
- Mahantha H.[10] (1993) reported diagnostic accuracy of 84.3% in blunt abdominal trauma.
- Lamke L. O.[15] (1978) detected intra abdominal bleeding in 90% of cases. Overall 4 taps were negative in our study. 2 out of which were true negative. A clinical and radiological investigation didn't reveal intra-abdominal pathology. These patients were managed conservatively. Negative tap helped us to avoid an unnecessary laparotomy. The remaining 02 cases were false negative, the clinical picture in all these cases was quite obvious of intra abdominal pathology.

Radiological investigations proved to be the same. In these cases negative tap was not taken into consideration and decision for laparotomy was made. Findings of laparotomy coincident with the clinical and radiological investigation. These cases were associated with minimal collection of the fluid in the peritoneal cavity. In these cases fluid was collected in the pouch of the Douglas. Negative tap may be because of minimal fluid in the peritoneal cavity particularly collected in the pouch of Douglas.

The only drawback of the abdominal paracentesis encountered in our study was a negative tap. So the negative tap should be dealt cautiously. The decision for further management should be based on clinical and radiological investigation.

This was also a point highlighted by many workers.

- Baker W. N. (1967) opined that, a negative paracentesis has no positive significance. If operation is indicated on clinical grounds, then, whatever may be, the fact that no fluid has been obtained from the peritoneal cavity must be completely disregarded [8].
- Stephens F. O. (1969) concluded that a negative tap does not prove that there is no significant intra-abdominal lesion and it must only be considered along with the patients overall clinical consideration [16].

In our series, we got the positive taps very often in the right lower quadrant. In a case of splenic

laceration, we got positive tap in the left flank also. In another case of ileal perforation, tap was positive in the left lower quadrant also. This suggests that paracentesis does not necessarily indicate the probable site of the lesion. This has also been observation of Giacobine J. N. and Baker W. N.

Conclusion

It is concluded that diagnostic abdominal tap is extremely reasonable diagnostic aid and can lead to improve surgical care of the patient with atypical acute abdominal pain

References

1. Townsend CM. Sabiston Textbook of Surgery: The biological basis of modern surgical practice 16th Ed. Singapore: Harcourt Asia PTE Ltd., W. B. Saunders Co.; 2001.
2. Thate RL, Jain CS, Nayak N, Dias AD. Diagnostic peritoneal tap of the acute abdomen. *Indian J. Surg.* 1974; 36: 26-9.
3. Neuhof H, Cohen I. Abdominal puncture in the diagnosis of acute intra peritoneal diseases. *Annals of Surgery.* 1926; 83: 454-62.
4. Giacobine JN, Siler VE. Evaluation of abdominal paracentesis. *Surgery Gynec and Obst.* 1960; 110: 676-86.
5. Moretz WH, Erickson WG. Peritoneal tap as an aid in the diagnosis of acute abdominal diseases. *American Surgeon.* 1954; 20: 363-77.
6. Glass WW, Gould SE. The acute abdomen: Aspiration 1st Ed. Baltimore: Williams and Wilkins Company; 1966.
7. Singh J, Bharadwaj DN, Singh B. Paracentesis in the management of Acute Abdomen. *Journal of Indian Medical Association.* 1973; 61(4): 176-9.
8. Baker WNW, Mackie DB, Newcombe JF. Diagnostic paracentesis in acute abdomen. *British Medical Journal.* 1967; 3: 146-9.
9. Rao SPS, Parekh BR, Raina VK, Kapoor JP. Evaluation of Diagnostic abdominal paracentesis in acute surgical conditions of the abdomen. *Indian Journal of Surgery.* 1977; 39: 284-90.
10. Mahanta H, Das MK, Datta Choudhary SB. An experience with diagnostic paracentesis in 100 cases of acute abdomen. *Journal of Indian Medical Association.* 1990; 88(5): 125-9.
11. Bhatnagar VB, Asopa HS. Diagnostic abdominal paracentesis. *Journal of Indian Medical Association.* 1971; 57: 167.
12. McPartlin JF, McCarthy W. An appraisal of diagnostic paracentesis of the abdomen. *British Journal of Surgery.* 1971; 58(7): 498-501.
13. Kosloske M, Goldthorn JF. Paracentesis as an aid to the diagnosis of intestinal gangrene. Experience in 50 infants and children. *Archives of Surgery.* 1982; 117(5): 571-5.
14. Mansoor T, Zubari S, Masiullah. Evaluation of peritoneal lavage and abdominal paracentesis in cases of blunt abdominal trauma. *Journal of Indian Medical Association.* 2000; 98(4): 174 5.
15. Lamke LO, Varenhorst E. Abdominal paracentesis for early diagnosis of closed abdominal injury. *Acta. Chir. Scand.* 1978; 144(1): 21-5.
16. Stephens FO. The use of peritoneal tap as an aid to diagnosis of intraabdominal lesions. *Journal of Royal College of Surgeons, Edinburgh.* 1969; 14: 230-4.