

## Original Research Article

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# An analytical study of acute abdomen in established cases of pneumoperitoneum

E. Prabhu, S. Lakshmibady\*

Department of General Surgery, Government Villupuram Medical College Hospital, Mundiyampakkam, Tamil Nadu, India

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**\*Correspondence:**

Dr. S. Lakshmibady,

E-mail: slucky1973@gmail.com

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## ABSTRACT

**Background:** Pneumoperitoneum refers to the presence of air within the peritoneal cavity. The most common cause is a perforation of the abdominal viscous, a perforated ulcer, although a pneumoperitoneum may occur as a result of perforation of any part of the bowel. The exception is a perforated appendix, which seldom causes a pneumoperitoneum. The aim of present investigation was to know the various clinical features of acute abdomen in established cases of pneumoperitoneum and to study the various surgical techniques used in the management.

**Methods:** This study is an analytical study of 103 patients admitted in emergency surgical wards. The relevant history, clinical examination, relevant investigations, and treatment were obtained by pretested proforma.

**Results:** The symptoms such as abdominal pain, abdominal distension, fever, and vomiting were present in our study. The most common symptom was an abdominal pain in almost all cases the overall mortality in our study was 6.79% most of them is due to colonic and duodenal perforations. In most of the cases, the cause of death was diagnosed as septicemia.

**Conclusions:** The incidence of GI Perforations can be reduced by educating the patients with appropriate medical management of peptic ulcer, tuberculosis, typhoid fever and also avoiding factors such as smoking and Alcohol.

**Keywords:** Alcohol, Gastric ulcer, Pneumoperitoneum, Perforations, Smoking

## INTRODUCTION

Pneumoperitoneum is defined as the presence of free air under the diaphragm.<sup>1</sup> GI perforations are the most common cause of pneumoperitoneum an acute abdomen.<sup>2</sup> Inflammation of the serial membrane that lines the abdominal cavity and the organs contained within is called as peritonitis.<sup>3</sup> Frequent causes of pneumoperitoneum are perforation due to peptic ulcer disease, ileal perforation due to typhoid and tuberculosis, acute appendicitis, colonic diverticulitis.<sup>4</sup> Initial management consists of resuscitation with large volume of crystalloids, Ryle's tube aspiration and administration of IV broad spectrum antibiotics against gram negative rods and anaerobes and then taken up for laparotomy and

for further management.<sup>5</sup> Inspite of better understanding of pathophysiology and advances in diagnosis and surgery and antimicrobial therapy and ICU support perforative peritonitis was potentially fatal.<sup>6</sup> The spectrum of etiology also differs from the western counterpart and our country. Upper GI perforations are more common in our country and lower GI perforations are more common in western parts.<sup>7</sup> the traditional sign of pneumoperitoneum is the crescent-shaped free air beneath the diaphragm on erect chest seen on abdominal plain film. In this position, it is possible to detect as little as 1 to 2 ml of free air.<sup>8</sup> The other conditions which can mimic the signs of pneumoperitoneum are: interposition of the colon or Chilaiditi syndrome, fat depositions, artifacts, intraabdominal abscess, intraperitoneal or an

internal hernia and volvulus, especially of the mobile caecum.<sup>9</sup>

## METHODS

This study is an analytical study of 103 patients admitted in emergency surgical wards of Government Villupuram Medical College Hospital, Mundiyampakkam with established pneumoperitoneum due to various GI perforations for a period of 1 year from December 2016 to November 2017.

All patients admitted, and relevant investigations and resuscitation done, and patients were taken up for emergency laparotomy. After obtaining clearance from the ethical committee of our hospital. Consents were taken from all the patient's cases selected above 13 years of age.

All nontraumatic perforations were included and traumatic perforations are excluded. The relevant history, clinical examination, relevant investigations, and treatment were obtained by pretested proforma. In all the cases vitals were stabilized and fluid and electrolyte imbalance were corrected, and the patient was started on broad-spectrum antibiotics. After general conditions of the patient were stabilized all patients were taken for emergency laparotomy after getting anesthesia assessment. The incision was planned accordingly for peptic ulcer perforation simple live omental patch closure was done. Ileal and gastric perforation edge of the ulcer were taken for tissue biopsy.

In large bowel perforation cases, either diversion colostomy was done. The complications which occurred was noted and treated accordingly. After suture removal patient was discharged. In this study, mortality is defined as the death of the patient during the same episode of pneumoperitoneum and peritonitis in the hospital. The follow up was for a period of one month.

## RESULTS

The symptoms such as abdominal pain, abdominal distension, fever, and vomiting were present in our study. The most common symptom was an abdominal pain in almost all cases Out of 103 patient's duodenal perforation was frequently assessed among patients of 61.2%. Ileal perforation was 13.6%, Gastric perforation was 12.6. Appendicular perforation was 7.8%, colonic perforation was 2.9%, Rectosigmoid perforation, and Meckel's diverticulitis was 1%.

The commonest symptom was abdominal pain which is present in all the subjects followed by abdominal rigidity in three-fourths of the subjects with duodenal perforation. Abdominal distension was present in only 31.7% of the patients.

The commonest complication in the postoperative period was wound infection in 20.6% followed by lower respiratory tract infection in 8% and burst abdomen in 5%. In 2% patients, perforation was fatal.

Primary closure was done in 12 patients (85.7%), ileostomy was done in 2 patients (14.3%). Perforation anywhere along the gastrointestinal tract typically requires emergency surgery in the form of an exploratory laparotomy. This is usually carried out along with intravenous fluids and antibiotics.

**Table 1: Distribution of the subjects with pneumoperitoneum according to diagnosis (N=103).**

| Diagnosis                | Frequency | Percent |
|--------------------------|-----------|---------|
| Duodenal perforation     | 63        | 61.2    |
| Ileal perforation        | 14        | 13.6    |
| Gastric perforation      | 13        | 12.6    |
| Appendicular perforation | 08        | 7.8     |
| Colonic perforation      | 03        | 2.9     |
| Rectosigmoid perforation | 01        | 1.0     |
| Meckel's diverticulitis  | 01        | 1.0     |
| Total                    | 103       | 100.0   |

**Table 2: Distribution of the subjects with duodenal perforation according to clinical symptoms (N=63).**

| Gender               | Frequency | Percent |
|----------------------|-----------|---------|
| Abdominal pain       | 63        | 100     |
| Abdominal distension | 20        | 31.7    |
| Abdominal rigidity   | 47        | 74.6    |

**Table 3: Distribution of the subjects with duodenal perforation according to post-operative complications (N=63).**

| Complication                      | Frequency | Percent |
|-----------------------------------|-----------|---------|
| Wound infection                   | 13        | 20.6    |
| Lower respiratory tract infection | 05        | 7.9     |
| Burst abdomen                     | 03        | 4.8     |
| Death                             | 02        | 3.2     |
| No complication                   | 40        | 63.5    |
| Total                             | 63        | 100.0   |

Risk of death up to 50% gastrointestinal perforation, also known as ruptured bowel, is a hole in the wall of part of the gastrointestinal tract.

The gastrointestinal tract includes the oesophagus, stomach, small intestine, and large intestine. Symptoms include severe abdominal pain and tenderness. Wound infection was observed in 2 patients (25%), the absence of complications was observed in 5 patients (62.5%). The incidence of death observed in 1 patient (12.5%).

**Table 4: Distribution of the subjects with ileal perforation according to surgical procedure (N=14).**

| Surgical procedure | Frequency | Percent |
|--------------------|-----------|---------|
| Primary closure    | 12        | 85.7    |
| Ileostomy          | 2         | 14.3    |
| Total              | 14        | 100.0   |

## DISCUSSION

In present study of 103 cases, the most common cause of pneumoperitoneum is perforation of peptic ulcer 61.16% and followed by ileal perforation which constitutes about 13.59% and followed by appendicular perforation of about 7.76%.<sup>10</sup> Karayiannakis et al also found the similar incidence of about 59.10% of perforation of peptic ulcer, ileal 17% and appendicular perforation of about 6.38% in their analysis of 658 cases.<sup>11</sup>

In present study, the commonest site of perforation is in the 1<sup>st</sup> part of duodenum anterior wall, followed by ileal, gastric, and appendicular.<sup>12</sup> Litynski also found that the most common site of GI perforation is duodenum followed by ileum, stomach, and appendix which also shows the same results as our study.<sup>13</sup> In 2006 the study conducted by Mouret et al also showed the same Result but differs in the site of perforation.<sup>14</sup> So, perforation of peptic ulcer was the most common cause of pneumoperitoneum secondary to GI perforation.

It is also found that most patients had peptic ulcer history, alcoholism, smoking and NSAID abuse. There is also a difference in the site of perforation when compared to the western countries. The symptoms such as abdominal pain, abdominal distension, fever, and vomiting were present in present study. The most common symptom was an abdominal pain in almost all cases.<sup>14</sup> As in Ratner Le et al stated the same findings. In typhoid perforation history of fever followed by abdominal pain was used for clinical diagnosis. Ratner et al also observed the same results.<sup>15</sup> On Examination distension and tenderness was the present majority of the cases. In most of the studies conducted tenderness was present in all cases of GI perforations. Tachycardia was also commonly observed. Abdominal guarding and rigidity also found in the majority of cases. Similar incidence also reported by Reynolds et al.<sup>16</sup>

Out of 63 cases of peptic ulcer perforations the decision was based on the surgical findings. Omentallive patch closure was done in duodenal and gastric perforations. The worldwide literature also agreed on the same. Colonic perforations were managed by colostomy.

The overall mortality in our study was 6.79% most of them are due to colonic and duodenal perforations. In most of the cases, the cause of death was diagnosed as septicemia.<sup>17</sup> The worldwide literature also shows a decline in the mortality of GI perforations.<sup>18</sup> The decrease in mortality is mainly due to higher antibiotics, proper

resuscitation, and advanced surgical procedures. Recent studies also suggest a mortality rate of about 5%. Present study results correlate well with other studies. Worldwide literature also shows a decline in mortality of GI perforations.<sup>19,20</sup>

## CONCLUSION

From present analytical study of acute abdomen in established cases of pneumoperitoneum it was concluded that the commonest cause of pneumoperitoneum due to GI perforations is duodenal ulcer perforation. Duodenal ulcer perforation is more common in the 4<sup>th</sup> decade of life with male preponderance.

Lower socioeconomic status group of people are more affected. Alcohol and smoking were aggravating factors. Due to the emergence of H2 blockers and eradication of *Helicobacter pylori* the incidence of peptic ulcer perforation has declined.

Live mental patch closure with peritoneal wash was very much effective. Definitive ulcer surgery was not recommended in emergency situations. The factors affecting the prognosis are early hospitalization, the presence of shock and co-morbid conditions.

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