
RESEARCH ARTICLE

Spectrum of Non-Traumatic Hollow Viscus Perforation in a Himalayan Population: A 3-Year Retrospective Study

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ABSTRACT

Non-traumatic hollow viscus perforation (NT-HVP) is a common surgical emergency, often resulting in high morbidity and mortality rates. This study examines the epidemiology, aetiology, clinical presentations, and outcomes of NT-HVP among patients in the Himalayan region, by reviewing data from the Indira Gandhi Medical College (IGMC) Surgery Department, Shimla, between 2015 and 2018. A total of 274 cases were analysed. The most common cause of the problem was peptic ulcer disease and the study area had challenges like difficult terrain and limited access to healthcare. The findings aim to improve the understanding of NT-HVP in resource-limited settings and provide insights for better management strategies.

KEYWORDS

Gastrointestinal Perforation; Peptic Ulcer Perforation; Abdomen, Acute; Epidemiology; Himalayan Region; Health Services

ARTICLE INFORMATION

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1. Introduction

Non-traumatic hollow viscus perforation (NT-HVP) is a critical surgical emergency characterized by the spontaneous rupture of the gastrointestinal tract, often leading to severe peritonitis and high mortality rates if not urgently treated. (Chandran et al., n.d.) NT-HVP has multifactorial aetiology, with peptic ulcer disease being the most common cause, particularly in remote regions with limited healthcare facilities and prevalent risk factors such as *Helicobacter pylori* infection and the use of non-steroidal anti-inflammatory drugs (NSAIDs). (Lau et al., 2011) Other causes include malignancy, inflammatory bowel disease, and iatrogenic injury.

The Himalayan region, with its unique geographical and socioeconomic challenges, presents a distinct context for studying NT-HVP. The mountainous terrain, limited medical facilities, and delayed patient presentations contribute to challenges in managing this condition. This often results in delayed diagnosis and a poor clinical profile at the time of presentation.

This study focuses on the epidemiology, clinical presentations, and outcomes of NT-HVP among patients treated at Indira Gandhi Medical College (IGMC) Shimla from 2015 to 2018. IGMC serves a large population in Himachal Pradesh, a state in the Himalayan mountains. We analysed a total of 274 cases to gain valuable insights into the burden of NT-HVP in the Himalayan population. This will help us identify the need for targeted public health interventions and improved healthcare access.

The findings of this study will contribute to a better understanding of the factors influencing the incidence and outcomes of NT-HVP. This knowledge will be helpful in formulating strategies for effective management of NT-HVP in resource-limited settings.

As medical professionals address the challenges posed by NT-HVP, it is imperative to recognize the importance of early diagnosis, timely surgical intervention, and the role of public health initiatives in reducing the morbidity and mortality associated with this condition.(Pouli et al., 2020)

2. Methodology

This study used retrospective observational design to analyse cases of non-traumatic hollow viscus perforation (NT-HVP) treated at the Indira Gandhi Medical College (IGMC) Shimla from 2015 to 2018. The medical records of patients diagnosed with NT-HVP were reviewed to collect data on demographic characteristics, clinical presentations, etiological factors, and surgical outcomes. The study included patients aged 18 years and above who were diagnosed with NT-HVP based on clinical, radiological, or intraoperative findings. Patients with traumatic perforations and those with incomplete medical records were excluded from the analysis to maintain the reliability and validity of the data. Data was systematically collected from the medical records of patients diagnosed with NT-HVP, focusing on demographic details, site of perforation, aetiology, clinical presentation, and outcomes. Statistical analysis was performed using descriptive statistics to summarize the demographic and clinical characteristics of the study population.

3. Results

3.1 Demographics

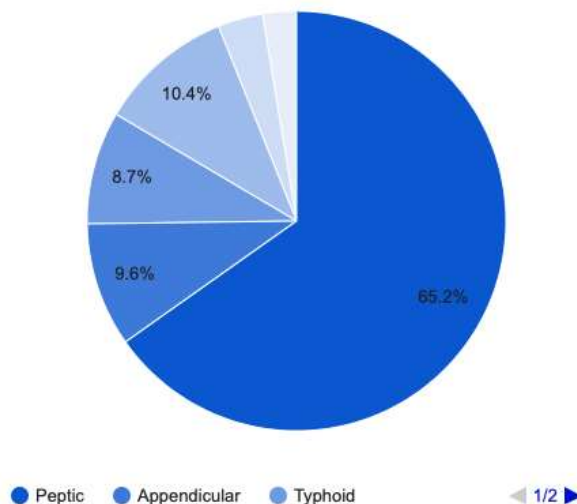
A total of 274 patients were included in the study. The mean age of presentation was 45 years, with a male-to-female ratio of 3:1. Most patients belonged to rural areas of Himachal Pradesh and surrounding Himalayan regions.

3.2 Site of Perforation

The distribution of NT-HVP by site is summarized in Table 1. (Figure 1)

Site	Frequency	Percentage
Duodenum	181	66.0
Gastric	36	13.14
Appendicular	27	9.85
Ileal	26	9.49
Colon	4	1.46
Total	274	100

Etiology of Non-Traumatic Hollow Visus Perforation (NT-HVP)



Duodenal perforations were the most common, accounting for two-thirds of cases, followed by gastric and appendicular perforations. Colon perforations were rare.

3.3 Etiology

Table 2 summarizes the etiological distribution.

Etiology	Frequency	Percentage
Peptic	178	75
Appendicular	27	11
Typhoid	24	10
Malignant	29	12
Tubercular	10	4
Idiopathic	6	3
Total	274	100

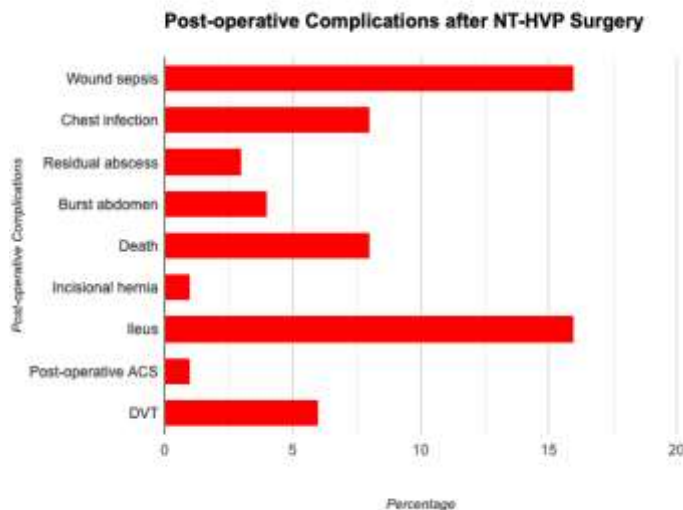
3.4 Symptoms

The distribution of symptoms by etiology is shown in Table 3.

Etiology	Pain (%)	Vomiting (%)	Distension (%)	Fever (%)
Peptic	100	10.98	92.49	6.94
Appendicular	91.30	78.26	30.43	52.17
Typhoid	100	33.33	16.67	83.33

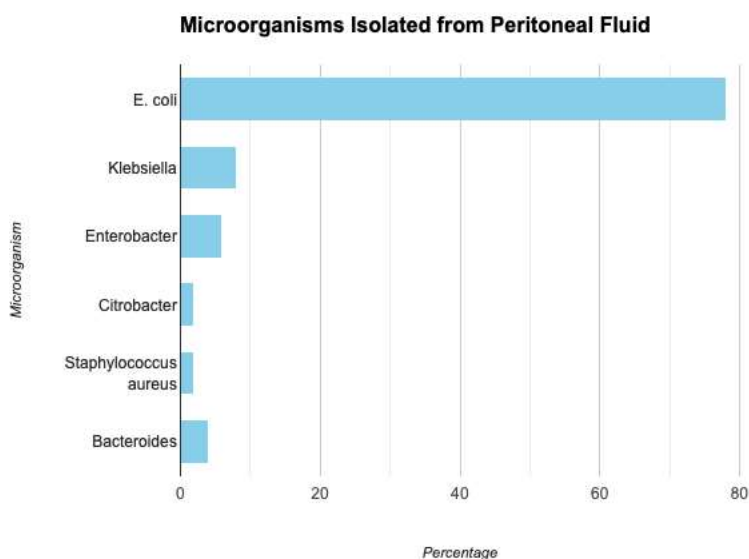
Post-operative complications:

Figure 2



Microorganisms

(Figure 3)



The most common bacteria found in peritoneal fluid was *E. coli*, which was present in 78% of cases. Other bacteria found included *Klebsiella* (8%), *Enterobacter* (6%), *Citrobacter* (2%), *Staphylococcus aureus* (2%), *Bacteroides* (4%).

Management: The majority of patients (95%) underwent emergency surgical intervention. The most common surgical procedure was laparotomy with primary closure or patch repair of the perforation. 3% patients underwent conservative management and all of them were appendicular perforations. 5 patients had

Outcome: The overall mortality rate was 8%. Delayed presentation, advanced disease stage, and comorbidities were associated with increased mortality.

4. Discussion and conclusion

Our study on non-traumatic hollow viscus perforation (NT-HVP) in the Himalayan population at Indira Gandhi Medical College (IGMC) Shimla (2015–2018) reveals several crucial points. Analysing 274 cases, we found a significant burden of NT-HVP, predominantly affecting middle-aged males (3:1 male-to-female ratio) with an average presentation age of 45. This aligns with existing research suggesting peptic ulcer disease, a major risk factor for NT-HVP, is more common in this demographic due to lifestyle factors like smoking and alcohol consumption.(Chandran et al., n.d.; Ib et al., 2000; Lee et al., 2016)

Duodenal perforations were the most frequent (66.06%), emphasizing the need for targeted public health initiatives to reduce peptic ulcer incidence. A multidisciplinary approach is warranted, considering the association with *Helicobacter pylori* infection, NSAID use, and lifestyle. Public health campaigns promoting early *H. pylori* diagnosis and treatment, educating about NSAID risks, and encouraging healthy habits could potentially lessen peptic ulcer incidence and subsequent perforations.

The study also highlights the unique challenges faced by Himalayan patients. Difficult terrain and limited healthcare access often lead to delayed presentations, significantly impacting outcomes. This aligns with previous research highlighting the importance of timely surgery for reducing NT-HVP mortality.(K et al., 2018) Therefore, improving access to healthcare services, particularly in remote areas, is crucial for better patient outcomes.

While pain was universally present, other symptoms like vomiting, fever, and distension varied by cause, like earlier studies.(G et al., 2021) This emphasizes the need for a high index of suspicion for NT-HVP in patients presenting with acute abdominal pain,

especially in regions with high peptic ulcer rates. The symptom variability based on aetiology suggests a personalised approach. For instance, the presence of fever in typhoid perforations and its absence in malignant cases could be valuable diagnostic clues.

The study aligns with existing literature on NT-HVP etiology. Peptic ulcer disease being the leading cause is consistent with previous studies.(Chandran et al., n.d.) This highlights the need for continued research into peptic ulcer disease causes and effective prevention/treatment strategies.

While free air under the diaphragm is a classic sign, its absence doesn't rule out NT-HVP. Factors like early presentation, small perforations, or inadequate bowel gas can limit its detection. Ultrasound, although valuable for detecting peritoneal fluid, may miss subtle perforations or localized peritonitis. Our study found free air in 69% of cases, aligning with previous reports (60-70% range).(Long et al., 2019) Peritoneal fluid, however, was detected in almost all cases where ultrasound was performed, confirming its higher sensitivity for NT-HVP diagnosis. Contrast-enhanced CT was used in cases of diagnostic uncertainty, identifying perforation in all cases.

E. coli was the most common organism isolated, followed by *Klebsiella*, consistent with previous studies.(Kumar-M et al., 2019) Simple closure with an omental patch was the primary surgical intervention. Malignant gastric perforations were managed with partial gastrectomy and gastrojejunostomy, while malignant colonic perforations were treated with a Hartmann's procedure. Ileal perforations were addressed through resection and anastomosis. All typhoid perforations were treated with simple closure after trimming the edges, and appendectomy was performed for all appendicular perforations.

Postoperative complications were observed in 34% of patients. The most common were wound infection (12%) and ileus (16%). These complications can be attributed to factors like surgical trauma, patient comorbidities, and postoperative care. Wound infections can arise from inadequate surgical technique, poor wound hygiene, or systemic factors like diabetes. Ileus can be caused by surgical manipulation of the bowel, anaesthetic agents, or underlying medical conditions.(Ay et al., 2011; Luckey et al., 2003)

Chest infections developed due to reduced lung capacity post-surgery, aspiration, or underlying respiratory conditions. Burst abdomen likely occurred due to poor nutritional status and low albumin levels. Mortality resulted from sepsis, multi-organ failure, or other complications. Postoperative acute coronary syndrome occurred in patients with pre-existing cardiovascular disease

The overall mortality rate of 8% is concerning, and mainly driven by delayed presentations (>48 hours) and comorbidities, contrasting with the reported worldwide rate of around 16%.(Mingoli et al., 2017)

Being a retrospective, single-centre study, the findings may not be generalizable to other populations or settings. Prospective, multi-centre studies are needed. Furthermore, the study relied on medical records, which may not be complete or accurate. Future research should aim to include patient follow-up data to assess long-term outcomes and complications associated with NT-HVP.

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