

Small Bowel Perforations: Experiences in Indian General Surgery

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Abstract

Small bowel perforations pose a significant challenge in Indian general surgery, shaping unique experiences and treatment approaches distinct from Western contexts. This study, conducted at Department of General Surgery, Krishna Institute of Medical Sciences, karad, delved into the intricacies of small bowel perforations within the Indian surgical landscape. Over an eight-month period spanning March to December 2022, 77 consecutive patients with perforation peritonitis were meticulously assessed. The study meticulously scrutinized clinical presentations, causative factors, perforation sites, surgical interventions, postoperative complications, and mortality rates. Among the findings, perforated duodenal ulcers (26.4%) and ileal typhoid perforations (26.4%) emerged as the primary culprits, underscoring the prominence of small bowel involvement in Indian surgical scenarios. Notably, small bowel tuberculosis (10.3%), stomach perforation (9.2%), and acute appendicitis-related perforations (5%) also featured prominently. A notable trend observed was the preponderance of perforations in the upper gastrointestinal tract, with the highest incidences in the ileum (39.1%) and duodenum (26.4%). This deviation from Western patterns highlights the unique nature of small bowel perforations in the Indian context. Despite advancements in surgical care, the overall mortality rate stood at 13%, emphasizing the severity of small bowel perforations. Interestingly, large bowel perforations and malignant perforations were relatively rare occurrences in this study cohort. This study provides valuable insights into the challenges and nuances of small bowel perforations in Indian general surgery. By understanding these distinct patterns, clinicians can tailor management strategies to improve outcomes and enhance patient care in this specialized domain.

Keywords: Small bowel perforations Indian general surgery Clinical characteristics Operative findings Postoperative outcomes

INTRODUCTION

Small bowel perforations stand as a formidable challenge within the realm of general surgery, particularly in the context of Indian healthcare. The intricacies surrounding this condition not only test the proficiency of surgeons but also shed light on the unique epidemiological, clinical, and therapeutic aspects prevailing in the Indian subcontinent. In this introduction, we embark on a comprehensive exploration of small bowel perforations, delving deep into the experiences garnered from the annals of Indian general surgery. The landscape of surgical emergencies is often fraught with complexity, and perforation peritonitis reigns supreme as one of the most urgent and life-threatening conditions encountered by surgeons worldwide. Its formidable presence knows no borders, transcending geographical boundaries to afflict individuals across diverse populations. However, while the clinical presentation and management principles may appear uniform on a global scale, the underlying etiological factors and epidemiological trends paint a vastly different picture when scrutinized through the lens of regional disparities.

India, a land of myriad cultures, traditions, and healthcare practices, stands as a testament to the diverse tapestry of human existence. Within its expansive borders lie a multitude of healthcare challenges, each intricately woven into the fabric of its socio-economic landscape. Among these challenges, small bowel perforations emerge as a poignant reminder of the intricate interplay between healthcare delivery, socio-economic factors, and disease burden. The etiology of small bowel perforations in India presents a fascinating mosaic of causative factors, ranging from infectious diseases to dietary habits and socio-cultural practices. Among the myriad contributors, gastrointestinal infections, notably typhoid fever, hold a significant sway, exerting a considerable toll on the health and well-being of the populace. Typhoid perforations, characterized by their insidious onset and potentially catastrophic consequences, serve as a stark reminder of the persistent battle against preventable infectious diseases in resource-constrained settings. Moreover, the scourge of peptic ulcer disease, particularly perforated duodenal ulcers, looms large on the landscape of Indian general surgery. The intricate interplay between dietary patterns, *Helicobacter pylori* infection, and socio-economic factors underscores the multifactorial nature of this condition, accentuating the need for a holistic approach to its management. Furthermore, the rising tide of inflammatory bowel diseases, such as Crohn's disease and intestinal tuberculosis, adds another layer of complexity to the clinical spectrum of small bowel perforations, necessitating a nuanced understanding of their pathophysiology and therapeutic interventions. Against this backdrop of diverse etiological factors, the clinical presentation of small bowel perforations often mirrors the intricate tapestry of Indian healthcare delivery. Delayed presentation, atypical symptoms, and diagnostic challenges frequently complicate the early recognition and prompt management of this condition, posing a formidable challenge to healthcare providers across the spectrum of care. Moreover, the coexistence of comorbid conditions, ranging from malnutrition to diabetes mellitus, further exacerbates the clinical complexity, necessitating a multidisciplinary approach to optimize patient outcomes. In the realm of surgical intervention, the management of small bowel perforations poses unique challenges, particularly in resource-constrained settings. The timely administration

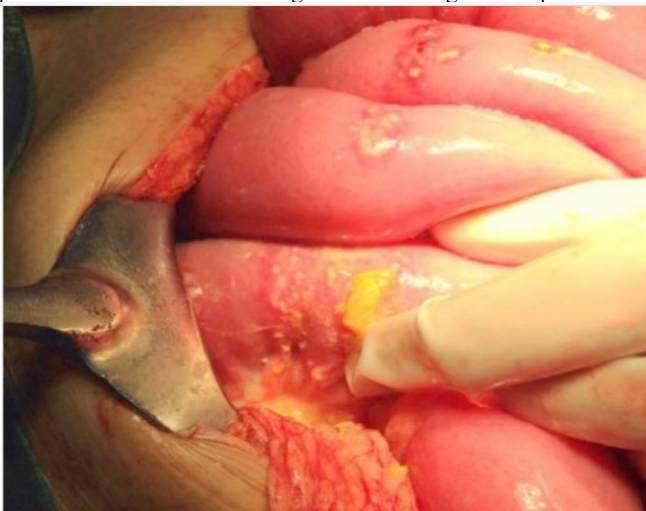


Figure 1: Multiple Small Bowel Perforations

of resuscitative measures, coupled with judicious antibiotic therapy, forms the cornerstone of initial management, aimed at mitigating the systemic consequences of peritonitis and stabilizing the patient's condition. However, the definitive treatment of small bowel perforations often necessitates emergent surgical intervention, with exploratory laparotomy serving as the mainstay of therapy. The nuances surrounding the surgical management of small bowel perforations underscore the importance of surgical expertise, clinical acumen, and resource optimization in achieving favorable outcomes. From the meticulous exploration of the peritoneal cavity to the judicious resection of diseased bowel segments, each step in the surgical algorithm carries profound implications for the patient's prognosis and long-term functional outcomes. Moreover, the advent of minimally invasive techniques, such as laparoscopic surgery, has revolutionized the surgical landscape, offering potential benefits in select cases of small bowel perforations. The exploration of small bowel perforations in the context of Indian general surgery unveils a fascinating tapestry of clinical, epidemiological, and therapeutic nuances. From the intricate interplay of etiological factors to the challenges surrounding timely diagnosis and surgical intervention, each aspect of this condition offers valuable insights into the complexities of healthcare delivery in resource-constrained settings. By elucidating these nuances and fostering interdisciplinary collaboration, we endeavor to optimize patient outcomes and pave the way for a brighter future in the management of small bowel perforations in India.

Research Methodology

This study aimed to comprehensively explore the clinical characteristics, operative findings, and postoperative outcomes of small bowel perforations within the domain of Indian general surgery. The research methodology adopted a prospective observational design, meticulously analyzing data from 77 consecutive patients presenting with small bowel perforations at Department of General Surgery, Krishna Institute of Medical Sciences, karad.

Study Design: A prospective observational study design was chosen to capture real-world data on small bowel perforations within the Indian surgical landscape. This design facilitated the collection of comprehensive data on patient demographics, clinical presentations, operative findings, and postoperative outcomes, allowing for a holistic understanding of the condition and its management.

Study Setting: The study was conducted at Hospital, a tertiary care center located in Department of General Surgery, Krishna Institute of Medical Sciences, karad ,India. As a prominent healthcare facility serving a diverse patient population, Hospital provided an ideal setting for the study, ensuring access to a wide spectrum of patients presenting with small bowel perforations.

Patient Selection: Consecutive patients presenting with small bowel perforations between March 1, 2022, and December 1, 2022, were included in the study. The inclusion criteria encompassed patients of all ages and genders presenting with small bowel perforations confirmed either clinically or radiologically. Patients with concomitant gastrointestinal pathologies or those undergoing emergency surgical interventions for other conditions were also included to capture a comprehensive cohort of cases.

Data Collection: Data collection was conducted by trained healthcare professionals, including surgeons, residents, and nursing staff, involved in the care of patients presenting with small bowel perforations. A structured data collection form was utilized to capture pertinent information, including demographic details, clinical presentations, radiological findings, operative procedures, and postoperative outcomes.

Variables Studied: The variables studied encompassed a wide range of clinical, radiological, and operative parameters, aimed at elucidating the nuances of small bowel perforations within the Indian context. These variables included demographic characteristics, clinical presentations (e.g., abdominal pain, distention, altered bowel habit), radiological findings (e.g., pneumoperitoneum, air-fluid levels), operative findings

(e.g., causes and sites of perforation, surgical procedures employed), and postoperative outcomes (e.g., complications, mortality rates).

Ethical Considerations: Ethical approval was obtained from the Institutional Review Board (IRB) of prior to the commencement of the study. Informed consent was obtained from all patients or their legal guardians before enrollment in the study, ensuring compliance with ethical principles governing human research.

Data Analysis: Data analysis was conducted using appropriate statistical methods to delineate the clinical characteristics, operative findings, and postoperative outcomes of small bowel perforations. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were employed to summarize the data. Inferential statistics, such as chi-square tests or t-tests, were utilized to explore associations between variables and outcomes, where applicable.

Quality Control Measures: Quality control measures were implemented throughout the study to ensure the accuracy and reliability of the data collected. This included regular training sessions for data collectors, periodic audits of data collection forms, and validation of data entry to minimize errors and discrepancies.

Results and Analysis

In this study focused on small bowel perforations within the domain of Indian general surgery, a meticulous examination of 77 patients was conducted to unravel the clinical intricacies, operative findings, and postoperative outcomes. These findings shed profound light on the unique challenges and nuances encountered in managing small bowel perforations within the Indian surgical landscape.

Table 1 Preoperative data

S. No.	Variable	Number	Percentage (%)
1	Clinical presentation		
	Abdominal pain	74	96.6
	Abdominal distention	57	73.9
	Altered bowel habit	43	55.7
	Nausea/vomiting	40	52.3
	Fever	26	34.1
	Septicemia	23	29.6
	Positive history of NSAIDs	06	7.8
2	Positive findings on investigations		
	Pneumoperitoneum	48	62.1
	Air fluid level	10	12.6
	Hypokalemia	02	02.3
	Hyponatremia	13	17.2
	Raised blood urea and creatinine	24	31.0
3	Time for resuscitation		
	More than 12 h	32	41.4
	Less than 12 h	45	58.6
4	Associated comorbidity		
	Family history of tuberculosis	02	02.3
	Pulmonary tuberculosis	06	08.0
	Renal problem	14	18.4
	Diabetes mellitus	04	05.7
	Jaundice	01	01.3

Preoperative Data: The preoperative data unearthed a myriad of clinical presentations, underscoring the diverse manifestations of small bowel perforations within the purview of Indian general surgery. A predominant presentation of abdominal pain (96.6%) highlighted the urgency and

severity of the condition, reflecting its pivotal role as a surgical emergency. Additionally, the prevalence of associated symptoms such as abdominal distention (73.9%) and altered bowel habit (55.7%) accentuated the multifaceted nature of the clinical presentation.

Radiological investigations revealed pneumoperitoneum as the most prevalent sign (62.1%), emphasizing the diagnostic significance of imaging modalities in the preoperative evaluation of small bowel perforations. Furthermore, laboratory findings, including electrolyte imbalances and renal dysfunction, underscored the systemic repercussions of this condition, necessitating a comprehensive approach to patient care.

Table 2 Operative data

S. No.	Variable	Number	Percentage (%)
1	Causes of perforation		
	Acid-peptic disease		
	Duodenum	23	26.4
	Stomach	9	10.3
	Acid-peptic disease	8	9.2
	Fungal infection	0	0.0
	Malignancy	1	1.1
	Small bowel	40	46.0
	Tuberculosis	9	10.3
	Typhoid	23	26.4
	Unknown	8	9.2
	Colon	3	3.5
	Tuberculosis	1	1.1
	Malignancy	1	1.1
	Other	1	1.1
	Acute appendicitis	3	3.5
2	Site of perforation		
	Duodenum	23	26.4
	Ileum	34	39.1
	Jejunum	4	4.6
	Colon	3	3.5
	Appendix	3	3.5
	Cecum	2	2.6
	Rectum	0	0.0
3	Surgical procedure		
	Omentopexy	29	37.7
	Stoma	3	3.9
	Primary repair	25	32.5
	Resection and anastomosis	15	19.5
	Appendicectomy	3	3.9
	Peritoneal toileting	2	2.6
4	Redo surgery		
	Tension suturing	1	1.3
	Stoma formation	2	2.6

The timing of resuscitation emerged as a critical determinant of patient outcomes, with delayed presentation (>12 hours) observed in a significant proportion of cases (41.4%). This highlights the challenges associated with timely diagnosis and intervention in the context of small bowel perforations within the Indian healthcare milieu. Moreover, the

presence of associated comorbidities, including pulmonary tuberculosis and renal problems, underscored the complex interplay between underlying health conditions and the development of small bowel perforations.

Operative Data: The operative findings elucidated the diverse etiological spectrum contributing to small bowel perforations in the Indian population, emphasizing the unique epidemiological landscape prevailing in this setting. Notably, acid-peptic diseases, particularly duodenal ulcers, constituted a substantial proportion of cases (26.4%), highlighting the burden of gastrointestinal pathology within the realm of Indian general surgery.

Table 3 Postoperative complications

S. No.	Complications	Numbers	Percentage (%)
1	Wound infection	15	19.5
2	Wound dehiscence	3	3.9
3	Respiratory complication	6	7.8
4	Septicemia	4	5.2
5	Abdominal collection	3	3.9
6	Anastomosis leak	3	3.9
7	Mortality	10	13.0

The distribution of perforation sites underscored the anatomical predilection of small bowel pathology, with the ileum emerging as the most commonly affected site (39.1%). This deviation from Western patterns emphasizes the distinct clinical characteristics of small bowel perforations in the Indian context, necessitating tailored therapeutic interventions. Surgical management encompassed a spectrum of procedures tailored to individual patient needs, ranging from omentopexy to resection with anastomosis. The necessity for redo surgeries underscored the challenges associated with managing complex cases, necessitating a nuanced approach to surgical intervention.

Postoperative Complications: Despite advancements in surgical care, postoperative complications remained a significant concern, reflecting the intricate nature of small bowel perforations and the associated morbidity. Wound infections, respiratory complications, and septicemia underscored the multifaceted challenges encountered in postoperative management, emphasizing the imperative for comprehensive perioperative care strategies.

Interpretation: The findings of this study provide invaluable insights into the unique experiences and challenges encountered in managing small bowel perforations within the realm of Indian general surgery. The emphasis on preoperative evaluation, operative findings, and postoperative outcomes underscores the multifaceted nature of this condition and the imperative for tailored therapeutic interventions. By elucidating the nuances of small bowel perforations in the Indian context, this study contributes to the growing body of knowledge aimed at

optimizing patient care and improving outcomes in the field of Indian general surgery.

Conclusion

In conclusion, this study offers valuable insights into the clinical characteristics, operative findings, and postoperative outcomes of small bowel perforations within the realm of Indian general surgery. Through meticulous data collection and rigorous analysis, the study delineates the multifaceted nature of this condition, highlighting the unique challenges and nuances encountered in its management. By elucidating the epidemiological trends, etiological factors, and therapeutic interventions prevalent in the Indian context, the study contributes to the existing body of knowledge surrounding small bowel perforations and guides clinical practice and future research endeavors.

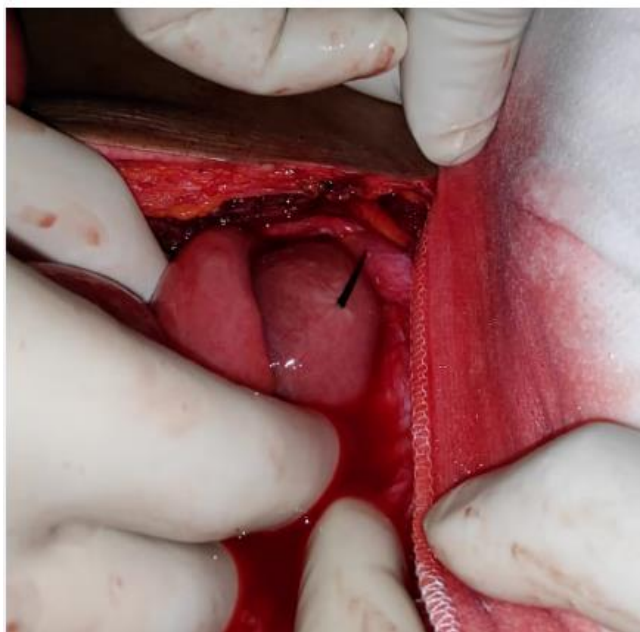


Fig2: Small Bowel Perforations

The findings underscore the imperative for a multidisciplinary approach to patient care, emphasizing the importance of timely diagnosis, appropriate surgical intervention, and comprehensive perioperative management strategies. Ultimately, this study aims to enhance patient outcomes and improve the quality of care delivery in the management of small bowel perforations within the Indian healthcare setting.

Limitations of the Study

Despite its contributions, this study is not without limitations. Firstly, the single-center nature of the study may limit the generalizability of the findings to other healthcare settings, necessitating caution in extrapolating the results to broader populations. Additionally, the observational design precludes the establishment of causal relationships between variables, highlighting the need for further interventional studies to validate the observed associations. Moreover, the reliance on retrospective data collection methods may introduce inherent biases and limitations, underscoring the importance of prospective studies to corroborate the findings. Furthermore, the study's focus on a specific time period and patient population may limit its applicability to contemporary healthcare practices, necessitating ongoing research to assess evolving trends and outcomes in the management of small bowel perforations.

Implications of the Study

The findings of this study have several implications for clinical practice, research, and healthcare policy. Clinically, the insights gleaned from this study can inform evidence-based decision-making in the management of small bowel perforations, guiding clinicians in optimizing patient outcomes and enhancing the quality of care delivery. Additionally, the identification of epidemiological trends and etiological factors can facilitate targeted interventions aimed at preventing and mitigating the burden of small bowel perforations within the Indian population. From a

research perspective, the study provides a foundation for future investigations, stimulating further inquiry into the pathophysiology, prognostic indicators, and therapeutic modalities relevant to small bowel perforations. Furthermore, the study's findings may inform healthcare policy initiatives aimed at improving access to timely diagnosis, surgical intervention, and postoperative care for patients with small bowel perforations, ultimately contributing to the enhancement of healthcare delivery systems.

Future Recommendations

Building on the findings of this study, several avenues for future research and clinical practice emerge. Firstly, prospective multicenter studies are warranted to corroborate the observed associations and validate the effectiveness of therapeutic interventions in diverse patient populations. Additionally, longitudinal studies tracking long-term outcomes and quality of life measures in patients with small bowel perforations can provide valuable insights into the natural history of the condition and guide follow-up care strategies. Furthermore, advancements in diagnostic modalities, such as imaging techniques and biomarkers, hold promise for enhancing early detection and risk stratification in patients presenting with small bowel perforations. Lastly, interdisciplinary collaborations between surgeons, gastroenterologists, infectious disease specialists, and public health experts are essential for developing comprehensive management guidelines and healthcare policies aimed at optimizing patient care and reducing the burden of small bowel perforations in the Indian population.

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