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To Validate a Severity Indicator Score in Evaluation and Management of Acute Intestinal Obstruction

[1]Dr Ram Prasad, Associate Professor, Department of General Surgery, J.L.N. Medical College & Associated Group of Hospitals, Ajmer, Rajasthan, India

[2]Dr Gaurav Kumar Sharma, Resident, Department of General Surgery, J.L.N. Medical College & Associated Group of Hospitals, Ajmer, Rajasthan, India

[3]Dr Rekha Porwal, Senior Professor, Department of General Surgery, J.L.N. Medical College & Associated Group of Hospitals, Ajmer, Rajasthan, India

[4]Dr Sandeep Krishnia, Resident, Department of General Surgery, J.L.N. Medical College & Associated Group of Hospitals, Ajmer, Rajasthan, India

[5]Dr Bhanwara Ram Patel, Resident, Department of General Surgery, J.L.N. Medical College & Associated Group of Hospitals, Ajmer, Rajasthan, India

Corresponding Author: Dr Gaurav Kumar Sharma, Resident, Department of General Surgery, J.L.N. Medical College and Associated Group of Hospitals, Ajmer (Raj.)

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Abstract

Background: Acute intestinal obstruction remains one of the most frequently encountered surgical emergencies, with significant morbidity and mortality, particularly in developing countries where delayed presentation complicates management. The decision between conservative and surgical management remains a critical challenge, often relying on subjective clinical judgment.

Aims and Objectives: To evaluate whether a clinical severity indicator score can identify patients with strangulated small bowel obstruction, to confirm the diagnosis and determine the need and timing of surgery, and to assess whether the clinical score allows early identification of strangulated obstruction.

Methods: This prospective observational study was conducted over 12 months in the Department of General Surgery, J.L.N. Medical College and Associated Group of Hospitals, Ajmer. Fifty patients with acute intestinal obstruction were assessed using a predefined severity indicator score incorporating five parameters: continuous abdominal pain >4 days, abdominal guarding, total leukocyte count (TLC) >11,000 cells/mm³, C-reactive

protein (CRP) >10 mg/L, and free intraperitoneal fluid (>500 mL) on ultrasonography or reduced bowel wall enhancement on CT. One point was assigned for each parameter. Scores were correlated with management modality, operative findings, complications, and outcomes.

Results: Maximum patients (28.0%) belonged to the 41–50 year age group, with a slight female predominance (52.0%). Postoperative adhesions were the most common etiology (40.0%), followed by tubercular abdomen (12.0%). Pain >4 days and abdominal guarding were each present in 50.0% of patients. Elevated TLC ($p = 0.004$) and CRP ($p = 0.001$) were significantly associated with operative management. Patients with a severity score ≥3 were predominantly managed surgically (23/24; $p < 0.001$), demonstrating the strongest predictive value. Ischemia was observed in 40.0%, gangrene in 28.0%, and perforation in 24.0% of patients, all significantly associated with severity score ≥3. ICU admission was required in 34.0% of patients, and overall mortality was 8.0%. Adhesiolysis was the most commonly performed procedure (24.2%).

Conclusion: The severity indicator score is a reliable predictor of the need for operative intervention in acute intestinal obstruction. A score ≥3 is significantly associated with operative management, complicated obstruction (ischemia, gangrene, perforation), and adverse outcomes. This practical scoring system can serve as a valuable tool for early risk stratification and guiding management decisions in resource-limited settings.

Keywords: Acute Intestinal Obstruction; Severity Indicator Score; Strangulation; Operative Management; C-Reactive Protein; Total Leukocyte Count.

Introduction

Acute intestinal obstruction remains one of the most frequently encountered surgical emergencies worldwide and continues to pose a significant challenge in both diagnosis and management. Despite advances in imaging techniques, perioperative care, and surgical strategies, intestinal obstruction still contributes substantially to morbidity and mortality, particularly in developing countries where delayed presentation and limited resources may complicate clinical decision-making.[1] The condition is characterised by partial or complete interruption of the normal flow of intestinal contents, resulting in accumulation of intestinal secretions, gas, and fluid proximal to the site of obstruction. This pathological process leads to progressive distension of the bowel, increased intraluminal pressure, impaired venous and lymphatic drainage, and eventually compromised arterial perfusion. If not recognised and treated promptly, the process may progress to bowel ischaemia, necrosis, perforation, peritonitis, and systemic sepsis.[2,3]

Acute intestinal obstruction accounts for a considerable proportion of emergency surgical admissions in tertiary care hospitals. The incidence and aetiological profile vary widely across different regions of the world. In developed countries, postoperative adhesions have emerged as the most common cause, accounting for nearly 60–70% of cases.[4] In contrast, in developing countries such as India, the spectrum of causes remains broader and often includes obstructed hernias, malignancies, intestinal tuberculosis, volvulus, and strictures in addition to adhesions.[5] While some cases can be managed conservatively with bowel rest, nasogastric decompression, and fluid resuscitation, others require urgent surgical intervention to prevent

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complications. Determining which patients will benefit from conservative management and which require early surgery remains a critical aspect of clinical decision-making.[6]

One of the major challenges in managing acute intestinal obstruction is distinguishing patients who can safely undergo conservative treatment from those who require urgent surgical intervention. Conservative management may be appropriate in cases of partial obstruction, particularly when adhesions are suspected and there are no signs of peritonitis or strangulation. However, prolonged conservative treatment in patients with severe obstruction can lead to delayed surgery and increased risk of complications.[7] Conversely, unnecessary early surgery exposes patients to operative risks and postoperative morbidity. Therefore, the development of reliable clinical tools that can objectively assess disease severity and predict outcomes is of great importance in improving patient management.[8]

In recent years, several scoring systems and predictive models have been proposed in surgical practice to assist clinicians in evaluating disease severity and guiding treatment decisions. These scoring systems integrate various clinical, laboratory, and radiological parameters to generate an overall severity score that reflects the patient's physiological status and the likelihood of complications.[9] In conditions such as pancreatitis, trauma, and sepsis, validated scoring systems have significantly improved risk stratification. However, the application of such scoring systems in acute intestinal obstruction has been relatively limited, and there remains a need for practical and reliable severity indicators that can be used in routine clinical settings.[10,11]

The relevance of this approach becomes particularly important in developing countries where patients often present late in the course of the disease. Delayed presentation may occur due to lack of awareness, financial constraints, or limited access to healthcare facilities. As a result, many patients reach tertiary care centres with advanced disease and complications such as bowel gangrene or generalised peritonitis. In such situations, rapid assessment and prompt decision-making are essential for improving survival.[12.,13] A severity indicator score could serve as a useful clinical tool in these settings by providing a structured method for evaluating patients and prioritising those who require urgent intervention.

The present study was therefore undertaken to validate a severity indicator score in the evaluation and management of patients presenting with acute intestinal obstruction in a tertiary care hospital. By systematically applying the severity score to patients admitted with intestinal obstruction and correlating the score with clinical outcomes, operative findings, and complications, the study aims to assess whether the scoring system can reliably predict disease severity and guide treatment decisions.

Materials and Methods

Study design and setting: This prospective observational study was conducted in the Department of General Surgery, J.L.N. Medical College and Associated Group of Hospitals, Ajmer, Rajasthan, over a period of 12 months.

Study population: Fifty patients presenting with acute intestinal obstruction were included in the study. The management of each patient was carried out by the treating surgical team according to the clinical condition and institutional protocols.

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Data collection: Clinical, laboratory, and radiological data were recorded for all patients at the time of admission.

History: Duration of symptoms, previous abdominal surgery, and associated clinical complaints.

Clinical examination: General examination included assessment of general condition, pulse rate, blood pressure, temperature, and hydration status. Systemic examination placed particular emphasis on abdominal examination, including assessment of abdominal distension, tenderness, guarding, rigidity, bowel sounds, and palpable masses. A provisional diagnosis of acute intestinal obstruction was made based on clinical findings.

Laboratory investigations: Complete blood count including total leukocyte count (TLC), C-reactive protein (CRP), and other routine biochemical investigations as required.

Radiological investigations: Chest X-ray (PA view), X-ray abdomen (erect view), ultrasonography (USG) of the abdomen and pelvis, and contrast-enhanced CT scan of the abdomen and pelvis wherever indicated.

Severity indicator score: After collection of complete clinical, laboratory, and radiological data, each patient was assessed using the predefined severity indicator scoring system. One point was assigned for the presence of each of the following severity indicators:

1. Continuous abdominal pain for more than 4 days
2. Abdominal guarding
3. Total leukocyte count (TLC) >11,000 cells/mm³ on admission
4. C-reactive protein (CRP) >10 mg/L
5. Free intraperitoneal fluid (>500 mL) on ultrasonography and/or reduced bowel wall contrast enhancement on CT scan

Each patient was assigned a total severity score based on the above parameters. Patients were subsequently managed either conservatively or surgically, according to their clinical condition. The severity scores were then correlated with the mode of management, operative findings, postoperative complications, and clinical outcomes.

Statistical analysis: Data were analysed using appropriate statistical methods. The Chi-square test was used to determine associations between categorical variables. A p-value <0.05 was considered statistically significant.

Results

Demographic characteristics: A total of 50 patients were included in the study. Maximum patients (28.0%) belonged to the 41–50-year age group, followed by 51–60 years and 61–70 years age groups (16.0% each). Females constituted a slight majority (52.0%), while males accounted for 48.0%. History of previous abdominal surgery was present in 26.0% of patients and was significantly associated with adhesive aetiology ($\chi^2 = 8.45$, $p = 0.004$).

Table 1: Demographic and clinical characteristics

Parameter	Number	Percentage (%)
Age group (years)		
≤20	3	6.0
21–30	7	14.0
31–40	7	14.0
41–50	14	28.0
51–60	8	16.0

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Parameter	Number	Percentage (%)
61–70	8	16.0
>70	3	6.0
Sex		
Male	24	48.0
Female	26	52.0
Previous abdominal surgery		
Yes	13	26.0
No	37	74.0

Clinical features and per-abdominal findings: Pain abdomen lasting more than 4 days and abdominal guarding were each observed in 50.0% of patients. Abdominal tenderness was the most common clinical finding (90.0%), followed by guarding (50.0%) and rigidity (4.0%). Tenderness was not significantly associated with operative management ($p = 0.264$), while guarding ($p = 0.010$) and rigidity ($p = 0.005$) showed significant association with complicated obstruction.

Table 2: Per-abdominal findings and management association

Finding	Present	Percentage (%)	χ^2	p-value
Tenderness	45	90.0	1.25	0.264
Guarding	25	50.0	6.72	0.010*
Rigidity	2	4.0	7.84	0.005*

*Statistically significant at $p \leq 0.05$

Laboratory parameters and management: Elevated TLC (>11,000 cells/mm³) showed highly significant association with operative management ($\chi^2 = 8.42$, $p = 0.004$). Elevated CRP (≥10 mg/L) showed an even stronger association with operative management ($\chi^2 = 10.15$, $p = 0.001$). Mean TLC was 13,450 ± 4,280 cells/mm³ and mean CRP was 16.8 ± 8.4 mg/L, both significantly elevated compared to normal values ($p < 0.001$).

Table 3: Laboratory parameters and management pattern

Parameter	Conservative	Operative	Total	χ^2	p-value
TLC ≤11,000	14	12	26	8.42	0.004*
TLC >11,000	3	21	24		
CRP <10 mg/L	13	8	21	10.15	0.001*
CRP ≥10 mg/L	4	25	29		

*Statistically significant at $p \leq 0.05$

Mode of presentation and aetiology: Subacute presentation was the most common (46.0%), followed by acute (44.0%) and chronic (10.0%). Acute presentation was significantly associated with operative management ($p = 0.042$). Postoperative adhesions were the most common cause of intestinal obstruction (40.0%), followed by tubercular abdomen (12.0%), bands and carcinoma (8.0% each). All patients with bands, carcinoma, mesenteric ischaemia, appendicular causes, stricture, intussusception, volvulus, internal hernia, and superior mesenteric artery syndrome required

operative management, while all three patients with paralytic ileus were managed conservatively ($p = 0.026$).

Table 4: Aetiology and management pattern

Cause of obstruction	Conservative	Operative	Total
Adhesions	10	10	20
Tubercular (Koch's abdomen)	4	2	6
Bands (extra-luminal)	0	4	4
Carcinoma	0	4	4
Mesenteric ischaemia	0	3	3
Appendicular	0	3	3
Paralytic ileus	3	0	3
Stricture	0	2	2
Intussusception	0	2	2
Volvulus	0	1	1
Internal hernia	0	1	1
SMA syndrome	0	1	1
Total	17	33	50

Severity indicator score and management: Patients with severity indicator score ≥3 were predominantly managed surgically (23/24; 95.8%), while those with score <3 were predominantly managed conservatively (16/26; 61.5%). This association was highly significant ($\chi^2 = 15.38$, $p < 0.001$), demonstrating the strongest predictive value among all parameters assessed.

Table 5: Severity indicator score and management

Severity Score	Operative	Conservative	Total
<3	10	16	26
≥3	23	1	24
Total	33	17	50
$\chi^2 = 15.38$, $p < 0.001$*			

*Statistically significant at $p \leq 0.05$

Operative procedures and pathological findings: Among the 33 patients who underwent operative management, adhesiolysis was the most commonly performed procedure (24.2%), followed by exploratory laparotomy with band release (21.2%), resection and anastomosis (15.2%), and loop ileostomy (15.2%). Ischaemia was observed in 40.0% of patients, gangrene in 28.0%, and perforation in 24.0%. All three pathological findings showed highly significant association with severity score ≥3 ($p < 0.01$ for all).

Table 6: Operative procedures performed

Operative Procedure	Number	Percentage (%)
Adhesiolysis	8	24.2
Exploratory laparotomy with band release	7	21.2
Exploratory laparotomy with resection & anastomosis	5	15.2
Exploratory laparotomy with loop ileostomy	5	15.2
Band release with appendectomy	4	12.1

Operative Procedure	Number	Percentage (%)
Adhesiolysis with bowel resection	3	9.1
Hartmann's procedure	1	3.0
Total	**33**	**100**

Postoperative complications and outcomes: Among the 33 patients who underwent surgery, wound infection was the most common complication (6.0%), followed by bowel fistula (4.0%) and burst abdomen (2.0%). Overall mortality in the study was 8.0%. ICU admission was required in 34.0% of patients and was significantly associated with severity score ≥3 (p = 0.009). Mortality was significantly higher in patients with gangrene and perforation (p = 0.002).

Table 7: Outcomes and statistical significance

Parameter	Number	Percentage(%)	χ^2	p-value
ICU admission	17	34.0	6.89	0.009*
No ICU admission	33	66.0		
Mortality	4	8.0	9.45	0.002*
Survival	46	92.0		

*Statistically significant at $p \leq 0.05$

Discussion

The present study was conducted to validate a severity indicator score in the evaluation and management of acute intestinal obstruction. A total of 50 patients were included in this prospective observational study. The findings demonstrate that the severity indicator score is a valuable tool for predicting the need for operative intervention.

In our study, the maximum number of patients belonged to the 41–50-year age group (28.0%). This is consistent with Biondo et al. (2004), who reported that intestinal obstruction is more common in middle-aged and elderly populations.[7] Of the 50 patients included, 66% underwent operative intervention and 34% were managed conservatively.

Our severity indicator score incorporated clinical parameters, laboratory markers, and radiological findings. Schwenter et al. (2010) proposed a clinicoradiological scoring system for predicting strangulated small bowel obstruction. Their study demonstrated that combining clinical findings with imaging features significantly improves the ability to detect bowel ischaemia.[14] Our findings support this approach, as patients with severity scores ≥3 were predominantly managed surgically (p < 0.001).

Zielinski et al. (2010) developed a predictive model based on clinical and radiological variables.[15] In our study, elevated TLC was significantly associated with operative management (p = 0.004), and elevated CRP showed an even stronger association (p = 0.001). These findings are consistent with Zielinski et al.'s observation that inflammatory markers are reliable predictors. Noh et al. (2012) demonstrated that combining laboratory parameters with imaging findings improves prediction of intestinal ischaemia.[16] Our study similarly found that the combination of clinical, laboratory, and radiological parameters provided the strongest predictive value (p < 0.001).

In the present study, the largest proportion of patients belonged to the 41–50-year age group (28.0%). Tiwari et al. reported the highest incidence in the 51–61-year age

group (25%) followed by the 40–50-year age group (23.33%).[17] Although the peak age group differed slightly between the two studies, both demonstrate that acute intestinal obstruction is more frequently encountered in middle-aged and older adults. Postoperative adhesions were the most common cause in our study, in agreement with Tiwari et al., who also identified adhesions as the leading cause (33.33%). The present study demonstrated a strong association between a severity indicator score ≥3 and the requirement for operative management ($p < 0.001$). Similar findings were reported by Tiwari et al., where the majority of patients with a severity score of 3 or more underwent surgical intervention, while most patients with lower scores were managed successfully by conservative treatment. Raised TLC and elevated CRP were significantly associated with operative management in the present study, similar to Tiwari et al.[17]

The overall mortality rate in the present study was 8.0%, which is lower than the 15% mortality reported by Tiwari et al.[17] The lower mortality observed in our study may be related to earlier diagnosis, timely surgical intervention guided by severity scoring, and advances in perioperative care. Nevertheless, both studies highlight that patients presenting with bowel ischaemia, gangrene, or perforation have a substantially higher risk of adverse outcomes, emphasising the importance of prompt recognition and treatment.

Limitations

The study was conducted at a single centre with a relatively small sample size. Larger multicentre studies are needed to validate the scoring system across different populations and healthcare settings. Additionally, direct measurement of serum lactate and other biomarkers was not performed due to financial constraints.

Conclusion

The severity indicator score is a reliable predictor of the need for operative intervention in patients with acute intestinal obstruction, with patients scoring ≥3 being significantly more likely to require operative management ($p < 0.001$). Elevated inflammatory markers (TLC and CRP) showed statistically significant association with operative management, while ischaemia, gangrene, and perforation—acute complications requiring urgent surgical intervention—were significantly associated with higher severity scores. The severity indicator score can therefore serve as a practical clinical tool for early risk stratification and guiding management decisions; however, further multi-centre studies with larger sample sizes are recommended to validate these findings.

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