## Original Research Article

# Evaluation of prognosis and outcome of small bowel obstruction using the acute general emergency surgical severity-small bowel obstruction score

## Hemendra C. Nath[1]*, Benedict Terang[1], Rupak Bhuyan[2], Sufil Gogoi[1]

[1]Department of Surgery, [2]Department of Radiology, Jorhat Medical College, Jorhat, Assam, India

**\*Correspondence:**
Dr. Hemendra C. Nath,
E-mail: forb_intnl@rediffmail.com

### ABSTRACT

**Background:** Small bowel obstruction (SBO) is a common surgical emergency, associated with significant morbidity and mortality specially if strangulated. There was not much used of scoring system for SBO. The aim of the study was to determine the usefulness of acute general emergency surgical severity (AGESS)-SBO score developed by Patrice Wendlling at Mayo Clinic in 2015 to evaluate the prognosis and outcomes of SBO.
**Methods:** 80 patients age ≥13 years who fulfill the study criteria and admitted in surgery ward, Jorhat Medical College and Hospital, Jorhat between May 2020 to October 2021 were identified. The American association for the surgery of trauma (AAST) anatomic score, physiological score and comorbidity score are added to get AGESS-SBO score.
**Results:** The mean age was 41.2 years and males (77.5%) were more affected. Obstructed external hernia (40%) was the most common cause of SBO. 64 patients (80%) were operated and 16 patients were treated conservatively. Complications were seen in 30 patients and 8 patients (10%) died during hospital stay. The median AGESS-SBO score is 5 (IQR 5-6) for complications and 2 (IQR 1.0-2.5) for no complications (p value of 0.0001).
**Conclusions:** Incidence is more in males and obstructed hernia was the commonest cause. Higher the AGESS-SBO score more the complications and so was morbidity and mortality. A score more than 2 has unfavorable outcome.

**Keywords:** AGESS-SBO, SBO, Small bowel obstruction, Strangulation, LOS

## INTRODUCTION

Small bowel obstruction is a surgical condition associated with high level of mortality and morbidity with a prevalence of 12-16%.[1] This condition occurs when the intestinal contents are prevented from moving along the length of intestine, and symptoms can vary based on the level and severity of obstruction. The two categories of small bowel obstruction (SBO) are mechanical and neurogenic.[2] Mechanical SBO are caused by adhesion, hernia, bands, stricture, tumor, volvulus, intussusception, stones, bolus.[3] The diagnosis is based on history and clinical examination and confirmed by radio-imaging. The severity assessment of SBO is important to predict the early management, prognosis and outcomes. There is not much use of scoring system for SBO, thus we aim to study and validate the scoring system for small bowel obstruction. For this, we used the acute general emergency surgical severity (AGESS)-SBO score to evaluate and predict the surgical severity, the prognosis and outcome of SBO. The AGESS-SBO score was developed by Patrice Wendlling at Mayo Clinic, Minnesota in 2015. The AGESS-SBO Score is the sum of American association for the surgery of trauma (AAST) anatomical score (0-5 points), physiological score (0-5 points) and comorbidity score (0-5 points) of the patient.[4-6]

*Aims and objectives*

The aims and objectives of this study were to determine various causes of small bowel obstruction; and to study the prognosis and outcome in small bowel obstruction on the basis of AGESS-SBO score.

## METHODS

The study was conducted for a period of 1 year 6 months from May 2020 to October 2021 with a sample size of 80. The study included patients aged 13 years and above admitted to surgery wards, Jorhat Medical College and Hospital (JMCH), Jorhat with radiologically proven cases of small bowel obstruction. Patients aged less than 13 years, pregnant women and unwilling patients were excluded from the study. Present study was a hospital based observational study. The study was approved by the institutional ethics committee, JMCH.

Necessary consent was obtained from the patient and relatives. Nasogastric aspiration with Ryle's tube and Foley's catheterization were done. All patients were resuscitated with intravenous fluid, dehydration corrected and kept nil per orally. Antibiotics, and antispasmodics, were given accordingly.

All patients with small bowel obstruction were assessed clinically in detailed after admission. History of medical diseases like heart disease, cerebral vascular accident (CVA), and diabetes were taken. Examination to detect any features of systemic inflammatory response syndrome (SIRS), sepsis, shock and organ dysfunction was done.

On admission a relevant hematological and biochemical investigations including serum electrolyte, plain abdominal X-ray (both erect and supine), ultrasonography (USG) of whole abdomen were carried out in all patients. Contrast enhanced computed tomography (CECT) scan abdomen was done in selected cases.

Patients who showed clinical improvement were continued conservative treatment. Patients who showed clear cut signs of acute obstruction with features of strangulation and failure of conservative treatment were managed by appropriate surgery after initial resuscitation. Intraoperative findings were recorded. Postoperative period was monitored and all parameters were recorded. Complications if any, were managed accordingly. Post operative follow up period was up to 6 months from time of discharge.

## RESULTS

Table 1 shows age incidence. The study shows peak incidence of the disease in the age group 21-30 years.

The mean age was 41.2 years.

Table 2 shows sex incidence. Males accounted for 62 patients (77.5%) and female accounted for 18 patients (22.5%) with male to female ratio of 3.4: 1 in the study.

**Table 1: Age incidence.**

| Age in years | Total | Percentage |
|---|---|---|
| 13-20 | 10 | 12.5 |
| 21-30 | 20 | 25.0 |
| 31-40 | 10 | 12.5 |
| 41-50 | 18 | 22.5 |
| 51-60 | 16 | 20.0 |
| >61 | 6 | 7.5 |

*Causes of small bowel obstruction*

The study shows obstructed inguinal hernias as the commonest cause of SBO with 32 patients (40%), followed by adhesions, intussusception, volvulus, ileocecal TB stricture, bands, obstructed umbilical hernia, Meckel's diverticulum with 20 (25%), 12 (15%), 4 (5%), 4 (5%), 4 (5%), 2 (2.5%), and 2 (2.5%) patients respectively.

*Investigations*

Positive X-ray findings were seen in 66 cases (82.5%). USG has a sensitivity rate of 95% (76 cases) for detection of obstruction and a sensitivity of 75% and specificity of 78% in determining bowel strangulation in our study. Leucocytosis was seen in 30 (37.5%) patients. Leucocytosis has a sensitivity of 65% and specificity of 72% for detection of strangulation obstruction.

**Table 2: Sex incidence.**

| Sex | Total | Percentage |
|---|---|---|
| Male | 62 | 77.5 |
| Female | 18 | 22.5 |
| Total | 80 | 100 |

*Anatomical score*

The median anatomical score was 2.5 [IQR: 2-4] (Table 3).

*Physiological score*

The median physiological score was 1 [IQR: 0-1] (Table 4).

*Comorbidity score*

The median comorbidity score was 0 [IQR: 0-0] (Table 5).

*AGESS-SBO score*

The median AGESS-SBO score was 3.5 (IQR: 2-5) (Table 6).

**Table 3: Anatomical score.**

| Parameters | Normal (score 0) | Partial simple obstruction (score 1) | Complete SBO without strangulation (score 2) | Complete SBO with strangulation but viable (score 3) | Complete SBO without viability (score 4) | Strangulation with perforation with diffuse contamination (score 5) |
|---|---|---|---|---|---|---|
| Total | 0 | 16 | 24 | 8 | 30 | 2 |
| Percentage | 0 | 20 | 30 | 10 | 37.5 | 2.5 |

**Table 4: Physiological score.**

| Parameters | Normal physiology (score 0) | SIRS (score 1) | Sepsis (score 2) | Severe sepsis (score 3) | Septic shock (score 4) | MODS (score 5) |
|---|---|---|---|---|---|---|
| Total | 34 | 44 | 2 | 0 | 0 | 0 |
| Percentage | 42.5 | 55 | 2.5 | 0 | 0 | 0 |

**Table 5: Comorbidity score.**

| Parameters | Normal (score 0) | Charlson comorbidity index of 1 or 2 (score 1) | Charlson comorbidity index of 3 or 4 (score 2) | Charlson comorbidity index of 5 or 6 (score 3) | Charlson comorbidity index of 7 or 8 (score 4) | Charlson comorbidity index >9 (score 5) |
|---|---|---|---|---|---|---|
| Total | 68 | 8 | 4 | 0 | 0 | 0 |
| Percentage | 85 | 10 | 5 | 0 | 0 | 0 |

**Table 6: AGESS-SBO score.**

| AGESS-SBO score→n=15 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Frequency | 16 | 22 | 2 | 10 | 16 | 10 | 2 | 2 | 80 |
| Percentage | 20 | 27.5 | 2.5 | 12.5 | 20 | 12.5 | 2.5 | 2.5 | 100 |

*Treatment distribution*

16 patients (20%) were managed conservatively and 64 patients (80%) were operated. Among the operated patients, resection and anastomosis was the commonest procedure done in 36 cases (56.2%), followed by hernia repair 16 cases (25%), adhesiolysis 14 cases (22%), ileostomy 12 cases (19%), band lysis 4 cases (6%) and derotation of volvulus 2 case (3%).

*Postoperative complications*

30 out of 64 operated cases developed in-hospital complications. The most common complication in the study was wound infection (35%), followed by chest infection (15%), septicemia (12.5 %), ARF (2.5 %), bed sore (7.5%) and fecal fistula (2.5 %).

*Length of hospital stay*

The overall length of stay (LOS) for patients who recovered was 8 days. The average length of stay for patients without complications was 7 days.

Patients who had developed complications has longer median LOS of 15 days. Average duration of stay for fatal cases was 4 days.

*Mortality*

The overall mortality rate in the study was 10%. 8 operated patients died (septicaemia-4, ARF-2, and respiratory cause-2).

Table 7 shows correlation between LOS with AGESS-SBO score. The study shows LOS was weakly but positively correlated with AGESS-SBO score, anatomical score, and physiological score.

**Table 7: Correlation between LOS with AGESS-SBO score.**

| Parameters | Kendall's Tau b τb | P value |
|---|---|---|
| LOS/AGESS-SBO score | 0.365 | 0.003 |
| LOS/anatomical score | 0.448 | 0.0001 |
| LOS/physiological | 0.415 | 0.002 |
| LOS/comorbidity score | -0.246 | 0.066 |

*Association of AGESS-SBO score with complication*

The AGESS-SBO score for complications was 5 (IQR: 5-6) and without complications was 2 (IQR: 1-2.5) which was statistically significant (p value 0.0001).

## Association of score with mortality

The AGESS-SBO for recovered cases was 2 (IQR: 2-5) and for fatal cases was 6.5 (IQR: 6-7.74) and statistically significant (p value 0.0001).

## Association of score with operative intervention

The AGESS-SBO score for conservative management was 1 (IQR: 1-1) and operative intervention was 4 (IQR: 2-5) and statistically significant (p value 0.0001).

## Comparison of outcome between recovered and expired

The median age for recovered cases was 40 years and expired cases was 55 years. The median LOS for recovered cases was 8 days while fatal cases have shorter hospital stay of 4 days (p value 0.001). The median AGESS-SBO score for recovered cases was 2 and fatal cases was 6.5 (p value 0.0001).

## Complications frequency according to AGESS-SBO score

The AGESS-SBO score with ≤2 has thirty-eight without complications. While score of >2 has forty-two patients out of which 30 patients developed complications and 8 died during the hospital stay (p value 0.000).

## The outcomes according to AGESS-SBO score

Patients with AGESS SBO score of ≤2 has shorter duration of hospital stay (median LOS 7 days) while those with score of >2 has longer hospital stay with median LOS 13.5 days (p value 0.001).

## DISCUSSION

### Disease etiology

The commonest cause of small bowel obstruction in the study was obstructed hernia (42.5%) followed by adhesion (25%) and intussusceptions (15%). In western countries, postoperative adhesions and small bowel volvulus are the commonest cause of SBO.[7] Whereas in developing countries like India, the most common cause of SBO is obstructed/strangulated hernia followed by adhesions.[8] The findings in our study are comparable to findings as reported by other studies. Adhikari et al reported obstructed hernia (35.9%), adhesions (15.5%), TB stricture (14.1%), volvulus (6.26%), intussusceptions (2.18%), and Meckel's diverticulum (2.18%).[9]

### Investigations

Positive rays findings were observed in 82.5% of cases which are comparable with the findings of 87% by Malik et al and 81% by Priscilla et al.[10-11] USG of abdomen are positive in 95% cases which are comparable with Ogata et al (88%), Ünlüer et al (97.7%).[12,13] USG has a sensitivity

of 75% and specificity of 78% in determining bowel strangulation in our study which is lower in comparison to findings by Ogata et al with a sensitivity of 89% and specificity of 91%.[12]

In our study leukocytosis has a sensitivity and specificity of 65% and 72% respectively for bowel strangulation which is comparable with other studies. Tiwari et al reported the sensitivity of leukocytosis for strangulation was 71.4% and specificity of 51.3%.[1] Nadalaya et al reported sensitivity of 63% and specificity of 60%.[14]

### Treatment

The most common surgical procedures performed in our study was resection and anastomosis (56.2%) which is higher than other studies. This was owing to delayed presentation and delayed surgical intervention in some cases. This was followed by hernia repair (25 %), adhesiolysis (22%), ileostomy (19%), band lysis (6%) and derotation of volvulus (3%) which are comparable to other studies. Tiwari et al reported resection and anastomosis (45.7%), adhesiolysis (14%), ileostomy (4%).[1] Abdullah et al reported resection and anastomosis (40%) and hernia repair (20%).[15] The median AGESS-SBO score for conservative management was 1. In our study the median AGESS-SBO score for operated cases was 4 while it was 6 as reported by Baghdadi et al which is comparable.[4]

### Complications

The most common complication was wound infection (35%) followed by respiratory tract infections (15%), septicemia (12%), and fecal fistula 2.5% and is comparable with studies by Qureshi et al who reported wound infection (36.58%), septicemia (26.83%), wound dehiscence (4.88%) and fecal fistula (2.44%).[16] The median AGESS-SBO score for uncomplicated cases was 2. The median AGESS-SBO score for complications was 5 in our study while it was 8 as reported by Baghdadi et al.[4] The complication rate in the present study was 38% which is higher than 21% reported by Baghdadi et al.[4]

### Mortality rate

The mortality rate in our study was 10% which is comparable with studies reported by Wangensteen (11%) and Ramachandran et al (12.7%).[3,17] The reason for high mortality in our study are multifactorial and attributed to late presentation, presence of SIRS and gangrenous bowels, patients age >50 years, presence of comorbidities. In our study, the median AGESS-SBO score for fatal cases was 6.5 (IQR: 6-7.74) and recovered cases was 2 which is lower than 9 and 4 respectively as reported by Baghdadi et al.[4]

### LOS

The median length of stay for patients who recovered was 8 as compared to 5 days reported by Baghdadi et al and the

average length of hospital stay for patients without complications was 7 days.[4] Patients who had developed complications has longer median LOS of 15 days which was higher than >9 days reported by Baghdadi et al.[4] The overall median AGESS-SBO score in our study was 3.5 while it was 5 as reported by Baghdadi et al.[4]

### *Limitations*

Past medical history and records were difficult to obtain from majority of the patients.

## CONCLUSION

The present study shows obstructed hernia as the commonest cause of small bowel obstruction in the Indian context. The AGESS-SBO score for small bowel obstruction has good correlation with the findings obtained in our study. AGESS-SBO score of 2 or less than 2 has a good prognosis. A score of more than 2 is associated with higher operative intervention, higher complications and mortality. Delayed presentation, presence of SIRS, intra-operative presence of bowel gangrene and perforation and AGESS-SBO score of more than 2 was associated with higher complications and mortality. Morbidity and mortality of small bowel obstruction can be reduced by appropriate early diagnosis and early intervention.

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