



Utility Of Surgical Apgar Score In Predicting Postoperative Morbidity And Mortality In Laparotomy Patients: A Prospective Observational Study

Dr. Akshi Savla, Dr. Ali Reza, Dr. Shubham Jain

***Corresponding Author:**
Dr. Akshi Savla

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Abstract

Background: Early identification of patients at risk of adverse postoperative outcomes remains a major challenge in general surgery. The Surgical Apgar Score (SAS) is a simple 10-point intraoperative scoring system based on estimated blood loss, lowest mean arterial pressure, and lowest heart rate.

Methods: A prospective observational study was conducted in the Department of General Surgery, MGM Medical College and Hospital, Navi Mumbai, from February 2023 to May 2025. Fifty adult patients undergoing elective or emergency laparotomy were enrolled. SAS was calculated at the completion of surgery and patients were followed for 30 days.

Results: Seventy percent of patients were male and most were aged 21–40 years. Postoperative complications occurred in 32% of patients, while overall 30-day mortality was 10%. Lower SAS categories demonstrated higher rates of morbidity and mortality. Complication rates decreased from 44.4% in patients with SAS 0–2 to 20% in patients with SAS 7–10. Mortality similarly decreased with increasing SAS. Statistical significance was not demonstrated, likely due to limited sample size.

Conclusions: Lower SAS values were associated with worse postoperative outcomes following laparotomy. The SAS remains a practical and objective tool for perioperative risk stratification

Keywords: Surgical Apgar Score; laparotomy; postoperative complications; mortality; risk assessment; general surgery

Introduction

Postoperative morbidity and mortality continue to contribute substantially to healthcare burden worldwide. Surgeons require reliable tools that can identify high-risk patients early and facilitate targeted postoperative monitoring.

The Surgical Apgar Score was introduced as a simple intraoperative scoring system analogous to the neonatal Apgar score. It incorporates three readily available parameters: estimated blood loss, lowest mean arterial pressure, and lowest heart rate. Unlike complex risk models requiring extensive laboratory investigations or preoperative calculations, SAS can be determined immediately after surgery without additional cost.

Laparotomy remains one of the most commonly performed major abdominal operations and is associated with significant physiological stress. Accurate prediction of outcomes in this population is therefore of particular importance. This study evaluated the utility of SAS in predicting postoperative morbidity and mortality among laparotomy patients treated at a tertiary care teaching institution.

Materials and Methods

Study Design and Setting: Prospective observational study conducted between February 2023 and May 2025.

Study Population: Fifty adult patients undergoing elective or emergency laparotomy.

Inclusion Criteria: Patients aged >18 years undergoing laparotomy.

Exclusion Criteria: Non-laparotomy procedures, laparoscopic procedures, unresectable metastatic malignancy, immunocompromised patients, and patients unwilling to participate.

Data Collection: Demographic variables, comorbidities, operative findings, and postoperative outcomes were prospectively recorded.

Outcome Measures: Primary endpoints were postoperative complications and 30-day mortality. Patients were followed throughout the postoperative period and for 30 days after surgery.

Statistical Analysis: Descriptive statistics were used. Associations between SAS categories and outcomes were evaluated using appropriate significance testing with $p < 0.05$ considered significant.

Results

A total of 50 patients were included. Thirty-five patients (70%) were male and fifteen (30%) were female. The largest age group was 21–40 years. Comorbid illnesses were identified in 44% of patients, with hypertension being the most common condition.

The distribution of SAS categories showed that most patients were clustered within intermediate-risk groups. Postoperative complications were observed in 16 patients (32%). Sepsis, surgical site infection, acute respiratory distress syndrome, paralytic ileus, re-exploration, acute kidney injury, and cardiovascular collapse represented the major complications encountered.

Complication rates demonstrated a consistent inverse relationship with SAS. Patients in lower score categories experienced more adverse events than patients in higher score categories. Thirty-day mortality occurred in five patients (10%), with mortality rates progressively decreasing as SAS increased.

Discussion

The present study demonstrated a clinically meaningful association between lower Surgical Apgar Scores and worse postoperative outcomes. Although

statistical significance was not achieved, likely due to the modest sample size, the observed trends were consistent with previously published literature.

The major strength of the SAS lies in its simplicity. All variables required for calculation are routinely available during surgery, allowing immediate risk stratification without additional investigations. This is particularly advantageous in resource-constrained settings where more complex scoring systems may be impractical.

The findings suggest that patients with low SAS values may benefit from intensified postoperative surveillance, early senior review, aggressive optimization of physiological parameters, and consideration for higher-dependency postoperative care.

Comparison with international studies indicates broad agreement regarding the predictive utility of SAS across surgical populations. Variability in statistical significance between studies may be attributable to differences in sample size, case mix, and operative complexity.

Limitations

The principal limitations include a relatively small sample size, single-centre design, and inclusion of both elective and emergency procedures. These factors may have reduced statistical power and limited generalizability. Larger multicentre studies are warranted.

Conclusion

The Surgical Apgar Score demonstrated an inverse relationship with postoperative morbidity and mortality among laparotomy patients. Despite the absence of statistically significant associations, clinically relevant trends were observed. The score is simple, inexpensive, reproducible, and immediately available at the end of surgery, making it a valuable adjunct for postoperative risk stratification and patient management.

Figure Legends

Figure 1. Distribution of Surgical Apgar Scores.
Figure 2. Postoperative complication rates according to SAS category.

Figure 3. Thirty-day mortality according to SAS category.

References

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Table 1. Baseline Characteristics

Variable	Result
Sample size	50
Male sex	70%
Female sex	30%
Patients with comorbidities	44%
Overall complication rate	32%
30-day mortality	10%

Table 2. Surgical Apgar Score Distribution

SAS Category	Patients (%)
0–2	18%
3–4	40%
5–6	32%
7–10	10%

Table 3. Major Postoperative Complications

Complication	Frequency (%)
Sepsis	8
Surgical site infection	6
ARDS	6
Paralytic ileus	4
Re-exploration	4
Acute kidney injury	2
Cardiovascular collapse	2