

Research Article

Pre-Operative Serum Albumin as a Predictor of Post Operative Outcome in Emergency Bowel Anastomosis: An Observational Study in Victoria Hospital, Bengaluru

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Received: 08.06.26, Revised: 12.07.26, Accepted: 10.08.26

ABSTRACT

Introduction: Hypoalbuminemia is associated with increased postoperative morbidity and mortality in patients undergoing major abdominal surgery. Emergency bowel anastomosis, performed in a physiologically stressed and often catabolic patient, carries a particularly high risk of anastomotic leak and other complications, and preoperative nutritional status may influence these outcomes.

Aim: To evaluate preoperative serum albumin as a predictor of postoperative outcome in patients undergoing emergency bowel anastomosis.

Materials and Methods: This hospital-based prospective observational study was conducted in the Department of General Surgery, Victoria Hospital, Bengaluru, over a 6-month period (January-June 2026). A total of 100 patients undergoing emergency bowel anastomosis were included. Preoperative serum albumin was measured and patients were categorised as having normal (≥ 3.5 g/dl) or low (< 3.5 g/dl) albumin. Preoperative clinical presentation and postoperative outcomes — including surgical site infection, pulmonary complications, ventilatory support, sepsis, prolonged ileus, anastomotic leak, cardiac complications, prolonged hospitalisation, and mortality — were recorded and analysed against albumin category.

Results: Of 100 patients, 42 had normal and 58 had low preoperative serum albumin. Mean serum albumin was significantly lower in patients who developed fever, surgical site infection, pulmonary complications, need for ventilatory support, sepsis, cardiac complications, prolonged hospitalisation, and mortality (all $p < 0.001$), and low albumin (categorically) was significantly associated with the same outcomes as well as vomiting ($p = 0.005$) and anastomotic leak ($p < 0.001$). Pain abdomen, per-abdominal tenderness, and prolonged ileus were not significantly associated with albumin level.

Conclusion: Preoperative serum albumin is a simple, inexpensive, and clinically useful marker for predicting postoperative morbidity — including anastomotic leak — and mortality in patients undergoing emergency bowel anastomosis. Routine preoperative assessment may help identify high-risk patients for closer perioperative monitoring and nutritional optimisation.

Keywords: Serum Albumin, Hypoalbuminemia, Emergency Bowel Anastomosis, Anastomotic Leak, Postoperative Complications, Prognostic Marker.

INTRODUCTION

Hypoalbuminemia is a well-recognised marker of poor nutritional and physiological reserve, and has repeatedly been linked to worse outcomes after major surgery.[1] Surgery itself induces a catabolic, stress state, and wound and anastomotic healing depend on adequate protein and energy reserves. Patients undergoing emergency bowel anastomosis are frequently malnourished at presentation — due to sepsis, obstruction, prolonged vomiting, or

delayed presentation — and are additionally exposed to the physiological demands of an unprepared bowel and an emergency operative setting.

Anastomotic healing in particular is dependent on adequate collagen synthesis and tissue oxygenation, both of which are compromised in hypoproteinemic states. Anastomotic leak remains one of the most feared complications of bowel anastomosis, carrying substantial morbidity and mortality, and identifying

patients at higher risk preoperatively could allow for closer monitoring, staged procedures, or nutritional optimisation where feasible.[2] Several nutritional indices exist, but there is no consensus on a single best preoperative marker. Serum albumin remains attractive because it is inexpensive, universally available, and does not require specialised equipment. A preoperative serum albumin level below 3.5 g/dl is generally taken to indicate depleted protein stores and a higher risk of postoperative complications, while levels at or above this threshold suggest adequate reserve.[3] This study was undertaken to assess whether preoperative serum albumin predicts postoperative outcome specifically in patients undergoing emergency bowel anastomosis, a subgroup in whom the consequences of impaired healing — namely anastomotic leak — are especially consequential.

MATERIALS AND METHODS

Study Design: Hospital-based prospective observational study.

Study Setting: Department of General Surgery, Victoria Hospital, Bengaluru.

Study Duration: 6 months (January 2026 – June 2026).

Study Population: All patients undergoing emergency bowel anastomosis during the study period.

Sample Size: 100 patients.

Sampling Technique: Consecutive sampling.

Inclusion Criteria:

1. Patients who gave consent for the study.
2. Age above 18 years and below 60 years, both males and females.
3. Patients presenting to the Department of Surgery requiring emergency bowel anastomosis.

4. If diabetic, HbA1c <7%.

Exclusion Criteria:

5. Age below 18 years or above 60 years.
6. Patients with established liver or renal parenchymal disease.
7. Patients with immunosuppression, including diabetes mellitus on chemotherapeutic medications.
8. Uncontrolled diabetes with HbA1c >7%.

Study Tools: Blood investigations (LFT, KFT, CBC, CRP, ESR, blood culture), chest X-ray, ultrasonography, CECT whole abdomen, Ryles tube for gastric decompression, Foley's catheter, and thermometer.

[Demographic data — age distribution, sex ratio — to be added.]

Statistical Analysis

Data were entered into a Microsoft Excel spreadsheet. Categorical variables were summarised as counts and percentages, and compared between the normal and low albumin groups using the Chi-square test; Fisher's exact test was used where expected cell counts were below 5. Continuous serum albumin values were summarised as mean $\pm$ S.D. and compared between patients with and without each clinical feature/complication using the independent-samples (Welch's) t-test. A p-value $\leq$ 0.05 was considered statistically significant.

RESULTS

A total of 100 patients undergoing emergency bowel anastomosis were included. Of these, 42 patients (42%) had normal preoperative serum albumin (≥ 3.5 g/dl) and 58 patients (58%) had low serum albumin (< 3.5 g/dl).

Table 1: Comparison of mean Serum Albumin (gm/dl) between Patients with and without Each Preoperative Clinical Presentation and postoperative Complication

Clinical symptoms / signs & Postoperative complications	Serum Albumin (Mean $\pm$ S.D.)YES	Serum Albumin (Mean $\pm$ S.D.)NO	t value	p value
Pain abdomen	3.30 $\pm$ 0.70	3.60 $\pm$ 0.76	0.864	0.433
Vomiting	3.19 $\pm$ 0.77	3.45 $\pm$ 0.69	1.667	0.101
Fever	2.96 $\pm$ 0.70	3.52 $\pm$ 0.82	3.656	<0.001
P/A tenderness	3.29 $\pm$ 0.79	3.90 $\pm$ 0.80	1.947	0.093
Surgical site infection	2.70 $\pm$ 0.70	3.90 $\pm$ 0.70	8.431	<0.001
Pulmonary complication	2.68 $\pm$ 0.70	3.50 $\pm$ 0.70	5.686	<0.001
Ventilatory support	2.72 $\pm$ 0.76	3.40 $\pm$ 0.70	3.704	<0.001
Sepsis	2.63 $\pm$ 0.48	3.45 $\pm$ 0.67	6.585	<0.001
Prolonged ileus	3.30 $\pm$ 0.76	3.30 $\pm$ 0.72	0.000	1.000
Anastomotic leak	2.61 $\pm$ 0.46	3.46 $\pm$ 0.68	7.087	<0.001

Cardiac complications	2.38 ± 0.46	3.37 ± 0.68	6.737	<0.001
Prolonged hospitalization	2.90 ± 0.70	3.50 ± 0.67	4.178	<0.001
Mortality	2.39 ± 0.37	3.40 ± 0.68	8.024	<0.001

Patients who developed fever, surgical site infection, pulmonary complications, required ventilatory support, developed sepsis, anastomotic leak, or cardiac complications, had prolonged hospitalisation, or died had a significantly lower mean preoperative serum albumin than those who did not (independent-samples t-test, all $p < 0.001$ – 0.001 ; Table 1, Figure 1). Anastomotic leak showed one of the

largest differences in mean albumin between groups (2.61 ± 0.46 vs 3.46 ± 0.68 g/dl, $t=7.087$, $p < 0.001$), consistent with its very strong categorical association in Table 2. Pain abdomen, vomiting, P/A tenderness, and prolonged ileus did not show a statistically significant difference in mean albumin ($p > 0.05$).

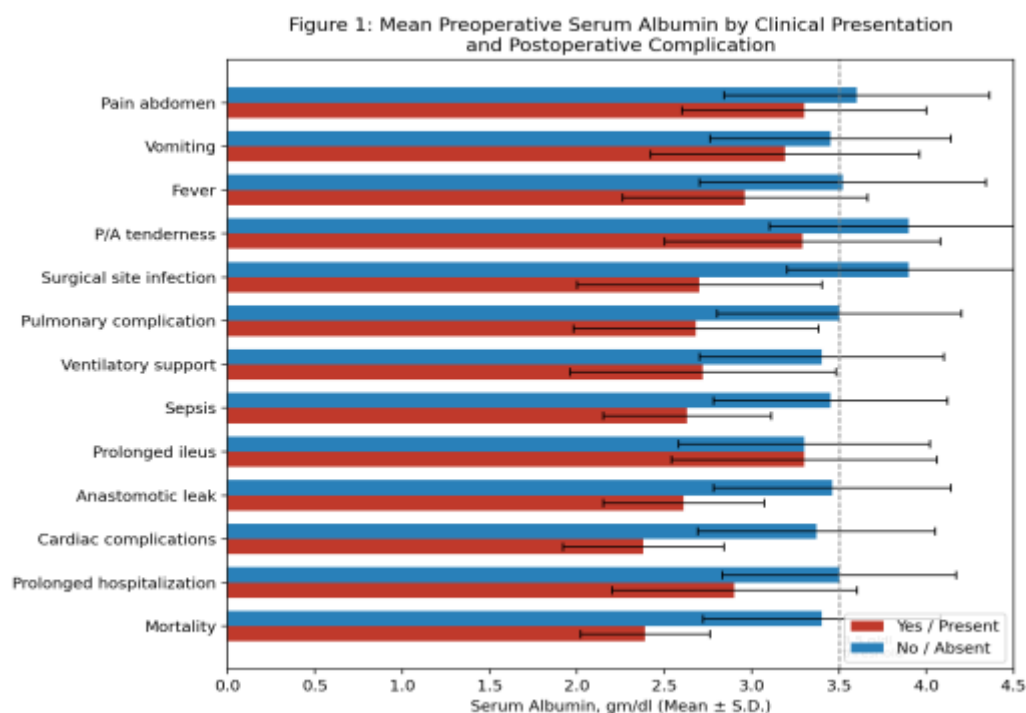


Figure 1: Mean Preoperative Serum Albumin ($\pm$ S.D.) in Patients with and without each Clinical Feature/Complication. Error Bars Represent 1 S.D.; dashed line Marks the 3.5 g/dl Hypoalbuminemia Threshold.

Table 2: Association of Preoperative Serum Albumin Category (Normal vs Low) with Clinical Presentation and Postoperative Complications

Clinical symptoms / signs & Postoperative complications		Normal Albumin(n=42)	Low Albumin(n=58)	χ^2 value	p value
Pain abdomen	No	3	2	0.700 (Fisher)	0.647
	Yes	39	56		
Vomiting	No	19	11	8.007	0.005
	Yes	23	47		
Fever	No	31	29	5.754	0.017
	Yes	11	29		
P/A tenderness	No	5	2	2.676 (Fisher)	0.127
	Yes	37	56		

Surgical site infection	No	33	26	11.466	<0.001
	Yes	9	32		
Pulmonary complication	No	35	27	13.988	<0.001
	Yes	7	31		
Ventilatory support	No	39	40	8.382	0.004
	Yes	3	18		
Sepsis	No	40	36	14.693	<0.001
	Yes	2	22		
Prolonged ileus	No	34	38	2.879	0.090
	Yes	8	20		
Anastomotic leak	No	40	34	16.976 (Fisher)	<0.001
	Yes	2	24		
Cardiac complications	No	42	45	10.820 (Fisher)	<0.001
	Yes	0	13		
Prolonged hospitalization	No	35	29	11.748	0.001
	Yes	7	29		
Mortality	No	42	45	10.820 (Fisher)	<0.001
	Yes	0	13		

Among the preoperative clinical features, vomiting ($\chi^2=8.007$, $p=0.005$) and fever ($\chi^2=5.754$, $p=0.017$) were significantly associated with low serum albumin, whereas pain abdomen (Fisher's exact $p=0.647$) and per-abdominal tenderness (Fisher's exact $p=0.127$) were not.

Among postoperative outcomes, low serum albumin was significantly associated with surgical site infection ($\chi^2=11.466$, $p<0.001$), pulmonary complications ($\chi^2=13.988$, $p<0.001$), need for ventilatory support ($\chi^2=8.382$, $p=0.004$), sepsis ($\chi^2=14.693$, $p<0.001$), anastomotic leak ($p<0.001$, Fisher's

exact), cardiac complications ($p<0.001$, Fisher's exact), prolonged hospitalisation ($\chi^2=11.748$, $p=0.001$), and mortality ($p<0.001$, Fisher's exact). Prolonged ileus showed a trend toward significance but did not reach the conventional threshold ($\chi^2=2.879$, $p=0.090$).

Notably, all patients who developed cardiac complications and all patients who died had low preoperative serum albumin. Anastomotic leak occurred in 24 of 58 patients (41%) with low albumin, compared with only 2 of 42 patients (5%) with normal albumin (Figure 2).

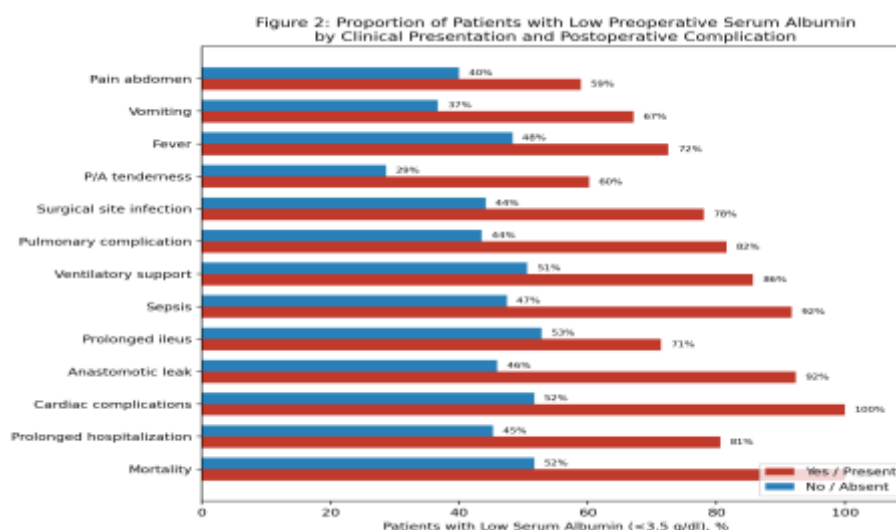


Figure 2: Proportion of Patients with Low Preoperative Serum Albumin (<3.5 g/dl), by Presence/Absence of each Clinical Feature or Postoperative Complication.

DISCUSSION

This prospective observational study assessed preoperative serum albumin as a predictor of postoperative outcome specifically in patients undergoing emergency bowel anastomosis at Victoria Hospital, Bengaluru, over a 6-month period. Of 100 patients studied, 58% had low preoperative serum albumin, reflecting the degree of nutritional depletion commonly seen in patients requiring emergency bowel surgery. Consistent with the wider literature on preoperative albumin and surgical outcome — including the large VA Surgical Risk Study by Gibbs et al., which examined preoperative albumin across more than 87,000 major surgical cases[4] — low serum albumin in the present cohort was strongly associated with infective and septic complications, respiratory compromise, cardiac events, prolonged hospital stay, and mortality, and mean albumin was significantly lower among patients who developed each of these complications (Table 1, Figure 1).

The particularly strong association observed between low albumin and anastomotic leak in this cohort is consistent with the physiological rationale that adequate protein reserve is required for collagen synthesis and anastomotic healing, and aligns with prior work in colorectal surgery identifying hypoalbuminemia as an independent risk factor for anastomotic and other postoperative complications.[5] Similarly, Kudsk et al. found that preoperative albumin, combined with surgical site, identified patients at major risk of postoperative complications,[6] and Truong et al. reported that hypoalbuminemia significantly influenced length of stay and complication rates — including surgical site infection — after colorectal surgery.[7] Given that anastomotic leak carries disproportionate morbidity and mortality after bowel surgery, this finding may be the most clinically relevant of the study and supports the use of preoperative albumin as a simple screening tool in patients being considered for emergency anastomosis.

The strong association between low albumin and cardiac complications in this cohort mirrors the findings of Davenport et al., who reported low serum albumin as an independent predictor of postoperative cardiac adverse events across a large general and vascular surgery cohort.[8] Likewise, the association between low albumin and both morbidity and mortality here is in keeping with Lalhruaizela et al., who found preoperative albumin to be a significant

predictor of postoperative outcome in gastrointestinal surgery.[9]

Not all preoperative clinical features tracked with albumin category in this cohort — pain abdomen, per-abdominal tenderness, and prolonged ileus did not reach statistical significance on either the categorical (Table 2, Figure 2) or continuous (Table 1, Figure 1) analysis — suggesting that while albumin correlates well with systemic markers of illness severity (fever, vomiting) and with major postoperative outcomes, it is a less reliable indicator of localised abdominal signs at presentation.

CONCLUSION

Preoperative serum albumin is a simple, cost-effective, and clinically useful biochemical marker in patients undergoing emergency bowel anastomosis. Low preoperative albumin was strongly associated with septic, pulmonary, and cardiac complications, prolonged hospitalisation, anastomotic leak, and mortality. Routine preoperative estimation of serum albumin may help identify high-risk patients who could benefit from closer perioperative monitoring and, where feasible, nutritional optimisation.

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