

Research Article

Preoperative serum albumin level as independent predictor of surgical outcome in acute abdomen

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ABSTRACT

Background: The prognostic implications and significance of hypoalbuminemia after surgical intervention is significant. In this study, we assess the predictive value of preoperative serum albumin level on postoperative morbidity and mortality following surgical intervention in acute abdomen.

Methods: In this retrospective study, Medical records of 110 patients with estimated preoperative serum albumin level undergoing exploratory laparotomy with acute abdominal conditions in a tertiary health care centre were reviewed. Patients with record of preoperative serum albumin level were reviewed. Albumin less than 3.2 g/dL was recognized as hypoalbuminemia. Types of surgery, postoperative complications, and mortality rates were collected. The association between preoperative serum albumin level and postoperative morbidity and mortality was assessed.

Results: Preoperative serum albumin level of 3.2g/dl was found in 33 (30%) cases and 77 (70%) patients had same or less than 3.2g/dl albumin. Patients with preoperative serum albumin less than 3.2 g/dL had complications in 50 (45.5%) cases than that of normal preoperative albumin levels (07: 5.5%; $p < 0.0001$, 95% CI=0.119-0.528). There was total mortality of 15 (14%). High Mortality of 14 (18%) patients was found in patients with low albumin group. There was 3% mortality with normal serum albumin level ($P < 0.362$; 95% CI=0.029-1.34). Skin and soft tissue infections were found in 5 (15%) cases with albumin > 3.2 g/dl and 28 cases with less than 3.2g/dl ($p < 0.397$; 95% CI=0.17-0.98). Chest infections were found in 2 cases (6%) with > 3.2 g/dl serum albumin against 20 cases (25%) with less than 3.2g/dl. ($p = 0.0187$; 95% CI=0.066-0.997).

Conclusions: Preoperative hypoalbuminemia is an independent risk factor for postoperative complications after emergency laparotomy.

Keywords: Serum albumin, Surgery, Morbidity, Mortality

INTRODUCTION

Preoperative risk assessment in surgical patients can be done with some general tests and scores. There are various risk assessment scores that aim to identify morbidity specific outcomes, such as respiratory failure, wound infection or sepsis etc. Risk may be related to planned or emergency procedure and factors within the patient themselves. A higher degree of risk is related to

emergency procedure. Higher American Society of Anaesthesiologists (ASA) grading combined with the type of surgery and its urgency has been related to postoperative mortality.^{1,2} There are various preoperative assessment protocols available^{3,4} to identify patients with risk of operative mortality and morbidity. Preoperative nutritional status has been an important factor related to morbidity and mortality. The aim of this study was to assess the predictive value of preoperative serum albumin

level in postoperative morbidity and mortality following emergency surgery.

METHODS

In this study medical records of 110 Patients who underwent emergency laparotomy were reviewed retrospectively. Data on demographic characteristics, type of surgery, post-operative complications including mortality were collected. Patients with no significant comorbidity reported and operated within 24 hours were taken into consideration. Laboratory reports containing serum albumin level were taken for the study. Serum albumin level of 3.2 g/dL was recognized as standard baseline state in this study. The association between preoperative serum albumin level and postoperative complications including mortality were determined. Statistical analysis was done applying Fisher’s exact test using INSTAT software.

RESULTS

There were 85 (77%) male and 25 (22%) female patients in the study group. Most frequent indication for

laparotomy was for perforated duodenal ulcer (43%) followed by for acute intestinal obstruction (28%) (Table 1). In 77 (70%) patients the serum albumin found to 3.2g/dL or less. There were skin and soft tissue infections in 33(30%) cases, respiratory tract infections in 22 (20%) cases and leak and enteric fistula in 2 (1.8%) cases (Table 2). There were 15 mortality (13.6 %). In 14 cases there were less than 3.2g/dL of S. Albumin (Table 3).

Table 1: Indications for emergency laparotomy: No. of patients (%)

Indications	No. of patients (%)
1. Perforated peptic ulcer	48 (43%)
2. Acute intestinal obstruction	28 (23%)
3. Acute appendicitis including perforations	20 (18%)
4. Incarcerated ventral hernia	6 (0.05%)
5. Small intestinal perforations	8 (0.07%)

Table 2: Morbidity.

Complications	S. Albumin>3.2g/dL (33; 30%)	S. Albumin <3.2g/dL (77; 70%)	Total (110) p value; 95% CI
Skin and soft Tissue infections	5 (15%)	28 (36%)	33 (p<0.0397) 95% CI :0.176-0.984
Respiratory Tract Infections	2 (6%)	20 (25%)	22 (20%) P<0.0187 95% CI=0.667-0.997
Fistula		2	2 (1.8%)
Total	7 (5.5%)	50 (45.5%)	57 (51.8%); p<0.0001 95% CI: 0.119-0.528

Table 3: Mortality.

Serum Albumin level	No. of Mortality (%)	P value; 95%CI
<3.2 G/dl	14 (18%)	
>3.2G/dl	01 (3%)	
Total	15 (13.6%)	<0.362; 0.029-1.34

DISCUSSION

Albumin, the body’s predominant serum-binding protein, has several important functions.^{5,6} It maintains normal plasma colloid oncotic pressure and comprises 50% of protein content in the body. Albumin transports bilirubin, fatty acids, minerals, trace elements vitamins, hormones and drugs. Serum level of albumin also affects platelet functions. Normal albumin levels indicate adequate kidney and liver and immune functions. Low level of

albumin is a marker for malnutrition and associated with increased risk of morbidity and mortality.⁶ The cytokines (TNF, IL-6) released as part of the inflammatory response to physiologic stress (infection, surgery, trauma) can decrease serum albumin by increased vascular permeability, increased degradation and decreased synthesis. The hypoalbuminemia leads to abnormal gastrointestinal malabsorbtion, impaired immunological response and impaired production of albumin and other plasma protiens in the liver.⁵ The outcome of surgery in both emergency and elective is related to status of preoperative serum albumin level though its surgical predictive value was underutilized.⁵

Peptic ulcer perforation constitute a major indication of surgery in this study followed by acute intestinal obstructions with overall mortality and morbidity of 13.6%% and 51.8% respectively.⁷ Risk stratification in

surgery done following various protocol.^{3,4} In a study of 400 cases undergoing cardiac surgery it was found that hypoalbuminemia was associated with long intensive care and long hospital stay.⁹ In a systematic review comprising more than 29 thousand patients it was observed that shock at admission, preoperative metabolic acidosis, tachycardia, acute renal failure, low serum albumin level, high American Society of Anaesthesiologists score and preoperative delay >24 h were associated with poor prognosis.¹⁰ Serum albumin level as single predicting factor is used in many a study. Hypoalbuminemia was found to be an independent risk factor in surgical site infections following gastrointestinal surgery.⁸ It predicts better in case of sepsis and major infections.⁵ In the present study SSI was found in 15% cases with >3.2g/dl albumin whereas the incidence of SSI increased to 36% with <3.2g/dl albumin. A meta-analysis of cohort studies found that, with every 10 g/L decrease in serum albumin, mortality was increased by 137% and morbidity increased by 89%.^{5,6} In the present study patients with >3.2g/dl albumin has 3% rate of mortality which increases to 18% with <3.2g/dl albumin (Table 3). In a study it was found that the in hospital mortality increases from 4% in normal level of albumin to 14% in low albumin level.¹¹ When ASA grade is compared to Serum Albumin level independently in respect of mortality predictions the results came out to be same.¹¹ In a similar study it was stated that serum albumin <3.5g/dl was associated with poor prognosis following abdominal surgery.¹² In the present study the morbidity was increased from 07 (5.5%) to 50 (45.5%).

CONCLUSION

Serum albumin level is a good predictor of surgical outcome in emergency abdominal surgery. It is a low cost test and can be used as independent prognostic factor in emergency surgery.

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