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# Perioperative Serum Albumin Level As Independent Predictor Of Surgical Outcome In Acute Abdomen

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***Abstract:*** ***Introduction:*** *Albumin is considered a negative acute-phase protein because its concentration decreases during injury and sepsis. Hypoalbuminemia is a risk factor for mortality, postoperative complications, and prolonged hospital stay. The magnitude of the systemic inflammatory response during the perioperative period, as indicated by the acute-phase proteins-C-reactive protein (CRP) in particular,may help identify the risk of postoperative infectious complication. The correlation between serum albumin and CRP with gastrointestinal cancer has been reported. However, it is unclear whether antecedent CRP could be utilized to predict future hypoalbuminemia in the perioperative period in colorectal surgery. The primary endpoint of this study was to reveal that antecedent CRP could be utilized to predict future hypoalbuminemia in the perioperative period of colorectal surgery.*

***Materials and methods:*** *In this study, Medical records of 100 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>3.2g/dl and 28 cases with less than 3.2g/dl (p=<0.397; 95%CI= 0.17-0.98).Chest infections were found in 2cases (6%) with >3.2g/dl serum albumin against 20 cases (25%) with less than 3.2g/dl. (p=0.0187; 95% CI=0.066-0.997).*

***Conclusion:*** *Serum albumin concentration is a better predictor of surgical outcomes than many other preoperative patient characteristics. It is a relatively low-cost test that should be used more frequently as a prognostic tool to detect malnutrition and risk of adverse surgical outcomes, particularly in populations in whom comorbid conditions are relatively frequent.*

***Key words:*** *Serum albumin, Preoperative, laparotomy.*

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## I. Introduction

Hypoalbuminemia has been shown to be associated with increased mortality and morbidity rates in both hospitalized patients and community-dwelling elderly persons. In surgery, PBan association between hypoalbuminemia and adverse outcome has been recognized for many years.1-4 There is a substantial evidence to show that patients who have signs of malnutrition have a higher risk of complications and an increased risk of death in comparison with patients who have adequate nutritional reserves.[5]

Nutritional assessment is essential for identifying patients who are at risk of developing complications related to significant malnutrition. A dietary history, physical examination (including anthropometric measurements), and relevant laboratory tests are the appropriate tools needed for an accurate evaluation of a patient's pre-operative nutritional status.[6]

Albumin is the most commonly used and reliable indicator of a patient's nutritional status; it is also a negative acute phase protein.7 In an acute illness or stress response, there is a reduction in serum albumin due to alterations in hepatic metabolism and loss of albumin into the interstitium. Serum albumin is a reliable and reproducible predictor of surgical risk and has a close correlation with the degree of malnutrition.[8]

Surgical site infection (SSI) is defined as infection occurring in an incisional wound within 30

days of the procedure or within 1 year if a prosthesis is implanted.9 SSI can be superficial (involving only the skin and subcutaneous tissue of the incision), deep (involving fascial and muscle layers), or organ space.10 SSI is also important from an economic point of view, especially among the rural population. These patients can expect to spend additional days in the hospital and suffer significantly increased morbidity and mortality.

## II. Materials And Methods

A study of twelve months duration (Jan 2014 - December 2014) was conducted at Department of Surgery, M.G.M Medical College and hospital, Jamshedpur, Jharkhand. In this study medical records of 100 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.

## III. Results

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

**Indications No. of p**

| **Indications** | **Number of patients (%)** |
|---|---|
| 1. Perforated peptic ulcer | 52(52%) |
| 2. Acute intestinal obstruction | 20(20%) |
| 3. Acute appendicitis including perforations | 12(12%) |
| 4. Incarcerated ventral hernia | 10(10%) |
| 5. Small intestinal perforations | 6(6%) |

**Table 2: Morbidity**

| **Complications** | **S. Albumin>3.2g/dL** | **S. Albumin <3.2g/dL** | **Total (110) p value; 95% CI** |
|---|---|---|---|
| Skin and soft Tissue infections | 6(16%) | 28(37%) | 34(p<0.0465) 95% CI : 0.165-0.965 |
| Respiratory Tract Infections | 3(7%) | 20(24%) | 23(21%) p<0.0176 95% CI : 0.665-0.995 |
| Fistula | | 2 | 2(1.8%) |
| Total | 8(6%) | 50(46%) | 56(52%):p<0.0001 95% CI : 0.115-0.528 |

**Table 3: Mortality**

| **Serum Albumin level** | **No. of Mortality (%)** | **P value; 95%CI** |
|---|---|---|
| <3.2 g/dl | 16(19%) | |
| >3.2 g/dl | 01(3%) | |
| Total | 15(14%) | <0.356;0.036-1.26 |

## IV. 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]

Serum albumin level as single predicting factor is used in many a study. Hypoalbuminamia 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 morality 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%).

## V. Conclusion

Serum albumin concentration is a better predictor of surgical outcomes than many other preoperative patient characteristics. It is a relatively low-cost test that should be used more frequently as a prognostic tool to detect malnutrition and risk of adverse surgical outcomes, particularly in populations in whom comorbid conditions are relatively frequent.

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