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Evaluation of pre-operative albumin in the prediction of outcomes of emergency laparotomy

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Abstract---Background: Hypoalbuminemia has been established indicator of nutritional status, which may and may not be clinically apparent, but is linked to a significantly higher risk of morbidity and mortality. Objective: To assess the post-operative morbidity with relation to pre-operative albumin status in patients undergoing emergency abdominal surgery. Methods: It was a hospital based observational study, 100 patients undergoing emergency abdominal surgery at Tertiary care Hospital was included. Hypoalbuminemia was diagnosed if serum albumin level was less than 3.5 gm/dl. Study period was between May 2021 to April 2022. The Statistical software namely SPSS 11.0 and Systat 8.0 were used for the analysis. Results: Pre-operatively, 60 patients had hypoalbuminemia (serum albumin <3.5 g/dl) and 40 patients had normal albumin levels (≥ 3.5 g/dl). Out of 100 patients, 41 (41%) developed complications postoperatively. 32 patients (50%) out of 60 patients with hypoalbuminemia (with serum albumin <3.5 g/dl) had complications. 9 patients (17.5%) with albumin level ≥ 3.5 g/dl had complications. Mean length of hospital stay was found to be higher i.e. 9.70 ± 4.75 days in patients with hypoalbuminemia, compared to 6.45 ± 3.31 days with those having

albumin level ≥ 3.5 g/dl. Conclusions: Preoperative albumin is a useful low-cost prognostic predictor for predicting surgery outcome.

Keywords---laparotomy, pre-operative, morbidity, serum albumin, emergency abdominal surgery.

Introduction

Hypoalbuminemia has been established indicator of nutritional status.[1]Hubner et al noted that post-operative albumin drops strongly correlated with the rise in C-reactive protein (CRP), and also that albumin could be measured 4-6 hours post operatively. The albumin response was also related to clinical outcomes.[2]There is substantial proof that patients with malnutrition have a higher risk of complications and death than individuals with adequate nutrition.[1,2]Initially, serum albumin was misinterpreted, and the significance of serum albumin in assessing a person's nutritional makeup was overlooked. Albumin a negative acute-phase protein. When there is acute illness or stress, a reduction in serum albumin occurs due to alterations in hepatic metabolism, and loss of albumin into the interstitium.[3,4,5] It also shows an immediate response to surgical stress. As a result, it may meet the criteria for predicting a difficult post-operative course.[5] The rationale behind the study to analyze the correlation between preoperative hypoalbuminemia and surgical complications encountered in patients undergoing emergency abdominal surgery.

Materials and Methods

It was a hospital based prospective observational study 100 patients undergoing emergency abdominal surgery at Tertiary care hospital were included. Data on type of surgery, post-operative complications were collected. Patients with no significant comorbidity admitted and operated within 24 hours were included in the study. The study period was May 2021 to April 2022. Serum albumin level of 3.5 g/dl was considered the standard baseline in the study.[7] Serum albumin level was less than 3.5 gm/dl was considered as hypoalbuminemia. The association between preoperative serum albumin level and postoperative morbidity was assessed.

Those patients with chronic debilitating disease like-patients having anemia with hemoglobin <7 g/dl, liver failure, nephrotic syndrome, diabetic patients; immunocompromised patients; femoral hernias; perforation due to medical causes like typhoid ulcer perforation; patients with associated head injury, orthopedic injury, renal injury, chest trauma; and patients who did not give consent to be excluded in the study. Patients below age 18 were excluded. Ethical clearance was obtained from the institutional ethics committee (human) College prior to the conduction of the study and written informed consent was obtained from patients or relatives.

Statistical Analysis

The Statistical software namely SPSS 11.0 and Systat 8.0 were used for the analysis. Chi-square and Fisher Exact test have been used to find the significance of proportion of incidence. $P < 0.05$ is considered significant.

Results

Table 1
Age and Gender wise distribution of patients

Age(years)	Totalno.
18-27	10
28-37	28
38-47	25
48-57	16
58-67	12
68-77	6
≥78	3

As per table 1 Of the 100 patients studied, 64% were male and 36% were female. The most common age group was 28-37 years seen 28% of patients followed by 38-47 years which shows the mostly the young group are suffered in this study. The study was male preponderance.

Table 2
Indications for emergency laparotomy

Indications	Numberof patients	Percent age	p-value
Perforatedpepticulcer	40	40	0.01*
Acute intestinalobstruction			
Malignant	24	29	0.22
Nonmalignant	5		
Appendicealperforations	14	14	0.11
Incarcerated ventralhernia	6	6	0.32
Strangulatedhernia	11	11	0.19

As per table 2 the most common indication for emergency laparotomy was perforated peptic ulcer (40%) and it was statistically significant ($p < 0.05$) followed by malignant acute intestinal obstruction (24%). Appendiceal perforations and incarcerated and strangulated hernia were other important causes.

Table 3
Post-operative morbidity associated with hypoalbuminemia

Complications	S.albumin <3.5 g/dl (60)	S.albumin >3.5 g/dl (40)	Total(100),p value
Surgical siteinfection(%)	22 (37.5)	8(17.5)	0.01
Wounddehiscence(%)	10(16.1)	1 (2.5)	0.02
Meanlength of hospitalstays(days)	9.70±4.75	6.45±3.31	P<0.05

Pre-operatively, 60 patients had hypoalbuminemia (serum albumin <3.5 g/dl) and 40 patients had normal albumin levels (≥ 3.5 g/dl). The mean preoperative serum albumin level of the patients included in the study was 3.26 g/dl with standard deviation (SD) of 0.57. 32 patients (52) out of 60 patients with hypoalbuminemia (with serum albumin <3.5 g/dl) had complications. 9 patients (17.5%) with albumin level ≥ 3.5 g/dl had complications. Surgical site infection was commonest complication found in 30 (30%) cases. Wound dehiscence was found in 11 (11%) case. Mean length of hospital stay was found to be higher i.e. 9.70 ± 4.75 days in patients with hypoalbuminemia, compared to 6.45 ± 3.31 days with those having albumin level ≥ 3.5 g/dl.

Discussion

This was a prospective hospital based study done on 100 patients admitted for emergency laparotomy. Albumin accounts for 75% of the oncotic plasma pressure.[6] Plasma albumin binds to free fatty acids, bilirubin, steroid hormones, calcium, and copper and transports them.[8] It has been demonstrated that the albumin-heme complex has a lipid antioxidant action.[6] Albumin moderate inflammation, minimize oxidative damage. Albumin serves as a source of amino acids for tissue protein synthesis. Perioperative levels of serum albumin have been shown to be powerful predictors of morbidity and mortality.[9] Hypoalbuminemia was linked to poor tissue healing, reduced collagen production in surgical wounds or anastomoses, and impaired immunological response.[8] Preoperative serum albumin plays a critical role in determining a patient's postoperative outcome after major surgery.[6]

The most common indication for emergency abdominal surgery was peptic ulcer perforation 36 (37.6%), followed by acute intestinal obstruction 29 (30.2%). In a study of 50 patients undergoing emergency exploratory laparotomy, it was found that 29 of the 50 patients (58%) had complications. Of these, the most commonly observed complication was wound dehiscence and sepsis. Patients with complications had a mean preoperative albumin level of 2.78 g/dl ($p < 0.05$). The preoperative albumin values had an inverse relation with the length of hospital stay, whereas the reduction in albumin levels had a positive correlation with the length of hospital stay.[10,11]. Truong et al performed a systematic literature review through an electronic search of MEDLINE from PubMed and the Cochrane library found that hypoalbuminemia has a major impact on the length of stay in the hospital, the rate of surgical site infections, the likelihood of enterocutaneous fistulas, and the development of deep vein thrombosis.[7]. Hu et al, on 42,483

patients undergoing gastrointestinal surgery found that serum albumin <3.5 g/dl was associated with wound dehiscence ($p<0.0001$).[12]

Conclusion

Preoperative albumin is a useful prognostic predictor for predicting surgical outcome, especially in emergency surgery. Post-operative morbidity in surgical patients could be decreased by assessing albumin levels in preoperative period, as hypoalbuminemia has adverse relation with surgical outcome. So, it is preferable to have normal albumin perioperatively.

Conflict of Interest- None

Source of Funding- None declared

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