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Original Research Article

Preoperative serum albumin level as a predictor of surgical complications after emergency abdominal surgery

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ABSTRACT

Background: Hypoalbumenia has been shown to be associated with increased morbidity and mortality in acute surgical patients due to increased catabolism. This study intends to correlate between hypoalbumenia and postoperative complications in patients undergoing emergency abdominal surgery.
Methods: A prospective study is done in a rural tertiary care centre in a total of 190 patients undergoing emergency abdominal surgery after obtaining ethical clearance. In this study preoperative serum albumin and postoperative complications including death up to postoperative day thirty were recorded and gathered using a checklist designed for the study and analysed. Serum albumin less than 3.5g/dl is considered as hypoalbumenia in this study. The correlation between preoperative serum albumin and postoperative morbidity and mortality is assessed.
Results: In a total of 190 patients, 93 (48.9%) patients had morbidity and 27 (14.2%) patients had mortality. Preoperative serum albumin less than 3.5g/dl is found in 120 (63.1%) cases and 70 (36.9%) patients has same or more than 3.5g/dl. Patients with preoperative serum albumin less than 3.5g/dl has morbidity in 87 (45.8%) patients than that of normal preoperative serum albumin level which is 6 (3.1%) cases (p= <0.0001, chi-square =72.31). The total mortality is 27 (14.2%) in which all mortality is found in low albumin group compared to no mortality in patients with normal serum albumin. As the albumin level decreases the risk of morbidity and mortality increases with majority of complication in this study occurring in patients with albumin group less than 2.5g/dl to 3g/dl.
Conclusions: Preoperative serum albumin is a good predictor of surgical outcome after emergency abdominal surgery.

Keywords: Morbidity, Mortality, Surgery, Serum albumin

INTRODUCTION

Hypoalbumenia has been shown to be associated with increased morbidity and mortality in acute surgical patients.[1,2] This complication is more in patients undergoing emergency surgery due to their poor nutritional status like surgical site infection, anastomosis breakdown, delayed wound healing, paralytic ileus. The correct assessment of the nutritional status of such patients is crucial since malnutrition is a risk factor for morbidity and mortality.[3] Decrease in the serum albumin level preoperatively which is a risk factor for surgical complications is associated with increased hospital cost, increased length of hospital stay, increased burden on family and decreased quality of life. One of the best biochemical parameters to assess nutritional status is estimating the serum albumin level and it is the simple and cost-effective method. Total protein in the body is

around 6 to 8 gram/dl out of which albumin contributes major part (3.5 to 5.5gram/dl).[4,5] When plasma proteins especially serum albumin decrease there will be decreased plasma oncotic pressure which cannot counterbalance hydrostatic pressure resulting in the development of edema. Serum albumin less than 3.5gram/dl is considered as hypoalbumenia.[4,5] Albumin is a direct measure of nutritional and immunological status and one of the essential components in wound healing process.[5-7]

This study intends to correlate between the hypoalbumenia and surgical complication in patients undergoing emergency abdominal surgery.

METHODS

Albumin is a blood protein that makes up a significant portion of the blood plasma. Albumin binds to many of the substances like hormones and some drugs and helps in transport of essential materials in the body. In hypoalbuminemia, this becomes defective. Hypoalbumenia is a risk factor for postoperative complications.

Authors conducted this study to correlate hypoalbunemia and postoperative morbidity and mortality. A prospective study was conducted in the Department of General Surgery, Adichunchanagiri institute of medical sciences, BG nagara after obtaining ethical clearance from the institution ethical committee. All patients and their attenders were explained regarding the study in their own understandable language and Written informed consent was taken from patient and their attenders. A total of 190 patients was included in our study who underwent emergency abdominal surgery like peptic ulcer perforation repair, intestinal resection and anastomosis, cholecystectomy for gall bladder perforation, appendicectomy etc. This study was conducted in our institution for a period of one year from November 2017 to November 2018.

Data were collected regarding preoperative serum albumin in patients who underwent emergency abdominal surgery in authors' institution and postoperative surgical complications like surgical site infection, anastomotic leak, prolonged intestinal ileus, burst abdomen, gastrointestinal fistula including death up to postoperative day thirty are collected and gathered using a checklist designed for this study and data was analyzed with the help of EPPI-INFO.

Statistical analysis

The data was entered, and frequency and percentage were calculated. Statistical significance was calculated using chi- square. Albumin level of less than 3.5g/dl is considered as hypoalbumenia and taken as baseline in this study. Correlation between hypoalbumenia and postoperatvie morbidity and mortality is determined.

Exclusion criteria

Patients with established liver and kidney disease and immunosuppression like diabetes mellitus were excluded from the study as these patients are already depleted of albumin stores due to their disease status.

RESULTS

In a total number of 190 patients, 117 (61.5%) patients were male and 73 (38.5%) patients female. 93 (48.9%) patients had morbidity (Table 1) and 27 (14.2%) patients had mortality (Table 2).

Table 1: Morbidity.

Morbidity	Frequency	Percent
Yes	93	48.9%
No	97	51.1%
Total	190	100%

Table 2: Mortality.

Morbidity	Frequency	Percent
Yes	27	14.2%
No	163	85.8%
Total	190	100%

Table 3: Albumin level and morbidity and mortality rates.

Albumin (g/dl)	Frequency (%)	Morbidity (%)	Mortality (%)
<3.5	120 (63.1%)	87 (45.8%)	27 (14.2%)
≥3.5	70 (36.9%)	6 (3.1%)	0 (0%)
Total	190 (100%)	93 (48.9%)	27 (14.2%)

Preoperative serum albumin less than 3.5g/dl was found in 120 (63.1%) cases and 70 (36.9%) patients had same or more than 3.5g/dl. 87 (45.8%) patients with preoperative serum albumin less than 3.5g/dl had morbidity when compared to normal preoperative serum albumin level which was seen in 6 (3.1%) cases (Table 3) (p= 0.0001) which was statistically significant and indicates surgical complications are more in hypoalbumenia group compared to normal albumin level group. The total mortality was 27 (14.2%) in which all mortality was found in low albumin group compared to nil mortality in patients with normal serum albumin levels (Table 3) which indicates mortality is significantly high in hypoalbumenia group.

In patients with serum albumin group less than 2.5g/dl had highest morbidity (24.8%) and mortality (8.4%) (Table 4) which indicates as the serum albumin level drops there is increase in postoperative complications and death. As the albumin level decreases the risk of morbidity and mortality increases with majority of complication in this study occurring in patients with

albumin group less than 2.5g/dl to 3g/dl. Albumin level less than 2.5g/dl having morbidity in 47 (24.8%) cases and mortality in 16 (8.4%) cases and albumin level 2.5 to 3.4g/dl having morbidity in 40 (21.0%) cases and mortality in 11 (5.8%) cases, albumin with more than or equal to 3.5g/dl had morbidity in 6(3.1%) cases and nil mortality (Table 4).

Table 4: Correlation of albumin levels and morbidity and mortality rates.

Albumin (g/dl)	Frequency (%)	Morbidity (%)	Mortality (%)
<2.5	63 (33.1%)	47 (24.8%)	16 (8.4%)
2.5-3.4	57 (30%)	40 (21.0%)	11 (5.8%)
≥3.5	70 (36.9%)	6 (3.1%)	0 (0%)
Total	190 (100%)	93 (48.9%)	27 (14.2%)

Table 5: Indication for emergency surgery.

Diagnosis	Frequency	Percent
Petic ulcer perforation	67	35.2%
Intestional obstruction	44	23.2%
Strangulated hernia	33	17.3%
Small intestinal perforation	20	10.6%
Perforated appendix	19	10.0%
Gall bladder perforation	5	2.6%
Mesenteric ischemia	2	1.1%
Total	190	100.0%

Most common indication for emergency abdominal surgery was peptic ulcer perforation (35.2 %) followed by acute intestinal obstruction n(23.2%), strangulated hernia (17.3%), small intestinal perforation (10.6%), perforated appendix (10%), gall bladder perforation (2.6%), mesenteric ischemia (1.1%) (Table 5) which are associated with surgical stress and increased catabolism causing decrease in serum albumin level responsible for most of the complications post operatively. Most common postoperative complication was surgical site infection (55%) followed by anastomotic leak (26%), gastrointestinal fistula (5.4%), prolonged ileus (4.3%), burst abdomen (3.2%) (Table 6) which increases the patient hospital stay, increased cost and decreased quality of life.

Table 5: Postoperative morbidity.

Postoperative morbidity	Frequency	Percent
Surgical site infection	55	59.1%
Anastomotic leak	26	28.0%
Gastrointestinal fistula	5	5.4%
Prolonged ileus	4	4.3%
Burst abdomen	3	3.2%
Total	93	-

DISCUSSION

Hypoalbumenia is a risk factor for postoperative complications. Total protein in the body is 6 to 8g/dl out of which albumin is a major constituent of about 3.5 to 5.5gm/dl. Hypoalbumenia may be due to combination of decreased albumin production, increased loss, acute dilution or fluid shift from vascular space. Albumin can be lost through epidermal, renal or gastrointestinal sources. Patients with acute emergency condition are classic for developing hypoalbumenia due to their poor nutritional status. The correct assessment of nutritional status of such patients is crucial since malnutrition is a risk factor for morbidity and mortality. One of the best biochemical parameters to assess nutritional status is estimating the serum albumin level and it is the simple and cost-effective method. Albumin is a direct measure of nutritional and immunological status and one of the essential components of wound healing process. In a retrospective study by Bhuyan et al, patients with preoperative albumin less than 3.2g/dl had complication in 45.5% cases and mortality of 18%.[1] In a prospective study by Gibbs et al, decrease in the serum albumin less than 2g/dl was associated with exponential increase in morbidity and mortality.[2] In a study by Hubner et al, the rate of complication was more when serum albumin less than 3g/dl.[3] In a study by Lohsiriwat V et al, 29% of hypoalbumenic patients developed complication where none occurred in nonhypoalbumenic patients.[4] Sonoda et al, Montomoli et al, and Gohil et al, showed that the preoperative serum albumin has an impact on the morbidity following colorectal surgery in their respective studies.[8-10] In the present study preoperative serum albumin less than 3.5g/dl has highest complication (48.9%) and death (14.2%) than albumin more than or equal to 3.5g/dl (3.1% and 0%) which is statistically significant with a p value less than 0.0001 and the majority of complications occurred in patients with albumin less than 2.5g/dl to 3g/dl. This study implies that as the albumin level decreases, the risk of postoperative morbidity and mortality increases.

CONCLUSION

Preoperative serum albumin is an independent predictor of surgical complications after emergency abdominal surgery and it is a simple and cost effective test.

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