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Original Research Article

Assessment of preoperative serum albumin level and its correlation with postoperative wound complication in major elective abdominal surgeries

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ABSTRACT

Background: 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. It is common and occurs in about 30% of surgical patients with gastrointestinal diseases and in up to 60% of those in whom hospital stay has been prolonged because of postoperative complications. The serum albumin level is the most readily available and clinically useful parameter. A serum albumin level greater than 3.5 g% suggests adequate protein stores and it confers a protective effect through several biological mechanisms. It predicts perioperative morbidity and mortality.
Methods: Our study was conducted on a cohort of 100 Patients admitted in Department of General surgery Hamidia Hospital for major elective surgery between October 2016 and September 2017. Sample size taken was 100.
Results: The present study shows that patients with serum albumin less than 3 g/dl has more postoperative complications and patients with serum albumin >3.5 g/dl has less postoperative complications which was statistically significant. The study concludes that as the serum albumin level increases the complication rate decreases.
Conclusions: Our study shows that sr. albumin is a good indicator of postoperative complications. The patients with sr. albumin <3.0 g/dl had a higher complication rate which was statistically significant ($p<0.05$). Patients with sr. albumin >3.5 g/dl had less complications which was statistically significant ($p<0.05$). The correlation between the serum albumin and complication rate was statistically significant in the malignant diseases when considered separately.

Keywords: Gastrointestinal surgery, Malnutrition, Postoperative complication, Serum albumin

INTRODUCTION

The adverse effects of malnutrition on the morbidity and mortality of patients was first recognized by Hippocrates (460 BC-370 BC) many centuries ago. It is common and occurs in about 30% of surgical patients with gastrointestinal diseases and in up to 60% of those in whom hospital stay has been prolonged because of postoperative complications. 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.[1] Nutritional assessment is essential for identifying patients who are at risk of developing complications related to significant malnutrition.[2]

A dietary history, physical examination (including anthropometric measurements), and relevant labs are the

appropriate tools needed for an accurate evaluation of a patient's preoperative nutritional status.

The serum albumin level is the most readily available and clinically useful parameter. A serum albumin level greater than 3.5 g% suggests adequate protein stores and it confers a protective effect through several biological mechanisms. It predicts perioperative morbidity and mortality.[3]

Serum albumin is the most important laboratory test for the diagnosis of protein-calorie undernutrition. Most patients with severe protein depletion will have low serum albumin levels. Patients with abnormal parameter have a markedly increased risk of poor clinical outcomes.[4]

Protein energy malnutrition occurs as a result of relative and absolute deficiency of energy and protein. It may be primary, due to inadequate food intake, or secondary, as a result of other illness. For most developing nations, Primary Protein energy malnutrition remains among the most significant health problems. Protein energy malnutrition affects every organ system. The most obvious results are loss of body weight, adipose stores and skeletal muscle mass. Hepatic synthesis of serum protein decreases and depressed levels of circulating proteins are observed. Due to changes in immunological function, wound healing is poor.[4]

Objectives of the study was to assess the nutritional status of patients and its related wound complications and to find out the preoperative predictive value of the serum albumin level and wound complications.

METHODS

This study was conducted on a cohort study of 100 patients admitted in Department of General surgery Hamidia Hospital Bhopal for major elective surgery between October 2016 and September 2017. Sample size taken was 100.

Inclusion criteria

Patients who were admitted for any major elective surgery in Department of General surgery Hamidia Hospital, patients Age >12 years, Patients undergoing major elective abdominal surgeries

Exclusion criteria

Patients who have icterus, severe anaemia < 7gm/dl, diabetes mellitus, chronic renal disease, and patients on steroids, Patients with Umbilical hernia, inguinal and femoral hernia.

Collection of data

Details of cases was recorded including history and clinical examination of patients, Serum albumin was estimated before elective surgery and after the surgery, monitor postoperative complication and Follow up was done till patient was discharged from hospital. Ethical approval taken by ethical committee. Statistical analysis was done accordingly, p value <0.05 was considered statistically significant. Z-test and Fischer exact t-test were used for analysis.

RESULTS

Of the 100 patients, the age varied from 13-75 yrs. The number of patients in the 41-50 years group was the highest (26%). And the highest no of complications were noted in the age group of 41-50 years (53%).

Table 1: Distribution of patients according to age.

Age (years)	Number of patients
13-20	8
21-30	20
31-40	21
41-50	26
51-60	19
>60	6

Table 2: Distribution of patients according to age and complications.

Age (in years)	Total patients	Patients with complication	Patients without complication	% of complication
13-20	8	00	8	00
21-30	20	10	10	50
31-40	21	06	15	28
41-50	26	14	12	53
51-60	19	11	8	42
>60	6	2	4	33

Table 3: Distribution of patients according to sex and complication rate.

Gender	Total no of patients	Patients with complication	Patients without complication	% of complication
Male	43	19	24	44
Female	57	24	33	42

Among all the age group patients between 41-50 years have the highest complication rate-53% (Table 2). Total 44% of males in the study developed complications and 55% of the females had complications (Table 3).

All four patient with serum albumin level <2.5 had wound complications, in patients with serum albumin between 2.6-3.0, the 14 patients had complication whereas 5 didn't, in patients with serum albumin between 3.0-3.5, the 12 patients had complication whereas 23 didn't in patients with serum albumin between >3.5, the 14 patients had complication whereas 29 didn't.

It was observed that the rate of complication was more when serum albumin level was less than 3.0 gm/dl which is statistically significant. Chi square test was used for comparison between different level of serum albumin level and their postoperative wound complications. The p value is <0.001045 which is statistically significant. So it can be concluded that low serum albumin level is related with higher wound complications (Table 4).

Table 4: Distribution of patients according to level of serum albumin level.

Serum albumin	Patients with complication	Patients without complication	% of complication
< 2.5	4	0	100
2.6-3.0	14	5	73
3.1-3.5	12	23	34
>3.5	13	29	30

Table 5: Distribution of patients according to type of procedure.

Type of procedure	Total no. of patients	Patients with complication	Patients without complication	% of complication
Bowel resection, anastomosis	31	12	19	38
Biliopancreatic	26	13	13	50
Oesophagogastric anastomosis	19	7	19	36
Nephrectomy, pyelolithotomy	10	6	4	66
Miscellaneous	14	5	9	35
Total	100	43	57	

Table 6: Distribution of wound complication according to southampton wound grading system.

	No. of patients	%
Grade I	20	46
Grade II	14	32
Grade III	07	16
Grade IV	2	04

The most common type of procedure observed was Bowel resection and anastomosis. The highest complication rate was seen in patients with Renal procedures like Pyelolithotomy and nephrectomy.

The highest complication rate was seen in patients with Renal procedures like Pyelolithotomy and nephrectomy. Least complications were seen in patients with oesophagogastric procedures (Table 5). Most common type of complication seen was of Grade I type whereas grade IV complication was seen least (Table 6).

DISCUSSION

Age incidence

The wound infection rates in our study shows only apparent higher rate of wound complications in the age group 41-50 years. Studies of Cruze and Ford et al and those by the Public Health Laboratory services from UK show an increased incidence of wound infection in elderly patients, Cruze et al has found that > 66 year age are 6 times more likely to develop wound complication than those between 10-20 year of age. In our study Complication rate in 41-50 year age groups is approximate five times more than in age group 13-20 year.

Sex incidence

Females outnumbered the number of male patients. In our study 19 out of 43 male patients developed wound complications, whereas in female patients 24 out of 57 patients developed wound complications.

Nutritional assessment is essential for identifying patients who are at an increased risk of developing Postoperative complications. A variety of nutritional indices have been found to be valuable in predicting patient outcome. In one study preoperative serum albumin level and Body Mass Index were used for nutritional assessment.

Study in University Department of Clinical Surgery, Trinity Center for Health Sciences, St. James's Hospital, Dublin, Ireland concluded that Patients with an albumin of less than 20 g/l on the first postoperative day were twice as likely to develop postoperative complications

than those with an albumin of greater than 20 g/l (54 vs 28% respectively, p<0.011).[5]

Serum albumin level less than 3 g/dl was associated with increased postoperative morbidity and mortality according to studies done by Leite et al.[5]

A retrospective study by Kudsk et al of 526 surgical patients who had preoperative serum albumin levels measured and were undergoing elective Esophageal, gastric, pancreaticoduodenal, or colon surgery a serum albumin levels below 3.25 gm/dl Correlated immensely with complications, length of stay, postoperative stay, and mortality.[6]

Liop et al found that a serum albumin below 3.5g/dl at the onset of treatment was a predictor of kidney and liver failure, hospital infection, and mortality in 12patients strata.[7]

Gibbs et al observed that a decrease in serum albumin from concentration greater than 4.6 g/dl to less than 2.1 g/dl (p<0.001) was associated with exponential increase in morbidity and mortality and that it was a good prognostic indicator, whereas anthropometric markers could not predict postoperative outcome.[4]

According to Ryan et al postoperative complication rate was higher when albumin was lower than 2.5 g/dl (p<0.001).[8]

According to Beghetto et al it was concluded that serum albumin level was the strongest predictive parameter for death and hospital infection (<3.5g/dl).[9]

CONCLUSION

The present study shows that patients with serum albumin less than 3g/dl has more postoperative complications and patients with serum albumin >3.5 g/dl has less postoperative complications which was statistically significant. The study concludes that as the serum albumin level increases the complication rate decreases.

The number of patients in the 41-50 years group was the highest (26%). And the highest no of complications Were noted in the age group of 41-50 years (53%).

The highest complication rate was seen in patients with renal procedures like pyelolithotomy and nephrectomy. Least complications were seen in patients with esophago-gastric procedures.

Female had more postoperative complication comparison to male. 44% of males in the study developed complications and 55% of the females had complications.

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