



ORIGINAL RESEARCH PAPER

General Surgery

HYPOALBUMINEMIA AS AN INDEPENDENT PROGNOSTIC RISK FACTOR FOR ADVERSE POST OPERATIVE OUTCOMES IN AN EMERGENCY LAPAROTOMY IN ADULT PATIENTS

KEY WORDS:Laparotomy, hypoalbuminemia, wound infection.

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ABSTRACT

Background: Laparotomies are commonly performed surgeries in an emergency setting. The complications associated with these are a result of the activation of the surgical stress response, the magnitude and duration of which are proportional to the surgical injury. Albumin is an important negative phase reactant. The prevalence of hypoalbuminemia in surgical patients is quite common. Preoperative hypoalbuminemia is an independent risk factor for several adverse outcomes postoperatively, and it is one of the marker for nutritional status of the patient. Low level of albumin is a risk factor for postoperative morbidity and mortality of the patients. **Objective:** To study level of serum albumin and its correlation with postoperative morbidity and mortality. **Materials and methods:** 84 patients in the age group 18-75 years who underwent Emergency laparotomy were studied from March 2018 to April 2020 at GCS Medical College. Effect of hypoalbuminemia was estimated. Study group consisted of albumin level less than 3g/dl and control group of albumin more than 3g/dl. Both groups were studied for post-laparotomy complications and data was analysed. **Results:** Prevalence of hypoalbuminemia is common in patients undergoing emergency laparotomy. Hypoalbuminemia has strong positive correlation to post-operative adverse outcomes like seroma, wound dehiscence, wound infection, incisional hernia and mortality. **Conclusion:**Hypoalbuminemia is a significant and effective prognostic risk factor which predicts adverse post-operative outcomes in patients undergoing laparotomy.

INTRODUCTION

Laparotomies are among the most commonly performed surgeries in an emergency setting. Complications following laparotomy vary from pain, wound infection and dehiscence, sepsis, bleeding, bowel complications such as anastomotic leaks to systemic complications such as acute respiratory distress syndrome (ARDS), acute kidney injury (AKI) and death.¹ These are a result of the activation of the surgical stress response which follows all surgeries, more so the major abdominal surgeries, the magnitude and duration of which are proportional to the surgical injury. These ultimately result in catabolic changes.²

The surgical stress response is associated with alterations in the plasma levels of the positive and negative acute phase reactants. These include positive acute phase reactants such as C-reactive proteins, haptoglobin, serum amyloid A, lactoferrin, ceruloplasmin, fibrinogen, and negative acute phase reactants such as albumin, transferrin and transthyretin. Changes in the levels of these reactants following surgery, though non-specific can predict the extent of the stress response and thus can serve as prognostic markers for prediction of complications.³ Albumin is one of the most important proteins used in the body. This essential protein makes up approximately 60 % of protein in blood plasma, where it acts as a carrier molecule for other molecules that are transported in blood. Blood albumin levels are regulated by several processes. These include the production of protein in the liver, the amount of protein secreted by the liver, the amount of proteins in body fluids other than blood and the rate at which the protein is degraded.⁴ Dysfunction in one or more of these processes can result in hypoalbuminemia. Possible hypoalbuminemic symptoms include full body swelling or swelling in one or more parts of the body such as the legs, hands and face. Losses of albumin from body- sites of excessive loss are from GI tract, kidneys and skin lead to poor tissue healing, decreased collagen synthesis in surgical wounds or at the anastomosis, and impairment of immune response such as macrophage activation and granuloma formation. Therefore in hypoalbuminemic patients wound infection, remote

infection such as pneumonia and anastomotic leakage were commonly found. People with this condition might have a poor appetite, muscle weakness, muscle cramps or fatigue. Low blood albumin cannot be corrected by simply prescribing an albumin supplement to raise the blood level of the protein. In fact, some studies indicated that it might be harmful to administer albumin as a part of the treatment. The optimum treatment for people with hypoalbuminemia is dependent on cause of the condition. Low blood levels of albumin are managed by treating the cause. Perforation, Peritonitis, obstruction and trauma are the most common surgical emergencies, and have relatively high morbidity and mortality rates⁵.

Mortality rates remain high as patients have other morbid conditions like diabetes, hypertension, acute kidney injury, despite of advances in surgical techniques, antimicrobial therapy, and intensive care support. Many scoring systems, such as the Acute Physiology and Chronic Health Evaluation II (APACHE II) score, the Simplified Acute Physiology Score II (SAPS II), the Sequential Organ Failure Assessment (SOFA), and the Mannheim Peritonitis Index (MPI) systems, have been introduced to estimate disease severity and prognosis in critically ill patients.

Materials and Methods

A Retrospective study of 84 patients who underwent emergency laparotomy, was conducted in the Department of General Surgery, From March 2018 to April 2020 at GCS Medical College Hospital and Research Centre. All patients were stratified according to history, physical examination and relevant investigations done to confirm the diagnosis. All the patients were assessed postoperatively for any complications.

Method of Collection of Data:

A study was conducted in patients who underwent emergency laparotomy during the study period from March 2018 to April 2020 at GCS Medical Collage Hospital and Research Centre. Data was collected from MRD department regarding indication for which laparotomy was done,

nutritional status and post-operative adverse outcomes.

Inclusion Criteria:

- All patients in the age group 18-75 years who underwent emergency laparotomy surgery in the Department of General Surgery during the given period.

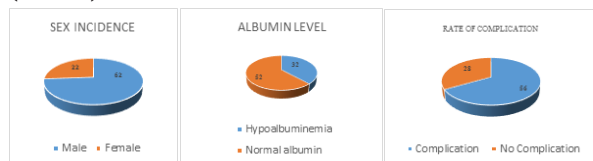
Exclusion Criteria :

- Patients who were not fit in our inclusion criteria.
- Patients below 18 years, and those patients whose data not available.

RESULTS

A retrospective study was conducted at GCS Medical College from March 2018 to April 2020. A total of 84 patients were studied on the basis of history, and indication for which emergency laparotomy was done, and followed up as per case records from MRD, for post-operative adverse outcomes.

Out of 84 patients studied, 62 (73.80%) were male and 22 (26.11%) were female.



Out of 84 patients 32 (38.09%) patients had hypoalbuminemia and 52 (61.90%) had normal protein level.

Out of 84 patients 56 (66.06%) had developed post-operative complication and 28 (33.03%) had no post-operative complication.

Table 1: Age Wise Albumin Level Distribution

Age		18-30	31-45	46-70	>75	Total
Albumin level	<1.5	1	5	8	2	16
	1.5-2.5	1	1	6	1	9
	2.5-3.5	2	2	2	1	7
	>3.5	10	30	8	4	52
						84

Table 2: Level of Albumin with Rate of Complication

Level	Complication	No Complication	Frequency
Class-4 (<1.5gm/dl)	15	1	16
Class-3(1.5-2.5gm/dl)	5	2	7
Class-2(2.5-3.5gm/dl)	5	4	9
Class-1(>3.5gm/dl)	31	21	52
Total	56	28	84

A total of 84 patients who underwent emergency laparotomy surgery 32 patients had hypoalbuminemia (<3.0 g/dl) and 52 had normal albumin (>3.5 g/dl) but these patients had co morbid condition like HTN, DM, Acute kidney injury and chronic kidney disease. So, The patients had a higher rate of complications as compared to hypoalbuminemia. Hence, it important to consider the rate of comorbid condition in patients with hypoalbuminemia.

Table:3 Effect Of Co-Morbidity In Complication

	Morbidity (HTN, DM, AKI, CKD, ETC)	No Morbidity	Total no.
Hypoalbuminemia	14	11	25
Normal albumin	24	07	31
Total no.	38	18	56

Table:4 Mortality And Gender

	Expired	Discharged
Male	2	60
Female	1	21

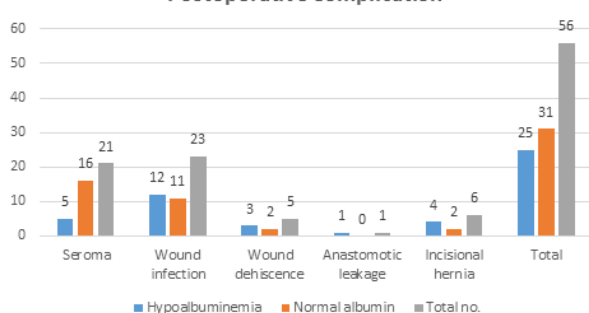
So out of 84 patients 56 developed complication and 28 didn't have complications, Out of them 25 patients with hypoalbuminemia developed complication, while 31 with normal albumin developed complication, and 3 patients have died because of associated morbidity like hypertension and acute kidney injury and sepsis alongwith low albumin level(<1.5).

Table 5: Postoperative Complication

Complication	Hypoalbuminemia	Normal albumin	Total no.
Seroma	05	16	21
Wound infection	12	11	23
Wound dehiscence	3	2	5
Anastomotic leakage	1	0	1
Incisional hernia	4	2	6
Total	25	31	56

In our study, decreased albumin was also significantly associated with post-operative complication like wound infection, wound dehiscence, seroma, anastomotic leakage, incisional hernia, etc.

Postoperative Complication



Statistical analysis was done accordingly, p value < 0.05 was considered statistically significant. Serum albumin < 3.0g/dl was associated with increased postoperative morbidity and mortality and risk of complication and more risk with associated co-morbidity and mortality.

DISCUSSION

This study was conducted to evaluate the role of hypoalbuminemia in post-operative complication in emergency laparotomy patients who underwent emergency surgery for acute abdominal conditions, like small bowel perforation, acute intestinal obstruction, peptic perforation, acute appendicular perforation, incarcerated hernia etc.

Table:6 Indication For Emergency Surgery

DIAGNOSIS	FREQUENCY	PERCENT
Small bowel perforation	30	36.75%
Acute intestinal obstruction	12	14.28%
Acute perforated appendicitis	20	24.80%
Incarcerated hernia	10	11.90%
Perforated peptic ulcer	10	11.90%
Others	02	2.38%
Total	84	100.0%

Reduced pre-operative hypoalbuminemia is relatable to observed post-operative complications like seroma formation, wound infection, wound dehiscence, anastomotic leakage, incisional hernia in present study. Out of 84 patients 56 developed complication (66.6%), from which 32 patients had hypoalbuminemia and 24 had normal albumin (>3.5 g/dl). They had comorbid condition like diabetes mellitus,

hypertension, acute kidney injury, chronic kidney disease etc.

Wound infection was the most common complication overall in the present study. Out of 56 patients developed post-operative complication, 23 developed wound infection. pus culture and sensitivity showed majority of bacterial infection klebsiella. Wound infection was also the most common complication in the study done by Bhuyan et al⁷, Gibbs et al⁸, Lohsiriwat et al⁹. In present study rate of complication was 41.07%, so this signifies that wound infection is most common complication, and second most common complication is seroma formation (37.05%) in present study.

Table: 7 Comparison Of Wound Complication Rate

STUDIES	Wound complication rates
Bhuyan et al	45.5%
Gibbs et al	28.4%
Lohsiriwat et al	29%
Present study	41.07%

In this study out of total 23 patients had wound infection (41.07%), 8 patients had diabetes mellitus and 4 were hypertensive and 2 had acute kidney injury, rest all had no comorbid condition, so this signifies that co morbidity plays major role in post-operative complications. So correction of glucose level in diabetic patients and control of blood pressure is most essential for better post-operative outcome.

In the present study pre-operative serum albumin less than 3.0 g/dl has highest rate of complication than albumin more than or equal to 3.5 g/dl, which was statistically significant, and majority of complication occurred in patients with albumin level less than 1.5 g/dl, those patients had developed 100% post-operative complication, and those who had co-morbid condition, instead of normal albumin they also developed high rate of complication and 3 patients have died because of low albumin (<1.5gm/dl) and associated morbidity like hypertension and acute kidney injury and sepsis.

CONCLUSION:

Our study shows that serum albumin is an indicator of postoperative outcome, maximum number of patients with complications, noted with serum albumin <1.5g/dl. The complication rate was almost similar with serum albumin range of 1.5-3.0. The patients with serum albumin <3.0g/dl had a higher complication rate which was statistically significant (p<0.05). Patients with serum albumin >3.5g/dl had less complications which was statistically significant (p<0.05).

Thus serum albumin is a good prognostic indicator and associated with significant increased risk of morbidity and mortality and the rate of post-operative complication were highest in associated morbid conditions like diabetes, hypertension, AKI, chronic renal disease, so they also predict outcome in post-operative periods.

SUMMARY

The study was conducted on 84 patients who underwent emergency laparotomy surgery at GCS Medical College, between March 2018 April 2020. Hypoalbuminemia is an important independent risk factor for the post-operative morbidity and mortality in the patients who underwent emergency abdominal surgeries.

DECLARATIONS

Conflict of interest: None declared
Ethical approval: Not required

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