Section: General Surgery

Original Research Article

TO EVALUATE THE ROLE OF PREOPERATIVE SERUM ALBUMIN LEVEL AS A PREDICTOR OF POSTOPERATIVE ABDOMINAL WOUND RELATED COMPLICATIONS AFTER EMERGENCY ABDOMINAL SURGERY IN A TERTIARY CARE HOSPITAL

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Abstract

Background: To measure preoperative serum albumin levels in patients undergoing emergency abdominal surgery in our institution and to study the incidence and grade of surgical site infection and wound dehiscence. Also, to correlate Preoperative serum albumin levels with postoperative abdominal wound-related complications till 30 days after surgery. **Materials and Methods:** This Observational Prospective study was conducted in the Department of General Surgery, Government Medical College and STM Hospital, Haldwani, on 150 patients requiring emergency abdominal surgery. **Result:** 66% of the study population had preoperative hypoalbuminemia (serum albumin level <3.5g/dl). Patients with preoperative hypoalbuminemia had significant postoperative surgical site infection, significant deep wound infections, and wound dehiscence according to the Southampton Grading and WUWHS SWD grading, respectively. **Conclusion:** Preoperative serum albumin level was used mainly to predict postoperative wound-related complications following emergency exploratory laparotomy, where this study revealed that preoperative serum albumin level was an exceedingly good predictor for assessing postoperative wound-related complications.

INTRODUCTION

Emergency abdominal operations are frequently performed in hospitals throughout India. Advancements in surgery and preoperative care have decreased postoperative deaths in recent decades. However, postoperative complications have continued to be prevalent. Postoperative problems expose patients to morbidity and result in a substantial financial cost. Emergency exploratory laparotomies, while lifesaving, impose significant acute surgical stress on the physiological systems. Prolonged surgical procedures can lead to increased metabolic stress response, potentially leading to postoperative problems. Early detection of patients with co-morbidities and nutritional inadequacies, along with prompt initial resuscitation, can potentially decrease postoperative death and morbidity rates. Nutritional aid in surgical patients aims to prevent or reverse catabolism caused by disease or damage.[1]

Albumin is the predominant plasma protein and is crucial in regulating body fluid distribution, acid-base balance, and binding essential substances in the blood.[2] The monomeric multi-domain macromolecule is the primary factor influencing plasma oncotic pressure and regulating fluid distribution across bodily compartments. Serum albumin is the primary carrier of fatty acids. It plays a crucial role in modifying certain substances' metabolism, affecting how many medications are processed in the body. Albumin is classified as a negative acute-phase protein due to its reduced levels during injuries and illnesses. It usually has a serum concentration ranging from 3.5 to 5.0 g/dl. Hypoalbuminemia is characterized by a serum level lower than 3.5 g/dl. A serum albumin level of more than 3.5 gm/dl indicates sufficient protein reserves

and offers protection through many biological mechanisms. It forecasts the likelihood of complications and death during the perioperative period. A serum albumin level below 3.5gm/dl in a stable, well-hydrated patient indicates malnutrition.[3] Serum albumin is commonly used as a biochemical and nutritional marker in pre-operative assessments of patients undergoing cardiac, trauma, and general surgeries. It falls rapidly during the first hour after surgery and remains low until the third day. Serum albumin typically decreases by around 33.0%. Patients with hypoalbuminemia preoperatively have higher risks of complications and death, and extended hospital stays.

Infection of the wound following surgery is a frequent medical issue. Wound infection is a complicated process resulting from multiple biological processes' molecular interactions.[4] The cause of the high morbidity and death rate is wound infections. To be classified as a surgical site infection, the wound must:

- It should happen no later than 30 days following the procedure (or one year in the case of organ/space infections with an implant in situ).
- They may include the skin, subcutaneous tissues, deep layers, or distant organs; additionally, they may contain pathogens isolated from the wound site or purulent drainage.[4]

SSI symptoms often manifest 3–7 days after surgery, and by definition, they must show within 30 days following surgery (or, in the case of an implant, within a year). Individuals with metabolic syndrome are more vulnerable, particularly those with diabetes, smokers, the elderly, and immunocompromised individuals. Individuals who have had complicated, drawn-out, or tainted surgery are also more vulnerable. The majority of patients report gradually developing pain and discharge, along with possible general illness.[5]

MATERIALS AND METHODS

The present study was conducted in the Department of General Surgery, Government Medical College and STM Hospital, Haldwani, after due permission from IEC for 18 months. It was a hospital-based observational prospective study that was conducted on 150 patients. The study was described to the participants, and their written consent was obtained. Inclusion Criteria were all patients aged 18 years and above who were admitted for emergency abdominal surgery and all patients giving consent. Exclusion Criteria were patients not willing to participate, patients with co-morbid illnesses such as kidney disease, liver disease, hypertension, and diabetes mellitus, and patients who underwent re-exploratory laparotomy within 30 days of previous surgery.

A detailed history was taken, and a thorough clinical examination was performed. Relevant biochemical and radiological investigations were done. Data was collected regarding preoperative serum albumin in patients who underwent emergency abdominal surgery in our institution and incidence and grading of postoperative wound-related complications like surgical site infection by Southampton grading, wound dehiscence by WUWHS SWD grading, and other complications like prolonged ileus, duration of hospital stay, anastomotic leak, enterocutaneous fistula and mortality of the patients till 30 days were assessed and correlation between preoperative serum albumin level and postoperative complications mentioned above was done.

Data was analyzed using parametric and non-parametric tests based on the distribution of the values obtained. Results were expressed as frequency, percentages, mean and standard deviation. A p-value of less than 0.05 was considered significant.

RESULTS

The study was conducted on 150 patients requiring emergency abdominal surgery. The mean age of the study population was 34.21 years, with age group 31-40 having the highest representation of 39 patients (26%). Males represented the majority, with 98 patients (65.33%). The majority of the patients were diagnosed with Gastric Perforation (26%) followed by Acute Intestinal Obstruction (Non-Malignant) (22%), Intestinal perforation (19.33%), and Blunt Trauma Abdomen (8%). The preoperative serum albumin in the study population ranged from 1.8 to 4 g/dl with a mean of 3.12 (± 0.64) g/dl.

[Table 1] shows that 66% of the patients had hypoalbuminemia (preoperative serum albumin <3.5 g/dl).

[Table 2] shows that among those patients with preoperative serum albumin <3.5 g/dl, the majority of the patients were graded IV B (28.3%) and grade IV A (18.2%) based on Southampton Grade.

[Table 3] shows that among those patients with preoperative serum albumin <3.5 g/dl, the majority of the patients were graded IV (58.58%) followed by IV A (28.28%) based on WUWHS SWD Grade.

Table 1: Preoperative Serum Albumin.

Preoperative serum albumin	No. of Patients	Percentage
<3.5 g/dl	99	66
>=3.5 g/dl	51	34

Table 2: Southampton Grade

Southampton grade	No. of Patients	Percentage
0	0	0

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I A	0	0
I B	3	3.03
I C	0	0
II A	4	4.04
II B	0	0
II C	7	7.07
II D	0	0
III A	10	10.1
III B	9	9.09
III C	4	4.04
III D	6	6.06
IV A	18	18.18
IV B	28	28.28
V	10	10.1
Total	99	

Table 3: WUWHS SWD Grade

WUWHS SWD Grade	No. of Patients	Percentage
No Dehiscence (0)	0	0
I	5	5.05
I A	2	2.02
II	0	0
II A	5	5.05
III	1	1.01
III A	0	0
IV	58	58.58
IV A	28	28.28
Total	99	

DISCUSSION

Preoperative nutrition plays a vital role in preventing the patient's mortality and morbidity post-operatively. In this study, we tried to evaluate the preoperative serum albumin level to predict the postoperative wound-related complications in 150 patients who presented to Dr Susheela Tiwari Government Hospital and underwent emergency exploratory laparotomy. Southampton grading and WUWHS grading systems were used to determine the wound site infections. The more significant burden of the people who underwent surgery was between 31-40 years, with a median age of 34.21 years. However, in contrast to our study, in the study conducted by James Gibbs et al,[6] in 1999, the median age was 61 years, and in the study conducted by Bhandari R.T. et al. (7) in 2016, the median age was 50 years. Males represented the majority, with 65.33% (98 patients). Similar results were identified in the previous study conducted by Sharath Prakash et al. (8) in 2019 and Bhandari R.T. et al,[7] in 2016. The majority of patients who underwent emergency exploratory laparotomy were because of Gastric Perforation (26%) followed by Acute Intestinal Obstruction (Non-Malignant) (22%), Intestinal perforation (19.33%), and Blunt Trauma Abdomen (8%). Similar results were identified in the study conducted by Sharath Prakash et al,[8] in 2019, where indications for emergency surgery were majorly due to hollow visceral perforation (45.8%) followed by intestinal obstruction (23.2%).

The preoperative serum albumin in the study population ranged from 1.8 to 4 g/dl with a mean of 3.12 (± 0.64) g/dl. 66% of the patients had Hypoalbuminemia (preoperative serum albumin <3.5 g/dl). Similar results were identified in the study conducted by Sharath Prakash et al,[8] 63.1% of the patients had Hypoalbuminemia. Among those with Hypoalbuminemia, 18.18% were graded IV A, I.e., they had pus/purulent discharge at one point only (<2cm), 28.28% were graded IV B, i.e., they had pus/ purulent discharge along the wound (>2 cm), and 10.1% were graded V i.e. they had deep or severe wound infection with or without tissue breakdown based on Southampton Grade, while 58.58% were graded IV and 28.28% were graded IV A according to WUWHS SWD Grading.

The duration of hospital stay in patients with Hypoalbuminemia was <=7 days for 23.23% of the patients, 8 to 14 days for 51.51%, and >14 days for 25.25% of the patients. 22.22% of patients with Hypoalbuminemia had prolonged ileus. 10.1% of patients with preoperative serum albumin <3.5g/dl had an anastomotic leak, while 1.01% (i.e., 1 patient) had enterocutaneous fistula, and 8.08% (i.e., 8 patients) had post-operative mortality within 30 days after emergency surgery.

So, according to our study, there is a significant association between preoperative hypoalbuminemia and postoperative wound-related complications such as surgical site infection and wound dehiscence, which were measured by Southampton grading,[9] and WUWHS SWD grading,[10] respectively. There was also a significant association between the preoperative hypoalbuminemia and the postoperative prolonged hospital stay.

CONCLUSION

So, our study indicates that preoperative serum albumin level can be used as a predictor of

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postoperative wound-related complications in emergency exploratory laparotomy patients, and the study also suggested that it can predict the patient's progression and prolonged hospital stay of the patient postoperatively.

However, as per our study, there was no significant association between preoperative hypoalbuminemia and postoperative complications such as anastomotic leak, enterocutaneous fistula, and postoperative 30-day mortality.

REFERENCES

1. Vonlanthen R, Slankamenac K, Breitenstein S. The impact of complications on costs of major surgical procedures: a cost analysis of 1200 patients. *Ann Surg.* 2011;254(6):907-913. doi:10.1097/SLA.0b013e31821d4a43.
2. Fanali G, di Masi A, Trezza V, Marino M, Fasano M, Ascenzi P. Human serum albumin: from bench to bedside. Mol Aspects Med. 2012;33(3):209-290. doi:10.1016/j.mam.2011.12.002
3. Hall R. Identification of inflammatory mediators and their modulation by strategies for the management of the systemic inflammatory response during cardiac surgery. J Cardiothorac Vasc Anesth. 2013;27(5):983-1033. doi:10.1053/j.jvca.2012.09.013
4. Kolasiński W. Surgical site infections - review of current knowledge, methods of prevention. Pol Przegl Chir. 2018;91(4):41-47. doi:10.5604/01.3001.0012.7253
5. Kamel C, McGahan L, Mierzwinski-Urban M, et al. Preoperative Skin Antiseptic Preparations and Application Techniques for Preventing Surgical Site Infections: A Systematic Review of the Clinical Evidence and Guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2011 Jun
6. Gibbs J, Cull W, Henderson W, Daley J, Hur K, Khuri SF. Preoperative serum albumin level as a predictor of operative mortality and morbidity: results from the National VA Surgical Risk Study. Arch Surg. 1999;134(1):36-42. doi:10.1001/archsurg.134.1.36
7. Bhandari, T. R., Shahi, S., Bhandari, R. S., & Lakhey, P. J. (2016). Preoperative serum albumin level as a predictor of perioperative outcome in patient undergoing major gastrointestinal surgery. Journal of Society of Surgeons of Nepal, 19(2), 13–20. https://doi.org/10.3126/jssn.v19i2.24544
8. KumarSV, Prakash DG, PottendlaVK. Preoperative serum albumin level as a predictor of surgical complications after emergency abdominal surgery. Int Surg J. 2019 Feb;6(2):361-364
9. Bailey IS, Karran SE, Toyn K, Brough P, Ranaboldo C, Karran SJ. Community surveillance of complications after hernia surgery [published correction appears in BMJ 1992 Mar 21;304(6829):739]. BMJ. 1992;304(6825):469-471. doi:10.1136/bmj.304.6825.469
10. World Union of Wound Healing Societies (WUWHS) Consensus Document. Surgical wound dehiscence: improving prevention and outcomes. Wounds International, 2018;18.

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