

15-Year-old male with severe nutritional deficiency for emergency laparotomy following road traffic accident

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Keywords	Abstract
Blunt trauma abdomen, malnutrition	The incidence of blunt abdominal trauma (BAT) is rising significantly among adolescents in India, primarily due to road traffic accidents (RTAs). Poor nutritional status can negatively impact healing, immunity, and overall outcomes in trauma patients. Hypoalbuminemia, anaemia, and hypoproteinemia are key indicators of malnutrition that may not be evident clinically but can significantly complicate trauma management. This case discusses the compounded effect of malnutrition in a pediatric trauma scenario.

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1. Introduction

Malnutrition is a prevalent issue among surgical patients, with estimates suggesting that 30-50% of patients undergoing major abdominal surgery are malnourished at the time of admission (Menta et al. 2024) which can impair wound healing, compromise immune function, and reduce muscle strength. Furthermore, malnourished patients often exhibit altered body composition, with decreased lean body mass and increased adiposity, which can affect drug metabolism and distribution, potentially complicating anesthesia and pain management. Overt or subclinical malnutrition has been repeatedly linked to greater incidence of post-

surgical complications, longer hospital stays, increased morbidity, and even mortality (Keerio et al. 2024). In elective surgery prehabilitation is advised by the European Society for Clinical Nutrition and Metabolism (ESPEN) regarding Clinical Nutrition in Surgery. They recommend delaying surgery for severely malnourished patients for 7–14 days to enhance their nutritional status (Weimann et al 2017).

Case report

History: A 15-year-old male child (UHID 3785484)

presented in the emergency department following blunt abdominal trauma from a collision between a two-wheeler and a four-wheeler. The child had complaints of severe abdominal pain. There was no history of loss of consciousness (LOC), vomiting, ear, nose and throat (ENT) bleed, seizures, fever, diarrhoea, or analgesic intake. He had a history of Pica i.e. eating paints, clay, chalk, raw rice since from one and half years of age. No other significant family or personal history.

Examination: On examination, the child was conscious, oriented, and following commands with Glassgow coma scale (GCS) 15/15. Vitals were stable except for tachycardia heart rate 160/min regular low volume. Generalized edema was present. Two large bore canula were secured and iv fluids were started. On local abdominal examination tenderness and guarding was elicited. E-FAST was done in emergency department and found to be positive for intra-abdominal free fluid suggestive of hemoperitoneum.

Investigations: Blood investigations including complete blood count, liver function tests, kidney function tests and arterial blood gases (ABG) were sent. Child had severe nutritional deficiency in form of anemia, hypoproteinemia, hypoalbuminemia. ABG showed metabolic acidosis with compensatory

respiratory alkalosis (Table1).

Management: After obtaining written informed consent from the parents, the patient was transferred to the operating room for an emergency exploratory laparotomy. Intraabdominal bleeding was secured and transfused 2 unit packed red blood cells (PRBC) to correct anemia, 53ml of 8.4% intravenous sodium bicarbonate was given to correct severe metabolic acidosis. During intra operative period arterial cannula was tried in bilateral upper and lower limb but failed due to generalized edema. Child was given 10ml of 10% intravenous inj calcium gluconate to prevent hypocalcemia secondary to bicarbonate therapy and blood transfusion, stabilize cardiac membrane for any hyperkalemic changes due to severe metabolic acidosis.

Outcome: Patient was shifted to pediatric ICU in an intubated state for monitoring and further management. Patient was extubated on the same POD in the evening after ABG improved. Patient shifted to step down unit on POD-2 and discharged on POD-5 from hospital. High-protein, calcium, iron, folic acid, calorie-dense diet initiated, multivitamin and mineral supplementation was advised at the time of discharge. The follow up period was uneventful.



Fig 1. Child with blunt trauma abdomen undergoing exploratory laparotomy

Table 1. Laboratory investigations at admission

Parameter	Result	Normal Range	Interpretation
Hemoglobin (Hb)	8.8 g/dL	13.5–17.5 g/dL	Anemia
Total Leukocyte Count	3.70 ×10 ⁹ /L	4–11 ×10 ⁹ /L	Leukopenia
Serum Albumin	1.69 g/dL	3.5–5.0 g/dL	Severe hypoalbuminemia
Total Protein	2.74 g/dL	6.0–8.3 g/dL	Severe hypoproteinemia

Arterial pH	7.030	7.35–7.45	Severe metabolic acidosis
Pco2	16.9 mmHg	35–45 mmHg	Respiratory compensation
Bicarbonate (HCO ₃)	5.6 mmol/L	22–28 mmol/L	Marked metabolic acidosis
Serum Lactate	1.3 mmol/L	<2.0 mmol/L	Normal
Other labs	within Normal Limits	(WNL)	

Discussion

This case underlines the importance of evaluating nutritional status in trauma patients, especially in the pediatric age group. Hypoalbuminemia and hypoproteinemia can impair wound healing, reduce drug binding, and alter fluid balance (Zhu et al. 2025). Anaemia and leukopenia reduce oxygen delivery and immune competence, increasing post-operative risk. Metabolic acidosis, reflected by low pH and bicarbonate, was managed promptly with bicarbonate therapy and supportive care. Use of calcium gluconate was essential in mitigating potential transfusion-related hypocalcemia and correcting electrolyte imbalances associated with severe acidosis (Wobith et al. 2024). Despite stable vitals, the presence of severe malnutrition may have aggravated the full physiological impact of the trauma. Early surgical intervention, along with nutritional and metabolic support, contributed to a favorable post-operative outcome (Lasithiotakis et al. 2025).

On reviewing the literature, we observed that a major gap exists in evaluating how pre-existing nutritional depletion influences acute trauma resuscitation. While typical paediatric trauma patients retain a robust physiological reserve, the presence of preexisting malnutrition alters this baseline entirely. This case turns the focus on the findings from (Moore et al 2025) regarding the development of Enhanced Recovery After Trauma

Conclusion

From this case report the specific learning point was that in trauma care, especially in young patients, a high index of suspicion for nutritional deficiency

Surgery (ERATS) pathways, demonstrating that metabolic stabilization must occur concurrently with urgent mechanical repairs to yield a favourable outcome.

Malnutrition is an independent predictor of postoperative complications, with severely malnourished patients experiencing nearly three times the complication rate of well-nourished patients. Preoperative nutritional status significantly influences length of hospital stay, with malnourished patients requiring longer periods of hospitalization. The impact of malnutrition extends beyond the immediate postoperative period, affecting quality of life outcomes up to 30 days after surgery. Preoperative albumin levels show a strong correlation with postoperative complications, suggesting its potential utility as part of a comprehensive nutritional assessment. The effects of malnutrition on surgical outcomes are multifaceted, influencing not only complication rates but also gastrointestinal recovery and overall patient well-being (Jedamzik et al. 2025) a single case cannot estimate and establish the severity of the issue a multidisciplinary study can be conducted in near future.

The authors accept that while these individual observations are vital for describing rare clinical situations, a single case cannot definitively calculate the true epidemiological prevalence or accurately establish standardized risk stratification tiers for malnourished trauma patients.

must be maintained. This case demonstrates how malnutrition can significantly complicate trauma management. Early identification and correction of nutritional and metabolic imbalances are critical to improving outcomes in such patients.

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