

Management of a Road Traffic Accident Polytrauma Patient in a Tertiary Care Hospital in Bangladesh: Case Report with Discussion

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Abstract

Introduction: In many parts of the world, the rising number of road traffic accidents (RTA) poses a substantial threat to human life. Polytrauma is leading cause of death in the 1 to 45 years old age group and the fourth cause of death in the overall population. The purpose of this presentation of a case with discussion is to demonstrate a critical polytrauma patient successfully handled in saving life in austere resource conditions.

Case Report: A 9-year-old girl presented to emergency department about an hour after being involved in motor vehicle accident in a semiconscious state with hypovolemic shock and sustained multiple injuries. She had multiple limb fractures and lacerated wound in forehead and left knee. Primary repair of forehead wounds, stabilization of fractures and wound coverage with skin graft were done remaining adherent to all polytrauma management guidelines and employing a multidisciplinary approach. Her post-operative recovery was uneventful. She was followed up and rehabilitated with the help of physiotherapy.

Conclusion: Even at resource-constrained centers, a patient's life can be saved with prompt diagnosis, a multidisciplinary approach, and basic management techniques for polytrauma patients.

Key words: Road traffic accident, polytrauma patient, tertiary care hospital

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Introduction

Increasing road traffic accidents (RTA) represent a significant threat to human life in many parts of the world¹. Around 16,000 victims receive fatal trauma injuries daily worldwide^{2,3} leading in the causes of death in 1 to 45 year age group^{4,5}. Hence branded as the fourth cause of death in the overall population⁶. As of 2022, the World Health Organization (WHO) forecasts that roughly 1.3 million people are killed in road traffic accidents, with 20 to 50 million more suffering non-fatal injuries, raising morbidity⁷. Low-income countries account for 13% of all such deaths, despite having only 1% of the world's motor vehicles. Pedestrians, including cyclists and motorcyclists, account for 54% of all fatalities. According to the most recent figures, Bangladesh has a high mortality rate from traffic injuries (15.3 per 100,000 people) and

the world's highest fatality rate per 10,000 vehicles (102 deaths per 10,000 motor vehicles). Two-thirds of all RTC (road traffic crashes) fatalities occur while moving the patient from the accident site to a health facility, with the remaining three-fourths not receiving any prehospital first assistance at all⁸. RTA is a 'global disaster' with escalating trends in fatalities and injuries in developing nations. The high number of injuries and deaths caused by road traffic accidents tells the story of the global road safety issue. RTIs (road traffic injuries) are on the rise in Bangladesh, as they are in other low- and middle-income countries, and they are also a primary source of injury mortality. Bangladesh has a relatively high road accident fatality rate, with government estimates showing more than 60 deaths per 10,000 vehicles. Every day, around eight people are killed in road accidents¹. The majority of

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patients with multiple trauma end up at a tertiary level hospital in the country⁹. Multiple trauma is a medical term that describes a person's condition after sustaining multiple traumatic injuries. Multiple trauma is the leading cause of morbidity and mortality in both developed and developing countries. Trauma remains the biggest cause of death and disability in humans. The frequency and prevalence of multiple trauma differ by region¹. According to the World Health Organization, by 2030, trauma will be one of the top five causes of death¹⁰. Road accidents cost countries like Bangladesh between 1-5% of their GDP (Gross Domestic Product) each year. Road traffic accidents create a massive public health burden in our country¹¹. The initial assessment and management of a patient with multiple injuries is crucial toward minimizing both morbidity and mortality and assisting recovery. Initial management involves care in both prehospital and hospital situations. Both play a key part in providing best treatment to the injured patient¹². Despite all of the initiatives made to reduce trauma incidence over the previous 30 years, the mortality rate has only slightly lowered by 1.8%^{13, 14}. In the tertiary trauma care hospitals, about 20-25% of patients under 60 years of age die, and with rising age the mortality rate jumps to 45-60%. Urbanization and industrialization have a direct impact on trauma incidence due to a growth in the number of personal automobiles

in the population and more frequent road traffic accidents (RTAs)¹⁰. More than half of polytrauma survivors experience a significant deterioration in quality of life or impairment^{15, 16}. In this case report a polytrauma patient is presented, who was managed successfully by early resuscitation in multi-disciplinary approach at one of the tertiary care hospitals in Bangladesh in austere settings.

Case Report

A 9 years old female child was brought to emergency department an hour after sustaining multiple injuries after being knocked by fast moving motor vehicle. On arrival she was semi-conscious with Glasgow Coma Scale 10/15 and abnormal mobility of right thigh. She was pale and in hypovolemic shock with blood pressure (BP) 80/40 mm of Hg, pulse 107 per min and respiratory rate 19 breaths/min. On examination, there were two lacerated wounds on her forehead about 5 cm x 2 cm and 3 cm x 3 cm and a large lacerated wound on her left knee 15 cm x 10cm. The left leg had laceration of 20 cm x 15 cm size. Her pupil was normal and refractory to light. Other examination findings were normal.

X-rays of lower extremities revealed closed fracture of mid shaft of the right femur (Figure 1), upper and lower epiphyseal open fracture of left tibia (Figure 2) and metaphyseal open fracture of left lower tibia and fibula (Figure 3). Blood group was 'B+', Hb% was 09 g/dl and



Figure 1: X rays show fracture mid shaft of femur right



Figure 2: X rays show upper and lower epiphyseal fracture of left tibia- fibula

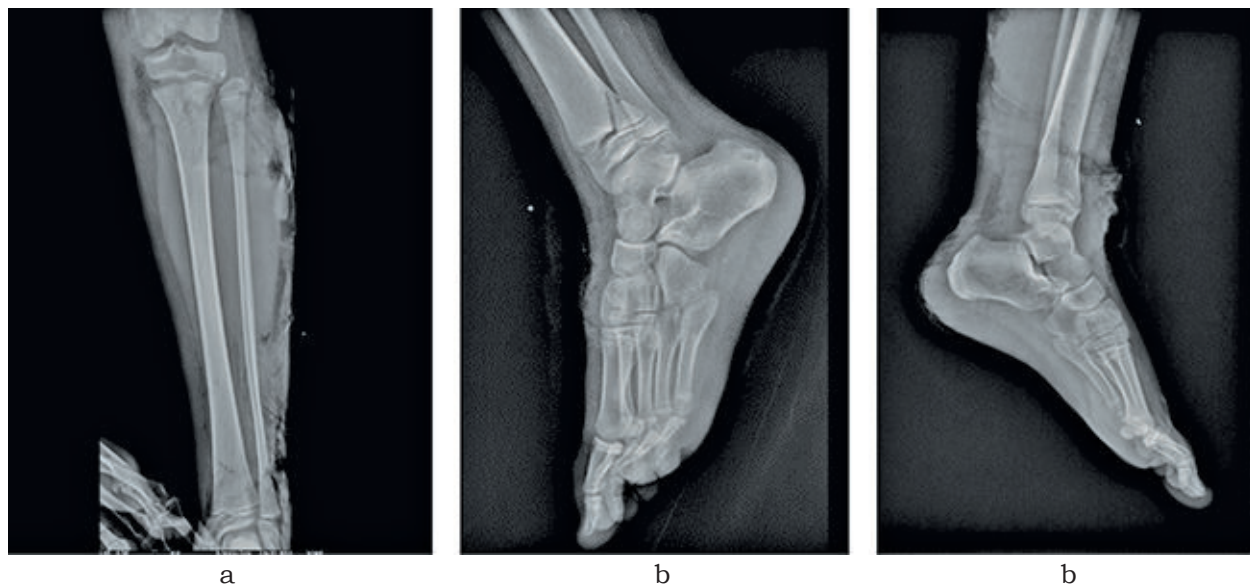


Figure 3: X rays show upper (a) and lower (b) epiphyseal fracture left tibia- fibula

Hematocrit was 36%. Cross matching was done for blood transfusion.

For this patient, primary repair of forehead wounds, fracture stabilization and wound coverage with skin graft were completed as first day surgery. Wound excision & debridement, primary repair of the wound of the sole of left foot, external fixator stabilization of left lower limb injuries (Figure 5), elastic titanium nail fixation of fractured right femur, were done at the same time. Split thickness autograft of skin was done on the left leg below the knee, above

the ankle & dorsum of the left foot under general anaesthesia.

Post-operatively, her vital signs were stable with good urine output & GCS of 12/15. Skin graft was taken nicely and other wound healed without any sepsis. Follow up X-rays show well uniting callus (Figure 6). The subsequent challenge faced was post trauma stiffness of knee and ankle with both lower limbs and pedal oedema. Physiotherapy was started to rehabilitate the patient.



Figure 4: X rays show elastic nail fixation of right femur

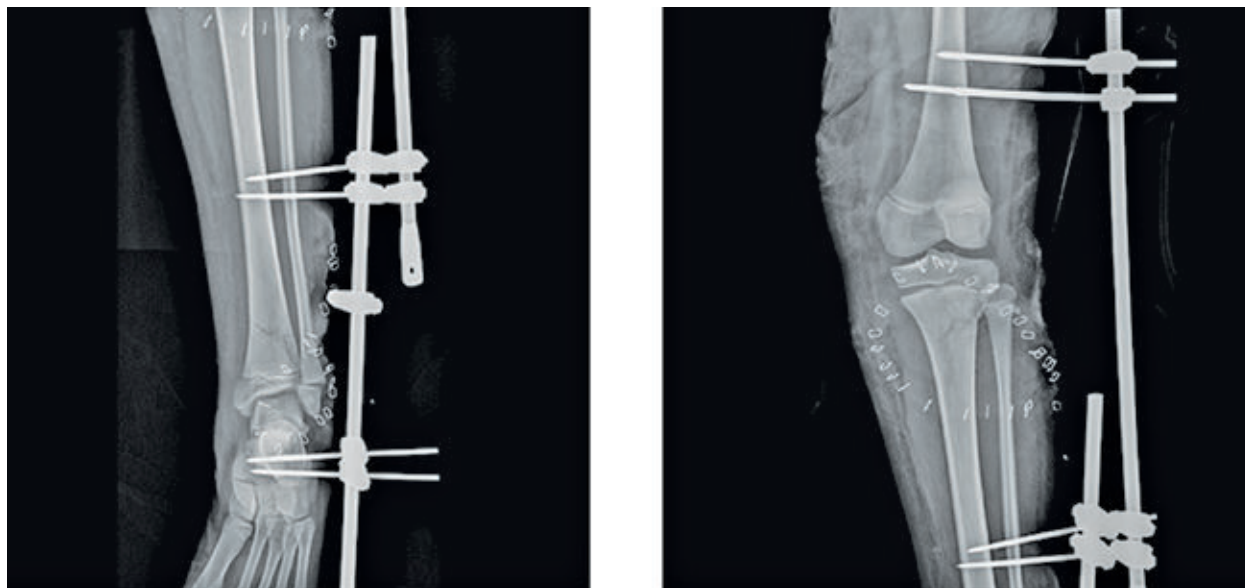


Figure 5: External fixation stabilization of left lower limb.

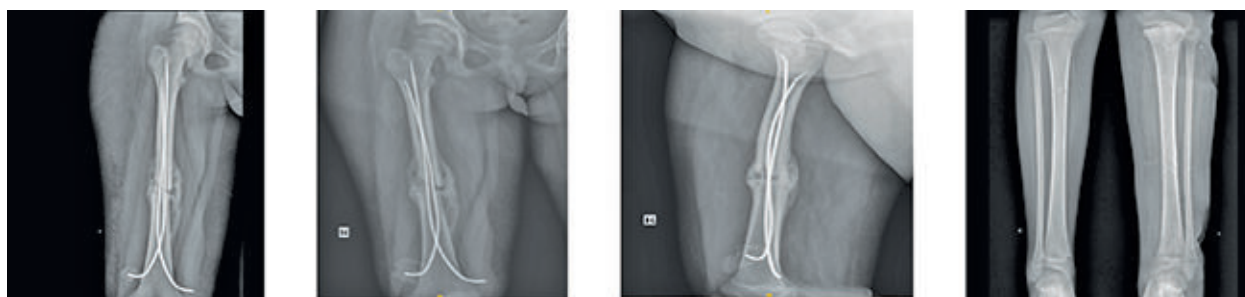


Figure 6: X-rays show good uniting state

Discussion

In the second half of the twentieth century, after the adoption of the term polytrauma and many refinements of its definition, Oestern et al. proposed the most comprehensive one, “polytrauma is a traumatic injury to two body regions, of which one or combination of all the existing injuries is life-threatening”¹⁷. One of the most effective methods of medical care for trauma patients is to establish a trauma team in the emergency department that follows a consistent algorithm^{18,19}. Their responsibilities should include identifying the appropriate surgical strategy, conducting cardiopulmonary resuscitation (CPR), and accurately assessing the illness severity^{20, 21}. Early inclusion of such a team can dramatically minimize the frequency of complications and negative outcomes, although this only happens in half

of all instances²². This is due to emergency department staff not being properly trained in the algorithms and criteria for involvement²³. In addition, non-specialized hospitals typically lack a trauma team, and all care is delivered by general anesthesiologists, critical care experts and trauma surgeons²⁴.

Following an RTC, on-the-spot emergency care was wholly dependent on onlookers’ knowledge and alertness, the location of a nearby health care institution, and the facility’s ability to adequately manage RTC victims. Often, victims received no early treatment, let alone first aid (which was administered after 2-12 hours). The most recent information also suggests that more than 40% of RTC patients were not sent to the hospital within an hour of being injured, which frequently linked to a

higher risk of severe damage. Limited availability of ambulances/transportation, poor emergency communication systems, distance to health facilities, victims' financial situation, and a lack of expertise for quick handling of RTC patients were cited as barriers to proper prehospital and hospital care⁸. In Dhaka, 81% of patients arrived at the hospital via transport other than an ambulance (e.g., private vehicles), which has a faster response time. Shorter excursions were also made using three-wheeled scooters and rickshaws. However, after comparing ambulance logs with emergency department admission logs, it was determined that ambulances spent less time making the same trip as other transport modalities. According to evidence, relocating ambulances near accident-prone areas or strategically essential health care facilities significantly improved response time in 90% of cases²⁵.

Management of polytrauma patients is difficult because there is no clear consensus on the best method. The majority of polytrauma deaths are preventable, as they are caused by either a delay in definitive care or a referral to specialized clinics. This is due to poor road infrastructures, lack of pre-hospital trauma care, long distances covered to reach definite care thus reducing the chance for the patient to receive medical care within the 'golden hour' where trauma surgeon has the greatest chance of reversing life-threatening injuries and its sequelae²⁶. Some institutes have been cautious and asserted that the completion of resuscitation needed to be performed before fixation. Moreover, surgeon preference was considered rather than patient criteria after the conclusion of resuscitation. As a result, some writers accepted a delay in the repair of the first major fracture, and timeframes varied from 24 to 36 hours under numerous conditions²⁷. Management of polytrauma situations necessitates not only urgent care, but also a unique approach, commitment, organization, readiness, and a well-coordinated, timely collaborative effort for an effective outcome within the 'golden hour'^{28,29}. Professor Richard Cowley originated the moniker 'the golden hour' based on his studies in Baltimore,

the United States, and during the Second World War, where he concluded that the majority of fatalities happened within the first 60 minutes after damage³⁰.

Independent factors such as attending surgeons, anesthetists, and nurses have a significant impact on the outcomes of these patients. Trauma patients are evaluated using grading scales to determine the extent of their injuries. These are mathematical techniques used to assess a patient's severity and prognosis on a numerical scale, either physiological or anatomical. Pre-hospital evaluations use physiological scales. The Revised Trauma Score (RTS) is the most often used, and it uses three physiological parameters: the Glasgow Coma Scale (GCS), breathe frequency (BF), and blood pressure. The Injury Severity Score (ISS) is the most often used anatomical scale⁶. The notion of early total care (ETC) was developed in the 1980s, when standardized, definitive surgical protocols were used. Indications for early complete surgery in patients who are stable or borderline stable. The operations should be carried out within 24 hours of trauma and always in trauma centers with enough human and material resources⁶. However, this technique was later found to be ineffective for trauma patients with substantial thoracic, abdominal, and head injuries, as well as those with high injury severity ratings (ISS). In the 1990s, the notion of initial, quick, temporary fracture stabilization followed by secondary definitive management after the acute phase of systemic recovery was developed as Damage Control Orthopaedics (DCO)⁶. External fixation of pelvic and long bone fractures, fasciotomies, debridement and stabilization of open fractures, and joint dislocation reduction are all examples of Damage Control Orthopaedics (DCO) operations⁶.

Resuscitation and damage control orthopedics are the mainstay factors in the management of polytrauma patient. In the reported case report the patient was knocked by a fast-moving motor vehicles sustaining multiple injuries. She experienced excessive hemorrhage leading to hypovolemic shock. It was estimated

that the duration of time from the accident to arrival at our hospital was within an hour. Thus, start of resuscitation was instituted within the 'golden hour'. Resuscitation and control of bleeding was done promptly. Successful resuscitation of polytrauma patient is determined by various clinical parameters, coordination of dedicated team of doctors and paramedics and availability of intensive care unit served the life of this patient.

The prognosis of the polytrauma patient is dependent on prompt and effective early treatment³². It is known as the 'golden hour' since time is of the essence. The emphasis on Prehospital Trauma Life Support (PHTLS) on-site and throughout transport is critical for the patient's prognosis when triaging and implementing urgent basic life support using the ABCDE procedure³⁰. This can be accomplished by teaching paramedics to perform resuscitation on critically injured patients. However, in peripheral hospitals, the concept of triage and golden hour in the management of polytrauma patients is overlooked. The index examination of a polytrauma patient is difficult, and every minute counts in terms of the patient's prognosis. Each team member's action or inaction has a potentially lethal outcome. Achieving clinically stable conditions in these individuals necessitates excellent care and expert hands. Prehospital treatment has a crucial role in determining the prognosis and fate of polytrauma patients. PHTLS guidelines, similar to ATLS, have been developed, and numerous courses and training programs are being effectively implemented around the world. The focus of these prehospital trauma recommendations is on basic life support and the numerous steps to be taken for airway, breathing, and circulatory control (ABC)³².

Bangladesh has a gradually rising high morbidity and mortality rate related to road traffic crashes (RTCs). Despite this, the availability of extensive post-crash care is nearly nonexistent. The prehospital care that a patient receives following an RTC is rudimentary, and hospital based care is often inadequate. This frequently results in

catastrophic health costs and consequences for the victims and their families⁸. Despite the tough conditions and limited resources, the reported patient was carefully handled. The example given demonstrates that polytrauma situations can be effectively managed and lives saved even in resource constrained circumstances when attending healthcare providers are highly trained in trauma care principles.

Conclusion

Management of RTCs in Bangladesh must be addressed promptly in order to meet the government's declared objective of universal health coverage by 2030, as well as the SDG targets of 3.6 and 11.2. Trauma remains one of the leading causes of death among surgical patients, however more than 80% of cases are preventable. This patient was handled using a multidisciplinary approach in an institution with minimal resources. A useful lesson to take away from this is that when the basic steps of managing a polytrauma patient are followed, an individual's life can be saved anywhere.

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