Case Report

Surgical Window and Treatment Strategy for Patient with Multiple Fractures Escaping Inflammatory Response: A Case Report

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ABSTRACT

Background:

Today's Orthopedic surgeons must be adept at the evaluation and management of complicated Multiple Injured Patients (MIP). Despite dynamic strategies, advance modern medical care, the mortality rate of 50-70% has been reported due to high-velocity accidental cases with femoral shaft fractures associated with pelvic fractures and injuries to other organs. We hereby present an interesting case of MIP with the unstable pelvic acetabulum, ipsilateral femoral shaft fracture, floating elbow, and distal radius fracture. It is essential to follow an optimal protocol for such complex fractures. Therefore, we stated the appropriate surgical window and treatment intervention to fix all the major fractures by overcoming the hyperinflammatory state.

Keywords: Multiple Trauma, Pelvic Fracture, Humerus Fracture, Operative time, surgical window

INTRODUCTION

The high-velocity accidents are associated with multiple fractures and mortality rates as high as 50%-70%. By appropriately prioritizing care and optimizing fracture management, a decrease in morbidity, mortality, and hospital stays results in improved utilization of resources and reduced societal cost in association with a frequent injury of these populations. Likewise, proper timing on the Pelvis, acetabulum, femoral shaft, other upper extremities fractures, organs injuries associated with an inflammatory state of the body is very important for improved long-term functional outcomes of patients. Hence, we have proposed a case report on the strategy and management for multiple-traumatic patient.
CASE REPORT

A 30-year-old man sustained multiple injuries in a major road traffic accident and had loss of consciousness with no spontaneous movement, no purposeful movement and no verbalization. Primary resuscitation was done at a local hospital. After 6 hours of resuscitation, he got oriented with speech, nonpurposeful movement, and makes an incomprehensible sound as his GCS was 9 out of 15. Patient had no nausea, vomiting, or hematuria. He was referred to West Chain Hospital after 48 hours from the time of the accident.

On admission, this patient was in a state of compensatory hemorrhagic shock and was found to have multiple injuries. His vitals were: blood pressure 100/75mmHg, 98-105 beats per minute, respiratory rate 22-27 per minute. According to Advance Trauma Life Support (ATLS) protocol, a Primary and Secondary assessment was done. Extended Focused Assessment Sonography (EFAST) for trauma) was done to exclude any source of visceral organ hemorrhage. On examination, the left elbow, left humerus, left midshaft forearm, the right wrist was swollen and tender on palpation with restricted motion. The left hip had pain on palpation and an attempt to move. The pelvis compression test was positive. CT and X-rays of affected parts were taken. The final diagnosis was made as:

- Left Transverse Acetabulum fracture (AO62B) with Central Dislocation of Hip joint
- Left Shaft of Femur fracture (AO:32B2)
- Left Distal Humerus fracture (AO: 15C3)
- Left Shaft of Ulna fracture (AO:22A1)
- Right Distal Radius fracture (AO:23C3)
- Right Superior Rami fracture (Nakatani classification type II)
- Cerebral contusion with mild Subarachnoid hemorrhage
- B/L Lung contusion

We performed manual reduction of the left hip joint and left tibia trabeculae skeletal traction. Temporary stabilization of the pelvis and acetabulum was achieved through the use of a pelvic sling. The fractured left arm and right wrist were splinted and braced. The estimated blood loss in femoral shaft and pelvis was 1500-2000ml. Hence, he was stabilized by 2 pints of whole blood and 2000ml fluid transfusion of ringer lactate and normal saline, intravenous broad-spectrum antibiotics, DVT prophylaxis, and other supportive measures. The Neurosurgery department was consulted immediately for the evaluation and treated accordingly. The patient was admitted to trauma ICU for closer observation. When intraperitoneal, intrathoracic, and intracerebral sources for bleeding have been excluded, attention was directed to stabilizing fractures.

Then, the patient was scheduled for three different operative procedure sittings at the gap of 8, 10, and 13 days dictated on the physiological recovery, inflammatory response, and resuscitative measures. Firstly, the femur shaft and acetabulum and were treated. The femur shaft was surgically corrected with minimal riming A2FN anterograde intramedullary nail. The anterior and posterior column of left acetabulum fractures was then operated with open reduction and internal fixation (ORIF) with reconstruction plates by posterior (Kocher-Langenbeck) approach.

The second operation was carried after 10 days. The Left Distal Humerus fracture (AO: 15C3) which was articular and multi fragmentary was surgically corrected with ORIF by the posterior triceps-on approach isolating the ulna nerve. One plate lied on the crest of the medial column and the other lied on the posterior aspect lateral column, where two plates lied on the 90 degrees to each other that conferred good biomechanical stability. The left ulna shaft fracture (AO:22B2) was corrected with a compression plate via a standard ulna approach.

DISCUSSION

There are a paucity and disarray about the management of polytraumatic patients and its surgical innervation. Polytrauma injuries consist of serious head injuries, abdominal, thoracic, elementary or multiple fractures, vascular injuries. However, existing data is often debatable and controversial when the patient sustains polytrauma. Patients require adequate resuscitation to the maintenance of hemodynamics, vitals stabilization, and intracranial pressure monitoring when suffers
long bone combined with the pelvis, head injury, and pulmonary. Therefore, polytraumatic patients need timely resuscitation, ICU care, and an optimal time window for osteosynthesis.

The early era consists of early stabilization of major skeletal injuries (Early Total Care, ETC). After the ’90s, the Damage Control Orthopedics (DOC) begun which emphasized temporary stabilization of unstable fractures allowing hemodynamic stability. The polytraumatized and hemodynamically unstable patient who is not fit for the definitive surgery might need skeletal traction, temporary external fixation, or splintage as a part of DOC. It generally stabilizes the long bone and unstable pelvis or acetabulum fractures with dislocation. Immediate definitive management of pelvis and long bone would cause a higher prevalence of “secondary hit” resulting in fat embolization, multiple organ failure, and ARDS. This allows patients to recover from the systemic inflammatory reaction to trauma. While several inflammatory mediators and coagulative parameters such as interleukin-6 (IL-6), IL-1, IL-8, IL-10, tumor necrosis factor-α (TNF-α), IL-1β are raised. In contrast, IL-6 and IL-8 are markers that are magnitude of acute systemic inflammation and determinant of postinjury mortality. These remains elevated for more than 5 days in traumatic patients with high ISS scores.

Therefore, current evidence of Damage Control Orthopedics (DOC) should be the primary focus on stabilizing the condition of unstable hemodynamic and multi- bone fracture patients. Aftermath definitive fixation procedure proceeds in a staged way manner by giving priority to the femoral fracture over pelvis or...
The principle of prioritizing resuscitation, operative timing, and strategy are essential to sustain the inflammatory state for improvement of a multi-traumatic patient for better functional recovery and to escape the systemic complications. Management of multi-trauma patients requires a multi-disciplinary approach that must initially ensure stabilization of general condition and vital function. The limitation of this case lacks a wide variety of trauma and only an individualized treatment strategy. Thus, Orthopaedic surgeons should have a dynamic role in decision making regarding the best surgical window, surgical approaches, and primarily resuscitation.

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