Management in High-risk Patients

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KEYWORDS

• Polytrauma • Fracture • Diabetes • Charcot • Neuropathy • Osteoporotic • Elderly

KEY POINTS

- Foot and ankle injuries in high-risk populations are associated with poorer outcomes and warrant special attention.
- Foot and ankle injuries in polytraumatized patients are often missed because of more life-threatening injuries and are associated with increased morbidity.
- Fall from height and automobile accidents are a predilection for foot and ankle injuries.
- Staged treatment protocols should be used to optimize the soft tissue envelop and to allow treatment of head and trunk injuries. Fractures in diabetic patients often require more aggressive management.

POLYTRAUMA AND THE FOOT AND ANKLE INJURY

Injuries to the foot and ankle are often missed or underestimated during the initial care of multi-injured patients or patients with polytrauma when life-threatening injuries such as head and trunk injuries or organ dysfunction and respiratory distress syndrome are under control. Many injuries are not realized until later in the patient's hospital stay when weight bearing is attempted. Nonetheless foot and ankle fractures are the source of long-term limitations in polytrauma cases. Multiple studies have analyzed long-term follow-ups and have shown that injures below the knee produce some of the highest rates for unemployment, as well as longer sick leave, more pain, more follow-up appointments, and decreased overall outcome as measured by Short Form 12 instruments.[1–4] Therefore early diagnosis and effective treatment of foot and ankle injuries are imperative. Considering the mechanism of injury may assist in early diagnosis. As noted by Probst and colleagues,[3] polytraumatized patients who

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had a fall from 3 m or higher and suicidal attempts are the most likely patients to have sustained foot and ankle injuries.

Despite a decline in mortality of patients with polytrauma the injury severity to the foot has not changed greatly.[5,6] In a long-term study (23 years) German researchers retrospectively analyzed mechanism of injury for foot and ankle fractures from front-seat occupants in automobile accidents.[7] Of 261 foot or ankle fractures, 41% were ankle fractures followed by forefoot, midfoot, and hindfoot. Fifty percent of the foot and ankle fractures were sustained in head-on collisions, as opposed to rollover accidents, rear-end, or side collisions. Midfoot fractures caused the highest degree of impairment, with 23% having a work limitation. Richter and colleagues[7] noted that safety measures for cars such as airbags and seatbelts have not affected the injury severity and incidence of foot and ankle injuries.

The goals when managing any traumatic injury are to preserve life, limb, and function. This management begins with thorough evaluation and documentation of the mechanism and environment in which in injury occurred, neurovascular status of the affected anatomy, quality of the surrounding integument, and other associated injuries. Surgical planning should begin immediately; however, clearance from the primary trauma team may be the limiting time factor to advance the patient to the operating room. Proper surgical approach and tissue handling are important for any surgery; however, it may be more vital for foot and ankle trauma. Surgical approach, technique, and materials are surgeon-controlled factors that should be thought about carefully. For example, incision planning should incorporate fracture deformity, keeping in mind soft tissues that may already be traumatized. The proper incision should ideally approach fractured bones at locations that allow adequate osseous reads to ensure proper reductions. Multiple incisions are often required to ensure reduction, as with talar neck fracture or with high-grade pilon fractures. The surgeon should keep in mind that the zone of injury may extend past the level of incision placement. Proper soft tissue handling becomes vital in these cases. Avoid or limit self-retaining retractors if possible because these can impede cutaneous blood supply and increase incision complications. Unnecessary grasping of cutaneous structures with forceps should also be avoided. Sharp dissection is often less traumatic than aggressive blunt dissection. Adequate surgical exposure is often coupled with fracture inspection. Fracture classifications are oversimplified. For example, Gardner and colleagues[8] used magnetic resonance imaging with low-energy ankle fractures classified by Lauge-Hansen. Seventeen percent of the fractures were not classifiable and 50% had ligamentous and fracture morphology not consistent with the Lauge-Hansen classification.[8] In addition, to ensure adequate healing, incisions should have ample blood supply each side of the incision, for which knowledge of the concept of angiosomes is important. Attinger and colleagues[9] explained the angiosome concepts for the foot and ankle in great detail: the safest incision is one that borders adjacent angiosomes. If an angiosome or its source artery is compromised from trauma or disease, then the incision should be placed within the ischemic angiosome territory to prevent damage to the patent angiosome.[9] With traumatic situations, additional surgery (as in staged protocols or reconstruction of posttraumatic deformity) is often required. To avoid any incision complications the primary surgeon should keep in mind the possibility of additional surgery.

Optimal timing of surgery relies on soft tissue injury, fracture reduction, and condition of the patient. Fracture reduction should be obtained as soon as possible. Malreduction or inadequate reduction of fractures is a source of continued pain, neurovascular impingement, and trauma to the soft tissues, and may be linked with complications. There are advantages and disadvantages to proceeding to operative