

Midfoot Crush Injuries



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KEYWORDS

• Midfoot • Crushing injuries • Tarsometatarsal joint

KEY POINTS

- Treatment of midfoot injuries can be surgical or nonsurgical, depending on the injury, the location, and the extent of the injury.
- Minor injuries usually heal with casting or bracing, whereas more unstable injuries typically need surgery for stability. Whether the injury is in a weight-bearing portion of the foot is also a consideration for surgery.
- It is vitally important that the surgeon makes a detailed assessment of the soft tissues and bones involved with the injury.
- Preservation and maintaining the soft tissue envelope should be of high priority to the surgeon.

INTRODUCTION

Crushing midfoot injuries are a relatively rare occurrence accounting for only 6% of traumatic midfoot injuries.^{1,2} Midfoot crush injuries are easily identified but often present a confounding treatment dilemma. Treatment has evolved from reduction and casting to bridge plating, external fixation, and combined pins and screws if accepting.¹ These injuries are often a part of a larger trauma and may be last on a lengthy priority list. In this review, we discuss the anatomy and role of the midfoot and review treatment and associated comorbidities of midfoot crushing injuries.

EPIDEMIOLOGY OF MIDFOOT FRACTURES

In a review of 155 patients at a level 1 trauma center, 72% of fractures were caused in traffic with 52%, 17%, 2.6%, and 1.3% of these traffic injuries being caused by car, motorcycle, pedestrian, and bicycle accidents, respectively. Falls accounted for 12% and blast injuries for 8%, and other injuries accounted for the other 8% of midfoot fractures (**Fig. 1**).³

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Fig. 1. A 27-year-old man who sustained a significant midfoot injury during a motor vehicle accident.

FUNCTIONAL ANATOMY OF THE MIDFOOT JOINTS

The articulations of the tarsometatarsal joint and midtarsal joint make up the longitudinal arch of the foot. The tarsometatarsal joint consists of 5 metatarsal bases articulating with 3 cuneiforms and the cuboid. The tarsometatarsal joints are bound by 3 groups of ligaments, the plantar, interosseous, and dorsal with the interosseous being stronger than the plantar and the plantar stronger than the dorsal ligaments. The first metatarsal and medial cuneiform make up the medial column, the central 2 metatarsals and their respective intermediate and lateral cuneiforms make up the central column, and the fourth and fifth metatarsals articulating with the cuboid comprise the lateral column. The dorsalis pedis artery and deep peroneal artery course dorsally over the tarsometatarsal joints and are at constant risk for embarrassment during midfoot trauma. The 2 tendons that cause the biggest problems with reduction are the tibialis anterior and peroneus longus, which become incarcerated easily in fracture dislocations of the tarsometatarsal and midtarsal joints. Ouzounian and Shereff,⁴ in a landmark study, found that the medial column is relatively stiff and immobile, whereas the lateral column is supple and readily adaptable to changes in terrain with the medial column allowing 3.5 mm of sagittal plane motion, the central column allowing only 0.6 mm of sagittal motion, and the lateral column allowing 13 mm of motion on average. Even though the medial column exhibits less than half the motion of the lateral column, it does provide an important role in gait by transferring force laterally through the tarsometatarsal joint through its available frontal plane motion. Although the second tarsometatarsal joint is known as the keystone, laboratory investigation found that the third tarsometatarsal joint is the joint that bears the greatest load during gait regardless of the foot position or load borne through the complex.⁵

The midtarsal joint complex comprises the talonavicular joint and calcaneocuboid joint. The calcaneocuboid joint contributes relatively little to hindfoot motion; however, the talonavicular articulation contributes to most rearfoot motion.⁶ The calcaneocuboid joint is a planar joint that contributes relatively little motion to the hindfoot. This articulation stays relatively stiff so that the cuboid can provide a stable bony alleyway

for the peroneus longus to efficiently work. The calcaneocuboid joint must also remain stable so the fourth and fifth metatarsals have a solid foundation with which to articulate with. The talonavicular joint, if damaged by trauma, can result in a staggering loss of pedal adaptive motion.

The navicular comprises 4 articular facets and the site of ligamentous and tendinous attachment. Blood supply to this bone is precarious owing to the large portion of the bone that is covered in articular cartilage. Blood vessels enter on the dorsal and plantar surfaces from the dorsalis pedis and posterior tibial artery via the medial plantar artery, respectively. This bone also receives arterial supply from the insertion of the posterior tibial tendon.^{7,8} This arterial pattern leaves the central portion of the navicular in a state of relative avascularity. It is no surprise that stress fractures propagate through the central portion of this bone. The cuboid is a pyramidal-shaped bone with a medial base and lateral apex. The peroneal groove runs along its plantar surface. There are 4 articular facets on the cuboid: distally it articulates with the fourth and fifth metatarsal bases, medially it articulates with the lateral surface of the lateral cuneiform, and proximally the cuboid articulates with the anterior process of the calcaneus. The cuboid is supplied blood by the lateral plantar artery. The talus normally has between 5 and 6 articular surfaces. The talus' blood supply arises from branches of the anterior tibial, posterior tibial, dorsalis pedis, and peroneal arteries.⁹

THE SOFT TISSUE ENVELOPE

Treatments of midfoot injuries in which soft tissues have been mismanaged or neglected have resulted in poor outcomes. The foot has a thin soft tissue layer covering a complex network of muscle, tendon, ligaments, neurovascular structures, and bony architecture. The soft tissue envelope is important not only for wound coverage but for the vascularity of the local tissue and bone. With respect to trauma, the basic principles followed by the Arbeitsgemeinschaft für Osteosynthesefragen group included anatomic reduction and stable internal fixation. Careful attention to soft tissue handling and functional rehabilitation of the injured site is vital for posttraumatic management. Functional rehabilitation involves restoring muscular power and normal or as close to normal biomechanics.

The soft tissue envelope has been recognized as the vascular envelope responsible for fostering the healing of the injury. The importance of surgical anatomy and atraumatic techniques can prevent devascularization and prevent adverse surgical sequelae after an injury. Proper soft tissue handling is mandatory as is the use of proper tools such as fine skin hooks that permit the manipulation of the skin and soft tissues without further damage.

A logical method of reconstruction of the soft tissues is necessary to allow bone to heal and limb to function well. These principles remain in the acute or chronic conditions with or without fractures involving the soft tissue. It is vitally important for the treating surgeon understand the approach and use of soft tissue techniques relative to the soft tissues in these complex injuries. Understanding the appropriate time to operate and the relationship between the soft tissue and the bone is key in the management of these multifaceted injuries. Fracture blisters should be resolved before starting surgical care. Examining the patient for posttraumatic edema reduction is necessary before surgical intervention. A simple inexpensive examination is the wrinkle test. When skin lines are present, this is a good indication that surgical care can be provided with a more predictable outcome of the soft tissue envelope.

COMPARTMENT SYNDROME

The foot comprises several myofascial compartments. There is disagreement as to the exact number, but for completeness this discussion we will refer to 10 separate compartments. These compartments are the medial, calcaneal, superficial (plantar), lateral, 4 interosseous, adductor, and dorsal (**Box 1**).

The pathophysiology of compartment syndrome is an increase in interstitial pressure with a decrease in capillary blood flow, which leads to a decrease in perfusion pressure and subsequent inadequate tissue blood perfusion. Compartment syndrome can occur up to 36 hours after insult. At 4 hours, muscle begins to necrose and only has an 8- to 10-hour window of viability; after this time has passed, the risk of infection outweighs any potential benefits of decompression.¹⁰ Fulkerson and colleagues,¹¹ in a review, contended that muscle begins to lose viability at 2 hours, and at 8 hours 90% of muscle shows injury, but it takes 12 hours to produce permanent contracture. They also stated that neural deficits begin at 30 minutes and are irreversible from 12 to 24 hours after injury, depending on the patient, if treatment is not instituted. With this time table, it is obvious that once neural symptoms set in, the clock begins ticking rapidly to institute treatment in the form of fasciotomy. Compartment syndrome occurs in 2% to 12% of all lower-extremity trauma, with 69% of cases resulting from fracture. In a case series of 12 patients by Manoli and colleagues¹², 3 were a result of multiple metatarsal fractures. Diagnosis has historically been made clinically by the “5 P’s”: pain, paresthesia, pulselessness, pallor, and paralysis; however, at this time, pain and paresthesia have been the only 2 clinical symptoms of diagnostic value.¹³ Definitive diagnosis is made by wick catheter readings of 30 mm Hg or higher. This number is derived from the forearm and leg, which has led others to use the range of 10 to 30 mm hg below diastolic blood pressure for diagnosis.¹¹ Phillips and colleagues¹⁴ also found a tuning fork is sensitive at 35 to 40 mm Hg. Shuler and colleagues¹⁵ in 2010 found normalized near-infrared spectroscopy to be useful in diagnosis in compartment syndrome. However the diagnosis is made, treatment must not be delayed. Before any bone work can be done, the tissues must be addressed. Several fasciotomy techniques have been described over the years, but for our purposes we describe the single medial and dorsal approach. From the medial approach, all compartments may be accessed except for the interosseous and adductor, which are approached by 2 dorsal linear incisions. Once decompression is achieved for massive midfoot injuries, an external fixator is an appropriate adjunct to stabilize the bony segments. Osseous stability is a key prerequisite for tissue viability. Once the tissues display viability, definitive internal fixation may be attempted. Typically, decompression of the fascial compartments is prophylactic for fracture blisters (**Figs. 2–4**).

Box 1

Myofascial compartments of the foot

- *Medial compartment*: flexor hallucis brevis, abductor hallucis
- *Calcaneal compartment*: quadratus plantae
- *Superficial compartment*: flexor digitorum brevis, flexor digitorum longus, lumbricales
- *Lateral compartment*: abductor digiti minimi, flexor digiti quinti
- *Interosseous compartment*⁴: respective dorsal and plantar interosseous
- *Adductor compartment*: adductor hallucis
- *Dorsal compartment*: Extensor digitorum Brevis, Dorsal Extrinsic Muscle tendons



Fig. 2. Preoperative view of a 33-year-old man who experienced a forefoot and midfoot crush injury with a compartment syndrome (12,000 pounds crushed his foot). Surprisingly, there were no fractures to his injured extremity.



Fig. 3. Post-2-incision dorsal fasciotomy after a compartment syndrome to the foot.



Fig. 4. Patient who underwent a single medial fasciotomy 2 years earlier.

FRACTURE BLISTERS

Fracture blisters occur after the soft tissues have undergone various degrees of insult. Historically thought of as only presenting with high-energy injuries, reports show these blisters occurring in injuries as innocuous as occurring from 4-foot falls.¹⁶ The pathogenesis of fracture blisters is multifactorial; shear or torquing force results in separation of the stratified squamous cell layer from the underlying vascular dermal layer by inflowing edema fluid. As this occurs, a relative tissue hypoxia results from vasodilatation, edema, and increasing interstitial pressure, which results in separation of the epidermis from the dermis. The level of separation differentiates fluid-filled blisters from hemorrhagic blisters. Fluid-filled blisters are tense and clear. They result from partial separation of the epidermis from the dermis with residual epidermal cells remaining on the surface of the dermis. Hemorrhagic blisters present as flaccid and blood filled. The blisters result from a complete epidermal-dermal separation (source). The timing of these blisters is anywhere from 12 hours to 3 weeks after trauma.^{17,18} Prophylactic measures include elevation, ice, compression, and early bony stabilization.¹⁶ Treatment protocols are less definitive. In several reports spanning 12 years, it has been stated consistently that there are no universal guidelines for treatment of associated fracture blisters when treating fractures.^{16,18-20} Suggested protocols include incision and drainage with roof left in place as biologic dressing, silvadene cream or betadine paint and compressive dressing applied, and surgical intervention delayed because of the presence of skin lines and blister epithelization. Others include derroofing all blisters and treat with silvadene twice daily until epithelization. Also, investigators have advocated leaving blisters intact until skin lines return and derroofing at the time of surgery and paint with betadine. Some investigators suggest that fracture blisters be treated with the same algorithms as second-degree burns.^{16,18-20} Whatever the treatment may be, the consensus among reports seems to be that incisions must be placed through supple, epithelialized tissue. It is idealistic to think that every massive mid-foot injury that presents should be stabilized in time to avoid fracture blisters; however, this has proven untrue many times over. Again, external fixation plays a pivotal role in the treatment of the mangled midfoot in the presence of fracture blisters. Whether it is circular fixation with skinny wires and pins or delta frame, these devices allow the bony segments to be stabilized while granting access to the soft tissues for constant monitoring and management until a time that definite management

can be attempted. In some cases, the external fixator may be the definitive method of fixation (Fig. 5).

TARSOMETATARSAL JOINT CRUSH INJURIES

This subset of injuries to Lisfranc joint differs from midfoot sprain in that crushing injuries to the tarsometatarsal joint do not follow the exact mechanism of injury as ligamentous Lisfranc injuries. Ligamentous Lisfranc injuries follow a twisting injury, whereas a crushing injury tends to be a more direct pattern that includes axial loading; projectile, blunt, or penetrating trauma by foreign object; or blast injury. Outcomes related to Lisfranc joint crush injuries are unfavorable. There is a 25% rate of posttraumatic arthritis in Lisfranc joint injuries regardless of age or gender.²¹⁻²³ In a study of patients with high-energy open Lisfranc trauma, Nithyananth and colleagues²⁴ found 5 deaths and 1 amputation, and of the 16 remaining patients there was a 77% spontaneous fusion rate. These investigators used open fracture protocols with multiple debridements and multiple k-wire fixation. In the small bones of the foot, k-wires can navigate small, comminuted areas in which screw fixation cannot. This is also true for skinny wires in circular external fixation with or without the use of olives for fracture reduction. The bones of the midfoot are largely cancellous and the risk for impaction, shortening, and rotational deformities are high. Aggressive bone grafting at the time of surgery is warranted in these cases. In crushing injuries to small articulating segments in the foot in which bone grafting is being used, interfragmentary compression is not necessary and can cause additional deformity. Positional screws, neutralization, and buttress plating is the method of choice in fixation of these injuries if feasible. Many of these injuries will show significant cartilage blowout and require primary arthrodesis. Temporary external fixation may be needed if significant comminution and instability are present. Multiple other surgeries may be needed first for life-threatening injuries or if the patient presents late and the soft tissues are not fit for open surgery. In patients who are not candidates for open surgery, this may be definitive fixation. The first second, and third tarsometatarsal joints are considered nonessential and may be fused with relatively low morbidity, the fourth and fifth tarsometatarsal



Fig. 5. A 38-year-old man who sustained forefoot and midfoot crush injury. Note the post-traumatic edema and fracture blister.



Fig. 6. A 45-year-old woman with a dorsal crush injury. Note the instability at Lisfranc and the mid foot.

joints play a significant role in adapting to terrain and, if destroyed, may cause long-term stiffness and difficulty ambulating. Attempts to salvage these joints should be made; however, in crushing injuries, the energy of injury may dictate the decision (Figs. 6–9).

CHOPART JOINT TRAUMA

The talonavicular and calcaneocuboid joint make up the Chopart joint. The talonavicular joint accounts for most rearfoot motion with $36.7^\circ \pm 13^\circ$ of motion. The calcaneocuboid joint only exhibits $14.4^\circ \pm 6^\circ$ of motion. In a study of simulated arthrodesis of the triple joint complex, Astion and coworkers⁶ found that by fusing the talonavicular joint, the subtalar and calcaneocuboid joints' ranges of motion decreased to 2° and that the posterior tibial tendon excursion decreased to 25% of its original value.⁶ Trauma to the talonavicular joint of any kind can result in deleterious changes to pedal motion. Every attempt at salvaging this joint should be undertaken before primary arthrodesis is considered. However, as with every crushing injury, the energy of the



Fig. 7. A 33-year-old man who experienced a degloving along with fracture and dislocation injury after a crush injury from a motorcycle accident. This patient underwent multiple debridements, negative pressure therapy, hyperbaric oxygen treatment, percutaneous pinning and a split thickness skin graft.



Fig. 8. A 33-year-old man who experienced a degloving along with fracture and dislocation injury after a crush injury from a motorcycle accident. This patient underwent multiple debridements, negative pressure therapy, hyperbaric oxygen treatment, percutaneous pinning and a split thickness skin graft.



Fig. 9. A patient presented with postoperative crush injury requesting reconstruction of the injured foot. This patient experienced partial loss after a crush injury.

injury will dictate treatment algorithms. The talus and navicular's precarious blood supply has been illustrated previously in this report. If this joint sustains severe comminution, primary arthrodesis should be considered. Importance of position in fusion of the talonavicular joint cannot be stressed enough. The posterior tibial tendon, saphenous nerve and vein, and the spring ligament may all be traumatized or incarcerated. Careful handling of the soft tissues is necessary. In this area, mono- or mini-rail external fixation may be needed to keep the talonavicular joint out to length while bone graft incorporating. If there is an associated talar neck fracture, the fixation must either span the entire site or hold the talonavicular joint to length while the talar neck and head are reconstructed. Buttress plating with multiple wires may be used as well to disperse forces across the graft site and to provide stability to the healing soft tissues. Fully threaded positional screws may be used as well (Figs. 10 and 11).

NAVICULAR COMMINUTION

The mechanism of action of comminuted navicular fractures tends to be a direct blow from an outside force such as a projectile object, axial loading injury, or blast.²⁵ If the injury is open, open fracture protocols should be instituted. Because the navicular's proximal and distal surfaces are covered with articular cartilage, most of these injuries have at least some intra-articular involvement. Although considered a nonessential joint, arthrosis of the naviculocuneiform joints can lead to chronic midfoot pain. Intra-articular damage to the talonavicular joint can have significant functional consequences. Comminution of the navicular can lead to loss of mechanical advantage of the posterior tibial tendon and frank collapse of the medial column. The mainstay of acute navicular crushing injuries is reduction with bridging external fixation to keep the midfoot out to length. If the soft tissues allow, acute treatment entails early open

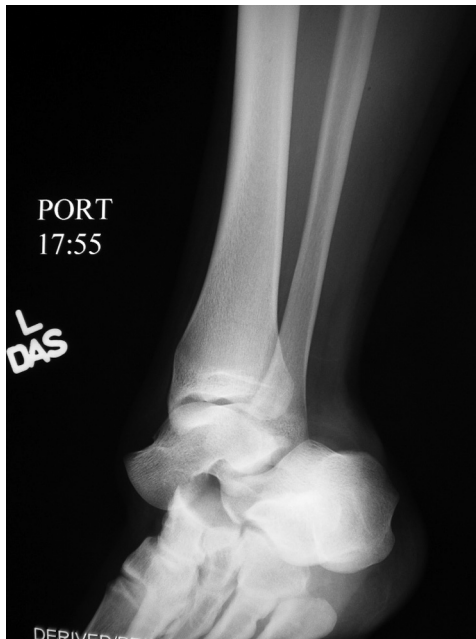


Fig. 10. Prereduction radiograph shows an isolated talar navicular dislocation after a motor vehicle accident.



Fig. 11. Prereduction radiographs show a complete talar navicular joint dislocation.

reduction and internal fixation with screws, k-wires, and bridge plating if necessary from the talus to the first metatarsal, which can be removed once consolidation has occurred.² Bone grafting plays a key role in comminuted navicular fractures because of the potential for significant bone loss during trauma. External fixation is used to stabilize the medial column and allow for incorporation of the bone graft and fixated native fragments. For isolated navicular comminution, a mono- or minirail is used. The rail fixator pins are placed distally in the medial cuneiform and first metatarsal and proximally in the talus or calcaneus. Often, 2 mono-rail fixators are needed to provide uniform diastasis. The second fixator is placed laterally into the calcaneus and cuboid or fifth metatarsal. Navicular comminution and gross midfoot comminution may be better suited for a delta frame with pins placed appropriately in the tibia, midfoot, and hindfoot.²⁶ If a ring fixator is chosen, it should be used with olive wires running transversely through the metatarsal parabola and the rearfoot complex to provide stable distraction. As stated earlier, the navicular is largely covered in articular cartilage. This factor is important when comminution destroys part or all of the articulating surfaces. Conservative treatment for posttraumatic midfoot arthritis begins with bracing and physical therapy. If conservative measures fail, surgical intervention is warranted. Naviculocuneiform fusion will not affect pedal mechanics significantly; however, fusion of the talonavicular joint can greatly alter the mechanics of the patient's gait. In cases of total articular blowout a talonavicular-cuneiform fusion will gather sufficient bone for solid union and ultimate freedom in position of fusion (**Fig. 12**).

ISOLATED CUBOID COMMUNITION

The literature lacks reports dealing with cuboid fractures. This lack of reports is directly proportional to the incidence of cuboid fractures as a whole. In the United Kingdom, there is an incidence of 1.8 per 10,000 annually.²⁷ Crushing injuries of the cuboid, to no surprise,



Fig. 12. A preoperative radiograph demonstrating a displaced fracture of the navicular prior to open reduction and internal fixation.

are rarely reported in the literature. This injury occurs from direct blow/blast or from forced abduction in the “Nutcracker” injury pattern mechanism. Direct blowing injuries to the cuboid occur from a direct strike of a foreign object, such as blunt trauma or penetrating open trauma. If the fracture is open, open fracture protocol should be instituted. With indirect injury mechanisms, the comminuted cuboid fracture is a component of a larger injury pattern. The forced abduction causes navicular subluxation, avulsion fracture, and crushing of the cuboid¹ and is often associated with a second metatarsal fracture. Historical treatment algorithms have given way to advances in internal and external fixation. In the late 1960s Dewar and Evans²⁸ recommended primary calcaneocuboid joint fusion, Main and Jowlett¹ and Ebizie²⁹ advocated plaster casting and triple arthrodesis for late arthritic symptoms. Treatment decision making begins with x-ray and often computed tomography scan findings. With a crushing injury to the cuboid, there will invariably be shortening to the lateral column, which can lead to a painful flatfoot deformity.³⁰ If there is displacement found, ORIF with bone grafting should be attempted. Depending on the severity of comminution, surgical intervention may entail simple open reduction and internal fixation with or without bone grafting and pins or screws to bridge plating for more cavernous defects needing to be grafted. Again, depending on the level of lateral column collapse and stability, an external fixator may be needed to hold the lateral column out to length. Whatever the intervention chosen, attention must be directed to the peroneus longus and its sulcus on the plantar surface of the cuboid. All attempts should be made to preserve the gliding motion of this osseotendinous unit (**Fig. 13**).^{26,30,31}

GLOBAL MIDFOOT CRUSHING

These injuries often are part of a polytrauma case. When gross instability to the midfoot, is present, early stabilization with external fixation allows the soft tissues to settle before

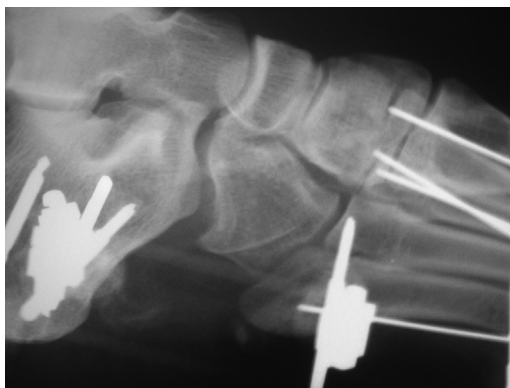


Fig. 13. A lateral radiograph shows an isolated cuboid fracture in a case in which external fixation has been applied to maintain the length while the soft tissues recover from the crush injury.

more definitive fixation with bone grafting can be instituted. In fracture patterns that have no primary cortical bone contact, tricortical structural bone grafting should be used. The same principles stated previously can be relied on for definitive management; however, with global comminution, most injuries warrant primary fusion ([Table 1](#)).

REHABILITATION

The period of treatment for a midfoot fracture is directly related to the location and type of fracture and the time of immobilization. The goal of rehabilitation should

Table 1 Proposed classification system for bone grafting				
Graft Site Type	Graft Technique	Primary Graft Indication	Secondary Graft Indication	Internal Fixation
Complete cortical apposition	Shear-strain relieving	Cancellous autograft	Cancellous allograft	Screw: Compression Plating: Locked or nonlocking
Partial cortical apposition	Cancellous backfilling	Cancellous autograft	Cancellous allograft	Screw: Positional or compression Plating: Combination locking/nonlocking
Bony gap <2 cm	Tricortical corticocancellous graft	Tricortical calcaneal, Tricortical iliac crest	Tricortical allograft of choice	Screw: Positional Plate: Combination locking/nonlocking
Bony gap >2 cm	Cortical strut + cancellous backfilling	Fibular strut or iliac crest + mixture autograft/allograft cancellous	Banked corticocancellous graft	Screw: Positional Plate: Combination locking nonlocking

emphasize restoring full range of motion, strength, proprioception, and endurance while attempting to maintain independence. Continuation of preinjury activity level is the goal with this patient population. To provide patients a pathway to rehabilitation, the local fracture/injury must be stable from the operative or nonoperative management.

The goal of rehabilitation is to return the full function with a painless, plantigrade foot. Some midfoot injuries may not hinder activities of daily living but may obstruct the individual's ability to work because of pain and restricted weight bearing. Gait training using appropriate assistive devices can help individuals with ambulation and allow them to move about independently. When indicated, the patient may progressively increase range of motion and proprioceptive and strengthening exercises until a normal gait and full function is evident. Orthotics or ankle foot orthosis may be indicated in some cases to protect the foot, relieve discomfort, and promote a functional gait pattern.

Displaced fractures will require surgery. These patients will typically require no weight bearing for several months followed by rehabilitation. Therapy and range of motion exercises are not started until bony union/stability has occurred. Bone healing may occur within 6 to 12 weeks, but bone strength and the ability of the bone to sustain a heavy load may take up to several months to years to return. Once healing has occurred, the individual may resume full activities of daily living. It is important to educate the patient not to overload the fracture site until the bone has regained its full strength.

SUMMARY

Treatment of midfoot injuries is surgical or nonsurgical, depending on the injury, the location, and the extent of the injury. Minor injuries usually heal with casting or bracing, whereas more unstable injuries typically need surgery for stability. Whether the injury is in a weight-bearing portion of the foot is also a consideration for surgery.

It is vitally important that the surgeon makes a detailed assessment of the soft tissues and bones involved with the injury. Preservation and maintaining the soft tissue envelope should be of high priority to the surgeon. Loss of bone in the midfoot can drastically shorten the foot. Keeping the columns out to length is key in the immediate postoperative timeframe for favorable long-term results. Surgical decisions should be based on issues such as the condition of the soft tissue and if there was any loss of bone in the fracture, how big the gap is in the dislocation or fracture, and if there is any instability in the foot. Nonsurgical treatment may be done if there is no loss of bone length, and if the gap is less than 2 mm. Treatment in this case would be casting for about 4 to 6 weeks. If surgery is performed, the patient will not be able to bear weight for at least 4 weeks.

The authors conclude that the importance of treating midfoot injuries adequately is shown in how the midfoot is needed for function with weight bearing and its relationship between the front and the back of the foot. It is also important to ensure that the patient is able to ambulate with a normal gait or as close to normal as possible.

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