

EXTERNAL FIXATION FOR TREATMENT OF JONES FRACTURES

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Jones fractures are well known as an injury with a high potential for complications. There are differing opinions regarding the appropriate management of this problematic fracture of the fifth metatarsal. Prolonged non-weightbearing cast immobilization has been the most commonly used historic method of treatment. Clapper et al reported a 72% union rate at an average of 21.2 weeks with this treatment. The prolonged healing time and inactivity make this form of treatment less attractive to competitive athletes and patients who need to be back on their feet sooner because of their occupation. There is also controversy over the method of fixation for repair of these fractures. Open reduction with internal fixation of screws, plates, and tension band wiring can provide compression and stability; however, disruption of the peroneus brevis tendon insertion, excessive periosteal dissection, fixation breakage, and pain associated with prominent fixation devices can occur. Percutaneous intramedullary screw fixation is the most commonly used method of fixation in the sports medicine community because of the limited dissection required. The larger screw sizes (4.5 mm and greater) are most often used. The author questions the actual compression achieved by this technique. The disruption of the medullary canal can in theory lead to disruption of the endosteal blood supply. Improper angle of screw insertion can cause a violation of the medial cortex. Operatively treated Jones fractures still must be casted non-weightbearing for six to eight weeks postoperative. This can lead to atrophy of muscles, joint stiffness, and disuse osteopenia that further increase the time of return to activity.

EXTERNAL FIXATION

The initiator of external fixation for management of fractures of long-bones was Lambotte in 1902. External fixators have most often been used in comminuted, infected, osteopenic bone fractures with soft tissue defects. The devices allow for

application of axial compression across a fracture while providing stability to allow for early weightbearing.

Yu and Shook first described the technique for fixation of a Jones fracture with a miniature external fixator. They proposed a closed, percutaneous procedure under fluoroscopy in order to preserve the already tenuous blood supply associated with this anatomic location of the fifth metatarsal. The patient was kept non-weightbearing for the duration in the external fixator; however the authors did question whether this was totally necessary. Lombardi et al reported on their experience with ten patients using miniature external fixators for Jones fractures. Their results were comparable to results with intramedullary screw fixation in time of clinical and radiographic union and return to activity rate. Nine of ten patients achieved union, and the one nonunion was asymptomatic. Their patients were kept partial weightbearing in a short-leg cast until two weeks after fixator removal, and they believed this may have attributed in their delay of returning patients to activity.

The author has used this technique in nine patients with Jones fractures. Union was achieved in all nine patients at an average of seven weeks. All patients were allowed full weightbearing as tolerated in a modified postoperative shoe two weeks after surgery.

APPLICATION TECHNIQUE

The procedure is performed percutaneously in a region that avoids complications associated with internal fixation. They are quick and easy to apply. Using C-arm fluoroscopy, the pins or screws are inserted using a template. They are inserted parallel to each other and perpendicular to the long axis of the bone from a lateral to medial direction. Two pins or screws are inserted into the base of the fifth metatarsal proximal to the fracture line and two into the shaft distal to the fracture line. Care should be taken to insure that the screws or pins are inserted

in the midline axis of the metatarsal to provide uniform compression across the fracture line. The device is attached and secured to the pins or screws. A five millimeter space should be left between the fixator body and the skin to allow for swelling. The device is then tightened to cause compression

across the fracture line. The specific method of compression differs among the varying devices used. The pin sites are dressed and a postoperative forefoot off-loading shoe is applied. An example of this technique is shown in figures 1-5.



Figure 1. Preoperative lateral oblique radiograph of Jones fracture.

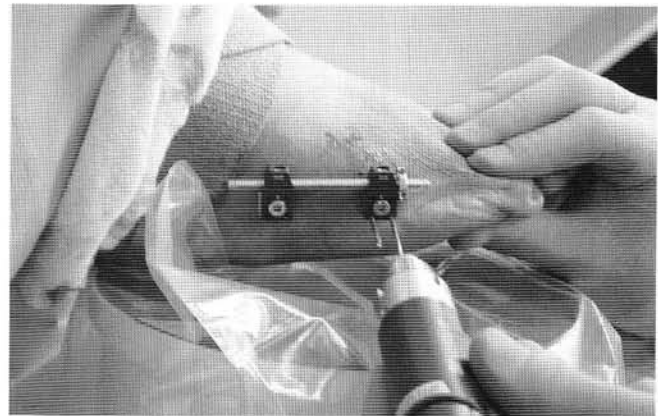


Figure 2. The pins are inserted percutaneously under fluoroscopic guidance. The fixator is used as a template for insertion of the pins.

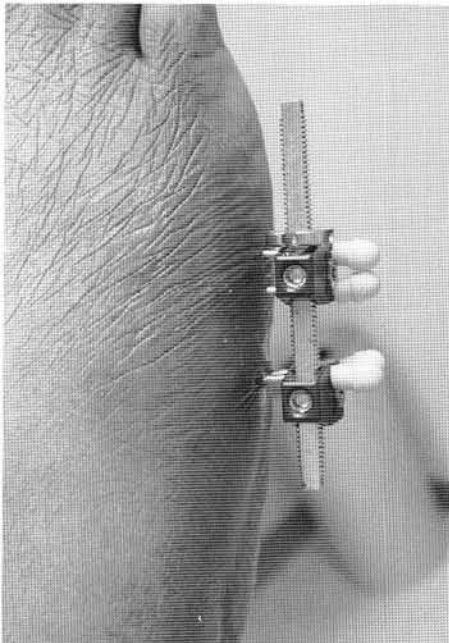


Figure 3. Clinical appearance of the foot after application of the miniature external fixator.



Figure 4. Two week postoperative lateral oblique radiograph with external fixator in place.



Figure 5. Postoperative radiograph at 8 weeks. The fixator was removed 2 weeks earlier. Note the complete union of the fracture.

POSTOPERATIVE MANAGEMENT

The patient is allowed partial weightbearing with crutches during the first two weeks and then full weightbearing as tolerated. Daily pin care consisting of peroxide cleansing and antibiotic ointment application to the pin sites begins on the third postoperative day. An ultrasound bone growth stimulator is employed to reduce healing time and insure union in this difficult fracture. The patients are seen every 2 weeks for pin site evaluation. Radiographs are taken every 2 weeks. The amount of compression can be adjusted in the office based on radiographic findings. The fixators are left on for 6 to 8 weeks until clinical and radiographic evidence of healing are noted. They are removed in office usually without anesthesia, though a local anesthetic block may be used if necessary. The patient is kept in a standard walking cast boot for an additional two weeks and then transferred into gym shoes and allowed to return to activity.

COMPLICATIONS

The complications associated with external fixation are surprisingly few in number. The most commonly encountered complication is pin tract infection. Patients are placed on prophylactic antibiotics to cover *Staphylococcus* and *Streptococcus* species for the first week postoperative and afterwards as needed for pin tract infections. Meticulous pin site cleaning should be stressed to the patient preoperatively and postoperatively. Pin site pain can occur if care is not taken to avoid the lateral dorsal cutaneous nerve. Nonunion is less likely to occur with this method than with open reduction or percutaneous intramedullary screw fixation because of the ability to adjust the amount of compression postoperatively. This technique should be avoided in patients with a stainless steel allergy.

CONCLUSION

The use of miniature external fixation devices is a theoretically sound technique for treatment of Jones fractures. The periosteal and endosteal blood supplies are undisturbed. There is no violation of the peroneus brevis tendon attachment, and pain from internal fixation devices is not an issue. The compression can be adjusted postoperatively as needed. The construction of the device allows for an earlier return to weightbearing during the initial postoperative period and a quicker return to activity after removal of the device.

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