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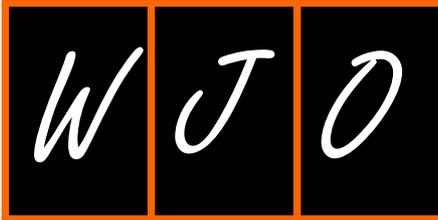
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Existing fixation modalities for Jones type fifth metatarsal fracture fixation pose high rates of complications and nonunion

Albert Thomas Anastasio, Selene G Parekh

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Abstract

Jones type fifth metatarsal fractures pose a challenge to the foot and ankle surgeon, given documented high nonunion rates as well as high complication rates including hardware prominence, nerve injury, and screw breakage for existing treatment modalities including screw and plantar plate fixation. We call for the design of innovative Jones-fracture specific implants which contour to the natural curve of the fifth metatarsal. Future research should aim to expand upon existing literature for Jones fracture fixation and evaluate efficacy of novel implants which are designed to address unacceptably high complication rates for existing treatment modalities.

Key Words: Jones; Metatarsal base; Fifth metatarsal; Athlete; Nonunion; Malunion

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Core Tip: Jones type fifth metatarsal fractures have high rates of complications and fixation failure. While intramedullary screw fixation is the current accepted treatment modality, we call for innovation in the treatment options for Jones fracture fixation to more appropriately address the challenges seen with this fracture pattern in the high level athlete.

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TO THE EDITOR

We read with interest a review article from Albloushi *et al*[1], who present an excellent overview of pathoanatomy, classification, and current concepts of fixation modalities for Jones type fifth metatarsal fracture. We thank the authors for this valuable contribution, and we agree with their conclusion that there remains a lack of consensus on the effective management of Jones fractures, especially in the high-level athlete group. In part, we believe this lack of consensus may be due to unacceptably high complication rates of existing surgical treatments.

Both delayed union and nonunion remain a challenging problem after Jones fracture fixation. The authors note that delayed union in zone 2 and 3 fractures are often the result of choosing screws that are smaller than 4.5 mm in diameter. They recommend utilization of larger screw diameters, especially in the athlete population. While we agree that smaller diameter screws often contribute to nonunion after Jones fixation, we also draw attention to the risk of cortical perforation and subsequent impingement related symptoms, and even potential nerve injury with use of the larger diameter screws[2]. The authors also mention the challenge in adequately appreciating the natural curvature of the fifth metatarsal during fracture fixation. The authors note that failure to maintain the screw within the cortical bone of the 5th metatarsal remains a major cause of nerve injury[3], and recommend meticulous choice of proper entry point of the guidewire and screw with the correct trajectory within the medullary canal. Still, achieving proper positioning of a straight screw within a bone with natural curvature is difficult, and the challenge is expounded when attempting to utilize a larger diameter screw in the case of the elite athlete. Moreover, cannulated screws have been shown to lack proper strength to withstand the significant and repetitive forces the fifth metatarsal must sustain and have been shown to be associated with screw breakage[4].

Despite the difficulties encountered with screw fixation of Jones fracture, plate fixation is also associated with substantial complication risk[5]. Nonunion rates have been unacceptably high in some series[6], and calcaneus autograft has become commonplace for the procedure, denoting an additional area of potential patient morbidity[7]. Hardware prominence also presents a unique challenge in the plating of the Jones fracture. Furthermore, soft tissue injury with the dissection required for proper plate placement flush against the cortical bone can be associated with nerve injury and periosteal stripping with destruction of native bone biology potentially impeding bony union.

With the high complication rates associated with the existing fixation modalities (intramedullary screw fixation and plantar plate fixation), there remains area for innovation with regards to treatment modalities for Jones fracture. Our institution has begun use of an intramedullary implant created specifically for Jones fracture fixation which we hope will be effective in reducing some of the listed complications. This implant has an inherent curve which is fabricated to closely aligned to the natural curvature of the fifth metatarsal. Furthermore, the implant has an end cap which serves to both compress across the fracture site and to reduce hardware prominence at the insertion site. To further enhance fixation at the distal end of the metatarsal, the implant has a talon based mechanism which once activated, provides further implant purchase distally to prevent screw pullout. A study at our institution is currently underway to evaluate whether or not these features lead to decreased complication rates and increased return to play and decreased time to bony union after Jones fracture fixation.

In summary, Jones fracture fixation remains a challenging problem for the foot and ankle surgeon. Existing treatment modalities are associated with high complication rates. Future research should aim to improve upon design elements of existing implants in an effort to effectively manage patients with this condition.

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FOOTNOTES

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