

Treatment of Metatarsal Fractures in the Competitive Athlete: Part 2

Here's a review of conservative and surgical approaches.

BY JOHN E. MCNERNEY,
DPM

Goals and Objectives

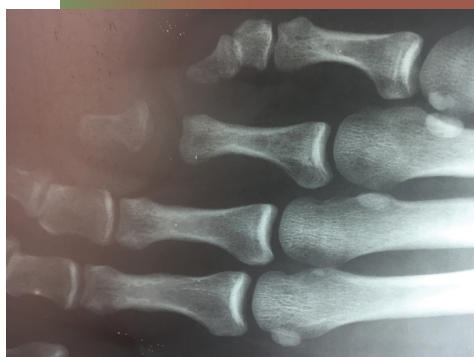
To outline and delineate the conservative and surgical management of metatarsalgia of the lesser metatarsals and base of the 5th fractures in the competitive athlete.

To be aware of the common surgical procedures that can be used to treat recalcitrant foot problems in competitive athletes.

To compare and contrast the diagnosis and treatment of the three common types of 5th metatarsal base fractures: stress fracture, avulsion fracture, and Jones fracture in the athletic population.

To recognize clinical signs and symptoms of lesser metatarsalgia.

To be familiar with the treatments of lesser metatarsalgia including surgical correction in athletes.



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Following this article, an answer sheet and full set of instructions are provided (pg. 118).—Editor

Treatment of Avulsion Fractures of the 5th Metatarsal Base

Most avulsion fractures can be treated conservatively, but when pain, swelling, inability to perform activities of daily life (ADLs), job requirements or when treating young athletes or professional athletes, early open re-

duction and screw fixation may be more prudent. Early weight-bearing yields uniformly good results in avulsion fractures. The suggested protocol is immediate full weight-bearing (FWB) to tolerance. When pain precludes full weight-bearing, semi-weight bearing (crutch assist with or

without Reece® shoe), or non-weight-bearing (NWB) protocol for two to four weeks is suggested.¹⁸

Delaying full WB for longer periods of NWB results in more stiffness, difficulty in stair walking and inability to jump.¹⁸ When the gap between the

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opposing sides of the avulsion fracture site measures greater than 4 mm, open reduction or percutaneous screw fixation lead to better outcomes, especially in athletes (Figure 1).

Pain is a good indicator of frac-

In cases where limited weight-bearing is too painful, a short leg walking cast or cast boot can be employed until fracture healing is achieved. Most avulsion fractures take six to eight weeks to allow full weight-bearing

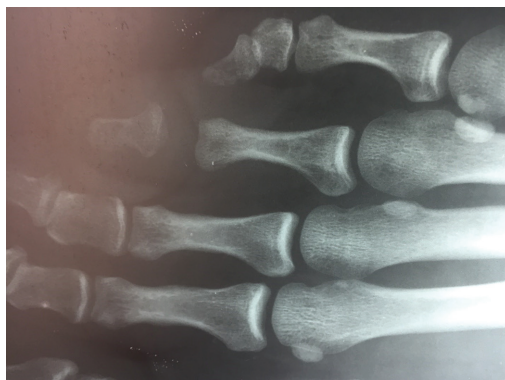


Figure 1: The patient above one week postoperatively. In surgery the middle phalanx and bursa were removed and a skinplasty helped to align the toe. Note the improved alignment of the 4th toe (clinodactyly). Pain in the 4th toe was relieved, but coincidentally so was the 3rd and 4th metatarsalgia.

Pain is a good indicator of fracture healing.

ture healing. Often radiographs will show an apparent delayed union, yet when the athlete is allowed to weight-bear to tolerance, bony union often follows rapidly (Figure 2).¹⁸ I experienced this phenomenon when working with a professional basketball player. Erring on the side of caution we kept him out of sport for 6 weeks, the radiographs showed little bone consolidation and some cause for concern. After speaking to a few older sports medicine physicians, we started him on a program of graduated weight-bearing and return to sport protocols monitored by the athletic trainer. The player had minimal pain and was back to basketball-related activities in a few weeks. Radiographs taken about two weeks after return to sport showed significant bone healing. Full return to sport was allowed within four weeks with no sequelae.

and return to sport.^{9,15,18} Surgery for avulsion fractures is rarely necessary, the exceptions being a large gap in the fracture site, significantly displaced fragments, poor local circulation, or systemic diseases that limit circulation (diabetes, etc.). The styloid process of the 5th metatarsal has good circulation compared to the diaphyseal/metaphyseal junction and generally heals well (Figures 3 and 4).¹⁹

Fractures of the Fifth Diaphyseal/Metaphyseal Junction (Jones Fractures)

There are at least three types of fractures that occur in the proximal 5th metatarsal area.^{14,20} We have discussed the stress fracture and the avulsion fracture, and made reference to the Jones fracture. Proximal diaphyseal stress fractures are often

confused with Jones fractures; therefore, treatment of true Jones fractures may be delayed or inadequate.²⁰ When we consider that anatomical or bio-mechanical variants and vascular inadequacies are sometimes combined with poor recognition, it is easy to see why Jones fractures often present a treatment conundrum.¹⁸⁻²⁰ True Jones fractures occur at the metaphyseal/diaphyseal junction generally about 1.5 cm from the base of the 5th metatarsal and often are seen in a cavus or adducted foot type.^{10,15}

Diagnosis of a Jones fracture is through a history and physical exam, initial diagnostic radiographs, and follow-up radiographs about 10-14 days

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Figure 2: Post-op of a 22 y/o college basketball player. He had symptoms of pain sub 3rd metatarsal especially when playing the guard position. Conservative treatment including cortisone injection was unsuccessful. He was on scholarship and decided that surgical intervention best suited his needs. Soft tissue release of the 3rd and 4th MPJ (tenotomy, capsulotomy and plantar plate release), PIPJ arthroplasty of the 3rd and 4th toes with K-wire fixation (3rd toe) was performed. The post-op course was unremarkable and the K-wire was removed at 15 days. The patient wore a Reece



surgical shoe for 4 weeks and progressed to a running shoe. He was back to shoot-arounds in 6 weeks and played in a game at 8 weeks. Two years post-op, he was still pain-free. He had a successful college sports career and is still playing playground ball.



Figure 3: An initial radiograph of a 37 y/o weekend warrior who was playing softball and felt "a crack and a sharp pain" on the lateral aspect of the foot while rounding first base. He was able to work the next day but pain and swelling on the lateral aspect of the foot and ankle made him seek attention. An x-ray taken a day after the injury shows an avulsion fracture of the styloid process.

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later. Torg, et al. classified Jones fractures by the healing potential of the fracture based on radiology.¹⁴ They placed Jones fractures into three categories: Type one (acute), a narrow fracture line with no intramedullary (IM) sclerosis; Type two (delayed union), previous injury or fracture with a widened fracture line and some IM sclerosis; and Type three (non-union), repetitive trauma with obliteration of the medullary canal. Torg felt that Type one fractures had the best healing potential and surgery was not often required. Treatment of Type two injuries depended on the amount of IM sclerosis, activity level of the patient and the time of discovery. Type three fractures were unlikely to heal without surgery or might require extended periods of NWB, not ideal for active individuals.

Torg recommended early surgery for Type 2 when dealing with young athletes, when the medullary canal was significantly narrowed or obliterated, or when there was a substantial delay from the time of first injury. Consider surgery in a young but skeletally mature athlete (16-18 years old) with moderate IM sclerosis, persistent pain and radiographic evidence of delayed union after 8-12 weeks of NWB or assisted weight-bearing. This is earlier than the classic time of intervention sug-

Figure 4: The same patient from Figure 3 two months later showing a healed avulsion fracture. Treatment was conservative since the patient was afraid he might lose his job if surgery was undertaken. Treatment consisted of the use of a walking boot with non-bearing for two weeks (crutches and swing through NWB), then 2 weeks of touch down boot walking was allowed. Full WB on the boot was allowed at 4 weeks, and walking without the boot started at 6 weeks. At 8 weeks, the patient was fully WB and back to full duty at work. There were no sequelae.

In the past, these injuries were treated with plaster casts. Protocol with plaster casts was to



progress to FWB on the cast with a walking heel at 6 weeks if tolerated. Most patients can be back to full activity at 6-8 weeks. Generally, these fractures healed well and with minimal to no sequelae. Mild pain and swelling may take up to 6 months to fully resolve. A series of 22 patients (two professional athletes included) had only one patient who took longer to heal (9 1/2 months). The oldest patient was a 66 y/o male (15 males total); the youngest was an 18 y/o female.

Avulsion fractures of the 5th metatarsal base can be a result of pull by a slip of the plantar fascia or peroneus brevis during ankle sprain.

gested at 3-6 months of NWB with lack of healing. It is absolutely true that almost all Jones fractures will heal with proper NWB protocols over time, but this can be a burden for competitive athletes. Dr. Lewis Maharam, a sports medicine physician, maintained that for every week of NWB, it took two weeks of FWB to

achieve the same competitive level of performance in an athlete. It emphasizes the need for early but safe return to sport.²¹

Treatment of Jones Fractures

Jones fractures must be among the suspected diagnoses when we see pain or tenderness laterally over the 5th metatarsal base, pain on palpation of the 5th met base, pain on resisted inversion/eversion of the foot, swelling, ecchymosis and inability to fully WB. As we have previously stated, most significant injuries to the foot, including Jones fractures, require rest, restriction of range of motion, and limited WB. This should be instituted immediately along with diagnostic radiographs taken when appropriate. The radiographic findings and ability to WB will often dictate the type of treatment necessary.

Treatment of Jones fractures is varied and controversial. Conservative care is recommended in most cases, and surgery is not always the best first response. Walking to tolerance with assisted WB using crutches alone or combined with a

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Most avulsion fractures take six to eight weeks to allow full weight-bearing and return to sport.



Figure 5: A post-operative radiograph of a 19 year old male runner who had an inversion sprain of the ankle that was untreated and failed to get better with 4 weeks of rest and OWB. An x-ray taken at a hospital ER showed an avulsion fracture of the styloid process with a significant gap at the fracture site (4-5 mm.). Because of the lag in treatment and the significant treatment gap, surgery was suggested. The x-ray above was taken 3 days post-operatively and showed good reduction of the avulsion. The patient followed a 2-week OWB, 2 week SWB, and 2 week FWB protocol and returned to running at about 8 weeks. The screw fixation was left in place.

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Reece® shoe, a below knee cast, or walking boot is often the best treatment.^{9,12-14,16} We already noted that in dealing with athletes, we want to allow return to sport as rapidly and safely as possible. Those with Jones fractures properly treated should be able to start active non-protected weight-bearing and light sport activity in 6-8 weeks. The fracture may not appear fully healed in radiographs in this time frame, so ability to perform sports-related activities like running, jumping, and cutting motions may be a better indicator for return to sport.

This is especially important since the 3-6 month hiatus that might be needed to see a fully united fracture may represent all or most of a season. A lot of athletes have type "A" personalities and need competition to avoid depression and to acknowledge that the treatment is appropriate. Early safe return to sport after a Jones fracture helps the athlete deal with the psychological as well as the



Figure 6: A 20 y/o college soccer player presented to a clinic with pain on the lateral side of his foot for 4-5 months. He remembered being tripped in a game and sitting out for two games. He returned to practice and was able to play out the rest of the season with moderate discomfort. Initially, he complained of mild pain to his trainer who noted edema and some ecchymosis but no significant problems with agility or ability to play. A diagnostic radiograph was read as negative by a local hospital. He was

the leading scorer on the team despite his injury. He was treated before and after each game with ice, electrogalvanic stimulation and reinforced Gibney-type ankle strapping.

His father noticed he was still limping about two weeks after the soccer season had ended. Ankle examination showed moderate lateral ankle edema (+3 pitting), pain on internal/external rotation of the forefoot over the rearfoot, and x-rays showed intramedullary sclerosis (marked by arrows) in the 5th metatarsal base distal to the styloid process. A diagnosis of Jones fracture with delayed healing was made.

physiological problems surrounding the injury. A protocol for return to sport is based on the tenets of sports medicine, my past experience, and my association with Drs. Maharam and Levy. Always encourage FWB as early as possible.

When rest, NWB or assisted WB, and aggressive physical therapy are unsuccessful in controlling or eliminating pain in 3-4 weeks or if radiographs show no signs of healing, surgery may be required. Confirmation of delayed or non-union fracture may be aided by MRI or CT scans in some cases (Figure 6). Often, clinicians recommend the use of external bone stimulators in cases of delayed union.²² This is especially true in cases when patients are poor surgical can-

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Often, clinicians recommend the use of external bone stimulators in cases of delayed union.

Figure 7A: The same patient 3 months later after open reduction and screw fixation of the Jones fracture. The patient's father initially was reluctant to have his son operated on despite the intramedullary sclerosis. He sought 3 other opinions. Ultimately, with the approach of the next season, continued pain in sport and even in activities of daily living, and the failure of conservative care, surgery was required. A 3.5 mm threaded screw was inserted across the fracture site. Care was taken to make sure the threads were across the fracture site so some compression was achieved.

The patient was placed in a plaster cast and kept NWB for 4 weeks, a walking heel was placed on the cast, and semi-WB with crutches was allowed from 4-6 weeks. The cast was removed at 6 weeks and the patient started therapy and



walked with a Reece® shoe. The therapist started treadmill running at about 8 weeks, and the Reece® shoe was discontinued and a well-constructed running shoe was used. The patient started sport-related activity at 8 weeks with no sequelae.



Figure 7B: The same patient approximately 5 months post-op. He was back to playing soccer with minimal pain. Soccer shoes that were cleated through the arch with a stable shank, semi-flexible orthotics and continued PT for 6 months, and home exercises for one year were prescribed. Mild swelling, stiffness in the foot and ankle, and mottled skin were seen for over 6 months. At 6 months, there was no pain. Speed and agility drills were easily performed, and return to soccer was non-painful. The x-ray above shows a well-placed screw and a fully healed Jones fracture. One can visualize where the fracture had been, but the fracture site is fully united and no exuberant bone is seen.

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didates, but “even in healthy patient populations, non-weight-bearing, with or without external bone stimulators, has facilitated consistent healing”.²²

Surgery for Jones Fractures

When intramedullary sclerosis is present or when treatment of Jones fracture is delayed for any reason, surgery may be required to achieve bone healing.^{14,15,18-20,22} Clapper, et al. found that even when no sclerosis was seen, the average time to union was 21.2 weeks with a 28% failure rate.²³ It is generally held that in serious athletes, active patient populations, or patients with compromised bone healing, surgical correction of Jones fractures should be seriously considered. Surgery is not without risks.

Complications can include damage to the sural nerve, peroneus brevis tendon, painful scar, and increased tendency for inversion sprains.^{10,18} The method of surgical correction is left to the discretion of the surgeon.

Most surgeons will opt for the use of an intramedullary screw of no less than 4.5 mm in diameter (Figure 5).¹⁰ Fluoroscopy can aid in proper placement of the screw, or cannulated screws can be used to obtain better screw positioning (Figures 7A and B). The caveat here is that Jones fractures in elite athletes failed most often when inadequate screw diameter or cannulated screws were improperly used.²⁵ While open reduction IM screw fixation is the most common treatment, percutaneous screw fixation, closed reduction with crossed K-wire fixation, cortico-cancellous bone graft, or mini-fragment plates have all been used successfully by some surgeons.¹³ Percutaneous screw and crossed K-wire fixation had a high learning curve. Reserve bone grafting and mini-plate fixation for failed surgery and comminuted or more difficult fractures (Figure 8).

The use of electromagnetic bone growth stimulators (EBGS)

following surgery is controversial. Jacobs states that evidence that EBGS works in delayed or non-union fractures is weak and he questions its use.²⁶ The cost of treatment, the low patient compliance, the logistics in implementation, and low cure rates are cited as impediments. The author has seen some benefit when

above all, did no harm. Despite the cost, inconvenience, low compliance, and equivocal results, even the slightest improvement in outcome was desirable for the surgeon and patient. We have stated multiple times that dealing with elite athletes can alter the classical approach to treatment of an injury.

Those with Jones fractures properly treated should be able to start active non-protected weight-bearing and light sport activity in 6-8 weeks.

using EBGS in Jones fractures that are delayed or decided non-unions. He agrees that the benefits are minimal, but when dealing with fractures that may require significant surgical intervention, he believes their use is justified.

Having employed bone stimulators in amateur and professional athletes over a 40-year span the author has found that bone stimulation: 1) sometimes reduced pain; 2) may have shortened bone healing time; 3) had a positive effect on the athletes' outlook on the injury; 4) and

In some cases, more conservative treatment was warranted; in other cases, a more aggressive approach is preferred. O'Donohue, a pioneer in sports medicine, preached that a sports medicine physician must accept athletics, avoid expediency, adopt the best method, act promptly, and achieve perfection.²⁷ This is especially true when discussing Jones fracture treatment, adopting the best method, and acting promptly. Delaying treatment and poor choice of treatment plan are common reasons for poor outcomes in Jones fracture treatment (Figures 9-11).

Screening of Athletes

Screening of athletes at the NFL combines found that early round-drafted athletes with previous Jones fractures performed worse within the first two years after injury (i.e., they started fewer games) than later round-non-injured draft picks.²⁸ The plantar and lateral cortices were often not healed on CT scans (50%), and re-fracture and non-union were more common.²⁸ Of 2,285 athletes screened, 72 (3.2%) had previous Jones fractures and all were treated with IM screw fixation. Wright, et al. reported on three players who had a re-fracture the first day back to full activity after surgery despite radiographic signs of healing.²⁹ Lareau reported a 12% re-fracture rate that required additional surgery.³⁰

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Figure 8: Intra-operative fluoroscopy of a Jones fracture showing the placement of a cannulated screw. A wire is inserted from the base of the styloid process into the medullary canal. The placement is checked and if acceptable, a cannulated screw of proper size is placed over the wire. A 3.5 or 4.0 mm. partially threaded screw can be used in most cases. When the screw was in place, the fluoroscope was used to check proper placement, making sure the threaded portion of the screw was across the fracture site. When the placement was assured, the wire was removed, leaving only the screw in place. With experience, most surgeons can learn to screw fixate without using fluoroscopy. It is still strongly suggested that a post-operative radiograph be taken before leaving the OR to ensure proper placement.

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Summary

In summary, we can say that Jones fracture surgery should be approached cautiously for many reasons. Most Jones fractures will heal without surgical intervention although they may take time, a commodity not often available, especially in athletes. Surgery is not always successful and re-fracture rates of 10-15% are not uncommon. Wright, et al. noted that re-fracture rates can be reduced by

larger diameter IM screws where anatomy permits, bracing, shoe modification, or orthotics post-operatively (for at least one year). Use all imaging technology available in elite athletes to access degree of healing and when re-fracture occurs use a larger diameter screw.

Jones fractures have an unjustly deserved poor reputation for being a nuisance injury. Let's dispel some misconceptions about Jones fractures and try to present a more logical and scientifically-based approach on diag-

nosis and treatment of these fractures. Medicine is constantly changing and treatment concepts and new modalities are evolving daily. As physicians and surgeons of the foot, we need to stay tuned to these changes and incorporate them into our practices as quickly and seamlessly as possible. This gives our patients the best chance for a more positive outcome. **PM**

References

- ⁹ Romanosky, N., Becker, T.: Essential Insights on Treating Fifth Metatarsal Fractures. *Podiatry Today*, 19(4), April, 2006, p.76.
- ¹⁰ Theodoulou, M., Pascarella, R.: A Guide to Intramedullary Fixation of Jones Fracture. *Podiatry Today*. 31(7), July 2018, p.18.
- ¹¹ Kavanaugh, JH, Brower, TD, Mann, RV: The Jones Fracture Revisited. *J.B.J.S. (Am.)*, Sept. 60(6), 1978, p.776.
- ¹² Porter, D.: Fifth Metatarsal Jones Fracture in the Athlete. *Foot and Ankle International*, Dec, 2017.
- ¹³ Bowes, J, Buckley, R.: Fifth Metatarsal Fractures and Current Treatment. *World J. of Orthopedics*, Dec., 7(12), 2016, p.793.
- ¹⁴ Torg, J., Baulduini, FC et al: Fractures of the base of the fifth metatarsal distal to tuberosity. Classification and guidelines for non-surgical and surgical management. *J.B.J.S. (Am.)*, 66,1984, p.209.
- ¹⁵ Cheung,CN, Lui, TH: Proximal fifth metatarsal fractures, anatomy, classification, treatment and complication. *Arch. Trauma Res.*, Dec. (5)4, 2018.
- ¹⁶ American Foot And Ankle Surgeons Website: Fractures of the fifth metatarsal, copyright 2020.
- ¹⁷ McNerney, JE: Treatment of chronic lateral instability. *Podiatry Management*, Sept, 2015.
- ¹⁸ Vorlat, P., Achtergael, W., Haentjens, P.: Predictors of outcome of non-displaced fractures of the base of the fifth metatarsal. *Int. Orthop.*, Feb., 31(1), 2007, p.5.
- ¹⁹ Smith, JW, et

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Figure 9: A post-operative x-ray of cerclage wiring of a styloid process fracture. This 17 y/o female volleyball player sustained an inversion sprain of the ankle after spiking a ball. She was aware of the significance of the injury due to previous injuries she had. Note that about 3.5 cm distal to the styloid fracture we were treating, an old healed Jones fracture is seen. The Jones fracture was treated elsewhere by the non-weight-bearing protocol about a year prior.



The patient was reluctant to treat her new styloid fracture conservatively and opted for surgery. Cerclage wiring was used because of fear that screw fixation would have to cross the old Jones fracture site, and we were unsure if the Jones fracture healing was fully mature. The patient used a walking boot for 2 weeks, a Reece® shoe for 2 weeks, and started therapy 3 days post-operatively. She was cleared to practice in 5 weeks and was back playing volleyball in 6 weeks with no significant sequelae.



Figure 10: An x-ray of a 23 y/o runner who tripped over a raised curb while training for a marathon. She rested, iced, and took Advil for about a week before presenting to the office. The radiograph shows a Jones fracture with some suspicion of mild displacement. Because it was an acute injury and the patient had a new job, a conservative course was taken. A walking cast was applied and the patient crutch-walked for 4 weeks, followed by 2 weeks of SWB and 1 1/2 weeks of FWB. The cast was removed at 7 1/2 weeks for the patient's comfort, and an x-ray (next Figure) showed adequate healing. PT, stable running shoes, and home care protocols were followed. The patient resumed running in 9 weeks and eventually ran her marathon 6 months later.



Figure 11: The patient from Figure 10 approximately 3 months post-Jones fracture. The fracture site is well healed in this x-ray, so the patient wore a stable running shoe and further treatment was suspended. She said she had no symptoms except for a mild ache on rainy days. So she was told she could start running in the stable shoe with proper flexibility protocols. She had orthotics from a previous podiatrist that appeared to be adequate, but they were rigid and hurt the fracture site. She was eventually cast for semi-flexible running orthotics. Her progress was so good that, as we noted above, she was able to run her marathon.

Fractures (from page 116)

al: The interosseous blood supply of the fifth metatarsal: Implications for proximal fracture healing. *Foot and Ankle*, Mar/Apr., 13(3), 1992.

²⁰ Lawrence, S., Botte, MJ: Jones fractures and related fractures of the fifth metatarsal. *Foot and Ankle*. 14(6), 1993, p.358.

²¹ Maharam, LG: MAHARAMS CURVE: THE EXERCISE HIGH—HOW TO GET IT, HOW TO KEEP IT. W.W. Norton and Company. NY, NY, First Edition, copyright, 1992.

²² Blahous, E.: Rethinking our approach to Jones fractures to facilitate shorter post-op recovery. *Podiatry Today*. Vol.24(12), Dec. 2011, pg.72.

²³ Clapper, MF., et al.: Fractures of the fifth metatarsal. Analysis of a fracture registry. *Clin. Orthop. Rel. Res.*, June (315), 1995, p.238.

²⁴ Visser, HJ, Malik, K., Wolff, Jesse, Wolff, Joshua: Managing a problematic intramedullary screw in a patient with a Jones fracture. *Podiatry Today*, Vol. 28(12), Dec, 2015.

²⁵ Granata, JD, et al: Failed surgical management of acute proximal fifth metatarsal (Jones) fractures. A retrospective case series and literature review. *Foot and Ankle Spec.*, 8(6), 2015, p.404.

²⁶ Jacobs, A.: Bone growth stimulation: What the evidence reveals. *Podiatry Today*. Vol. 29(2), May 2016, pg. 44.

²⁷ O'Donohue, DH: TREATMENT OF INJURIES TO ATHLETES, 3rd ED., WB Saunders, Phila., 1976.

²⁸ Spang, RC, et al: Jones fractures identified at the National Football League Scouting Combine: Assessment of prognostic factors, computed tomography findings and initial career performance. *Orthop. J. Sports Med.*, Aug. 6(8), 2018.

²⁹ Wright, RW et al: Refracture of proximal fifth metatarsal (Jones) fracture after intramedullary screw fixation in athletes. *Am. J. Sports Med.*, 28(5), 2000, pg. 732.

³⁰ Lareau, CR, Hsu, AR, Anderson, RB: Return to play in NFL after operative Jones fracture treatment. *Foot Ankle Int.*, 37(1), 2016, p.8.



Dr. McNerney is a consultant podiatrist to the New York Giants and Kean University. He is a fellow of the Academy of Podiatric Sports Medicine and a Diplomate of the American Board of Foot and Ankle Surgery.

CME EXAMINATION

SEE ANSWER SHEET ON PAGE 119.

1) Avulsion fractures of the 5th metatarsal base:

- A) Are true Jones fractures.
- B) Generally require surgery.
- C) Can be a result of pull by a slip of the plantar fascia or peroneus brevis during ankle sprain.
- D) Are in metaphyseal bone.

2) True Jones fractures:

- A) Occur in the metaphyseal region of bone.
- B) Are identified by the lack of intramedullary sclerosis.
- C) Commonly heal well with proper protocols over time.
- D) Almost always require surgery with screw or pin fixation.

3) Which is true in the treatment of true Jones fractures?

- A) It is proscribed and dogmatic, requiring open reduction with fixation in most cases.
- B) Initial care of these fractures requires full weight-bearing as quickly as possible.
- C) Surgery is the best treatment since sequellae are few and healing is more rapid.

D) Early surgical intervention may be prudent in professional or young athletes.

4) _____ is a good indicator of fracture healing.

- A) Pain
- B) Edema
- C) Paresthesia
- D) Instability

5) Most avulsion fractures take _____ weeks to allow full weight-bearing and return to sport.

- A) Two to four
- B) Four to six
- C) Six to eight
- D) Eight to ten

6) True Jones fractures occur at the metaphyseal/diaphyseal junction generally about 1.5 cm from the base of the 5th metatarsal and often are seen in a _____ foot type.

- A) Cavus or abducted
- B) Cavus or adducted
- C) Planus or abducted
- D) Planus or adducted

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- 7) When _____ is present or when treatment of Jones fracture is delayed for any reason, surgery may be required to achieve bone healing.
- A) Intramedullary sclerosis
 - B) Excessive edema
 - C) Ecchymosis
 - D) Neuropathy
- 8) Those with Jones fractures properly treated should be able to start active non-protected weight-bearing and light sport activity in ____ weeks.
- A) 2-4
 - B) 4-6
 - C) 6-8
 - D) 8-10
- 9) Often, clinicians recommend the use of _____ in cases of delayed union.
- A) NSAIDs
 - B) Immobilization
 - C) External bone stimulators
 - D) CAM boots
- 10) Surgery is not always successful and re-fracture rates of ____ are not uncommon.
- A) 10-15%
 - B) 15-20%
 - C) 20-30%
 - D) 30-40%

SEE ANSWER SHEET ON PAGE 119.

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Enrollment/Testing Information and Answer Sheet

Continuing
Medical Education

Note: If you are mailing your answer sheet, you must complete all info. on the front and back of this page and mail with your credit card information to: **Program Management Services, P.O. Box 490, East Islip, NY 11730.**

TESTING, GRADING AND PAYMENT INSTRUCTIONS

(1) Each participant achieving a passing grade of 70% or higher on any examination will receive an official computer form stating the number of CE credits earned. This form should be safeguarded and may be used as documentation of credits earned.

(2) Participants receiving a failing grade on any exam will be notified and permitted to take one re-examination at no extra cost.

(3) All answers should be recorded on the answer form below. For each question, decide which choice is the best answer, and circle the letter representing your choice.

(4) Complete all other information on the front and back of this page.

(5) Choose one out of the 3 options for testgrading: mail-in, fax, or phone. To select the type of service that best suits your needs, please read the following section, "Test Grading Options".

TEST GRADING OPTIONS

Mail-In Grading

To receive your CME certificate, complete all information and mail with your credit card information to: **Program Management Services, P.O. Box 490, East Islip, NY 11730. PLEASE DO NOT SEND WITH SIGNATURE REQUIRED, AS THESE WILL NOT BE ACCEPTED.**

There is **no charge** for the mail-in service if you have already enrolled in the annual exam CME program, and we receive this exam during your current enrollment period. If you are not enrolled, please send \$29.00 per exam, or \$249 to cover all 10 exams (thus saving \$41 over the cost of 10 individual exam fees).

Facsimile Grading

To receive your CME certificate, complete all information and fax 24 hours a day to 1631-532-1964. Your CME certificate will be dated and mailed within 48 hours. This service is available for \$2.95 per exam if you are currently enrolled in the annual 10-exam CME program (and this exam falls within your enrollment period), and can be charged to your Visa, MasterCard, or American Express.

If you are *not* enrolled in the annual 10-exam CME program, the fee is \$29 per exam.

Phone-In Grading

You may also complete your exam by using the toll-free service. Call 1-800-232-4422 from 10 a.m. to 5 p.m. EST, Monday through Friday. Your CME certificate will be dated the same day you call and mailed within 48 hours. There is a \$2.95 charge for this service if you are currently enrolled in the annual 10-exam CME program (and this exam falls within your enrollment period), and this fee can be charged to your Visa, Mastercard, American Express, or Discover. If you are not currently enrolled, the fee is \$29 per exam. When you call, please have ready:

1. Program number (Month and Year)
2. The answers to the test
3. Credit card information

In the event you require additional CME information, please contact PMS, Inc., at **1-800-232-4422**.

ENROLLMENT FORM & ANSWER SHEET

Please print clearly...Certificate will be issued from information below.

Name _____ Email Address _____
Please Print: FIRST MI LAST

Address _____

City _____ State _____ Zip _____

Charge to: ☐ Visa ☐ MasterCard ☐ American Express

Card # _____ Exp. Date _____ Zip for credit card _____

Note: Credit card is the only method of payment. Checks are no longer accepted.

Signature _____ Email Address _____ Daytime Phone _____

State License(s) _____ Is this a new address? Yes ☐ No ☐

Check one: ☐ I am currently enrolled. (If faxing or phoning in your answer form please note that \$2.95 will be charged to your credit card.)

☐ I am not enrolled. Enclosed is my credit card information. Please charge my credit card \$29.00 for each exam submitted. (plus \$2.95 for each exam if submitting by fax or phone).

☐ I am not enrolled and I wish to enroll for 10 courses at \$249.00 (thus saving me \$41 over the cost of 10 individual exam fees). I understand there will be an additional fee of \$2.95 for any exam I wish to submit via fax or phone.

Over, please

EXAM #8/21

**Treatment of Metatarsal Fractures
in the Competitive Athlete: Part 2
(McNerney)**

Circle:

- | | |
|------------|-------------|
| 1. A B C D | 6. A B C D |
| 2. A B C D | 7. A B C D |
| 3. A B C D | 8. A B C D |
| 4. A B C D | 9. A B C D |
| 5. A B C D | 10. A B C D |

Medical Education Lesson Evaluation

Strongly agree [5]	Agree [4]	Neutral [3]	Disagree [2]	Strongly disagree [1]
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- 1) This CME lesson was helpful to my practice ____
- 2) The educational objectives were accomplished ____
- 3) I will apply the knowledge I learned from this lesson ____
- 4) I will make changes in my practice behavior based on this lesson ____
- 5) This lesson presented quality information with adequate current references ____
- 6) What overall grade would you assign this lesson?
A B C D
- 7) This activity was balanced and free of commercial bias.
Yes ____ No ____
- 8) What overall grade would you assign to the overall management of this activity?
A B C D

How long did it take you to complete this lesson?

____ hour ____ minutes

What topics would you like to see in future CME lessons?
Please list :
