

# Shock Wave Therapy Compared with Intramedullary Screw Fixation for Nonunion of Proximal Fifth Metatarsal Metaphyseal-Diaphyseal Fractures

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**Background:** The current “gold standard” for treatment of chronic fracture nonunion in the metaphyseal-diaphyseal region of the fifth metatarsal is intramedullary screw fixation. Complications with this procedure, however, are not uncommon. Shock wave therapy can be an effective treatment for fracture nonunions. The purpose of this study was to evaluate the safety and efficacy of shock wave therapy as a treatment of these nonunions.

**Methods:** Twenty-three patients with a fracture nonunion in the metaphyseal-diaphyseal region of the fifth metatarsal received high-energy shock wave therapy (2000 to 4000 shocks; energy flux density per pulse, 0.35 mJ/mm<sup>2</sup>), and twenty other patients with the same type of fracture nonunion were treated with intramedullary screw fixation. The numbers of fractures that were healed at three and six months after treatment in each group were determined, and treatment complications were recorded.

**Results:** Twenty of the twenty-three nonunions in the shock wave group and eighteen of the twenty nonunions in the screw fixation group were healed at three months after treatment. One of the three nonunions that had not healed by three months in the shock wave group was healed by six months. There was one complication in the shock wave group (post-treatment petechiae) and eleven complications in the screw-fixation group (one refracture, one case of cellulitis, and nine cases of symptomatic hardware).

**Conclusions:** Both intramedullary screw fixation and shock wave therapy are effective treatments for fracture nonunion in the metaphyseal-diaphyseal region of the fifth metatarsal. Screw fixation is more often associated with complications that frequently result in additional surgery.

**Level of Evidence:** Therapeutic Level III. See Instructions to Authors for a complete description of levels of evidence.

There are three distinct fracture types in the proximal part of the fifth metatarsal: tuberosity avulsion fracture, fracture of the metaphyseal-diaphyseal junction (Jones fracture), and diaphyseal stress fracture<sup>1</sup>. Tuberosity fractures heal well, Jones fractures heal less well, and diaphyseal stress fractures heal poorly.

The prevalence of delayed union and nonunion of an acute closed fracture involving the metaphyseal-diaphyseal region of the fifth metatarsal has been reported to range from 7% to 44%<sup>1-5</sup>. Management can be challenging.

There have been reports of successful nonoperative treatment of acute fractures and fracture nonunions of the proximal part of the fifth metatarsal with a weight-bearing or

non-weight-bearing cast<sup>2</sup>. However, compliance with this form of treatment, particularly non-weight-bearing, is often difficult. Other potential problems include continued pain despite radiographic evidence of healing, substantial muscle atrophy, disuse osteoporosis, increased susceptibility to reinjury, and, perhaps most importantly, persistent fracture nonunion<sup>1,3-8</sup>.

For these reasons, most clinicians recommend a surgical approach<sup>2,4,8-10</sup>. Options include tension band wiring<sup>11</sup>, corticocancellous inlay bone-grafting with or without intramedullary screw fixation<sup>2</sup>, dorsomedial bone-grafting<sup>12</sup>, and intramedullary screw fixation alone<sup>3,9,10,13,14</sup>. Reports of the results of these surgical treatments have generally been favorable<sup>3,5,10,12</sup>.

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