

Percutaneous or Open Reduction of Closed Tibial Shaft Fractures During Intramedullary Nailing Does Not Increase Wound Complications, Infection, or Nonunion Rates

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Purpose: Diaphyseal tibia fractures are commonly treated with intramedullary devices. This technique is often performed with closed reduction maneuvers. Surgeons faced with difficulty can use percutaneous techniques to manipulate the fracture fragments, or formally open the fracture site for direct reduction. Concerns with percutaneous and open techniques include superficial and deep wound complications, an increased risk of infection secondary to fracture exposure, and an increase in the rate of nonunion. Our purpose was to compare the incidence of complications (wound, infection, nonunion) among those patients treated with closed, percutaneous, and open intramedullary nailing for closed tibial shaft fractures.

Methods: Closed diaphyseal tibia fractures (OTA type 42) treated with intramedullary fixation at three trauma centers over a 6-year period were retrospectively reviewed. All injuries were treated by fellowship-trained traumatologists and the reduction method was classified as closed, percutaneous, or open. Patient demographics, fracture classification, and associated injuries were recorded. Charts and radiographs were reviewed to determine union, postoperative wound complications, and return to the operating room within 1 year for an infection requiring surgical debridement. A Fisher exact test using a Monte Carlo method of approximation was utilized due to small observations per cells. The P value was set at 0.05 for two-tailed test.

Results: 322 (OTA type 42) tibial shaft fractures in 321 patients met inclusion criteria. 205 patients were treated with closed reduction, 61 patients were treated with percutaneous reduction, and 56 patients were treated with formal open reduction. Patients were followed for a minimum of 12 months or to union. The nonunion rate was 4.9% (10/205) for the closed group, 4.9% (3/61) for the percutaneous group, and 7.1% (4/56) for the open group, with no statistically significant difference ($P = 0.492$). The deep infection rate was 2% (4/205) for the closed group, 1.6% (1/61) for the percutaneous group, and 7.1% (4/56) for the open group, with no significant difference ($P = 0.133$). The superficial wound complication rate was 1% (2/205) for the closed group, 1.6% (1/61) for the percutaneous group, and 3.6% (2/56) for the open group, with no significant difference ($P = 0.179$).

Conclusion: This is the largest reported series of closed tibial shaft fractures nailed with percutaneous and open reduction. We found that percutaneous or open reduction of closed

tibial shaft fractures did not result in increased wound complications, infection, or nonunion rates. As a result, we feel that carefully performed percutaneous or open approaches may be useful in obtaining reduction of difficult tibial shaft fractures treated with intramedullary devices.