



Abstract: Treatment of Nonunions and Bone Defects of the Tibia with the Ilizarov/ Taylor Spatial Frame

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What was the question?

The personality of a tibial nonunion is defined by patient factors, bone loss, radiographic appearance, deformity, leg length discrepancy (LLD), infection, and the soft-tissue envelope. These are complex and often limb threatening problems. What are the results of our experience with use of the modern Ilizarov method to comprehensively approach these problems? What guidance can we provide to reconstructive trauma surgeons for optimal treatment of these complex problems?

How did you answer the question?

Our registry was used to identify 38 patients with tibia nonunions treated between 1999 and 2003. This included 30 men and 8 women with an average age of 43 (8-72). There were 10 smokers and 4 diabetics. The nonunions were the outcome of 10 closed fractures, 26 open fractures, one failed tumor reconstruction and one case of osteomyelitis and bone defect following a snake bite. Ten patients had previous flaps and 17 patients presented with drainage. There were 23 mobile or atrophic, 6 partially mobile or normotrophic, and 9 stiff or hypertrophic nonunions. The tibial location of the nonunion was proximal in 6, middle in 12, and distal in 20. There were 23 patients with bone defects with an average size of 5.9 cm (range: 1.5-16). Limb length discrepancy was present in 22 patients with an average of 3.1 cm (range: 1-5.7). This resulted in an average tibial longitudinal deficiency of 6.5 cm in 31 patients (range: 1-19). The average number of previous surgeries was 4 (range: 0-20). There was a history of infection in 23 patients treated previously with antibiotics.

What are the results?

At surgery, 19 (50%) nonunions were diagnosed as infected, and treated with 6 weeks of culture specific antibiotics. Bone grafting was used in 25 (66%) patients. Distraction osteogenesis for bone transport or lengthening was used in 19 (50%) patients for an average length of 6.9 cm (range 2.5-16) at the proximal tibia in 13, distal tibia in 2, both locations (trifocal technique) in 3, and femur in one. The frame was used dynamically in distraction and/or compression for an average duration of 130 days (range: 15-480). The

total time in the frame averaged 289 days (range: 119-715). Bony union was achieved after initial treatment in 28 (74%) patients. The ten initial failures included 9 infected nonunions, the outcome of 3 closed, 2 grade 3A open fractures, and 5 grade 3B open fractures, 2 diabetics, 1 smoker, and 1 patient requiring ankle arthrodesis. The 10 initial failures were treated with frame reapplication in 4, intramedullary rodding in 3, plate fixation in one, and amputation in 2, resulting in final bony union in 36 (95%) patients. The average LLD was 1.6 cm (range: 0-6.8). SF-36 scores improved in 6 of 8 categories. AAOS lower limb module scores improved from 51 to 77. ASAMI classification of results revealed 24 excellent, 12 good, and 2 poor bone outcomes and 20 excellent, 14 good, 2 fair, and 2 poor functional outcomes.

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