

Flecting Osteotomy of the Distal Tibia for Salvage of an Asymmetric Osteoarthritic Ankle Joint

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Introduction/Purpose: Deformity of the distal tibia in the sagittal plane with increased posterior tilt of the articular surface (recurvatum deformity) results in altered biomechanics and high contact pressure in the anterior tibiotalar joint with consecutive osteoarthritis (OA). As the talus becomes anteriorly extruded out of ankle mortise, the distance between its center of rotation and longitudinal axis of tibia is typically seen to be increased. In an attempt to restore physiologic load of such misaligned ankles in the sagittal plane, we have started to use a correcting osteotomy of the distal tibia to realign the center of rotation of talus and tibial axis.

The aim of this study was to analyze the radiological and clinical outcome in a consecutive series of patients.

Methods: 39 patients (female, 12; male 27; age 47 [28 to 72, SD 10.6] years) were treated with a flecting osteotomy of the distal tibia for a symptomatic misalignment in the sagittal plane with the use of an anterior opening wedge osteotomy ($n = 28$), posterior closing wedge osteotomy ($n = 9$), or dome-shaped osteotomy from medially ($n = 2$). If necessary, simultaneous corrections in the frontal plane were performed to address additional valgus/varus deformities. Standard weight-bearing radiographs were used pre- and postoperatively to evaluate the tibial anterior surface angle (TAS), tibiotalar surface angle (TTS), tibial lateral surface angle (TLS), calcaneal pitch and talar offset ratio (TOR). A four-staged flecting score was used to classify the grade of OA of the tibiotalar joint in the sagittal plane, also taking the coronal joint congruency into account.

Results: The cumulative survival rate of the joint was 77% (95% CI: 48-86%) after 3 years, with 9 patients needing a joint sacrificing procedure (total ankle arthroplasty, 7; ankle fusion, 2). In the remaining 30 patients, pain decreased 2.0 points on the VAS ($p < 0.001$), and the AOFAS hindfoot score improved by 17 points ($p < 0.001$). The ROM did not change significantly. Patient satisfaction with the outcome was good in 68% and moderate in 25%, 7% were not satisfied. The mean TLS increased by 6.6 (SD 5.84) degrees, the mean TOR decreased 0.239 (SD 0.1814). TAS, TTS and calcaneal pitch did not change significantly. Ten ankles (26%) showed an improvement, 22 (56%) no change and 7 (18%) a worsening in the flecting score.

Conclusion: The flecting osteotomy of the distal tibia was found to be an effective method to restore the tibiotalar joint congruency through moving the tibia axis anteriorly to the center of rotation of the talus, and lengthening the lever arm of the Achilles tendon. Besides normalizing the joint reaction forces of the tibiotalar joint, the procedure was also found to be effective to stabilize the talus against anterior extrusion. However, with a failure rate of 23%, there is need for further studies to determine the indication and limitation of this procedure.

