Novel Double Osteotomy Technique of Distal Tibia for Correction of Asymmetric Varus Osteoarthritic Ankle

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Introduction/Purpose: A most challenging condition for balancing a varus arthritic ankle is the presence of a defect in the medial tibial plafond. After our initial results with a medial tibial plafond plasty did not fulfill our expectations of success, we hypothesized that adding a correcting supramalleolar osteotomy of the distal tibia would move the loading force to the tibiotalar joint more medially and thus act as an evertor force to the talus. In this study we asked (1) what surgical technique was used in detail; (2) what complications were observed; (3) what is the postoperative pain relief; (4) what is the patients' mid-term functional outcome including range of motion; (5) what is the patients’ mid-term radiographic outcome including hindfoot alignment and progression of ankle osteoarthritis?

Methods: Twenty consecutive patients were included into this study, no patients were lost for follow-up with a 4-year minimum required by the study. The mean age of the patients was 44 ± 12 years (range, 17-60 years). Followup averaged 5.9 ± 2.1 years (range, 4-11.2 years). All intraoperative and postoperative complications were recorded. The postoperative pain relief was assessed using a visual analog scale (VAS). Functional outcomes were assessed using the American Orthopaedic Foot and Ankle Society (AOFAS) hindfoot score and by measuring the ankle’s range of motion. Weight-bearing radiographs were used to assess osteotomy union and hindfoot alignment. Hindfoot alignment was assessed by measurement of the tibial ankle surface (TAS) angle, the tibiotalar (TT) angle, tibial lateral surface (TLS) angle, the tibiotalar tilt, and the moment arm of the calcaneus. Osteoarthritis grading was performed preoperative and postoperatively according to Takakura et al.

Results: There were no intraoperative or perioperative complications. All patients had osseous fusion within 6 postoperative months. The average VAS pain score decreased significantly from 7.9 ± 1.3 (range, 6-10) to 1.3 ± 1.6 (range, 0-7). The average AOFAS hindfoot score increased significantly from 49 ± 15 points (range, 36-68) preoperatively to 86 ± 12 points (range, 66-96) postoperatively. The mean preoperative and postoperative ankle range of motion were comparable with 39° ± 11° (range, 25°-46°) and 38° ± 9° (range, 28°-46°). The varus tilt improved significantly from 19.4° ± 8.2° (range, 6°-32°) to 6.9° ± 3.9° (range, 1°-12°). According to Takakura's classification, three ankles deteriorated by one stage, 11 ankles improved by one stage, and six ankles showed no changes.

Conclusion: The novel double osteotomy was found to be an efficient and successful method to restore tibiotalar joint congruency and to normalize hindfoot alignment. The key of success of medial tibial plafond plasty may be the move of the joint load medially by the additional supramalleolar correcting osteotomy, thus creating an eversion force to the talus. Further in vitro studies are needed to evaluate these hypotheses.