Outcomes of Open and Percutaneous Endoscopically-Assisted Calcaneal Osteotomies in Patients with varus and valgus hindfoot: A Comparative Study in 252 consecutive patients.

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Background: Calcaneal osteotomy is a common procedure for realignment of the hindfoot deformity in patients with cavovarus and planovalgus foot deformities. An oblique incision is the standard open approach which runs across the sural nerve distribution risking a nerve injury. In addition, superficial infection and injury to medial neurovascular structures are possible complications as were described in previous studies. Percutaneous calcaneus osteotomy technique has been introduced as a minimally invasive and effective method. However, there is lack of evidence in literature comparing outcomes and complications of open versus percutaneous techniques.

Material and Methods: Retrospective chart review of 252 consecutive patients (258 feet) who were diagnosed with planovalgus and cavovarus foot deformities between January 2004 and June 2014. The patients underwent calcaneal osteotomy using an open technique (193 patients / 198 feet; medial slide 86 patients / 88 feet, lateral slide 28 patients / 30 feet, and lateral closing-wedge (Dwyer) 79 patients / 80 feet). Percutaneous technique was used in 59 patients / 60 feet (medial slide 18 patients / 18 feet, lateral slide 41 patients / 42 feet). The minimum follow up included in the study was 6 months in both open and percutaneous techniques (mean, 19.1 months; range, 6 to 96 months for open medial slide; mean, 27.5 months; range, 6 to 81 months for open lateral slide, mean, 17.6 months; range, 6 to 72 months for open lateral closing-wedge and mean, 22.2 months range, 6 to 38 months percutaneous medial slide, mean, 16.9 months range, 6 to 37 months percutaneous lateral slide). The primary outcome measures were Foot Function Index (FFI); (pain, disability, activity limitation, and total score); Short Form-36 (SF-36); physical and mental component scores, and Visual Analogue Scale (VAS). The secondary outcomes included operative time and complications. Pre- and post-operative SF-36, and Foot Functional Index (FFI), pain
(Visual Analog Scale) were obtained and compared using pair t-test. Complications and operative time of all technique were compared using independent t-test and Chi-square Test.

**Results:** Both groups demonstrated significant improvement of post-operative functional outcomes (FFI, SF-36, and VAS (p-value < 0.05 all)) compared to pre-operative status. Lateral closing-wedge (Dwyer) calcaneal osteotomy was significantly longer operative time among all techniques. Percutaneous technique demonstrated lower rate of complications including wound infection, sural nerve dysesthesia, and painful scar but no significant differences. Plantar nerve symptom was higher in lateral slide or lateral-closing wedge calcaneal osteotomy in both techniques while painful hardware requiring a removal was higher in medial slide calcaneal osteotomy in both techniques but no significant difference.

**Conclusion:** Both open and percutaneous calcaneal osteotomy demonstrated significant improvement in terms of functional outcomes as measured with the FFI, SF-36, and VAS for hindfoot procedure in patients with cavovarus and planovalgus foot deformities. Percutaneous group resulted in lower rate of wound infection, sural nerve injury, and painful scar but other complications were comparable to the open group.

**Level of Evidence:** Level III, Retrospective study.

**Key Word:** Open Calcaneal Osteotomy, Percutaneous Calcaneal Osteotomy, Planovalgus and Cavovarus Foot Deformity, Outcomes and Complications