Comparing Patient Reported Outcomes and Complications Following Open versus Minimally Invasive Double and Triple Arthrodesis for Rigid Flatfoot Deformity: A Retrospective Analysis

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Introduction: Double or triple arthrodesis is a common surgical intervention for patients with rigid flatfoot deformity who have not responded to nonoperative treatment. While this procedure is traditionally performed as an open surgery, minimally invasive percutaneous (MIS) techniques have emerged as an alternative with benefits such as a lower wound complication rate, less pain, and improved cosmesis. However, currently there are limited studies available to compare the outcomes of open versus MIS techniques in double and triple arthrodesis procedures. The purpose of the current study was to analyze patient outcomes following open versus MIS double / triple arthrodesis, to offer valuable insights to guide clinical decision-making.

Methods: Following institutional review board approval, 97 open and 79 MIS arthrodesis procedures were retrospectively analyzed. Primary outcomes, including Visual Analog Scale (VAS) and Foot Function Index (FFI) scores, were assessed at each preoperative and postoperative clinic appointment. Secondary outcomes, such as time to union, nonunion, and postoperative complications were collected for each patient. Radiographic measurements such as Meary's Angle, calcaneal pitch, and Kite's Angle were collected at preoperative and final postoperative appointment. All continuous data were compared on t-test, while noncontinuous data were compared on a Chi-squared analysis.

Results: In the open arthrodesis cohort, the mean age was 67.5 (range 32-88) years, while mean age was 70.7 (range 58-86) years in the MIS arthrodesis cohort. The mean follow-up duration was 31.3 (range 25-38) months amongst patients who underwent open arthrodesis, and 33.7 (range 24-42) months amongst patients who underwent MIS. Both cohorts demonstrated significant improvements in VAS and FFI scores ($p<0.001$). The open cohort showed a slightly greater improvement in VAS scores ($p<0.001$), but no significant differences were found in the change in (Δ) FFI scores between the groups. There were no significant differences in nonunion rates or time to union. However, the open cohort had a significantly higher incidence of wound dehiscence (8.2%) in comparison to the MIS group (0%) ($p=0.009$).

Discussion: Both open and MIS techniques for double and triple arthrodesis for treatment of rigid flatfoot deformities resulted in similar improvement in patient reported outcome measures. MIS techniques offered a significant advantage in reducing postoperative wound dehiscence. Meanwhile, there was no difference in union rate between open arthrodesis and MIS arthrodesis. This retrospective study may aid in surgeons' decision making when planning operative intervention for patients with rigid flatfoot deformity.

Significance/Clinical Relevance: This study addresses a critical gap in comparative outcomes between open and minimally invasive double/triple arthrodesis for rigid flatfoot deformity, demonstrating that minimally invasive techniques achieve equivalent functional improvement with fewer wound complications, thereby informing surgical decision-making and patient care optimization.