Fat Graft and Bone Wax Interposition Provides Better Functional Outcomes and Lower Reossification Rates Than Extensor Digitorum Brevis After Calcaneonavicular Coalition Resection

Abstract
Background:
Calcaneonavicular coalitions are the most common form of tarsal coalitions. The prefered treatment for symptomatic coalitions is surgical resection; however, there are no published studies that directly compare different interposition techniques. The purpose of the present study was to retrospectively compare pain relief, functional outcomes, and complications of children and adolescents who had a resection of a symptomatic calcaneonavicular coalition with interposition of fat graft, bone wax, or extensor digitorum brevis (EDB).

Methods:
In total, 48 patients (56 ft) underwent calcaneonavicular coalition resection-interposition at 3 institutions from July 2008 to July 2015. There were 23 feet in group 1 (fat graft), 18 feet in group 2 (bone wax), and 15 feet in group 3 (EDB). Patient demographic characteristics were similar between all groups for age, sex, coalition type, and symptoms onset. Data concerning clinical and radiographic features, surgical technique, and postoperative complications were obtained from all available medical records. Radiographs were evaluated at last follow-up to determine coalition regrowth. Preoperative and postoperative pain was assessed with the visual analog scale, and function was assessed with use of the American-Orthopaedic-Foot and Ankle Society (AOFAS) score.

Results:
Pain improved to an average of 0.5 in the first group (range, 0 to 6), 0 in group 2, and 1.7 in group 3 (range, 0 to 5) (P=0.033). The average AOFAS score improved from 59 (range, 33 to 71 points) to 98 points (range, 62 to 100 points) in the fat graft group, from 50 (range, 34 to 62 points) to 98 points (range, 88 to 100 points) in the bone wax group, and from 48 (range, 30 to 60 points) to 75 points (range, 70 to 95 points) in the EDB group (P<0.001). Eight feet had regrowth of the coalition on the postoperative radiographs: 1 in group 1 (4%), 1 in group 2 (6%), and 6 in group 3 (40%) (P=0.004). Five feet from the third group developed progressive symptoms.

Conclusions:
In our study, autogenous fat graft and bone wax interposition techniques provided better pain relief, gave better functional scores, and avoided more effectively coalition reossification than EDB technique. Further studies are required to evaluate safety of bone wax as an interposition material.

Level of Evidence:
Level III—therapeutic.

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