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Modified Evans Osteotomy: A Cadaveric Study of Structures at Risk

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Introduction/Purpose: Lateral column lengthening is commonly used to treat foot deformities. The original Evans osteotomy was described to be done 1 to 1.5 cm proximal to the calcaneocuboid joint. A modified Evans osteotomy described by Hintermann is done in the sinus tarsi just anterior to the posterior facet. The suggested advantages of the modified osteotomy are: more stability of the anterior fragment, less probability of injuring the spring ligament, preserving the function of peroneus longus because the osteotomy is posterior to its sulcus, and a better correction. However, no studies have assessed the risk of spring ligament injury, posterior facet injury and middle facet injury. This cadaveric study was done to assess the medial exit point of the osteotomy in relation to the medial structures.

Methods: The modified Evans osteotomy was performed by the author who is a foot and ankle consultant in 20 fresh frozen lower limb specimens. Ten were complete lower limb specimens and ten were below knee specimens. Ten were right sided and ten were left sided. After exposure and peroneal tendon retraction, the osteotomy was done by an oscillating saw in the sinus tarsi just anterior to the posterior subtalar facet in a direction perpendicular to the lateral surface of the calcaneus. After completion of the osteotomy, the talus was dissected and removed and the relation of the osteotomy to the posterior facet, middle facet, anterior facet and spring ligament was documented. The distance between the medial part of the osteotomy and the anterior end of the posterior subtalar facet was measured, as well as the distance between the medial part of the osteotomy and the posterior border of the middle facet.

Results: The spring ligament was not injured in any specimen. The posterior facet was not injured in any specimen with an average distance of 6.45 mm between the anterior end of the its medial part and the osteotomy (range: 0-15 mm). The anterior facet was contiguous with the middle facet in six specimens. The anterior facet was not injured in any specimen. In six specimens, the osteotomy passed between the posterior and middle facets just posterior to the middle facet, and in one specimen, it passed between the anterior and middle facets. In the remaining 13 specimens, the osteotomy passed through the middle facet with an average distance of 7.07 mm between the osteotomy and the posterior border of the middle facet (range: 2-13 mm).

Conclusion: This study proves that the modified Evans osteotomy avoids injury of the spring ligament and the posterior subtalar facet. Although it starts laterally just anterior to the posterior facet, it exits medially safely away from the medial part of the posterior facet. The middle facet has a chance of 65% to be traversed by the osteotomy, however the clinical implications of this needs further studies. Also, a comparative study between the Evans osteotomy and the modified Evans osteotomy is needed.

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