

Radiographic Evaluation of a Modified Chevron Osteotomy to Correct for Deviated Articular Cartilage

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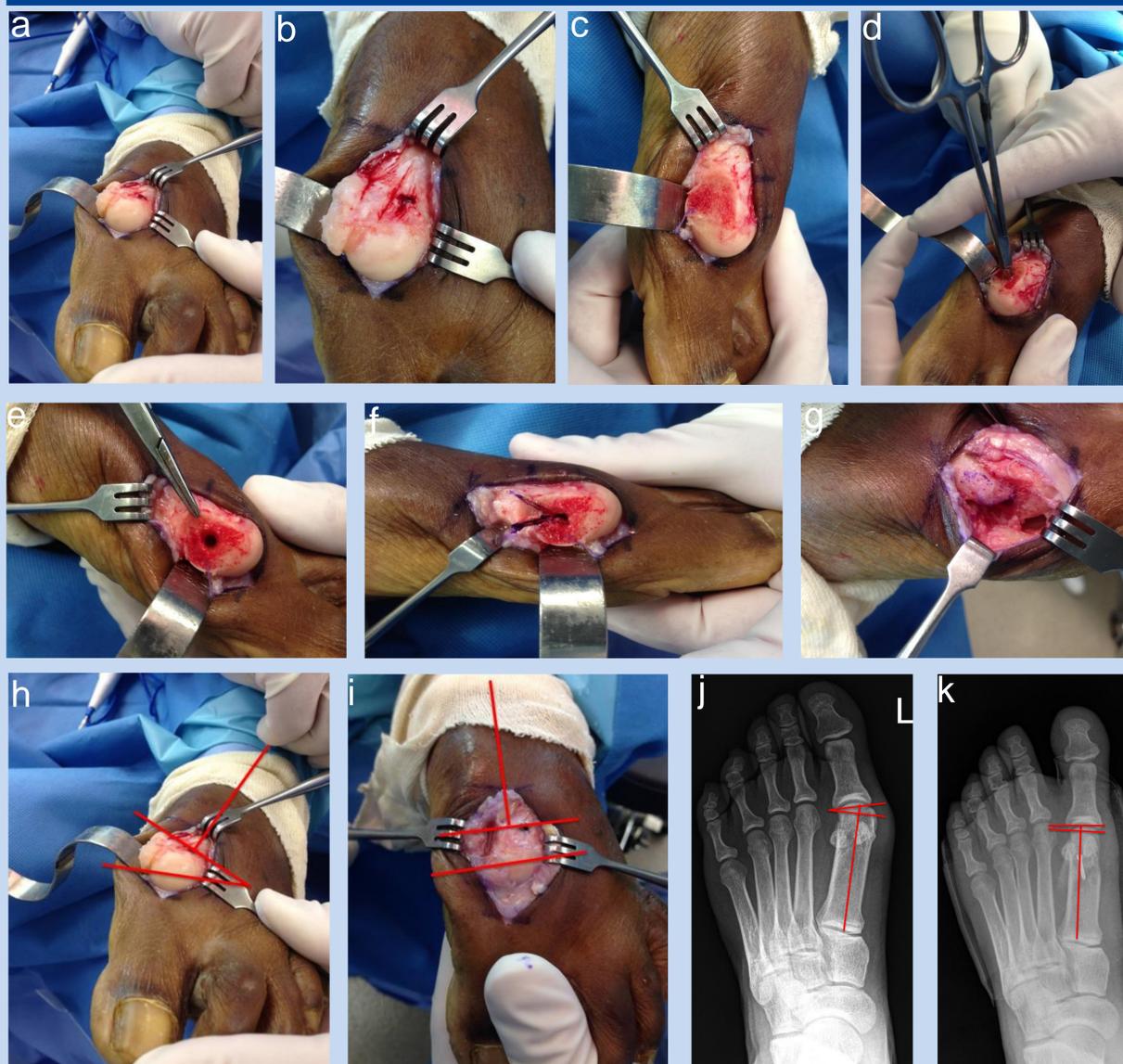
INTRODUCTION

- One of the most popular distal first metatarsal procedures used to correct abnormal intermetatarsal angle (IM) is the Chevron bunionectomy. In order to also correct for associated abnormal distal metatarsal articular angle (DMAA) we introduced the "Cone" modification. The objective is to obtain accurate data correlating successful use of the cone technique with postoperative radiographic measurements.
- Thus far, literature search has revealed no prior articles describing the coning technique and its advantages to addressing a deviated articular surface at the first MTPJ. The goal of this study is to provide radiographic validation of successful outcomes using the aforementioned method to achieve adequate correction of DMAA. This study will hopefully support the usefulness of this procedure and lessen complications associated with more complex osteotomies.

METHODOLOGY

- Radiographic review of 19 patients from 2009-2013 at Montefiore that have undergone bunionectomy using the cone technique as a stand alone procedure of the first ray. All patients had a DMAA of greater than or equal to 9 degrees pre-operatively and had pre-existing HAV deformity for at least 5 years.
- One surgeon performed the surgical technique demonstrated in Figures 1a-1i:
 - 1a-b: Demonstrates deviated articular cartilage
 - 1c: Resection of medial eminence
 - 1d: Introduction of hemostat into medial metatarsal head
 - 1e: Hemostat is rotated in a circular motion to create a cone shape at the apex of osteotomy (wider medially and narrow laterally)
 - 1f: Chevron osteotomy performed
 - 1g: Impaction of metatarsal head medially due to the cone shape
 - 1h-i: Demonstrates correction of articular cartilage
- Pre- and postoperative radiographic measurements were compared by two different observers such as: DMAA, first IM Angle, HA Angle, Sesamoid Position, and Metatarsal Protrusion angle (Figures 1j-k).

Figures 1a-k: Surgical technique for "Coning" procedure



N=19	N
Age:	
Mean	55
Range	25-75
Sex:	
Male	5
Female	14
Follow up:	
Mean	5 months
Range	3-8 months

	Preop	Postop	Preop-Postop	P Value*
Reading 1, mean (SD)	31.7(10.9)	11.9(6.5)	19.8(6.7)	<0.001
Reading 2, mean (SD)	31.1(11.0)	11.7(6.2)	19.4(6.5)	<0.001

RESULTS

- Post-operative radiographic evaluation was an average of 5 months
- There was a statistically significant decrease in DMAA when comparing pre and postoperative radiographic measurements
- The average angle of preoperative DMAA was 31.4 degrees. The average angle of postoperative DMAA was 11.8 degrees. The average angle of improvement for DMAA was 19.6 degrees

CONCLUSIONS

- The Coning modification is easy to perform and simultaneously corrects both IMA and DMAA.
- Possible complications:
 - Improper evaluation of structural integrity of underlying bone such as subchondral cysts associated with osteoarthritis
 - Iatrogenic fracture secondary to impaction of metatarsal head of proximal phalanx or directly from pressure of hemostat through lateral wall
 - If the Chevron cut is made too obtuse, it will not correctly fit into the confines of the cone created, thus preventing adequate realignment of the cartilage. The angle should be reduced to approximately 45-50 degrees.
- Coughlin and Carlson reported that the DMAA is often unrecognized and perhaps underestimated. If a deviated articular cartilage is ignored from the surgical plan and approach, there will likely be a less than satisfactory result.
- To date, there have been excellent results with the adjunctive use of the coning technique. Perhaps this poster will inspire a more detailed study on this modification to HAV corrective surgery.

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