



# Minimally Invasive Distal Oblique Metaphyseal Metatarsal Osteotomies (DOMMO) as an Adjunctive Surgical Option for Severe Metatarsus Adductus and Metatarsalgia. A Case Study

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## STATEMENT OF PURPOSE

To describe the different types of percutaneous lesser metatarsal distal extracapsular osteotomies used to treat metatarsus adductus and metatarsalgia. Immediate weight bearing is performed after these osteotomies. The correction is dynamic without fixation. A unique case is presented.

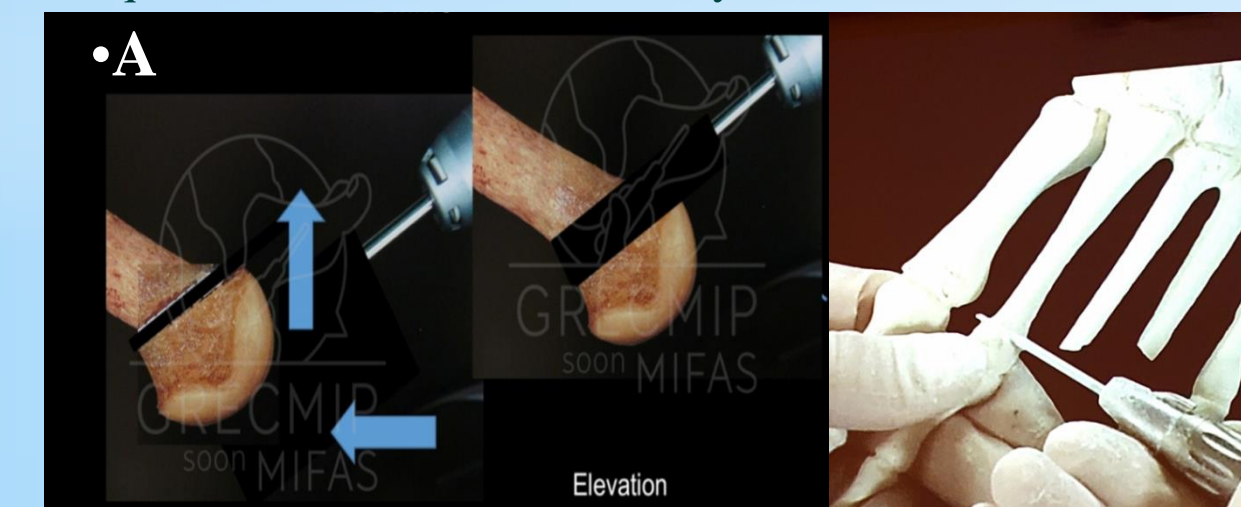
## LITERATURE REVIEW

There has been resurgence in MIS forefoot surgery utilizing high torque/low speed drill units and Shannon burs. It is necessary to distinguish the different types of percutaneous lesser metatarsal distal osteotomies.

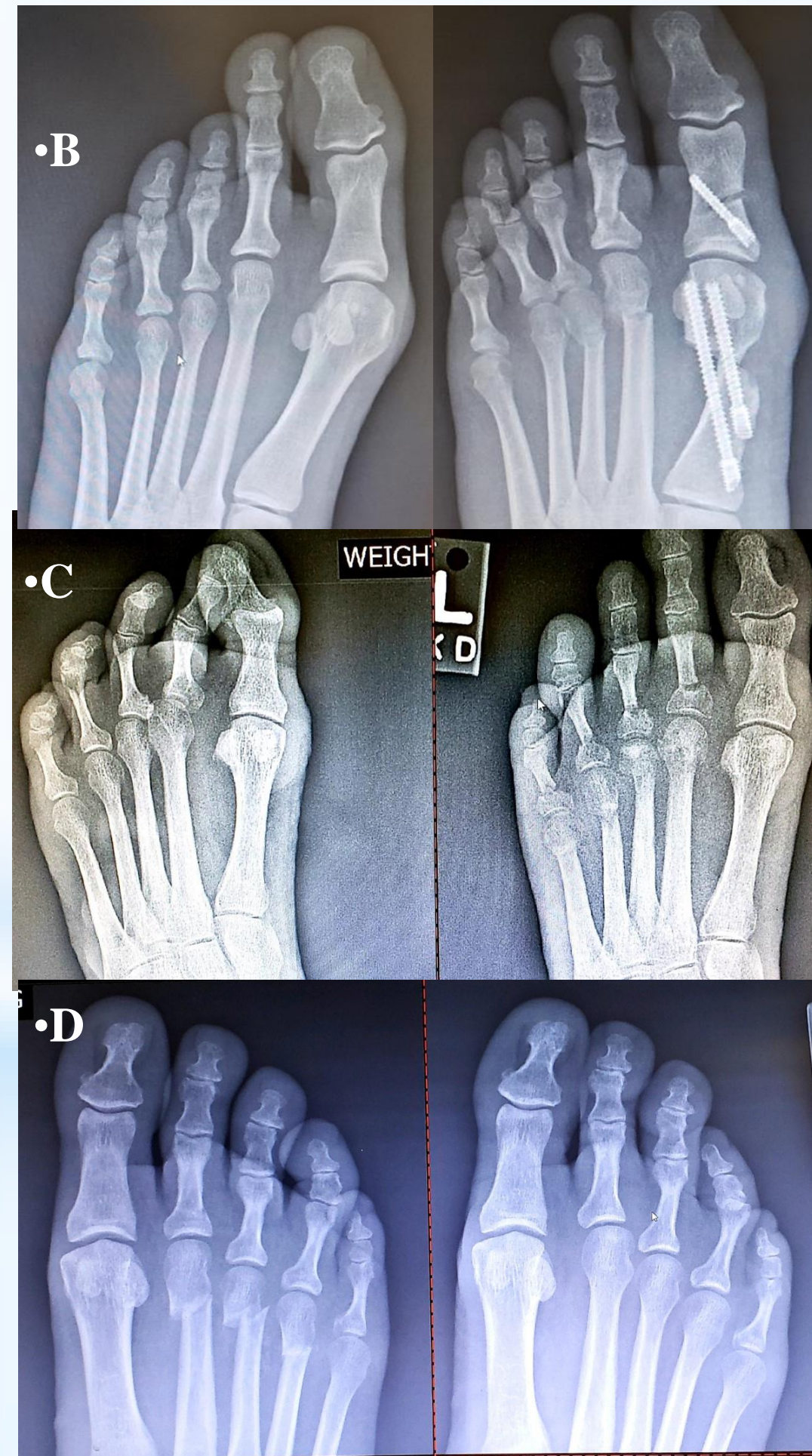
Distal metatarsal metaphyseal osteotomy (DMMO) (Figure A,B *metatarsal osteotomies 2 and 3*) are traditionally performed to correct metatarsalgia by shortening and elevation similar to an open Weil osteotomy. Osteotomy placement is oblique 40-45 degrees in the sagittal plane and perpendicular to the metatarsal shaft in the transverse axis.<sup>1,2,3,4</sup>

Distal intra capsular metatarsal osteotomy (DICMO) (Figure C *metatarsal osteotomies 2 and 3*) are performed when mild shortening and elevation is warranted, but transverse plane correction is not wanted. This is often the case when a pre-existing bunion deformity is present. Unwanted lateral displacement of a DMMO could lead to an increase of the intermetatarsal angle and overall exacerbation of a bunion deformity or loss of correction of adjacent bunion surgical procedure.<sup>2,4</sup>

Distal oblique metatarsal metaphyseal osteotomy (DOMMO) (Figure D *metatarsal osteotomies 2 and 3*) is performed when significant transverse displacement, shortening, and elevation is warranted. Medial or lateral correction is performed depending on the oblique orientation of the osteotomy to the metatarsal shaft in the transverse axis.<sup>4</sup>



•Figure A displays the orientation of the traditional DMMO. The osteotomy is performed with a sweeping motion. Note the far right picture of the transverse axis perpendicular to the first metatarsal. This is the dorsal exit point of the osteotomy.



## CASE STUDY

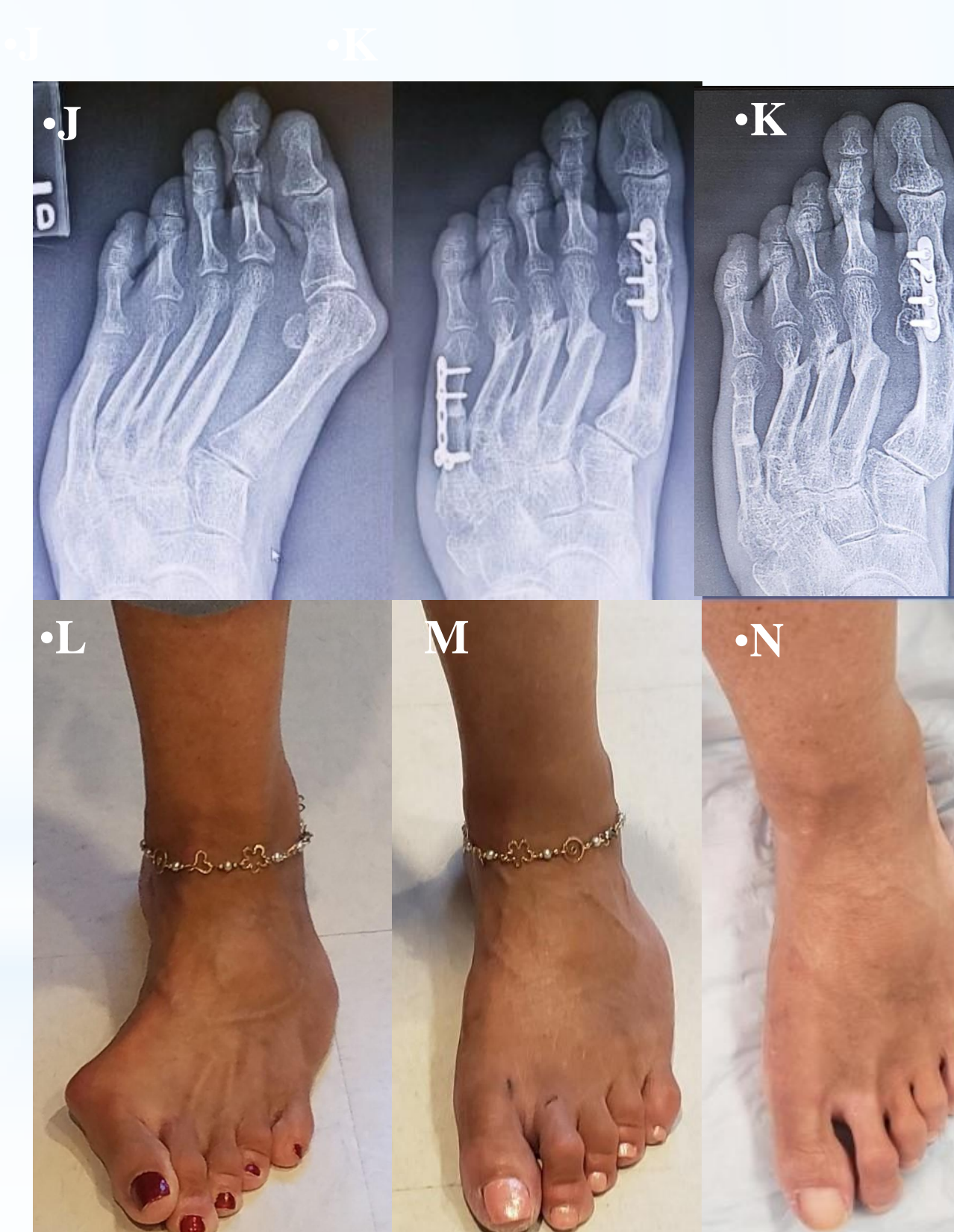
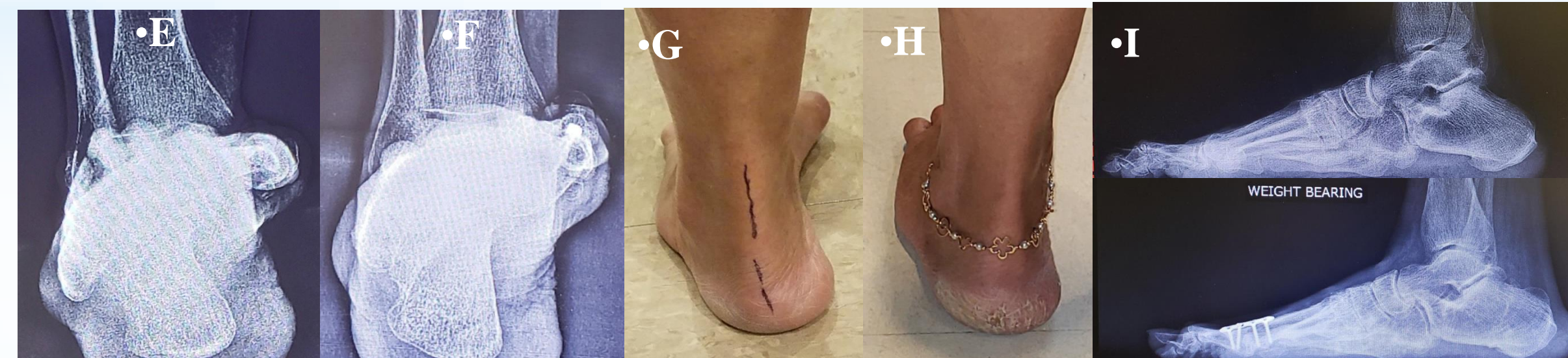
61 year old female with long standing rheumatoid arthritis presented with severe pain in the plantar forefoot, lateral malleolus, and cuboid. The patient had a history of multiple lesser metatarsal stress fractures. Physical exam revealed gastrocnemius equinus, non-reducible cavovarus, tenosynovitis of the peroneal tendons, and severe metatarsus adductus. An MRI revealed a high grade tear of peroneal longus. Coleman block test was negative. (Figure E,G,I,J). After conservative therapy was exhausted, the patient opted for surgery. The procedure was staged in 3 separate surgeries:

**Stage 1:** Open gastrocnemius recession, Dwyer calcaneal osteotomy with plate fixation, and peroneus longus tendon tear repair.

**Stage 2 (7 months later):** Mini-open proximal chevron osteotomy with percutaneous k-wire fixation x 3, open arthrodesis 1st metatarsal phalangeal joint with plate fixation, DOMMOs 2-4, open dorsiflexory/lateral closing wedge midshaft 5th metatarsal osteotomy with plate fixation, Mini-open posterior tibial “Z” lengthening. (Figure F,H,I,M).

**Post-op course, Stage 2:** Immediate weight bearing in CAM walker weeks 0-4, Surgical sandal weeks 4-8, then sneaker. K-wires removed at 6 weeks in the office. Bone stimulator was used at the patient’s request for 4 months due to concern on radiograph of asymptomatic non-union (Figure J).

**Stage 3:** 5th metatarsal and calcaneal plates removed at 11 months (Figure I,K,N).



•Figure O displays a medial oblique view displaying complete healing at 1 year post-op

## RESULTS

The patient had pain along the hardware of the 5th metatarsal and calcaneus up until removal. Asymptomatic delayed union was noted of the 3rd metatarsal which healed uneventfully (Figure K,O). Temporary compensatory contracture of the digits (Figure M), was seen until hardware was removed (Figure K,O). At 12 months the patient was pain free, back to all activities, and all osteotomies were healed (Figure K,N,O).

## ANALYSIS AND DISCUSSION

A case is presented where severe metatarsus adductus is corrected with percutaneous DOMMO's. Potential advantages include puncture incisions that facilitate skin healing without the concern of skin bridge necrosis, immediate weight bearing, powerful correction of severe deformities, cosmesis, and procedural speed. Disadvantages include learning curve, potential for non-union, malunion, prolonged edema, bone bridging between the osteotomies, and risk of increasing a pre-existing bunion deformity if there is poor execution of the osteotomy. DOMMO is an emerging procedure that appears to be safe, minimally invasive, allowing immediate weight bearing, and effective in severe deformity correction. More research is needed in the future to validate these claims.

## REFERENCES

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4. Personal conversation with Olivier Laffenetre, M.D. August 10th 2019

Special thanks to GRECMIP soon to be MIFAS for permission to use slide A.

DISCLOSURE: \* Paid consultant for WRIGHT Medical Technologies. ++ Paid consultant for Orthofix. ACFAS Fellowship Committee

