SCARF Osteotomy for Correction of Hallux Valgus

Healthcare

Keywords: metatarsal, bone, osteotomy, angle, restore, deformity, syntheses, healing, pain, weight bearing.

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Abstract

Aim: Hallux valgus deformity surgical treatment has improved during last years. The authors present and report their experience with a modified SCARF osteotomy with three years follow-up,with patients diagnosed and operated in the Universitary Clinic of Orthopaedic and Traumatology of Mother Teresa Hospital,from January 2011-March 2014. The presented technique provides predictable correction of moderate to severe hallux valgus deformities. Methods: Correction of hallux valgus deformities was achieved using a Z step osteotomy cut to realign the first metatarsal bone. A retrospective analysis was undertaken in 38 patients (54 feet).Results were analyzed by clinical examination, a questionnaire including the AOFAS forefoot score,modified, and plain roentgenograms. Results: Hallux valgus and intermetatarsal angle improved at mean 19.6° and 6.9°,respectively.Mean forefoot score improved from 50.1 to 91 points out of 100 possible points. Satisfactory healing time was expressed by an average return back to their atitude of 6weeks ,without including phisiotherapy. Persistence or recurrence of hallux valgus was seen in 3 patients(8%). The complication rate was 5.4% including post operative pain, superficial wound infection,atrophy of the muscles, traumatic dislocation of the distal fragment. Conclusion: The presented technique provides predictable correction of moderate to severe hallux valgus deformities.

Introduction

The osteotomy for the correction of the first metatarsal bone to reduce a increased intermetatarsal angle was performed using a Z step cut. SCARF is the carpentryterm of this Z step osteotomy and osteosyntheses technique(1,2,3,4,5). Since the first description of SCARFosteotomy, this procedure has been used with great success for correction of moderate to severe hallux valgus deformities.The principe of this osteotomy technique in search for greater stability of the corrective first metatarsal osteotomies.

At this time, the use of this operative technique was limited, probably because of the lack of sophisticated osteotomy tools. Microoscillating saws allowed angulated osteotomy cuts in bone. Early weight bearing due to great inherent stability and rare postoperative complications have contributed to its frequent application.Sagittal-plane instability frequently leads to prolonged osseous healing and first metatarsal dorsiflexion malposition. Therefore, midshaft osteotomies may fill the gap between the limitation of distal osteotomies and the instability of proximal osteotomies. An increased intermetatarsal (IM) angle, a normal or increased distal metatarsal articulation angle (DMAA), adequate bone stock, and symptomatic hallux valgus (HV) deformity have been establishedas major indications for the SCARF osteotomy.

To date only a few reports exist in the literature describing midterm results of SCARF osteotomy in larger populations. The literature concerning the SCARF osteotomy includes technical notes, but indications and contraindications have not been well defined. The current authors report their experience with a modified SCARF procedure in a three-year follow-up and indicate the use of this procedure with respect to other corrective procedures.

There were 30 female and eight male patients. The average age at the time of surgery was 50 years (range, 35 to 65 years). Two patients had systemic disorders which caused neuropathy and/or angiopathy of the lower extremity. There were two patients with diabetes mellitus, five patients with rheumatologic symptoms. Patients with pathologic sonography and manifest peripheral angiopathy were refused surgery. Patients were informed about a higher risk for possible wound healing complications. If they still wanted the operative treatment, surgery was planned.Patients were also informed to stop smoking, but none did. Five patients had had previous hallux valgus operations of different types. Akin osteotomy was performed in seven cases(1). Akin osteotomy was added to SCARF osteotomy in those cases where hallux valgus interphalangeus (HVI) with a HVI angle greater than 15° was present or if, after completing the Scarf osteotomy and the soft-tissue reconstruction, the hallux was still in more than 10°of valgus position,as studied in the literature. In 12 cases with symptomatic hammer toe deformity, hammer toe corrections using the Hohmann resection arthroplasty was added.

In six cases for treatment of metatarsalgia,was performed nerve removal. Eight patients underwent surgery on both feet.All of them in two sessions with an average interval of six months. At mean of 12 to 24 months a retrospective analysis including clinical examination and radiographic evaluation was undertaken.

Clinical and Radiological Assessment

Clinical preoperative and follow-up evaluation was obtained by using the 100-point AOFAS forefoot score,modified . All patients were examined preoperatively by the two operating surgeons(2,4). Follow-up examination and rating was done by the same team involved in the primary treatment.Most of patients seen in clinic were photographed and overall radiographic assessment was done on weight-bearing radiographs obtainedpre- and postoperatively in standardized dorsoplantar and lateral views. (Figure 1,2).

Fig .1 Normal foot view of a hallux valgus

Fig.2.Weight bearing X Ray pre/postoperative patient

Surgical Technique

Operations were performed using spinal locoregional anestesia and a tourniquet just above the knee joint. The standard approach was via a medial incision,at the junction of the plantar and the dorsal skin,with its proximal part below the surface projection of the metatarsal. The joint capsule and the medial collateral ligament of the MPI joint were incised horizontally(1,2). The attachments of the collateral ligaments were retracted, but the plantar dissection of the medial ligament structures was limited to retain the vascularity of the metatarsal head. The medial aspect of the metatarsal head was exposed. The medial eminence of the metatarsal head was partially resected. A lateral release was indicated if the lateral ligaments were shortened and the MP I joint could not be manipulated in a 15° varus position. From an additional small dorsal interdigital approach, the lateral capsule was released longitudinally above the lateral sesamoid, leaving the plantar plate and the adductor tendon intact. The sesamoids were then mobilized.

In preparation for the three osteotomy cuts, two guiding 1.2-mm K wires were inserted at the corner points of the planned SCARF cut. The entry point of the proximal pin averaged 2 cm distal to the first metatarsal medial cuneiform joint line, over the concavity of the inferior aspect of the metatarsal at the junction of the plantar inferior to the medial aspect. The entrance point of the distal pin crossed the metatarsal head 5 mm proximal to the dorsal cartilage surface in the dorsal to the medial aspect. Both K wires were oriented strictly parallel to each other. The horizontal osteotomies were performed using the micro-oscillating saw and the transversal osteotomies were performed using the micro-reciprocating saw(Fig 3,4,5,6,7).

The angle of each cut was at 45° to 60° to the longitudinal metatarsal axis. The authors' modification of the SCARF osteotomy described by Barouk includes the angulation of the distal osteotomy cut and the placement of the distal pin on the dorsal-medial aspect of the first metatarsal. This modification alters the inclination of the longitudinal cut making it more oblique. After completing the osteotomy, the distal fragment was displaced laterally to reduce the intermetatarsal angle.

Lateral displacement was achieved by pushing the distal fragment laterally while holding the proximal fragment of the first metatarsal in place. Different options of displacement are possible, depending on the translation and the orientation of the SCARF cut. The translation is greater for larger IM angles. For maximal stability of the osteotomy after translation, it is necessary to orient the proximal and distal osteotomy cut strictly parallel to each other. Translation and lowering was indicated for hallux valgus with intermittent metatarsalgia or a deficit of the first metatarsal head in weight-bearing. This is best diagnosed clinically rather than radiologically. The osteotomy was modified by directing the orientation of the K wires and the horizontal cut more plantar. Translation and shortening of the first metatarsal could be performed.Shortening was obtained by increasing the obliquity of the anterior and posterior cuts with respect to the longitudinal axis of the second metatarsal. Additional shortening was indicated in severe forefoot deformity with luxation of the lesser toes at the metatarso-phalangeal joints. Translation and lengthening were indicated in cases with short first metatarsal combined with metatarsalgia. Lengthening was obtained by decreasing the obliquity of the anterior and posterior cuts with respect to the longitudinal axis of the second metatarsal. To prevent shortening, the obliquity of the pins and the proximal and distal cut must be oriented distally. Translation and rotation were used for congenital hallux valgus to attempt to correct oblique DMAA angle(4). Fixation of the osteotomy was achieved using two small cannulated bicortical compressive screw.

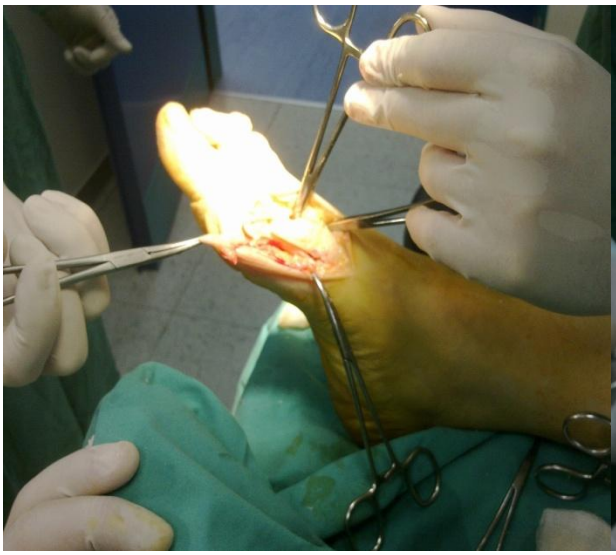

Fig.3. Surgical view pre osteotomy

Fig.4.Surgical view post osteotomy

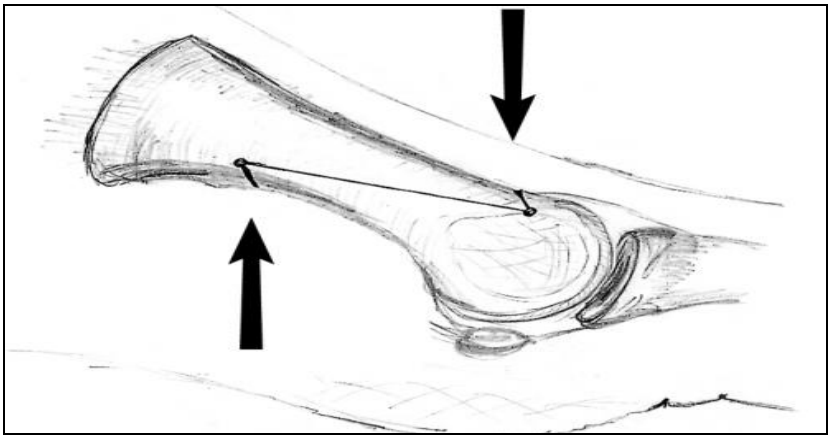

Fig.5. Schematic view of osteotomy plane

Fig.6. Bone fixation,lateral view

Fig.7.A/P view

Results

The average clinical and radiographic follow-up range was 12 to 24 month.Regarding to postoperative pain, 70% of operated feet reported to be completely pain-free, and 12% of operated feet reported to have only occasional or slight discomfort.The remaining 10% had mild to moderate discomfort.The length of the first metatarsal was reduced by an average of 2.5 mm (+/- 2.7 mm). Healing was expressed by the ability of full weight bearing gait pattern and the time from surgery to return back to work.Bone healing was documented on plain radiographs six weeks after surgery. At the time of final follow-up,no loss of correction of the intermetatarsal angle was noted. However, four patients (10%) showed a recurrent or persistent hallux valgus. Complications were rare and comprised superficial wound infections necessitating antibiotic medication and traumatic dislocation of the osteosyntheses .

Discussion

The SCARF osteotomy has become a widely used procedure in middle Europe since the introduction and the development of specially designed osteosyntheses material. This paper, introducing the SCARF osteotomy, describes the operative procedure and the possibilities of the SCARF in combination with other osteotomies in lesser metatarsals. Complications included two metatarsal fractures,failure to consolidation,also,neuropathy and angiopathy.Also,describe the new tendence of foot surgery of our clinic,in the Universitary Clinic of Mother Teresa Hospital,Tirana,Albania.

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