



Scarf osteotomy in hallux valgus : a review of 72 cases

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The Scarf osteotomy is now widely used for the correction of hallux valgus. The aim of our study was to evaluate the results after Scarf osteotomy considering patient's satisfaction as well as the clinical and radiological results.

Between 1996 and 1999, 72 feet underwent a Scarf osteotomy of the first metatarsal and, in 11 feet, an additional Akin osteotomy of the proximal phalanx, for the correction of hallux valgus (55 patients : 49 female, 6 male ; mean age : 52 years).

The hallux valgus angle improved significantly, from 32° preoperatively to 18° at follow-up (minimal follow-up : 6 years ; mean : 7.5 years).

A second operation was necessary in two patients because of recurrence of hallux valgus, and a fusion of the first metatarsophalangeal joint was performed in two patients. At the time of latest follow-up 78% of the patients were satisfied or very satisfied with the result. The Scarf osteotomy combined with Akin's closing wedge osteotomy is a safe and effective procedure for the treatment of moderate hallux valgus deformities.

Keywords : foot ; hallux valgus ; scarf osteotomy.

INTRODUCTION

Painful hallux valgus is a common clinical problem, especially in women in shoe wearing societies. While constricting footwear appears to be the major cause, intrinsic factors play a role as well (9). The role of genetic predisposition has also been noted, with evidence to suggest familial

tendencies. Since the first description of hallux valgus in 1870 by Hueter, surgical correction has remained a challenge with at least 130 procedures being described (12). Nevertheless, surgical osteotomy is an effective treatment for painful hallux valgus (20). The Scarf osteotomy has been described by Burutaran (4) in 1976 and was developed mainly by Weil and Borelli in 1991 in the USA and Barouk in 1993 in France. The Scarf osteotomy is now widely used in Europe and is popular because of its inherent stability and ease of internal fixation. Most reports about Scarf osteotomy present good short and mid-term results in moderate and severe hallux valgus. Dereymaeker (7) states that there is no age limit and osteoporosis is not a real contraindication to the Scarf osteotomy (2, 7, 12, 16, 22). However, Coetzee (5) recently reported multiple potential

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pitfalls of the Scarf osteotomy and suggested to reserve the Scarf osteotomy for young patients with moderate hallux valgus and good bone stock.

The aim of our study was to evaluate results after Scarf osteotomy of the first ray considering patient satisfaction as well as the clinical and radiological data.

MATERIALS AND METHODS

Between January 1996 and January 1999, 55 patients (72 feet) underwent a Scarf osteotomy of the first metatarsal combined if necessary with an Akin closing – wedge osteotomy of the proximal phalanx of the great toe for the correction of hallux valgus. The Scarf osteotomy was in that period our standard procedure in the correction of moderate and severe hallux valgus deformity with an increased first intermetatarsal angle.

There were 49 female and 6 male patients. The average age at the time of surgery was 52 years (range : 18 to 84). Two patients had had previous hallux valgus surgery ; both patients underwent a distal soft tissue procedure. Seventeen patients underwent surgery on both feet, six patients in a single session and eleven in two sessions. An additional Weil osteotomy of the lesser metatarsals was performed in 29 cases (1, 9). Patients with rheumatoid arthritis were excluded from this study.

Pre-operative complaints were related to a bunion, pain and difficulty with footwear. Nineteen patients (21 feet) also complained about metatarsalgia or claw toe deformity of the lesser toes.

Data were collected based on a review of the medical records performed preoperatively and during follow-up. The pre- and postoperative radiographs were analysed independently by the first author.

Postoperative subjective data were collected based on a written survey conducted by mail at a minimum of 6 years postoperatively. The questionnaire was based on the AOFAS hallux rating system (13). Patients were asked questions, emphasising the presence of pain, limitation of activity, shoe wear and overall satisfaction.

Radiological evaluation

The radiographs obtained included weight-bearing dorsoplantar and lateral views. The following criteria were evaluated : the hallux valgus angle (a normal angle is less than 15°, a mild hallux valgus deformity is less than 20°, a moderate deformity is between 20° and 40° and a severe deformity is greater than 40°), the first

intermetatarsal angle (normal < 9°), the distal metatarsal articular angle (DMAA), lateralisation of the sesamoids and signs of osteoarthritis of the first MTP.

Operative technique and postoperative care

All patients were admitted to the hospital on the day of surgery. The majority of the procedures (70%) were performed by the second author or under his direct supervision by a resident. All operations were performed with general or spinal anaesthesia. All patients were placed in the supine position. A pneumatic tourniquet at the upper leg was used. A lateral soft-tissue release was achieved through a dorsal incision between the first and second metatarsal heads. A strict medial incision was then made over the first metatarsophalangeal joint. Adequate removal of the exostosis at the medial side of the first metatarsal was then performed. The Scarf osteotomy was then performed, first the longitudinal cut and then the two transverse cuts. Because of the blood supply for the metatarsal head, the transverse cuts were made from proximal plantar to distal dorsal. The plantar fragment was translated laterally, and was fixed to the dorsal fragment with two Scarf screws. The medial bone excess was then resected. At this point of the procedure, it was decided whether an additional Akin osteotomy of the proximal phalanx was necessary ; it was performed in eleven patients. The Akin osteotomy was fixed with a staple or screw, keeping the lateral cortex intact. Finally, the medial capsule was closed without tension.

In 21 cases, an additional Weil procedure on one or more of the lesser metatarsals was performed in the same session.

Postoperatively, the patients were allowed to walk in a shoe with a stiff sole for six weeks without weight bearing restriction. The mean hospital stay was two days.

The preoperative data were compared to the results at follow-up using the paired t-test ($p < 0.05$).

RESULTS

Subjective outcome

We received the questionnaires related to 65 feet, three patients (four feet) died before latest follow-up and three patients were not traceable for follow-up.

At the time of follow-up (mean : 7.5 years ; range : 6 to 9 years), 78% (51 feet) of the patients were satisfied or very satisfied with the result of the



Fig. 1. — A 45-year old woman with bilateral hallux valgus symptomatic on the right side.

hallux valgus correction, 12 patients were moderately satisfied and 2 patients were not satisfied with the result. The satisfaction rate was higher in patients with no preoperative signs of osteoarthritis of the first MTP joint : in this group (n = 51 feet), 88% (45 feet) were satisfied or very satisfied with the result and 6 were moderately satisfied. During follow-up no pain or occasional pain of the forefoot was reported by 84% (55 feet) of the patients. Only one patient reported daily pain at the first MTP joint. No restrictions in daily living and no or mild restrictions in recreational activities were reported by 80% (52 feet) of the patients. None reported severe restrictions in daily living or recreational activities. Two patients needed to wear (semi)custom made shoes. The majority of the patients would choose the Scarf osteotomy again for correction of their hallux valgus deformity.

Radiological outcome

The hallux valgus angle improved significantly, from 32° preoperatively to 18° at follow-up (mean radiological follow-up : 22 months). Immediately after operation this angle was reduced to an average



Fig. 2. — Same patient 6 years after Scarf osteotomy on the right side, with good clinical and radiological result.

of 14°. No overcorrection, e.g. hallux varus deformity, was observed. The first intermetatarsal angle improved from 15° to 9° at follow-up.

On the preoperative radiographs, there was a lateralisation of the medial sesamoid in 88% of the patients, versus 16% at follow-up.

There was only one patient with a mild hallux valgus deformity in our study group ; the majority of the deformities were moderate. There was a severe hallux valgus deformity in eight patients : the mean hallux valgus angle was 43° preoperatively and was significantly reduced to 24° at

follow-up. We found in 14 patients an increased DMAA preoperatively ; this angle was not significantly reduced postoperatively.

There were preoperative signs of osteoarthritis of the first metatarsophalangeal joint in sixteen patients. Their mean hallux valgus angle was 36° preoperatively versus 23° at follow-up. The IMA was corrected from 14° to 11° at follow-up. The mean age of the patients in this group was significantly higher (69 years) compared with the group with no signs of osteoarthritis (47 years).

Complications

One patient had a superficial wound infection which was appropriately treated with oral antibiotics. Two patients developed postoperative neuralgia along the medial scar ; almost complete spontaneous recovery was observed at follow-up. A fracture of the first metatarsal occurred intra-operatively in one patient but this healed satisfactorily. In two patients the distal screw was prominent and caused pain on the dorsal aspect of the foot. The pain disappeared after removal of the screw once consolidation was achieved. A recurrence of the hallux valgus was seen in two patients. Both were treated with a distal soft tissue procedure, which lead to a good result in one patient. The other patient denied having further surgery.

A fusion of the MTP I was performed in two patients, respectively 24 and 36 months after the Scarf osteotomy ; in both of them, there were signs of osteoarthritis of the MTPJ on the preoperative radiograph. Both fusions healed successfully.

DISCUSSION

The Scarf osteotomy is a technically demanding procedure for the correction of hallux valgus as stated by Barouk (2), Weil (22) and Dereymaker (7). Despite this, it has become a widely used procedure in Europe. The osteotomy permits horizontal displacement, shortening, rotation, elevation and lowering of the metatarsal head (2, 22). It has been suggested that the Scarf osteotomy should be indicated for patients with a moderate or severe hallux valgus deformity and an IMA between 12° and

20° (6, 14, 16). For mild hallux valgus deformities, distal osteotomies like the chevron osteotomy may be considered. The results of distal osteotomy are comparable to the Scarf osteotomy and a less extensive procedure is necessary (7). The correction of the DMAA malalignment by the Scarf osteotomy was not significant in our study. Although it should be possible to change the DMAA with the Scarf osteotomy, a distal osteotomy is advised for the correction of DMAA malalignment (3, 7, 14). In hallux valgus with a high intermetatarsal angle, a proximal osteotomy with distal soft tissue procedure or a Lapidus procedure should be considered (8, 15, 17). As generally reported, the occurrence of osteonecrosis of the first metatarsal head after Scarf osteotomy is rare (11, 18). There were no identified cases of osteonecrosis of the first metatarsal head in our study.

We found a complication rate of 14%, among which 8% minor complications and 1.5% not related to the hallux valgus surgery. The complications observed in our study are comparable to other studies regarding the Scarf osteotomy for correction of hallux valgus deformities (6, 19). Coetzee (5) however found a high complication rate after Scarf osteotomy.

The Scarf osteotomy can be used when there is early osteoarthritis of the metatarsophalangeal joint. Shortening of the first metatarsal enables a pressure reduction in the joint, although shortening of the first metatarsal can result in transfer metatarsalgia. In advanced osteoarthritis another procedure, like a Keller Brandes or fusion of the first MTP joint should be used (7, 21). This is comparable with the results in our study group. An MTP arthrodesis was performed after Scarf osteotomy in two of the sixteen feet with osteoarthritis (13%). Patients were less satisfied with the result at follow-up.

To allow precise forefoot management the Scarf osteotomy can be combined with the Weil lesser ray osteotomy (1). We saw no adverse effects of combining these procedures in one operation session.

In conclusion, the results of 72 Scarf operations in 55 patients were reviewed at a mean of 7.5 years. The Scarf osteotomy combined with an Akin closing wedge osteotomy appeared as a safe and

effective procedure for the correction of hallux valgus in patients with no or slight radiological degenerative changes of the first metatarsophalangeal joint.

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