

Management of Severe Hallux Valgus Using Combined Proximal Closing Osteotomy with a Distal Soft Tissue Reconstruction

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ABSTRACT

Background: many surgical procedures were described for correction of hallux valgus and the type of operation is based upon; foot length, width and redressibility of the transverse arch, hallux valgus evaluation of possibility of its passive redression and radiographic examination of foot.

Aim of the work: To evaluate the results of hallux valgus surgery combining the distal soft tissue reconstruction (DSTR) or modified McBride procedure and proximal closing wedge osteotomy of the first metatarsal base.

Patients and methods: This prospective study, was performed in King Abdul-Aziz Hospital, Taif, Saudi Arabia. The study was approved by the local committee of human research, and all patients gave written informed consent to participation. Ten patients (8 women and 2 men) with mean age of 28 years (18-40 years) were included in the study with 16 surgeries. The mean postoperative follow-up was 36 months (28 – 48). The operative technique performed in these patients was a combination of DSTR with closing osteotomy of the first metatarsal base.

Results: The mean pre-operative intermetatarsal 1-2 angle (IMA) revealed by radiographs was surgically corrected from 20.3 degrees at the baseline to the mean degree of 7.9. The mean pre-surgical hallux valgus angle (HVA) was 44.9 degrees proved by radiographs was surgically improved to 11.7 degrees, and 3 years after operation it reached 12.3 degrees (mean). Ninety percent of patients were satisfied with their surgical results and cosmetic improvements were achieved in 93.7 % (15/16 feet in 9 patients).

Conclusion: The combination of wedge osteotomy of the first metatarsal base and the distal soft tissue reconstruction (DSTR) or modified McBride procedure is suitable in the treatment of young patients having severe forms of hallux valgus and minimum arthritic changes in metatarsophalangeal joint with increased IM.

Key words: **Severe Hallux Valgus, Combined Proximal Closing Osteotomy, Distal Soft Tissue Reconstruction**

Introduction:

Hallux valgus is a forefoot condition in which the 1st metatarsal is medially deviated and the hallux is laterally deviated creating a medial prominence at the 1st metatarsophalangeal (MTP) joint that can be painful, especially with footwear (Bosch et al, 2000). The condition is a complex of deformities of the first ray of the foot, often accompanied by deformity of forefoot (Coughlin and Jones, 2007). Surgical procedures most frequently performed on young patients suffering from hallux valgus include Mitchell's osteotomy modified by Dega (Mitchell et al, 1958 and Kuo et al, 1998) and Austin's chevron osteotomy of the neck of the first metatarsal (Trnka et al, 2004 and Shariff et al, 2009). The latter procedures are followed by McBride operation and osteotomies of the first metatarsal bases (McBride, 1963 and Trnka et al, 1999). However, a distal soft tissue reconstruction (DSTR) or modified McBride procedure involves a lateral release as well as a medial capsulorrhaphy after the medial eminence has been resected which has a lower risk of hallux varus than the traditional McBride which included a lateral sesamoidectomy (Trnka et al, 1999). These techniques are suitable for young patients having severe hallux valgus with minimum or no arthritic changes of first MTP joint and good MTP joint mobility (Mann et al 1992 and Trnka et al, 1999). The decision on the

type of operation is based upon the following criteria; foot length, width and redressibility of the transverse arch, hallux valgus, evaluation and possibility of its passive redression and radiographic examination of foot in AP projection with measurements of the intermetatarsal 1-2 angle (IMA, angle between the long axes of the first and second metatarsals) and hallux valgus angle (HVA, angle between the long axes of first metatarsal and proximal phalanx) (Mann et al 1992).

Patients and methods:

This prospective study was performed in King Abdul-Aziz Hospital, Taif, Saudi Arabia from January 2008 to January 2010. The study was approved by the local committee on human research, and all patients gave written informed consent to participation. Ten patients (8 women and 2 men) were included in the study with 16 surgeries. The mean postoperative follow-up was 36 months (28 – 48). The patients met the clinical criteria of severe hallux valgus and the preoperative radiograph in AP projection (figure 2), in most cases showed IMA of more than 20 degrees and hallux valgus angle (HVA) exceeding 40 degrees. The operative technique performed in these patients was a combination of a distal soft tissue reconstruction (DSTR) or modified McBride with closing osteotomy of the first metatarsal base (Mann et al 1992 and Trnka

et al, 1999). The operative procedures were done under general or spinal anesthesia and after application of pneumatic tourniquet; the first incision was placed on the medial side, over the exostosis of the first metatarsal head and led to its base. The exostosis was excised and a closing wedge osteotomy of first metatarsal base was performed and fixed by using either screw or by bone sutures then a U- shaped flap with distal base was prepared from the joint capsule. A second dorsal incision was done between the first and second metatarsals

making the first metatarsal bone to be accessible. The U-shaped flap, was used to balance the alignment of the big toe , by stitching it in dorsal or plantar direction, as needed to correct the remaining valgus deformity under a greater traction, however, better correction entailed in 5/16 operations, to perform sesamoidectomy. Postoperatively the site was fixed with plaster for 6 weeks. After the osteotomy had been healed, which was checked by radiographic examination and after restoring the full weight bearing activity of the foot we extracted the screw.

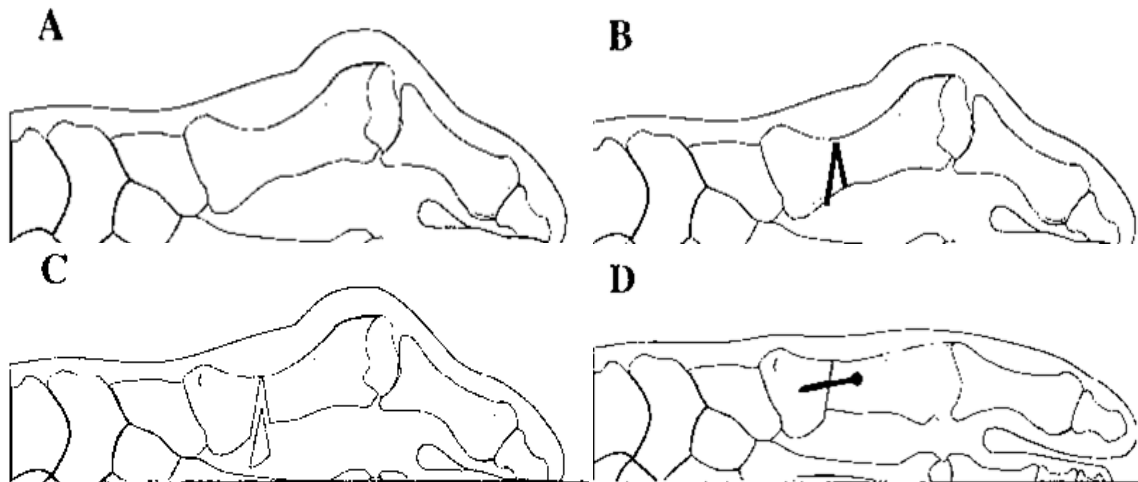


Figure 1: The metatarsal osteotomy technique, after Mann et al (1992).

Results:

Ten patients (8 women and 2 men) with mean age of 28 years (18-40 years) were included in the study with 16 surgeries.

They were clinically and radio graphically examined prior to operation, 6 weeks after the operation and thereafter every 3 months

after the operation (mean period of 36 months). The clinical findings involved the following; pain, in-shoe pressure and degrees before surgery and was surgically improved to 11.7 degrees, and 3 years after operation it reached 12.3 degrees (mean). The mean IMA (1-2) was 20.3 degrees prior to operation which was surgically corrected down to the mean of 7 degrees, and 3 years after operation it reached 7.9 degrees (mean). Three years after the operation, the loss of correction observed in the IMA was proved to reach a mean of 0.9 degree and in HVA of 0.6 degree. No loss of correction occurred in the osteotomies which were fixed by a screws however in those which fixed only by bone suture and plaster, the loss of correction in hallux angle

cosmetic appearance of foot in addition to physical examination and radiological findings. The mean HVA was of 44.9 was of 0.9 degrees and in intermetatarsal 1-2 angle it was in value of 1.3 degrees (mean). Following surgery sense of pain relief and in-shoe pressure were improved and 9/10 patients (90%) were satisfied with their surgical results. Cosmetic improvements were achieved in 93.7 % (15/16 feet in 9 patients). Complications included; hallux varus in 1/16 operations (6.3%), metatarsalgia in 2/16 operations (12.5%) and in one operation (6.3%), secondary wound healing was observed. No case of post-operative arthritis or osteonecrosis was observed.

patients	Number (%)
Total number of patients	10 (100)
Males	2(20)
Females	8(80)
Mean age	28 years

Table 1: Demographic data.

Table 2: Pre and postoperative findings.

Finding	Preoperative	Postoperative
Mean HVA	44.9 degrees	11.7 degrees (immediately after surgery) 12.3 degrees (3 years after) 7degrees (immediately after surgery)
Mean IMA	20.3 degrees	7.9 degrees (3 years after)
Patient satisfaction	0%	90%
Cosmetic improvement	0%	93.7%



Figure 2: Plain X-Rays showing severe halux valgus before and after correction.

Discussion:

The goals of hallux valgus surgery are not only to correct the HVA and pronation of the 1st MTP, but also to narrow the forefoot by resecting the medial eminence and/or correcting the IMA (Austin and Leventen 1981, Shurnas et al, 2009). In addition, the surgical goals are to re-establish the normal weight bearing status of the 1st ray, the MTP joint congruency and relationship of the metatarsal head-sesamoid joint (Saragas, 2009). After more than 160 years of hallux valgus surgery, we may think that a perfect treatment should have been found, Peabody, (1931) thought that he had found it and he

stated that all of his patients were happy and there was no complication; he was wrong (Trnka et al, 1999), however, Helal, (1981) counted more than 150 different techniques and the number had been increased since that time (Saragas, 2009). A distal soft tissue repair and realignment may be performed with or without a proximal first metatarsal osteotomy, however, a soft tissue procedure can be utilized for mild hallux valgus deformities but with moderate and severe deformities the osteotomy has to be added (Shurnas et al, 2009). Mann, (1992) mentioned that; if the HVA is less than 25

degrees and in a congruent joint, chevron or Mitchell osteotomy of first metatarsal is performed and in cases of first metatarsophalangeal joint subluxation he advised a combination of soft tissue procedures with chevron or Mitchell osteotomy of the first metatarsal. In incongruent joints, he combines soft tissue procedure with proximal first metatarsal osteotomy or performs Mitchell's osteotomy. If the HVA above 40 degrees and the joint with no or minimal arthritis the treatment of choice especially in young patients, would be combined DSTR and proximal phalangeal osteotomy or to combine the wedge osteotomy of the first cuneiform bone with the proximal phalangeal base osteotomy (Mann et al 1992 & Trnka et al, 1999). In the present study all cases were young (mean age was 28 years) and they had severe deformities and their joints were of no or minimal arthritis. These findings fulfilled the criteria to be treated by combined wedge osteotomy of the first metatarsal bases and distal soft tissue reconstruction (DSTR) or modified McBride procedure. Ninety per cent of patients were satisfied with subjective improvement, painless walking and elimination of problems with putting on their shoes and cosmetic improvement was achieved in 93.7% of cases. These results of satisfaction rate are consistent with the findings of Mann, (1992). A distal soft tissue

reconstruction (DSTR) or modified McBride procedure involves a lateral release as well as a medial capsulorrhaphy after the medial eminence has been resected, however, the resection of sesamoid bone in the traditional McBride operation might increase the risk of hallux valgus (Trnka et al, 1999). In 5/16 surgeries performed in this study better correction entailed to perform sesamoidectomy and in 1/5 of those patients (20%), hallux varus had developed. The technique of wedge osteotomy of the first metatarsal is demanding, however; it entails risks of shortening, malalignment and metatarsalgia and due to these reasons, in the first metatarsal area it is preferred to perform either wedge or chevron osteotomy (Coetzee, 2003). However, Trnka, et al, (1999) reported 85% good to excellent functional results, and he reported also that the incidence of hallux varus (27%), malunion (25%), metatarsal shortening (average 5 mm) and resultant transfer metatarsalgia (25%). In this study halux varus was recorded in 1/16 operations (6.3%) but in 20% of the sesamoidectomy group, metatarsalgia related to the shortening of the first metatarsal and to secondary reduction of the transverse arch of the foot in 2/16 operations (12.5%) and, secondary wound healing was observed in one operation (6.3%). No case of post-operative arthritis or osteonecrosis was observed in the present series. This lower

incidence of complications might be related to smaller number of patients. In cases of incongruent joints, some authors performs wedge osteotomy of first cuneiform bone (Shurnas et al, 2009). If the HVA is greater than 50 degrees, an IMA greater than 25 degrees or congruent first metatarsophalangeal joint, extra-articular osteotomies may be required to achieve adequate correction and in the presence of significant spasticity or degenerative arthritis, an arthrodesis would be preferable (Coughlin et al, 2005). Regardless of the degree and severity of the deformity or the operative intervention chosen, a frank discussion of the risks and benefits of surgery and the amount of time it takes for full recovery; on average, patients take up to a year to be fully recovered and when patients have this expectation set before surgery, the postoperative outcome is more likely to match their experience (Coughlin and Jones, 2007).

Conclusion: The combination of wedge osteotomy of the first metatarsal base and the distal soft tissue reconstruction (DSTR) or modified McBride procedure is suitable in the treatment of young patients having severe forms of hallux valgus and minimum arthritic changes in metatarsophalangeal joint with increased IMA.

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recommended combination of soft-tissue procedures with proximal first metatarsal osteotomy in arched modification or

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ملخص عربى

علاج الاعوجاج الوحشى الشديد لاصبع القدم الاكبر عن طريق الجمع بين اعادة بناء الانسجة

اللينة القاصية مع القطع العظمى للسلامية الاولى لعظام القدم

بحث مقدم من: د/ عبد الله على الزهرانى

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ملخص البحث :

يتضمن البحث النتائج الجراحية لعلاج الاعوجاج الوحشى الشديد لاصبع القدم الاكبر عن طريق الجمع بين اعادة بناء الانسجة اللينة القاصية مع القطع العظمى للسلامية الاولى لعظام القدم وقد تضمن البحث 10 مرضى (8 سيدات ورجلين) اجريت لهم 16 جراحة للقدم .

وقد كان متوسط فترة المتابعة للحالات 3 سنوات ومتوسط العمر 28 سنة وقد تم تصحيح زاوية اعوجاج الاصبع الاكبر من 44,9 درجة فى المتوسط قبل العملية الى 12,3 درجة وقد اظهرت النتائج ان 90% من المرضى راضين عن نتائج العلاج.

خاتمة: ان استخدام الجمع بين اعادة بناء الانسجة اللينة القاصية مع القطع العظمى للسلامية الاولى لعظام القدم مناسب لعلاج الاعوجاج الوحشى فى المرضى صغار السن و يعانون من اعوجاج وحشى شديد فى اصبع القدم الاكبر مع عدم وجود التهاب شديد بالمفصل.