

Scarf osteotomy in tailor's bunion: A review

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Abstract

Tailor's Bunion (TB) is a prominence of the Vth metatarsal bone at the base of the little toe. Scarf Osteotomy (SO) is a very useful technique to treat TB and in some cases it represents the first-rate surgical treatment for this deformity. The aim of this paper is to describe this little known pathology, analyze all surgical techniques of the past and review controlled trials or reviews that compare SO in TB published in the literature. All studies published in the literature have shown good results about the stability of the deformity correction over time, recovery of function of the little toe and pain.

Introduction

Tailor's Bunion (TB), or *Bunionette*, or *Digitus Quintus Varus*, is a prominence of the Vth metatarsal bone at the base of the little toe, as described by Davies in 1949 [1]. This prominence was firstly observed in tailors sitting when crossing their legs because of putting pressure on the outer borders of their feet. Usually, it is clinically characterized by pain and formation of the callus, and radiographically by a wide angle between the IVth and Vth metatarsal bones, a wide metatarsophalangeal angle and a deformity in varus of the metatarsophalangeal joint [2]. The conservative treatment consists in the use of comfortable shoes, but when this treatment is not possible to apply, the surgery is recommended.

The literature has shown many surgical treatments about TB [3-6], but some authors have highlighted the power of osteotomical techniques in comparing to simple exostectomies without internal fixation [7] for the increased incidence of recurrence. In a few cases of TB, procedures can be arthroplasty or silastic sphere implants [8].

Vth metatarsal osteotomies are divided into distal, proximal or shaft, such as the surgical management of hallux valgus. Since '50 years, the Vth metatarsal osteotomies with medial transposition of its distal part are very frequent: the transversal neck osteotomy [9], Mitchell's osteotomy [10], the oblique neck osteotomy [11] with the compact of osteotomized fragment on the medial cortical bone [12], the "V" sliding osteotomy in traversal plane (like Chevron) [13,14], the wedge osteotomy (like Reverdin) [15], the semicircle osteotomy with a medial convexity [16], the derotation and the transposition neck osteotomy [17], the wedge oblique osteotomy medially closed [18], the distal horizontal osteotomy [3], the S.E.R.I. (simple, effective, rapid, inexpensive) osteotomy [6], the osteotomy of the base [19] or other simple proximal, distal or diaphyseal osteotomies [20] associated with a lateral metatarso-phalangeal capsulotomy [21].

Choosing the most useful surgical technique is not easy because of several explanations, as follows: the simple lateral condilectomy with bursectomy is useful in large metatarsal heads (like Du Vrier's purpose [22]), the distal subcapital osteotomy in valgus deformities and the oblique shaft osteotomy in "sabre-blade" proximal shaft deformities [2].

Considering the large number of procedures, a single surgical technique is preferred to solve all issues of the diversity of anatomo-pathological forms. The main evolution of all correction techniques is represented by a shaft osteotomy: the Scarf Osteotomy [23]. It uses three cutting lines: a longitudinal (along the diaphysis), and two trasversal (anterior and posterior perpendicular at the first longitudinal cut). Thus nine osteotomized fragment displacements are possible: four on the dorsal-plantar plane (medial or lateral translation, with a medial or lateral rotation) and five on the sagittal plane (shortening, lengthening, lowering, axial rotation and elevation). It allows a triplar metatarsal correction, which is not allowed for the other techniques, and it also permits an easier fixation without involving the vascular supply.

Although Scarf Osteotomy technique was created for the first metatarsal deformities, Barouk used this technique in cases of *Digitus Quintus Varus* [24]. Its transverse bony cuts are performed with an angle of 30° on the longitudinal cut of the big toe, and with the resultant displacement of the Vth head fragment towards the big toe: its osteotomy and its correction are in the reverse direction to the traditional Scarf Osteotomy (used for the big toe). This surgical procedure is a viable option, especially in cases of "sabre-blade" Vth metatarsal deformities.

According to this introduction and our experience, Scarf Osteotomy is the most adequate technique, and it is the first-rate treatment in cases of TB in our Orthopaedic Department, already used for the first metatarsal deformity. Thus the purpose of this study is the review of the published literature about Scarf Osteotomy in TB cases.

Materials and methods

The literature review is systematically conducted by using some

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database (*i.e.* PubMed, EMBASE, CINAHL) and considering articles until November 2014. Clinical cases that report controlled trials and review comparing Scarf Osteotomy in TB are included. The quality of studies is assessed. The titles and abstracts of all articles are reviewed following study-selection criteria. Each full-text manuscript is systematically evaluated according to: the study typology, its characteristics (*i.e.* the deformity degree, the evaluation foot scoring system, the age of patients), the aspects of the surgery (*i.e.* surgeon's ability about Scarf Osteotomy Technique, the type of fixation, follow-ups), the targeted outcomes, and the major findings.

Results

There are many studies that describe Scarf Osteotomy as a possible surgical technique in TB, but only three studies analyze its main role and have *Scarf Osteotomy* and *Tailor's Bunion* in the title. These articles are Seide and Petersen, 2001 published on *Archives of Orthopaedic and Trauma Surgery* [25], Maher and Kilmartin, 2010 published on *Foot and Ankle International Journal* [26] and Guga *et al.* 2012 published on *Foot and Ankle Surgery Journal* [27] (Table 1).

Discussion

The Scarf Osteotomy is a Z-shaped metatarsal osteotomy, which is commonly used for the correction of an increased intermetatarsal I/II angle in patients with hallux valgus [28]; its main advantage is the high primary stability [29].

The first article on the Scarf Osteotomy [25] is about TB caused by an increased angle between the IVth and Vth metatarsal bone: in this study the authors analyze both clinical results through the Fore Foot Scoring System (FFSS), in according to Kitaoka score [12], and radiological results of their surgical procedure in ten symptomatic patients. They were treated between 1997 and 1998 with the osteotomy and fixation using two 1.7 mm titanium miniscrews. The patients treatments had no complications and all metatarsal bones healed in six weeks with a significantly reduction of intermetatarsal IVth/Vth angle, from 10.3 to 6.8 degree. The authors concluded that Scarf Osteotomy is a safe and adequate procedure in symptomatic TB.

The second article on the Scarf Osteotomy [26] evaluates a cohort of symptomatic patients in whom TB is treated using the same technique of the first study [25] and applying two 2.0 mm AO screws. This study reports the middle and long terminal results (*i.e.*

mean follow-up period of six years and six months) of the treatment of 28 patients. Their satisfaction and clinical evaluation, according to the AOFAS (forefoot) scoring system, are performed. The results are: 86% completely satisfied, 11.4% satisfied with reservations and 3% dissatisfied; 91% considered themselves better than before surgery, while 8.6% felt they were no better; 91% of patients said they would undergo surgery under the same conditions again. The AOFAS scoring recovery is from a 44.1 to 91.8 at six month follow-up, that final one was 88.1; then, no complications are recorded. Also in this study, Scarf Osteotomy results as the technique that ensures good results for TB in a middle and long time follow-up.

The third article is a recent study of three welsh surgeons that have purposed Scarf Osteotomy for 12 cases affected by TB. The Scarf Osteotomy is called *Reverse* by the authors because it is compared to the traditional technique for the first metatarsal bone. After surgical correction of the IVth/Vth metatarsal angle, no corrections to the metatarso-phalangeal angle and no rotation of the head fragment have been done. Finally, they fixed Vth metatarsus bone by one or two 2.5 mm screws inserted in a dorso-plantar direction. All twelve patients are evaluated with a mean follow-up of twelve months, with radiological and clinical evaluation, according to the same AOFAS (forefoot) scoring system. No complications are recorded, and the surgical treatment has had the following results: a reduction from 13.1° to 7.27° of intermetatarsal angle, from 19.9° to 6.36° of metatarso-phalangeal angle, and an improvement of their clinical condition from 54.25 to 89.58.

In all three studies the surgical treatment has been performed for a painful prominence of the fifth metatarsal and an increased IVth/Vth intermetatarsal angle. In the first clinical trial the mean patient's age is very low and gender is not specified: thus, this article is less comparable to the other two studies. The second study has evaluated middle and long term results: a rating scale improvement has been shown 6 months after surgery (91.8pt); later, 5 years after, it was reduced (88.1pt). Despite this slight decrease, this article shows that Scarf Osteotomy is also stable over time. The third article shows the type of performed osteotomy that refers to the traditional technique reported to the big toe. This type of osteotomy is defined as *reverse*, even if it is the same of that of the other two studies. Also in this third study, the findings are positive.

In conclusion, although in these years many surgical techniques

Table 1. Articles that explain in the title the keywords *Scarf Osteotomy* and *Tailor's Bunion*.

Clinical Study	Study design/target population	Outcome measures	Evaluating scale	Mean follow-up	Results
Seide and Petersen [25]	Clinical trial: n 10 (mean of age 26.1)	Recovery of pain	Forefoot Scoring System [12], residual pain, self-assessment of the cosmetic result (in four categories)	14 months	Ffss recovery from 29.5 pt to 73 pt, no patients with residual pain, 8 patients with excellent cosmetic self-assessment and two with good cosmetic self-assessment
		Reduce radiographically of IV th V th intermetatarsal angle	Weight-bearing dorsoplantar radiographs		IV th V th intermetatarsal angle value was been reduced from 10.3° to 6.8°.
Maher and Kilmartin [26]	Clinical trial: n 28 (9 males and 19 female, mean of age 46)	Recovery of pain	AOFAS (forefoot) score and patient satisfaction	6.5 years	AOFAS score recovery from 44.1 pt to 88.1 pt. 86% satisfied, 11.4% satisfied with reservation and 3% dissatisfied. 91% considered themselves better than before surgery, 8.6% felt they were no better.
		Reduce radiographically of IV th V th intermetatarsal angle	Weight-bearing dorsoplantar radiographs		IV th V th intermetatarsal angle value was been reduced from 9.9° to 5.7°.
Guha <i>et al.</i> [27]	Clinical trial: n 12 (10 female and 2 males, mean of age 57)	Recovery of pain	AOFAS (forefoot) score	12 months	AOFAS score recovery from 54.2 pt to 89.6 pt.
		Reduce of IV th V th intermetatarsal angle and metatarso-phalangeal angle radiographically	Weight-bearing dorsoplantar radiographs		IV th V th intermetatarsal angle value reduced from 13.1° to 7.3°. Metatarso-phalangeal angle reduced from 19.9° to 6.36°.

are developed, the Scarf Osteotomy is the most reliable procedure in TB in according with the literature. In particular, the main advantages are: a quick mobilization of the patient and, few related complications after the surgery. It also helps to correct the intermetatarsal angle, while maintaining an excellent sagittal and transverse plane stability.

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