ORIGINAL ARTICLE

Scarf osteotomy versus metatarsophalangeal arthrodesis in forefoot first ray disorders: Comparison of functional outcomes

R. Desmarchelier b,*, J.-L. Besse a, b, M.-H. Fessy a, b, The French Association of Foot Surgery (AFCP) 1

a Lyon 1 University, IFSTTAR, LBMC UMR-T 9406, Biomechanics and Shock wave mechanics Research Laboratory, 69675 Bron Cedex, France
b Southern Lyon Hospital Center, Department of Orthopaedic Surgery and Traumatology and sports medicine, Lyon Civilian Hospitals, 69495 Pierre-Bénite Cedex, France

Accepted: 14 April 2012

KEYWORDS
Scarf osteotomy; Metatarsophalangeal arthrodesis; Hallux; Functional result; Sports activity; Quality of life; First ray disorders

Summary
Introduction: Scarf osteotomies of the first metatarsal and metatarsophalangeal arthrodesis are the two most frequent surgical forefoot reconstructive procedures.

Hypothesis: We compared functional results of isolated arthrodesis of the first metatarsophalangeal joint with an isolated Scarf osteotomy of the first metatarsal.

Materials and methods: This was a retrospective, observational, continuous study of patients operated between 1993 and 2008. After patients who had undergone a procedure on the lateral rays, extremely elderly patients, lost to follow-up patients and those with incomplete questionnaires had been excluded, there remained two comparable groups of 25 patients. Mean age was 60 in the arthrodesis group [41—70] and 59.8 in the Scarf group [47—71]. The Scarf group included 25 hallux valgus (100%) compared to 16 hallux valgus (64%) and nine hallux rigidus (36%) in the arthrodesis group. Complications were recorded. Evaluation of functional results was based on the most recent functional or quality of life scores (AOFAS, FFI, FAAM, SF 36) and a questionnaire on physical and athletic ability.

Results: There was no significant difference in the rate of complications between the two groups. There was no difference in pain according to the AOFAS score with 35.6/40 (± 6.5) in the Scarf group and 34.5 (± 5.9) in the arthrodesis group. Global satisfaction was also similar between the Scarf and arthrodesis groups: 91.4% and 90% of very satisfied or satisfied patients, respectively. The FFI score was higher in the Scarf group than in the arthrodesis group: 8.6 (± 20.1) and 19.8 (± 17.7) respectively. Functional results were better in the Scarf group than in the arthrodesis group with a FAAM Daily Activity score of 80.2 (± 12.1) compared to 68 (± 7.2),

* Corresponding author.
E-mail addresses: romain.desmarchelier@chu-lyon.fr (R. Desmarchelier), jean-luc.besse@chu-lyon.fr (J.-L. Besse), michel.fessy@chu-lyon.fr (M.-H. Fessy).
1877-0568/$ - see front matter © 2012 Published by Elsevier Masson SAS.
Introduction

The hallux plays an essential role in foot biomechanics and for propulsion during walking. Any modification due to a surgical procedure will affect foot function and the patient’s quality of life. It is therefore essential to be able to describe the extent of these changes following different surgical procedures. The metatarsophalangeal joint of the hallux can become the site of degenerative osteoarthritis conditions called hallux rigidus [1]. Moreover, the hallux can also present with an acquired deformity called hallux valgus [2]. These conditions are two frequent indications for surgery of the hallux. Hallux valgus can be corrected by an osteotomy of the first metatarsal, for which numerous techniques have been described. In case of significant deformity or especially in the case of progressive osteoarthritis, arthrodesis of the metatarsophalangeal joint can also be proposed [3].

The results of these surgical procedures have been studied in traditional retrospective studies based on an analysis of radiological images and clinical function scores such as the AOFAS [4]. As a result we know the rate of complications [5], satisfaction [6], pain [7], and walking distance [8]. Nevertheless, these studies do not compare one type of surgical procedure to another. More important, these evaluations are frequently performed by the surgeon, and not obtained directly from the patient.

Our goal was to compare the functional results of surgical procedures of the foot for hallux deformities. We performed a retrospective study in patients who were operated on by the same senior surgeon (JLB), to treat hallux valgus or hallux rigidus, either by conservative treatment associating arthrosis with a Scarf osteotomy of the first metatarsal (M1) [9], or by arthrodesis of the first metatarsophalangeal joint (MTP1) with ball and cup reamers and osteosynthesis with titanium staples [10]. To limit study bias we excluded patients who underwent associated surgery on the lateral rays. The most recent functional and quality of life scores were used.

Materials and methods

Patients

This was a retrospective, observational study of a continuous series of patients who underwent surgery between 1993 and 2008. The minimum follow up was 1 year after surgery. After exclusion of patients who had undergone an associated procedure on the lateral rays, there were 110 patients with 58 metatarsophalangeal arthrodeses of the hallux and 62 Scarf osteotomies of the first metatarsal. To obtain comparable groups, patients included in the Scarf M1 group underwent surgery between 2005–2008 and those in the MTP1 arthrodesis group between 1993 and 2008. After excluding lost to follow-up patients and incomplete or incorrect completed questionnaires, we had 65 patients with 35 MTP1 arthrodeses and 30 Scarf M1 osteotomies. Because of the difference in age between the two groups, we excluded extremely elderly patients to obtain two comparable populations. Thus, there were two groups of 25 patients.

The mean age was 60 years old in the arthrodesis group [41–70] and 59.8 years old in the Scarf group [47–71]. The Scarf group included 25 hallux valgus (100%) and the arthrodesis group included 16 hallux valgus (64%) and nine hallux rigidus (36%). Mean follow up was 66.6 months (±28) in the arthrodesis group and 41.6 months (±17.2) in the Scarf M1 osteotomy group.

Functional evaluation and quality of life scores

We recorded short, intermediate and long term complications and surgical revisions.

Evaluation of functional results was based on the AOFAS score [11], SF 36, a general quality of life score [12] and specific scores for foot pathologies: the Foot Function Index (FFI) [13], and the Foot and Ankle Ability Measure (FAAM) [14]. We also performed an in depth evaluation of the patients’ ability to perform a certain number of physical and sporting activities based on a functional questionnaire developed by Bonnin [15].

This questionnaire included general items about the patients’ occupational and recreational activities as well as the degree of satisfaction with surgery. It also included functional items from the AOFAS score: pain, activity limitations, walking distance and difficulty walking on different types of ground. The practice of a sports activity was evaluated by asking the person about his/her practice of 13 sports (exercise bicycle, bicycle, gymnastics, swimming, golf, gardening, dance, yoga, sailing, hiking, cross-country skiing, downhill skiing, and jogging) and pain when practicing sports. The Foot Function Index is a score that evaluates a certain number of situations in which the patient may have
Scarf osteotomy and arthrodesis in hallux valgus: comparison of functional results

Table 1  Rate of complications in the two groups.

<table>
<thead>
<tr>
<th>Types of complications</th>
<th>Arthrodesis Group (%)</th>
<th>SCARF Group (%)</th>
<th>Statistical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudarthroses</td>
<td>3.4</td>
<td>0</td>
<td>ns</td>
</tr>
<tr>
<td>Delayed union</td>
<td>6.9</td>
<td>0</td>
<td>ns</td>
</tr>
<tr>
<td>Transfer metatarsalgias</td>
<td>3.4</td>
<td>6.6</td>
<td>ns</td>
</tr>
<tr>
<td>Recurrent hallux valgus</td>
<td>0</td>
<td>1.6</td>
<td>ns</td>
</tr>
<tr>
<td>Hypercorrection or faulty position</td>
<td>3.4</td>
<td>4.9</td>
<td>ns</td>
</tr>
<tr>
<td>Discomfort from internal fixation</td>
<td>1.7</td>
<td>1.6</td>
<td>ns</td>
</tr>
</tbody>
</table>

trouble, difficulties or feel pain. It is noted on a score of 0 (no trouble, difficulties or pain) to 10 (constant trouble, impossible to perform an action, worst pain imaginable) on a paper scale similar to a visual analogue scale. The results were presented in the form of numerical data. The FAAM scale includes 21 items on daily activities and eight items on sports activities (Appendix A). This score was validated to measure function in patients with leg, ankle and foot pathologies. It is scored from 0 (no difficulty) to 4 (impossible). It is associated with an evaluation of overall foot function (percentage 0–100). The patient then measures his/her ability to practice a sport (from 0–100) then estimates his level of functioning (from normal to very abnormal).

The SF 36 (MOS 36 item, Short Form Health Survey) was developed from the «Medical Outcome Study», which began in 1986. This questionnaire includes 36 questions, which measure a population’s state of health and quality of life. The 36 items are divided into eight categories: physical activity [PF], limitations due to a physical condition [RP], physical pain [BP], perceived health [GH], vitality [VT], life and relationships with others [SF], limitations due to a mental condition [RE] and mental health [MH]) make it possible to calculate two scores (physical health [SP] – mental health [SM]) and a global score. This score was translated and validated in several languages and has been available in France since 1998. It is used extensively for national and regional surveys, public health research and clinical research (randomized drug trials, chronic diseases and more recently orthopedic surgery). Each of the categories is evaluated with scores from 0 to 100, with 100 representing the best state of health.

The questionnaire (including functional items from the AOFAS, FFI and FAAM scores and analysis of sports activities) and the SF 36 score were sent to each patient by mail.

Methodology and analysis

Analysis of questionnaire results was performed with JMP 7.0 (SAS®) software. Qualitative variables were introduced into contingency tables then compared among groups using the Pearson Chi² test. For quantitative variables we first confirmed a normal distribution and equal variance: if these conditions were met we used the Student t test. When these conditions were not met we used the Mann Whitney non parametric test. Whatever the method used, \( P < 0.05 \) was considered to be significant.

Results

Complications and surgical revisions

The rate of complications was not significantly different between the Scarf and arthrodesis groups (Table 1). Revision surgery was necessary in nine patients in the arthrodesis group, with one pseudarthrosis treated by graft, four cases of delayed union, revised by removal of internal fixation material, two corrections for faulty positioning of the arthrodesis, one removal of painful internal fixation material and one case of transfer metatarsalgia treated by Weil osteotomy of the lateral rays. Two surgical revisions were performed in the Scarf osteotomy group, one recurrent hallux valgus treated by repeat conservative surgery, one removal of an uncomfortable screw.

Functional results and quality of life

Global satisfaction was comparable in the two groups: 91.4% (Scarf group) and 90% (arthrodesis group) of satisfied or very satisfied patients (Table 2).
Table 3  Results of the second section of the Foot Function Index (FFI).

<table>
<thead>
<tr>
<th>Do you have difficulty</th>
<th>Arthrodes group</th>
<th>Scarf group</th>
<th>Statistical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking around your house</td>
<td>0</td>
<td>0</td>
<td>ns</td>
</tr>
<tr>
<td>Walking outside on uneven ground</td>
<td>1.7 (± 3.2)</td>
<td>0.2 (± 0.7)</td>
<td><em>P</em> &lt; 0.05</td>
</tr>
<tr>
<td>Walking more than 500 m</td>
<td>0.6 (± 2.4)</td>
<td>0.2 (± 0.5)</td>
<td>ns</td>
</tr>
<tr>
<td>Going up stairs</td>
<td>0.3 (± 1.1)</td>
<td>0.1 (± 0.4)</td>
<td>ns</td>
</tr>
<tr>
<td>Going down stairs</td>
<td>0.5 (± 1.3)</td>
<td>0.1 (± 0.4)</td>
<td>ns</td>
</tr>
<tr>
<td>Going on tiptoe</td>
<td>4.5 (± 4.2)</td>
<td>1 (± 2.5)</td>
<td><em>P</em> &lt; 0.05</td>
</tr>
<tr>
<td>Getting up from a chair</td>
<td>0</td>
<td>0</td>
<td>ns</td>
</tr>
<tr>
<td>Going up or down a slope</td>
<td>2 (± 3.3)</td>
<td>0.6 (± 1.6)</td>
<td><em>P</em> &lt; 0.05</td>
</tr>
<tr>
<td>Walking fast or running</td>
<td>3.9 (± 3.9)</td>
<td>0.5 (± 1.6)</td>
<td><em>P</em> &lt; 0.05</td>
</tr>
</tbody>
</table>

The difficulty is graded from 0 to 10 on an analogic scale (0 corresponding to no difficulty and 10 to impossible to perform the actions).

Table 4  Comparison of functional scores by indication (Hallux valgus versus Hallux Rigidus) in the arthrodesis group.

<table>
<thead>
<tr>
<th>Functional score</th>
<th>Metatarsophalangeal arthrodesis</th>
<th>Hallux rigidus</th>
<th>Hallux valgus</th>
<th>Statistical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfied or very satisfied</td>
<td>89%</td>
<td>87.5%</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Walking distance of 1 km</td>
<td>100%</td>
<td>94%</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>AOFAS pain</td>
<td>34.4 (± 7.3)</td>
<td>33.8 (± 6.2)</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Global SF 36</td>
<td>69.9 (± 21.3)</td>
<td>60 (± 19.2)</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Mental health SF 36</td>
<td>66.4 (± 23.1)</td>
<td>57.9 (± 18.1)</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Foot Function Index</td>
<td>12.2 (± 14.8)</td>
<td>13.9 (± 18.4)</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>FAAM daily activities</td>
<td>80.9 (± 3.5)</td>
<td>75.6 (± 7.9)</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>FAAM sports activities</td>
<td>24.1 (± 9.1)</td>
<td>22.3 (± 6.9)</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>FAAM estimated global function</td>
<td>89% (± 22.3)</td>
<td>87% (± 14.7)</td>
<td>ns</td>
<td></td>
</tr>
</tbody>
</table>

We did not find any difference in the mean AOFAS pain score (/40 points) between the Scarf group 35.6 ± 6.5 and the arthrodesis group 34.5 ± 5.9. Walking distance was greater in the Scarf osteotomy than that in arthrodesis group with 100% and 80% of patients capable of walking more than 1 km respectively.

The patients in the Scarf group had a mean global SF 36 global that was statistically higher than patients in the arthrodesis group: 70.9 ± 14.1 versus 62.3 ± 20.6 respectively. The score was found to be higher due to the mean Mental Health score 68.7 ± 14.2 in the Scarf group and 60.4 ± 19.3 in the arthrodesis group. The Scarf group FFI was statistically better than that in the arthrodesis group: 8.6 ± 20.1 versus 19.8 ± 17.7 respectively (the higher the score, the greater the pain and/or difficulty) (Table 3). Functional results were better in the Scarf group than those in the arthrodesis group based on a FAAM Daily Activity score of 80.2 ± 12.1 versus 68 ± 7.2; a FAAM Athletic Activity score of 29.7 ± 6.7 versus 25.2 ± 7.6; and an estimated FAAM Global Function score of 94% ± 10.8 versus 87% ± 15.7 respectively.

Table 5  Difficulties encountered when practicing different sports activities (sports activity items – Foot and Ankle Ability Measure [FAAM] score).

<table>
<thead>
<tr>
<th>Have difficulty with the following activities</th>
<th>None or slight difficulty (%)/Scarf (%)</th>
<th>Moderate difficulty (%)/Scarf (%)</th>
<th>Extreme difficulty (%)/Scarf (%)</th>
<th>Other limiting factor (%)/Scarf (%)</th>
<th>Statistical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running</td>
<td>40/90</td>
<td>26/3</td>
<td>14/0</td>
<td>20/7</td>
<td><em>P</em> &lt; 0.05</td>
</tr>
<tr>
<td>Jumping</td>
<td>46/83</td>
<td>14/7</td>
<td>26/0</td>
<td>14/10</td>
<td><em>P</em> &lt; 0.05</td>
</tr>
<tr>
<td>Sudden starting and stopping</td>
<td>46/80</td>
<td>11/10</td>
<td>23/0</td>
<td>20/10</td>
<td><em>P</em> &lt; 0.05</td>
</tr>
<tr>
<td>Side steps</td>
<td>77/97</td>
<td>11/3</td>
<td>6/0</td>
<td>6/0</td>
<td><em>P</em> &lt; 0.05</td>
</tr>
<tr>
<td>Low impact sports</td>
<td>74/93</td>
<td>9/7</td>
<td>6/0</td>
<td>11/0</td>
<td><em>P</em> &lt; 0.05</td>
</tr>
<tr>
<td>Performing usual activities normally</td>
<td>69/80</td>
<td>14/13</td>
<td>6/3</td>
<td>11/3</td>
<td><em>P</em> &lt; 0.05</td>
</tr>
<tr>
<td>Going down the stairs</td>
<td>97/90</td>
<td>3/10</td>
<td>0/0</td>
<td>0/0</td>
<td>ns</td>
</tr>
<tr>
<td>Practicing usual sports at the same level and for the same length of time</td>
<td>57/77</td>
<td>20/30</td>
<td>1/0</td>
<td>14/10</td>
<td>ns</td>
</tr>
</tbody>
</table>
In the MTP1 arthrodesis group, the hallux rigidus and hallux valgus subgroups had identical results for satisfaction, walking distance, pain, global function FFI, FAAM and SF 36. (Table 4).

**Sports activities**

The patients in the Scarf group did more hiking (74%) than those in the arthrodesis group (42%). There was no statistically significant difference in the other activities evaluated (Tables 5 and 6), but results were at the limit of significance in favor of the Scarf group for exercise bicycle, gymnastics, cross-country and downhill skiing and jogging.

**Discussion**

Even if satisfaction is the same for the two types of surgery, functional results were better in patients who underwent a Scarf osteotomy of the 1st metatarsal than in those who underwent arthrodesis of the metatarsophalangeal joint of the hallux. This is the first study to compare the results of arthrodesis of the hallux and conservative surgery with a Scarf osteotomy based on detailed functional criteria, quality of life, and sports ability. There is no interpretation bias since the patients filled out the questionnaires by themselves without the surgeon’s participation. We evaluated two surgical procedures of the hallux, but there are many other conservative procedures and different arthrodesis techniques for hallux deformities. Nevertheless, it would be difficult to compare all these techniques at the same time unless a multicenter study was performed.

There are certain limitations to this study. Because the two procedures were not indicated with the same frequency, the inclusion period was different for each procedure. To have a comparable mean age in each group we excluded certain questionnaires, and the small number of patients in each group decreases the statistical power of the results. This is a study only based on a questionnaire, making it impossible to compare functional results with preoperative scores. The pathologies leading to surgery were different in the two groups, which could have created an important bias. However, we did not find any difference in functional results between hallux valgus and hallux rigidus in the arthrodesis group. In the same way Van Doeselaar et al. [16] did not find any difference between the hallux valgus and hallux rigidus groups. When evaluating arthrodesis for hallux pathologies by the FFI score, we can therefore consider that the surgical procedure is the only variable that affects functional results.

The rate and types of complications are comparable to those found in the literature for each type of surgery. A faulty position is reported in 3 to 20% of cases of arthrodesis [6], overloading of the interphalangeal joint in 5 [7] to 17% [8] and pseudarthrosis in 0 [7,8] to 8% [17]. Hammel et al. [18] reported surgical site infections in 0.8% of Scarf M1 osteotomies, delayed union in 5.7%, significant stiffness in 1.3% at 1 year, secondary displacement in 1.1%, broken internal fixation material in 0.4% and indications for revision surgery for recurrent hallux valgus in 0.2%.

The rate of satisfied patients was comparable for Scarf osteotomy (91.4%) and MTP1 arthrodesis (90%), and these rates are comparable to those found in all recent series [17, 19–21]. Function after MTP1 arthrodesis was found to be globally satisfying and durable in a study by Groulier et al. [6]. Most series of Scarf osteotomy and MTP1 arthrodesis use the AOFAS score to evaluate functional criteria by comparing global preoperative and postoperative scores: the increase is comparable in all series with a gain of approximately 30 points [4, 19, 22–25]. Nevertheless, the score items are not usually listed in detail. Because our study with the questionnaire does not include a clinical evaluation, a global AOFAS score could not be provided, however the subjective items are all given in detail, so that a more detailed comparison of the results is possible. In a cohort of 49 MTP1 arthrodeses evaluated at 3, 6, and 12 months, Poggio et al. [25] showed that the global AOFAS score progressed for 1 year while pain improved for 6 months; this supports our choice to evaluate patients at least 1 year after surgery.

We did not find any difference in pain between the two populations during daily or recreational activities. Thus 94.3% (Scarf M1 group) and 96.7% (arthrodesis MTP1 group)
had no pain or occasional moderate pain, which corresponds to published results \cite{4,8}. The AOFAS results for walking distance were better with osteotomy; 100% of the osteotomy patients had an unlimited walking distance, compared to 80% of the patients with arthrodesis. A limitation in walking distance was found in 10 to 15% patients with arthrodesis in other studies \cite{7,8}. Moreover, patients who underwent an osteotomy had less difficulty on irregular terrain or climbing, which explains why a greater proportion practiced an activity such as hiking.

In the present study functional results following Scarf osteotomy were shown to be better than those following metatarsophalangeal arthrodesis of the hallux based on the AOFAS and FFI scores, which has never been studied in the literature. Only one study \cite{16} has used the FFI score to evaluate patients who underwent surgery of the forefoot: Van Doeselaar did not find any different between the hallux valgus and the hallux rigidus groups who underwent MTP1 arthrodesis. The FFI score improved by 30 points and went from 38 to 8 in both groups.

The recently published FAAM score has not yet been used to evaluate surgery of the forefoot. Our study is therefore a reference because it shows better results with Scarf osteotomy than with MTP1 arthrodesis.

Only the study by Flavin and Stephens \cite{26} used the SF36 score and shows an improvement in the global score after arthrodesis of the first metatarsophalangeal joint.

Finally in relation to specific physical activities, although the possibility of walking on tip toe is considered to be possible in 85% of patients in both groups, our study shows FAAM and FFI scores that are better for osteotomy for this action, as well as for sudden changes in speed, taking an hill and being able to run or to crouch.

We did not find any studies in the literature which provided an in depth analysis of the sports capacities of patients after these two types of surgery. Brodsky et al. \cite{8} is the only study to report that 86% of golfers and 92% of hikers were able to return to their leisure activities without limitation after MTP1 arthrodesis.

**Conclusion**

This study clarifies the functional results that can be expected following a Scarf osteotomy of the 1st metatarsal and arthrodesis of the metatarsophalangeal joint of the hallux and provides the patient with specific information on the expected quality of life, in particular in relation to physical and sports activity, depending on the surgical procedure performed. The results suggest that conservative surgery of the hallux by Scarf osteotomy of the metatarsal is preferable in patients for whom both indications are possible or in young patients to obtain the best possible functional results. Moreover, because the validity of the AOFAS score is increasingly criticized \cite{27}, quality of life scores such as the FAAM or SF 36 can be used before foot surgery and at surgical revision to effectively evaluate the surgical procedures.

**Disclosure of interest**

R. Demarchelier: no conflict.

J.-L. Besse: consultant for Biotech-International; royalties for Surgefoot.

M.-H. Ferry: no conflict.
Appendix A. Foot and Ankle Ability Measure (FAAM) score items.

Foot Consultation: FAMM score

**Daily Activities**

*Respond to each question with a number from 0-4 (4 no problem, 0 impossible). Leave at -1 if your limitation is due to something else besides your ankle or foot*  

**Stand up** □  
**Walk on flat ground** □  
**Walk on flat ground barefoot** □  
**Walk on an incline** □  
**Go down a hill** □  
**Go up stairs** □  
**Go downstairs** □  
**Walk on an incline** □  
**Take a sidewalk** □  
**Crouch** □  
**Go on tiptoe** □  
**Begin walking** □  
**Walk less than 5 min.** □  
**Walk 10 min.** □  
**Walk more than 15 min.** □

**Do you have difficulty with the following because of your foot or ankle?**

**House cleaning** □  
**Daily activities** □  
**Washing** □  
**Light work (standing or walking)** □  

**Hard work (pushing, pulling, climbing, carrying heavy objects)** □  
**Leisure activities** □

*How would you evaluate on a scale of 0-100, your level of daily activity compared to the level you had before you presented with your foot or ankle problem. 100 is your former level, 0 is if you cannot do anything.*

**Sports Activity**

**Ability to run** □  
**Ability to jump** □  
**Starting and stopping quickly** □  
**Lateral, scissor movements** □  
**Ability to land after jumping** □  
**Practice a sport at the same technical level as before** □  
**Practice a sport as long as you wish** □

**Overall how do you evaluate your level of activity today?** □

**Total FAMM daily activity** □  
**Total FAMM overall activity** □  
**Total FAMM Sports** □

References


Kumar S, Pradhan R, Rosenfeld PF. First metatarsophalangeal arthrodesis using a dorsal plate and a compression screw. Foot Ankle Int 2010;31:797–801.


