

# RELATIONSHIP BETWEEN QUALITY OF LIFE AND RADIOLOGICAL PARAMETERS AFTER HALLUX VALGUS CORRECTION

## RELAÇÃO ENTRE A QUALIDADE DE VIDA E PARÂMETROS RADIOGRÁFICOS APÓS CORREÇÃO DO HÁLUX VALGO

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### ABSTRACT

**Objective:** To evaluate the correlation between postoperative quality of life and the severity of hallux valgus deformity. **Methods:** A total of 23 patients underwent moderate ( $n = 14$ ) and severe ( $n = 9$ ) hallux valgus (HV) surgical correction with the Scarf technique between January 2010 and December 2012. The mean follow-up time was 60 months. Participants answered the SF-36 quality of life assessment questionnaire and their radiographs were evaluated at three different moments (preoperative, 1 and 5 years after surgery). Statistical analysis was performed with a maximum 5% significance level. **Results:** The sample consisted of two men and 21 women, aged 58.7. SF-36 mean value was 75.73 and the metatarsophalangeal and interphalangeal angles improved significantly at the three moments ( $p < 0.05$ ). SF-36 showed no statistical difference between patients with moderate or severe HV ( $p > 0.05$ ). No correlations were found between quality of life and pre and postoperative radiographic angles. **Conclusion:** Patients with moderate and severe hallux valgus submitted to surgical correction had a very good quality of life and a significant improvement in radiographic parameters. However, these variables were not correlated. **Level of Evidence II, Retrospective study.**

**Keywords:** Hallux Valgus. Osteotomy. Quality of Life.

### RESUMO

**Objetivo:** Avaliar a correlação entre qualidade de vida pós-operatória e a gravidade da deformidade do hálux valgo. **Métodos:** 23 pacientes foram submetidos à correção cirúrgica do hálux valgo (HV) moderado ( $n = 14$ ) e grave ( $n = 9$ ) pela técnica de Scarf, entre janeiro de 2010 e dezembro de 2012. O tempo mínimo de acompanhamento foi de 60 meses. Os participantes responderam ao questionário de avaliação de qualidade de vida SF-36 e foram avaliadas suas radiografias em três momentos distintos (pré-operatório, 1 e 5 anos de pós-operatório). A análise estatística foi realizada com nível de significância máximo de 5%. **Resultados:** A amostra contou com 2 homens e 21 mulheres, com média de idade 58,7 anos. O valor médio do SF-36 foi 75,73 e os ângulos metatarsofalangeal e interfalangeal apresentaram melhora significativa nos momentos avaliados ( $p < 0,05$ ). O SF-36 não mostrou diferença estatística entre os pacientes com HV moderado ou grave ( $p > 0,05$ ). Não houve correlações entre a qualidade de vida e os ângulos radiográficos pré e pós-operatórios. **Conclusão:** Os pacientes com hálux valgo moderado e grave submetidos à correção cirúrgica apresentaram qualidade de vida considerada muito boa e tiveram significativa melhora dos parâmetros radiográficos. Contudo, não houve associação entre essas variáveis. **Nível de Evidência II, Estudo retrospectivo.**

**Descritores:** Hallux Valgus. Osteotomia. Qualidade de Vida.

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### INTRODUCTION

Hallux valgus (HV) is a deformity prevalent in 23% of the adult population aged between 18 and 65 and in 35.7% of those above 65, especially women. In addition to aesthetic deformity, most patients experience pain in the first metatarsophalangeal joint, and for 30% of them, wearing footwear is difficult, which leads to worse quality of life.<sup>1-4</sup>

Several surgical techniques are described to correct the various degrees of deformity, allowing the performance of soft tissue

balancing procedures to surgeries involving osteotomies and arthrodeses.<sup>4-6</sup> Burutaran and Zygmunt originally described the Scarf technique, and Weil and Barouk later popularized it. It is a Z osteotomy to realign the first metatarsal bone, widely used to correct different degrees of HV deformity.<sup>7-11</sup>

Most articles published on the topic compare the results between the different surgical techniques, evaluating the degree of radiographic correction, relapse rates and complications. Data such as pain and range of motion of the first metatarsophalangeal

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joint are commonly used by surgeons to evaluate the postoperative outcome.<sup>10,12</sup> However, surgeon and patient diverge on their perception. Often, although with a residual deformity, patients are highly satisfied. SF-36 score, when evaluating the psychometric properties of the patient's quality of life, allows a broader analysis of the postoperative outcome of bunion correction surgery from the patient's point of view.<sup>13-16</sup>

Studies evaluating the quality of life of patients with hallux valgus and, mainly, relating quality of life to the degree of radiological correction are scarce.<sup>13,14</sup> Thus, this work aims to evaluate the correlation between quality of life and radiographic parameters obtained after hallux valgus surgical correction using the Scarf technique. Our hypothesis is that even patients with residual radiographic deformities improve their quality of life after surgery. To know this correlation endorses the importance of the deformity clinical correction rather than of the radiographic aspect.

## METHODS

This study was approved by the Institution Research Ethics Committee. A study was conducted with all patients submitted to moderate and severe HV surgical correction by Scarf technique associated with soft tissue release between January 2010 and December 2012 to obtain a cohort of patients with a minimum follow-up of five years. Different specialists from the foot and ankle surgery group of the institution performed the surgeries and all patients followed the same postoperative protocol and signed the informed consent form.

Patients without all necessary imaging tests, patients with mild deformities, those submitted to deformity correction with other techniques, revision surgeries or bilateral correction were excluded. Besides, patients who disagreed to participate in the study were removed.

Patients who met the inclusion and exclusion criteria were invited to participate in the study. The characteristics recorded were sex, age at the time of surgery and operated foot. Quality of life was quantified applying the Medical Outcomes Study 36-Item Short-Form (SF-36). The questionnaire has 36 items, divided into eight scales (physical functioning, role limitations due to physical health, pain, general health, energy/fatigue, social functioning, emotional well-being, and role limitations due to emotional problems), with scores ranging from zero (worst general health status) and 100 (best health status). The form involves aspects related to disease consequences, it has already been validated for the Portuguese language in Brazil and proved to be reliable to evaluate the results of hallux valgus correction surgery.<sup>17-20</sup> All participants were evaluated by the lead researcher, who did not participate in the surgery of any of them.

### Radiographic analysis

Foot radiographs in orthostasis at dorsoplantar incidences and profile were performed by the patients before surgery, about one and five years after surgical correction. The radiographic parameters evaluated and compared in the three moments were the following:

- metatarsophalangeal angle (MPA)<sup>21</sup>: angle formed by the lines that bisect the diaphysis of the first metatarsal and of the hallux proximal phalanx;
- Intermetatarsal angle (IMA)<sup>21</sup>: angle formed by the lines that bisect the diaphyses of the first and second metatarsals.

Each angle was measured twice by the same examiner, with a one-week interval between the evaluations, and calculated in degrees with the angular measurement tool of the Dicom Viewer software, version 3.0.0®, in the dorsoplantar incidence with load.

The patients were separated into two groups according to radiographic parameters. The moderate hallux valgus group included patients with intermetatarsal angle between 11° and 16° or metatarsophalangeal between 20° and 40°; and the severe hallux valgus group included those with intermetatarsal angle higher than 16° or metatarsophalangeal higher than 40°, according to Couglin's criteria.<sup>21,22</sup> Demographic characteristics, final values of SF-36 score, and radiographic parameters were compared between the two subpopulations.

### Statistical analysis

Continuous variables were reported as mean ± standard deviation and were compared between moderate and severe HV groups and between different pre and postoperative moments. When repeated measurements of the same variable were normal, we compared two of them using the paired Student t-test and then three measurements with the ANOVA test for repeated measurements, with the post-hoc corrections of Bonferroni and Tukey to compare means. When they did not follow normal distribution, we compared two measurements with the Wilcoxon nonparametric test and three repeated measurements using the Kruskal-Wallis test. The assumption of normality for continuous variables was evaluated with the Kolmogorov-Smirnov (KS) and Shapiro-Wilk (SW) tests. The correlational research between two quantitative variables was performed by calculating the Spearman's rank-order correlation coefficient or Pearson Test. Based on the collected data, a database was built in a spreadsheet to analyze them with the IBM SPSS (Statistical Package for the Social Science) program, version 21.0, and with Microsoft Excel. All discussions considered a 5% (0.05) maximum significance level.

## RESULTS

A total of 23 patients met the inclusion and exclusion criteria. Nine patients (39.1%) had severe HV and 14 (60.9%), moderate HV. Of the patients with severe HV, six had MPA > 40° and three had IMA higher than 16°. The patients' mean age at the time of surgery was 58.7 ± 8.99 (39-76 year-olds), 57.4 in the severe group, and 59.5 in the moderate group. This result showed no statistical difference (p > 0.05) (Table 1).

**Table 1.** Baseline characteristics of the total sample and per subgroup.

	Mean	Max	Min	SD	Moderate HV	Severe HV
Sample	total (n = 23)				n = 14	n = 9
Sex	13W 11M				16W 0M	7W 2M
Side	12R 12L				10R 4L	5R 4L
Age	58.7	76	39	8.99	59.5	57.4
SF-36	75.7	91	33.4	15.77	73.3	79.5

HV: hallux valgus; SD: standard deviation; W: women; M: men; R: right; L: left.

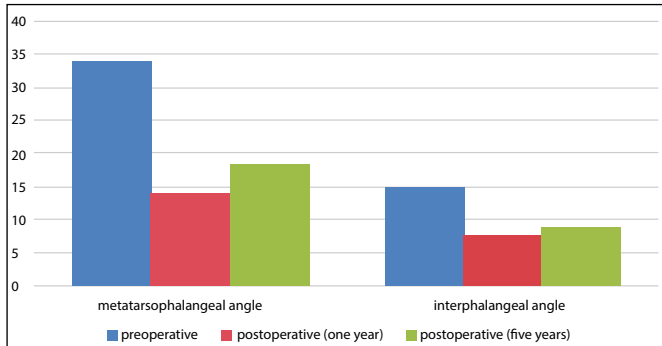
After a 60-month minimum follow-up time, the total sample SF-36 was 75.7 (SD ± 15.77) and per subgroup it was 79.5 and 73.3, respectively for severe and moderate HV. This difference had no statistical significance (p > 0.05).

The values found when measuring the metatarsophalangeal angle in the preoperative phase, one and five years after surgery, showed significant improvement (p < 0.05) in all three moments. Regarding the intermetatarsal angle, the initial values improved considerably one year after surgery and these values also improved after five years (p < 0.05). However, the difference between the initial values and after five years was insignificant (p > 0.05) (Table 2 and Figure 1).

**Table 2.** Variation of radiographic parameters in the pre and postoperative period of patients submitted to HV correction with the Scarf technique.

	Mean	Max	Min	SD	Moderate HV	Severe HV
MPA	33.9	50	20	8.62	28.5	42.4
MPA1	13.9	26	2	6.19	12	16.9
MPA5	18.5	41	2	8.90	17.4	20.2
IMA	14.8	19	6	3.00	13.4	17.1
IMA1, 2011	7.7	14	2	2.95	6.8	9.1
IMA5	8.8	14	2	3.27	8.4	9.4

Caption: HV: hallux valgus; SD: standard deviation; MPA: metatarsal angle; MPA1: one year after surgery; MPA5: five years after surgery; IMA: intermetatarsal angle.



**Figure 1.** Pre and postoperative radiographic parameters to HV correction with the Scarf technique.

The quality of life (SF-36) of patients five years after surgery and the values of radiographic parameters (MPA and IMA) preoperatively, one and five years after surgery ( $p > 0.05$ ) were not correlated. Similarly, SF-36 and the patients' age at the time of surgery were not correlated ( $p > 0.05$ ).

## DISCUSSION

This study aimed to determine the correlation between quality of life (QoL) and radiographic parameters after Scarf surgery for HV correction. Our initial hypothesis has been confirmed. We found no correlation between the SF-36 values and the radiographic parameters measured in the late postoperative period. In addition, no differences in QoL were found between patients who had moderate and severe deformities. Our findings serve for surgeons to care more about clinical criteria than radiographic when evaluating their postoperative results.

Scarf technique is widely used especially for moderate to severe deformities, presenting great correction power.<sup>7,10,23,24</sup> Our patients' metatarsophalangeal and interphalangeal angles improved

significantly. MPA was significantly lower ( $p < 0.05$ ) than the preoperative period at all postoperative moments; IMA has improved significantly after one year ( $p < 0.05$ ), which remained improving after five years, but without relevance ( $p > 0.05$ ). Accordingly, Choi et al.<sup>23</sup> evaluated 53 feet operated with the technique and all radiographic changes showed statistically significant improvement. The difference is that these authors had a 24-month mean follow-up, while in this study it was 60 months.

The SF-36 score sum in our work showed a mean value of 75.7 points, with no statistical difference ( $p > 0.05$ ) between the groups of patients with moderate and severe hallux valgus. According to the Spanish version of SF-36, adapted by Caporicci and Neto,<sup>25</sup> the final score was divided into: 0 = Bad; from 0 to 25 = Regular; from 26 to 61 = Good; from 62 to 84 = Very Good, and from 85 to 100 = Excellent. Thus, we can consider that after the mean time of five years, the operated patients' quality of life was very good.<sup>17,21</sup> Menz et al.<sup>19</sup> evaluated patients with hallux valgus and compared clinical deformity and QoL with SF-36. They found a reduction in QoL when deformity worsened. Lopez et al.<sup>26</sup>, after evaluating 100 women with HV, confirmed a relationship between QoL and the bunion deformity. However, these authors used the Manchester scale to measure foot deformity, while our study used objective angular parameters measured on radiographs. In accordance with our results, other authors<sup>27,28</sup> found no relationship between the degree of radiographic deformity and the score obtained in the SF-36, proving the relevance of SF-36 to evaluate the results of hallux valgus surgeries. We can see a correlation between worse quality of life and HV deformity when it is clinically analyzed. It is different when we consider radiographic parameters; however, literature has no consensus. Lazarides et al.<sup>29</sup>, preoperatively evaluating radiographs of 22 patients together with SF-36, attested the more severe the deformity, the worse the QoL.

Our study has some limitations, such as sample size, although it is compatible with the number of patients in other studies. In addition, the SF-36 evaluation at one single moment limited us in identifying changes in the patients' quality of life in an evolutionary way. The studies on the subject show hallux valgus cripples QoL when clinical criteria based on patients' impressions are analyzed. On the other hand, articles that use angular measurement in their methodology report no relationship between deformity and QoL. Although this was not the objective of our work, we infer that sometimes HV hypocorrection aiming at a better aesthetic result, especially in more severe cases, can bring more satisfactory results to the patient.

## CONCLUSION

The quality of life of patients submitted to the Scarf technique for moderate and severe hallux valgus correction has no correlation with postoperative radiographic parameters after five years of surgery.

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