

Health-related quality of life in patients with hallux valgus

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Abstract

Background and Aims: No deformity of the forefoot occurs more frequently than hallux valgus (HV), which is considered to be medial deviation of the first metatarsal and lateral deviation and rotation of the hallux, either with or without medial soft tissue enlargement of the metatarsal head. The HV deformity can lead to painful motion of the joint or difficulty in daily joint activity that often requires surgical correction. The aims of this study were to investigate the levels of foot pain and quality of life of patients with HV before and after surgery. Our study is focusing on imagistic investigations in HV, clinical aspects, specific treatment, foot pain levels, quality of life and general health before and after surgery. **Patients, Materials and Methods:** Our research was conducted in the period 2010–2015. We recruited 56 patients, 35 women and 21 men, age range 20 to 76 years, mean age 44.4 years, with HV (radiographic HV angle 25–40 and >40). We applied *Visual Analogue Scales* (VAS) for the foot pain and the *Euro Quality of Life* – five dimensions health questionnaire (EQ-5D). **Results:** The results show statistically significant differences concerning the foot pain levels in VAS and also pain/discomfort, mobility and anxiety/depression in the EQ-5D subscale in HV before and after surgery. The results prove high improvement of the scores of foot pain, discomfort, mobility and anxiety/depression after surgery. Concerning the participation in usual activities and the self-care, the obtained results were not statistically significant. **Conclusions:** Our research was a proof that the surgery in HV represents a fruitful pathway of intervention and care and shows a high rate of success, favorable outcomes and improvement in quality of life of the patients.

Keywords: hallux valgus, foot pain, quality of life, depression, psychosis.

Introduction

Hallux valgus (HV) is common in all age groups, appearing in both genders, female and male. The hallux valgus has different grades of severity, so that in severe conditions, it may be considered as a serious problem, which may affect the quality of life and the patient will complain about difficulty in shoes selection, limitation of daily activities, nail disorders and occurrence of bunions and calluses [1, 2].

The aims of this study were to investigate the levels of foot pain and quality of life of patients with HV before and after surgery. The motivation and importance of this study raised from the fact that in this field of pathology a multidisciplinary approach is needed and there is a lack of existing research in HV, implying multidisciplinary and also implying the correlations concerning mental health, physical, global health and also psychological wellbeing and quality of life issues.

In the same time, we have to be attentive and focused when evaluating special categories of patients with comorbid HV with high risks concerning mental health (depression, psychosis, antipsychotic treatment induced

weight gain) or general health issues (diabetes mellitus) [3–5].

Intrinsic and extrinsic factors may have a role in developing hallux valgus deformity, therefore, in order to correct any deformity we have to understand all the mechanisms of the deformity and to choose the best methods to evaluate the condition where the common and gold standard method for hallux valgus assessment is the angular measurement of the 1st metatarsophalangeal (MTP) joint using anterior–posterior X-ray imaging [6–9].

For plantar grapping at the 1st metatarsocuneiform (MTC) joint and dorsal translation of the 1st metatarsus (MT) relative to the cuneiform indicative of instability, the lateral radiograph should be done [10–12].

In the treatment of an affection, some of the primary goals are the reduction of the impact of the disease on the patient, improving its quality of life and first of all the approach should be ethical [13]. Therefore, we cannot talk about the evaluation of the treatment quality without referring to the quality of life and personalized clinical and tailored psychological needs of the patients who benefit from that treatment [14, 15].

Patients, Materials and Methods

The present research was performed between the years 2010 and 2015, in the IInd Clinic of Orthopedics and Traumatology in Timișoara, Romania. We recruited 56 patients, 35 women and 21 men, age range 20 to 76 years, mean age 44.4 years (standard deviation – SD 15.1 years), with HV (radiographic HV angle 25–40 – grade II and >40 – grade III)

Our study is focusing especially on: clinical evaluation of the patients, the HV imaging investigations and also on the general health, foot pain, psychological and quality of life evaluation before and after the surgical intervention.

Clinical evaluation of the patients

Through the physical examination, the patient's foot is observed while walking standing and sitting. The 1st MTC joint is evaluated for hypermobility and crepitus. The degree of hallux valgus deformity is assessed with and without weight bearing. The 1st MTP joint was assessed for reducibility of deformity, range of motion, crepitus, and pain with motion. The MTP joints are evaluated for synovitis, range of motion, and stability. The skin should be carefully examined for plantar callosities suggestive of transfer lesions, bursitis, and erosions.

A careful neurovascular examination is conducted to assess vascular status and the presence of interdigital neuralgias.

HV imaging investigations

For plantar grapping at the 1st MTC joint and dorsal translation of the 1st MT relative to the cuneiform indicative of instability, the lateral radiograph should be done.

General health and pain

General health and well-being were assessed using the *Euro Quality of Life* – five dimensions health questionnaire (EQ-5D). The EQ-5D is a generic HRQoL (*Health-Related Quality of Life*) instrument that measures HRQoL in five dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression). Each dimension has three levels: no problems, some problems, extreme problems.

Visual Analogue Scales (VAS) were used to investigate foot pain intensity. The pain VAS is a continuous scale comprised of a horizontal (HVAS) or vertical (VVAS) line, usually 10 cm (100 mm) in length, anchored by two verbal descriptors, one for each symptom extreme. Participants were also asked to indicate how satisfied they were with the appearance of their feet on a 100 mm VAS, with 0 mm representing “completely satisfied with appearance” and 100 mm representing “completely dissatisfied with appearance”.

Operative treatment

To narrow the forefoot by resecting the medial eminence and correcting the inter-metatarsal angle were other goals of the operative treatment, where the main goal was the correction of the angulation and pronation of the first MTP.

In the present study, especially Chevron Osteotomy and Scarf Osteotomy surgical techniques were used.

Statistical analysis

All analyses were carried out using SPSS software (version 17.0, Chicago, IL, USA) and Microsoft Excel. The reported *p*-values are two-sided. *P*<0.05 was considered as statistically significant.

We included, in analysis, the HV group with hallux valgus angle 25–40 – grade II and with hallux valgus angle >40 – grade III; randomly chosen).

Results

In our study, 42 patients were diagnosed with grade II and 14 patients with grade III HV. In order, 38 patients were diagnosed with unilateral HV and 18 patients with bilateral HV.

Concerning the clinical evaluation of the patients, in patients with HV, we could observe some symptoms as pain over-prominence at MTP joint, compression of digital nerve, which may cause symptoms and difficulty with shoe wear due to media eminence.

Through the HV imaging investigations, we captured the following aspects and results (Figure 1 and Table 1).



Figure 1 – (A and B) Radiograph of the foot.

Table 1 – Radiographic measurements in HV

Hallux valgus (HV)	Long axis of 1 st and proximal phalanges	Identifies MT deformity	Normal <15°
Inter-metatarsal angle (IMA)	Between long axis of 1 st and 2 nd MT		Normal <9°
Distal metatarsal articular (DMAA)	Between 1 st MT long axis and line through base of distal articular cap	Identifies MTP joint incongruity	<15°
HV inter-phalangeus (HVI)	Between long axis of distal phalanx and proximal phalanx		<10°

MT: 1st metatarsus; MTP: 1st metatarsophalangeal joint.

The average scores concerning the foot pain, on the VAS scales have been assessed before and after surgery. So that, the patients with HV reported more foot pain before surgery. Concerning the results for the two time-points, before and after surgery, on a 100 mm VAS, we obtained statistically significant differences: for worst pain (median – MD: 25.5 mm, confidence interval – CI: 14.3 to 36.6) and for average pain (MD: 12.3 mm, CI: 6.2 to 18.3). Also, the participants with HV had more significant concerns about the foot appearance before the intervention (MD: 38.1 mm, CI: 23.8 to 52.3) than after surgery (Table 2).

After the application of the EQ-5D questionnaire, the proportion of patients with and without problems on the five areas was estimated, before and after surgery, so that, we noticed the decrease in the number of HV

patients who declare themselves with problems after surgery.

Table 2 – Comparison between the results for foot pain on VAS for HV patients before and after surgery

VAS (0–100 mm)	Before surgery	After surgery	Mean difference (95% CI)
Worst pain VAS	37.7±26.5	12.2±16.9	25.5 (14.3 to 36.6)**
Average pain VAS	15.5±15.1	3.2±6.9	12.3 (6.2 to 18.3)**
Appearance VAS	58.5±31.4	20.4±23.2	38.1 (23.8 to 52.3)**

VAS: Visual Analogue Scales; HV: Hallux valgus; CI: Confidence interval; * $p<0.05$; ** $p<0.001$.

There were some noticeable differences concerning the results for the EQ-5D subscales for the HV patients, before and after the surgical intervention, for the domains: anxiety/depression, pain/discomfort and mobility. The participants reported, before the surgical intervention for HV, more pain/discomfort (MD: 1.27, CI: 0.28 to 1.7) and mobility problems (MD: 1.17, CI: 0.0 to 1.34) and higher results for anxiety/depression (MD: 0.90, CI: 0.43 to 1.43), while the results concerning the usual activities and self-care were not significantly different between the two timepoints, before and after surgery (Table 3).

In Figure 2, we captured the X-ray of a 46-year-old patient with bilateral HV. The measurements show an angle of HV-38° – grade III to her right leg and grade II

at her left leg. A surgical intervention was made, practicing Chevron osteotomy on the right HV (Figure 3) and metallic osteo-synthesis with two screws. The post-surgery result is favorable (Figure 4) the patient, also showing a significant improvement in pain after the surgery.

Table 3 – Comparison between the results of EQ-5D for HV patients before and after surgery

EQ-5D	Before surgery	After surgery	Mean difference (95% CI)
Anxiety/depression	1.90±0.65	1.0±0.40	0.90 (0.43 to 1.43)
Usual activities	2.87±0.63	2.88±0.55	-0.01 (-0.32 to 0.30)
Self-care	1.91±0.82	1.90±0.62	0.0 (-0.37 to 0.38)
Mobility	2.62±0.33	1.45±0.32	1.17 (0.0 to 1.34)*
Pain/discomfort	2.92±0.94	1.65±0.65	1.27 (0.28 to 1.7)*

HV: Hallux valgus; CI: Confidence interval; * $p<0.05$; ** $p<0.001$.



Figure 2 – Clinical aspect of hallux valgus (HV): preoperative radiography of patient with HV 38° – grade III.



Figure 3 – Intraoperative aspects – distal osteotomy (Chevron).



Figure 4 – Postoperative radiography.

Discussion

The present prospective study was done to examine the epidemiological, clinical, psychological aspects of the HV deformity. In this order, we decided to measure the pain and quality of life in correlation with the personalized clinical and psychological profile of each patient, before and after surgery.

In our study, in order to investigate the intensity of foot pain the applied VAS method was adapted from a technique described by Saro *et al.* [16–18].

The pain that cannot be controlled by conservative treatment is the first indication for a surgery. The patients may feel the pain over the bunion or in the 2nd metatarsal joint. An overall pre-operative and psychological counseling is required to improve the HV surgery outcomes [19].

A prospective study by Coughlin & Jones evaluated 103 patients with 122 feet treated for moderate to severe deformity [20, 21]. They found that 83% of the patients

had a family history of HV, 71% of feet with HV deformity had an increased 1st metatarsal length, when compared with the 2nd metatarsal, 71% of feet had an curved or oval MTP joint surface, 32% of feet had moderate to severe metatarsus adductus, 34% of patients had a history of occupation or shoe wear as causative factors for developing their bunion, 23% of feet had plantar gapping at the 1st MTC joint and 13% of feet had increased 1st ray mobility as defined by 9 mm or more of motion determined by Klaue's device [22].

There are several types of osteotomies that we can use to fix HV angles, but on the other hand, before we finally decide to make the surgery we have to do number of examinations that include the whole foot; such as to examine the numerous foot angles, and the different positions of the foot while standing, sitting and laying down [18].

In our study, Chevron osteotomy was performed as described by Austin, however the incision over the MTP joint was placed straight medially and a tenotomy was

not done. The distal fragment was then displaced laterally approximately 4 to 6 mm, depending on the width of the metatarsal head, and the osteotomy site was impacted on itself.

No additional holes were placed through the cortex of the proximal metatarsal to anchor the capsular flap. Instead, the plantar and dorsal aspect of the flap was tightly closed before the “U”-shaped capsular flap was placed and reattached. So that the risk for displacement was minimized and no internal fixation was used [23–26].

Our study showed that HV negatively impacts on the health-related quality of life, on the psychological wellbeing, on anxiety/depression symptomatic and psychopathological dimension, on the self-reported foot-pain/discomfort, mobility and function. General physical functioning, self-care and participation in physical activity were not yet so much affected.

The surgery has a high rate of success, favorable outcomes and improvement in quality of life of the patients, especially when it is tailored to the personal clinical but also psychological needs of the patients [27, 28]. Also, in order to register good results, we must take into account also the psychological profile, the vulnerability markers and tolerability concerning their possible psychopathological dysfunctional response in correlation with stressful events like surgical procedures and possible treatment emergent events [29–31]. We also must be careful to evaluate the clinical situation multidisciplinary and to pay attention to special categories of patients with comorbid HV with high risks concerning mental health (depression, psychosis, antipsychotic treatment induced weight gain) or general health issues (diabetes mellitus) [3–5].

In line with some already existing research results, our study proved improvement of the quality of life of patients with HV postsurgery, the impact of the HV condition on the health-related quality of life being significant [32].

Similar with some already existing researches, in our study, most of the patients had favorable postoperative outcomes and the surgery shows an outstanding improvement of reducing preoperative pain [33, 34]. In addition, the majority of patients were satisfied from the cosmetics results. However, a small number of patients had poor outcomes following the surgery.

In the same time, our present study captures some new, interesting dimensions, through the fact that it implied in this field of pathology a multidisciplinary approach because there is a lack of existing research in HV, implying multidisciplinary and also implying the correlations concerning mental health, physical, global health, personalized, tailored clinical profile and also psychological wellbeing and quality of life issues.

✉ Conclusions

HV is a complex disorder that must be objectively, also multidisciplinary studied and surgically individualized. HV deformity is accompanied by significant foot-specific pain, disability and a great impact on the quality of life and psychological wellbeing of the patients. The approach of these cases should be multidisciplinary and multidimensionally. Our research was a proof that the surgery

in HV represents a fruitful pathway of intervention and care and shows a high rate of success, favorable outcomes and improvement in lifestyle and quality of life of the patients.

Conflict of interests

The authors declare no conflict of interests.

Author contribution

Bogdan Gheorghe Hogeia has equal contribution and thus shares first authorship.

References

- [1] D'Arcangelo PR, Landorf KB, Munteanu SE, Zammit GV, Menz HB. Radiographic correlates of hallux valgus severity in older people. *J Foot Ankle Res*, 2010, 3:20.
- [2] Nix S, Smith M, Vicenzino B. Prevalence of hallux valgus in the general population: a systematic review and meta-analysis. *J Foot Ankle Res*, 2010, 3:21.
- [3] Nussbaum LA, Dumitraşcu V, Tudor A, Grădinaru R, Andreescu N, Puiu M. Molecular study of weight gain related to atypical antipsychotics: clinical implications of the CYP2D6 genotype. *Rom J Morphol Embryol*, 2014, 55(3):877–884.
- [4] Timar B, Timar R, Gaiță L, Oancea C, Levai C, Lungeanu D. The impact of diabetic neuropathy on balance and on the risk of falls in patients with type 2 diabetes mellitus: a cross-sectional study. *PLoS One*, 2016, 11(4):e0154654.
- [5] Timar B, Popescu S, Timar R, Baderca F, Duica B, Vlad M, Levai C, Balinisteanu B, Simu M. The usefulness of quantifying intraepidermal nerve fibers density in the diagnostic of diabetic peripheral neuropathy: a cross-sectional study. *Diabetol Metab Syndr*, 2016, 8:31.
- [6] Meyr AJ, Adams ML, Sheridan MJ, Ahalt RG. Epidemiological aspects of the surgical correction of structural forefoot pathology. *J Foot Ankle Surg*, 2009, 48(5):543–551.
- [7] Menz HB, Roddy E, Thomas E, Croft PR. Impact of hallux valgus severity on general and foot-specific health-related quality of life. *Arthritis Care Res (Hoboken)*, 2011, 63(3):396–404.
- [8] Coughlin MJ, Saltzman CL, Nunley JA 2nd. Angular measurements in the evaluation of hallux valgus deformities: a report of the *ad hoc* Committee of the American Orthopaedic Foot & Ankle Society on angular measurements. *Foot Ankle Int*, 2002, 23(1):68–74.
- [9] Russell TG, Jull GA, Wootton R. Can the Internet be used as a medium to evaluate knee angle? *Man Ther*, 2003, 8(4):242–246.
- [10] Frey C, Thompson F, Smith J, Sanders M, Horstman H. American Orthopaedic Foot and Ankle Society women's shoe survey. *Foot Ankle*, 1993, 14(2):78–81.
- [11] Nery C, Coughlin MJ, Baumfeld D, Ballerini FJ, Kobata S. Hallux valgus in males – part 1: demographics, etiology, and comparative radiology. *Foot Ankle Int*, 2013, 34(5):629–635.
- [12] Menz HB, Munteanu SE, Landorf KB, Zammit GV, Cicuttini FM. Radiographic classification of osteoarthritis in commonly affected joints of the foot. *Osteoarthritis Cartilage*, 2007, 15(11):1333–1338.
- [13] Nussbaum LA, Andreescu N, Nussbaum L, Grădinaru R, Puiu M. Ethical issues related to early intervention in children and adolescents with ultra high risk for psychosis: clinical implications and future perspectives. *Rev Rom Bioet*, 2014, 12(3):64–81.
- [14] Nussbaum L, Grădinaru R, Andreescu N, Dumitraşcu V, Tudor A, Suciu L, Ștefănescu R, Puiu M. The response to atypical antipsychotic drugs in correlation with the CYP2D6 genotype: clinical implications and perspectives. *Farmacia*, 2014, 62(6):1191–1201.
- [15] EuroQol Group. EuroQol – a new facility for the measurement of health-related quality of life. *Health Policy*, 1990, 16(3): 199–208.
- [16] Huskisson EC. Measurement of pain. *Lancet*, 1974, 2(7889): 1127–1131.
- [17] Jensen MP, Karoly P, Braver S. The measurement of clinical pain intensity: a comparison of six methods. *Pain*, 1986, 27(1):117–126.

- [18] Saro C, Johnson DN, Martinez de Aragón J, Lindgren U, Felländer-Tsai L. Reliability of radiological and cosmetic measurements in hallux valgus. *Acta Radiol*, 2005, 46(8): 843–851.
- [19] Mann RA, Coughlin MJ. Adult hallux valgus. In: Coughlin MJ, Mann RA (eds). *Surgery of the foot and ankle*. 7th edition, vol. 1, Mosby Inc., St. Louis, 1999, 150–269.
- [20] Coughlin MJ, Jones CP. Hallux valgus: demographics, etiology, and radiographic assessment. *Foot Ankle Int*, 2007, 28(7): 759–777.
- [21] Coughlin MJ. Juvenile hallux valgus: etiology and treatment. *Foot Ankle Int*, 1995, 16(11):682–697.
- [22] Klaue K, Hansen ST, Masquelet AC. Clinical, quantitative assessment of first tarsometatarsal mobility in the sagittal plane and its relation to hallux valgus deformity. *Foot Ankle Int*, 1994, 15(1):9–13.
- [23] Glynn MK, Dunlop JB, Fitzpatrick D. The Mitchell distal metatarsal osteotomy for hallux valgus. *J Bone Joint Surg Br*, 1980, 62-B(2):188–191.
- [24] Nery C, Barroco R, Réssio C. Biplanar chevron osteotomy. *Foot Ankle Int*, 2002, 23(9):792–798.
- [25] Jones S, Al Hussainy HA, Ali F, Betts RP, Flowers MJ. Scarf osteotomy for hallux valgus. A prospective clinical and pedobarographic study. *J Bone Joint Surg Br*, 2004, 86(6): 830–836.
- [26] Austin DW, Leventen EO. A new osteotomy for hallux valgus: a horizontally directed “V” displacement osteotomy of the metatarsal head for hallux valgus and primus varus. *Clin Orthop Relat Res*, 1981, (157):25–30.
- [27] Abhishek A, Roddy E, Zhang W, Doherty M. Are hallux valgus and big toe pain associated with impaired quality of life? A cross-sectional study. *Osteoarthritis Cartilage*, 2010, 18(7):923–926.
- [28] Saro C, Jensen I, Lindgren U, Felländer-Tsai L. Quality-of-life outcome after hallux valgus surgery. *Qual Life Res*, 2007, 16(5):731–738.
- [29] Nussbaum L, Andreescu N, Hogeia LM, Muntean C, Ștefănescu R, Puiu M. Pharmacological and clinical aspects of efficacy, safety and tolerability of atypical antipsychotic medication in child and adolescent patients with schizophrenia and bipolar disorders. *Farmacia*, 2016, 64(6):868–875.
- [30] Andreescu N, Nussbaum L, Hogeia LM, Grădinaru R, Muntean C, Ștefănescu R, Puiu M. Antipsychotic treatment emergent adverse events in correlation with the pharmacogenetic testing and drug interactions in children and adolescents with schizophrenia and bipolar disorder. *Farmacia*, 2016, 64(5):736–744.
- [31] Nussbaum LA, Hogeia LM, Andreescu NI, Grădinaru RC, Puiu M, Todica A. The prognostic and clinical significance of neuroimaging and neurobiological vulnerability markers in correlation with the molecular pharmacogenetic testing in psychoses and ultra high-risk categories. *Rom J Morphol Embryol*, 2016, 57(3):959–967.
- [32] Yamamoto Y, Yamaguchi S, Muramatsu Y, Terakado A, Sasho T, Akagi R, Endo J, Sato Y, Takahashi K. Quality of life in patients with untreated and symptomatic hallux valgus. *Foot Ankle Int*, 2016, 37(11):1171–1177.
- [33] Chen JY, Ang BF, Jiang L, Yeo NE, Koo K, Singh Rikhray I. Pain resolution after hallux valgus surgery. *Foot Ankle Int*, 2016, 37(10):1071–1075.
- [34] Cho NH, Kim S, Kwon DJ, Kim HA. The prevalence of hallux valgus and its association with foot pain and function in a rural Korean community. *J Bone Joint Surg Br*, 2009, 91(4): 494–498.

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