

EVALUATION OF VARIOUS SURGICAL METHODS IN THE TREATMENT OF HALLUX VALGUS

Abstract of PhD Thesis - Incze-Bartha Sándor

Table of contents

Chapter I. Introduction, short history

Introduction

Short history

Chapter II. Hallux valgus

Chapter III. Surgical treatment in hallux valgus

Soft tissue procedures

Distal osteotomies

Diaphyseal osteotomies

Proximal osteotomies

Special operations

Chapter IV. Clinical study regarding various methods of treatment in hallux

Introduction

Materials and Methods

Results

Discussion

Conclusions

Chapter V. Radiological study regarding of the efficiency of the Scarf osteotomy

Introduction

Materials and Methods

Results

Discussion

Conclusions

Chapter VI. Analysis of the pathological, operated forefoot and various osteotomies with the method of finite element analysis.

Introduction

Geometric model construction

The mathematical model

Biomechanical analysis of the normal, pathologic forefoot and various osteotomies

Discussions

Conclusions

Chapter VII General Conclusions

References

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Hallux valgus is an acquired tri - plane deformity where the first toe deviates in abduction, dorsiflexion and pronation, followed by the varus deviation of the first metatarsal and the formation of the first metatarsal head exostosis – bunion. It is symptomatic when the first metatarsal head is touching the shoe or the first toe touches the second one. The deformity affects seriously the quality of life in the affected population especially in the female one. For a successful treatment is important to choose a right method of treatment applied in function of the deformity. Research based on computer modeling is a modality to have early simulated results on which the real treatment can be based.

The first surgically resected exostoses are attributed to Gernet in 1836 and the term hallux valgus is first used by Heuter in 1870. Since then a vast number of techniques were published Helal in 1981 numbered over 150 procedures.

To diagnose the deformity a thorough local general and radiologic examination has to be performed. The patient's expectation from the treatment has to be cleared and any intervention only for cosmetic reason has to be abandoned. The choice of a treatment and especially surgical treatment method is based on the surgeon preferences, it's a big difference between an orthopedic book and the personal practical stock of method a surgeon knows and likes. The operations in the case of hallux valgus can be classified in soft tissue operations, osteotomies and special operations like metatarso – phalangeal – cuneiform arthrodesis, resection arthroplasty etc. The more used interventions in our days are: the McBride procedure for soft tissues, Scarf, Chevron, Akin osteotomies the mini invasive variants of the Hohmann osteotomy, Lapidus procedure and Keller resection arthroplasty.

On a series of 61 patients with hallux valgus we have studied the clinical results after conservative or surgical treatment. The conservative treatment was used by patients with very mild deformity or where unable to receive – or refused surgical treatment and included insoles, orthotics, NSAID and painkiller medication. For the surgical treatment the procedures of McBride and Scarf osteotomy were used. The results were evaluated with the help of the Manchester scale the AOFAS score and a VAS scale. Our results are that 30% of the conservatory group was satisfied with the results compared to more than 80% from the surgical group. We had 3 wound complications from the operated group – 1 infection which was treated with metatarso-phalangeal arthrodesis. We tried to find statistic correlation between the AOFAS score and the VAS scale we found only a weak one, we decided not to use the VAS scale for our

further studies.

For the para - clinic study we have developed an own method for the measurements of radiographs: the RxTools program edited in C++ .Net. We have analyzed 234 radiographs from which 138 feet with hallux valgus and 96 normal feet. We have determined the hallux valgus, the intermetatarsal, the distal metatarsal articular, the metatarsus adductus the cuneiform obliquity angle and the metatarsal protrusion. We've conducted a study for the evaluation of our digital method, one for comparing the healthy population with the ill one regarding metatarsus adductus, cuneiform obliquity and metatarsal protrusion and a third one for the evaluation of Scarf osteotomy. The results showed us that our method is reliable, faster and more precise than the classical method for x-ray analysis. There is a statistical difference between the healthy and the hallux valgus population regarding the metatarsal protrusion, however there is none regarding the metatarsus adductus and the cuneiform obliquity angle. With the scarf operation we have managed to achieve a statistical difference between all the parameters: mean correction of HVA was 19.15, IMA 4.31, DMAA 9.42, and MP was 0.03.

Understanding of mechanical changes at the level of the forefoot in the case of hallux valgus and operated hallux valgus is important for improving the treatment of the deformity. Because in vivo measurements are hard to perform and take time we have created a #D computerized forefoot geometrical and mathematical model which can be used for evaluating the changed mechanics of the forefoot with the method of finite element analysis

We have built our model based on the CT findings of a healthy young adult using our own method. We have performed a static analysis of the healthy foot and various pathologies created on the model. Then we have isolated the first metatarsal and performed osteotomies fixed with various implants in different positions.

The computer modeling together with the finite element analysis is a pertinent method for studying the hallux valgus and useful by the preoperative planing.