

It's A Small World After All- Surgical Management of Hallux Valgus and Hallux Rigidus: An Email Survey Among Foot and Ankle Orthopedic Surgeons Regarding Their Current Practice.

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ABSTRACT

Background: Hallux valgus and hallux rigidus are common conditions for which numerous operative interventions have been described in the literature. Various clinical and radiological measurements have been used to help grade severity and to guide treatment. Various clinical and radiological criteria have been suggested to choose one of the numerous techniques in surgical treatment of hallux valgus and rigidus. We hypothesized that the surgeons' professional background will influence that choice depending on age, type and institution of training as well as their orthopaedic cultural orientation.

Materials and Methods: A survey was e-mailed to all members of the Israeli Foot and Ankle Orthopaedic Association. Questions were asked regarding respondents' demographics as well as their preferred treatment for 3 separate cases of hallux valgus and hallux rigidus of varying severity. They were specifically asked about type of deformity correction and type of fixation. The responses were collected and statistically analysed.

Results: The survey was mailed to all 75 members of the Israeli Orthopaedic Foot and Ankle Association. 58 responses were received with a response rate of 73%. Selected surgical treatments differed as follows: for moderate hallux valgus 60% of the responders chose MIS MICA as the preferred procedure. For severe hallux valgus 45% stated they would fuse the 1st MTPJ (Metatarsophalangeal joint) while 30% would perform MIS (Minimally Invasive Surgery) MICA (Minimally Invasive Chevron Akin). For Hallux rigidus 90% of the responders said they would fuse the joint.

Conclusion: The study identifies that in spite of the large number of procedures described in the literature, the vast number of surgeons use only a small number of procedures. The Foot and Ankle specialists tend to perform more modern surgeries such as MICA.

Keywords: Bunions, Foot surgery techniques, Forefoot, Toe, Hallux valgus, Hallux rigidus, MIS MICA, Survey, 1ST MTPJ fusion

Abbreviations

MTPJ - Metatarsophalangeal joint

MIS - minimally invasive surgery

MICA - minimally invasive chevron akin

IMA - intermetatarsal angle

HVA - hallux valgus angle

Introduction

Hallux valgus is one of the most prevalent deformities of the foot, with the earliest published reference to the condition dating back to 1870 [1]. This condition can result in significant pain

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and disability, severely impacting an individual's ability to perform daily activities [2]. Common clinical manifestations include pain, difficulty fitting into footwear, deformities of the lesser toes, ulceration over the bunion, erythema in the bunion area, and concerns regarding cosmetic appearance. The precise etiology of hallux valgus remains incompletely understood, but it is likely multifactorial in nature [3].

More than 100 surgical techniques have been documented in the literature, each demonstrating varying degrees of success. These techniques encompass various osteotomies of the first metatarsal, fusion procedures, and soft tissue interventions. Multiple treatment algorithms have been proposed to assist surgeons in the decision-making process, which is typically based on patients' symptoms and the severity of the deformity assessed through standard weight-bearing anteroposterior and lateral radiographs [4-7].

The choice of surgical intervention may be influenced by the surgeon's professional background, including factors such as specialization, age, type of training, and institutional affiliation, as well as their orthopaedic cultural orientation. Surveys conducted among the members of the Australian Orthopaedic Association in 2012 and the Swiss Orthopaedic Association in 2015 revealed that a surgeon's affiliation with the local Foot and Ankle Association and their age significantly influenced treatment choices [8,9]. Younger surgeons with specialized training in foot and ankle surgery tend to favour newer and cutting-edge surgical techniques.

This study builds upon similar studies conducted by Iselin et al. both in Australia and Switzerland in 2012 and 2015 [8,9]. The objective of these studies was to examine the current foot and ankle practice of orthopaedic surgeons in Australia and Switzerland and to identify their preferred treatment modalities for varying severities of hallux valgus and hallux rigidus.

The present study aims to investigate the current foot and ankle practice of orthopaedic foot and ankle surgeons in Israel and to compare the findings with those published in Switzerland and Australia.

Materials and methods

This current study utilized the same hypothetical clinical cases and questionnaire as described by Iselin et al. in their previous studies [8,9]. The questionnaire and hypothetical clinical scenarios were translated from English to Hebrew, with consent granted by Iselin et al. for their use in the current study.

A survey incorporating the Hebrew questionnaire and hypothetical clinical cases was disseminated via email to the members of the Israeli Orthopaedic Foot and Ankle Association during 2023. Participants completed the survey online through a dedicated Google Form designed to collect their responses.

Demographic information was collected through several questions, including the number of foot and ankle surgical cases performed annually, the surgeons' age, and their level of training (e.g., fellowship training, location, and duration). The survey included radiographs of three distinct cases.

Case 1 (Figure 1) presented an anteroposterior radiograph depicting moderate hallux valgus, characterized by an intermetatarsal angle (IMA) of 11° , a hallux valgus angle (HVA) of 34° , and a congruent joint with no indications of joint space narrowing. Case 2 (Figure 2) depicted severe hallux valgus on an anteroposterior radiograph, with an IMA of 17° , an HVA of 44° , an incongruent joint, and evidence of joint space narrowing alongside significant lateral displacement of the sesamoids. Case 3 (Figures 3) illustrated an AP radiograph of advanced degenerative arthrosis of the first metatarsophalangeal joint (MTPJ), marked by significant dorsal osteophyte formation.



Figure 1: Anteroposterior radiograph of a case of moderate hallux valgus with an intermetatarsal angle of 11° , an HVA of 34° , a congruent joint with no evidence of joint space narrowing



Figure 2: Anteroposterior radiograph of a case of severe hallux valgus with an IMA of 17° , an HVA of 44° , an incongruent joint, and some narrowing of the joint space with significant lateral displacement of the sesamoids



Figure 3: An AP radiograph of a case of advanced degenerative arthrosis of the first MTPJ with significant dorsal osteophyte formation

Participants responded to questions regarding their preferred treatment methods for each of the three cases. For Cases 1 and 2, questions included, “Which procedure would you perform?” “What type of fixation would you use?” and “Would you also perform a distal soft tissue procedure (McBride)?” Each of the first two questions offered multiple options as well as a “other” category for additional responses. In Case 3, similar questions were posed; however, the question regarding the addition of a soft tissue procedure was omitted.

Statistical Analysis

This is a descriptive paper. Descriptive statistics was used to collate each variable.

We used mean, range and percentages for the different variables. The statistical analysis was done using IBM SPSS ver 29.

Results

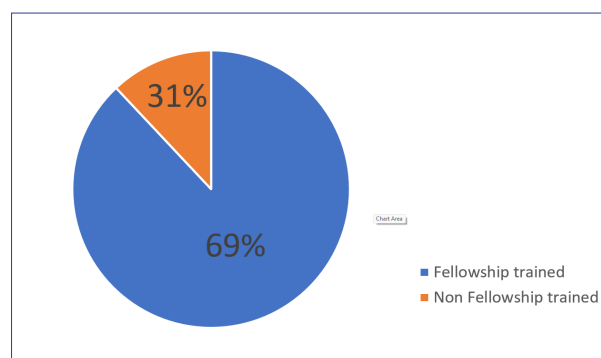
A survey was distributed to all 75 members of the Israeli Orthopaedic Foot and Ankle Association. A total of 58 responses were received, yielding a response rate of 73% (Table 1). Among the respondents, 40 out of 58 (69%) were fellowship-trained, with 40% completing their fellowship in the United States and 30% in Australia (Graph 1). The majority of respondents were aged 41-50 years (55%) or 51-60 years (20%) and reported performing more than 25 foot and ankle forefoot cases per year (95%). Regarding practice settings, 90% of the surgeons were involved in both public and private practice. Additionally, 45% of respondents had over a decade of experience as foot and ankle surgeons.

For Case 1 (moderate hallux valgus), the most frequently selected procedure was minimally invasive Chevron-Akin osteotomy (MIS MICA), chosen by 60% of respondents (Table 2). An open Chevron-Akin osteotomy was selected by 30%, while one surgeon indicated he/she would perform a bunionectomy alone. Among those opting for distal osteotomy (MIS MICA or open Chevron-Akin), 80% utilized screw fixation for the osteotomy. A subgroup analysis revealed that 80% of foot and ankle surgeons

in Israel who completed a fellowship chose to correct moderate hallux valgus using a minimally invasive approach ($p=0.052$). No correlation was found between the age of the surgeon or surgeon's years of experience and the type of surgery chosen for the correction of moderate hallux valgus.

Table 1: Demographics

Survey Recipients	75
Responders	58 (Response rate 58/75-73%)
Israeli Orthopedic Board certificate	58 (100%)
Israeli foot and ankle association members	58 (100%)
Age groups (Years of age):	
30-40	2/58= 3%
41-50	32/58= 55%
51-60	12/58= 20%
61-70	9/58= 15%
>70	3/58= 5%
Case load (forefoot cases per year)	
0-10	3/58= 5%
11-25	0%
26-50	18/58= 30%
>50	38/58= 65%
Type of practice	
Public	6/58= 10%
Private	0%
Public Private	52/58= 90%
Orthopedic training	
Fellowship trained	40/58=69%
Non-Fellowship trained	18/58=31%



Graph 1: Fellowship trained vs non-fellowship trained foot and ankle Israeli surgeons

Table 2: Preferred procedure for the correction of case 1 (moderate Hallux Valgus)

Procedure	Percent of Surgeons
MIS MICA	60%
Open Chevron Akin	30%
Open Bunionectomy	5%

In Case 2 (severe hallux valgus), the most commonly preferred procedure was first metatarsophalangeal joint (MTPJ1) fusion, selected by 45% of respondents (Table 3). Additionally, 30% of surgeons chose MIS MICA, while 20% opted for first tarsometatarsal (TMT) joint fusion combined with an Akin osteotomy and a lateral release. For fixation, 75% of the respondents used screws or a combination of screws and plates.

Table 3: Preferred procedure for the correction of case 2 (Severe Hallux Valgus)

Procedure	Precent of Surgeons
1 st MTPJ fusion	45%
MIS MICA	30%
1 st TMT fusion	20%

For Case 3 (hallux rigidus), MTPJ fusion was the preferred treatment for the majority of respondents (90%; Table 4). Of these, 35% selected a plate and lag screw construct for fixation, while 30% opted for plate fixation alone. Joint replacement arthroplasty was chosen only by 5% of respondents.

Table 4: Preferred procedure for the correction of case 3 (Hallux Rigidus)

Procedure	Precent of Surgeons
1 st MTPJ fusion	90%
Keller	10%

Discussion

Despite the extensive range of surgical procedures described in the literature for hallux valgus and hallux rigidus, our study revealed that only a limited number of procedures are preferred by the majority of the Israeli orthopaedic foot and ankle surgeons surveyed. Four procedures minimally invasive Chevron-Akin osteotomy (MICA), distal Chevron osteotomy, first metatarsophalangeal joint (MTPJ) fusion, and first tarsometatarsal (TMT) fusion accounted for the majority of preferred treatments across the three cases analysed: 90% for Case 1, 95% for Case 2, and 90% for Case 3. These findings suggest that foot and ankle specialists are increasingly adopting modern surgical techniques such as MICA and focus on performing only few surgical procedures.

Minimally invasive surgery (MIS) for hallux valgus correction has gained increasing popularity in recent years due to its numerous advantages over traditional open procedures. This approach uses small incisions and specialized instruments, reducing soft tissue trauma, postoperative pain, and recovery time [10]. Advances in surgical techniques and imaging technology have improved the precision and outcomes of MIS, allowing for effective correction of deformities while preserving joint function [11]. Studies have shown comparable or superior results to open surgery in terms of alignment correction, patient satisfaction, and complication rates. As a result, MIS is becoming a preferred option for both patients and surgeons seeking less invasive solutions for hallux valgus [12,13].

This study highlights that, despite the wide variety of procedures described in the literature, most surgeons utilize a small subset of these options. Similar trends were observed in studies

conducted both in Switzerland and Australia, where only 4-5 procedures were preferred by the majority of orthopaedic surgeons surveyed. These studies also noted a preference among foot and ankle surgeons for more contemporary and up to date surgical procedures.

In contrast to our findings and the findings by Iselin, a survey of academic foot and ankle surgeons in the United States reported greater variability in preferences for treating severe hallux valgus [14]. Approximately 50% of respondents favoured a metatarsal osteotomy, 25% selected first MTPJ fusion, and another 25% opted for a Lapidus procedure. Similarly, a questionnaire involving 427 German foot and ankle surgeons revealed that open surgery remains the gold standard for hallux valgus treatment, with minimally invasive surgery employed by only 7% of respondents [15].

Our findings show very small differences in the surgical practices of Israeli foot and ankle specialists, reflecting the influence of the country's small size and its shared training programmes who apported similar paradigms. Despite the availability of numerous surgical options for hallux valgus, a limited number of procedures were preferred, aligning with findings from studies in Switzerland and Australia. Notably, even in bigger countries than Israel with more surgeons, the preference for modern surgical techniques persists, indicating that global foot and ankle specialists may be influenced by similar variables.

This study's strength lies in its specific focus on foot and ankle surgeons who perform forefoot surgeries, offering a precise insight into trends and preferences within the Israeli Orthopaedic Foot and Ankle Association. Moreover, the study includes a solid survey response rate of 73% enhancing the validity and generalizability of the findings. Additionally, all respondents actively perform foot and ankle surgeries, with the majority conducting over 50 forefoot cases annually.

The findings of this study, together with the results of similar studies conducted in Australia and Switzerland by Iselin et al, indicate that a generalization can be made, allowing for a comprehensive understanding of trends in forefoot surgery among foot and ankle surgeons worldwide.

However, the study has certain limitations. The structured nature of the questionnaire, which may have deterred responses or constrained surgeons' ability to fully describe their preferred surgical approaches.

In conclusion, while a wide array of surgical techniques is available for treating forefoot deformities, foot and ankle surgeons worldwide appear to concentrate on mastering a select number of procedures, particularly those that are more advanced and modern. These findings underscore a convergence in global surgical practices, reflecting shared influences and preferences in the field of foot and ankle surgery.

Declarations

- Human Ethics and Consent to Participate declarations: not applicable
- There was no funding to this study.
- All authors consent for publication.

- The data that support the findings of this study are not openly available due to reasons of sensitivity and are available from the corresponding author upon reasonable request.
- No Competing interests of any of the authors.
- All authors contribute equally to this paper.

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GG was responsible for designing the study, conducting the research, collecting and analyzing the data, and writing the manuscript. PS and LI assisted in conceptualizing the study, revising the manuscript, and providing guidance on the writing style.

Competing Interest declaration

No competing interest for any of the authors.

During the preparation of this work the author(s) used chatGPT4 in order to improve the quality of the English used to write the paper. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication

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