
CLINICAL ARTICLE

Comparison between unilateral and bilateral hallux valgus corrective surgery with respect to pain/tolerance and cost effectiveness

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Abstract

Background:

Bilateral sequential (under one anaesthetic) hallux valgus surgery is considered by many to be too debilitating and uncomfortable to the patient in the short term post-operative period (up to 6 weeks), and should be staged.

Method:

This retrospective study evaluates tolerance to pain, comfort and activities of daily living during the first 6 weeks post-operatively, as well as cost effectiveness in patients who had unilateral compared to those who had bilateral sequential forefoot surgery (limited to hallux valgus corrective surgery with/without lesser toe surgery). A questionnaire on pain and function was used. The functional outcome was graded by the AOFAS clinical rating system and the correction assessed clinically and radiologically.

Results:

The results for pain and patient tolerance/comfort profile over time, for the two groups did not differ significantly. Cost and time factors were shown to be more favourable ultimately, in the bilateral hallux valgus surgery group. Both the outcome score and clinical correction were comparable in the two groups.

Conclusion:

This study favours bilateral sequential hallux valgus correction (when indicated) without compromising the results, or patient comfort and function.

Introduction

The concern that bilateral hallux procedures will temporarily severely debilitate the patient in the immediate post-operative period (6 weeks) makes bilateral sequential forefoot surgery undesirable to many orthopaedic surgeons. Many surgeons will thus dissuade patients (who may require it) from undergoing bilateral bunion surgery despite requests by the patient to the contrary.

There is a paucity of information in the literature regarding this issue even though the debate rages on at academic meetings.

The hypothesis is that bilateral sequential forefoot surgery does not compromise results, or patients' comfort and functionality, or cost effectiveness.

Table I:
Additional information regarding the surgery

	Group A	Group B
Assoc Akin osteotomy	10	12 (7 bilateral, 5 unilateral)
Lesser toe surgery	10	8
Previous forefoot surgery	5	5
Bone graft from resected medial eminence	12	7
Bone graft from distal medial tibial metaphysis	5	10

Materials and methods

In this retrospective study, 36 patients were divided into two groups. Group A (n=18) consisted of patients who had unilateral forefoot surgery and Group B (n=18) had bilateral sequential forefoot surgery. They were not necessarily consecutive hallux patients (see discussion).

The two groups were comparable in age (Group A: 56 years [range 27–79], Group B: 53 years [range 35–77]); demographics; gender (Group A: 15 females and 3 males, Group B: 17 females and 1 male); and type of operative procedures.

The inclusion criteria were patients who had a basal opening wedge osteotomy using the Low Profile Plate and Screw System™ (Arthrex®, Naples, Florida, USA) and distal soft tissue release for moderate hallux valgus deformity (Hallux Valgus angle 20–40 degrees and Intermetatarsal I-II angle 13–20 degrees¹).

Associated surgical procedures are summarised in *Table I*.

The associated lesser toe surgery included a combination of hammer toes, Weil osteotomies and percutaneous extensor tenotomies.

The previous forefoot surgery had been carried out between 18 to 25 years prior to the present surgery.

Origin of the bone graft was not recorded in one patient from each group.

The post-operative protocol in both groups was the same:

- strict elevation for 2 weeks (allowing bathroom visits)
- stay home for at least 4 weeks (except for hospital visits weekly)
- minimum walking in post-operative shoes (with heel wedges) and crutches/walker. if unable to use crutches/walker, then wheelchair
- routine painkillers/non-steroidal anti-inflammatory agents.

A comprehensive questionnaire (*Figure 1*), compiled partly from the American Orthopaedic Foot and Ankle Society forefoot scale² and partly from frequently asked questions by patients, was telephonically conducted by an independent observer. This data was retrospectively collected.

Validation of questionnaire

Although some points of the questionnaire are from validated scoring systems,² there are other questions that have been included that have not been previously used. The rationale for using these questions (viz. function, sleeping, dependence and general comfort) is that these are aspects of daily living that could be affected by having bilateral surgery.

Questionnaire for hallux valgus (bunion) surgery (100)			
	Week 1	Week 3	Week 6
Pain (40)			
40 – none			
30 – mild occasional			
20 – moderate daily			
0 – severe, almost always present			
Function (30)			
<i>Activity limitations</i>			
20 – No limitations of daily activities (such as mobilising within the house (crutches, walker, wheelchair), eating, making tea, toilet visits			
10 – Limited daily activities			
0 – Severe limitation of daily activities			
<i>Bathing/showering</i>			
10 – Without help			
0 – With help			
Sleeping (10)			
10 – Sleeping through the night			
5 – Waking up between 3 and 6 times/night			
0 – Not sleeping			
Dependence (10)			
10 – Independent			
5 – Partially dependent			
0 – Totally dependent			
General comfort (10)			
For the bilateral:			
Would you recommend a bilateral or would you have preferred one foot at a time?			

Figure 1:

Questionnaire for hallux valgus (bunion) surgery with respect to pain and general tolerance

Also, the expert clinical psychologist stated that as these questions are used to compare two groups in the same study, validation as a general questionnaire is not indicated, and that the findings are valid purely as a comparison between groups. The patients had all been operated on within 20 months (range 12–30 months) prior to the questionnaire. Although the data were retrospectively recalled, despite the time lapse, all answers were readily forthcoming.³

Furthermore, the functional outcome was graded by the AOFAS clinical rating system for the hallux² and the correction assessed clinically and radiologically.

Results

Average theatre time was 77.22 minutes in Group A and 120.00 minutes in Group B.

The average stay in hospital was 1.4 days in Group A and 1.5 days in Group B.

Extensive statistical analysis was performed, where applicable, by the Biostatistics Department of the University of the Witwatersrand and DMSA (Specialists in Data Management and Statistical analysis). The data was normally distributed. Group A and B improved at a similar rate and their pain and functional scores at each time point were not significantly different ($p=0.2898$), as per the questionnaire totals (Group A at week 1 = 52.22; at week 3 = 71.38; at week 6 = 84.44; and Group B at week 1 = 49.44; at week 3 = 62.77; at week 6 = 78.33).

However there was a significant increase over time with respect to the total questionnaire of parameter scores (Figure 2).

Although it is understood that level of post-operative analgesia, post-operative protocol and concomitant lesser toe surgery can have a significant impact on short-term recovery, these were eliminated as variables as both groups had the same post-operative analgesia which did not include patient-controlled analgesia. The post-operative protocol and concomitant surgery was the same between the two groups.

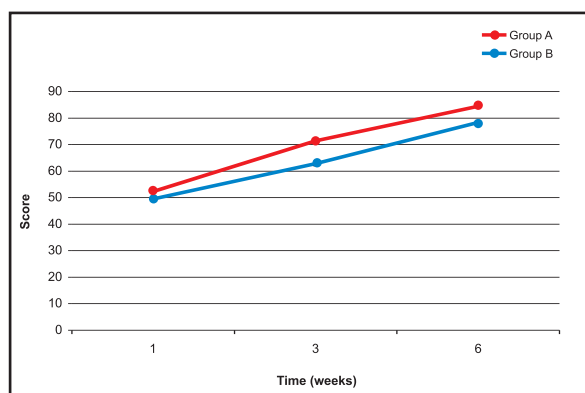


Figure 2:
Analysis of variance for repeated measures comparing Group A and B with respect to repeated scores of weeks 1, 3 and 6

One could also argue that the bilateral group would have more pain collectively, as more patients had bone graft harvested from the distal tibial medial metaphysis. However this was not the case.

No complications were encountered in these first 6 weeks.

The t-test was used to determine if there is any significant difference in the mean regarding the hallux valgus angle (HV) and intermetatarsal (I–II) angle (IM).

In Group A a highly significant difference was found between the pre- and post-operative hallux valgus angle with p-value of less than 0.0001 ($p<0.0001$).

Pre-operative mean=31.7 (SD=7.5); post-operative mean=18.9 (SD=6.2).

Similarly, a highly significant difference between pre- and post-operative intermetatarsal (I–II) angle was found with p-value<0.0001; pre-operative mean=14.86 (SD=2.69); post-operative mean=8.21 (SD=3.93).

In Group B, no significant difference in the mean of right versus left pre-operative angles was found for both hallux valgus and intermetatarsal angles with p-values of $p=0.932$ and $p=0.497$ respectively. Similarly, no significant difference in the mean of right versus left post-operative angles was found for both hallux valgus and intermetatarsal angles with p-values of $p=0.328$ and $p=0.833$ respectively.

In view of the above results an average between the left and right foot was therefore taken.

Comparing pre-operative to post-operative findings with respect to the hallux valgus and intermetatarsal angles in Group B, the right foot showed a highly significant difference ($p < 0.0001$) with the pre-operative mean=32.5 (SD=7.34) and post-operative mean=16 (SD=10.2) for the hallux valgus, and pre-operative mean=14.12 (SD=2.29) and post-operative mean=8.47 (SD=4.57) in the intermetatarsal angle.

Similar highly significant results ($p < 0.0001$) were found in the left foot. Hallux valgus pre-operative mean=32.71 (SD=4.18) and post-operative mean=14.74 (SD=8.3). Intermetatarsal pre-operative mean=14.64 (SD=2.21) and post-operative mean=8.24 (SD=3.42).

Finally, no significant difference was observed between the hallux valgus and intermetatarsal angles between Group A and Group B, neither pre-operative (hallux valgus: p-value = 0.71; intermetatarsal: p-value = 0.59) nor post-operative (hallux valgus: p-value = 0.32; intermetatarsal: p-value = 0.91).

Although the AOFAS score showed a highly significant difference between pre- and post-operation (p-value < 0.0001), pre-operative mean=46.86 (SD=12.05) and post-operative mean=87.14 (SD=10.68) in Group A and pre-operative mean=48.7 (SD=17.6) and post-operative mean 87.35 (SD=9.47) in Group B, the difference is not significant between Group A versus Group B, neither pre-operatively (p-value = 0.73) nor post-operatively (p-value = 0.95).

Discussion

A weakness of this study is that all data were retrospectively collected. However, patients felt that they could adequately recall their situation at 1, 3 and 6 weeks. The figures throughout each group and each time period matched relatively well indicating that this was probably true.

The patients chosen for this study were not consecutive as other hallux valgus procedures were also performed during the period from which the study patients were selected from. The study was limited to patients who had proximal first metatarsal open wedge osteotomy with fixations using the Low Profile Plate and Screw System™, (Arthrex® Naples, Florida, USA) and a distal soft tissue release. This was done in order to eliminate potential variables as much as possible by having the identical procedure and fixation in all the patients in both groups. Patients with different procedures for hallux valgus and means of fixation were left out of the study.

It is evident from the above that the patients undergoing bilateral sequential forefoot surgery are not any more compromised with respect to pain and tolerance than patients having one foot operated.

Average theatre time of 77.22 minutes in Group A compared to 120.00 minutes in Group B reflects 64% more theatre time in Group B, which in fact is approximately a 45% saving were the bilat surgery to be split into two sessions. This corresponds to a significant saving of theatre time cost.

Patients undergoing bilateral sequential forefoot surgery are not any more compromised with respect to pain and tolerance than patients having one foot operated

The average total hospital cost of R16 844.14 in Group A and R26 877.26 in Group B reflects a saving of approximately 20% if the procedure is done at the same time in bilateral cases. The patients in this study were specifically chosen, as all patients had identical implants used. As the implants used were the same in all patients, this factor is cost constant.

Furthermore, time off work and hours lost should be added to the general cost of the procedure if it were to be staged one foot at a time as this will impact on the cost effectiveness. The amount of man hours lost would vary from person to person depending on the work expected of them. The important fact however, is that each individual patient would take the same amount of time off their respective work when they have the second foot operated on at a later date.

Average return to work for Group A was 5.1 weeks (range: 2–10 weeks) and for Group B was 6.1 weeks (range: 4–9 weeks). Housewives and the unemployed were excluded.

It is also clear that although the correction achieved in both groups is significant, the corrections between the two groups were not significantly different.

Likewise the improvement in the AOFAS score is significant in the two groups – the difference in improvement between the two groups was not significant.

In Group B, 16 of 18 patients said they would have bilateral surgery again rather than two separate operations at different times.

Conclusion

In view of the above results regarding the two groups' tolerance to the short-term post-operative period, given the equal clinical results, the average total hospital costing and man hours lost, we conclude that bilateral sequential hallux valgus corrective surgery is feasible, equally tolerable, more convenient (for the patient) and certainly a more cost effective approach than unilateral surgery in a patient who requires to have both feet addressed surgically, without compromising the results of the procedure.

This is also reflected by 16 out of 18 patients in Group B who would have bilateral surgery again. These results may well be extrapolated to most bilateral forefoot surgery.

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