

Evaluating the Radiographic Change and Patient Satisfaction Following Bunion Surgery

Laura C. Vander Poel, DPM and Robert E. Marra, DPM
Saint Francis Hospital and Medical Center, Hartford, Connecticut

BACKGROUND:

One of these most common foot complaints presenting to foot and ankle specialists is hallux abducto valgus. It has been found to affect 23% of adults 18-65 years old and 35.7% of those greater than 65 years old.¹ Fortunately, there are a number of distal metaphyseal osteotomies that can be performed to surgically correct a mild to moderate deformity. This class of bunionectomies tend to have a high post-operative patient satisfaction; however, they often do not achieve the correction of the 1-2 intermetatarsal angle (IMA) and hallux abductus angle (HAA) that is desired. The purpose of this study is to examine the primary reasons patients choose to pursue surgical treatment, their opinion of the outcome of the surgery, and if any correlation between the patient satisfaction and degree of correction exists.

LITERATURE REVIEW:

Distal metaphyseal osteotomies for the correction of hallux abducto valgus are the most common means for surgical correction of a mild to moderate bunion deformity. Their popularity is due to their immediate or early return to weight bearing due to the inherent stability of the bone cuts as well as the variations available to correct in the multi-planar fashion.²

Evaluating the success of these procedures can be performed in a number of different ways including radiographic analysis and patient's satisfaction post operatively. The radiographic analysis of bunion deformities has been debated in recent literature to find the best possible method of evaluation of surgical correction. Coughlin et al. determined the precise reference points in the first metatarsal, second metatarsal and the proximal phalanx before and after a distal osteotomy for accurate readings of the IMA and the HAA.³ Research has also focused on manual versus computer assisted radiographic measurements. Computer assisted radiographic measurements appear to be more reliable, with less technical error and can be performed quicker than manual measurements.^{4,5}

The patient's perception of the surgical outcome and their quality of life following a distal metaphyseal osteotomy are the reasons these procedures are so widely used. Numerous prospective and retrospective studies have proven patients are pleased and their quality of life improves following surgical treatment of their bunion

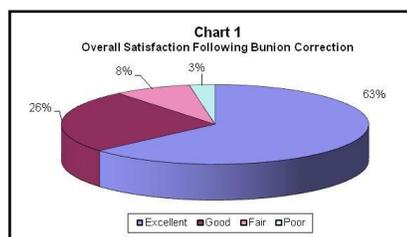
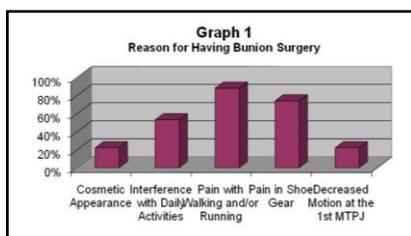
deformity.^{6,7,8,9,10} Despite the large number of studies supporting patient satisfaction following surgery, few have been able to correlate the level of satisfaction with the measured correction of the deformity. Goforth et al. aimed to fulfill this task with an eighteen month study and then a follow up five years later on patients that had single screw fixation of an Austin bunionectomy. They evaluated the clinical examination, radiographic data as well as a patient questionnaire of 45 procedures from 32 patients who had surgical correction. They found the IMA and HAA to be corrected and maintained and the patient satisfaction remained good to excellent in 96% of the procedures.¹⁰ Fifteen years after this study was published we are still performing this osteotomy frequently, however we question the true radiographic correction of the deformity this study, and others, states to be present.^{10,11}

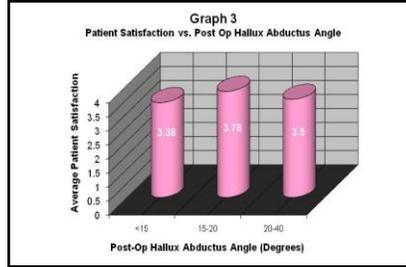
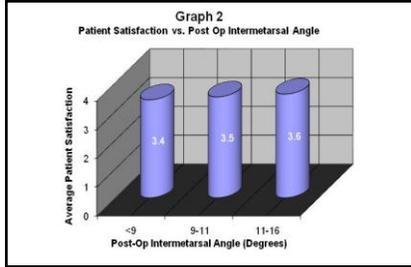
MATERIALS AND METHODS

One hundred and ninety three patients had either an Austin, Youngswick, or Long dorsal arm bunionectomy performed between January 6, 2005 and October 27, 2010 by a single provider. These patients were each sent a short patient satisfaction survey with questions probing the following areas: their perception of their bunion size, effect on daily activities, pain associated with the deformity, range of motion at first metatarsal phalangeal joint (MTPJ), and affect on shoe gear choice prior to and following surgery. In addition, it questioned their primary reason for having surgery, overall satisfaction with bunion correction, and if they would recommend bunion correction to a friend. All patients had returned to full weight-bearing status at the time the survey was sent. Ninety four completed surveys were returned, however patient were excluded if they were less than 18 years old, greater than 65 years old, had any additional procedures performed on either the proximal phalanx or first metatarsal at the same time, or if an incomplete weight bearing radiographic follow-up could be found. After the exclusion criteria was met, 77 patients (91 procedures) of which 72 females and 5 males encompassed our sample. The mean age at surgery was 47 (range, 18 to 64). Of the 91 procedures, 43 were on the right foot and 48 were on the left foot; 9 utilized screw fixation where as 82 used absorbable pin fixation. No single session-bilateral operations were performed; all bilateral procedures were staged with a minimum of a 3 month delay prior to correcting the contra-lateral side.

Radiographic evaluation of the pre and postoperative weight-bearing films of the 91 procedures were performed by a single evaluator, blinded to the survey results. The IMA and HAA were measured utilizing a computer assisted module on electronic radiographs. The IMA was determined by measuring the angle between the bisection of the second metatarsal and the bisection of the first metatarsal (both with reference points 1-2 cm proximal to the distal articular surface and 1-2 cm proximal to the proximal articular surface). The HAA was determined by measuring the angle between the bisection of the first metatarsal and the proximal phalanx (with reference points placed ½-1 cm proximal and distal to the articular surfaces).³

PATIENT DATA





Number of Patients	77	Number of Procedures Performed	91
Sex: Male: Female	5:72	Type of Fixation	
Average Age	49	Screw	9
Foot: Right: Left	43:48	Absorbable Pin	82

RESULTS

The mean IMA measured 12.4° (5 to 19°) pre-operatively and 8.9° (4 to 16°) post-operatively. The mean HVA measured 22.5° (4 to 38°) pre-operatively and 18.1° (-7 to 31°). The average decrease in IMA was 3.35°, and the average decrease in HVA was 4.4°.

Graph 1 indicates why the patient chose to have bunion correction, the primary reason being pain with walking and/or running (88.3% of patients). The lowest ranked reasons were cosmetic appearance and decreased range of motion. Chart 1 indicates the patients overall satisfaction with their bunion correction. **89.2% of patients rated their satisfaction with bunion correction as good or excellent.** Only 3% ranked their satisfaction as poor. In addition, 89.5% of patients would recommend bunion correction to a friend. **Graph 2** and **Graph 3** show the patient satisfaction based on the patients post-operative radiographic measurements, the IMA and the HAA respectively. There was little to no difference in patient satisfaction for the various post-operative angles.

DISCUSSION AND ANALYSIS

Quantitative angular measurements are used on a daily basis by foot and ankle specialists to assess the severity of hallux abducto valgus deformity and to determine which surgical treatment option is ideal for the patient. The angular measurements are then followed to assess the post-operative correction. This study indicates that the post-operative correction may not be a true assessment of the “success” of the surgery. The measured IMA has commonly been used to term hallux valgus either normal (<9°), mild (9-11°), moderate (12-16°) or severe (>16°).⁴ Despite the extent of the post-operative deformity, patients were generally satisfied with their surgical correction (**Table 2**). There was little

to no difference in satisfaction comparing a normal to a moderate deformity. The same was true with respect to the post-operative HAA (**Table 3**).

These results support the hypothesis that the true success of a distal metaphyseal osteotomy is not dependent on the post-operative radiographic correction. The success lies in the improved or resolved symptoms the patient initially presents with, and their reasoning for electing the surgical treatment. When bunion deformities affect daily living, causing pain when walking or running, and pain in shoes, patients make the choice to have the deformity corrected. These are the complaints we should aim to treat, rather than focusing on the quantitative measurements.

REFERENCES

1. Nix S, Smith M, Vicenzino B. Prevalence of hallux valgus in the general population: a systematic review and meta-analysis. *J Foot Ankle Research* 21: 1-9, 2010.
2. Banks AS, Downey MS, Martin DE, Miller SJ. McGlamry's comprehensive textbook of foot and ankle surgery, volume one, third edition. Section IV: First ray, hallux abducto valgus, and related disorders, pp 485-8, Philadelphia, 2001.
3. Coughlin MJ, Saltzman CL, Nunley JA. 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* 23:68-74, 2002.
4. Pique-Vidal C, Maled-Garcia I, Arabi-Moreno J, Vila J. Radiographic angles in hallux valgus: differences between measurements made manually and with a computerized program. *Foot Ankle Int* 27:175-180, 2006.
5. Srivastava S, Chockalingam N, Fakhri TE. Radiographic angles in hallux valgus: comparison between manual and computer-assisted measurements. *J Foot Ankle Surg* 49:523-8, 2010.
6. Thordarson DB, Rudicel SA, Ebramzadeh E, Gill LH. Outcome study of hallux valgus surgery – an AOFAS multi-center study. *Foot Ankle Int* 22: 956-9, 2001.
7. Morandi A, Dupplicato P, Sansone V. Results of distal metatarsal osteotomy using absorbable pin fixation. *Foot Ankle Int* 30: 34-8, 2009.
8. Tai CC, Ridgeway S, Ramachandran M, Ng VA, Devic N, Singh D. Patient expectations for hallux valgus surgery. *J Ortho Surg* 16:91-5, 2008.
9. Saro C, Jensen I, Lindgren U, Fellander-Tsai L. Quality-of-life outcome after hallux valgus surgery. *Qual Life Res* 16:731-8, 2007.
10. Goforth WP, Martin JE, Demrose DS, Sligh TS. Austin bunionectomy using single screw fixation: five-year versus 18-month follow-up findings. *J Foot Ankle Surg* 35:255-9, 1996.
11. Potenza V, Caterini R, Farsetti P, Forconi F, Savarese E, Nicoletti S, Ippolito E. Chevron osteotomy with lateral release and adductor tenotomy for hallux valgus. *Foot Ankle Int* 30: 512-6, 2009.

Gregory J. Matthews, Department of Statistics, University of Connecticut