CHAPTER **26**

RECURRENT HALLUX VALGUS: Treatment Considerations

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INTRODUCTION

Recurrent hallux valgus is defined as a postoperative hallux abductus angle greater than 20 degrees with less than 10 degrees of angular correction.[1] Recurrence has been noted to be among the most common complication associated with hallux valgus surgery.[2-5] Typically the term recurrence and undercorrection are used interchangeably (Figure 1).

Figure 1. Clinical image of recurrent hallux valgus.

ETIOLOGY

Many surgical procedures have been described in the literature for the correction of hallux valgus,[6] but a special knowledge of the etiologic factors, pathomechanics, and patient factors is needed to achieve a permanent solution for this deformity. There are two categories of recurrence: operative factors and patient factors. The main cause of recurrence associated with operative factors is improper procedure selection.[7] Other common causes include inadequate medial eminence resection, failure of lateral release, and hypermobility/ligamentous laxity. One can argue that failure to address other associated deformities in the phalanx, metatarsal, or sesamoids may also predispose a patient to recurrence (Figure 2).

There are multiple patient factors mentioned in the literature associated with hallux valgus and also the progression of hallux valgus. These include generalized diseases such as rheumatoid arthritis, gout, hypothyroidism, Parkinsonism, cerebral palsy, and hereditary neuromuscular disorders. Patient controllable factors also include compliance with weight bearing status and also shoegear choices. Special attention must be brought to juvenile hallux valgus, patients with generalized joint laxity, and arthritis of the first metatarsophalangeal (MPJ). In these cases, the chance of recurrence is noted to be higher (Figure 3).[7]

Figure 2. Improper procedure selection.

Figure 3. Progressive deformity.

LITERATURE REVIEW

In a retrospective study by Austin et al in 1981,[8] they reviewed 300 Chevron osteotomies over a 3 year period. They noted a 10% recurrence rate and stated it was associated with patients that had a preoperative hallux abductus angle of >35° and an intermetatarsal angle of >15°. Fokter et al,[9] in 1999 performed a retrospective study of the modified Mitchell osteotomy for hallux valgus correction in 105 feet. After an average of 21 year follow-up they noted a recurrence rate of 47% and associated this with a hypermobile first ray and an improper lateral release.

Kilmartin,[10] in 2002 wrote about a series of 244 revisional foot surgeries in a 4-year period. The mean time since the original operation was 9 years. A total of 66% were secondary to failed first ray surgery and 26% presented with a recurrent hallux valgus. The most common procedures previously performed were Mitchell distal metatarsal osteotomy, Keller arthroplasty, first metatarsophalangeal fusion, and Silver exostectomy. Recurrent hallux valgus accounted for 41.5% of all first ray revisional surgeries.

Daghino et al[11] in their multicenter study in 2003 compared the long term outcomes of the Regnauld arthroplasty with metatarsal osteotomy for hallux valgus. The distribution was 23 metatarsal proximal osteotomies (Juvara), 42 distal osteotomies (Reverdin-Green modified by Laird-Todd), and 7 phalanx osteotomies (Akin). Patients in the Regnauld study group showed under-correction or relapse of the deformity in 36% and 15%, respectively, whereas in the osteotomy group only 21% had partial undercorrection of the deformity.

In regards to hallux valgus and first ray mobility, a study by Faber et al examined the role of first ray hypermobility on outcome of a Hohmann osteotomy (50 feet) versus a Lapidus (51 feet).[12] They found a recurrence in 1 from the Lapidus group (2%) and 2 from the Hohmann group (4%). They concluded that there was no support to the choice of Lapidus over Hohmann for hypermobility. In a study by Kopp et al, they reviewed the results of a modified Lapidus for patients with hypermobility and reported a recurrence rate of 4%.[13] Similarly, Coughlin et al noted a recurrence rate in only 5% after performing a lateral release, crescentic osteotomy and if needed an Akin in 122 patients. A total of 20 patients were noted to have hypermobility prior to surgery and only 2 had residual hypermobility.[1]

Okuda et al[14] in 2007 analyzed radiographs of 60 recurrent hallux valgus cases (all female patients) where they studied the shape of the lateral edge of the first metatarsal head after hallux valgus surgery and classified the head as angular (type A), round (type R), or intermediate (type I), based on measurements taken with a geometric device (a Mose sphere). In this study they found significant relationship between round-shaped lateral edge of first metatarsal head and recurrent hallux valgus. They concluded that an identification of a round sign intraoperatively may allow for the modification of surgical procedures and improvement of the clinical results.

Saro et al in 2007 performed a prospective randomized controlled trial comparing a Lindgren osteotomy (50 feet) and Chevron osteotomies (50 feet). There were no recurrences in the Lindgren group and one in the Chevron group.[15] Kadakia et al performed 13 percutaneous distal metatarsal osteotomies without lateral release on patients with mild to moderate hallux valgus deformity.[16] They noted a recurrence rate of 38% and concluded that percutaneous distal metatarsal osteotomy was unacceptable for hallux valgus correction secondary to a high amount of complications.

PHYSICAL EXAMINATION

The patient needs to be carefully evaluated to determine foot posture as well as forces driving the deformity, presence of plantar callosities, and alignment of the great toe. Next is a detailed and specific examination including quality and quantity of range of motion at the first metatarsophalangeal joint as well as the first metatarsocuneiform joint. Evaluation of gastrocnemius versus gastrocsoleal equinus should be tested by performing the Silfverskiold test.[17] Attention needs to be paid to reducibility of the deformity and the presence of

metatarsalgia. Also, one needs to document if there are additional deformities that may have influence on the deformity of the first metatarsophalangeal joint (Figure 4).

RADIOGRAPHIC EXAMINATION

Standardized AP, MO, and lateral weight-bearing radiographs are imperative to evaluate bone and joint pathology. This evaluation includes bone quality, presence of osteophytes, narrowing of the joints, sesamoid position, length, width, and shape of the first metatarsal. It is imperative to reevaluate all angles including intermetatarsal angle, hallux abductus angle, hallux interphalangeus angle, metatarsus adductus angle, and size of the medial eminence. One should also note associated radiographic deformities including other digital abnormalities, midfoot osteoarthritis, or flatfoot deformity.

DECISION MAKING

The decision making process requires careful preoperative assessment, which includes a detailed history of onset and duration of symptoms as well as their severity. A complete physical examination, in-depth radiographic evaluation, and recognition of the deforming forces that require surgical correction are essential. These will lead to the most important decision: a joint sparing or destructive procedure. It is also important to address the patient's expectations, age, activity, occupation, family support and if the patient will be compliant with nonweight bearing postoperative instructions if necessary. It is important to know what the patient's prior procedure was and to know if bone grafting or any special fixation devices are needed. One must also determine and consider any other patient factors, such as the generalized systemic diseases mentioned. Once surgical intervention is decided upon, the patient needs to understand the postoperative regimen regarding nonweight bearing status, refraining from tobacco use (if this pertains), and the potential need for bone stimulation devices and physical therapy.

SURGICAL OPTIONS

Joint sparing is one of the methods for correction of a mild to moderate hallux valgus, which includes soft tissue realignment with or without exostectomy, distal osteotomy, proximal osteotomy or a combination of all 3. Joint destruction is a method described for correction of more severe hallux valgus with associated comorbidities. These include the Keller arthroplasty, metatarsophalangeal (MPJ) joint fusion, tarsometatarsal joint fusion, or a combination with a soft tissue procedure. Once surgery is elected, the goal is to err on the aggressive side when fixing a recurrent deformity, as resecting a less than optimal amount of bone will lead to future recurrence. The surgical procedure selected must be definitive.

In a review by Kitaoka et al[16] in 1998, 16 feet were evaluated in whom a salvage procedure with a crescentic osteotomy and concurrent soft tissue release was performed for recurrent hallux valgus. In this series of patients, all had first MPJ range of motion full and pain free with mild or no arthrosis. Complications reported included hallux varus, transfer metatarsalgia and nonunion.

A comparison between arthrodesis and resection arthroplasty for failed hallux valgus operation by Kitaoka et al[4] in 1998, retrospectively reviewed a total of 20 feet, 11 feet had the Keller procedure, and 9 had the arthrodesis procedure. The Keller group was observed for an average of 10 years and the arthrodesis group for an average of 5 years. The end results on the Keller group were 6 with good results, 4 with fair results, and 1 with poor results. Recurrence rate was 55%.[6,11] In the

Figure 4A. First metatarsal excursion.

Figure 4B. Range of motion of first MPJ.

Figure 5. Lapidus procedure incision planning.

Figure 6A. AP and MO radiograph Lapidus.

Figure 6B. Lateral radiograph Lapidus.

arthrodesis group, 6 had good results, 2 had fair results, and 1 had poor results with a recurrence rate of 33%.[3,9]

Coetzee et al[6] in a prospective observational cohort study in 2003 evaluated a Lapidus procedure performed for recurrent hallux valgus in 26 feet. The mean hallux valgus angle improved from 37.1 to 17.1 degrees and the mean intermetatarsal angle improved from 18 to 8.6 degrees. In their modified procedure they recommend that if the first metatarsal is more than 1 centimeter shorter than the second, a Weil osteotomy is to be performed on the second and third metatarsals. If greater than 2 centimeters, a lengthening of the first ray with an interpositional bone block fusion is required. Complications found included 3 nonunions (all in smokers) and 2 superficial wound infections. They concluded that the Lapidus procedure is a reliable option for revision after failure of hallux valgus surgical treatment.

Arthrodesis of the first MPJ can be done as a salvage procedure after failed Keller-Brandes arthroplasty. Vienne et al evaluated the results of 22 feet at an average follow up of 34 months.[19] In this study, the average preoperative hallux valgus angle of 24 degrees was corrected to 16 degrees postoperatively ($P < 0.001$), and significant decrease of pain and marked functional improvement of the forefoot were achieved.

First MPJ arthrodesis as a treatment for failed hallux valgus surgery was also evaluated by Grimes and Coughlin[20] in 2006 in a total of 33 feet over a 20 year period. The recurrent hallux valgus accounted for 55% of failed surgeries. After surgery, results were reported as excellent in 13 feet (39%), good in 11 feet (33%), fair in 8 feet (24%) and poor in one foot (3%). They reported one subsequent recurrent hallux valgus first MPJ fusion with a hallux valgus angle of 35 degrees.

RECOMMENDATIONS

At our institution, we prefer to address recurrent hallux valgus with a Lapidus procedure. This is, of course considering the patient does not have osteoarthritis in the first metatarsophalangeal joint. We will perform a dorsal incision from the cuneiform, extending to the base of the proximal phalanx (Figure 5). Dissection will begin distally and the interspace will be exposed and release of the deep transverse intermetatarsal ligament, adductor tendon, and the lateral sesamoidal ligament will be performed.

After release, attention will then be directed to the first metatarsal-cuneifrom joint. The joint will be exposed and

Figure 7. Postoperative view.

held open with a laminar spreader. The joint will then be denuded of all cartilage and then fish-scaled and fenestrated with a 2.0mm drill bit. The deformity is reduced and then a 1.6 mm Kirschner wire will be directed from the cuneiform to the metatarsal base being aimed just lateral to the midline of both bones. Another 1.6 mm wire will be directed from the base of the first metatarsal to the medial cuneiform and this wire will be just medial to the midline of both bones. Both wires are then overdrilled with a 3.5 mm cannulated drill bit. The top hat from the Synthes small fragment set (Synthes, Westchester, PA) will then be placed in the overdrilled area and the wire then removed. A 2.5 mm drill will then be used to complete the drilling. A 3.5 mm Synthes screw will then be placed after proper length is measured. C-arm fluoroscopy is then utilized to ensure proper alignment and correction (Figure 6).

If more correction is desired, a third 3.5 mm screw may be placed from the base of the first metatarsal to the base of the second metatarsal (Figure 7). The area is then closed in layers and the patient placed in a modified Jones compression dressing with a posterior splint. The patient is then non-weight bearing for a period of around 6-8 weeks.

SUMMARY

As with any other surgical intervention, all conservative therapy should be exhausted first. When deciding on surgery, one must take into account all the aforementioned factors. It is of utmost importance when performing recurrent hallux valgus surgery to pick the proper procedure. If the patient has DJD of the first metatarsal, it is recommended that a first MPJ fusion be performed. If there is no evidence of DJD, then a Lapidus is the procedure of choice. We also recommend an extended period of nonweight bearing for patients undergoing recurrent hallux valgus surgery.

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