REVISIONAL HALLUX VALGUS SURGERY

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Recurrence of deformity is one of the more common complications in hallux valgus surgery (1-3). The deformity may have been undercorrected with an inadequate procedure or spuriously repaired with an inappropriate procedure. At times the recurrence may present despite apparently adequate correction. In any case, the management of the recurrent deformity is an unpleasant task requiring good doctor-patient relationships and careful deliberation to revise the procedure appropriately.

In assessing recurrent hallux valgus deformity, attention to the patient's complaint should take precedence over the surgeon's dissatisfaction with the result. The surgeon often concentrates on the recurrence of the dorsomedial prominence of the first metatarsal head. The patient may only be describing painful limitation of joint motion and be completely satisfied with the amount of correction. Defining the patient's complaint is an important consideration in revisional surgery.

ETIOLOGY AND TREATMENT

Even seemingly appropriate surgery with satisfactory intra-operative correction can result in recurrence. Ascertaining the etiology of recurrent hallux valgus can be difficult. Several factors must be considered when evaluating the deformity. Efforts to discover the cause of recurrence may be aided by dividing recurrences into three types (Table 1.).

Type I recurrences consist of those deformities in which structural correction was never obtained. Undercorrections are usually the easiest to evaluate. The increased intermetatarsal angle and/or hallux abductus angle was never adequately repaired. Type II recurrences include those deformities which appeared satisfactorily corrected intra-operatively but recurred shortly after the surgery. Finally, type III recurrences are comprised of those deformities which for one reason or another, insidiously recur after a substantial period of time.

Treatment may then be based on the type of recurrence and should be aimed at alleviating the deforming force.

Type I Recurrent Hallux Valgus

Deformities which have had an attempt at surgical correction that did not adequately reduce the intermetatarsal and/or hallux abductus angle are classified as type I recurrent hallux valgus. *Recurrent* is probably a misnomer for this form of surgical failure since the deformity was never actually corrected. Residual hallux valgus may be a more appropriate term.

Type I recurrences may result from performing an inadequate procedure such as a simple exostectomy in a patient with a significantly increased intermetatarsal angle (Fig. 1). Insufficient capital fragment displacement or base wedge resection are other likely causes. In either form of osteotomy the lack of fixation or fixation failure can result in displacement and recurrence of deformity. Failure to recognize and address associated deformities such as hallux valgus interphalangeus may be another cause of type I recurrence (4).

Treatment of type I recurrences is directed toward the structural deformity which continues to exist. Undercorrection of hallux valgus deformity may simply be the result of improper intra-operative assessment. While performing the surgical revision the forefoot should be loaded to simulate weightbearing while assessing the degree of correction. Special consideration may be required depending on the osseous integrity remaining following the previous surgery. Realignment of displaced distal osteotomies will often require careful application of internal fixation such as stainless steel wire loop, crossed Kirschner-wires (K-wire), or even screws (5, 6). The use of intra-operative x-rays is another grossly neglected technique of evaluation.

Type II Recurrent Hallux Valgus

Hallux valgus deformities which recur after a brief period of apparently adequate correction are termed type II. In this type recurrence the deformity reappears within weeks to a few months following surgical repair. Displacement of osteotomies can be an early cause of type II recurrences, especially if delayed union develops or internal fixation is removed prematurely.

Table 1.

CLASSIFICATION OF RECURRENT HALLUX VALGUS

TYPE	TIME LAPSE BETWEEN SURGERY AND RECURRENCE	POSSIBLE REASONS FOR THE RECURRENCE
I	Immediate	1. Inadequate exostectomy 2. Exostectomy only with increased intermetatarsal angle 3. Failure to assess the correction obtained intra-operatively with the foot in loaded position 4. Poor choice of procedure 5. Displacement of osteotomies
II	Weeks To Few Months	1. Reliance on soft tissue procedures to correct structural deformities 2. Late displacement of delayed or non-union fragments 3. Failure to perform muscle-tendon balance about the first metatarsophalangeal joint 4. Inappropriate or inadequate osteotomy utilization
III	Several Months To Years	1. Failure to control pronatory forces such as equinus 2. Rheumatoid arthritis - progressive disease 3. Spasticity of lower extremity muscles 4. Ligamentous laxity

Another possible cause is seen when soft tissue manipulations such as capsulotomy, capsulorrhaphy, or tendon transfer are relied upon to maintain a structurally uncorrected deformity. This should not be misconstrued to imply that muscle-tendon balance is unimportant in hallux valgus repair. In fact, failure to alleviate the aberrant lateral direction of pull of the flexor hallucis longus by adductor hallucis release and sesamoid relocation may be another significant cause of type II recurrence (Fig. 2).

Probably the most typical cause of type II recurrent deformities is related to the choice of osteotomy performed on the first ray. Correction of hallux valgus with medial cuneiform, first metatarsal, and proximal phalangeal osteotomies have all been described. The success or failure of each of the techniques will depend on many factors. In general, the degree of correction is related to the realignment of the first metatarsal with sufficient decrease of the intermetatarsal angle and decrease in the hallux abductus angle. Procedures which tend to neglect either of the above deformities are at a greater risk of failure. The classic example of this is the use of the Akin phalangeal osteotomy as an isolated procedure to repair the entire complex deformity of hallux abducto valgus with associated metatarsus primus adductus (Fig. 3).

The Akin procedure does not decrease the intermetatarsal angle and when performed alone results in a significant incidence of recurrence of hallux valgus deformity (7).

Decreasing the intermetatarsal angle by osteotomy of the first metatarsal has proven to be an effective means of hallux valgus repair. Choosing the level of the

Fig. 1. This hallux valgus deformity was treated with minimal incisional technique. Simple exostectomy is destined to failure in this condition since neither muscle-tendon balance nor structural realignment was obtained in this moderately severe deformity.

Fig. 2. Recurrence of hallux valgus despite distal first metatarsal displacement osteotomy with fixation and proximal phalangeal wedge osteotomy. Muscle-tendon balance about first metatarsophalangeal joint was apparently neglected or inadequately treated as evidenced by lateral subluxation of sesamoid apparatus.

Fig. 3. Basilar phalangeal osteotomy with metatarsal head exostectomy was used in this failed attempt to correct moderately severe deformity. Level of deformity is clearly at metatarsal segment and appropriate correction with osteotomy of first metatarsal will be required to revise this recurrent deformity.

osteotomy has generally been related to the severity of the deformity. Most authors feel that distal first metatarsal osteotomies should be restricted to use in mild to moderately severe deformities. The deformity with a large intermetatarsal angle is best corrected by osteotomy or perhaps arthrodesis at the first metatarsal base region. Although guidelines for the proper use of first metatarsal osteotomies have been suggested based on the intermetatarsal angle few objective reports have been presented to support these criteria (8). The surgeon must often rely on his own experience to determine the realistic parameters of each osteotomy procedure.

Treatment of the type II recurrence is directed at correction of the structural deformity, as was the case in type I recurrences. When performing the revisional surgery the osseous integrity and alignment should be carefully assessed prior to surgery. Careful attention is given to joint congruity and muscle-tendon balance about the first metatarsophalangeal joint.

Recurrences following isolated Akin or Akin-McBride procedures will require careful attention to hallux alignment since decrease in the intermetatarsal angle by metatarsal osteotomy may result in an adductus position of the hallux. In cases in where a distal metatarsal osteotomy has resulted in recurrence sesamoid displace-

Recurrences following isolated Akin or Akin-McBride procedures will require careful attention to hallux alignment since decrease in the intermetatarsal angle by metatarsal osteotomy may result in an adductus position of the hallux. In cases in where a distal metatarsal osteotomy has resulted in recurring sesamoid displacement one should carefully evaluate the lateral aspect of the joint to ascertain adequate release. Failure to perform adductor tendon and fibular sesamoidal ligament release is a common cause of recurrence (Fig. 4).

Caution should be used to prevent overcorrection during management of recurrences, since simple muscle-tendon balance may be all that is needed to reduce and maintain correction. This would be true only in instances where adequate structural correction was previously obtained.

Type III Recurrent Hallux Valgus

The last type of recurrent hallux valgus occurs after a significant period of apparent lasting correction. This is termed type III recurrent hallux valgus. The conditions which result in type III recurrence include extraneous forces such as pathologic pronation or muscle spasticity (9, 10). Patients with undiagnosed rheumatoid arthritis may have continued expression of their disease resulting in fibular drift of all digits including the hallux. Pan metatarsal head resection with or without implant arthroplasty of the first metatarsophalangeal joint will often be required in the rheumatoid patient with recurrent hallux valgus secondary to the disease.

Discerning the etiology of the type III recurrent hallux valgus condition will require ruling out the above mentioned causes. Pronatory forces should be controlled following the surgical revision if that is found to be the cause of the recurrence. The influence of equinus should not be underestimated and tendo Achillis or gastrocnemius lengthening may be performed as an adjunct to the hallux valgus revisional surgery. In other instances the patient may be placed in a raised heel shoe to compensate for equinus.

Failure to recognize or alleviate spasticity of leg and foot musculature can also result in late recurrence of hallux valgus (Fig. 5). The deforming influence of spastic muscles is sometimes difficult to predict and even type II recurrences may occur in the presence of severe instances of spasticity. Tendon transfer and/or arthrodesis procedures will usually be required to prevent further recurrence or additional deformity in the presence of spasticity.

Fig. 4. Dissection of first intermetatarsal space of left foot is shown. Note attachment of adductor hallucis tendon remains intact in this recurrent hallux valgus deformity. Release of fibular sesamoidal ligament and adductor hallucis from their insertion into fibular sesamoid will be necessary to complete surgical revision.

SPECIAL CONSIDERATIONS IN REVISIONAL HALLUX VALGUS SURGERY

Each individual case of recurrent hallux valgus is unique and challenging. The surgeon performing the revision must be able to objectively evaluate the recurrent deformity. At times objectivity can be difficult if the surgical failure is ones own. Occasionally, it may be wise for the surgeon to seek the opinion of a peer to insure rational decision making. Realistic expectations on the part of the surgeon and the patient should delineate not only the means of surgical intervention but also the extent to which conservative methods should be exhausted.

Although it is difficult to categorize recurrent hallux valgus cases there are a few special considerations and circumstances which may be common among these deformities. The timing, osseous and soft tissue integrity, and patient's complaint all play an important role in the treatment.

Tissue plane dissection is important in revisional surgery. Delamination of soft tissues and lysis of adhesions will often be necessary to adequately mobilize the first metatarsophalangeal joint. Identification of pathologic and iatrogenic anatomic relationships is best accomplished through anatomic dissection techniques. Surgical hemostasis although usually obtained easily with careful anatomic dissection may in some instances warrant the use of a tourniquet.

Finally, the importance of careful dissection and preservation of blood supply to the first metatarsal head has been stressed by many authors. Previous surgery about the first metatarsal creates an increased risk of avascular

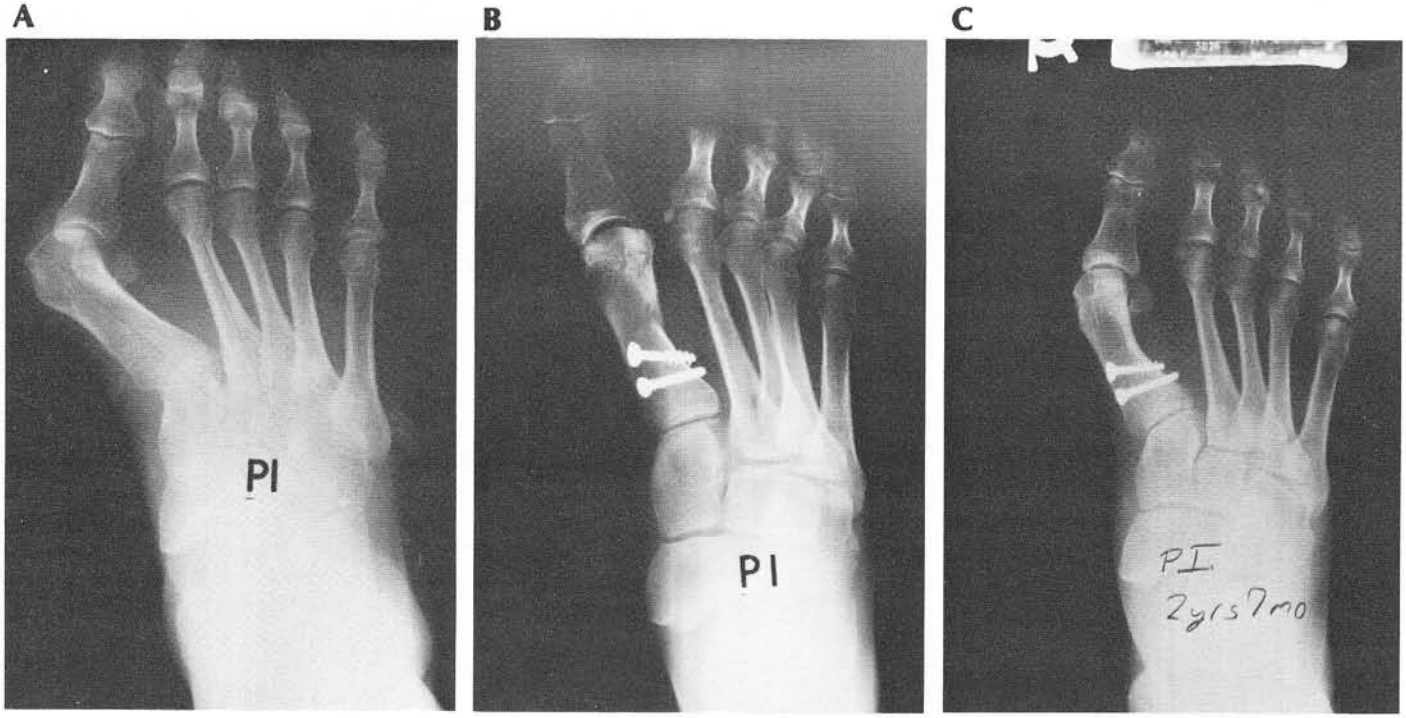

Fig. 5. A. This 20 year old male presented with severe hallux valgus deformity and spastic paralysis of tibialis anterior muscle. B. Correction of the severe hallux valgus deformity was obtained with proximal first metatarsal wedge resection and modified McBride Procedure. C. Profound recurrence of deformity is seen secondary to continued influence of spastic muscle pull. Hindsight suggests arthrodesis at first metatarsocuneiform joint may have been more appropriate.

necrosis of the first metatarsal head. This simply reinforces the need for meticulous dissection.

The osseous integrity is often compromised by previous bunionectomy. Staking of the metatarsal head without true correction of the hallux valgus deformity is unfortunately a commonly seen complication. Management of this situation may require joint realignment with capital fragment wedge resection such as a Reverdin osteotomy. However, in some cases exostectomy may have been too extensive to allow joint realignment. In such instances, metatarsal head resection with or without implant arthroplasty may be required. Allogenic osteochondral grafting had been suggested but not yet proven as useful in this situation (personal communication, E. Dalton McGlamry, D.P.M., 1988).

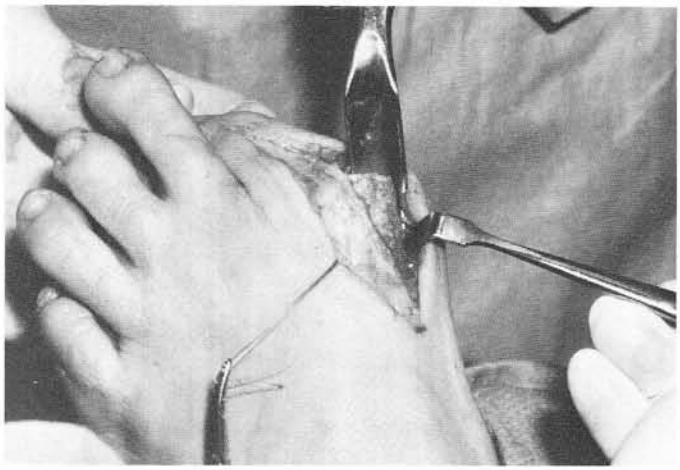

Fig. 6. Delamination and release of adhesions will often be necessary in revisional hallux valgus surgery. McGlamry metatarsal elevator is shown releasing fibrous adhesions about sesamoid apparatus which were causing limitation and motion.

CONCLUSION

A discussion of recurrent hallux valgus deformity has been presented. A classification of the types of recurrent hallux valgus has been suggested as a tool for determining the etiology and possible techniques for revision. Since prevention is usually the best medicine, an understanding of the etiology of the recurrence is suggested as crucial in preventing similar surgical failures.

It is the objective of this chapter to aid the foot surgeon in anticipating possible pitfalls with various procedures and to avoid their occurrence. Prevention is still the best treatment for complications of any type.

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