HALLUX ABDUCTO VALGUS CORRECTION IN THE GERIATRIC PATIENT

Thomas J. Merrill, D.P.M.

"It is better to know what sort of patient has the disease than to know what disease the patient has."

The term "geriatric" describes age, though the age of the patient may have little reference to the choice of a hallux abducto valgus procedure. Age is not an indication for a certain procedure. What we really mean when we say "do this for a patient that age" is "do this for a patient with potentially advanced degenerative joint disease, decreased ambulation requirements, osteoporosis, an apropulsive gait, extensive soft tissue contractures, etc." The wide spectrum of health factors in the older patient demand an even greater attention to the individual selection of a surgical procedure. A "young" 70 year old is not an "old" 65 year old. Age is relative.

There are several procedures most commonly used for the geriatric hallux abducto valgus deformity:

1903 Closing base wedge osteotomy
1904 Keller arthroplasty
1928 McBride bunionectomy
1952 McKeever arthrodesis
1972 Implant arthroplasty
1982 Reverdin osteotomy with reverse buckling

Of these procedures, the Keller, the implant arthroplasty, and McGlamry's use of the Reverdin have been the only procedures with specific reference to their use in a geriatric patient. The Keller bunionectomy has been described for the patient "who is considered essentially a house-bound ambulator."

This list does not include distal osteotomies for several reasons. A long standing deformity usually presents with a large first intermetatarsal angle. Osteoporosis is also a factor. One study has correlated age to patient dissatisfaction with distal osteotomies and concludes "perhaps older patients have greater expectations." One study stated that of 116 implant arthroplasties performed, only 8% of the patients with an absence of a complicating systemic disease were under age 50.

For the purpose of this discussion, the patient is an acceptable surgical candidate, medically and emotionally. We will address a long standing deformity with a severe hallux abducto valgus and a large intermetatarsal angle. Several factors can inhibit a surgeon from using the "ideal" procedures that would be indicated for a younger patient with a similar deformity. A very large intermetatarsal angle should "ideally" be addressed with a base wedge osteotomy. The geriatric patient may have osteoporosis with loss of bone strength. This loss could interfere with the fixation and healing of the base osteotomy. Also, the patient may not be able to tolerate six weeks of non-weight bearing on the operative foot. The decision to abandon a base wedge osteotomy for fear of complications would appear to be choosing a more conservative approach. In reality, we are asking a combination of several less powerful procedures to go beyond their typical function. To accomplish this, each of these lesser procedures must be executed precisely to maximize their effectiveness.

RADIOGRAPHIC EXAMINATION

Several areas should be noted in the preoperative radiographs. Osteoporosis can be evaluated by examining the subchondral bone and metaphyseal areas of the metatarsals in the dorsal plantar radiograph, and the calcaneus in the lateral projection. The distance between the lateral process of the talus and the floor of the sinus tarsi can indicate the relative position of the subtalar joint in angle and base of gait. A patient with a fully pronated position probably does not resupinate during the forefoot loading phase of the gait cycle. This can be correlated to the strength of the tibialis posterior tendon in the clinical examination.

Asymmetrical joint space narrowing, or flattening of the lateral edge of the metatarsal head can indicate if a Reverdin osteotomy is needed. The proximal articular set angle is very difficult to measure on a radiograph and is more accurately evaluated intraoperatively. The shape and size of the fibular sesamoid can indicate if it should be removed. The fibular sesamoid is displaced laterally-

and dorsally in relation to its normal articular surface beneath the metatarsal head. There are tremendous dynamic forces placed on the fibular sesamoid in this abnormal position. It is the fulcrum point for the tension band effect of the lateral head of the short flexor tendon. As the protective articular cartilage is eroded, degeneration and microfracture of the subchondral bone leads to the jagged, hypertrophy appearance of the sesamoid. These radiographic changes are an indication to remove the sesamoid. The degree of proximal shift of the fibular sesamoid in relation to the tibial sesamoid can indicate if the lateral head of the flexor hallucis brevis tendon should be released. Obviously, this is not a factor if the sesamoid is excised.

The angulation of the first metatarsocuneiform joint and the separation of the first cuneiform from the second metatarsal may indicate the transverse plane flexibility of the first metatarsal. This mobility or lack of it will be critical to the surgical selection process.

CLINICAL EXAMINATION

The transverse plane mobility of the first metatarsal cannot be directly evaluated until the plantar lateral contractures are released intraoperatively. However, the sagittal plane mobility can be evaluated by maintaining the subtalar joint in neutral position, thus locking the midtarsal joint, and dorsiflexing the first metatarsal. This sagittal plane flexibility usually predicts the transverse plane flexibility.

The deformity of the second digit is usually present with a long standing hallux abductus deformity and certainly needs to be addressed. Many times this will be the chief complaint of the patient. The patient should be educated as to how this relates directly to their bunion deformity and the difficulty associated with attempting to correct one without the other.

The gait cycle is evaluated specifically for resupination of the foot during forefoot loading and the presence of extensor substitution during the swing phase. An apropulsive gait will have no resupination of the subtalar joint to stabilize the forefoot during toe-off, and extensor substitution could indicate a posterior equinus.

INTRAOPERATIVE DECISIONS

The final selection of procedures is usually made in surgery. Specifically for a geriatric patient, there are four procedures that may be preferable: the Reverdin, the base wedge osteotomy, implant arthroplasty, and the Keller. These options are explained to the patient with the understanding that the decision may be made intraoperatively.

Reduction of the Hallux Abductus

The sequential reduction of the hallux abductus deformity requires the anatomic release of all soft tissue contractures and follows the concepts of anatomic dissection of the first metatarsophalangeal joint:

1. deep transverse intermetatarsal ligament
2. adductor hallucis tenotomy
3. fibular sesamoidal ligament

The following procedures are determined intraoperatively as needed:

1. lateral capsulotomy
2. lateral head of flexor hallucis brevis tenotomy
3. fibular sesamoidectomy
4. extensor hallucis brevis tenotomy
5. extensor hallucis longus lengthening
6. adductor hallucis tendon transfer

The severe hallux abductus with the associated adaptive soft tissue contractures may prevent the relocation of the joint even after this thorough sequential release. If the hallux abductus cannot be reduced, a Keller arthroplasty, McKeever arthrodesis, or an implant arthroplasty are indicated.

Reduction of the Metatarsus Primus Adductus

After the total sequential release of the first metatarsophalangeal joint, the transverse plane flexibility of the first metatarsal is assessed. The hallux is adducted to a congruous position. The medial base of the proximal phalanx is placed in the sagittal groove of the metatarsal head to establish anatomic reduction of the joint. The relative alignment of the hallux to the metatarsal or the PASA and DASA are now evaluated. If the hallux remains in an abnormal abducted position, a Reverdin or Akin is indicated. An advantage of the Reverdin osteotomy is that it is actually performed in the non-weight bearing portion of the first metatarsal, distal to the sesamoid articulation. Akin osteotomies have not been successful with an associated large intermetatarsal angle.

The principles of the Reverdin osteotomy, physiologic hallux adductus, and reverse buckling are dependant on the flexibility of metatarsal in the transverse plane. This flexibility is evaluated by adducting the hallux and producing a retrograde force on the metatarsal head to close the intermetatarsal angle. If the hallux is in satisfactory alignment and there is "lateral tracking of the hallux with dorsiflexion", the plantar lateral structures are not

fully released. Excision of the fibular sesamoid is often necessary at this point. The lateral structures must be totally released before the transverse plane mobility of the first metatarsal can be accurately evaluated.

If the adduction deformity of the first metatarsal is rigid, and the intermetatarsal angle cannot be reduced, a base osteotomy or arthrodesis is indicated. Although about 50% of the patients sampled had rheumatoid arthritis as the primary indication for this procedure, one study showed a direct relationship between the preoperative IM angle and the reduction in the IM angle with an arthrodesis. The average age at the time of the arthrodesis was 61.

A closing wedge osteotomy has a definite advantage over an opening osteotomy that would require the healing of a bone graft. A transverse base wedge osteotomy has several advantages over an oblique base wedge osteotomy in a geriatric patient. The only advantage of an oblique osteotomy is to facilitate screw fixation. Kirschner wires will usually provide better fixation than screws in bone that has decreased density. The transverse osteotomy is also inherently more stable than an oblique osteotomy if the fixation should fail.

The decision for an implant arthroplasty can not be made without addressing the intermetatarsal angle and the degree of osteoporosis. The implant does not have the strength to correct an osseous deformity and requires adequate bone strength to hold the implant over time.

SUMMARY

The surgical correction of a geriatric hallux abducto valgus deformity is in many ways more challenging than the procedure in a younger patient. Systemic complications and the limited procedure choice requires additional attention to radiographic, clinical, and intraoperative decisions.

Bibliography

McGlamry ED, Feldman MH: A treatise on the McBride procedure. *J Am Podiatr Assoc,* 61:161-173, 1971.

Butlin WE: Modifications of the McBride Procedure. *J Am Podiatr Assoc* 64: 585-602, 1974.

Martin WJ, Mandracchia VJ, Aiken S: A preliminary analysis of fibular sesamoidectomy in the McBride Bunionectomy. *J Am Podiatr Assoc* 73: 577-580, 1983.

Fenton CF, Gilman RD, Yu GV: Criteria for joint replacement surgery in the foot. *J Am Podiatr Assoc* 72: 535-538, 1982.

Wrighton JD: A ten year review of Keller's operation. *Clin Orthop* 89: 207-214, 1972.

Fenton CF, McGlamry ED: Reverse buckling to reduce metarsus primus varus. *J Am Podiatr Assoc* 72: 342-346, 1982.

Hattrup SJ, Johnson KA: Chevron osteotomy: analysis of factors in patients' dissatisfaction *Foot Ankle* 5: 327-332, June, 1985.

Cavaliere RG, Ruch JA: Fixation of first metatarsal osteotomies. In McGlamry ED, McGlamry R (eds): *Doctors Hospital Podiatry Institute Seminar Manual* Atlanta, Doctors Hospital Podiatry Institute,1985, pp 136-139.

Zlotoff H: Swanson flexible hinge toe implant. *J Am Podiatr Assoc* 73: 347-355, 1983.

Mann RA, Katcherian DA: Relationship of metatarsophalangeal joint fusion on the intermetatarsal angle. *Foot Ankle* 10: 8-11, 1989.