PES VALGUS INDUCED DEGENERATIVE ARTHROSIS

D. Scot Malay, D.P.M.

Pathologic pes valgus deformity is a complex pedal entity that requires early, aggressive biomechanical and/or surgical intervention while the deformity is still flexible (Fig. 1). The deformity consists primarily of frontal plane heel eversion, transverse plane forefoot abduction at the midtarsal joint and sagittal plane collapse of the medial column. A wide variety of clinical entities may be identified with respect to etiology and pathogenesis of pes valgus deformity, including: forefoot varus, flexible forefoot valgus, limb torsional malalignments, ankle joint equinus, congenital calcaneovalgus, and ligamentous laxity. We have noted the presence of ankle equinus in practically all cases of pes valgus. This type foot, while still flexible, compensates during weightbearing by means of maximum subtalar joint and oblique midtarsal joint pronation, supinatory forefoot torque (supinatus) about the longitudinal midtarsal joint axis with resultant medial column breech, and LisFranc joint complex breakdown (Fig. 2). Moreover, hallux abductovalgus, hallux limitus/rigidus, hammertoes, metatarsalgia, and heel spur syndrome may develop secondary to distal hypermobility and strain upon the plantar fascia. Moreover, severe hindfoot valgus can induce painful calcaneofibular impingement.

The lateral radiograph will reveal an anterior break in the cyma line, and marked declination of the talus relative to the first metatarsal. The dorsoplantar radiograph reveals an increased talocalcaneal angle. The clinician must accurately distinguish this pathological, destructive type of pes valgus from the benign condition pes planus which is without gross clinical or radiographic heel eversion, forefoot abductus, or medial column breech. Furthermore, the clinician must distinguish collapsing pes valgo planus from more rigid forms of pes valgus such as tarsal coalition, improperly reduced clubfoot, and congenital vertical talus. Acute traumatic events such as tarsal fracture/dislocation (especially involving the calcaneus) and rupture of the tibialis posterior tendon may also affect pes valgus deformity.

Fig. 1. Pes valgus deformity.

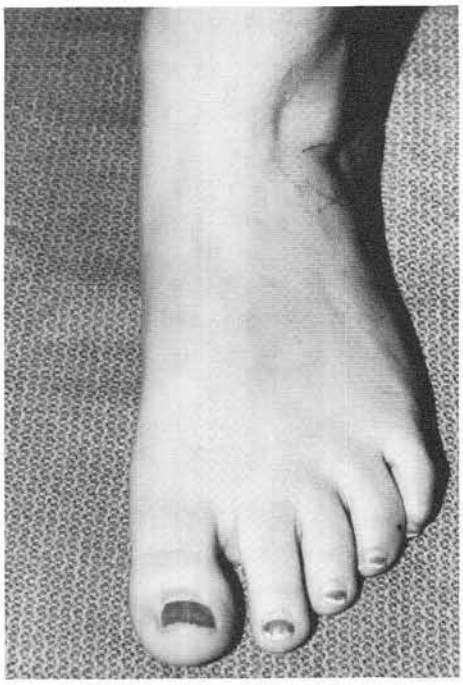

Fig. 1. A. Collapsing pes valgus in adolescent female.

Fig. 1. B. Long standing bilateral pes valgus with degenerative arthrosis.

PATHOGENESIS OF DEGENERATIVE JOINT DISEASE

From a clinical perspective, degenerative joint disease is synonymous with the terms osteoarthritis, osteoarthrosis, and arthrosis. This condition is essentially a noninflammatory response of the joint to injury. Injury may take the form of chronic microtrauma, acute traumatic events such as fracture/dislocation (Fig. 3), and changes secondary to metabolic diseases such as gout or to rheumatoid arthritis. Chronic wear of the hyaline

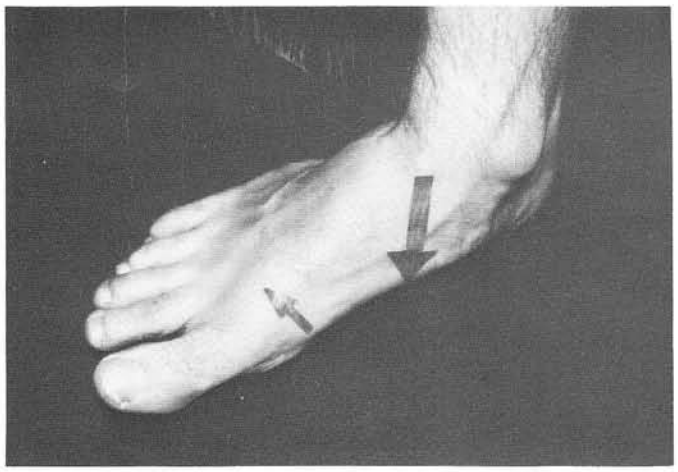

Fig. 2. Hyperpronation of subtalar joint and oblique midtarsal joint during late midstance and propulsion, affecting supinatory twist of forefoot about longitudinal midtarsal joint axis.

articular surface, particularly near the end range of joint motion when compressive forces increase, results in initial cartilage flaking with subsequent, deeper fibrillation and eventual erosion.

Hyaline cartilage has a limited intrinsic repair capacity. Pleuripotential mesenchymal stem cells from surrounding connective tissues are necessary for effective repair (1). The underlying cortical bone is then subjected to the same wearing forces with resultant microfracture of the supporting trabeculae of the subchondral bone plate. This creates subchondral bone plate fracture with eventual remodeling and stiffening. The bone remodels in response to articular load (Wolff's law). Peripheral articular hyaline and fibrocartilaginous capped bony proliferation develops. This osteophytic proliferation occurs at capsuloligamentous attachments and also projects into the synovial cavity. Such changes initiate limitation of motion, and with further stress may result in gross fracture. The degenerative process also affects local synovitis, as well as stretching and counter contracture of capsuloligamentous structures.

The degenerative process typically follows an insidious onset, and progressively worsens with weightbearing and ambulation. Generally, the patients are aged 40 years or older. Pain occurs secondary to local synovitis, subchondral fracture and periarticular soft tissues strain. In the presence of advanced osteophytic proliferation, acute fracture of the osteophyte may elicit an exacerbation of pain. Loss of the smooth articular gliding surface and soft tissue contracture effect stiffness and decreased range of motion, post-static dyskinesia, and crepitus.

Systemic metabolic diseases (rheumatoid arthritis, seronegative arthropathies), advanced age, congenital malalignment deformities, ligamentous laxity (Ehlers Danlos, Marfan's syndrome), osteoporosis, obesity, and overuse secondary to environmental conditions (professional athletes, repetitive microtrauma in the work place) predispose to the development of degenerative joint disease.

There are no definitive laboratory studies indicative of degenerative joint disease. Standard radiographs showing articular irregularity with joint space narrowing, subchondral sclerosis, erosion, and osteophyte production are usually helpful in making the diagnosis.

Treatment

Conservative management of degenerative joint disease secondary to long standing pes valgus involves appropriate biomechanical support. The use of nonsteroidal anti-inflammatory drugs in combination with appropriate orthoses yields satisfactory results in the majority of patients. Intra-articular corticosteroid injection usually affects temporary relief of symptomatology, however, rarely has any long lasting therapeutic benefit. The key to successful conservative management is twofold: 1) Early intervention, prior to significant articular degeneration and fixed deformity. 2) Appropriate combination of biomechanical support with systemic medication. Biomechanical support alone may be effective, however, the use of nonsteroidal anti-inflammatory drugs without supportive mechanical measures will fail in almost all cases.

Surgical management of degenerative arthrosis secondary to pes valgus falls into two major categories: 1) prophylactic, and 2) salvage. Prophylactic surgical intervention must take place prior to significant degenerative arthrosis with resultant loss of flexibility. This type of surgery is usually performed in children and adolescent patients.

Radiographic evaluation should reveal essentially smooth, normally contoured articular surfaces. McGlamry urges early and aggressive treatment, the choice of surgery being based upon the planal dominance of the deformity (2). Most commonly, sagittal and transverse planal dominance exists. Appropriate procedures include medial column tendosuspension, lateral column lengthening in the form of Evan's opening calcaneal osteotomy and bone graft, and correction of triceps surae equinus. Medial column correction in severe sagittal plane breech may also require talonavicular or naviculo-cuneiform arthrodesis. In very young patients, arthroeresis of the subtalar joint in an effort to block excessive pronation may be a consideration. Furthermore, should there be a significant frontal plane component to the deformity, posterior calcaneal osteotomies to return the calcaneus to a normal alignment beneath the talus may be beneficial.

A

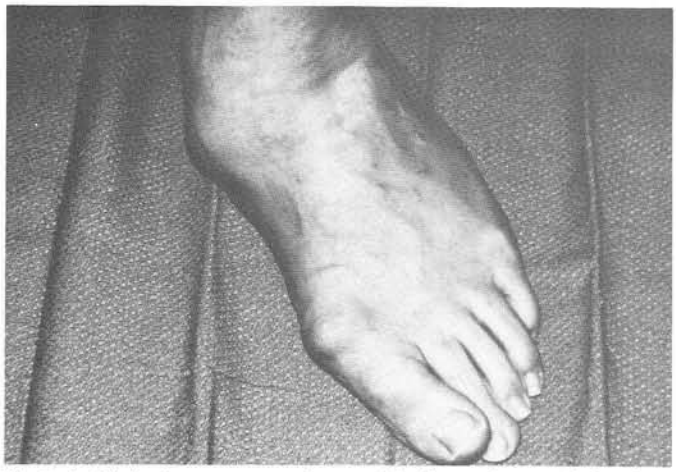

Fig. 3. A. Clinical appearance of severe hindfoot valgus, with forefoot varus and abductus.

B

Fig. 3. B. Preoperative dorsoplantar radiograph.

C

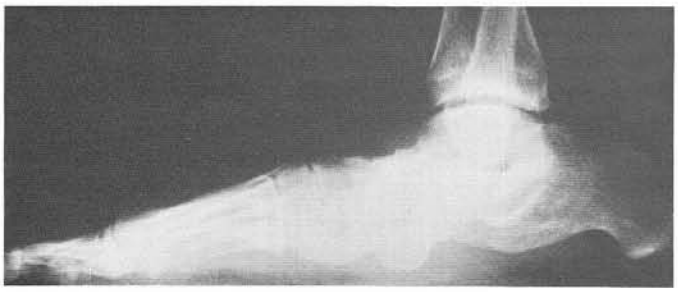

Fig. 3. C. Preoperative lateral radiograph.

Fig. 3. Post-traumatic degenerative joint disease following motor vehicle accident.

D

Fig. 3. D. Dorsoplantar radiograph following triple arthrodesis and first metatarsal osteotomy.

E

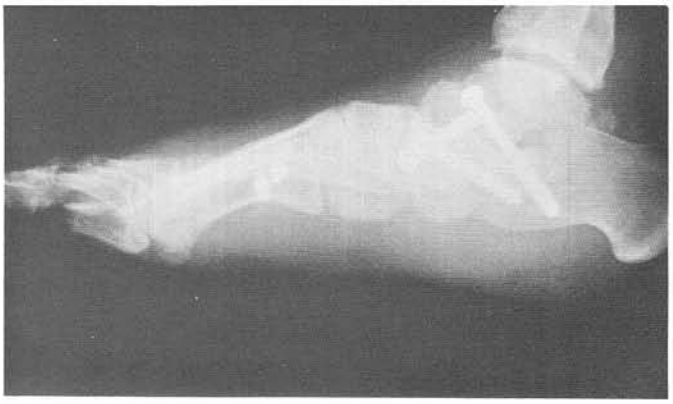

Fig. 3. E. Postoperative lateral radiograph.

Fig. 4. Severe long standing pes valgus induced tibialis posterior spontaneous rupture with degenerative arthrosis.

A

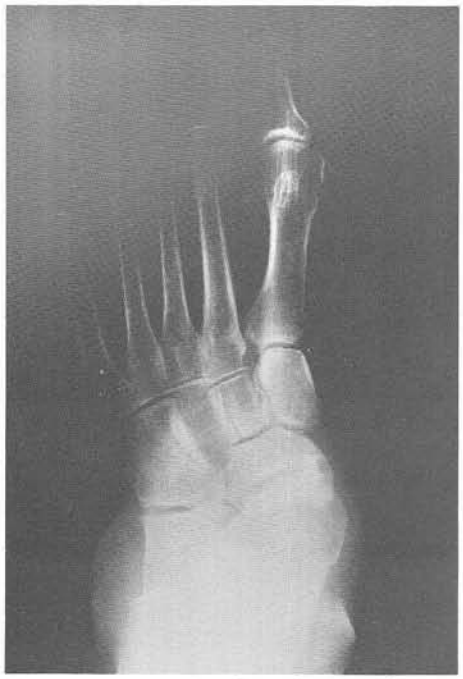

Fig. 4. A. Preoperative dorsoplantar radiograph.

C

Fig. 4. C. One year postoperative dorsoplantar radiograph.

B

Fig. 4. B. Preoperative lateral radiograph displaying medial column sagittal plane breech.

D

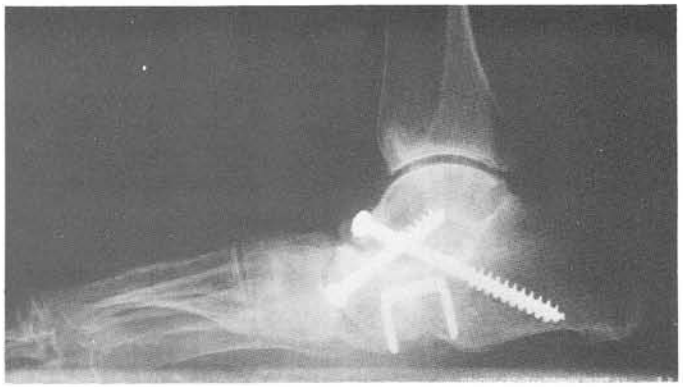

Fig. 4. D. One year postoperative lateral radiograph revealing increased naviculocuneiform fault, corresponding with gradual development of pain at this location.

Surgical intervention directed at salvaging the patient with symptomatic degenerative arthrosis secondary to long standing pes valgus with loss of flexibility usually involves some form of tarsal arthrodesis. Isolated subtalar joint fusion initially preserves midtarsal joint function, however accelerated degeneration of this intimately related joint complex secondary to loss of subtalar motion is common (Fig. 4). This procedure may be indicated in the younger patient displaying sinus tarsistis without clinical or radiographic evidence of midtarsal joint degeneration. The close proximity and reciprocal function of the subtalar and midtarsal joint cannot be over emphasized. Moreover, isolated subtalar joint arthrodesis does not allow correction for significant forefoot varus deformity which is usually present in symptomatic pes valgus.

Isolated medial column arthrodesis may be indicated in adults with severe destruction of the talonavicular or naviculocuneiform joints in a primarily sagittal plane deformity. LisFranc's joint complex, especially along the medial column, may also benefit from partial or total arthrodesis (Fig. 5). Abduction deformity affecting the tarsometatarsal articulation is not uncommon following acute trauma to this region.

Fig. 5. Systemic long standing pes valgus with LisFranc's joint degeneration.

A

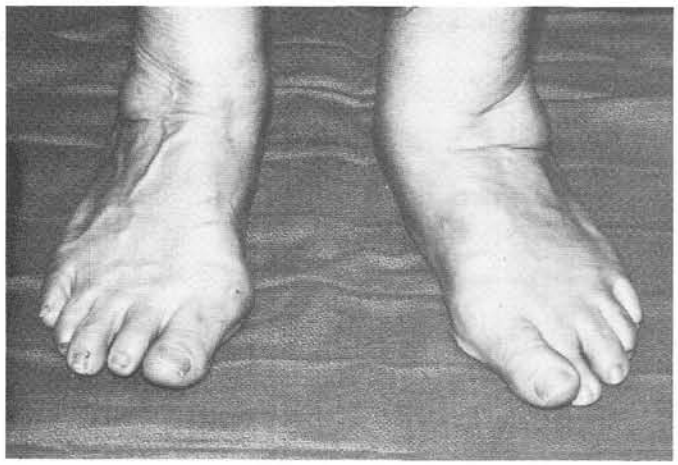

Fig. 5. A. Preoperative clinical appearance, indicative of distal hypermobility.

B

Fig. 5. B. Preoperative dorsoplantar radiograph.

C

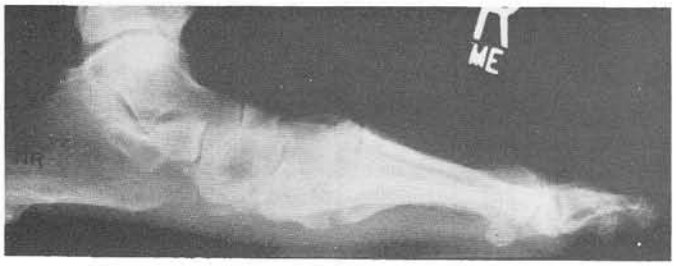

Fig. 5. C. Preoperative lateral radiograph with significant plantar metatarsocuneiform gapping and dorsal impingement.

D

Fig. 5. D. Postoperative dorsoplantar radiography.

E

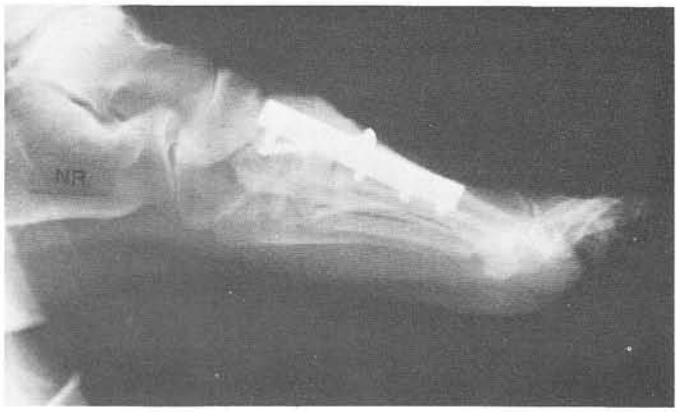

Fig. 5. E. Postoperative lateral radiography.

The author has found triple arthrodesis to be the single most dependable and versatile procedure for correction of long standing pes valgus requiring triplane correction. The procedure has been described in great detail by McGlamry et al (3). The establishment of rigid internal fixation greatly enhances the postoperative rehabilitation process.

SUMMARY

Pes valgus is a complex deformity displaying calcaneal eversion, forefoot abductus and medial column breech with resultant supinatus. Degenerative arthrosis secondary to osseous and soft tissue malalignment in the pes valgus deformity is common. Early recognition and aggressive treatment, often including surgical intervention, are necessary to prevent conversion from flexible deformity to the more fixed form of pes valgus with serious joint destruction.

References

1. Radin EL et al: Mechanical factors influencing articular cartilage damage. In Peyron JG (ed): *Osteoarthritis: Current Clinical and Fundamental Problems*. Paris, Ciba-Geigy, 1985.
2. McGlamry ED, Mahan KT, Green DR: Pes valgo planus deformity. In McGlamry ED (ed): *Comprehensive Textbook of Foot Surgery*, vol 1. Baltimore, Williams & Wilkins, 1987, pp 403-465.
3. McGlamry ED, Ruch JA, Mahan K, DiNapoli DR: Triple arthrodesis. In McGlamry ED (ed): *Reconstructive Surgery of the Foot and Leg: Update '87*. Tucker GA, Podiatry Institute, pp 126-152.