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Tailor's Bunion Deformity

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Tailor's bunion or *bunionette* is a term applied to an enlargement of the lateral aspect of the fifth metatarsal head that produces various degrees of pain, swelling, and tenderness. This enlargement of the lateral aspect of the fifth metatarsal head may present as either hypertrophy of soft tissue overlying the fifth metatarsal, a congenitally enlarged or dumbbell-shaped fifth metatarsal head, an abnormal lateral angulation of the fifth metatarsal shaft, or a combination of these conditions. The deformity is located at the dorsolateral or lateral aspect of the fifth metatarsophalangeal joint. Commonly, a splayfoot deformity is associated with a Tailor's bunion deformity.

ETIOLOGY

Various causes are attributed to the development of a Tailor's bunion deformity. The various factors may occur alone or in combination to produce the deformity and may be divided into structural and functional causes.

In review of the literature, the following authors describe the structural etiology of this deformity. Davies[1] attributes the deformity to persistent embryonic splaying of the fifth metatarsal caused by incomplete or imperfect development of the transverse intermetatarsal ligament. Gray states that failure of the transverse pedis muscle to insert at the fifth metatarsophalangeal joint between the fourth and fifth metatarsal heads results in a loss of contractural support. Lelievre[2] attributes the development of a Tailor's bunion deformity to one of three mechanisms: (1) a supernumerary bone that attaches to the lateral aspect of the fourth metatarsal head, forcing the fifth metatarsal

head laterally; (2) spreading of the metatarsals resulting in a wide intermetatarsal angle; (3) pressure on the lateral side of the fifth metatarsal head caused by sitting with crossed legs. DuVries[3] states that hypertrophy of the soft tissue overlying the fifth metatarsophalangeal joint, a congenitally wide, dumbbell-shaped fifth metatarsal head, and lateral deviation of the fifth metatarsal shaft or head whether singly or a combination of these three conditions will produce the deformity. Frankel et al. stated that a medially dislocated fifth metatarsophalangeal joint will cause the symptoms associated with this deformity.

The functional etiologies of a Tailor's bunion deformity are attributed to abnormal biomechanics.[4] The fifth ray consists of the fifth metatarsal only. It moves in supination and pronation about a triplane axis, and has mainly sagittal plane dominance. The axis of motion lies in an angle of approximately 20° from the transverse plane and 35° from the sagittal plane.[5] Clinically, there is equal dorsiflexion and plantar flexion of the fifth ray. The functional etiology of a Tailor's bunion deformity consists of four factors: (1) excessive subtalar joint pronation; (2) uncompensated varus position of the forefoot or rearfoot in a fully pronated subtalar joint; (3) a congenitally plantar-flexed fifth metatarsal; and (4) idiopathically, an absence of the transverse pedis muscle or an enlarged fifth metatarsal head.

Subtalar joint pronation alone will not cause a Tailor's bunion deformity. With excessive subtalar joint pronation, the midtarsal joint unlocks, subsequently unlocking the fifth ray and causing dorsiflexion with weight-bearing. This excessive dorsiflexion causes eversion of the fifth metatarsal. The deep transverse intermetatarsal ligament through its attachment to the

flexor cap of the hypermobile fifth metatarsal, combined with the stable fourth metatarsal, causes a medial pull of the flexor cap. This causes frontal plane deformity at the metatarsophalangeal joint while the long flexor and extensor tendons bowstring across the joint. The abductor digiti minimi migrates plantarly, which causes the lateral capsule to stretch while the medial capsule contracts. Retrograde forces will therefore accentuate this deformity.

An uncompensated varus deformity in a fully pronated foot will produce subluxation and pronation of the fifth ray. With this varus deformity of the foot, the total number of degrees of varus deformity must exceed the potential degrees of calcaneal eversion that can be produced by maximal subtalar joint pronation. Thus, with the fifth ray plantar to the central three rays, with weight-bearing the fifth metatarsal will dorsiflex and evert, causing a Tailor's bunion deformity.

Idiopathic causes of Tailor's bunion deformity are either osseous or soft tissue in nature. The absence of attachment of the transverse pedis muscle is a soft tissue abnormality described as causing idiopathic Tailor's bunion deformity. A congenitally enlarged or dumbbell-shaped metatarsal head is an osseous idiopathic cause of a Tailor's bunion deformity. In either case (soft tissue or osseous), the idiopathic cause of the deformity is not common, but should be considered in cases without subtalar joint pronatory conditions.

CLINICAL EVALUATION

When evaluating the fifth metatarsophalangeal joint, clinical evaluation should involve gross inspection of the entire foot. Deformities should be noted. The patient's complaints will vary with the degree of deformity, but usually pain or discomfort over the lateral, dorsolateral, or plantar-lateral aspect of the fifth metatarsophalangeal joint is the chief complaint. Lesion patterns, whether purely lateral, plantar-lateral, or plantar, and mild to diffuse hyperkeratosis should be noted. These lesion patterns will afford the evaluator a clue as whether the deformity has a structural or functional cause. An adventitious bursa may be palpated in the area. The skin overlying the joint may be erythem-atous as a result of friction, pressure, or local trauma caused by shoe gear. Mild to moderate pain may be

palpable in this area. The pain is alleviated by ambulating barefoot, in sandals, or even in jogging shoes.

Range of motion of the fifth metatarsal and its relationship to the axis of the three central metatarsals should be evaluated. Quite commonly, an adducto varus deformity of the fifth digit is found. The foot is also evaluated in the relaxed calcaneal stance position and neutral calcaneal stance position (both weight-bearing and non-weight-bearing). With weight-bearing, the increased degree of deformity is noted. Following this, the subtalar joint is put in the neutral position with the patient standing, and the amount of improvement in the Tailor's bunion is observed. This should give one an idea of the amount of control to expect of the fifth ray with control of the subtalar joint. The foot is finally observed during the gait cycle in comparison with the other foot.

RADIOGRAPHIC EVALUATION

Radiographs are taken with the patient in the angle and base of gait. The areas to specifically evaluate in association with a Tailor's bunion deformity are (1) rotation of the entire fifth metatarsal, making the lateral plantar tubercle and the styloid process of the fifth metatarsal more prominent; (2) an increased inter-metatarsal angle between the fourth and fifth metatarsals; (3) an increased lateral deviation angle; (4) hypertrophy of the fifth metatarsal head; and (5) arthritic changes of the fifth metatarsal head. The specific angles used to evaluate a Tailor's bunion include the intermetatarsal angle and the lateral deviation angle. Schoenhaus[6] tried to determine the intermetatarsal angle between the fourth and fifth rays and the second and fifth rays. The results showed that the normal intermetatarsal angle between the second and fifth rays is approximately 16° ± 2°, and the normal intermetatarsal angle between the fourth and fifth rays is approximately 8°. Angles greater than these were considered pathologic. Fallat and Buckholz[7] in 1980 presented a more comprehensive study to accurately assess the intermetatarsal angle between the fourth and fifth metatarsals, taking into account anatomic variations. They also determined the effect of supinatory and pronatory positions on the intermetatarsal angle and on lateral bowing of the fifth metatarsal. The intermetatarsal angle is measured by comparing the long

longitudinal bisection of the fourth metatarsal with a line that is tangent to the proximal one-half of the medial cortex of the fifth metatarsal (Fig. 31-1A). In measuring the proximal one-half of the medial cortex of the fifth metatarsal, the bowing often found at the fifth metatarsal neck does not influence the findings. They reported an average normal of approximately 6.5° with an increase to approximately 8° to 9° in patients with Tailor's bunion deformities.

Lateral bowing of the fifth metatarsal head becomes another factor in radiographic assessment of a Tailor's bunion deformity on the dorsiplantar views. This lateral bowing is usually seen at the distal one-third, or

neck, of the metatarsal, but may arise at the midshaft region of the fifth ray. The lateral deviation angle as described by Fallat and Buckholz is formed by a line bisecting the head and neck of the fifth metatarsal with the line measuring the proximal one-half of the medial cortex of the fifth metatarsal (Fig. 31-1B). The average normal lateral deviation angle was measured at approximately 2.5°, whereas an average value of approximately 8° was noted in the pathologic foot. An angle of 5° warranted an osteotomy at the neck of the fifth metatarsal.

With radiographic evaluation, the deformity will either lie in one or more of the following areas: (1) the
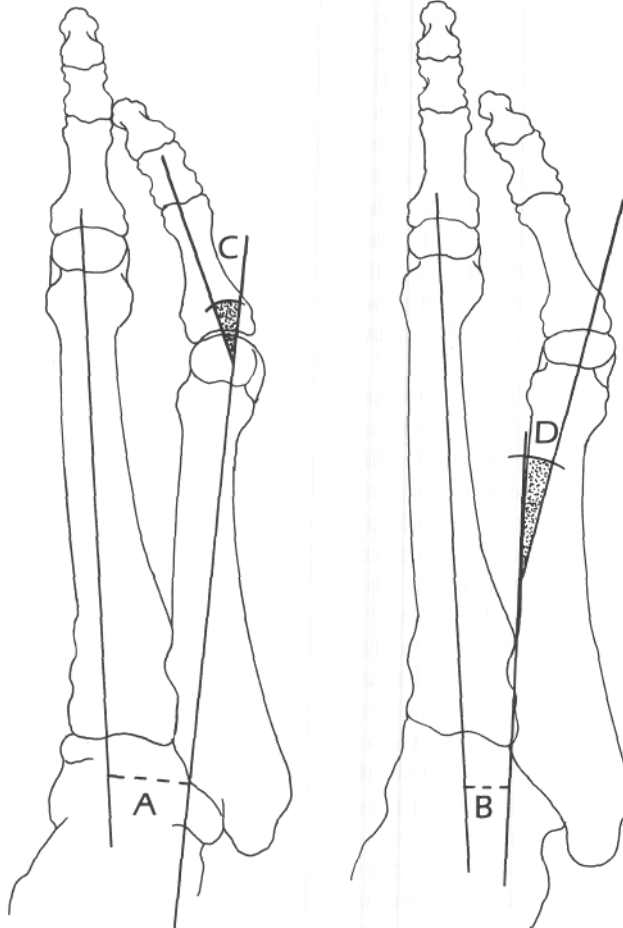

Fig. 31-1. (**A**) Fourth intermetatarsal angle; (**B**) lateral deviation angle.

fifth metatarsal base, (2) the fifth metatarsal neck, (3) the lateral condyle of the fifth metatarsal, or (4) the entire articulating surface of the fifth metatarsal.

SURGICAL RECOMMENDATIONS AND CONSIDERATIONS

Ideally, when considering and planning fifth metatarsal surgical correction of a Tailor's bunion deformity. It is important to identify the deformity, perform stable osteotomies with appropriate fixation, follow logical postoperative care, and recognize problems that arise and have the flexibility to alter management.

Historically, Davies[1] in 1949 described a simple lateral exostectomy (Fig. 31-2). Others copied him and later did partial exostectomies or exostectomies combined with soft tissue procedures. The soft tissue procedures included a medial vertical ligament release, freeing the flexor cap, performing an inverted L cap-sulotomy with ellipses, and an abductor digiti minimi transfer to help achieve and maintain correction and decrease recurrence or dislocation of the Tailor's bunion deformity. Lelievre[2] described an adaptation of the Keller arthroplasty (Fig. 31-3) that increased tone and function of the medial periarticular structures; this caused further varus or adducto varus of the fifth toe with an increase in retrograde forces on the fifth metatarsal head.

Weisberg[8] and Amberry[9] described a fifth metatarsal head resection with a lateroplantar condylectomy of the proximal phalanx of the fifth toe (Fig. 31-4). The indications for performing a fifth metatarsophalangeal joint arthroplasty were a dumbbell-shaped metatarsal head with no other pathology noted. The usefulness of an arthroplasty as an isolated procedure is rather limited. Undercorrection, recurrence, loss of congruity, or dislocation at the fifth metatarsophalangeal joint are relatively common sequelae of this procedure. These are explained when one understands that there is a dynamic imbalance of the joint secondary to these procedures which increases the deformity. The lateral capsular structures are weakened, and recurrence is facilitated. When joint destruction is obvious on radiography, a complete or hemi-head resection is performed on the fifth metatarsal head. An effort is made to draw as much capsule as possible together in the center of the joint through a pursestring suture. This

helps to maintain the digit in a proper position postoperatively. Implant arthroplasty has been performed in this area; however, it is not recommended because of the extreme range of motion of the fifth ray during gait.

When one is planning an osteotomy of the fifth metatarsal for correction of a Tailor's bunion deformity, principles of fixation, bone healing, and the degree of deformity need to be addressed. Stability of the osteotomy site is required for optimal healing. Fixation must stabilize fragments until bone healing has occurred after 5 to 6 weeks. This is especially true for diaphyseal bone in which the blood supply is decreased and nonunion and malunion are common. Floating osteotomies are less than optimal. The ex-
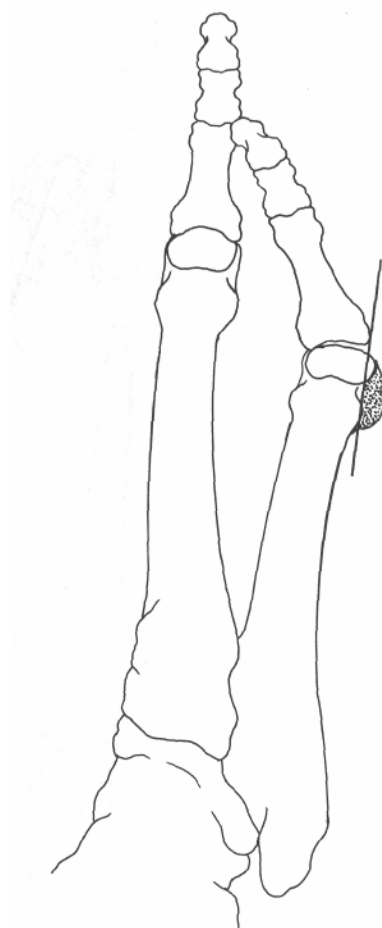
Fig. 31-2. Lateral exostectomy.

treme independent range of motion of the fifth metatarsal makes an osteotomy of the fifth metatarsal in this area nearly impossible to heal without fixation.

Use of a fifth metatarsal neck osteotomy is indicated when the apex of the deformity is at the fifth metatarsal neck. Neck osteotomies are performed quite frequently today. In a study by Keating[10], patients stated that they were extremely satisfied with neck osteotomies, but the recurrence of the deformity was approximately 12 percent and the occurrence of transfer lesions approximately 76 percent. Of the 76 percent transfer lesions present, 36 percent were very symptomatic. The success rates of neck osteotomies to correct Tailor's bunion deformities averaged
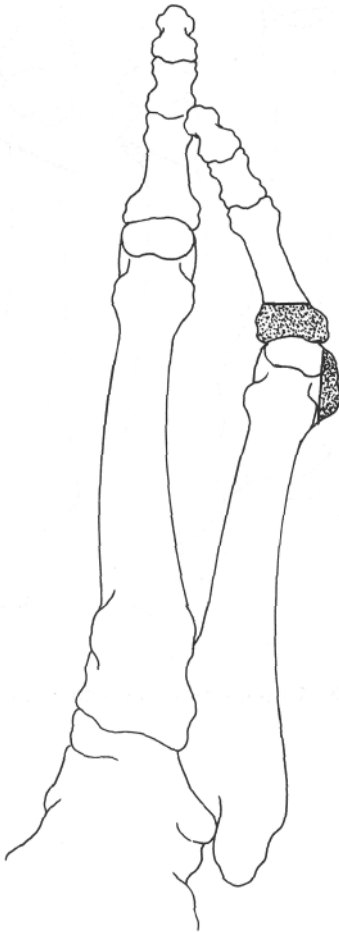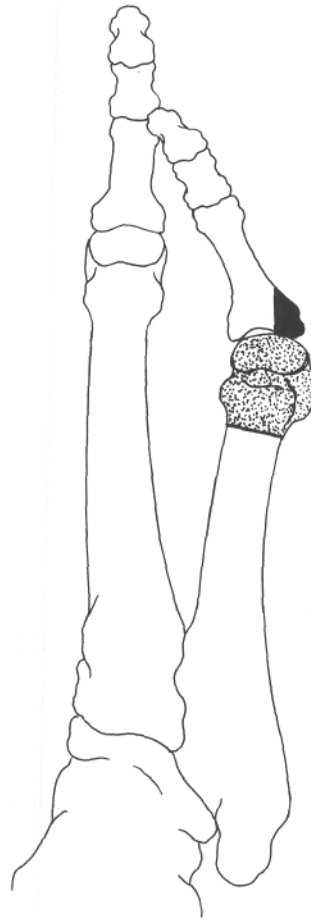

Fig. 31-4. Fifth metatarsal head resection with lateral plantar condylectomy of the proximal phalanx of the fifth toe as described by Weisberg and Amberty.

mately 56 percent. Therefore, it is imperative to recognize the apex of the deformity when planning surgical correction. In 1951, Hohmann[11] described a single transverse osteotomy at the level of the metatarsal neck with medial displacement of the capital fragment toward the fourth metatarsal (Fig. 31-5). This is usually fixated with a single Kirschner wire (K-wire). A Wilson-type displacement osteotomy, or rather reverse Wilson osteotomy, is described as an oblique osteotomy from distal lateral to proximal medial with displacement of the capital fragment medially (Fig. 31-6). The osteotomy is orientated in a perpendicular relationship to the long axis of the fifth metatarsal when viewed laterally. Shortening is noted to occur

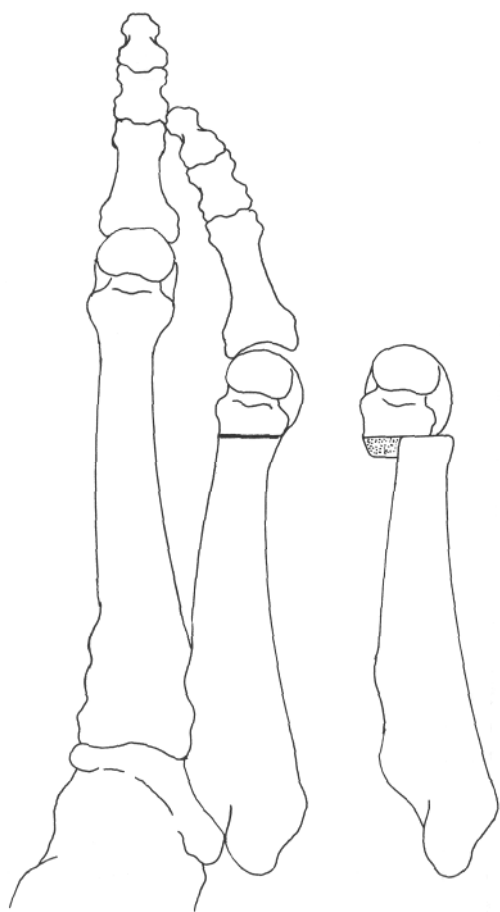**Fig. 31-3.** Adaption of Keller arthroplasty as described by Lelievre.
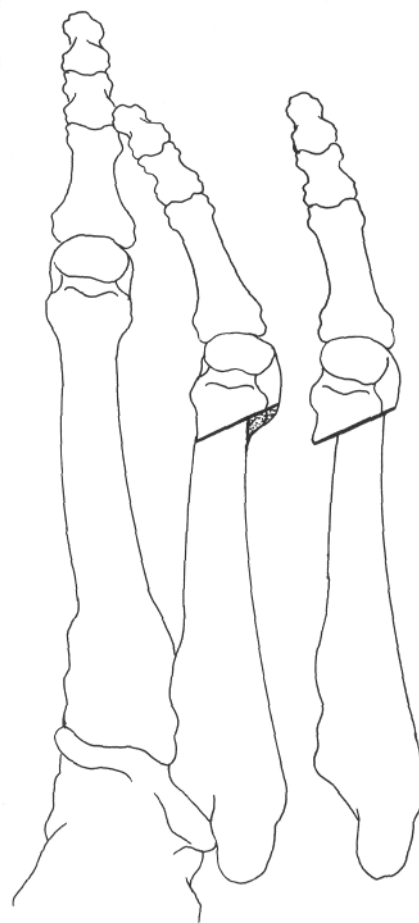
approxi-

Fig. 31-5. Hohmann osteotomy.

Fig. 31-6. Wilson-type displacement osteotomy.

with this osteotomy. A distal oblique osteotomy described by Helal[12] in 1975 was orientated in a dorsal-proximal to plantar-distal direction with respect to the fifth metatarsal. This was to be perpendicular to the weight-bearing surface of the foot. Complications of this procedure encouraged telescoping of the fragments.

The Mitchell displacement osteotomy as described by Leach[13] in 1974 was advocated in patients with intermetatarsal angles greater than 9° between the fourth and fifth metatarsals (Fig. 31-7). The reverse Austin or sagittal plane V sliding osteotomy allows for displacement of the head of the fifth metatarsal medi-
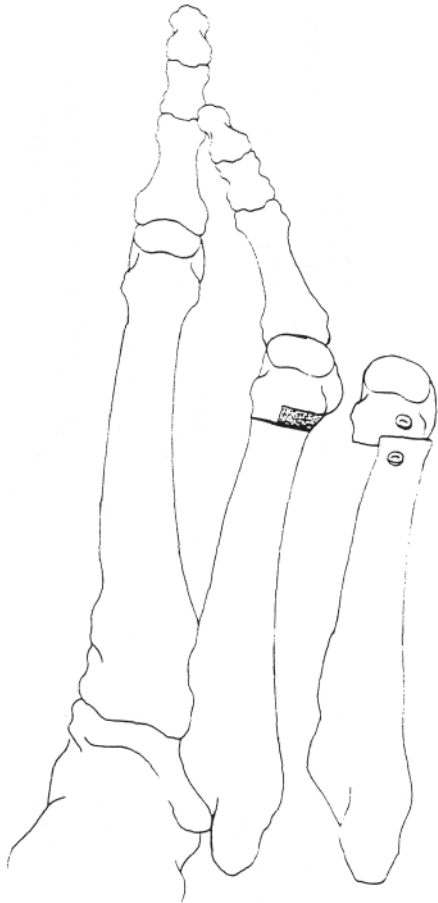

Fig. 31-8. Reverse Austin/sagittal plane V sliding osteotomy.
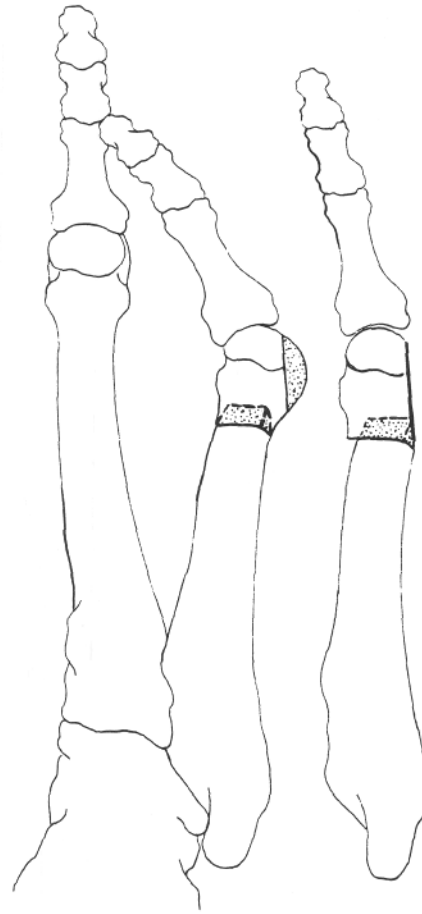

Fig. 31-7. Mitchell displacement osteotomy.

ally 2 mm with resection of a small amount of bone from the lateral aspect of the fifth metatarsal head (Fig. 31-8). This corrected only in the transverse plane, and is usually fixated with K-wires. Closing wedge osteotomies have been described by Mercado,[14] Gerbert,[15] and Buchbinder[16] (Fig. 31-9). Mercado[14] advocated a medially based closing wedge osteotomy at the neck of the fifth metatarsal, which was performed at the point of greatest deviation of the shaft of the fifth metatarsal and was fixated with K-wire or an intramedullary cortical bone plug graft. Yancy[17] described a closing base wedge osteotomy at the junction of the middle and distal one-third of the metatarsal that was fixated
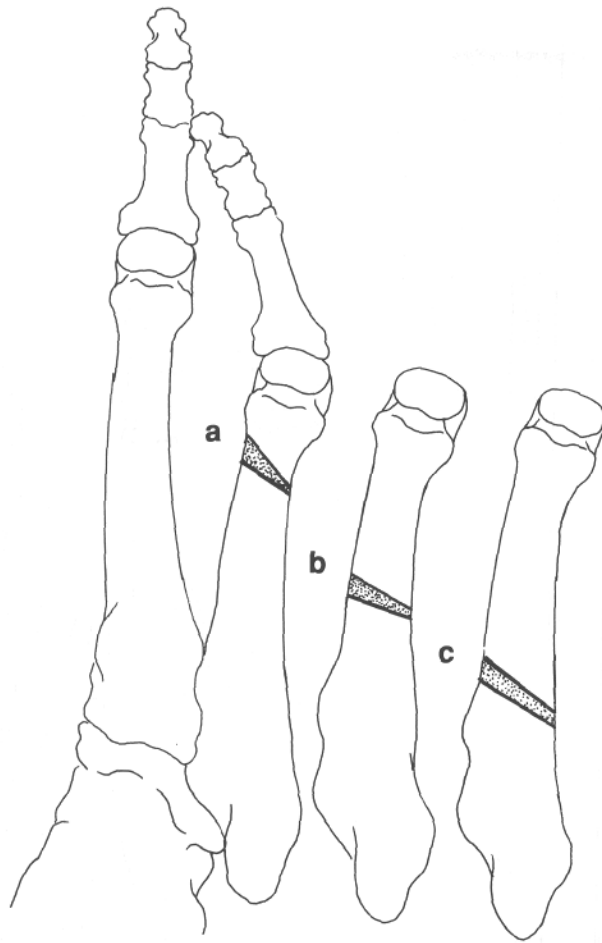
performing a distal oblique wedge osteotomy for the correction of a Tailor's bunion deformity is that the primary level of the deformity is the lateral bowing in the distal portion of the metatarsal. This procedure involves two oblique cuts with an appropriate wedge resection removed. Key conceptual factors involve the distal cut, which should be placed at approximately 60° to the long axis of the fifth metatarsal, and the proximal cut, which will vary with the degree of the deformity. The lateral hinge should be preserved, and this osteotomy must be fixated. Potential complications of this procedure include proximal lateral cortical hinge fracture, fracture displacement, excessive wedge resection, and recurrence of the lateral exostosis.
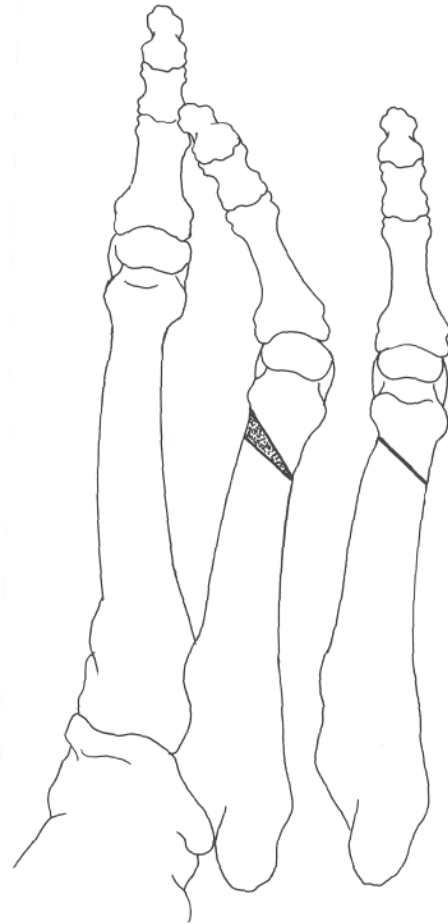

Fig. 31-9. Closing wedge osteotomies as described by (**A**) Mercado, (**B**) Yancey, and (**C**) Gerbert.

with K-wire (Fig. 31-10). This procedure must be fixated, and there must be good bone-to-bone contact, or delayed union, nonunion, or pseudoarthrosis may result.

A closing base wedge osteotomy is performed when the apex of the deformity is at the metatarsal base. This type of oblique wedge osteotomy is fixated according to AO/ASIF protocol, whereas a transverse/arcuate osteotomy has been fixated with K-wire or monofilament wire. Buchbinder[16] described a derotational angular transpositional osteotomy that involved a small resection of bone perpendicular to the fifth metatarsal and 2 to 3 cm distal to its base. The key indicator to

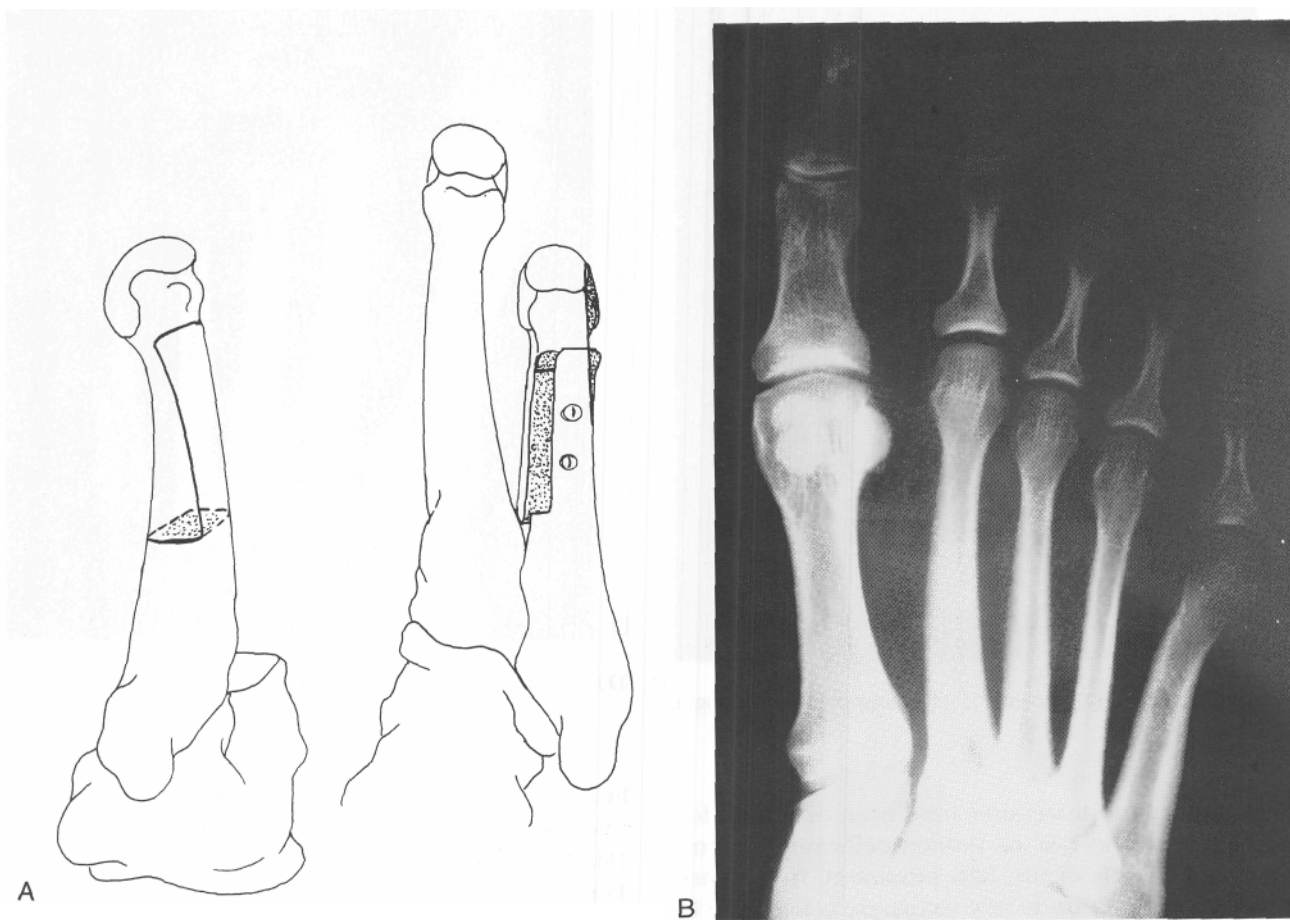**Fig. 31-10.** Distal oblique osteotomy.

Fig. 31-11. (A) Diagram depicting transpositional Z osteotomy; (B) preoperative radiograph; *(Figure continues.)*

Fig. 31-11 *(Continued).* (C) postoperative radiograph; (D) postoperative radiograph after screw removal.

Many surgical procedures have been described for correction of the Tailor's bunion deformity, encompassing all levels of the fifth metatarsal. It becomes readily apparent that no one technique is adequate in treating all forms of fifth metatarsal pathology. Complications are well documented, including delayed union or nonunion, floating fifth digit, transfer lesions to adjacent metatarsals, and recurrence of the deformity. The selection of the surgical procedure is most accurate when based on the preoperative radiographic findings as advocated by Fallat and Buckholz.[7] With a significantly increased intermetatarsal angle, the procedure of choice may be a base wedge osteotomy. The more proximal axis allows a longer radius arm so that greater medial displacement of the fifth metatarsal

head can be achieved with every degree of wedge resected. Procedures done at the base, however, demand excellent reduction with internal fixation as well as strict non-weight-bearing postoperatively.

When the primary focus of the deformity is lateral bowing of the distal metatarsal, the surgical osteotomy should be directed at this level. When the main focus of the deformity is at the distal neck of the fifth metatarsal, or the intermetatarsal angle is mild to moderate, neck osteotomies can be quite satisfactory. With a significantly increased intermetatarsal angle and significant bowing of the distal metatarsal, the author would recommend a transpositional Z osteotomy with 2.0 screw fixation (Fig. 31-11). This horizontally directed Z osteotomy as described by Gudas and Zygmunt

(1983-1990, University of Chicago) for correction of hallux valgus allows for a potentially longer radius arm so that greater medial displacement of the fifth metatarsal head can be effected. The importance of adequate internal fixation cannot be stressed enough with this procedure. Complications of this technique include fracture through the shaft distal to the proximal cut as well as those previously mentioned.

CONCLUSION

A comprehensive literature review and logical approach to the treatment of a symptomatic Tailor's bunion deformity has been introduced. As one can deduce, no state-of-the-art procedure can be presented for the correction of this fifth ray deformity. The etiologic factors, preoperative assessment, and focus of the deformity should be thoroughly assessed to achieve a successful outcome.

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