INTRA-OPERATIVE DECISION MAKING IN HALLUX VALGUS SURGERY

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PURPOSE

The techniques of anatomic dissection in hallux valgus surgery have evolved into a rather high level of efficiency. The techniques have become an almost routine exercise in the process of disarticulation of the first metatarsophalangeal joint.

It is important that the surgeon develop this high level of surgical skill into a near routine function so that he may take advantage of the many opportunities that it can provide in dealing with each unique and challenging situation he/she may face in the process of surgical repair of the hallux deformity.

The difference between a good or poor result and consistently excellent results can be the decisions that are made as the surgeon is faced with a choice of alternatives in the step-by-step anatomic dissection and physiologic reconstruction of the first metatarsophalangeal joint.

This presentation will systematically examine each significant step in the sequence of hallux valgus dissection and reconstruction. Specific options will be discussed when the clinical situation requires an alteration or unique manipulation of standard technique to satisfactorily control an individual deforming component of the hallux valgus deformity. Effective intra-operative decision making can make the all-important difference between a technician and a surgeon.

PREOPERATIVE EVALUATION

While this discussion is surgically oriented, the standard preoperative workup must not be forgotten. The standard workup should include: a thorough history of the chief complaint, clinical and radiographic objective evaluation and documentation, biomechanical evaluation, and structural analysis and correlation with associated deformities or conditions.

A detailed and thorough preoperative workup can be an invaluable tool for analysis and comparison of the effectiveness of any given or specific surgical technique.

INCISION PLACEMENT

Surgical exposure of the first metatarsophalangeal joint is initially determined by the placement of the skin incision. The specific placement of the initial incision can have a great influence on the ease of access and exposure of all underlying tissues and regions of the joint.

The standard incision used at the Institute follows the dorsomedial contour of the first metatarsophalangeal joint (Fig.1). The incision will fall just medial to the extensor hallucis longus tendon and just lateral to the medial dorsal cutaneous nerve and medial marginal vein. This placement allows for equal ease of access to the plantar-medial margin of the joint, which includes the abductor hallucis tendon as well as the plantar-lateral margin of the joint and the adductor hallucis tendon.

The incision begins proximally at the mid-shaft level of the first metatarsal and extends distally to the level of the interphalangeal joint of the hallux. The generous length of the incision allows for ease of exposure to all regions of the joint without the need of over-zealous retraction.

TISSUE PLANE DISSECTION

The techniques of anatomic dissection of the first metatarsophalangeal joint have been exhaustingly described in both film and text over the last fifteen years. The premise of the technique still remains the ability to cleanly separate the superficial fascia from the deep fascia from one side of the joint to the other (Figs. 2A,B).

It is this technique that preserves the primary vascular and neural structures that supply the soft tissues around the joint and allows for direct attack upon the underlying osseous and periarticular structures of the first metatarsophalangeal joint without significant disruption of the viability of the digit itself.

It is also this technique that controls bleeding during the surgical procedure by avoiding direct violation of the main vascular supply and protecting it within the

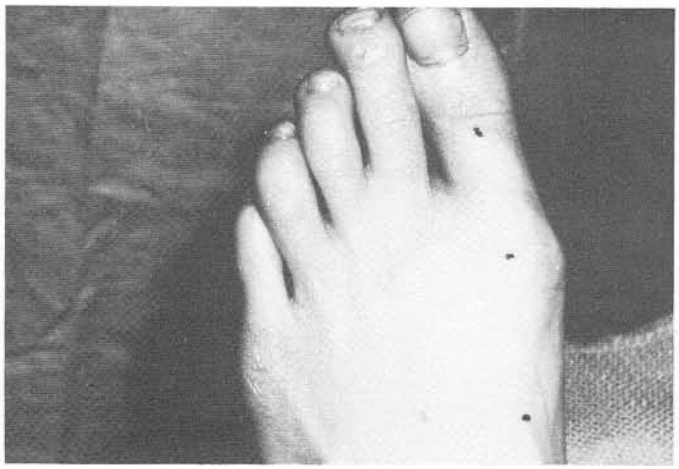


Fig. 1. Dorsomedial incision for hallux valgus repair.

retracted superficial fascia. With this approach the most extensive reconstruction of the first metatarsophalangeal joint can be easily performed without the need for a tourniquet and still be done without extensive bleeding or delay.

PLANTAR-LATERAL RELEASE

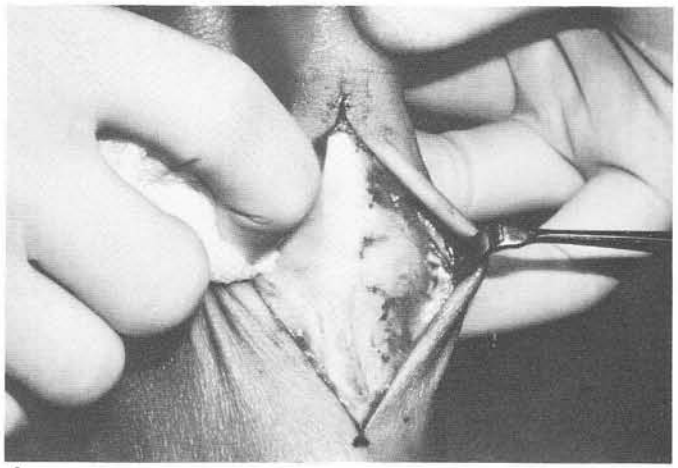
Release of contracture of the peri-articular structures at the plantar-lateral aspect of the first metatarsophalangeal joint presents the first area where definitive decision making can have a real bearing on the outcome of the surgical procedure.

Release of the Adductor Tendon

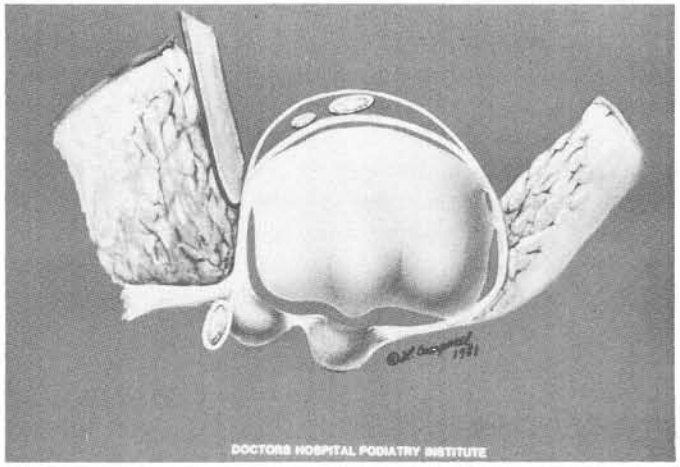
This sequence begins with the identification and detachment of the adductor hallucis tendon from its primary insertion into the base of the proximal phalanx (Figs. 3A,B). A secondary but critical attachment of this tendon is to the lateral surface of the fibular sesamoid. The tendon must be isolated and released from all surrounding attachments within the intermetatarsal space to allow for complete mobilization and subsequent transfer.

The maneuver is performed with routine regularity by most members of the Institute faculty.

A key clinical appreciation can be established by performing a simple maneuver before and after each specific surgical manipulation within the first intermetatarsal space. The basic maneuver involves loading the first metatarsophalangeal joint and evaluating the range of motion in the direction of dorsiflexion. If this maneuver is performed before and after releasing the adductor tendon, the surgeon can develop an appreciation or feel for the deforming influence of the adductor tendon in the deformity of hallux abducto valgus.

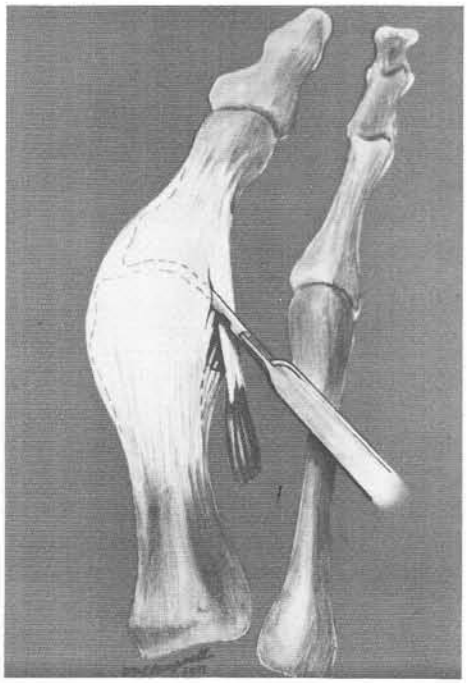


A



B

Fig. 2. A, B. Separation of superficial fascia from deep fascia around first metatarsophalangeal joint (photo and illustration).



A

Fig. 3. A. Identification of insertion of adductor hallucis tendon into base of proximal phalanx.

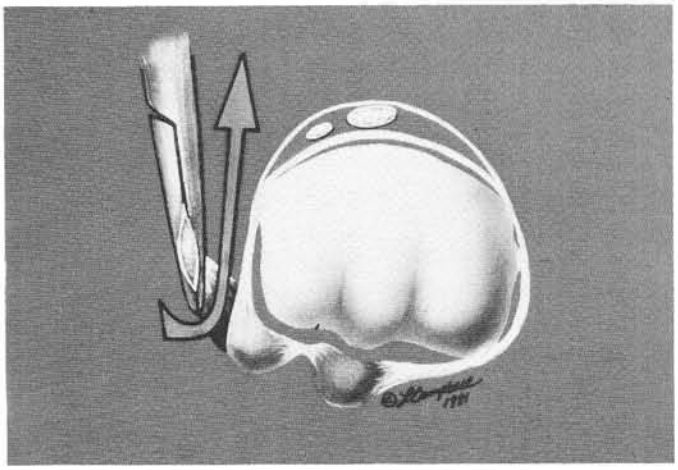


Fig. 3. B. Circumscribing release of adductor tendon from lateral surface of fibular sesamoid.

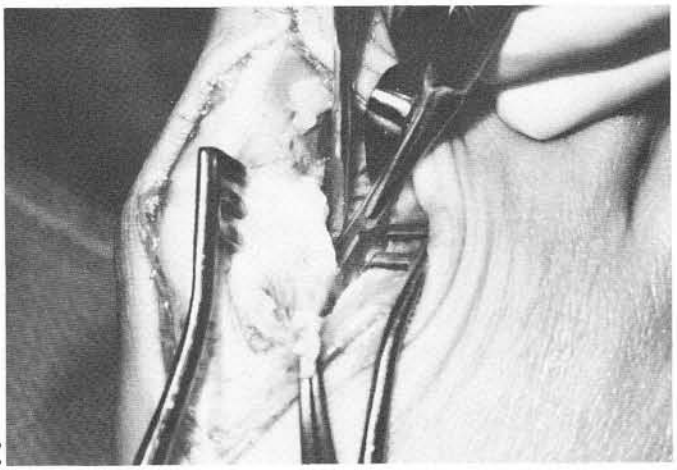


Fig. 3. C. Transection of fibular sesamoidal ligament.

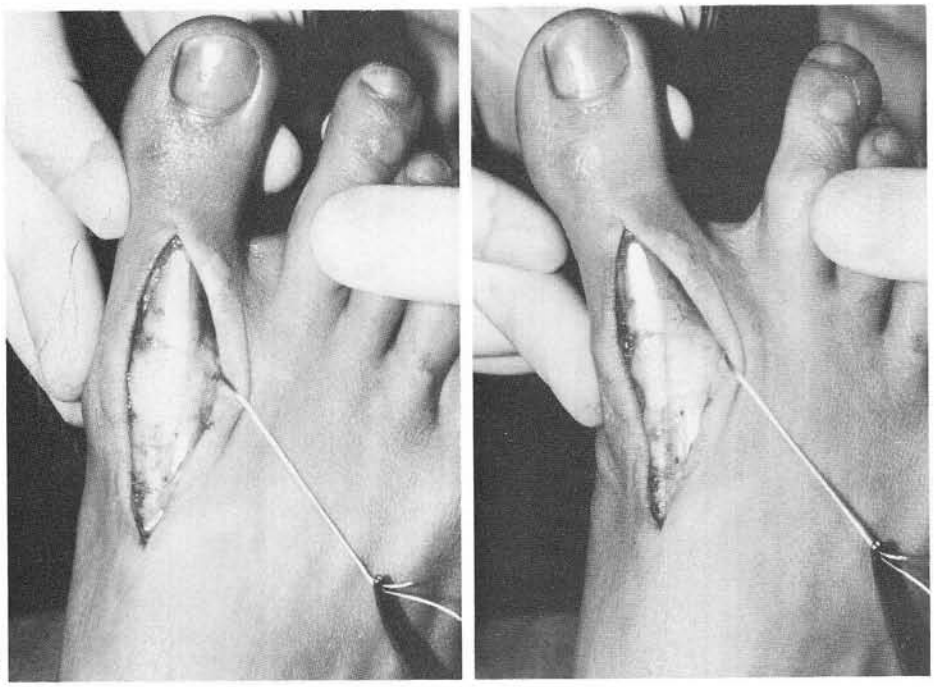


Fig. 3. D. Rupture of lateral collateral ligament and joint capsule by forceful manipulation.

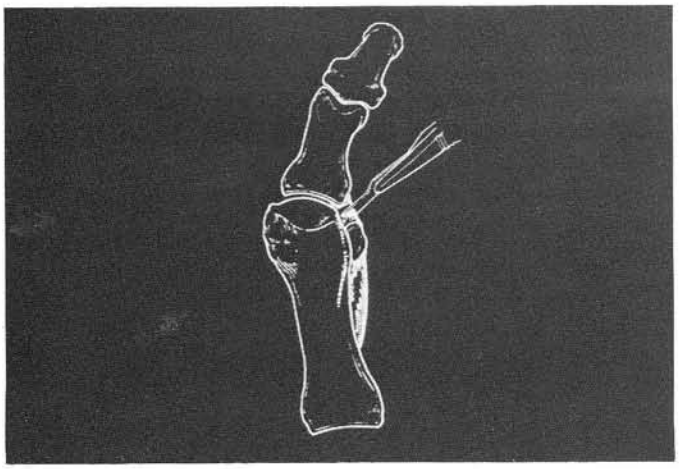


Fig. 3. E. Sectioning of tendinous insertion of flexor hallucis brevis.

Similarly, with release of each additional structure within the interspace, an appreciation for individual structure's contributions to the overall deformity can be obtained. From this surgical observation, specific surgical execution can be performed when necessary to relieve any specific component of the deformity.

Release of the Fibular Sesamoidal Ligament

The next step in the sequence within the intermetatarsal space involves release of the fibular sesamoidal ligament (Fig. 3C). This step is performed routinely and has been described previously. Release of the fibular sesamoidal ligament allows for relocation of the fibular sesamoid beneath the metatarsal head and into the

lateral sesamoidal groove. Many factors have yet to be evaluated before it can be determined that the released fibular sesamoid will remain and function within its groove.

These first two maneuvers, release of the adductor tendon and sectioning of the fibular sesamoidal ligament, are routinely performed in almost all hallux valgus cases. From this point forward, specific evaluation of each individual structure is made for its contribution to the deformity before a decision is made to release the structure and its deforming influence.

Release of the Lateral Collateral Ligament

The first metatarsophalangeal joint is then loaded and dorsiflexion is evaluated with the hallux held in a rectus alignment with the metatarsal and congruous articulation of the base of the proximal phalanx and the head of the metatarsal.

If the hallux can dorsiflex freely in the sagittal plane without a tendency for lateral deviation, then no further dissection is performed within the intermetatarsal space.

If, however, the hallux demonstrates significant lateral deviation with dorsiflexion, there is still significant contracture remaining within the peri-articular structures of the plantar-lateral aspect of the joint. The next structure in the sequence to then be released will be the lateral collateral ligament of the first metatarsophalangeal joint.

The ligament can be sectioned by direct incision of the lateral joint capsule. The preferred technique however involves a medial dislocation of the hallux by forceful manipulation to rupture the lateral collateral ligament and lateral capsular tissues. Rupture of the ligament is usually felt as a popping sensation and significant release of the joint (Fig. 3D). Dorsiflexion is again evaluated and if the excursion is free and unrestricted, no further dissection or manipulation is performed.

If significant lateral deviation is still present, the only remaining structure that can be in contracture and cause deviation of normal joint motion is the lateral head of the flexor hallucis brevis.

Release of the Tendon/Ligament of the Lateral Head of the Flexor Hallucis Brevis

It is well understood that the laterally dislocated position of the fibular sesamoid can cause lateral deviation of the hallux and progression of the deformity of hallux abducto valgus. Before frank osseous and articular degeneration and adaption of the articulation of the fibular sesamoid and the head of the metatarsal has occurred, contracture of the lateral head of the flexor hallucis brevis muscle and tendon can be a primary deforming influence on the range of motion of the first metatarsophalangeal joint. In these circumstances, direct sectioning of the tendon at the anterior edge of the fibular sesamoid can significantly release the contracture of the lateral head of the flexor hallucis brevis (Fig. 3E).

If the fibular sesamoid is of relatively normal contour, release of the contracture of the lateral head of the flexor hallucis brevis muscle and tendon is performed by sectioning the tendinous fibers at the anterior edge of the fibular sesamoid. These fibers attach directly into the base of the proximal phalanx of the hallux and virtually eliminate the influence of the lateral head of the flexor hallucis brevis when sectioned. A very dramatic improvement in the range of motion of the first metatarsophalangeal joint can be created with this maneuver when significant lateral contracture remains. Care must be taken when performing the maneuver to avoid concomitant sectioning of the flexor hallucis longus tendon which runs between the hallucal sesamoids.

Excision of the Fibular Sesamoid

If lateral deviation of the hallux persists after sectioning the tendinous fibers of the flexor hallucis brevis, the shape and function of the fibular sesamoid itself may be the remaining deforming influence on the range of motion of the first metatarsophalangeal joint. The fibular sesamoid remains attached to the tibial sesamoid via the intersesamoidal ligament. If osseous hypertrophy or adaptation prevents the fibular sesamoid from relocating beneath the metatarsal head, it can still influence the range of motion of the hallux via its attachments to the tibial sesamoid. If this circumstance is encountered, excision of the fibular sesamoid is then indicated.

Cautions of Plantar-Lateral Release

In the typical hallux valgus deformity, the routine plantar-lateral release involves detachment and isolation of the adductor tendon and sectioning of the fibular sesamoidal ligament. When specific circumstances indicate additional dissection, the significant neutralization and even elimination of lateral joint stability can be created with execution of the remaining maneuvers as described. These additional techniques include; rupture of the lateral collateral ligament, sectioning of the tendinous extension of the lateral head of the flexor hallucis brevis and ultimately excision of the fibular sesamoid itself.

The dissection techniques within the interspace have proven to be rather effective. Under certain cir-

cumstances rupture of the lateral collateral ligament combined with sectioning of the fibers of the lateral head of the flexor hallucis brevis have been shown to be as effective as excision of the fibular sesamoid. With the evolution of effective structural procedures such as the Austin and base wedge techniques, the danger of medial imbalance is very real even if the fibular sesamoid remains within the articular network. Care must be taken when performing muscle-tendon rebalancing techniques including the adductor tendon transfer and capsulorrhaphy to avoid creation of medial imbalance. The surgeon must become acutely aware of the effectiveness of these soft tissue manipulations in combination with dynamic osseous procedures. Meticulous evaluation of function must be made while combining these maneuvers in the repair of hallux abducto valgus.

CAPSULAR DISSECTION

Delivery of the head of the first metatarsal is performed through a standard dorsomedial approach. The capsular incision can be executed as the classic inverted L or extended as a T. Extension of the dorsal longitudinal incision out onto the base of the proximal phalanx. This facilitates exposure of the dorsal contours of the metatarsophalangeal joint (Fig. 4A). A clean incision through capsule and synovium will reveal the articular cartilage of the head of the metatarsal. Elevation of the dorsal capsular and synovial tissues will reveal the delicate dorsal fold that invests into the dorsal surface of the metatarsal head (Fig. 4B).

If there is bony hypertrophy, osteophytic lipping or gross prominence of the dorsal contour of the metatarsal head, the capsular and synovial tissues must be stripped from the bone surface for adequate osseous resection and remodeling. A clean sub-periosteal technique is used to decrease shredding of the capsular tissues and minimize peri-articular fibrosis.

If however, there is no significant bony hypertrophy or osteophytic lipping over the dorsal contour of the metatarsal head, the anatomic relationship of synovial and capsular attachment can be maintained. Preservation of this delicate intra-articular junction can reduce postoperative fibrosis and enhance the recovery of joint motion. Minimal reflection of dorsal capsular tissues can be performed at the dorsomedial corner of the metatarsal head to allow adequate exposure for the resection of the dorsomedial prominence.

If an Austin-type technique is to be used, capsular and periosteal reflection of dorsal tissues can be performed separately away from the intra-articular dissection. A Freer periosteal elevator is used proximally to create a subperiosteal channel across the neck of the metatarsal.

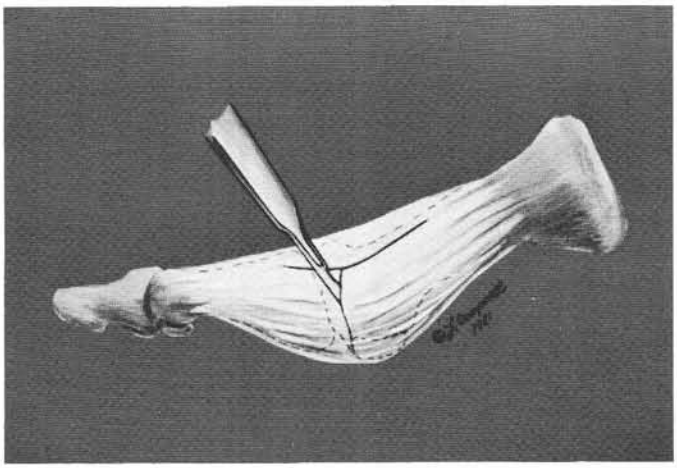


Fig. 4. A. Medial capsular incision.

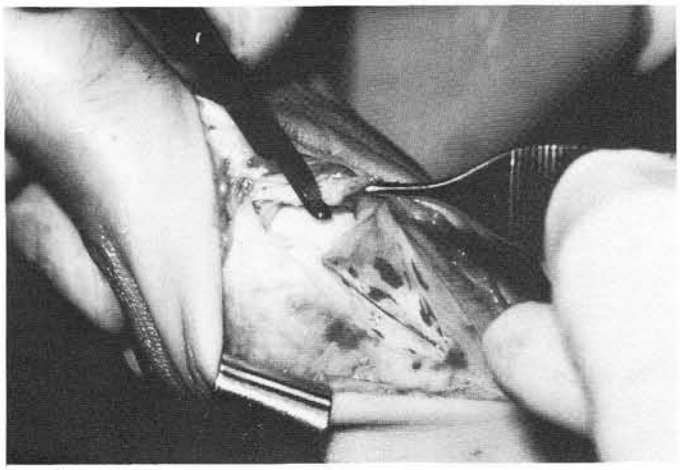


Fig. 4. B. Elevation of dorsal capsular fold to reveal dorsal aspect of metatarsophalangeal joint.

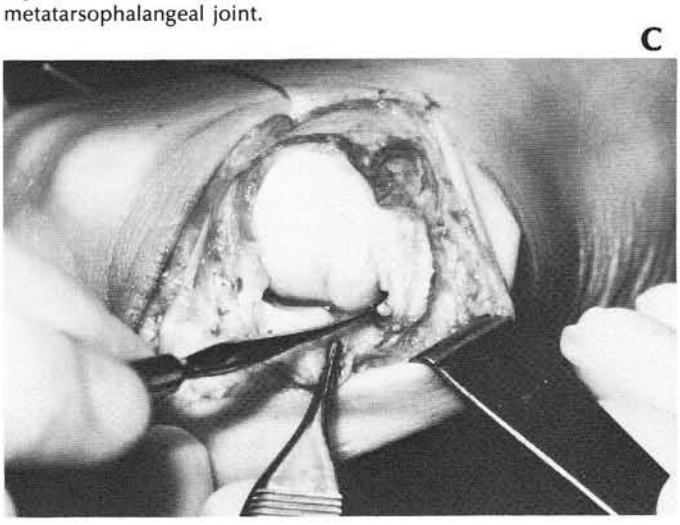


Fig. 4. C. *Resident's* pocket.

This channel creates exposure and a site for exit of the dorsal arm of the Austin-type osteotomy.

A soft tissue island then remains applied to cortical bone between the dorsal rim of the metatarsal head and

the dorsal osteotomy. This periosteal island will then continue to serve as a source of blood supply to the capital fragment after the metaphyseal osteotomy is completed.

The two-level dorsal capsular dissection technique can accomplish several beneficial functions:

1. preservation of the dorsal synovial pouch, decreasing postoperative fibrosis and enhancing recovery of end range of motion.

2. creation of an extra-articular exit for the dorsal arm of the metaphyseal osteotomy, similarly decreasing peri-articular fibrosis created by bone healing.

3. maintenance of a dorsal island of periosteal attachment to the capital fragment of the metatarsal following metaphyseal osteotomy, preserving vital blood supply.

Reflection of the medial capsular flap is initiated with the vertical arm of the capsular incision. The vertical incision is placed at the level of the medial epicondyle, just proximal to the joint line. This incision should transect the medial collateral ligament and open the *resident's* pocket (Fig. 4C). The knife is inserted into the pocket and the capsule is reflected from the medial surface of the head and neck of the metatarsal.

A Freer periosteal elevator is then used to reflect periosteum from the inferior cortical surface at the neck of the metatarsal. This creates an inferior channel for exit of the inferior arm of the metaphyseal osteotomy and accomplishes several other physiologic advantages as well.

The inferior pattern of soft tissue reflection will have similar benefits to the dorsal technique as well as a mechanical benefit which can aid in stabilization of the metaphyseal osteotomy:

1. preservation of the plantar articular pouch which includes the sesamoid apparatus, decreasing postoperative fibrosis and adherence of the sesamoids to the under-surface of the metatarsal head.

2. creation of an extra-articular exit for the inferior arm of the metaphyseal osteotomy.

3. maintenance of a plantar strip of soft tissue attachment to capital segment of the metatarsal following metaphyseal osteotomy, preserving additional blood supply.

4. mechanical stability through the plantar soft tissue attachment. The plantar soft tissues include fibers from the plantar fascia. As the foot is loaded in weightbearing, tension through these fibers will resist dorsal rotation and displacement of the head of the metatarsal.

The synovial and capsular tissues of the first metatarsophalangeal joint are delicate soft tissues. Meticulous handling of these tissues can significantly decrease fibrosis and scarring and enhance the recovery of full range of motion following surgery for hallux abducto valgus.

EXOSTECTOMY

The guidelines for resection of bone from the metatarsal head no longer are determined by how much prominence needs to be removed. At one time, the sagittal groove of the metatarsal head was used as the landmark for resection of bone when performing the bunionectomy. This technique destroys the anatomic contour of the tibial sesamoidal groove and can lead to hallux varus deformity via medial luxation of the tibial sesamoid.

Resection of bone through the sagittal groove also eliminates the contour of the sagittal groove. This contour is actually the anatomic position for articulation of the medial rim of the base of the proximal phalanx when the metatarsophalangeal joint is in a congruous position (Fig. 5). Preservation of the sagittal groove will provide protection against medial luxation of the tibial sesamoid by preserving the plantar-medial condyle of the metatarsal head and the tibial sesamoidal groove. Preservation of the sagittal groove also provides a stable articulation for the base of the proximal phalanx against the head of the metatarsal. This interlocking point of contact will resist medial luxation of the proximal phalanx and its potential for development of hallux varus.

Resection of bone from the metatarsal head for the purpose of bunionectomy is focused at the dorsomedial corner or general prominence of the dorsomedial epicondyle (Figs. 6A,B). The general contour of the metatarsal head should be rounded and smoothed with care taken to preserve the integrity of the sagittal groove and the plantar articulation for the tibial sesamoid. This technique is especially recommended when hallux valgus repair includes lateral transposition of the metatarsal head by structural reduction of the intermetatarsal angle. However, there may be instances when more bone must necessarily be resected. In these instances, extreme care must be taken in realignment of peri-articular structures and capsular repair.

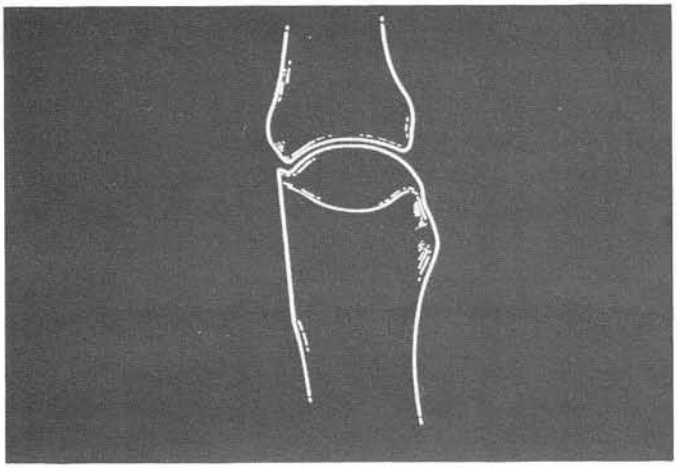


Fig. 5. Congruous articulation of first metatarsophalangeal joint with alignment of medial rim of base of proximal phalanx in sagittal groove of metatarsal head.

SELECTION OF APPROPRIATE SURGICAL PROCEDURE

Once the prominence of the metatarsal head has been resected, range of motion of the metatarsophalangeal joint must again be evaluated to begin the process of selection of the most appropriate surgical procedure for correction of the specific deformity. The process begins with loading the first ray while manually reducing the intermetatarsal angle. The hallux is then placed in a congruous relationship to the metatarsal head and range of motion in dorsiflexion is evaluated.

A critical judgement and clinical appreciation is made with determination of this congruous position. The hallux is adducted in the transverse plane until the medial rim of the proximal phalanx locks into position in the sagittal groove of the metatarsal head. With the joint loaded and the intermetatarsal angle manually reduced, the hallux is moved through a range of dorsiflexion. This is the same maneuver that was performed before and after each sequential step of the interspace dissection.

In most cases it is the adequate release of plantar-lateral contracture that allows the hallux to dorsiflex cleanly in the sagittal plane when the hallux has been reduced into a congruous position on the metatarsal head.

Lateral deviation of the articular surface of the metatarsal head or what is commonly described as an abnormal Proximal Articular Set Angle (PASA) can indeed occur, but is apparently much less common than was previously thought. Lateral tracking or the perception of a track-bound joint has been significantly decreased by the orderly release of specific contractures at the plantar-lateral aspect of the metatarsophalangeal joint.

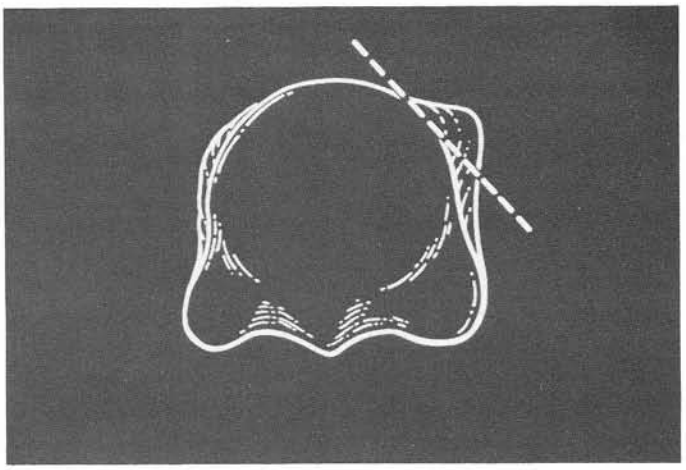


Fig. 6. A. Planned resection of dorsomedial epicondyle.

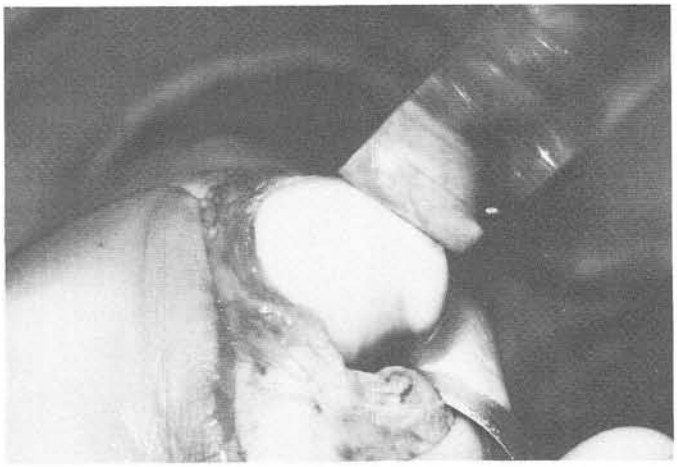


Fig. 6. B. Resection of dorsomedial aspect of metatarsal head.

Once an adequate plantar-lateral release has been performed and the range of dorsiflexion evaluated, a clearer appreciation of the true attitude or direction of the articular surfaces of the metatarsophalangeal joint can be appreciated. An abnormally high PASA or DASA can indeed occur and when present appropriate structural procedures can be employed to counter their affects.

For the purposes of this discussion, the selection of appropriate surgical procedures for the repair of the deformity of hallux abducto valgus will include:

1. Austin type procedures
2. Base wedge osteotomies
3. McBride variations
4. Reverdin modifications
5. Akin
6. Implant arthroplasty, Keller et. al.
7. Arthrodesis and Other Techniques.

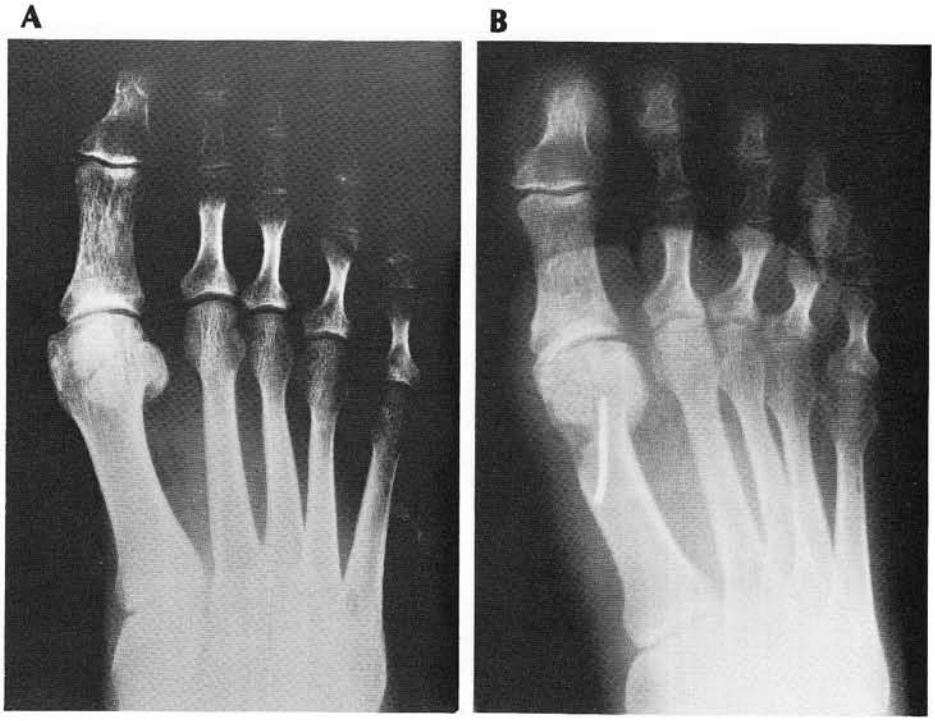


Fig. 7. A, B. Austin hallux valgus repair; preoperative and postoperative.

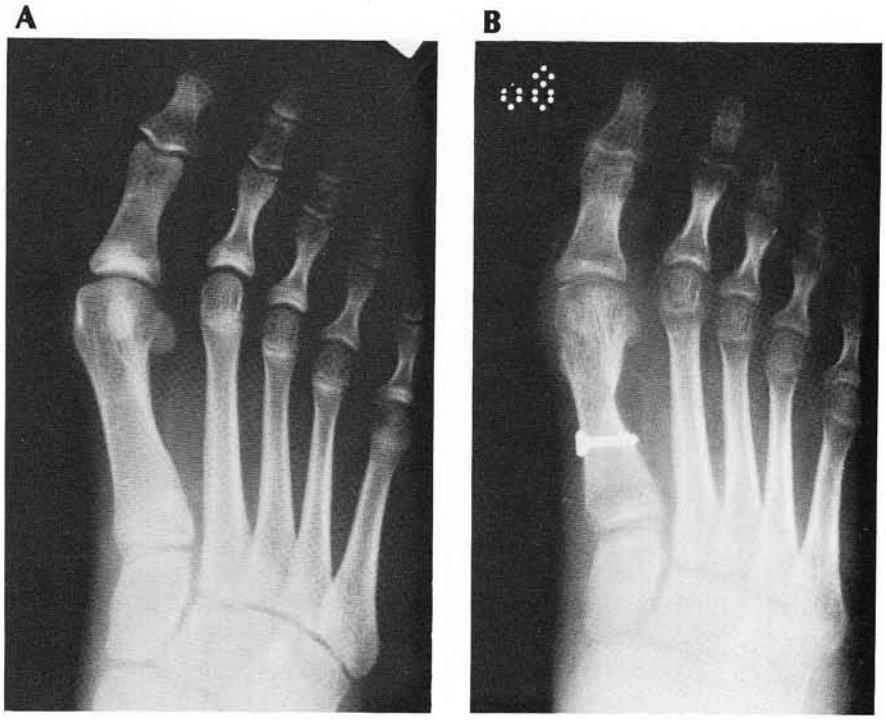


Fig. 8. A, B. Base wedge osteotomy; preoperative and postoperative.

Austin-type

The Austin bunionectomy has become one of the most common procedures used in hallux valgus surgery in the podiatric community (Figs. 7 A,B). It has proven to be a dependable and effective procedure with relatively few complications. Many variations of this osteotomy have been introduced and most seem to be effective in various surgeon's experience.

The Austin technique is recommended for most mild to moderate hallux valgus deformities. It appears to be most effective in a joint with minimal degeneration or adaptation. Various modifications of the procedure have been used successfully in dealing with deviated PASA's, hallux limitus and other types of deformity of the first metatarsophalangeal joint.

Austin-type procedures have also been used for more severe deformities with intermetatarsal angle relationships that might seem to suggest the need for a base wedge osteotomy. This approach can meet with some success given the individual surgeon's own experience and ability to evaluate and deal with other deforming forces and relationships.

Base Wedge Techniques

There have been many significant advances in base wedge osteotomy techniques of the first metatarsal in the last ten years, especially with the application of the principles of rigid internal fixation and a greater appreciation of the mechanics and demands of functional bone healing (Figs. 8A, B).

The base wedge osteotomy is not a weight-bearing procedure.

The need for a base wedge osteotomy in the correction of the deformity of hallux abducto valgus is usually seen with a significant increase in the intermetatarsal relationship, especially when this is a rather rigid or unreducible condition.

McBride Techniques

The term McBride bunionectomy has come to mean any one of a variety of soft tissue repair techniques and bone resection of the first metatarsophalangeal joint. The classic McBride incorporates excision of the fibular sesamoid as a primary component of the procedure Figs. 9A,B).

With the advent of specific dissection techniques within the first interspace, the plantar-lateral contracture can usually be eliminated quite successfully without the actual need for excision of the fibular sesamoid.

Components of the McBride bunionectomy are used routinely in most surgical repairs of the first metatarsophalangeal joint, whether the actual procedure be an "Austin," a base wedge, or other technique.

The McBride technique however, with or without excision of the fibular sesamoid, can be used quite successfully by most experienced surgeons to correct even quite severe deformities. A variety of compromising situations may see the surgeon elect to use this non-osteotomy technique for the repair of even severe hallux valgus deformity. These situations may include: age, social factors and work requirements, osteoporosis, or need to avoid casting.

When using any technique in a compromised situation, complications must be anticipated and steps taken to avoid them. One of the most dreaded complications of the McBride-type procedures is the occurrence of hallux varus. The deformity usually results from medial luxation of the tibial sesamoid. It is usually preceded by elimination of lateral contracture and even residual lateral stabilization and then precipitated by over-correction or excessive bone resection. The McBride

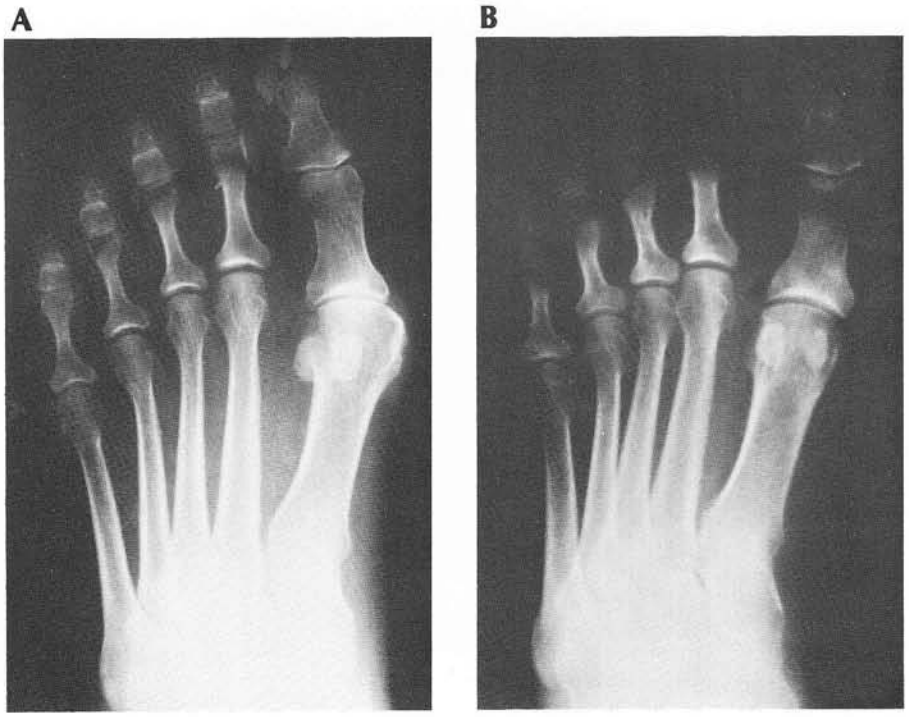


Fig. 9. A, B. McBride bunionectomy; preoperative and postoperative.

maneuver can be over-done and result in an iatrogenic deformity.

Reverdin-type

The traditional Reverdin osteotomy or the Green-Reverdin modification are both distal metaphyseal osteotomies used in hallux valgus repair to redirect the distal articular surface of the metatarsal head (Figs. 10 A,B). Their primary function is to reposition a laterally deviated articular facet. These techniques are quite effective when an abnormally high PASA is a significant component of the deformity.

The Reverdin-type osteotomy is also useful in reducing the intermetatarsal relationship when a more proximal osteotomy technique may not be the procedure of choice. The reverse buckling of a physiologic adductus alignment of the hallux can significantly reduce the intermetatarsal angle in a flexible deformity.

Akin

The Akin osteotomy is theoretically used to correct an abductus deformity within the proximal phalanx or an abnormally high distal articular set angle (DASA) (Figs. 11 A,B).

True abductus alignment of the great toe can be produced by a lateral bowing of the proximal phalanx. This relationship is often inadequately appreciated in preoperative analysis of the deformity. If not fully appreciated, this secondary deformity can lead to a significant complication in the repair of the primary deformity of hallux abducto valgus.

During the actual surgical repair of the hallux valgus deformity, the alignment of the great toe is often clinically set by comparing the position of the external alignment of the digit to the proximal segment of the rest of the foot. Deviation of the nail may also give an appearance of hallux valgus to the person responsible for holding the hallux in rectus alignment during capsular repair.

Under these circumstances, the hallux with a clinically significant DASA may be held in rectus alignment and in fact, the joint is repaired with the articular surface of the base of the proximal phalanx medially luxated from the metatarsal head. This subtle luxation may readily lead to a hallux varus deformity.

With the techniques of anatomic dissection and effective structural re-alignment, care must be taken to ensure repair of capsular tissues with confirmation that the metatarsophalangeal joint is in a congruous position. This congruous position can be confirmed clinically by visualizing the medial rim of the proximal phalanx articulating directly within the sagittal groove of the metatarsal head. If significant hallux abductus remains, then an Akin osteotomy may be indicated for proper realignment of the first ray segment.

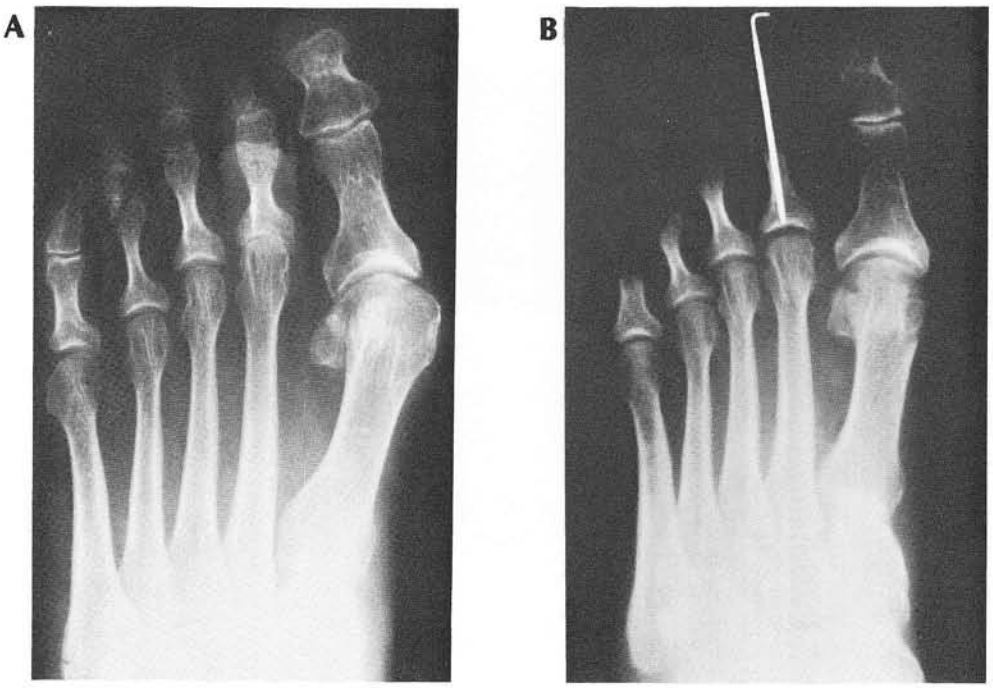


Fig. 10. A, B. Reverdin osteotomy; preoperative and postoperative.

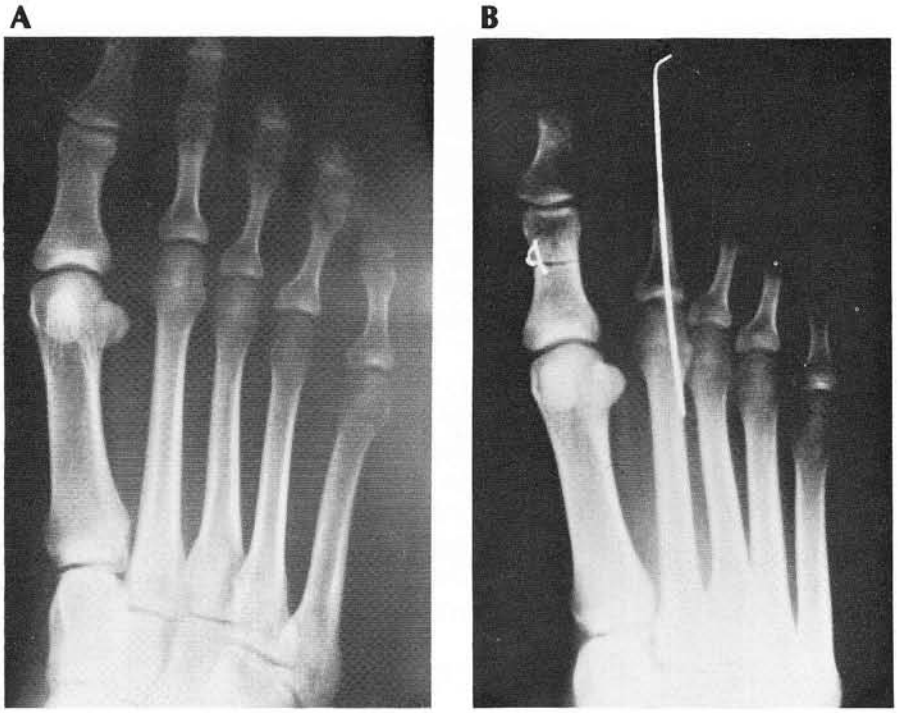


Fig. 11. A, B. Akin osteotomy; preoperative and postoperative.

Fig. 12. A, B. Implant arthroplasty; preoperative and postoperative.

Implant arthroplasty, Keller, etc.

Arthroplasty of the first metatarsophalangeal joint is indicated when degeneration or distortion of the articular segment of the joint are significant enough to prevent a smooth, pain-free range of motion once the primary deformity has been corrected. These techniques and their specific indications are widely discussed (Figs. 12 A,B).

Arthrodesis and Other Techniques

Arthrodesis of the metatarsophalangeal joint, Lapidus fusion, and other procedures have their place in hallux valgus surgery. Their use has specific indications and are discussed in other chapters.

Once the structural mechanics of the specific hallux valgus repair procedure have been performed, the

delicate process of rebalancing the peri-articular structures of the metatarsophalangeal joint begins. This process is one of fine tuning the ultimate function of the metatarsophalangeal joint and is often the difference between an average and an excellent surgical result.

MUSCLE-TENDON BALANCE/ADDUCTOR TENDON TRANSFER

The adductor tendon transfer technique has been used widely as an integral part of hallux valgus surgery. The primary function of the transfer is relocation of the sesamoid apparatus within the sesamoidal grooves of the metatarsal head (Fig.13). Several other secondary benefits include derotation of the hallux, assist in reduction of the intermetatarsal angle and reinforcement of the medial capsular flap. The technique has been described completely in previous texts and film.

The technique is most useful in the typical hallux valgus deformity where successful plantar-lateral release has been performed and there is minimal adaptive change of the sesamoid articulation which would prevent the sesamoids from functioning freely beneath the metatarsal head once relocated.

While the adductor tendon transfer is a very effective and useful technique, it also must be used judiciously. The technique must not be used to try to do too much and caution must be taken to avoid its use when it can be too effective and create a medial imbalance which can lead to hallux varus.

Caution must be taken when combining the adductor tendon transfer with a complete plantar-lateral release or fibular sesamoidectomy. In this circumstance, the pull of the adductor tendon transfer can easily sublux the tibial sesamoid medially out of the sesamoidal groove and produce hallux varus. Similarly in a mild deformity, an over zealous adductor transfer can lead to varus deformity. And finally, in hallux valgus repair where a structural osteotomy i.e., Austin or base wedge is used, it is possible to create a structural zero or even a negative IM relationship. In these circumstances, the adductor tendon transfer must be used judiciously or avoided if there is a tendency to medial dislocation of the tibial sesamoid.

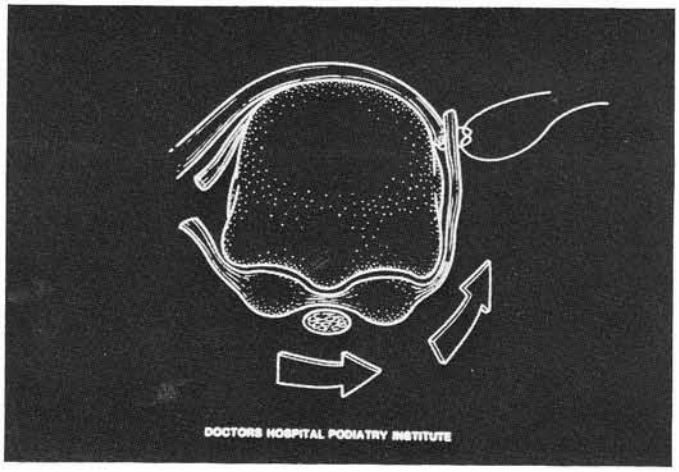


Fig. 13. Relocation of sesamoidal apparatus following adductor tendon transfer.

The adductor tendon transfer is a valuable and key surgical technique in the complete repair of hallux valgus deformity. The maneuver must be considered as a surgical tool and used with discretion. If performed as a mere technical exercise and not judiciously evaluated during its execution, it can lead to significant postoperative complications.

CAPSULORRHAPHY

The capsulorrhaphy technique of the first metatarsophalangeal joint includes excision of redundant tissues and repair or closure of the capsular incisions. The key factor to this process is the position in which the metatarsophalangeal joint is held during its execution (Figs. 14 A-C).

Fundamentally, the metatarsophalangeal joint should be held in an anatomically congruous position. Then the appropriate amount of medial capsule can be excised and tissues repaired under proper tension.

If the hallux is held in what appears to be an apparent rectus alignment the metatarsophalangeal joint may actually be medially luxated. If redundant capsule is excised with the joint in this overcorrected position, it is quite possible to trade the original deformity for a new one . . . hallux varus.

The final closure of capsular tissues is as critical as any other part of the surgical procedure. Great care must be taken to properly align the metatarsophalangeal joint in its congruous position for this final phase of the repair of the hallux valgus deformity.

Completion of the surgical procedures includes the anatomic closure of the wound by specific tissue layers. This phase of the surgical process must not be minimized or taken as routine.

This paper has been written in an attempt to describe the clinical process that is used in the actual execution of the reconstruction of the first metatarsophalangeal

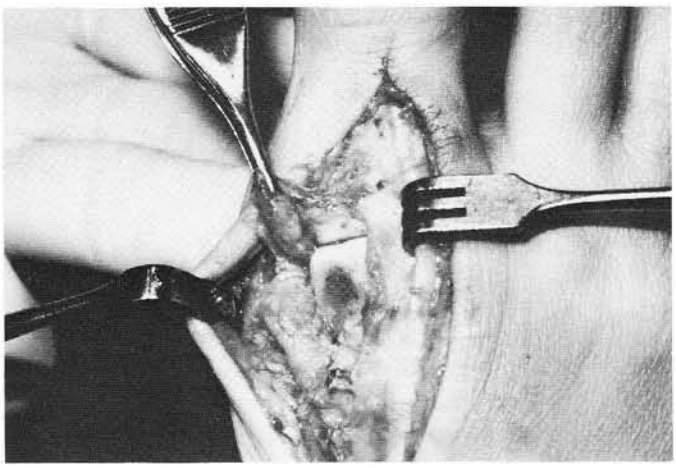


Fig. 14. A. First metatarsophalangeal joint held in congruous position for capsular closure.

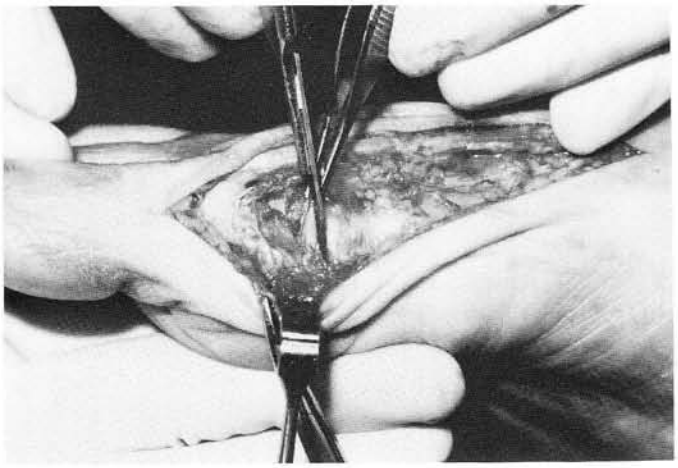


Fig. 14. B. Excision of redundant capsular tissue.

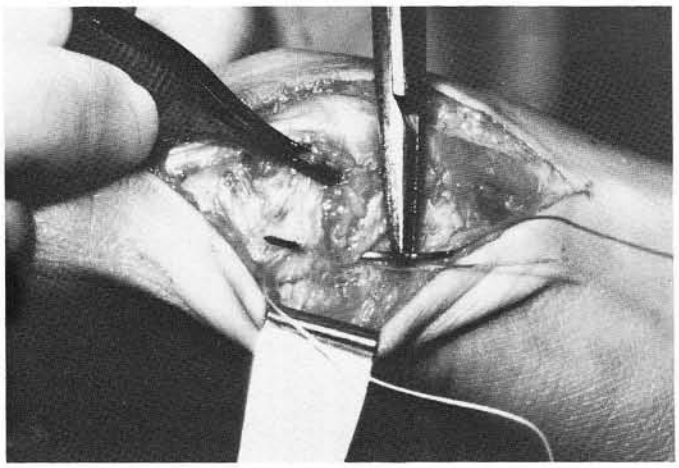


Fig. 14. C. Closure of medial capsule.

joint in the deformity of hallux abducto valgus. Many of the actual surgical techniques are described in more detail in other text and demonstrated vividly in film. It is the understanding of why these techniques are used, and the ability to judiciously employ them that makes the difference between a surgeon and a technician.

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