



# The MIS Akin Osteotomy

Here's a modern MIS technique for HAV correction.

BY DONALD PEACOCK, DPM

## Introduction

Foot surgeons are familiar with the closing wedge osteotomy of the hallux and refer to the procedure as the Akin osteotomy. The original Akin bunion procedure described in 1925 involved soft tissue releases with remodeling of the first metatarsal head along with an osteotomy of the hallux.<sup>1</sup> Today, the procedure is more commonly used in conjunction with other procedures, including distal and proximal first metatarsal osteotomies. Minimally invasive foot surgeons use the Akin osteotomy in a variety of ways, including:

- 1) Augmenting procedures designed to alleviate symptoms associated with hallux rigidus.
- 2) Correction of hallux abductus.
- 3) Alleviating ulcers and pressure issues under the hallux.
- 4) Pathology associated with the hallux abutting the 2nd toe.
- 5) Treating hallux abductus interphalangeous.
- 6) Resection of osteomyelitis
- 7) Reverse percutaneous Akin for hallux varus.

The instructors in the Academy of Ambulatory Foot and Ankle Surgery (AAFAS) teach the MIS Akin technique to new attendees in a “hands-on” fashion during their cadaver seminars. The Akin lends itself remarkably well to MIS paradigms. An early publication on the subject was written by Dennis White, DPM in 1991.<sup>2</sup> Others described the MIS Akin technique in

conjunction with a first metatarsal exostectomy, with and without an osteotomy.<sup>3,4</sup>

The MIS Akin has found a niche in conventional circles in recent years. Stephen Barrett, a well-known podiatric surgeon, informed the author that he routinely employs a non-fixated MIS Akin in conjunction with an Austin. He

ditional surgeons can perform the Austin with fixation in less than 20 minutes, most surgeons require 40 minutes or more to perform this task. It's nice to have a procedure that can be done in less than two minutes to rectify the less than ideal correction of abductus following bunion correction. The MIS Akin procedure is faster than ap-

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went on to state that “the procedure is fast and adds very little time to my surgery.” Ask yourself this: How many times have you skillfully performed an Austin only to be left with continued abduction of the hallux? What do you do about it? Do you splint the toe firmer than normal and does that really work for you? Would you like to learn a two-minute true correction for this issue? There is more than meets the eye with the MIS Akin procedure, and it can be used in a variety of other ways.

## Surgical Times

In light of reduced reimbursements, time efficiency is more important than ever. While some tra-

plying the extra splinting that you hope will work. It's a perfect tool to use as a post-bunionectomy touch up and will not add excessive surgical time.

## Concepts of MIS

Most of the principles used in minimally invasive foot surgery are entertained in performing the MIS Akin osteotomy. The procedure makes for an excellent subject when teaching surgeons new to the fundamentals of MIS. These principles include appropriate incision placement to avoid neuro-vascular structures and appropriate soft tissue reflection to avoid unnecessary dissection and trauma to the soft tissue. This tech-

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nique can be learned rapidly, allowing for immediate implementation.

### Clarity of Application

Before delving into minimally

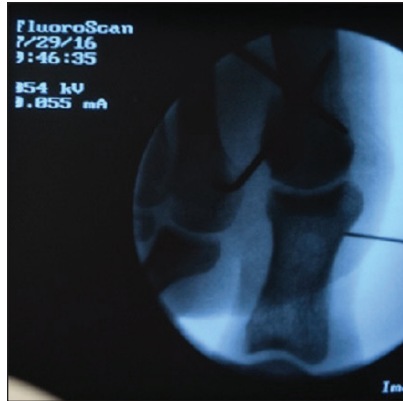


Figure 1: Incision site placement utilizing a 67 blade under the guidance of fluoroscopy.



Figure 2: Incision made with 67 or 64 blade on the medial aspect of the hallux. The incision is made percutaneously between the dorsal and plantar neurovascular structures.

supervision of doctors knowledgeable in MIS philosophy. Instruction in the rudiments of MIS is carried out by the AAFAS in their cadaver seminars two times per year. The AAFAS also has a mentorship program to assist in transitioning to MIS techniques.

Logically, a proper working knowledge of foot anatomy is vital prior to attempting MIS foot surgery. While minimally invasive surgery strives to be less traumatic, the wrong application and unskilled execution of MIS may lead to permanent and possibly crippling complications.<sup>5</sup>

### Tools of the Trade

The MIS Akin osteotomy can be performed utilizing either a rotary burr or a small sagittal saw. When utilizing a rotary burr, it is best to use a high torque low-speed drill. The author prefers a high torque variable speed drill to allow for very low speeds. Most of the time, the speed used will result in a quiet and almost inaudible sound from the drill. Higher-speed drills will result in friction heat and thermal necrosis, leading to greater chance of delayed union and excessive bone loss. When utilizing a sagittal saw, a slightly larger incision will be required and the saw should be maintained at full speed.

### The Biomechanics of Minimally Invasive Surgery

When utilizing a rotary burr, the surgeon must be aware of the axis of motion within the instrument at all times. This awareness is one of the most important aspects

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Figure 3: A small rasp is used to reflect the periosteum in the path of the proposed osteotomy to be created by the Isham burr. This step is essential to limit the possibility of soft tissue entanglement.

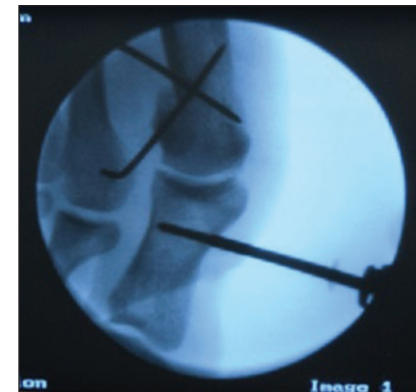


Figure 4: The Isham burr is inserted for creation of the osteotomy under the guidance of fluoroscopy.



Figure 5: Lateral cortex is left in place after the osteotomy.



Figure 6a: Maneuvers showing forcible closure of the osteotomy.



Figure 6b: Fluoroscopy representation after forcible closure.



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of MIS surgery. Even slight deviations from the pre-planned axis will result in an angular or irregular osteotomy. It is vital to utilize fluoroscopy when performing the surgical correction to assist in proper placement of the osteotomy (Figure 1). There are essentially two types of techniques described when utilizing a rotary burr. One technique involves performing a pilot hole, and then completing the osteotomy



Figure 8: First and second layer bandage showing Unna boot layer.

elitis, an altered osteotomy position is indicated for the purpose of avoiding the infected bone or for the purpose of debriding infected bone intentionally.

### Other Considerations

When performing the osteotomy distally for correction of hallux interphalangeus, the surgeon should be aware that tightening of the hallux interphalangeal joint is possible. The author prefers an oblique long arm wedge osteotomy to help prevent tightening of the hallux interphalangeal joint when correcting a hallux interphalangeus deformity via MIS technique.

**Prior to performing the osteotomy, it is important to determine the exact location of the osteotomy with the use of fluoroscopy.**

lunge joint when correcting a hallux interphalangeus deformity via MIS technique.

### Technique: The Percutaneous MIS Akin

An incision is made using a 67 or 64 blade over the medial aspect of the proximal phalanx great toe and carried down to the periosteum structures (Figure 2). Utilizing the blade, a small area of the periosteum is reflected. At this time, a small rasp is used to remove the

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my from within the bone dorsally and plantarly.

The other technique involves making an osteotomy cut from dorsal to plantar or vice versa in one sweeping motion. It is important that the surgeon keep in mind that the cutting surface of the burr is on the side and not the distal tip. The appropriate motion would require both maintaining the axis of motion and a slight reciprocation movement of the hand. Completion of the osteotomy is quick and should take no more than two minutes to complete.

### Academic Considerations:

#### Contra-indications for the Use of the MIS Akin

- 1) IM angle over 15 degrees for procedure in HA cases.
- 2) Rigid bunion deformity with mild to moderate increase in the IM angle.
- 3) Significant deviated or subluxed first metatarsal phalangeal joint with bunion.
- 4) In cases where the above pathology exists (1-3), the Akin osteotomy should be performed in conjunction with appropriate bunion correction and first metatarsal osteotomy.
- 5) With plantar ulcerations and osteomy-



Figure 7: Dual K-wire fixation performed to fixate a through and through osteotomy for the purpose of correcting a rotational valgus deformity.



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periosteum from the medial aspect of the phalanx and the dorsal aspect in the path in which the cutting burr edge will be traveling (Figure 3). A straight Isham or Shannon burr is then inserted between the bone and

the reflected periosteum (Figure 4).

A precise placement is required to avoid damage to adjacent neurovascular structures. The osteotomy is performed perpendicular to the axis of the proximal phalanx. Once the osteotomy is begun by the rotary burr, a reciprocating motion is

made performing an osteotomy in the medial aspect of the hallux with the lateral cortex intact (Figure 5). By applying pressure to the toe medially while maintaining the oscillating movement, the desired wedge can be removed. Lastly, the osteotomy is

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Figure 9: 3 x 3 longitudinal splints attached to Unna boot layer in order to splint the hallux in over-corrected position.



Figure 10: Final Coban dressing layer.



Figure 11: Depiction of a patient's self-bandage utilizing a foam wedge to maintain surgical correction.

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Figure 12: Case 1—pre-operative x-ray modified McBride bunionectomy with MIS Akin osteotomy.



Figure 13: Case 1—post-op x-ray six months following modified McBride bunionectomy with MIS Akin osteotomy.



Figure 14: Case 2—Immediate post-op showing residual hallux abductus following Austin bunionectomy.



Figure 15: Case 2—improved hallux abductus following 2-minute MIS Akin osteotomy.



Figure 16: Case 3—Performing modified dorsal wedge Akin osteotomy for a chronic ulceration on the hallux.



Figure 17: Case 3—ulceration healed in 3 weeks following the dorsal wedge Akin osteotomy.



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closed by forcible closure, leaving the lateral cortex intact (Figures 6a, 6b).

### Anatomical Considerations

To reiterate, prior to performing the osteotomy, it is important

be too proximal. If the osteotomy is performed too proximally, the patient may experience pain in the plantar aspect of the osteotomy site when weight-bearing.

This placement will protect the intrinsic plantar muscular structures from being accidentally severed

and may lead to a dorsi-flexion position post-operatively. The osteotomy is maintained for four to six weeks, utilizing external bandaging. In cases where there is significant rotational deformity, a through and through osteotomy is preferred and usually maintained with dual K-wire fixation (Figure 7).

**To prevent loss of correction,  
it is important for the patient not to wear  
a curved last shoe for up to three months  
following the procedure.**

### Post-operative Care

The incision is closed with a 5.0 nylon suture. The foot is bandaged and stabilized via external bandage/fixation. The author prefers to start with a layer of 3 x 3 bandaging, and covering the forefoot portion with an overlying Unna boot second layer (Figure 8). At this time, a folded longitudinal 3 x 3 bandage is used to splint the toe into an over-corrected position, keeping it in place by attaching the splint to the underlying Unna boot (Figure 9).

The dressing is finished with gauze wrap and Coban (Figure 10).

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to determine the exact location of the osteotomy with the use of fluoroscopy. Generally, the osteotomy is performed approximately 8 to 10 mm distal to the base of the proximal phalanx. The proximal phalanx has a concave anatomical makeup here. It is better to be slightly distal than to

during the surgical procedure as well. It is important to maintain a few millimeters of the lateral cortical bone and not disrupt the lateral cortex. By maintaining the lateral cortex, the need for fixation is bypassed.

Disruption of the lateral cortex will require more aggressive fixation



Figure 18: Case 4—Plantar hallux ulcer (one year duration) with underlying osteomyelitis.



Figure 19: Case 4—3-month post-op x-ray displaying area of denuded osteomyelitis.



Figure 20: Case 4—3-month post-op showing healed ulcer.



Figure 21: Case 5—Limited ROM 1st MPJ pre-op.

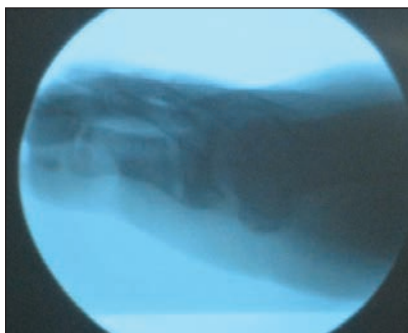


Figure 22: Case 5—Fluoroscopy showing the modified dorsal wedge Akin osteotomy.



Figure 23: Case 5—One year post-op showing increased ROM from dorsal modified MIS Akin and MIS Dorsal wedge 1st metatarsal osteotomy.



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This is held in place for a minimum of four to six weeks and changed weekly. The patient is normally placed in a surgical shoe. At four weeks, patients will begin to bandage the correction themselves using Coban and a foam wedge placed between the first and second toe (Figure 11). This is maintained for an additional two weeks prior to wearing normal footwear. To prevent loss of correction, it is important for the patient not to wear a curved last shoe for up to three months following the procedure.

### Case 1: A Hybrid Approach—Modified McBride Bunionectomy with MIS Akin

This case is of a 70-year-old female who had a flexible bunion deformity. When pressing on the 1st metatarsal, the IM angle was reduced to normal. The patient underwent a modified McBride conventional bunionectomy along with a minimally invasive Akin osteotomy. In Figures 12, 13, you can see the pre-operative and post-operative x-rays. The IM is reduced by the re-aligning effect that the osteotomy has on the flexor apparatus.

### Case 2: Akin Osteotomy to Augment a Conventional Austin Bunionectomy

This patient was a 43-year-old female who underwent an Austin bunionectomy. At the end of the surgery, mild residual hallux abductus was present. A MIS Akin osteotomy was performed to improve her cosmetic outcome and correct the mild residual deformity. This procedure only added two minutes to the surgical time (Figures 14, 15).

### Case 3: A 41 Year-Old Diabetic Patient with a Long-Standing Ulceration

A modified Akin osteotomy with a dorsal wedge was performed along with a percutaneous FHL tenotomy on the hallux. This allowed reduction of pressure and the six-month ulceration healed in three weeks. The patient was uninsured and the procedure was performed

in the office under local anesthesia (Figures 16, 17).

### Case 4: A 61 Year-Old Female with Osteomyelitis of the Hallux

The author used the same principles of the MIS Akin to perform a larger wedge bone resection, thereby removing the underlying osteomyelitis with subsequent healing of the ulcer that was present for one year (Figures 18–20).

### Case 5: MIS Akin Osteotomy to Correct Hallux Limitus in a 26-Year-Old Male Patient

For this patient, a combination procedure was performed including a dorsal wedge osteotomy first metatarsal along with a modified dorsal

wedge MIS Akin osteotomy. This correction allows for greater dorsi-flexion in the first metatarsal phalangeal joint and removal of the exostosis from the dorsal aspect of the first metatarsal phalangeal joint. The patient had an extremely quick recovery and was back to work in approximately six days. The patient continues to be pain-free. The combination of the metatarsal osteotomy and the hallux also decompresses the 1st MPJ (Figures 21–23).

### Case 6: MIS Correction of Hallux Varus

This patient is a 68-year-old female who sustained significant scarring and hallux varus deformity after

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## About the AAFAS

The Academy of Ambulatory Foot and Ankle Surgery is an international multidisciplinary organization of surgeons that promotes minimally invasive foot and ankle surgery. The Academy is more than 40 years old and is responsible for spreading the techniques of MIS foot surgery to a small band of American podiatrists and European orthopedic foot surgeons. Gradually, by way of active promotion, the Academy has seeded the fundamentals of MIS foot surgery worldwide. The organization has survived in both good times and bad. The early years of MIS foot surgery were met with some controversy in the United States. “Unfortunately,” reports AAFAS, “a few bad surgeons gave the techniques an unfair reputation that has ridiculously remained in the podiatric mindset. By the same token, there were other skilled foot surgeons who achieved great results utilizing MIS techniques.” The techniques and surgeons remained virtually underground in the United States while the procedures gained more traction in European surgical circles.



Recently, the Academy is experiencing growth with a newfound interest amongst podiatric physicians who are traditionally residency-trained. The techniques developed by the early pioneers have been continuously upgraded and modernized. Most of these techniques can be performed in an office setting under local anesthetic and techniques are generally quicker than traditional techniques. This time conservation fits in well with the economic barriers we are now facing as podiatric surgeons. The techniques are fast, less expensive, versatile and make for happy patients and doctors.

Join AAFAS at their next seminar in New Orleans January 12th–14th 2017. Go to [www.aafas.org](http://www.aafas.org) to register.



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a traditional bunion surgery with a cerclage wire fixation of an open Akin osteotomy. The author employed a percutaneous incision laterally to correct the varus deformity via a reverse Akin osteotomy distal to the fixation. This technique made correction possible without the need for hardware removal (Figures 24–27).



Figure 24: Case 6—Pre-op hallux varus with scarring from traditional Austin and open Akin with cerclage wire fixation.

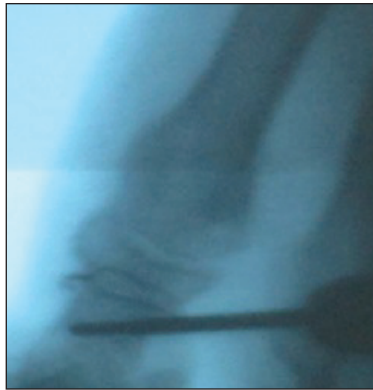


Figure 25: Case 6—Fluoroscopy view of Reverse MIS Akin osteotomy to correct hallux varus. Note the position of burr, avoiding previous fixation.



Figure 26: Case 6—Result of MIS Reverse Akin osteotomy cut, avoiding the need for hardware removal.

## Conclusion

The percutaneous MIS Akin osteotomy is a highly capable procedure and is relatively easy to learn. Care must be taken with soft tissue structures to avoid injury of neurovascular and tendon structures in the

hallux. With proper training, this procedure becomes a nice addition to the foot surgeon's armamentarium. The main advantages of the procedure is its inherent speed of execution and ability to treat a variety of deformities. Once fundamental practical knowledge of MIS is mastered, the MIS Akin can be immediately implemented into your practice. The author invites all interested to join us at the AAFAS to learn this amazing procedure.

The learning curve for the MIS Akin is not steep. You will be glad you learned this technique. **PM**



Figure 27: Case 6—hallux varus correction Post-op 6 weeks after MIS reverse Akin.

## References

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**Dr. Peacock** has been in private practice for 18 years in Whiteville, NC. He was traditionally trained in a podiatric surgical residency. He is an assistant professor in the AAFAS and is a diplomate of the American Board of Podiatric Surgery-ABPS. Dr. Peacock has an interest in expanding the scope and acceptance of MIS foot surgery in the podiatric medical community. He believes that MIS procedures can be used as a valuable part of a traditional foot surgeon's arsenal of tools.