The PRIB Procedure

Here’s a modern MIS technique for HAV correction.

BY DONALD PEACOCK, DPM

Introduction

Hallux valgus surgical correction is a common task performed by foot surgeons and is one of the more challenging ones. More than 150 surgical procedures have been developed to correct HAV. In this presentation, the author presents a unique minimally invasive technique (MIS) which allows for:

1) Correction of IM angles over 16°
2) Direct PASA adjustment
3) Hallux abductus rectification
4) 1st ray length preservation
5) Reduction of medial shelf created by the osteotomy
6) Removal of the medial Bunion prominence
7) Fixation options
8) An office-based paradigm
9) An inexpensive cost-effective process
10) Quick surgical times/10-15 minutes

Previous MIS bunion techniques offer resolution to many of the above characteristics and the procedure described here borrows from previous contributions. Combining the properties of the reputable Reverdin-Isham and Bosch procedures led to this presentation. The procedure is introduced as the PRIB procedure and is the acronym for Peacock, Reverdin, Isham, Bosch.

Background

Distal first metatarsal osteotomies are widely accepted for treating HAV deformities. These osteotomies lend themselves well to MIS techniques. On the other hand, shortening is observed when performing through and through osteotomies by means of a burr. MIS cutting burrs have a width of 2mm and contribute to this observable fact (Figure 1). The effect is more pronounced in patients with higher IM angles. The rationale behind modifying the Reverdin-Isham and Bosch procedures is aimed at bringing about a MIS osteotomy which can achieve what these techniques accomplish with the added advantage of combining their inherent strengths.

Similarities and Differences to the Reverdin-Isham and the Bosch

For patients who have IM angles under 16°, the author employs the Reverdin-Isham procedure which is performed intra-capsular in the metaphyseal area of the first metatarsal head. This procedure removes the medial bunion. A wedge osteotomy is performed angled away from the sesamoids leaving the lateral cortex intact. The author has achieved good results with this osteotomy with IM angles up to 16 (Figure 2).

In patients who require further reduction of the intermetatarsal angle, utilizing a through and through variation of the Reverdin-Isham leads to shortening of the first ray (Figure 3). This is obviously advantageous or not depending on the patient’s foot type and deformity. For

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example, in a patient with concurrent hallux rigidus, decompression by shortening is favorable. Conversely, a patient with a relatively short 1st ray will not benefit from further shortening.

The Bosch procedure is performed extra-capsular in the distal diaphyseal area of the 1st metatarsal and allows for correction of large IM angles. It does not allow for reduction of the medial bunion prominence or the cortical shelf created by the transposition of the osteotomy. The author employs the Bosch technique to correct high IM angles in patients with minimal bunion prominence and slight PASA needs. The Bosch is not as effective in patients with large bunion prominences and does not allow for direct PASA correction. The Bosch procedure is time-efficient and is executed in five minutes. The fixation method for the Bosch is painful for some patients (Figure 4).

Like the Reverdin-Isham procedure, the PRIB procedure allows for direct correction of PASA and removal of the medial bunion. Like the Bosch, the PRIB osteotomy is performed extra-capsular in the distal diaphyseal area and has the same ability to correct larger IM angles.

Pre-operative Criteria

The PRIB procedure is directed at treating symptomatic large medial bunion deformities with IM angles over 16 degrees. The specific criteria for the PRIB procedure are as follows:

1) The first metatarsal phalangeal joint should have good range of motion with no crepitus or pain.
2) The first metatarsal phalangeal joint can be congruent, deviated, or subluxed.
3) The intermetatarsal angle is over 16°.
4) The PASA is increased.
5) DASA angle is normal.
6) HA angles are slightly or highly abnormal.
7) The relative metatarsal protrusion angle is either positive or negative.

Operative Technique

The PRIB procedure combines several minimal-


The PRIB procedure combines several minimally invasive surgical techniques.

is performed with a 64 blade and is made over the plantar medial border of the first ray where the metatarsal head fans out in the distal diaphyseal area (Figure 5). The incision is continued down in a single cut until reaching the periosteum. From this position, the 64 blade is used to underscore the capsule at the first metatarsal phalangeal joint, employing a sweeping motion. Under fluoroscopy, a 3.1 wedge burr is inserted and the medial prominence is resected from the first metatarsal head (Figure 6). Pressure is applied to the first metatarsal phalangeal joint area, and the medial eminence is eliminated as bone paste (Figures 7, 8).

The first step of the osteotomy involves a wedge osteotomy in the distal diaphyseal area of the first metatarsal, leaving the lateral portion of the cortex intact. This is accomplished using a straight Isham burr (Figure 9). The osteotomy is angled at a 35°-45° from dorsal distal to plantar proximal and is angled distally to help maintain length of the first metatarsal in patients with a relatively short 1st ray (Figure 10). It can be made parallel to the 2nd metatarsal or proximal, if desired. The final cut of the osteotomy involves completing the lateral cortex cut with a J stroke movement leaving a lateral plantar shelf. This maneuver will allow for further 1st ray lengthening and added stability for patients requiring plantar flexion of the 1st ray (Figures 11, 12, 13).

The osteotomy is then shifted by inserting a Locke elevator through the incision site into the medullary canal of the 1st ray and using this as a fulcrum to transpose the osteotomy (Figures 14, 15). After laterally shifting the osteotomy, a percutaneous lateral release is done (Figure 16). Thumb pressure can transpose the osteotomy in some patients. Note the plantar lateral shelf in Figure 15.

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Subsequent to displacing the osteotomy, fixation is accomplished via percutaneous K-wire placement in a modified Bosch version (Figure 17). This fixation technique permits torquing to further close the PASA correction. Percutaneous fixation can also be performed proximal dorsal to plantar distal, if desired (Figure 18). The modified Bosch fixation and the dorsal percutaneous fixation methods are less painful than the originally described Bosch fixation. The osteotomy can be plantarflexed by distracting the distal fragment and pressing the medullary portion of the fragment onto the plantar lateral shelf created by the osteotomy (Figure 19). Following the fixation, the medial shelf created by the osteotomy is reduced using the same plantar medial incision, and a short Isham burr and a small rasp. Most patients will require a MIS Akin osteotomy to further correct the deformity.27

All steps of the procedure should be directly monitored under fluoroscopy guidance to ensure correct placement of incisions, osteotomy angles, appropriate IM closure, proper fixation placement, and adequate bunion prominence removal, etc. The procedure should be performed in a sterile environment, with the patient prepped and draped in the usual sterile manner. The hand piece used with the burrs requires a high torque low speed motor. The surgeon will need to adhere to all standards required for any surgical procedure, including gentle handling of soft tissue and bone. The speed of the burr requires low RPMs so that necrosis and heating of the bone and soft tissue will not occur excessively. An ankle block is used with no tourniquet to help flush out debris and facilitate cooling of the tissue. Proper knowledge of MIS techniques is a prerequisite and will require mastering with less advanced procedures before attempting the PRIB technique.

Post-operative Management

The patient is placed in a surgical shoe and is discharged following the surgery. The patient is allowed to weight-bear as tolerated, and to refrain from excessive ambulation including weight-bearing exercise. Post-operative pain is managed by minimal amounts...
of pain medication and NSAIDs in suitable patients. The initial dressing is changed in three days. The second post-operative visit is at day 10, and the sutures are removed. Post-operative x-rays are taken in three to four weeks, and the K-wire is removed. Some minimal boney callus formation may be seen in the x-ray at this time. The patient is allowed to wear an athletic shoe when the K-wire is removed. After the K-wire is removed the patients will apply their dressing as discussed below. The patient can resume all normal activities including exercise in six to eight weeks. Normal footgear can be worn as tolerated after four weeks.

**Post-operative Bandaging**

It is important to properly splint the foot in a corrected position. The Akin procedure is not fixated and will require external splinting via the bandage. The post-operative dressings are composed of two phases.

The initial phase involves a sturdy compressive bandage. The first layer of dressing is an Unna boot applied directly to the skin. This dressing allows for rectus bandaging and splinting of the Akin osteotomy. This phase of dressing is used for immediate post-op and continues for three to four weeks with weekly bandage changes (Figure 20).

The second phase of splinting involves the patient applying a toe wedge between the hallux and second toe and utilizing Coban to compress the foot. Bathing is not allowed until the K-wire is removed. The patient is allowed to go back into larger, athletic footgear in four weeks and to gradually progress to casual wear, as tolerated (Figure 21).

**Advantages of PRIB**

The advantage of this MIS osteotomy is that it allows for correction of large intermetatarsal angles over 16, and can directly address PASA while limiting shortening seen with through and through osteotomies. Also, by creating the plantar lateral shelf, added stability is gained with patients demanding plantar flexion of the first ray. In addition, the PRIB allows for reduction of the medial bunion, as well as reduction of the medial shelf created by the osteotomy. Finally, fixation via percutaneous methods is easily achieved due to the oblique nature of the osteotomy.

**Disadvantages of PRIB**

The most obvious disadvantage of this osteotomy is its more proximal
PRIB (from page 124)

imal placement than standard distal osteotomies, such as the Austin, etc. This characteristic will result in a less stable osteotomy, requiring fixation.

Conclusion

The PRIB technique borrows from already established MIS osteotomies, including the Reverdin-Isham and Bosch techniques. The procedure can be performed under local anesthetic in the office setting, and the technique can be performed in 10-15 minutes. The PRIB is usually done in conjunction with an Akin osteotomy. Other than the fluoroscopy, no special equipment is needed and the cost of the K-wire is not prohibitive to office-based procedures. It’s also a Pretty, Reliable, Impeccable, and Beneficial way to correct HAV deformity. Figures 22 and 23 show the pre-op and post-op x-rays and photos of a patient with an IM angle of 22 degrees. PM

References


Figure 22: Pre-op and post-op 12 weeks PRIB performed on IM of 22.

Figure 23: Pre-op and post-op photos 12 weeks PRIB performed on IM angle 22.

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-Academy of Ambulatory Foot and Ankle Surgery and is a diplomate of the American Board of Podiatric Surgery. 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.