

# METHODS FOR AVOIDING COMPLICATIONS WHEN PERFORMING THE EVAN'S CALCANEAL OSTEOTOMY

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## INTRODUCTION

The Evan's calcaneal osteotomy is a surgical procedure that works very well for the correction of the flexible pediatric flatfoot. This procedure is usually done as the major part of the total reconstruction of the flexible flatfoot. The additional procedures may include soft tissue work such as tendon lengthening or tendon re-routing and additional osseous procedures. The procedure can be technically demanding for the inexperienced surgeon and can be wrought with complications, such as nonunion, malunion, over correction, nerve entrapment, tendon rupture, infection, and fracture into the calcaneal cuboid joint, if precautions are not taken to avoid them from the initial work up to the final postoperative visit. Often these complications can come from the technical nature of the procedure itself such as a displaced graft or a poorly placed osteotomy; however they can also come from non-compliance of the patient or misunderstanding between the patient and the surgeon. The purpose of this article is to look at ways in which simple steps can be taken to help the surgeon make the Evan's calcaneal osteotomy as complication-free as possible.

## PREOPERATIVE PREPARATION

The first step is in the initial visit. It is important to determine the true nature of the patient's pain and to avoid letting the parent, if the patient is a child, speak for them.

One of the ways to avoid having noncompliant patients is to see how the patient does with conservative care assignments. The author usually has the patient wear orthotics and perform Achilles tendon stretches for a significant period of time prior to making the decision to perform surgery. If a patient fails to follow the instructions or frequently misses followup appointments these may be indications that the patient will not be very compliant.

Another important part of avoiding complications in the preoperative phase is to make sure the patient and family members understand what will take place after the surgery. The day of surgery is not the time to realize that the patient does not understand that they will not be

walking on their foot for 6 to 8 weeks. Be sure to explain what to expect after surgery to the patient several times as well as to both of the parents.

When deciding on the exact procedures that will be performed be sure to carefully look at the forefoot for the possibility for a met-adductus deformity. The author prefers to stage the procedures as apposed to fixing both the forefoot and rearfoot procedures all at once.

Once the day of surgery is planned make sure to arrange for any special equipment. Bone graft will need to be obtained whether allogenic or autogenous. The author prefers to use freeze dried iliac crest graft because of its ease of procurement and strength of the graft as well as not having any side affects from obtaining graft from the patient. Special instrumentations may include some type of retractor device for holding the osteotomy site open and taping in the graft without crushing it. The author's preference is to use a lamina spreader without teeth and a rubber tipped impactor. Either a C-arm or an x-ray machine will be needed during the case and will also need to be arranged in advance.

## INTRAOPERATIVE

Certainly the most technical part in avoiding complications takes place in the operating room. Prior to starting the case, the operative sites should be marked both on the foot and leg especially when the patient will be in the prone position for part of the procedure, because it is easy to confuse the correct limb once the patient has been turned.

When making the incision, it is important to feel for land marks to identify the calcaneal cuboid joint. The C-arm is also helpful to identify the area to make the incision, which should be about 1.0 to 1.5 cm proximal to the calcaneal cuboid joint to be over the osteotomy site. By slanting the incision this will allow for some error and give more of an option for the osteotomy site.

Once dissection is underway, watch out for the sural nerve and avoid trauma to the peroneal tendons by having adequate retraction. The muscle belly of extensor digitorum brevis should be either dissected through or reflected proximally off of the calcaneus only to the

osteotomy site and no further. When performing the deep dissection, the ligaments around the calcaneal cuboid joint as well as the joint capsule should be preserved to help maintain the stability of the joint and to prevent later dislocation of this joint when the graft is inserted.

The bone graft should be soaked in saline for 30 minutes prior to cutting it or attempting to place it in the osteotomy site. To avoid time issues, start soaking the graft when the case is first started. When the time comes to measure the graft, take a ruler and measure the osteotomy site when it is held open to the width that gives the best result and alignment of the foot. The graft should be impacted with an object that will not crush it. A rubber tipped impactor works well. The skin needs to be carefully retracted away from the site when impacting to avoid crushing the skin and causing potential necrosis.

After the graft is in place it should be checked with the C-arm to be sure of the alignment of the graft and the position of the calcaneal cuboid joint. The joint should be manipulated under the C-arm to make sure it is still functional. If the joint is displaced and not moving as it should when manipulated, the graft may be too big or the joint may have been compromised during the dissection and may need to be pinned with a K-wire to hold it in place while the osteotomy site heals. The wire can then be removed at a later date.

Once the graft is in place, the subtalar motion should be checked to ensure that over correction has not occurred. The subtalar joint needs to be able to evert beyond neutral position. If the subtalar joint motion is too limited then the graft is too big and needs to be smaller to reverse the over correction. The graft is removed and the size adjusted by decreasing the width of the graft. One way to prevent over correction and get the right measurement for the graft from the start is to check the subtalar motion when the lamina spreader is in place and then take the measurement.

Usually the graft fits tightly in the osteotomy site and fixation is not needed. The soft tissues should be checked before closure to make sure that the peroneal tendons are intact and to be aware of excessively traumatized tissue. The dressing around the incision site should be applied so that there is not too much pressure. The tissue can easily break down and can be an unpleasant surprise at the first cast change especially if the tissue was excessively traumatized during the procedure.

## POSTOPERATIVE

The most difficult time to prevent complications is in the postoperative phase because the patient has the most control. The most important thing to do is to make sure the patient and the parents know the time schedule that is to be followed and the complications that can occur if they are not followed.

The patient needs to be strictly nonweightbearing on the surgical limb. The Author's preference is to put on a modified Jones compression dressing after the procedure and then do the first cast change approximately 1 week later. If there are concerns about the soft tissue, the dressing change can be done earlier. A petroleum impregnated dressing over the incisions also help to prevent the drained blood from the incision from sticking to the gauze and pulling apart the sutured tissue.

Radiographs should be taken on a regular basis to see that the graft is incorporating. When the visits occur the cast should be inspected on the bottom to see if the patient has been walking on the foot.

The patient may start ambulating on the foot when the graft is incorporated (usually 6 to 8 weeks.) The patient starts ankle range of motion in 4 weeks if a tendon procedure such as an Achilles tendon lengthening is performed. When the patient begins ambulating they start out in a cam-walker for approximately 2 weeks then they proceed to shoes with orthotics. When the patient starts walking in shoes the patient will walk with a limp and it may take from a few weeks to several months for the gait to appear normal.

In time the bone graft will completely resorb and will not be visible on a radiograph. The contralateral foot can be operated on when the patient has completely recovered, and is able to walk and run comfortably on the corrected foot. This process will usually take about 6 months.

## CONCLUSION

The Evan's calcaneal osteotomy is a very effective procedure for the treatment of flexible pes valgus deformities. By taking the simple precautions that have been discussed, many of the complications associated with the procedure can be avoided.