

# Versatility of the Cotton Osteotomy

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## INTRODUCTION

The Cotton osteotomy is a simple, yet powerful procedure that does not often get used in isolation but is an adjunctive procedure that can enhance the correction of a deformity of the medial column of the foot. The indications for using the Cotton osteotomy are as varied as the methods by which it can be implemented.

The Cotton osteotomy is simple to perform since no fixation is needed and it has a low complication rate with appropriate postoperative non-weightbearing and immobilization. Cotton first described the procedure in 1936 as a procedure to plantar-flex the first metatarsal (1,2). Since that time, the indications have expanded.

## INDICATIONS

The main purpose of the Cotton osteotomy is to plantar-flex the medial column of the foot. The need to plantar-flex the medial column can occur in a hallux valgus deformity that needs additional correction or added length. In the pediatric patient, the Cotton osteotomy works well when combined with the Evans calcaneal osteotomy. This combination provides additional medial column stability and also prevents the medial joints from requiring a fusion, which will have a profound effect on adjacent joints in the future (Figure 1).

In the patient needing a talonavicular fusion, the Cotton osteotomy can provide additional correction without needing to fuse an additional joint. It can stabilize the medial column more effectively than simply fusing the

talonavicular joint by itself (Figure 2). The shape of the wedge can also be modified to not only plantar-flex the medial column but to abduct it as well.

## PROCEDURE

The best bone for the procedure is from the iliac crest. Allogenic bone works very well as long as it is dense enough to handle the compression that occurs at the osteotomy site. No fixation is required to secure the graft site and a true wedge shape for the graft works best instead of a truncated shape. This prevents stress in the medial cuneiform, which may cause a fracture into the proximal or distal sections due to the uneven pressure. The author prefers an incision on the dorsum of the foot directly over the medial cuneiform. This approach provides direct access to the dorsum of the cuneiform and makes the osteotomy easier to cut.

A c-arm should be used to make sure the osteotomy is in the appropriate location. This will reduce the amount of dissection required since the margins of the cuneiform will not need to be disrupted. This will also reduce the potential for displacement of the ends of the cuneiform since the ligaments to the first metatarsal and navicular will not be disrupted. The ideal location of the osteotomy is in the



Figure 1. The Cotton procedure adds additional correction in the pediatric flatfoot correction when used with other procedures.



Figure 2. The Cotton procedure added additional correction to this talo-navicular fusion without needing to fuse another joint in the medial column.



Figure 3. The true wedge shape of the Cotton graft provides for even pressure across the osteotomy that will help prevent fracturing into the joints.

middle of the cuneiform. This allows for protection from cutting into the adjacent joints, and also makes it less likely for stress risers to occur once the graft is placed.

The osteotomy is cut all the way through the bone to allow for greater correction. The shape of the graft and the intact plantar ligaments will allow enough compression to keep the graft in place.

The graft is wedge shaped and should be cut after the measurement of the osteotomy is made. The osteotomy is opened with an elevator until the amount of correction is achieved and then a measurement of the dorsal aspect of the opening is made. After soaking the graft in saline for approximately 30 minutes, the iliac crest is then secured on a cutting station and a tri-cortical wedge is then cut using a saw. The wedge shape of the graft allows for even pressure across the osteotomy, otherwise a graft that is truncated will cause uneven pressure that can result in a fracture of the proximal or distal fragments of the cuneiform into the adjacent joints (Figure 3).

If the graft is too wide for the width of the osteotomy, one of the sides of the graft can be removed with bone cutting forceps making a bi-cortical graft. The graft is then placed in the osteotomy site with the cortical sides medial and dorsal. This placement will provide for a lateral shift of the medial column. In conjunction with an Evans procedure this will help to offset any metadductus that is unmasked following the procedure. After the graft is inserted the placement of the graft is checked with a c-arm and then the wound is closed. When multiple procedures are being performed, the Cotton should be done last as it functions best to augment or complete the amount of correction desired.

## POSTOPERATIVE COURSE

After the dressing is applied, the foot is casted and the patient needs to off load the foot for 6 weeks. At week 4 the foot is healed enough to allow for active ankle motion (usually one set of 50 each day). This motion is simply to get the ankle moving, which is very effective if a tendon procedure was performed as well. At week 6, if the graft is incorporating and the foot is healing well, the patient may walk in a cam boot for 2 weeks. The patient may then transition into a sturdy tennis shoe and gradually increase activities. This course will need to be modified if another procedure is performed that requires more time off of the foot such as a talo-navicular fusion.

The Cotton osteotomy is a procedure that is easy to perform and is very versatile in that it can augment other procedures to increase correction when the medial column needs to be plantar-flexed or stabilized. The procedure does not require fixation and does not destroy joints.

## REFERENCES

1. Cotton FJ. Foot statistics and surgery. *N Engl J Med* 1936;214:353-62.
2. Boffeli TJ, Schnell KR. Cotton osteotomy in flatfoot reconstruction: a review of consecutive cases. *J Foot Ankle Surg* 2017;56:990-5.