The Double Knot Suture Modification in Mitchell’s Osteotomy for Hallux Valgus

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This article presents a modification of Mitchell's osteotomy by using a double knot suture for stabilization.

Mitchell's osteotomy is among the most common procedures performed for the treatment of hallux valgus. Traditionally, the osteotomy is stabilized after lateral displacement using a transosseous suture passed through vertical drill holes in the proximal and distal fragments. Placing this suture is technically demanding, leading to the use of various alternative fixation techniques.

**SURGICAL TECHNIQUE**

A standard dorsomedial incision is used for the procedure. A y-shaped capsular incision is made and a bunionectomy is performed as described by Mitchell. Subperiosteal dissection is carried out dorsally and medially, but only minimally inferiorly to preserve a wide inferolateral soft tissue bridge and blood supply to the distal fragment. The step-cut distal metatarsal osteotomy is marked and a 2-mm drill bit is used to drill the suture holes proximal and distal to the proposed osteotomy site. Our modification is applied at this point. Instead of attempting to thread a single suture through the two drill holes, two long straight surgical needles are armed with independent 'O' Ethibond sutures. These needles are used to pass the sutures through the two drill holes from dorsal to plantar, across the soft tissues underlying the first metatarsal, and out through the skin of the plantar surface of the foot (Figure 1).

The needles are then removed and a small curved haemostat is used to gently hook the sutures out one by one from under the metatarsal shaft and head. Both sutures are then pulled back in through the sole and delivered out through the surgical incision (Figure 2).

The osteotomy is completed as routine and the distal fragment is displaced laterally. The plantar ends of the proximal and distal threads are now knotted together firmly (Figure 3). Both threads are pulled dorsally so that the knot lies snugly underneath the bone. The threads are now knotted dorsally in the routine manner to stabilize the osteotomy (Figures 4 and 5).

The remaining procedure, including capsular advancement and closure, is carried out as in the described technique.

**DISCUSSION**

Several modifications of the Mitchell procedure...
tips & techniques

Figure 2: Sutures are hooked from under the metatarsal and delivered through the incision. Figure 3: Plantar ends of both sutures are knotted to obtain the plantar knot.

Figure 4: Plantar knot pulled snugly against bone. Dorsal ends of sutures knotted. Figure 5: Final appearance of the knot.

Hooking the threads out using a small haemostat does not require dissection of the plantar soft tissues.

REFERENCES

The need to be conservative in dissecting soft tissues off bone has been emphasized to prevent vascular compromise to the metatarsal head. This makes subperiosteal exposure of the plantar surface of the first metatarsal undesirable. Using the traditional technique, the drill holes in the dorsal cortex of the metatarsal both proximal and distal to the osteotomy are easily visible and accessible. Using a curved needle, it is usually easy to pass the fixation suture from dorsal to plantar through one of the bone fragments, but passage through the other fragment from plantar to dorsal can be tedious because of difficulties in locating the plantar drill hole and restrictions in maneuvering a curved needle large enough to negotiate the width of the metatarsal in the plantar soft tissues. This can lead to excessive plantar periosteal stripping and consequently, damage to the blood supply of the distal fragment. This difficulty has led several surgeons to use the modified technique of passing the fixation suture through drill holes only in the dorsal cortex. We believe that this is much less stable than the traditional method.

Using the double-knot technique solves this problem. There are no vital structures directly underneath the metatarsal neck to be injured by the surgical needles. Hooking the threads out using a small haemostat does not require dissection of the plantar soft tissues. We have not found the double-knotted suture to be weaker than the ordinary suture in any way provided that good surgical knotting technique is followed.

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