

Proximal Tibia Bone Graft Harvest: A safe and effective method for autogenous bone graft in the foot and ankle

Mohammad Rimawi DPM¹, Shruti Patel DPM, MS², Justin Fleming DPM, FACFAS³

1. Third Year Resident, Jefferson Health, Philadelphia, Pennsylvania

2. Chief Resident, Jefferson Health, Philadelphia, Pennsylvania

3. Attending Physician, University Orthopedic Associates, Somerset, New Jersey

Introduction

The use of grafts in a surgical setting can be pivotal in foot and ankle reconstruction. Although there has been an increase in popularity amongst allografts and synthetic biologics, harvesting autogenous bone grafts remain to be the gold standard. This can be attributed to its osteoconductive, osteogenic and osteoinductive properties. Autografts have also been proven to incorporate at a faster rate(1) and display the lowest immunogenicity in comparison to its counterparts (2,3,4). Common donor sites for obtaining autografts include: iliac crest, calcaneus, proximal and distal tibia. However each site carries its own risks and limitations. Iliac crests bone graft harvests have been reported to be associated with significant pain and morbidity (4,5,6,7). The distal tibia and calcaneus both share a threshold for the amount of graft that can be harvested. Regardless of choice of graft, each will require an independent incision, tend to increase operative time, weaken the harvest site, all of which cumulatively can increase the risk of complications. The purpose of this study is to do a retrospective review of the author's results and technique of utilizing the proximal tibial bone graft to show a safe and effective method for harvesting autogenous graft for foot and ankle surgeries.



Figure 1: Landmarks for marking out incision for proximal tibia bone graft harvest.

(A): Tibial Tuberosity
(B): Gerdy's Tubercle
(C): Fibular Head

Methods

Between 2003 and 2017, Over 50 patients (N=54) were retrospectively identified through the billing code who had undergone foot or ankle surgery utilizing the ipsilateral, proximal tibia as the donor site for autogenous bone graft. The patients varied from isolated fusions, revision of non-unions, and included traumatic injuries. Although not a contraindication, any patient with a history of knee pain or significant knee arthritis was excluded from bone harvest at that site. Immediate post operative Tibial X-rays were taken after surgery. All patients were kept nonweightbearing until the primary surgical site displayed osseous union which was monitored through serial X-rays and was determined by the surgeon on the case.

Technique

A 4-5 centimeter oblique incision (**Fig. 1**) begins just inferior to the Gerdy's tubercle and ends slightly distal to the inferior aspect of the tibial tubercle (8). There are no named neurovascular structures in this region and dissection can be carried sharply to the crural fascia overlying the anterior musculature. Once the lateral aspect of the tibia is exposed, a 1.5 cm by 1 cm oval shaped cortical window is then created in the lateral metaphysis (8). A 2.0 mm drill is used to outline the window and the drill holes are connected with an osteotome (9). The harvest then begins with the use of various curved curettes. The defect can then be packed with gel foam and thrombin and may or may not be filled with allograft as well, depending on surgeon preference (**Fig. 2**). The cortical window is then returned to its original position. Repair of the periosteum is not necessary.

Results

Of all the patients reviewed, 51 out of the 54 (94.44%) patients had no reported complications from the proximal tibia bone graft harvest site (**Table 1**). The remaining 3 patients (5.5%) were noted to have minor complication which included: wound dehiscence, knee pain, and a wound dehiscence that required surgical debridement. All reported wound complications eventually resolved with local care. The maximum amount of graft harvested that was reported was 40 mL. Average follow up time was 16.75 months. No donor site fractures have been reported to author's knowledge.

Figure 2: Immediate post operative films of a patient (A)-(B) with just use of gelfoam and thrombin. (C)-(D) This is another patient that had both gelfoam and thrombin and back filled with a biologic substitute (hydroset).



Table 1: Complication Results

Patient	Complication	Long Term Outcome
1	Knee Pain	Resolved with Physical therapy and short course steroid taper
2	Wound dehiscence	Superficial wound at the donor site that resolved with local care.
3	Wound Dehiscence	Required surgical excisional debridement. Deep surgical cultures were no growth. Wound site healed.

Conclusion

Our surgical principles and techniques show that complications are limited with similar rates of complications noted from other donor sites. However, this option allows for more graft to be harvested with less morbidity. This region can easily provide 20-40 mL of cancellous bone for the index procedure which is quite significant when compared to other potential graft sites such as the distal tibia or calcaneus (9). The procedure is also well tolerated by patients and has a low risk of complications. In conclusion, harvesting autogenous bone from the proximal tibia is a safe, and reproducible procedure with minimal complications noted.

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