Case Report

A Reversed Tibial Flip Autograft Technique for Correcting Over-Valgus Knee After High Tibial Closing-Wedge Osteotomy in Total Knee Arthroplasty

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Abstract: Excessive valgus deformity after a failed high tibial osteotomy presents problems for subsequent total knee arthroplasty because the proximal tibia is deformed, necessitating a much larger resection of bone from the medial aspect of the tibia. Other researchers have reported the tibial flip autograft technique to augment the tibial medial compartment to correct varus knee. We have modified this technique, which we call the reversed tibial flip autograft technique, for a patient with valgus knee after failed high tibial osteotomy. Clinical results were excellent, and no signs of loosening were apparent 2 years after surgery, suggesting that this technique is useful for management of tibial bone loss and correction of valgus angular deformity in total knee arthroplasty. **Key words:** high tibial osteotomy, total knee arthroplasty, autograft, tibial flap, valgus deformity.

High tibial osteotomy (HTO) was first reported by Jackson [1] as a surgical procedure for treatment of unicompartmental osteoarthritis of the knee. Several types of complication after HTO have been reported [2,3], one of which is overcorrection, resulting in excessive valgus deformity. Several recent reports have dealt with the topic of total knee arthroplasty (TKA) for failed HTO [4-6], but they did not consider the specific difficulties within the subgroup of patients with significant overcorrection.

Franceschina and Swienckowski [7] reported the tibial flip autograft technique for bone defects involving the medial compartment of the knee in patients undergoing TKA. This technique augments the medial compartment with a wedge of bone resected from the proximal lateral tibia and then flipped. We reversed this flip technique for a patient with an overcorrected valgus knee after HTO.

Case Report

A 71-year-old woman presented with pain in the right knee. She walked with a cane and did not participate in recreational sports such as tennis and

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golf. Her height was 158 cm, and her weight was 60 kg. Radiographs showed medial compartment osteoarthritis of the right knee. The preoperative mechanical axis was 4° varus; the tibial slope was 9°, and the range of motion was 0° to 140°. She had undergone arthroscopic partial meniscectomy at another hospital but had no other relevant medical history.

We performed a lateral closing-wedge osteotomy proximal to the tibial tubercle. A plate, screws, and staples were used for fixation. The postoperative mechanical axis was 12° valgus, and the tibial slope was 10°. Three months after surgery, the valgus deformation had progressed because of nonunion, and the mechanical axis was 25° valgus. The screws were broken, and hence, we performed fixation again with staples and iliac bone grafting. Three months later, the proximal tibial bone had united (Fig. 1), but the patient found walking without a T-cane and a knee brace difficult because her right knee had valgus deformity.

Ten months after unification of the iliac bone graft, we performed TKA to correct the over-valgus deformity, using a reversed tibial flip autograft technique. In preoperative planning, reproducible lines were drawn on anteroposterior radiographs to measure the appropriate angles of resection to be used (Fig. 2). During surgery, an image intensifier and angle guide were used to measure the appropriate angles of resection. Resection of the proximal tibial wedged bone graft was necessary, and therefore, a posterior stabilizing prosthetic device was used (Scorpio Super Flex PS, Stryker, Kalamazoo, Mich).

We used a deep lateral parapatellar approach to the joint to avoid postoperative patellar maltracking [8]. Standard femoral and patellar bone resections were made at the appropriate levels, and modified reversed tibial flip autograft technique was used on the tibial side (Fig. 2). The first resection (line A) was made by creating a flat, cancellous surface. The long axis of the tibia is represented by line B (Fig. 2). Line C then becomes the horizontal line across the proximal tibia and perpendicular to line B. The bone wedge is bisected by line D. The corticocancellous bone wedge was then flipped such that the thickest portion of the wedge was precisely positioned over the lateral compartment. This process created a platform perpendicular to the long axis of the tibia and acted to restore the lateral cortical rim for stable mounting of the tibial component. The bone graft was provisionally fixed with K-wire during

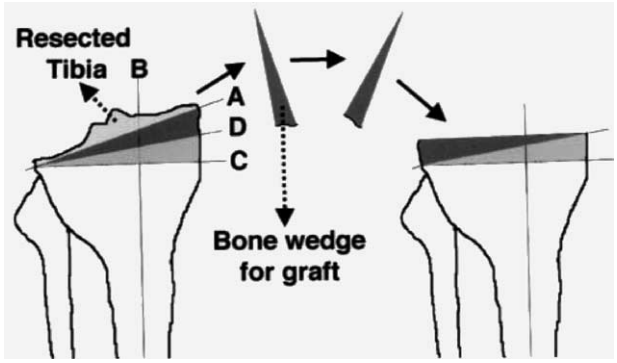

Fig. 2. Schematic illustration of reversed tibial flip technique. The lateral compartment of the proximal tibia was augmented by flipping wedged bone.

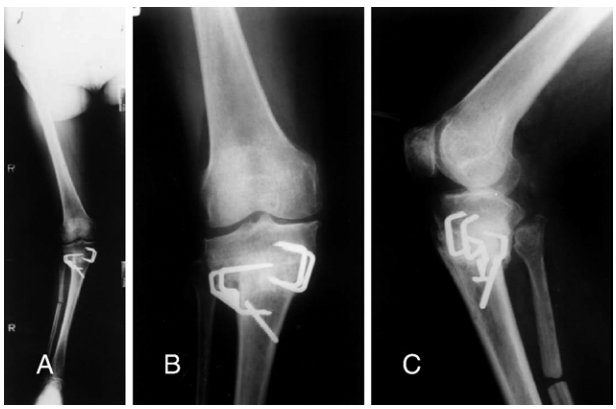

Fig. 1. (A) Standing anteroposterior, (B) anteroposterior, and (C) lateral radiographs of the right knee, showing valgus deformation after a failed HTO. The mechanical axis was 25° valgus.

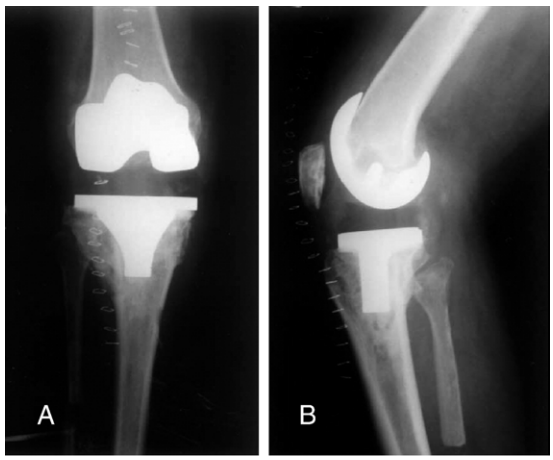

Fig. 3. (A) Anteroposterior and (B) lateral radiograph after TKA using the reversed tibial flip autograft technique. The wedged bone was grafted to the proximal lateral aspect of the tibia. The mechanical axis was 8° valgus.