

# A Novel Approach of “Cortical Fortification” - Supracondylar Femoral Osteotomy with Four Cortical Stabilization and Minimal Fixation for Coronal Plane Angular Deformity Correction in Adolescent Valgus Knee

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## Abstract

Patients with severe knee valgus with post rachitic aetiology are frequently encountered especially in the developing countries. Different types of corrective supracondylar osteotomy have been described by various authors from time to time like Mc Dermott, Healy, Debeyre, Agelietti & popular Coventry method [1], Mc Dermott [2], Healy [3,4], Debeyre [5], Agelietti [6] & popular. Deformity correction is required at the knee for more than 15 degrees valgus or the plane of the knee joint deviates >10 degrees from horizontal. A novel technique of “Cortical fortification” for correcting coronal plane angular deformity in a post rachitic adolescent female has been described here.

## Case Presentation

A 15 year old female presented with the complaint of left knee valgus deformity. She had history of taking antirachitic treatment (Vitamin D deficiency rickets) few years back which got recovered with calcium and Vitamin D supplementation. There was no history of trauma, infection or any growth disturbance. On examination she had valgus deformity of 30 degrees at the knee with good range of motion at knee. Patient was planned for surgical restoration of normal mechanical axis alignment of the lower limbs using this technique of “Cortical fortification”. Preoperative assessment for the desired angle of correction was made using full length lower limb CT scanogram. Lower limb preparation, draping and tourniquet application following limb exsanguinations using esmarch bandage was done. A 5 cm medial parapatellar skin incision was made starting 1 cm proximal to and 1 cm medial to medial patellar margin. Distal femur was exposed anteromedially using subvastus approach. Drill holes were made 1 cm proximal & distal to the proposed site of osteotomy, using 3.2 mm drill bit on the medial surface of the femur with provisional fixation of 4.5 mm partially threaded cancellous screws. Multiple drill holes were made using 2 mm drill bit in the inverted V fashion on the medial surface of femur, with apex of the knee proximal to the physeal scar under C arm image intensifier. The osteotomy was made joining these holes, while extending it across the femur leaving partially intact lateral femoral cortex. Deformity was corrected by hinging on the lateral cortex and breaking it enabling some inherent stability by the ragged nature of the fractured cortical bone edges. After achieving desired correction medial stabilization was achieved using figure-of-eight cerclage wire fixation around the already inserted screws. Inherent

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**Figure 1:** Radiograph (lateral view) of knee region showing inverted V osteotomy in sagittal plane fixed by Figure of eight cerclage wire around the partially threaded cancellous screws across the osteotomy.



**Figure 2:** Radiograph (anterioposterior view) of knee region showing osteotomy fixed by figure of eight cerclage wire around the screws across the osteotomy, with apparent tension band effect with compression of the osteotomy on the medial side.



**Figure 3:** Radiograph (anterioposterior view) of knee region with PoP cast at 2 months with osteotomy showing good union.

V nature of the osteotomy provides stability in the sagittal plane in the region of anterior and posterior cortices (Figure 1 and 2). Change of mechanical axis towards normal with reduced concavity across the lateral side of knee and increased convexity medially provides presumably more stabilization with tension band principle with tensile forces acting laterally by biceps femoris and iliotibial tract getting converted to compression forces on the medial side of the level of corrective osteotomy & thus providing stability in addition to fixation in that area. Additional external support was given to the limb with above knee Plaster of Paris (PoP) cast for 8 weeks. The osteotomy united well after 2 months (Figure 3 and 4) with good



**Figure 4:** Radiograph (lateral view) of knee region at 2 months with osteotomy showing good union.

knee function. The authors conclude that this novel technique aptly called as “Cortical fortification” (Figure 1 and 2) together shows the concept of Cortical fortification) with stabilization of the anterior, posterior, lateral and medial femoral cortices using minimal fixation as described above can be used for severe knee valgus correction. It uses basic stabilization principles with very less and cost effective fixation. It can be performed easily with little learning curve and is beneficial especially in situations where financial aspect of the patient is a real serious concern.

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