

SINGLE-STAGE HIGH TIBIAL OSTEOTOMY AND ACL RECONSTRUCTION: INSIGHTS INTO THE INTRICACY



Dr Sagar Umerjekar

D.Ortho, DNB Ortho, FIJR,(FIAS)

KS Orthocare hospital, Coimbatore,T.N

Dr Karthik Selvaraj.M

MS Ortho (AIIMS),DNB,

MRCS,FAOA(Newzealand),

Chief consultant, KS Orthocare hospital,

Coimbatore, T.N

Abstract:

Knee instability due to chronic complete anterior cruciate ligament(ACL) tear can be really debilitating and an additional deformity in the lower limb may worsen the scenario further by the transmission of abnormal stresses over the joint surfaces. We report a case of 38 years female with chronic complete tear of left ACL along with clinically significant varus deformity. She was managed by single stage biplanar single stage medial open wedge high tibial osteotomy (MOWHTO) along with ACL reconstruction(ACLR) using hamstring autograft.

Introduction:

Chronic ACL tears have been routinely reconstructed and most results can be rewarding. One important aspect to be considered in all such cases during preoperative planning is associated deformity in the lower limb, especially the coronal plane which can have an impact on the reconstruction. High tibial osteotomy in combination with ACL reconstruction has been demonstrated to improve the alignment, restore anterior knee stability and help to slow the advancement of arthritis [1]. In our patient, we did a single-stage combined biplanar MOWHTO with ACL reconstruction.

CASE:

A 38years female presented with left knee pain and instability for about 1 year after an initial trauma, which was managed conservatively. The instability was progressive and associated with ongoing pain. Clinical examination findings included a positive anterior drawer test, Lachman test +3, McMurray test positive for lateral meniscus, with full knee range of movement along with a clinically significant varus deformity in bilateral knee joints.

She was evaluated radiologically. Weight-bearing anteroposterior and lateral radiographs of bilateral knee joints were done which showed significantly reduced medial joint space, lateral joint opening and varus deformity. Radiological varus was found to be around 15 degrees. MRI of the left knee showed a complete ACL tear

(chronic), bucket handle tear in body and posterior horn of lateral meniscus, osteoarthritic changes present in the medial and lateral femoral condyle, baker cyst and multiple loose bodies.

We planned a single-stage biplanar MOWHTO with ACL reconstruction in our patient.

Surgical technique:

With a properly planned operative setup inside the theatre, the patient was placed in a supine position with the operative limb(left) over the operation table and the opposite limb(right) in the lithotomy position. The C-arm machine was placed over the left side of the patient and the arthroscopy tower over the right side (Fig 1). This setup facilitated the surgeon to perform an arthroscopic procedure standing on the foot end and high tibial osteotomy standing on the right side in between the operative limb and non-operative limb placed in the lithotomy position.

Initially, diagnostic arthroscopy of the left knee was done and found to have a complete tear of the ACL with a tear in the body and posterior horn of lateral meniscus, Intrasubstance tear of medial meniscus posterior horn and osteoarthritic changes in medial femoral and tibial condyles. All inside repair of the lateral meniscal tear was done.



Right iliac crest bone graft was harvested for placing in the osteotomy site. Through a vertical incision over the anteromedial aspect left leg, the hamstring grafts (semitendinosus and gracilis) were harvested, quadrupled and prepared accordingly. The femoral socket was drilled and serially reamed as per appropriate length. Later, biplanar MOWHTO was performed and the osteotomy site was opened using a graduated device up to 15degrees noting that the lateral cortex was maintained intact. Iliac crest wedge was placed posteriorly in the osteotomy site to avoid increasing the posterior tibial slope and the HTO plate with screws was fixed over it, except for the proximal anterior screw. A tibial tunnel was prepared and tunnel scopy was done to confirm that no screw was penetrating the tibial tunnel(Fig 2). Finally, the graft was passed across the tunnel and suspensory fixation is done on either side. Intraoperative correction of varus deformity was noted clinically and measured with an alignment rod. ACL reconstruction was found satisfactorily stable as evaluated by the Lachman test. Postoperatively, ACL rehabilitation and knee ROM exercises were taught as per standard protocols and non-weight bearing ambulation using walker support was advised for up to 6 week's time. Radiographs and clinical improvement has been depicted in Fig 3.

Fig 1: Patient positioning. The C-arm machine is placed over the left side of the patient and the arthroscopy tower over the right side. Non operative limb is placed over a leg holder.

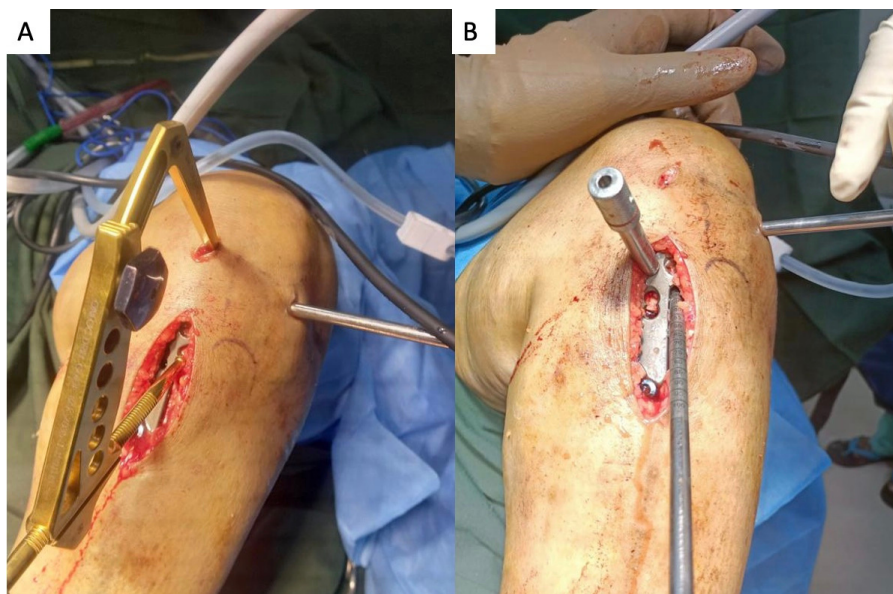


Figure 2: Intraoperative images. A: HTO plate in situ with Tibial ACL jig. B: Demonstrating the position of the tibial tunnel and empty proximal anterior screw slot of the HTO plate

Discussion:

The preoperative planning, operative setup and order of surgical steps followed have a significant role in the overall ease of performing the surgery more precisely. The need for correction of bony deformities before soft tissue procedures is the dictum and applied here too, hence MOWHTO was performed prior to ACL reconstruction. The meticulous interplay between tibial tunnel drilling and placement of proximal screws in the HTO plate was a challenge dealt with caution. There have been two schools of thought

pertaining to doing this surgery, in a staged or combined manner. Stride and associates found that combined ACL reconstruction and high tibial osteotomy surgery results in improvements in post-operative functional outcomes along with low complication rates, re-rupture and revision rates [2]. The proponents of two-stage procedures like Noyes et al in their series found statistically significant improvements in pain, swelling, and giving way in patients who had undergone a staged procedure to first correct the varus malalignment and subsequently reconstructed the ACL [3]. There is a lack of literature pertaining to the comparison between single and two-stage procedures in terms of long-term outcome, which needs further evaluation.

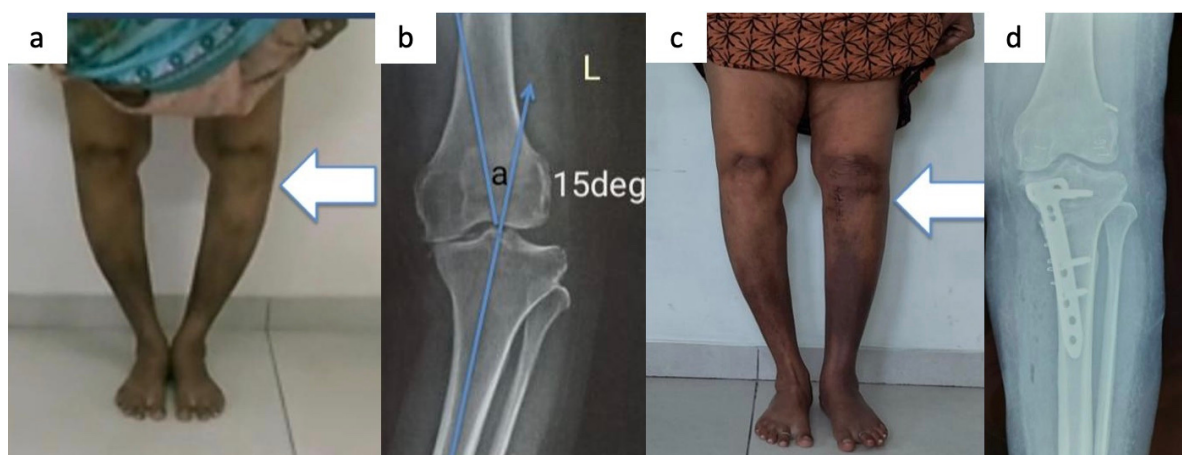


Figure 3: Pre-operative & post-operative images. A & B: Pre-operative clinical image & Alignment radiographs. C & D: Post-operative clinical image & Alignment radiographs

Conclusion:

Single-stage MOWHTO with ACL reconstruction gives overall good results functionally and delays the progression of medial knee joint osteoarthritis and also prevents rupture of the reconstructed ACL graft.

More elaborate studies on long term outcomes of combined procedure and comparison between single and two-stage surgery is needed.

References:

1] Cantivalli A, Rosso F, Bonasia DE, Rossi R. High tibial osteotomy and anterior ligament reconstruction/revision. Clin Sports Med. 2019;38(3):417–33. <https://doi.org/10.1016/j.csm.2019.02.008>

2] Crawford M, Lee DH, Amendola A. Surgical management and treatment of the anterior cruciate ligament deficient knee with malalignment. Clin Sports Med. 2017;36(1):119–33. <https://doi.org/10.1016/j.csm.2016.08.006>

3] Noyes FR, Barber-Westin SD, Hewett TE. High tibial osteotomy and ligament reconstruction for varus angulated anterior cruciate ligament-deficient knees. Am J Sports Med. 2000;28(3):282–96. <https://doi.org/10.1177/03635465000280030201>