



International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2021; 7(4): 813-816
© 2021 IJOS
www.orthopaper.com
Received: 19-07-2021
Accepted: 05-09-2021

Dr. Nihar Modi
Junior Resident, Grant
Government Medical College
and Sir J.J Group of Hospitals,
Byculla, Mumbai, Maharashtra,
India

Dr. Safiuddin Nadwi
Fellow in Joint Replacement
(Germany), Consultant
Orthopaedic Surgeon, Trauma
and Joint Replacement
Apollo Spectra Hospitals,
Tardeo, Mumbai, Maharashtra,
India

Dr. Ankit Marfatia
Associate Professor, Grant Govt.
Medical College and Sir J.J.
Group of Hospitals, Mumbai,
Maharashtra, India

Dr. Stavan Amin
Junior Resident, Grant Govt.
Medical College and Sir J.J.
Group of Hospitals, Mumbai,
Maharashtra, India

Corresponding Author:
Dr. Nihar Modi
Junior Resident, Grant
Government Medical College
and Sir J.J Group of Hospitals,
Byculla, Mumbai, Maharashtra,
India

ACL reconstruction, medial meniscus repair and high tibial osteotomy done as a single stage procedure in a case of neglected ACL and partial medial meniscus tear with a subsequent varus knee: A case report

Dr. Nihar Modi, Dr. Safiuddin Nadwi, Dr. Ankit Marfatia and Dr. Stavan Amin

DOI: <https://doi.org/10.22271/ortho.2021.v7.i4l.2971>

Abstract

A long standing anterior cruciate ligament (ACL) tear causes progressive degenerative changes in the knee. This leads to secondary meniscal lesions, cartilage degenerative changes and subsequent varus angulation.

A 27 year old male footballer presented to us with a traumatic right knee pain and swelling with recurrent instability, since 8 years. On examination there was knee laxity with an obvious varus deformity of the right leg. Radiographs showed medial compartment osteoarthritis and MRI was suggestive of a chronic ACL and medial meniscus tear. A single step salvage procedure of ACL reconstruction, medial meniscus repair and valgus producing high tibial osteotomy (HTO) was done for this patient. Post operatively there was no knee laxity and instability. At one year follow up, the patient had a satisfactory outcome with a painless and complete knee range of motion and had full weight bearing.

In this case report we have shown how a single step salvage procedures with biological reconstructions can be done for patients with chronic ACL and medial meniscus tear patients with varus angulation, with a good outcome. Hence, simultaneous reconstructions of the ACL and medial meniscus with HTO can be used as a novel management technique to delay arthroplasty in young patients with unstable arthritic knees.

Keywords: High tibial osteotomy, varus deformity, osteoarthritis, medial meniscus repair, ACL reconstruction

Introduction

A long standing anterior cruciate ligament (ACL) tear causes progressive deterioration of knee structures, causing secondary meniscus lesions and cartilage degenerative changes.¹ Chronic ACL deficiency has been implicated to be a significant risk factor in development of medial tibio-femoral osteoarthritis and varus angulation^[2].

Anterior cruciate ligament reconstruction (ACLR) is a routinely done procedure in acute ACL tears or chronic anterior knee instability. ACLR restores knee stability and allows for faster mobilisation especially in active patients^[3].

Valgus producing high tibial osteotomy (HTO) for varus knees, has been proven to be an excellent treatment option in active and young patients presenting with early and painful medial compartment osteoarthritis^[2, 3].

In patients presenting with ACL deficient knees along with varus angulation, a sole ACL reconstruction may restore the stability, but cannot prevent the progressive changes of medial compartment osteoarthritis^[4, 5].

Patients who undergo a delayed ACLR have a high risk of medial meniscal lesions, which is mostly managed by concomitant complete or partial meniscectomy, which itself is a definite risk factor for early medial osteoarthritis^[2].

Hence the management of patients with ACL deficient knees, with medial meniscus tears and a varus deformity, poses a great challenge to most orthopaedic surgeons. We present a case of a young male, who presented to us with a chronic ACL deficient knee, with medial meniscus damage and a varus knee we managed the patient with a combined ACLR, medial meniscus repair and a valgus producing high tibial osteotomy as a single stage procedure.

Case Report

A 27 year old male, presented to us with complaints of right knee pain, recurrent swelling and instability. He had a history of trauma to the lateral aspect of the right knee while playing football, 8 years back. Patient had taken treatment elsewhere and had been managed with a knee brace and pain killers, for 8 years. On examination patient had medial joint line tenderness and the range of motion was terminally painful and restricted. Patient had an obvious varus deformity. On further examination, laxity was seen with positive Lachman’s test and Anterior Drawer Test. Dial test and external rotation recurvatum test was negative ruling out posterolateral corner injury.

Plain radiographs of the right knee were done, which showed medial compartmental osteoarthritis (Figure 1) and MRI was done which revealed a chronic ACL tear with a partial vertical tear of the posterior horn of medial meniscus.

After thorough consideration and preoperative planning, an informed consent was taken and taking into consideration the age and active lifestyle of the patient, a single step salvage procedure for ACL reconstruction, medial meniscus repair and HTO was planned.

Intravenous antibiotic prophylaxis was administered. Patient was taken in supine position on a radiolucent table under spinal anaesthesia. A tourniquet was put at the level of proximal thigh with a side support over the lateral aspect of the tourniquet. A diagnostic arthroscopy was done first, and cartilaginous surface lesions were evaluated. After this, a 7cm longitudinal incision (Figure 2) was made medial to patellar tendon and an autologous semitendinosus and gracilis 4 strand hamstring graft was mobilised (Figure 3).

A femoral tunnel was drilled with inside out technique. The partial tear of the medial meniscus was then fixed using the FAST-FIX Meniscus Repair System™. Marking was done for High Tibial Osteotomy using the Arthrex iBalance® HTO System. A 10 mm medial open wedge osteotomy was done (Figure 4) and fixed using the DePuy Synthes TomoFix® Tibia Compression Plate. A tibial tunnel of 5 cm was then made just above the level of osteotomy. The graft was passed through the tunnel and a 25x9 mm screw was passed to secure the graft in place (Figure 5). The procedure was uneventful and wound was closed with skin staplers.

Hip, knee and ankle range of motion exercises were started immediately after the operation. Partial weight bearing was started from day 1 for 8 weeks, followed by 8 weeks of full weight bearing. Post operatively, Lachman’s test and anterior drawer test was seen to be negative. Patient was followed up at 3 months and radiographs and clinical photos were taken (Figure 6a and Figure 6b). At 1 year follow up with patient presented to us with no instability and knee pain and a repeat radiograph was taken (Figure 7). Patient had a painless range of motion without any limitation and could completely kneel down and squat (Figure 8).



Fig 1: Radiograph showing varus angulation



Fig 2: Hamstring graft being mobilised



Fig 3: Autologous semitendinosus and gracilis graft being mounted

Table 1: Advantages and disadvantages of an ACL repair with simultaneous HTO and medial meniscus repair

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Single procedure ▪ Reliability and delays degenerative changes ▪ Delays need for arthroplasty ▪ Reduced cost as compared to a staged procedure ▪ No interference between osteotomy screws and tibial tunnel 	<ul style="list-style-type: none"> ▪ Longer rehabilitation ▪ Higher technical demand ▪ Longer learning curve ▪ Increased costs compared with an isolated osteotomy



Fig 4: Intraoperative C-arm shoot of medial open wedge being made



Fig 5: Immediate postoperative radiograph showing valgus high tibial osteotomy and plate fixation



Fig 6a: Radiograph at 3 months follow up



Fig 6b: Clinical photo at 3 months follow up



Fig 7: Radiograph at 1 year follow up



Figure 8: Complete squatting and kneeling down seen at 1 year follow up

Discussion

Anterior laxity in patients with a deficient ACL has shown to cause progressive degenerative osteoarthritis [6]. Radiologically evident osteoarthritis of at least Kellgren-Lawrence grade 2 is seen five times more commonly in ACL deficient knees as compared to uninjured knees [7]. The varus alignment (coronal plane deformity) shifts the mechanical axis medially and increases load transmission along the medial part of the knee joint. This, subsequently leads to an adduction moment at the knee joint and causes a constant varus thrust, adding to stress on the reconstructed ACL [4, 5]. In addition, an increase in the posterior tibial slope has also been seen in chronic ACL tear patients. The increased posterior tibial slope increases anterior translation of the tibia resulting in increased stress on the reconstructed graft [8]. HTO, allows the surgeon to reduce the posterior tibial slope and hence correct deformity in the sagittal plane too [4]. A study by Noyes *et al.* showed that in ACL deficient patients, meniscus tears have been managed with meniscectomy in majority of the cases. Irrespective of the outcome achieved with ACL repair, meniscectomy has proven to accelerate degenerative joint changes. A key factor in the successful long-term outcome of ACL reconstruction is meniscus preservation. Hence in our case we have managed the patient with a meniscus repair instead of a meniscectomy [9]. HTO plus ACLR as a single stage procedure has shown to restore knee instability, correct the varus alignment and slow advancement of arthritis [8]. This novel procedure has improved functional outcomes, facilitated early return to functional activities and delayed the need for arthroplasty [8, 10].

An HTO with ACL repair and medial meniscus repair clearly has an obvious advantage of a single procedure as compared to a staged procedure, but this procedure also has a few disadvantages^[2, 11]. (Table 1)

Therefore, in such cases, we can say that biological reconstruction combined with salvage procedures in a single sitting is a good option for young and active patients to delay arthroplasty^[10].

A review of literature was done and data from a few studies is presented below.

A systematic review by Wang *et al.* found that combined surgery (HTO and ACLR) showed improvement in post-operative functional outcome. Resulted in significant improvement in post-operative functional subjective outcomes. This study showed that HTO plus ACL was found to have low complication rates like re-ruptures, and need for revision surgery^[6].

Yeu Li *et al.*, in his systematic review, found that combined HTO plus ACL reconstruction in active young patients was a viable salvage procedure and provided satisfactory alleviation of medial compartment osteoarthritis, restoration of anterior stability, improvement of subjective evaluations and an early return to recreational sports^[2].

In a study by Cheng Jin *et al.*, simultaneous open-wedge HTO and ACL reconstruction in patients with ACL injury with medial compartmental OA showed satisfactory postoperative activity level scores and functional outcomes. However, a few patients showed residual instability and progression of OA^[5].

In a systematic review by Arnav Gupta *et al.*, he found that the use of HTO for ACLR revision has low complication rates, no re-ruptures and produces satisfactory postoperative functional outcomes. The main indications for combined HTO with ACLR revision was a posterior slope of more than 12° or severe varus malalignment^[12].

The combined procedure of a high tibial osteotomy with an ACL reconstruction and medial meniscus repair done as a single stage procedure showed a good clinical and functional outcome in our case.

Conclusion

Young and active males, carry the risk of an early revision surgery, if operated with arthroplasty for early onset osteoarthritis. In young patients, we should prefer biological salvage procedures like HTO which would delay primary arthroplasty. Patients having unstable knees with ligamentous deficiency and arthritis, can be managed with a well-planned single stage surgery with good functional outcomes.

Therefore, a single stage ACL reconstruction with HTO is a novel management technique for young and active patients with unstable arthritic knees. In this case report we have also explained as to why preferring a meniscus repair over a meniscectomy would reduce the progression of degenerative knee joint changes in the future and delay the need of an arthroplasty.

References

1. Trojani C, Elhor H, Carles M, Boileau P. Anterior cruciate ligament reconstruction combined with valgus high tibial osteotomy allows return to sports. *Orthop Traumatol Surg Res* 2014;100(2):209-12.
2. Li Y, Zhang H, Zhang J, Li X, Song G, Feng H. Clinical outcome of simultaneous high tibial osteotomy and anterior cruciate ligament reconstruction for medial compartment osteoarthritis in young patients with anterior cruciate ligament-deficient knees: a systematic

review. *Arthroscopy* 2015;31(3):507-19.

3. Mehl J, Paul J, Feucht MJ, Bode G, Imhoff AB, Südkamp NP, *et al.* ACL deficiency and varus osteoarthritis: high tibial osteotomy alone or combined with ACL reconstruction? *Arch Orthop Trauma Surg* 2017;137(2):233-240.
4. Cantin O, Magnussen RA, Corbi F, Servien E, Neyret P, Lustig S. The role of high tibial osteotomy in the treatment of knee laxity: a comprehensive review. *Knee Surg Sports Traumatol Arthrosc* 2015;23(10):3026-37.
5. Jin C, Song EK, Jin QH, Lee NH, Seon JK. Outcomes of simultaneous high tibial osteotomy and anterior cruciate ligament reconstruction in anterior cruciate ligament deficient knee with osteoarthritis. *BMC Musculoskeletal Disord* 2018;19(1):228.
6. Stride D, Wang J, Horner NS, Alolabi B, Khanna V, Khan M. Indications and outcomes of simultaneous high tibial osteotomy and ACL reconstruction. *Knee Surg Sports Traumatol Arthrosc* 2019;27(4):1320-1331.
7. Ajuied A, Wong F, Smith C, Norris M, Earnshaw P, Back D, *et al.* Anterior cruciate ligament injury and radiologic progression of knee osteoarthritis: a systematic review and meta-analysis. *Am J Sports Med.* 2014;42(9):2242-52.
8. Klek M, Dhawan A. The Role of High Tibial Osteotomy in ACL Reconstruction in Knees with Coronal and Sagittal Plane Deformity. *Curr Rev Musculoskelet Med.* 2019;12(4):466-471.
9. Noyes FR, Barber-Westin SD. Treatment of meniscus tears during anterior cruciate ligament reconstruction. *Arthroscopy* 2012;28(1):123-30.
10. Beyzadeoglu T, Demirel M, Circi E. Simultaneous ACL-PCL reconstructions with high tibial osteotomy: salvage for an unstable arthritic knee. *BMJ Case Rep.*, 2016, 13. bcr2015210053.
11. Bonasia DE, Dettoni F, Palazzolo A, Rossi R. Opening Wedge High Tibial Osteotomy and Anterior Cruciate Ligament Reconstruction or Revision. *Arthrosc Tech.* 2017;6(5):e1735-e1741. Published 2017 Oct 2. doi:10.1016/j.eats.2017.06.044
12. Gupta A, Tejjal T, Shanmugaraj A, Horner NS, Simunovic N, Duong A, *et al.* Surgical Techniques, Outcomes, Indications, and Complications of Simultaneous High Tibial Osteotomy and Anterior Cruciate Ligament Revision Surgery: A Systematic Review. *HSS J* 2019;15(2):176-184.