

Transpatellar “central” portal for an arthroscopic hamstring tendon graft reconstruction of the Anterior cruciate ligament

Madan Ballal¹, Pavankumar Chebbi², Sathish Kumar S^{3,*}

¹Associate Professor, ²Assistant Professor, ³Resident, Dept. of Orthopaedics, Sanjay Gandhi Institute of Trauma and Orthopaedics, Bangalore

***Corresponding Author:**

Email: sathish.hs88@gmail.com

Abstract

Purpose to evaluate the efficacy of central portal in the reconstruction of AM and PL ACL bundle reconstruction as a viewing portal.

Methods: This study was conducted on series of 55 patients operated for ACL ruptures, using the central portal technique, from September 2012 to March 2014, with a one year follow up till March 2015. Double bundle ACL reconstruction was performed in 6 patients, selective bundle in 4 patients and single bundle in 45 patients of which 7 were revision ACL reconstruction.

Results: Out of the 55 knees we operated using the central portal two patients complained of anterior knee pain, none of the patients had patellar tendon adhesions and/or ruptures.

Conclusion: Central portal provides an excellent visualization for anatomical placement of AM and PL bundles during ACL reconstruction and may reduce incidence of improper tunnel position during ACL reconstruction with no significant complication associated with the transtendinous approach.

Keywords: Three portal ACL, Transpatellar portal, Gillquist portal, Hamstring ACL reconstruction, Central portal

Introduction

Typically arthroscopic reconstruction of ACL is done using two portals. For viewing we use anterolateral portal and for working portal anteromedial portal is used. Sometimes it is difficult to analyse the attachment of double ACL bundles at the lateral intercondylar notch of femur subsequently requiring notch plasty. Cohen and Fu (2007) have described a technique consisting of three portals for ACL reconstruction. Three portals consist of a high anterolateral, an anteromedial portal which is placed along 1 cm medial from medial border of patellar tendon. Another accessory medial portal was used as a working portal.⁽¹⁾ But we found there is a risk of iatrogenic injury to the medial femoral condyle if the portal is placed too medial to facilitate the camera through the anteromedial portal.

A proper placement of the drill tunnels is very important for the success of an ACL reconstruction,^(2,3,4,5) thus a good viewing portal will make sure that the tunnel placement on to the femoral and the tibial side is accurate.

In our current study we have used a three portal technique for ACL reconstruction. A standard anterolateral viewing portal, an anteromedial working portal, with a third transpatellar portal which is placed through the patellar tendon and this portal was used exclusively for viewing. The purpose of the current study is to evaluate the use of central portal technique in arthroscopic ACL reconstruction.

Materials and Methods

This study was conducted on series of 55 patients operated for ACL ruptures, using the central portal

technique, from September 2012 to March 2014, with a one year follow up till March 2015. Double bundle ACL reconstruction was performed in 6 patients, selective bundle in 4 patients and single bundle in 45 patients of which 7 were revision ACL reconstruction.

Portal site:

Anterolateral Portal: The anterolateral portal is mainly used as viewing portal. It is constructed through an incision made lateral to the patellar tendon along the inferior pole of the patella lying 1 cm above lateral knee joint when the knee is at 60 degrees flexion. The main function of this portal is viewing portal.

11-scalpel blade is used to create this portal and care has to be taken to avoid articular cartilage damage. This portal avoids excessive resection of patellar fat pad and allows complete visualization of all the compartments of knee. Using this portal for visualization, other two portals are created.

Anteromedial Portal: The anteromedial portal is created by placing a 18-gauge needle 1 cm inferior to tip of patella and 1 cm above the medial joint line along the medial border of patellar tendon. The purpose of this portal is a working portal. This portal provides proper visualization to create femoral tunnel without damaging medial femoral condyle cartilage and has an advantage over transtibial technique. This portal can also be used to place guide the tibial tunnel.

Transpatellar (central) portal: The “central” portal is used purely as a viewing portal. It is placed nearly 1 cm (intra-tendinous) below from the inferior pole of the patella when the knee is flexed to 60 degrees by a vertical incision directly through the patellar tendon paralleling its fibers. The portal is created using direct

visualization with an 18-gauge spinal needle later with an 11-scalpel blade taking care to avoid damage to the articular cartilage of the trochlea. This portal is specifically used for viewing the wall of the lateral intercondylar notch and femoral insertion sites of the ACL. The exact position of insertion of ACL bundles on the tibia can be determined using this bundle. While viewing through this portal and working through the anteromedial portal in this manner, no notchplasty is required because there is no obstruction to viewing the notch, and the prepared graft is placed in its anatomic insertion while avoiding impingement of the posterior cruciate ligament.



View from central portal: tibial tunnel drilling



Portal markings



View from the central portal of the femoral tunnel



View of the Marking on the femoral ACL insertion anterolateral portal



View of the Marking on the femoral ACL insertion central portal

Results and Observation

Out of the 55 knees we operated using the central portal two patients complained of anterior knee pain, none of the patients had patellar tendon adhesions and/or ruptures.

Discussion

In an Arthroscopic ACL reconstruction, portal placement is vital to efficaciously perform the proposed procedure.^(2,3,4) Individually the three portals described in this study have exact roles during surgery. Majority of cases of ACL reconstruction failure occurs due to faulty surgical techniques, while biological events also have an effect on the results.⁽⁶⁾

Anatomical placement of femoral tunnel during ACL reconstruction can be difficult if done without notchplasty to analyse the lateral wall of intercondylar notch when done using an anterolateral portal. This may cause improper placement of femoral tunnel. We in our study have used the central portal for the purpose of viewing portal for the femoral tunnel placement and used an anteromedial working portal. The use of central portal has avoided the notchplasty procedure which is associated with knee kinematics changes and may impact anterior stability of knee. This may lead to unfavourable effects on graft healing and might lead to failure of reconstruction.⁽⁷⁾

Multiple portals for AM and PL ACL bundle reconstruction provides help though out the surgery.⁽¹⁾ In our study we have used central portal for tibial tunnel

drilling. It is very essential to determine exact anatomic location of ACL AM and PL bundles for tibial tunnel placement. Central portal provides an excellent visualization of tibial footprint.

Araujo et al⁽⁸⁾ advocated a three portal technique for ACL reconstruction in which they performed the arthroscopy by a high anterolateral portal, an anteromedial portal; which is placed into the knee joint through the medial third of the patellar tendon and just above the joint line, and an accessory anteromedial portal was used by creating a portal, above the anterior horn of the medial meniscus placed 2 cm medial along the medial border of the patellar tendon. A distance of around 2 mm between the instrument and the medial femoral condyle was required for safe drilling as it avoids injury to the condyle. The specific location of the AMP is determined according to differences in patients' individual anatomy such as notch width.

The use of central portal has been found to be associated with complications such as increased postoperative pain, and decreased isokinetic quadriceps strength postoperatively. Complications, such as peritendinitis, tendinitis or tendon granuloma have been reported.^(9,10) We did not encounter any of these complications in our study.

Bayar et al,⁽¹¹⁾ reported that use of central portal did not cause any clinical problems in a low demand group but ultrasonographic findings in those patients showed a hypoechoic area of patellar tendon. Studies by Cook JL et al⁽¹²⁾ showed that there was no statically significant relationship between ultrasonographic findings and clinical outcome.

According to Martino et al.,⁽¹³⁾ changes in the patellar tendon were due to physiological cicatricial evolution of surgical breach and should not be considered as a complication of transtendinous approach.

Although central portal use did not result in any significant complication of patellar tendon, its use in patients with previous patella tendon injury or clinical patellar symptoms should be carefully assessed.

Conclusion

Central portal provides an excellent visualization for anatomical placement of AM and PL bundles during ACL reconstruction and may reduce incidence of improper tunnel position during ACL reconstruction with no significant complication associated with the transtendinous approach.

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