

Suspensory Fixation of Grafts in Anterior Cruciate Ligament Fixation using Endobutton and Suture Disc – A Prospective Study of 30 Cases

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Abstract- INTRODUCTION: Arthroscopic ACL reconstruction has become the gold standard for ACL insufficiency in active patients. Hamstring tendon is the most favoured graft choice for ACL reconstruction. The aim of this study is to prospectively evaluate the clinical outcome of a series of 30 patients who underwent Arthroscopic ACL reconstruction using hamstring tendons with suspensory method of fixation using Endobutton on femur and titanium suture disc on the tibial end, with a follow-up of 2 years.

MATERIALS & METHODS: 30 patients ACL insufficiency were operated upon Arthroscopic ACL reconstruction using hamstring tendon autograft fixed with Endobutton and suture disc between sept 2012 to march 2014 at Sanjay institute of trauma and orthopaedics, Bangalore were included in the study. All the patients were assessed clinically (IKDC) at 6 months, 1 year and 2 years followup in this study.

RESULT: At the final follow up, according to IKDC classification 21(70%) patients were in normal group and 7 (23.3%) patients in nearly normal group and 2(6.6%) patients in abnormal group. And grade 1 laxity in grade I laxity seen in 16 patients and grade II in 1 patient at final follow up but none complained of instability. Tunnel widening in 2 cases at tibial side

CONCLUSION: Arthroscopic anatomical ACL reconstruction has been the treatment of choice for ACL tear and hamstring tendon is the graft choice for ACL reconstruction. It is necessary to provide sufficient mechanical stability for the graft to obtain good clinical outcome. Endobutton on the femoral side and suture disc on the tibial end is good mechanical and strong suspensory type of fixation device for ACL reconstruction

Index Terms- ACL Reconstruction, Hamstring graft, Endobutton , suture disc.

I. INTRODUCTION

Anterior cruciate ligament rupture is the most common knee ligament injury.

The incidence of ACL tears has increased in the general population with the rise of participation in sports. (1) The development of symptomatic knee instability after ACL injury ranges from 16% to almost 100% (2). There have been significant technical advances during recent decades to treat ACL insufficiency and many studies have documented the successful results of contemporary arthroscopic ACL reconstruction (7). Bone- patellar tendon-bone (BPTB) or hamstring constructs are

most commonly used. All autologous graft has donor site morbidity. Many studies have demonstrated that hamstring grafts have fewer problems with anterior knee pain, quadriceps muscle deficits, loss of extension compared with BPTB autografts. low harvest morbidity and excellent biomechanical graft properties coupled with improved fixation of soft tissue grafts are all reasons for excellent clinical outcomes of ACL reconstruction using hamstring tendons (5,9)

Suspensory methods using endobutton for femur and suture disc for tibia tunnel fixation and aperture methods of fixation have been described, with aperture fixation resulting in increased stiffness of the construction compared with the suspensory method (8)

Our study is designed to analyze the postoperative outcome of arthroscopic ACL reconstruction with quadrupled semitendinosus tendon autograft fixed in femoral tunnel using endobutton and in the tibial side using suture disc.

Material and methods

This was a prospective study on a continuous series of 30

Patients operated on for ACL rupture, using the same technique, from September 2012 to March 2014.

The exclusion criteria were a previously operated knee, ligament reconstruction of the contralateral knee, associated lateral or medial ligament lesions, as well as observed chondral lesions that could modify the postoperative rehabilitation protocol (grade III or IV cartilaginous lesions).

Pre-operative assessment

The pre-operative assessment included detailed history and physical examination , radiographs and MRI of the involved knee. Lachman test ,Anterior drawer test and Mc Intosh Pivot shift test were used for testing ACL .The results were graded as 0 (negative), 1+,2+ and 3 + positive. Other tests performed routinely included the Varus and Valgus stress tests ,Mc Murray's test , Posterior drawer test and the Reverse Pivot shift test. Radiographs included the standing AP view of both the knees and a Lateral view of the affected. .MRI of the involved knee was done in all the cases (fig 1). In all acute cases of ACL injury, patient were treated with long knee brace for three weeks following which ACL reconstruction was planned after bone oedema subsided

Operative technique

Arthroscopic technique: After induction of anaesthesia, supine position with upper thigh tourniquet. Clinical tests performed under anaesthesia. Initial diagnostic arthroscopy performed via anteromedial and anterolateral ports and meniscal injuries managed. Oblique incision about 3cm antero-medially on proximal tibia starting 3-4cm distal to joint line and 3-4cm medially to tibial tuberosity. Semitendinosus tendon is more horizontal and lies below gracilis. It is pulled with curved clamp or a mixtar and snared with a braided suture, dissection carried proximally up the thigh. The insertion end of the tendon is held with ethibond and the surrounding fibrous extension released ACL graft master used for pretensioning and control of tendon. The overall length of the tendon is measured. The tendon is looped in half to make double strand of equal length. Place a double Krackow-type whipstitch in free end of each tendon with No. 2 Ethibond. The double stranded graft will be looped further to create a total of four strands and graft size measured with the tendon sizer. Femoral tunnel preparation is done through low placed anteromedial port with knee in maximum flexion (>120degree). The guide pin advanced so that it exits the distal femoral cortex the femoral tunnel length to be reamed is measured with a depth gauge and then calculated according to the length of the graft material. Using the appropriate diameter reamer, the femoral tunnel is reamed based on graft size. Tibial guide placed taking ACL footprint, the inner edge of anterior horn of the lateral meniscus, the medial tibial spine, the PCL as reference points. Guide pin passed and cannulated reamer over it as determined by the prepared graft diameter size. Initially No.2 ethibond attached to eye of beath pin passed through anteromedial port to the femoral tunnel exiting lateral aspect of thigh. Using suture retriever through tibial tunnel pull the other end of ethibond out and secure to the pre-tensioned graft with endobutton attached tight rope and is pulled out of the femoral tunnel, so that the thread is out of the thigh. Under arthroscopic visualization in the joint, the threads of the endobutton are pulled using the principle of flipping the endobutton and the femoral fixation is confirmed by toggling of the endobutton. When tension is placed on the grafts, the knee is taken through approximately 15 to 20 cycles of complete flexion and extension. This helps to align the grafts and also tests for impingement between the grafts and bony structures. The tibial side of the graft is fixed with a suture disc which is held over the tibial tunnel by passing the ethibond threads through the suture disc and tightening the knots around the disc. The joint is cleared off the debris by thorough lavage. Graft harvest site is sutured in layers with no 2-0 vicryl. Skin sutured with ethilon / skin staples. Compression bandage dressing done and long knee extension brace applied.

Rehabilitation:

Postoperative protocol for rehabilitation was used. A brace was given for a period of three week to protect the ligament. Range of motion of the knee and isometric muscle exercises were started the day after the operation and gradually progressed on the basis of closed kinetic chain exercises. Knee flexion of more than 90° and walking with full weight bearing was allowed one month postoperatively. Indoor cycling and swimming were permitted after four weeks and running after 3 months. High demand sports activities were allowed after approximately 12 months.

II. RESULTS

This series included 30 patients; the minimum follow-up of the clinical assessment was 2 years with mean follow up of 36 month Highest number of patients fall in age group 31-35yrs (30%), next being 26-30yrs (20%). Mean age of our study is 31.6yrs. Elder patients aged 48yrs and younger ones are 19yrs. Male patients account to 28(93.33%) of the total 30 in study group and rest 02 (06.67%) are females. Male preponderance may be related to their frequent involvement in outdoor work and strenuous activities. 16 out of 30 patients (53.33%) got Right Knee involvement and 14 Left Knee ACL tear (46.67 %). Nature of injury in 11 patients (36.66%) is due to sports (athlete, joggers, jump, physical trainers, kabaddi, cricket, players). RTA being the cause for ACL tears in 10 patients and the rest 9 sustained injuries due to other causes like slip and fall. About occupation majority of our patients 13 (43.33%) of total 30 fall into competitive lifestyle like joggers, military trainers, athletes followed by sedentary 11 patients (36.66), next is farming 06 patients (20%). All the patients were examined with Lachman, anterior drawer and pivot shift tests in OPD and under anaesthesia prior to surgery. In OPD, 28 patients turned positive Lachman rest 2 patients Lachman negative. Under anaesthesia all were Lachman positive. In OPD 27 were anterior drawer positive, when the same done under anaesthesia 29 were positive. Pivot shift test was positive in 16 patients in OPD but the same when done under anaesthesia was positive in 28 out of total 30 patients. Results of associated injuries on initial diagnostic arthroscopy shows ACL with MM tear in 16 patients (53.33%), isolated ACL tear in 9 patients (30%). ACL tear with MM and LM injury noted in 5 patients. complications at the end of 6 months 2 patients complained of mild pain at the graft site. No superficial or deep infection seen. Lachman grade I laxity seen in 16 patients and grade II in 1 patient at the end of final follow up but none complained of instability. 2 patients (who had preoperative restriction of terminal flexion of about 10degrees) had restriction of the terminal 10-15degree flexion at the postoperative 6 month follow-up and 2 patients had 5-10 degree restriction of extension, which improved with physiotherapy. Tunnel widening at the tibial side was seen in 2 cases

Postoperative Outcome x ray was taken,(fig 2) All the patients were examined 3, 6, 12, and 24 months after surgery as well as at the latest follow-up. The clinical assessment was based on, the objective criteria of the International Knee Documentation Committee (IKDC 1999) and LGS In our study, 21 (70%) patients got normal postoperative recovery according to IKDC scoring at final follow-up, while 7(23.3%) near normal and rest 02 were abnormal related to knee stiffness and 21 patients got excellent results according to LGS scoring while 7 patients showed good results.and the score was fair in rest 2 patients at the final follow up

III. DISCUSSION

Surgical reconstruction of the ACL has become the standard in the treatment of ACL injuries. The primary goal of ACL reconstruction is to restore the stability of the knee .Successful clinical outcomes following anterior cruciate ligament

reconstruction with a hamstring graft has been reported by many authors .(3,4)

The choice of fixation in ACL reconstruction is still evolving and the current fixation device which has been widely used were the Endobutton and the Bio composite interference screws which has helped to render an improved rehabilitation program post operatively.

(11) All patients in our study underwent ACL reconstruction with hamstring graft fixed with Endobutton and suture disc for tibial tunnel.

Vernon J. Cooley et al(10)in their study concluded that ACL reconstruction using quadrupled fold semitendinosus tendon autograft provides excellent clinical outcome, patients maintain preinjury activity without episodes of reinjury. Degeneration of the articular surfaces rarely occurs and the reoperation rates are minimal. About 85% of the patients according to IKDC scoring fall into normal to near normal in their study as compared to more than 70% normal and 23% near normal in our study Although Endobutton is not a direct fixation device into the graft, there is a nylon material present between the graft and the button. This suspensory fixation has been associated with increased anterior joint laxity.(8) In our study we found 16 patients had grade I laxity after 1 year grade II in 1 patient at the end final follow up Due to the indirect fixation of the graft there is a cyclic stretching of the graft under load which leads to the tunnel widening and inhibit the tendon-bone healing.(12) There is an anteroposterior movement occurring inside the widened tunnel described as the “windscreen wiper” effect. Nebeking et al(13) has described that there will be femoral tunnel enlargement when fixing the hamstring tendon with Endobutton in his study. In our study we had 2 cases of tibial tunnel widening

The advantages of Biodegradable interference screw is maintained as we have used titanium suture disc which is also MRI compatible and revision surgery is much easier when compared to metal screws. 23 The disadvantage is breakage of the screw while inserting and the biocompatibility screw is concern (14) which can be overcome with suture disc usage

In a study by Spicer et al (6) areas of sensory change over the front of the knee were identifiable in 50% of the patients and of these 86% demonstrated sensory changes in the distribution of the infragenicular branch of the saphenous nerve. In our study patients complained of numbness over the anterior aspect of leg around 10 % of patients

IV. CONCLUSION

This study was conducted on 30 patients suffering from ACL deficiency in the age group of 19-48 years. Instability of knee in the form of giving way is main complaint evaluated by Lachman test and confirmed by arthroscopy. The functional outcome of anterior cruciate ligament reconstruction with quadrupled semitendinosus tendon autograft using endobutton and suture disc will help the graft to facilitate graft tunnel healing and also

maintain its strength until there is a good graft to bone healing occurs completely is excellent to good (93%) with mild laxity

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