

**ORIGINAL RESEARCH**

# Inside Out Meniscus Repair in Concomitant Arthroscopic ACL Reconstruction without a Safety Incision

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**ABSTRACT**

**Background:** Medial meniscus tears are commonly associated with ACL tears, with an incidence ranging from 55% to 80%, and a higher incidence observed in cases of chronic instability compared to initial trauma. Present study aimed to analyze the novel technique for inside out meniscus repair in concomitant ACL reconstruction using the hamstring graft harvest incision and to evaluate the Tegner-Lysholm scores of these patients post-operatively.

**Materials and Method:** 15 patients with an ACL tear associated with a bucket handle tear of the medial meniscus were included in study. All 15 patients underwent Arthroscopic ACL Reconstruction using a hamstring graft and inside out medial meniscus repair under spinal anaesthesia by a single surgeon. The patients were then put on a standard post operative rehabilitation protocol with non-weight bearing ambulation with crutch assistance and knee range of motion was started immediately. After suture removal at 2 weeks, the patient was put on partial weight bearing and full weight bearing at 4 weeks post operatively.

**Results:** The mechanism of injury was a fall in seven patients (46.67%), a sports related injury in four patients (26.67%), a trip and fall in three patients (20%) and a dance related injury in one patient (6.67%). The mean time since injury to surgery was  $7.27 \pm 4.73$  months. The patients were followed up for a period of 6 months, during which one patient reported serous discharge from the wound which resolved with regular dressing after suture removal. No other adverse events, re-injury or other postoperative complications were reported. None of the patients had any complaints related to neurological injury such as tingling and numbness. At the end of 6 months, the Tegner - Lysholm Knee Score was calculated to evaluate the outcomes. The mean score was  $92 \pm 6.85$ . Seven patients (46.67%) had an excellent score (range: 95-100), suggesting an asymptomatic knee, six patients (40%) had a good score (range: 84-94) and two patients (13.33%) had a fair score (<84).

**Conclusion:** Inside-out medial meniscus repair during ACL reconstruction demonstrates promising outcomes, with high Tegner-Lysholm Knee Scores and minimal postoperative complications, suggesting its viability as a practical and safer alternative in meniscal repair during concomitant ACL Reconstruction.

**Keywords:** ACL reconstruction, meniscus repair, Tegner - Lysholm Knee Score.

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**INTRODUCTION**

Medial meniscus tears are commonly associated with ACL tears, with an incidence ranging from 55% to 80%, and a higher incidence observed in cases of chronic instability compared to initial trauma [1]. If left untreated, these tears can become more complex and increasingly difficult to repair over time. Acute injuries tend to present a higher incidence of lateral meniscus tears (61%) compared to medial meniscus tears (38.5%), whereas in chronic injuries, the incidence of medial meniscus tears rises significantly (74.5%) [2]. This variation has been attributed to the pull of the semimembranosus muscle on the posterior

horn of the medial meniscus, which wedges the meniscus between the femoral and tibial condyles [3]. The subsequent risk of osteoarthritis is 3.54 times higher when there is meniscus damage associated with an ACL tear [4]. The treatment of meniscal tears has evolved significantly, transitioning from open meniscectomy to arthroscopic total meniscectomy, and now to a more conservative approach, which includes masterly neglect and repair techniques [5]. Studies have demonstrated that long-term outcomes are superior with meniscal repair compared to meniscectomy [6]. Various meniscal repair techniques have also been developed, i.e. inside-out, outside-in,

and all-inside methods. The inside-out technique initially posed a higher risk of injury to the saphenous and peroneal nerves, leading to modifications that included additional incisions for needle and suture retrieval [7].

In this case series, we describe a novel method of inside out repair which uses the incision made for hamstring graft harvest and evaluate the resulting Tegner – Lysholm Knee Scores of 15 patients.

### OBJECTIVES

The objectives were: To analyze the novel technique for inside out meniscus repair in concomitant ACL reconstruction using the hamstring graft harvest incision; To evaluate the Tegner-Lysholm scores of these patients post-operatively.

### MATERIAL AND METHODS

15 patients with an ACL tear associated with a bucket handle tear of the medial meniscus who presented to our centre between October 2023 and March 2024 were included in our series. All 15 patients underwent Arthroscopic ACL Reconstruction using a hamstring graft and inside out medial meniscus repair under spinal anaesthesia by a single surgeon. The patients were then put on a standard post operative rehabilitation protocol with non-weight bearing ambulation with crutch assistance and knee range of motion was started immediately. After suture removal at 2 weeks, the patient was put on partial weight bearing and full weight bearing at 4 weeks post operatively.

### Surgical Procedure

After an initial diagnostic arthroscopy, the semitendinosus and gracilis graft was harvested through an anteromedial incision. The femoral and tibial tunnels were drilled and prepared. Repairability of the medial meniscal tear was checked and zone of the tear was noted. After reducing the tear and debriding the edges, inside out repair was carried out using zone specific cannulas using Fiber Wire (Figure 1). The graft was then passed and secured with a bioscrew. A plane was created between the capsule and the subcutaneous layer of skin using blunt

dissection (Figure 2) and the sutures were retrieved through the anteromedial incision using a right-angled forceps or a probe (Figure 3). The sutures were then secured using sliding knots to hold the meniscus in place (Figure 4). The wound was then closed in layers.

### Data Collection

The collected data included baseline characteristics such as sex and age; injury details: mechanism of injury, time since injury and type of tear; details of surgery and complications. The patients were then followed up at 6 months and were assessed using the Tegner – Lysholm Knee Score.

### Statistical Analysis

Statistical Analyses were conducted using GraphPad software v10.3.1. Descriptive data was generated and reported in terms of mean  $\pm$  standard deviation.

### RESULTS

The recruited patients had a mean age of  $27.33 \pm 4.78$  years (range: 20-36 years). 80% of the patients were male ( $n=12/15$ ) and 20% were female ( $n=3/15$ ). The mechanism of injury was a fall in seven patients (46.67%), a sports related injury in four patients (26.67%), a trip and fall in three patients (20%) and a dance related injury in one patient (6.67%).

The mean time since injury to surgery was  $7.27 \pm 4.73$  months. The patients were followed up for a period of 6 months, during which one patient reported serous discharge from the wound which resolved with regular dressing after suture removal. No other adverse events, re-injury or other postoperative complications were reported. None of the patients had any complaints related to neurological injury such as tingling and numbness. At the end of 6 months, the Tegner - Lysholm Knee Score was calculated to evaluate the outcomes. The mean score was  $92 \pm 6.85$ . Seven patients (46.67%) had an excellent score (range: 95-100), suggesting an asymptomatic knee, six patients (40%) had a good score (range: 84-94) and two patients (13.33%) had a fair score ( $<84$ ). The proportion of patients in the different Tegner – Lysholm Score ranges is shown in Figure 5.



**Figure 1: Inside Out Sutures after Percutaneous Retrieval**



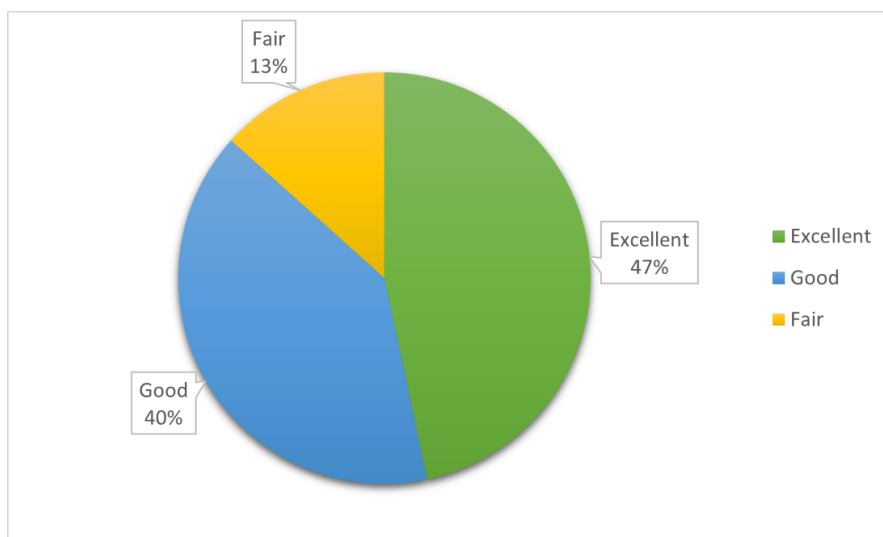
**Figure 2: Creation of a Plane between Capsule and Subcutaneous Layer of Skin by Blunt Dissection**



**Figure 3: Suture Retrieval through the Anteromedial Incision using a Probe**



**Figure 4: All Sutures Retrieved through the Anteromedial Incision and Sliding Knots passed**



**Figure 5: Pie Chart representing Functional Outcome using Tegner - Lysholm Knee Score**

## DISCUSSION

This study demonstrates the effectiveness of using the hamstring graft harvest incision for inside-out medial meniscus repair in patients undergoing ACL reconstruction, with a mean Tegner–Lysholm Knee Score of  $92 \pm 6.85$  at the six-month follow-up. This technique may offer a safer alternative to traditional inside-out repairs, as it utilizes the existing incision for hamstring graft harvest, thereby reducing the risk of additional trauma and potentially lowering the rate of postoperative complications. Despite the promising outcomes, our study is limited by its small sample size and short follow-up. Future studies should aim to replicate these findings in a larger cohort over an extended period to assess long-term efficacy and complication rates.

## CONCLUSION

In conclusion, our novel approach for inside-out medial meniscus repair during ACL reconstruction demonstrates promising outcomes, with high Tegner–Lysholm Knee Scores and minimal postoperative complications, suggesting its viability as a practical and safer alternative in meniscal repair during concomitant ACL Reconstruction.

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