

# OPERATIVE WOUND COMPLICATIONS: A STUDY OF OBLIQUE INCISIONS FOR HAMSTRING TENDON HARVESTING IN ARTHROSCOPIC LIGAMENT RECONSTRUCTION



## Orthopaedics

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## ABSTRACT

**Objective** The present study aimed to assess operative wound related complications mostly surgical site infections related to the use of oblique incisions in hamstring tendon graft harvesting in ligament reconstructions.

**Methods** The present study was conducted at a tertiary referral center for 12-24 months. There were a total of 400 patients included in the study who were subjected to oblique incision for harvesting of hamstring tendons. The mean follow-up was 14.7 months. Patients with an indication of ligament reconstruction were included in the study, and their outcomes were studied, tabulated and analyzed for a period of 12-24 months.

**Results** From the tabulated results it was inferred that 89.25% of all patients showed excellent healing within 02 weeks of the surgery with no short/long-term wound complications or surgical site infections. The incidence of surgical site infections was less than 1%. It was also observed that in 99.50% patients the operative wound healed within a period of 03 weeks from the surgery.

**Conclusion** Oblique incision, which showed lower risk of operative wound complications, might be more recommended for graft harvesting. Patients who underwent ligament reconstruction using an oblique incision had a very low incidence of surgical site infections.

## KEYWORDS

ACL- Anterior Cruciate Ligament – IPBSN- Infra-patellar Branch Of The Saphenous Nerve PCL- Posterior Cruciate Ligament.

## INTRODUCTION

Harvesting of hamstring tendon is a very important step in anterior cruciate ligament (ACL) and posterior cruciate ligament reconstruction. Although there are many advantages for using the hamstring tendon for cruciate ligaments reconstruction. We have used the oblique incision technique to avoid all the disadvantages and allow for fast, easy, and perfect hamstring tendon graft harvesting. The aim of our oblique incision technique for hamstring tendon harvesting is to avoid all complications and difficulties related to graft harvesting and keeping sartorial fascia in a good condition often not requiring repair. We carried out arthroscopic ACL reconstruction using hamstring tendons auto graft. Anterior cruciate ligament (ACL) reconstruction is one of the most common arthroscopic procedures which may result in wound (Graft harvest site) complications. The procedure is often performed using either a hamstring tendon or a patellar tendon auto graft<sup>[1]</sup>. Although hamstring tendon harvesting carries less risk of injury to the IPBSN between the two approaches, postoperative complications are not uncommon and vary between 12 and 88%<sup>[2]</sup>. Vertical, horizontal, and even oblique incision methods have been proposed to reduce the risk of nerve injury based on anatomical findings of the IPBSN distribution<sup>[3,4,5,6]</sup>. Nevertheless, no consensus has been reached regarding the optimal incision method at the pes anserinus area for hamstring tendon harvest. Some studies have even attempted to identify safe and/or risk zones at the pes anserinus area for hamstring tendon auto graft harvesting<sup>[4,7,8,9,10,11]</sup>. The number of clinically comparative studies is minimal, with the few published having small sample sizes and largely comparing only two types of incision method. The purpose of this study was to evaluate the incidence of surgical site complications, tourniquet time required to harvest the graft, need for repair of Sartorius fascia and injury to infra-patellar branch of saphenous nerve.

## MATERIALS AND METHODS

### Study Design:

A prospective study was conducted on 400 patients for assessment of the outcome of graft site incision. All 400 cases were operated using the oblique incision by 04 different surgeons using the same technique.

### Place Of Study:

Command Hospital, Chandimandir.

### Study Period:

From Dec 2016 to Dec 2018- 02 years.

Study population: All patients undergoing ACL, PCL reconstruction were included in this study.

### Sample Size:

All patients requiring ligament reconstruction were to be included in the study. Based on previous year records from the statistical department of this hospital average amounted to be around 240 cases of Arthroscopic ligament reconstruction per year.

### Inclusion Criteria:

1. Age < 40 years.
2. No evidence of previous incisions/ scars on the graft harvesting site.

### Exclusion Criteria:

1. Age > 40 years
2. Evidence of previous surgery/SSG/Flap cover on the graft harvest site.
3. Revision surgeries.
4. Skin lesions compelling to otherwise suggest using a different incision.

### Ethical Clearance:

Ethical clearance was obtained from institutional ethics committee of the hospital before start of study. Written informed consent was obtained from each subject before the conduct of the study.

### Conduct Of The Study

Informed written consent was taken from all the patients reporting for arthroscopic ligament reconstruction. The part was prepared by painting the limb with chlorhexidine lotion the previous night. The graft site and the portal sites were shaved with an electric razor at the time of induction of anaesthesia. All cases were administered spinal anaesthesia. Routine primary preparation was done using chlorhexidine scrub and intravenous antibiotics were given half an hour before the skin incision. Part was prepared and draped using standard protocols. Limb was elevated for 02 minutes before inflating the tourniquet.

### Surgical Technique:

Once the tourniquet was inflated an oblique incision was given at

the level of the tibial tuberosity approx. 04 -05 cms in length. Skin and subcutaneous tissue was incised and the pes anserinus was identified. An oblique incision was given on the pes and it was obliquely incised using a scissor both proximally and distally. The semitendinosus was separated from the pes anserinus using a mixtar. Semitendinosus was then scoped out leaving the pes behind. A mixtar was used to pull the graft mainly to separate the semitendinosus from the tendon of Gracilis and to delineate the first band. After isolating the semitendinosus the first band was incised and the tendon was secured using an ethibond no.05/02. The tendon of semitendinosus was then pulled to identify the other two bands. The bands were incised clean using a tissue cutting scissors and the tendon was released from its bony insertion at the proximal tibia. The tendon was thereafter harvested using a closed stripper. The wound was irrigated with normal saline mixed with 1 gm of vancomycin at the end of the arthroscopy and the skin was closed using skin staples. Patients were instructed for partial weight bearing rehabilitation for 04 weeks. The sutures were removed 14 days after surgery. Isometric quadriceps muscle exercises were advised 24 h after surgery. Aggressive physiotherapy was started after 2 weeks to achieve full range of motion and adequate muscle strength. Follow-up visits were at 4 weeks and at 3, 6, 12, and 24 months.

## RESULT

The study of 400 patients who underwent arthroscopic ligament reconstruction were evaluated for wound related complications following the oblique incision technique and there result was tabulated as follows-

| No. of patients. | At the time of first dressing- 04 days from the day of surgery. | Suture removal after 14 days from day of surgery. Signs of Inflammation (redness /redness of the surgical wound site) | Delayed suture removal (within one week from the day of surgery) | Number of patients who had to be taken up for debridement /secondary suturing. | Long term wound complications. |
|------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------|
| 357              | Nil                                                             | 357                                                                                                                   | Nil                                                              | Nil                                                                            | Nil                            |
| 32               | 32                                                              | 22                                                                                                                    | 10                                                               | Nil                                                                            | Nil                            |
| 11               | 11                                                              | Nil                                                                                                                   | 09                                                               | 02                                                                             | Nil                            |

From the tabulated results it can be inferred that 89.25% of all patients showed excellent healing with no short/ long-term wound complications or surgical site infections. Furthermore it showed that 04% of all cases had some signs of inflammation in the form of redness of the operated wound of which 68.75% patients healed without any sequel and in 31.25% patients delayed suture removal was done within 03 weeks from the day of surgery. It was also noted that in 02 patients that is 0.5% of all the patients debridement and secondary closure of wound had to be undertaken without any long term wound related complications.

## DISCUSSION

A standard incision has not been described in the literature for semitendinosus and gracilis graft harvest. Brown et al showed an oblique incision in parallel with the skin lines in the superior region of the pes anserine. This parallel incision was supposed to give a superior vision and lead to less scarring by facilitating skin retraction [12]. Marder et al recommended a 4-cm oblique incision, 3 fingers distal from the joint level over the insertion of the pes anserine<sup>[13]</sup>. In a cadaver study of Pagnani et al<sup>[14]</sup> they announced that the insertion site of hamstring tendons is at 1.9 cm distal and 2.25 cm medial of the tibial tubercular apex, and they suggested graft harvesting from 4 parts of the knee in order to relax the saphenous nerve when running the gracilis tendon at the posteromedial aspect of the knee. A vertical incision is considered to cause more scar tissue due to it being vertical to skin lines and also to increase the risk of nerve injury due to being vertical to the IPBSN<sup>[15]</sup>.

The IPBSN exits from the adductor canal and descends at a 45° angle through the anterior knee<sup>[16]</sup>. Also; there are numerous varieties of the transverse branches of the IPBSN, from the lower pole of the patella up to the distal tibial tubercle<sup>[17]</sup>. Therefore, nerve injury is inescapable when the skin is incised for tendon harvesting. Wisely, an incision parallel to the nerve passage may cause less nerve injury<sup>[18]</sup>.

Our results confirm the theory that an oblique incision is not associated with any long term complication although we did not include injury to infra-patellar branch of the saphenous nerve (IPBSN) as one of the outcome factors. In our technique, the fascia is left intact and need not be repaired as the cleanly incised ends repose back and heal without any complications. In our technique of using an oblique incision to harvest the graft there were less than 1% wound related complications in the form of surgical site infection. Furthermore, using our technique in a group of 400 patients the wounds healed within a period of 03 weeks in 97.25% patients without any significant complications.

## CONCLUSION

Therefore, it would be advisable to follow the oblique incision technique for graft harvesting for all individuals undergoing arthroscopic ligament reconstruction using hamstring tendons to avoid any short/long term complications and also to achieve an excellent outcomes. The described technique is reproducible, easy to perform and can be utilized for all types of ligament reconstructions. The incidence of surgical site infections was less than 1%.

## Footnotes

Each author certifies that he has no commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

Each author certifies that his or her institution has approved the human protocol for this investigation that all investigations were conducted in conformity with ethical principles of research, and that informed consent was obtained.

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