

# A PROSPECTIVE STUDY DONE TO EVALUATE THE FUNCTIONAL OUTCOME OF KNEE AFTER ARTHROSCOPIC POSTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING IPSILATERAL PERONEUS LONGUS AUTOGRAFT.

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## Abstract

### Background:

PCL is one of the major ligaments of the knee joint which stabilizes the tibia on the femur. It prevents posterior translation of the tibia.

### Aims and Objectives:

To evaluate the functional outcome of knee joint after arthroscopic posterior cruciate ligament reconstruction using ipsilateral peroneus longus autograft and also to assess the donor site morbidity.

### Methods:

A prospective study was conducted on 24 patients in the department of orthopaedics, Indira Gandhi Institute of Medical Science, Sheikhpura, Patna. All patients (male or female; age range 18-40 years) with PCL tear coming in OPD and emergency department of the Indira Gandhi Institute of Medical Sciences, Patna; were included in the study.

### Results:

The mean age of the patients was 29.5 years with a range from 19 years to 39 years. Most of the patients (37.5%) were in the age group of 25-32 years followed by 33.3% in the age group of 33-40 years, and 29.2% aged 18-25 years. All the patients were males. There was a significant improvement in IKDC and Tegner Lysholm score at 6-weeks, 3-months, 6-months, 1-year, 1.5 years, and 2-years compared with pre-operative IKDC and Tegner Lysholm score. The donor site morbidity was assessed with Foot and Ankle Disability Index (FADI) and found to be unaffected.

### Conclusion:

Arthroscopic single bundle PCL reconstruction using ipsilateral peroneus longus tendon autograft had significant improvement in functional outcome of the knee based on IKDC and Tegner Lysholm score. Ankle function was also found to be preserved based on FADI score at 2-years follow-up.

**Keywords:** PCL, IKDC score, Tegner Lysholm score, FADI score, Submitted: 2023-08-29 Accepted: 2023-09-08

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## 1. Introduction.

Posterior cruciate ligament (PCL) tear occurs with an incidence of about 3% of acute knee injuries in trauma settings.<sup>1</sup> Isolated PCL tears are

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rare and about 95% of the PCL tears are in combination with other ligamentous injury. With increasing incidence of RTA and increased involvement in sports activities, knee injuries are more common now-a-days. Ruptured PCL can result in pain, persistent instability, impaired knee kinematics, subsequent injury to other knee ligaments and increased risk of developing early osteoarthritis of knee joint.<sup>2,3</sup>

PCL is one of the four major ligaments of the knee joint that functions to stabilize the tibia on the femur. The origin of PCL is from the anterolateral aspect of the medial femoral condyle and inserts on the posterior aspect of the tibial plateau. It prevents the posterior translation of the tibia. The additional function of PCL comprises of resistance against varus, valgus and external rotation stresses. The PCL is approximately 1.3 to 2 times thicker than anterior cruciate ligament. Additionally, PCL is roughly twice as strong as the anterior cruciate ligament (ACL). Therefore, the PCL is less likely to tear than ACL.<sup>4-6</sup>

Posteriorly directed stress on the proximal tibia while the knee is flexed causes PCL injuries. Common mode of PCL tear is by dashboard injuries during road traffic accidents. The PCL can also be injured after fall with impaction of force on the proximal leg in a flexed knee. Sports like football, skiing, soccer and baseball often cause PCL injuries. Occasionally, rotational hyperextension injuries can also lead to PCL tears.<sup>7,8</sup> The mode of injury based upon high or low energy trauma and its duration determines the symptomatology of the patients. Common complaints of the patients with PCL tear are posterior knee pain, swelling and stiffness. Symptoms of instability are seen in chronic cases.<sup>9</sup>

The present study was aimed to evaluate the functional outcome of knee joint after arthroscopic posterior cruciate ligament reconstruction using ipsilateral peroneus longus autograft and also to assess the donor site morbidity in postoperative patients.

## 2. Material and Methods.

A prospective study was conducted on 24 patients in the department of orthopaedics, Indira Gandhi Institute of Medical Science, Sheikhpura, Patna. All patients (male or female; age range 18-40 years) with PCL tear coming in OPD and emergency department of the Indira Gandhi Institute of Medical Sciences, Patna; were included in the study. All the patients included in the study were supposed to have intact Peroneus longus tendon on the ipsilateral side. All the selected PCL deficient patients were treated by arthroscopic PCL reconstruction using ipsilateral peroneus longus autograft. Stump of peroneus longus was tenodesed with peroneus brevis tendon before closure of the donor site incision.

## 3. Results.

Shows that the mean age of the patients was 29.5 years (range: 19-39 years). The highest number of the patients (37.5%) belonged to the age group of 25-32 years, which was followed by 33.3% aged 33-40 years, and 29.2% aged 18-25 years. All the patients were males. The most common mode of injury (approximately 71%) was road traffic accidents (RTA), the second highest being sports (25%) and direct trauma to knee (4.2%). The right and left knee were affected with an equal incidence. Time since injury to reconstruction was < 6 months for 58.3% patients, 6-12 months for 33.3% and >12 months for 8.3% patients.

shows that the posterior sag sign was present in all the preoperative patients. While at 6-weeks, 3-months, 6-months, 1-year, 1.5 years, and 2-years follow-up, posterior sag sign was absent in all the postoperative patients. The posterior drawer test was positive in all the patients pre-operatively. On clinical assessment 7 patients had grade 2 while the remaining 17 patients had grade 3 injury. At 6-weeks, 3-months, 6-months, 1-year, 1.5 years, and 2-years follow-up, posterior drawer test was negative (**table 3**).

reveals that there was a notable enhancement in IKDC score at 6-weeks ( $74.8 \pm 1.3$ ), 3-months ( $77.0 \pm 1.2$ ), 6-months ( $78.8 \pm 1.2$ ), 1 year ( $83.0 \pm 1.0$ ), 1.5 years ( $87.3 \pm 3.1$ ) and at 2 years (91.6

Table 1: Baseline characteristics-based distribution of the study subjects

	Frequency	Percentage
<b>Age Distribution</b>		
18-25	7	29.2%
25-32	9	37.5%
33-40	8	33.3%
<b>Gender</b>		
Male	24	100%
Female	0	0%
<b>Mode of injury</b>		
RTA	17	70.8%
Sports	6	25%
Trauma	1	4.2%
<b>Side affected</b>		
Right knee	12	50%
Left knee	12	50%
<b>Time since injury to reconstruction</b>		
<6 months	14	58.3%
6-12 months	8	33.3%
>12 months	2	8.3%

Table 2: Posterior sagging of tibia

Posterior sagging of tibia	Present	Absent
Preoperative	24	0
6-week	0	24
3-month	0	24
6-month	0	24
1-year	0	24
1.5-years	0	6
2-years	0	3

Table 3: Posterior drawer test

Posterior drawer test	Positive	Negative
Preoperative	24	0
6-week	0	24
3-month	0	24
6-month	0	24
1-year	0	24
1.5-years	0	6
2-years	0	3

± 2.4) follow-up, compared with pre-operative IKDC score.

shows that all pre-operative patients had fair Tegner Lysholm knee score. There was a significant improvement in the score post-operatively at 6-weeks, 3 and 6-months where all the patients had good score. At 1-year, 13 patients had excellent while remaining 11 patients had good Tegner Lysholm knee score. At 2 years follow-up, all the patients had excellent Tegner Lysholm knee score. With the help of FADI, the donor site morbidity was assessed. The mean FADI score was  $96.0 \pm 0.0$  both pre-operatively and post-operatively, showing that ankle function and stability were not affected (**table 6**).

#### **4. Discussion.**

Various options of autografts are available for arthroscopic PCL reconstruction but the most common option has been hamstring autograft. In comparison to Bone-Patellar-Tendon-Bone (BPTB) autograft the harvest of hamstring autograft is easier. On the other hand Bone-Patellar-Tendon-Bone (BPTB) autograft can have earlier return to sports, but may have incidence of anterior knee pain in some.<sup>10</sup> Hamstring autograft can have some demerits like unpredictable graft size, decrease in hamstring muscle power during deep knee flexion and thigh hypertrophy.<sup>11</sup>

Studies in the past in context to biomechanics has shown that peroneus longus autograft has comparable tensile strength.<sup>12</sup>

The present study found that PCL reconstruction using ipsilateral peroneus longus autograft improved the IKDC and Tegner Lysholm score along with no donor site morbidity.

In a study 132 autograft reconstructed PCL patients (mean age- 31.6 years). Patients improved by 22.7 on the Lysholm score, 3.9 on the Tegner activity score and 20 on the IKDC score. A comparative review of these trials suggests that elderly PCL deficient patients may benefit from operative therapy as much as younger individuals.

A study found a high rate of return to sports i.e. 79% along with good patient satisfaction, and

function restoration. The average age of 14 athletes was 27.5 years (range: 17 to 43). The athletes also had good functional scores after PCL reconstruction.

Research conducted in a study where 36 patients received transtibial technique of PCL reconstruction and 30 patients received tibial inlay technique of PCL reconstruction. The average age of the patients were 37 years and 35 years respectively. Return to preinjury sports activities was seen in 21 patients (58.3%) in the transtibial group and 19 patients (63.3%) in the tibial inlay group.

A meta-analysis of 14 studies were done by researchers on 523 patients with a mean age of 30.2 years in which isolated PCL reconstruction was done. A significant improvement in functional outcome scores were seen in these patients, but there was a low rate (44%) (95% CI, 23%-66%) of return to sports to preinjury level.

The mean Tegner Lysholm score and IKDC score of different studies are comparable with our study and arthroscopic PCL reconstruction using single bundle Peroneus longus autograft is a good treatment option for posterior cruciate ligament deficient knees.

#### **5. Limitation.**

The limitation of this study is a small sample size which can be attributed to a lower incidence of PCL injuries. The assessment of the study's outcome was based on a subjective score rather than an objective score. A shorter follow-up length may restrict the potential long-term effects and outcomes of this operation.

#### **6. Conclusion.**

Arthroscopic single bundle PCL reconstruction using ipsilateral peroneus longus tendon autograft had significant improvement in functional outcome of the knee based on IKDC and Tegner Lysholm score. Ankle function was also found to be preserved based on FADI score at 2-years follow-up.

Table 4: IKDC score

IKDC score	IKDC score	P value
<b>Preoperative</b>	66.8±2.3	
<b>6-week</b>	74.8±1.3	0.0001
<b>3-month</b>	77.0±1.2	<0.0001
<b>6-month</b>	78.8±1.2	<0.0001
<b>1-year</b>	83.0±1.0	<0.0001
<b>1.5 years</b>	87.3±3.1	<0.0001
<b>2 years</b>	91.6±2.4	<0.0001

Table 5: Tegner Lysholm Knee Score

	Excellent (95-100)	Good (84-94)	Fair (65-83)	Poor (<65)
Preoperative	0	0	24	0
6 weeks	0	24	0	0
3months	0	24	0	0
6months	0	24	0	0
1 year	13	11	0	0
1.5 years	5	1	0	0
2 years	3	0	0	0

Table 6: FADI score

FADI score	FADI score
<b>Preoperative</b>	96.0±0.0
<b>6-week</b>	96.0±0.0
<b>3-month</b>	96.0±0.0
<b>6-month</b>	96.0±0.0
<b>1-year</b>	96.0±0.0
<b>1.5 years</b>	96.0±0.0
<b>2 years</b>	96.0±0.0

## 7. Recommendation.

For improving the functionality of the injured joints, this method of reconstruction offers a good stability.

## 8. List of abbreviation.

PCL- Posterior cruciate ligament  
 FADI- Foot and Ankle Disability Index  
 IKDC- International Knee Documentation Committee  
 ACL- Anterior Cruciate Ligament  
 RTA- Road Traffic Accidents

BPTB- Bone-Patellar-Tendon-Bone

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## 10. Conflict of interest.

None

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None

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