

# Outcomes of Patellar Replacement Vs Patellar Neurectomy in Total Knee Replacement

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## ABSTRACT

**Objectives:** To compare the outcomes of patellar replacement and patellar neurectomy in Patients undergoing Total Knee Replacement.

**Materials & Methods:** The design of this study was a cross sectional study design and this study was conducted in DHQ Teaching Hospital Gujranwala. Total 30 Patients were enrolled in this study and they were divided into two groups. Group A constitutes of 15 Patients underwent Post tibial neurectomy. And Group B consisting of 15 Patients went through Tibial Resection. All the patients have been assessed through the Tinel test on the painful area and self-administered Patient-Reported Outcome Measurements (PROMs): Patellar replacement also known as patellofemoral arthroplasty, is a surgical procedure that is performed in conjunction with total knee replacement (TKR) to relieve pain in the knee joint caused by patellofemoral arthritis or other conditions affecting the patella. All the patients of Group B were given anesthesia to numb the area. An incision was made in front of the knee to expose the patella and surrounding structures. Removal of the patella: The patella was carefully removed from the knee joint. The underside of the patella was reshaped to fit a prosthetic component that was implanted in its place. The patellar component was attached to the reshaped surface of the patella using bone cement. The patella was repositioned in the knee joint and attached to the femur using sutures. The incision was closed using sutures or staples. The goal of patellar replacement is to reduce pain and improve function in the knee joint. All the group A participants went through Patellar neurectomy. Patellar neurectomy is a surgical procedure that involves cutting or removing the nerve endings that supply sensation to the patella.

**Results:** Total 30 Patients participated in this study. In Group A =15 Patients who underwent patellar Neurectomy and 15 Patients in Group B who experienced Tibia Resection. Total 5 months follow up was done. Group B participants showed excellent Results. NRS score decreased to 0 in Group B. While in patellar Neurectomy group A two patients experienced still moderate pain. Remaining 13 patients although did not experienced pain but felt numbness on limbs.

**Practical Implication:** Patellar neurectomy involves cutting or removing the nerve endings that supply sensation to the patella, interrupting the transmission of pain signals from the patella to the brain. Although it is less time consuming but can cause numbness or altered sensation in the skin over the patella, which may affect the patient's quality of life Does not address underlying patellar instability or misalignment, which can still cause pain and functional limitations Can be associated with a risk of complications such as neuroma, infection, stiffness.

**Conclusion:** Patellar Resection with TKA has better outcomes than Patellar Neurectomy. Patellar denervation with electrocautery is effective in reducing pain and opioid consumption after total knee replacement. Postoperative range of motion is significantly better in patellar denervation group, which means that patellar denervation significantly improves clinical outcome

**Keywords:** Total Knee Replacement, Patellar Replacement, Neurectomy, Tibia Resection, Pain, Prosthesis

## INTRODUCTION

Total knee replacement (TKR) is a common surgical procedure used to relieve pain and restore function in patients with severe knee osteoarthritis or other degenerative joint diseases<sup>(1)</sup>. During a TKR surgery, the surgeon may address the patella, or kneecap, which can also be affected by arthritis or other conditions.

There are two main techniques used to address the patella during TKR: patellar replacement and patellar neurectomy<sup>2,3</sup>. Patellar replacement involves removing the natural patella and replacing it with an artificial one made of plastic or metal. This approach is often used when the patella is severely damaged or unstable. Patellar replacement can help to restore stability and function to the knee joint and may also reduce pain<sup>4</sup>. Patellar neurectomy, on the other hand, involves cutting the nerve that supplies sensation to the patella. This approach is used to reduce pain in the patella without removing it. By cutting the nerve, the patient may experience less pain in the patella area, although some loss of sensation may occur<sup>5,6</sup>. The outcomes of patellar replacement versus patellar neurectomy in TKR have been studied in several clinical trials and observational studies. Overall, the available evidence suggests that patellar replacement may be associated with better functional outcomes and reduced pain compared to patellar neurectomy<sup>7,8</sup>.

Complications associated with the patella and patellar component of the prosthesis are important causes of failure in a total knee arthroplasty<sup>1,2</sup>. Potential complications involving the

patella include patellar tendon avulsion (often associated with a previous high tibial osteotomy), patellofemoral instability due to inadequate soft-tissue balancing and component failure caused by factors such as a metal-backed component, recurrent instability, loosening or fracture. Apart from all these, hemarthrosis and osteonecrosis of the patella are high on the list as patellar vascularity is at stake during a TKR procedure unrelated to the surgeon's expertise. Lateral retinacular release (LR) is a surgical procedure during TKR, performed to ensure patellar tracking and provide knee stability<sup>[3]</sup>. Tracking is the term used to describe the movement of the patella in the knee and should ideally be centered anteriorly in the femur at the trochlear groove<sup>[4]</sup>. There are two ways of correcting this patellar mal tracking during TKR, firstly by removal of patellar osteophytes and secondly by LR release that can further prevent patellar subluxation or dislocation.<sup>[5]</sup> Some patients have a genetic predisposition to retinacular tightness and can have a laterally riding patellae.<sup>[6]</sup> Trauma to the patella is another important etiology for patellar misalignment which results in inflammation and fibrosis of the retinaculum pulling the patella off the track. Diagnostic arthroscopy is extremely helpful in defining and quantitating articular damage in TKR patients with associated patellofemoral disease<sup>[7]</sup>. The initial arthroscopy, preceding LR, should rule out other intraarticular pathologies, quantitate and localize synovitis, correlate patellar tracking with radiographic findings, quantitate and characterize articular lesions and rule out loose bodies elsewhere in the knee.<sup>[8]</sup>

The most common complication of patellar neurectomy is numbness or altered sensation in the skin over the patella, which can be temporary or permanent. Any surgical procedure carries a risk of infection, which can be particularly concerning in joint replacement surgery. Signs of infection may include redness, swelling, warmth, pain, and fever (9). Patellar neurectomy may result in stiffness or weakness in the knee joint, which can affect range of motion and mobility. This is more likely to occur if the patient has a pre-existing knee condition or if the procedure is not performed correctly (10). Patellar replacement can result in instability of the patella, which can cause pain, discomfort, and difficulty with activities that require bending the knee (11). Instability may occur if the patellar component is not properly positioned or if the soft tissues surrounding the patella are damaged during the surgery. Misalignment of the patellar component can occur, which can cause pain (12). Like any surgery, patellar replacement carries a risk of infection. Signs of infection may include redness, swelling, warmth, pain, and fever. Some patients may experience ongoing pain in the patellofemoral joint despite the surgery, which can be due to a number of factors, including malalignment, muscle weakness, or nerve irritation.

**MATERIALS & METHODS**

The design of this study was a cross sectional study design and this study was conducted in DHQ Teaching Hospital Gujranwala. Total 30 Patients were enrolled in this study. They were divided into two groups. Group A constitutes of 15 Patients underwent Patellar neurectomy. While the remaining 15 Patients of group B went through Patellar resurfacing. All the patients have been assessed through the Tinel test on the painful area and self-administered Patient-Reported Outcome Measurements (PROMs): Patellar replacement also known as patellofemoral arthroplasty, is a surgical procedure that is performed in conjunction with total knee replacement (TKR) to relieve pain in the knee joint caused by patellofemoral arthritis or other conditions affecting the patella. All the patients of Group B were given anesthesia to numb the area. An incision was made in front of the knee to expose the patella and surrounding structures. Removal of the patella: The patella was carefully removed from the knee joint. The underside of the patella was reshaped to fit a prosthetic component that was implanted in its place. The patellar component was attached to the reshaped surface of the patella using bone cement. The patella was repositioned in the knee joint and attached to the femur using sutures. The incision was closed using sutures or staples. The goal of patellar replacement is to reduce pain and improve function in the knee joint.

All the group A participants went through Patellar neurectomy. Patellar neurectomy is a surgical procedure that involves cutting or removing the nerve endings that supply sensation to the patella. After giving local Anesthesia An incision was made in the front of the knee to expose the patella and surrounding structures. The cutaneous branch of the femoral nerve, which supplies sensation to the skin over the patella was identified. The nerve was removed from the area: The incision was closed using sutures.

**RESULTS**

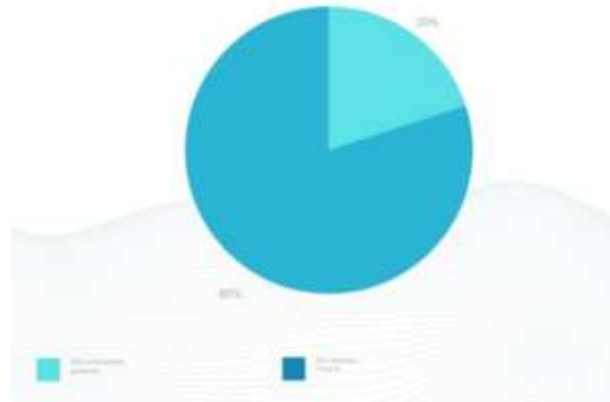
Total 30 Patients participated in this study. In Group A =15 Patients who underwent patellar Neurectomy and 15 Patients in Group B who experienced Patellar Resection. Total 5 months follow up was done. Group B participants showed excellent Results. NRS score decreased to 0 in Group B. While in patellar Neurectomy group A two patients experienced still moderate pain, remaining 13 patients although did not experienced pain but felt numbness on limbs, which also effected their lives. Total 12(80%) out of 15 Patients were satisfied with TKA results of Group A. Total 14 (93%) out of 15 Patients were satisfied with TKA results in group B.

Table 1: Showing Demographic Details of Patients

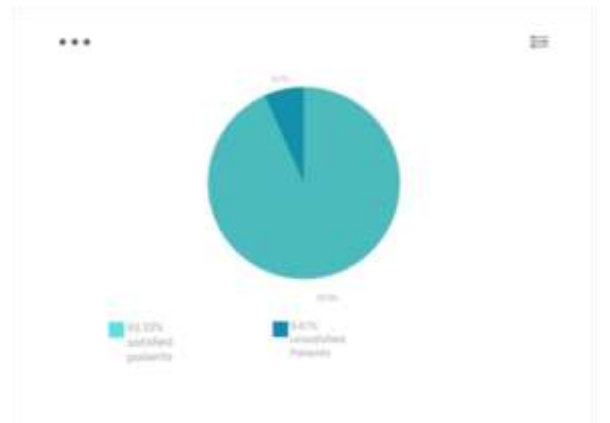
	Patellar Neurectomy (Group A)	Patellar Resection/Resurfacing (Group B)	P-Value
Age(years)	55(40-65)	50(40-58)	0.26
Gender			
Male	05	05	<.01
Female	10	10	<.01
BMI	28.5(22-30.6)	26.7(24.8-28.2)	0.50

Table 2: Showing Comparison Between Results of Neurectomy and Resection

	Patellar Neurectomy (Group A)	Patellar Resection/Resurfacing (Group B)	P-value
Length of Follow up(months)	5(4-7)	5(4-7)	<0.05
NRS pain score			
Pre-operative	8(3, 10)	7(3, 10)	0.52
Post-Operative	1(1, 8)	0(0,7)	0.77
Satisfied with result of TKA	12	14	0.59



Graph 1: showing 12(80%) out of 15 Patients underwent through TKA with Patellar neurectomy were satisfied but 3(20%) patients developed complications.



Graph 2: showing 14(93.33%) out of 15 underwent TKA with patellar Resection were satisfied while 1(6.67%) developed complications

**DISCUSSION**

Either patellar replacement or patellar neurectomy during total knee replacement (TKR) depends on the patient's individual circumstances and the surgeon's expertise. Both procedures aim to improve the patient's quality of life by relieving pain and restoring function in the knee joint. However, Our Results showed

that patellar resection has better outcomes than patellar Neurectomy<sup>(13)</sup>. Total 30 Patients participated in this study. In Group A =15 Patients who underwent Patellar Neurectomy and 15 Patients in Group B who experienced Patellar Resection. Total 5 months follow up was done. Group B participants showed excellent Results. NRS score decreased to 0 in Group B<sup>(14)</sup>. While in patellar Neurectomy group A two patients experienced still moderate pain, remaining 13 patients although did not experienced pain but felt numbness on limbs, which also effected their lives. Total 12(80%) out of 15 Patients were satisfied with TKA results of Group A. Total 14 (93%) out of 15 Patients were satisfied with TKA results in group B. Patellar replacement involves the removal of the patient's natural patella and replacement with an artificial one<sup>(15)</sup>. The artificial patella is designed to match the patient's anatomy and provide a smooth surface for the joint to glide on. Here are some advantages of patellar replacement Can provide good pain relief and restore function in the patellofemoral joint Improves stability and alignment of the knee joint Provides a durable solution that can last for many years Allows preservation of the patellar nerve, maintaining normal sensation in the knee<sup>(16)</sup>. Patellar replacement can improve knee function by restoring the natural movement of the patella. This can reduce pain and stiffness in the knee joint and improve the ability to perform daily activities<sup>(18,19)</sup>. TKA is an operation with a high gain in quality-of-life. Patellofemoral pain (PFP) in particular is a common complication after TKA and is often responsible for revision surgery. Sensi et al.<sup>(10)</sup> reported an incidence of 8% for AKP after TKA.

In particular, increasing, and localized contact pressure and patella malt racking is held accountable for PFP, but the reasons are various. After 1960s, changes in the femoral component such as addition of a trochlear flange improved the clinical results and decreased anterior discomforts in TKA. These changes encouraged some surgeons to resurface patella in TKA. The largest study of patellar resurfacing is that of Yeganeh et al<sup>(2)</sup>. The most prevalent complication in the non-resurfaced group was continuing chronic knee pain. This was retrospective and involved surgeons, but the authors considered that the two groups of patients were essentially similar. In a recent annual report of the National Joint Registry of England and Wales 2013, 67% of primary total knee replacements were performed without patellar resurfacing, as the majority of surgeons believed that the benefits did not outweigh the risks<sup>(11)</sup>. In a prospective randomized study, Feller et al. provided no evidence to support the routine resurfacing of the patella at a TKA for osteoarthritis. Controversy remains regarding whether the procedure should include patellar resurfacing or not<sup>(1, 2, 5, 6)</sup>. This uncertainty has led to three approaches to patellar resurfacing in total knee replacement: always resurface, never resurface, or selectively resurface<sup>(12)</sup>.

Advanced destructive osteoarthritis of the patellofemoral joint (PFJ) results in AKP symptoms<sup>(14)</sup>. A problem without patellar resurfacing TKA is chondrolysis of the patella. It should be remembered that patellar tracking, contact area, and pressure distribution are significantly different between native and prosthetic knees. According to the theory of Dye, each knee having a unique "envelope of function"; a potential range of activity in which it maintains a homeostasis of all surrounding tissues. A prosthetic knee can be viewed as a knee functioning with a combined biologic and artificial transmission with a limited potential range of activity. Artificial products containing metals and polyethylene are harder and less flexible than the original cartilage, and therefore, make it unlikely that the knee will return fully to its pre-injury/pre-arthritis state. It is known that the structures in and around the PFJ are very sensitive to pain, being full of nociceptors such as subchondral bone of patellae affected with degenerative disease are all richly supplied with type IVa free nerve endings and fibers containing Substance P. There was a significant difference of mean retro patellar pressure between natural knee and after TKA, which may be one important reason for AKP after TKA in vivo<sup>(17)</sup>.

Some surgeons prefer non-resurfacing patella, but they remove osteophytes around the patella and reshape the patella<sup>(6)</sup>.

<sup>21)</sup>. It results in decrease of AKP. Lateral patella facetectomy had improved clinical results in patients with isolated patellofemoral arthritis<sup>(18-22)</sup>.

Some clinicians encouraged to perform lateral patella facetectomy in TKA for treatment of patellofemoral osteoarthritis. Zhang et al. demonstrated that partial lateral facetectomy is an effective way to improve the function of patellar-retaining TKA in patients with primary osteoarthritis. Patients who underwent partial lateral facetectomy showed more significant improvements in the scores and fewer lateral patellar osteophytes in radiographs. In some studies, partial lateral facetectomy had better results compared with lateral release for correction of patellar tracking<sup>(2)</sup>. A partial lateral facetectomy may have the ability to increase congruency and to accommodate small mismatches or small errors in the lateral facet.

Lateral facetectomy also can decrease the rate of lateral release and reduce the rate of damage of the lateral geniculate artery<sup>(15-17)</sup>. We thought that lateral facetectomy can decrease AKP over constraining the PFJ is incompatible with freedom of motion in recent prosthesis. Thus, partially conforming surfaces may provide reasonable motion, laxity, and stability. In our experience, lateral facetectomy can provide partial conformity and decrease patellofemoral shear force.

Decreased pain: Patellar replacement can provide significant pain relief for patients who have chronic knee pain due to patellofemoral arthritis or other conditions that affect the patella. Patellar replacement can help improve quality of life by reducing pain and allowing patients to engage in activities that they may have avoided due to knee pain Lower risk of complications<sup>(20)</sup>: Compared to total knee replacement, patellar replacement is a less invasive procedure with a lower risk of complications such as infection, blood clots, and nerve damage. Faster recovery time: Patellar replacement typically has a faster recovery time compared to total knee replacement, allowing patients to return to normal activities more quickly<sup>(21)</sup>. Minimal bone loss: Patellar replacement preserves the majority of the patient's own bone, making it a good option for younger patients who may need additional knee surgeries in the future. However, it is More complex and time-consuming surgery than patellar neurectomy May require a longer recovery time and more extensive physical therapy<sup>(22)</sup>.

Patellar neurectomy involves cutting or removing the nerve endings that supply sensation to the patella, interrupting the transmission of pain signals from the patella to the brain<sup>(23)</sup>. Although it is less time consuming but can cause numbness or altered sensation in the skin over the patella, which may affect the patient's quality of life Does not address underlying patellar instability or misalignment, which can still cause pain and functional limitations Can be associated with a risk of complications such as neuroma, infection, stiffness .

## CONCLUSION

Patellar Resection with TKA has better outcomes than patellar Neurectomy. Patellar denervation with electrocautery is effective in reducing pain and opioid consumption after total knee replacement. Postoperative range of motion is significantly better in patellar denervation group, which means that patellar denervation significantly improves clinical outcome

**Conflict of Interest:** There is no conflict of interest in this study

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