

IMPACT OF PATELLAR DENERVATION IN TOTAL KNEE ARTHROPLASTY WITHOUT PATELLAR RESURFACING: A PRELIMINARY STUDY AND REVIEW OF LITERATURE

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ABSTRACT

Anterior knee pain (AKP) is still a major problem in total knee arthroplasty (TKA). Several approaches have been developed to alleviate pain more effectively and safer. Disabling pain receptors by electrocautery could theoretically achieve denervation of the anterior knee region. However, there is no clear consensus for therapeutic recommendations. The present study aimed to evaluate results after patellar denervation with electrocautery in TKA at a minimum follow-up of 1 year.

KEYWORDS: Knee- Patellar Denervation.

INTRODUCTION

Residual patellofemoral pain is one of the main problems in TKA without patellar resurfacing. To reduce the prevalence of anterior knee pain, circumpatellar electrocautery has been used (Altay, Ertürk et al. 2012). However, no conclusion could be drawn on the benefit of this approach.

We carried this study to evaluate results after patellar denervation with electrocautery in TKA at a minimum follow-up of 1 year.

Through this study we aimed to answer to multiple questions.

- Does the circumferential electrocautery of the patella improve the residual pain

- Is there any histological evidence that this act may denerve totally or partially the patella

Patients and Methods

Our study was carried out on 30 patients operated on for degenerative knee osteoarthritis. All of our patients had a total knee prosthesis without patellar resurfacing by the same surgeon using the same path and the same type of prosthesis (posterior stabilized with movable platform).

Surgical procedure

Our surgical approach was internal para-patellar for all our patients (Fig1) with electro-coagulation using an electro-surgical scalpel around the periphery of the patella for the purpose of isolating the nerves and the pruning of the osteophytes (Fig2).

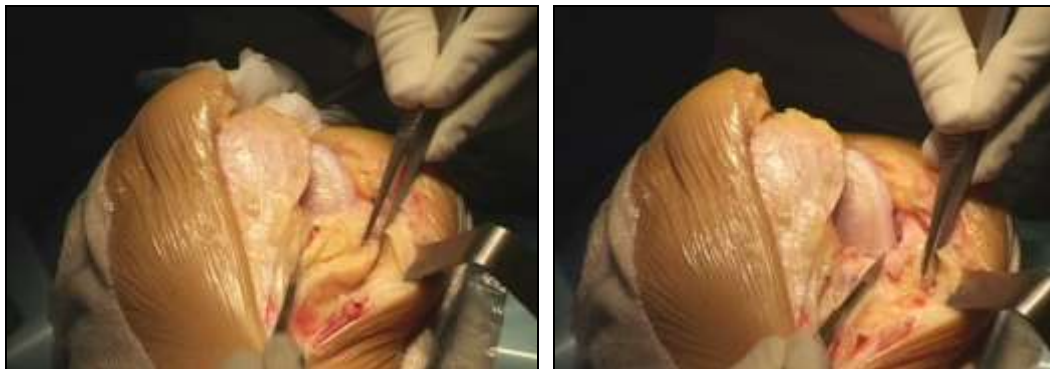


Fig 1: Accessing the knee and internal para-patellar arthrotomy.

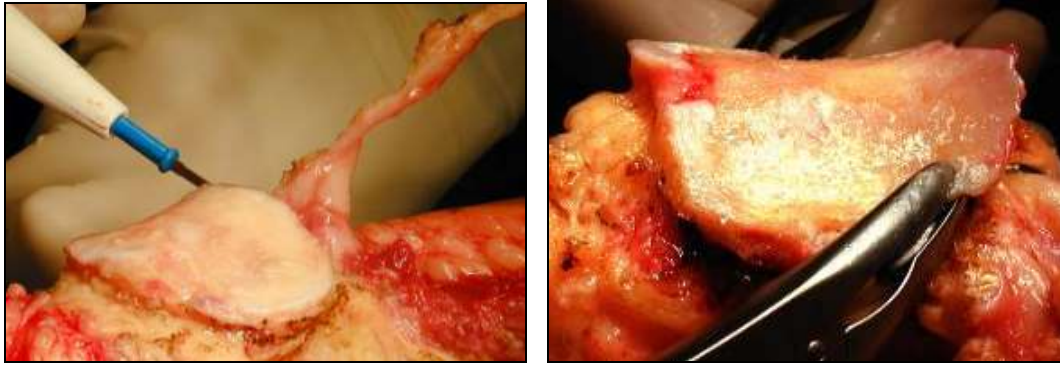


Fig 2: Electrocoagulation and pruning of osteophytes.

The soft tissues removed from the circumference of the patella after electrocoagulation were stored in 10% buffered formalin and then sent for histological study.

Before closure, we check good femoro-patellar congruence and the quality of the movement of the patella and we make sure there is no possible attachment of the upper edge of the patella with the lower edge of the prosthetic trochlea?

☞ Clinical assessment

The evaluation of our patients was carried out pre-operatively and at a follow-up of 01 year postoperatively based on radio-clinical criteria.

Concerning the clinical evaluation, patellar pain was evaluated and judged to be nonexistent, moderate or severe, the questioning related to going up and down the stairs: impossible, with the help of a ramp, without help and the clinical examination assessed active and passive flexion and extension. The Knee Society score was used to assess the knee and pre- and post-operative functions.

☞ Histopathological examination

The soft tissue structures surrounding the knee joint have been the subject of histological examination. The

specimens were stained using haematoxylin and eosin and observed under light microscopy.

☞ Radiological assessment

Regarding the radiological evaluation, several parameters were studied such as: the stage of osteoarthritis, the misalignment of the limbs, the position of the patella.

RESULTS

As to the clinical evaluation, we noted a clear improvement in patellar symptomatology compared to the preoperative period, with 73% of the patients without pain; this pain exists moderately and is considered bearable for the rest of the patients.

The functional improvement is also clear in the quality of going up and down the stairs, but 56, 66% of the patients still need a ramp.

For the Knee Society score, the improvement in knee scores and in postoperative function was noted with a gain which mainly concerned the knee score (Fig3 and 4).

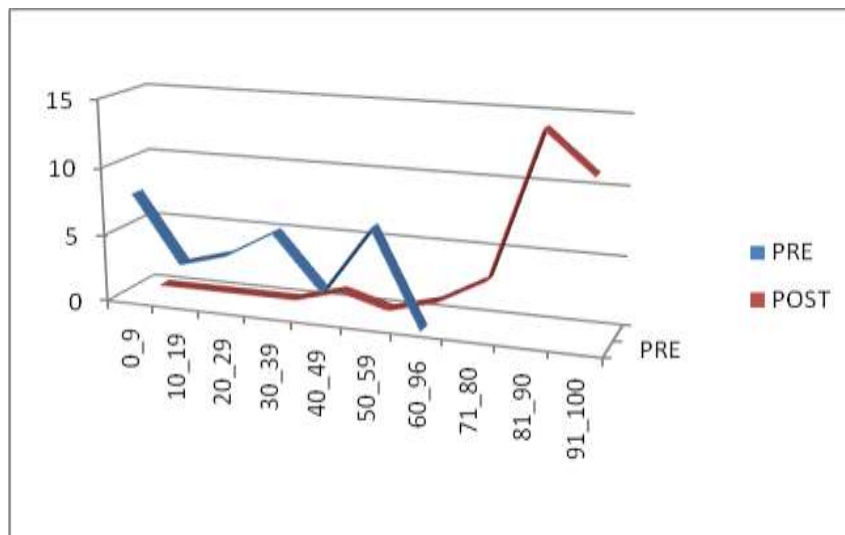


Fig 3: Knee score assessment (Knee Society).

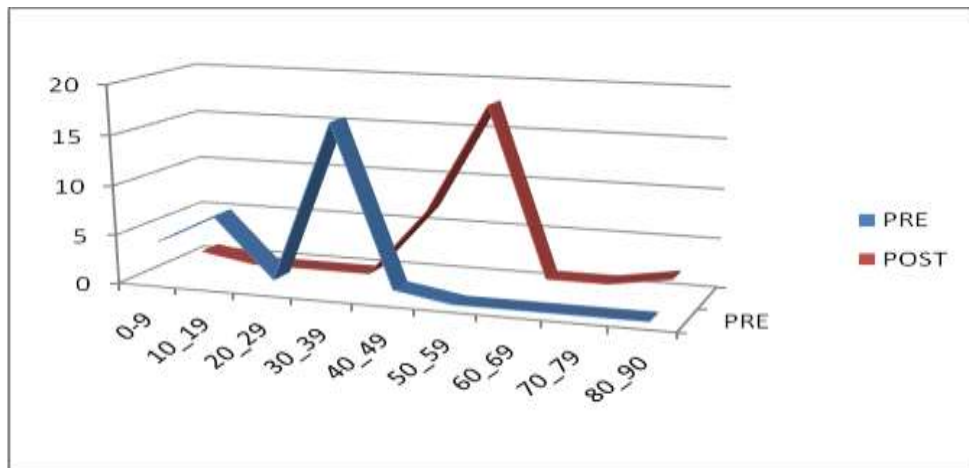


Fig 4: Function score evaluation (Knee Society).

The radiological evaluation criteria have restored a satisfactory mechanical axis in almost all cases (Fig5), a good patellar position with a patella centered in all cases.

Abundant nerve tissue was found in the loose connective tissue and periosteum around the patellae (Fig6).



Fig 5: Restoration of the mechanical axis.

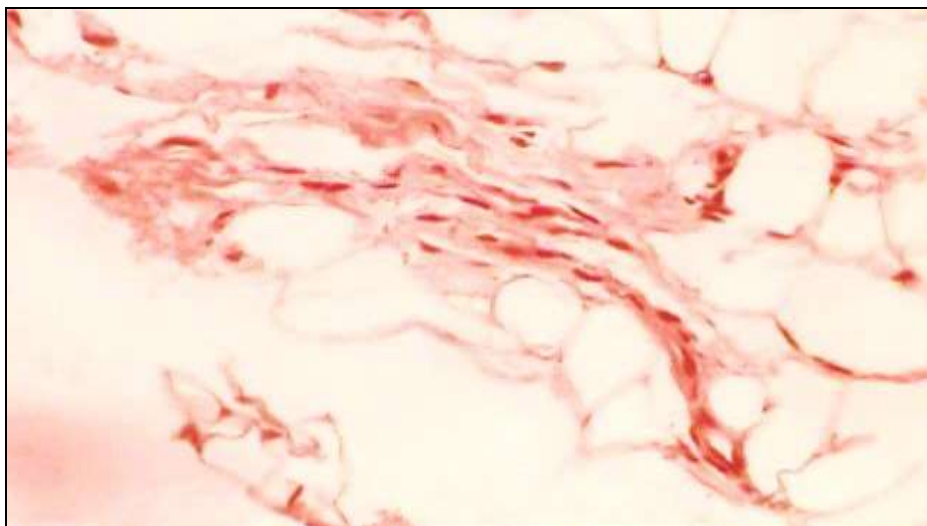


Fig 6: Nerve tissue found around the patellae.

DISCUSSION

- Anterior knee pain pathophysiology have been reviewed and the “Neural Model” has been suggested as an explanation for the genesis of anterior knee pain(Sanchis-Alfonso, Roselló-Sastre et al. 2011). In fact, a neural proliferation of nociceptive axons (substance P positive nerves), mainly in a perivascular location have been found in the lateral retinaculum(Sanchis-Alfonso, Roselló-Sastre et al. 2011).
 - Several approaches have been applied, as the patellar denervation by circumferential electrocautery.
 - We have demonstrated histologic presence of nerve fibers within the bone marrow of the human patella, as confirmed previously(Barton, Ostrowski et al. 2017).
 - In addition, a better understanding of the patella’s nerve supply enables effective and selective denervation in severe patellofemoral joint problems. Moreover, it has been demonstrated the greatest density of intraosseous nerves within the medial and central patella(Barton, Ostrowski et al. 2017). Further elucidation of the physiological roles of these histologically documented nerves may lead to new treatment options for anterior knee pain in the future.
 - It has been reported previously that circumferential electrocautery of the patella does not significantly improve AKP (anterior knee pain) compared with non-electrocautery techniques but that circumferential electrocautery significantly improves patients' knee function after surgery(Fan, Ge et al. 2015).
 - However the possibility of pain arising in other anatomical structures such as infrapatellar fat pad, synovium, and subchondral bone despite patellar denervation. All of these have a rich nerve supply, and each of these structures, individually or in combination, could be a potential source of nociceptive output resulting in the perception of pain. Histological study of the above-mentioned anatomical structures is mandatory to elucidate this finding.
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CONCLUSION

Our results highlight that Patellar denervation provides some benefit in terms of pain and clinical outcomes after TKA without patellar resurfacing. Further larger long-term prospective comparative series are needed to support these results.

Patellar denervation provides some benefit in terms of pain and clinical outcomes after TKA without patellar resurfacing.

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