

Comparison between Non-patellar denervation vs patellar denervation by circumferential cautery on anterior knee pain following primary total knee arthroplasty: A prospective comparative study at rural medical college

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Abstract

Introduction: Anterior knee pain is one of the common problems in post primary total knee arthroplasty patients. There are different methods of prevention of anterior knee pain post total knee replacement. The objective of this study is to compare the efficacy of patellar denervation using circumferential electrocautery versus non-denervation in relieving anterior knee pain following primary total knee arthroplasty.

Methods: Forty patients were grouped randomly in to two groups of nineteen patients (Group A) and twenty one patients (Group B) each. Patients in group A underwent patellar denervation with electrocautery and group B patients didn't undergo patellar denervation. They were followed up at 2 weeks, 1, 2 and 3 months regularly and clinical score was determined using knee society score and anterior knee grading system by waters and Bentley.

Results: There is no statistical difference in anterior knee pain score between the two groups.

Conclusion: Patellar denervation doesn't reduce the anterior knee pain following primary total knee arthroplasty and anterior knee pain was thought to be multifactorial.

Keywords: Primary total knee arthroplasty, patellar denervation, anterior knee pain

Introduction

Anterior knee pain is one of the common problems in post total knee arthroplasty patients with an incidence of 8% ^[1]. Denervation of patella with circumferential electrocautery will prevent anterior knee pain without adding any technical difficulties.

While the etiology of anterior knee pain is exactly not known but thought to be multifactorial. There are many predictors of anterior knee pain ^[2, 3, 4] like young age, female gender, individual pain threshold and non-modifiable predictors like anxiety, depression, problems of pain processing and patient expectations ^[5].

Causes of anterior knee pain can be divided into functional and mechanical ones. Functional causes include quadriceps weakness, patellar maltracking, quadriceps avoidance gait ^[6, 7, 8]. Patella Baja can cause anterior knee pain but in low incidences ^[9]. Increased malrotation of

tibia or femoral component, posterior subluxation of tibiofemoral joint, avascular necrosis of patella and transient ischemia are the other causes of anterior knee pain as they alter the joint reaction forces at patellofemoral joint ^[9, 10, 11].

There are different methods of prevention of anterior knee pain post total knee arthroplasty that include denervation by circumferential electrocautery, patellar resurfacing, prevention of patellar maltracking and proper component position ^[12]. As the patellar resurfacing appears to be an option to reduce anterior knee pain post total knee arthroplasty, it is still identified in 5 % of cases ^[13]. Presence of nociceptive nerve fibres have been identified in a study ^[14]. Our study proposes that the circumferential electrocautery of patella may be beneficial in patients when patellar resurfacing is not possible in all cases of rural medical college for relieving anterior knee pain in post total knee arthroplasty cases.

Objectives of the study

To compare the efficacy of patellar denervation using circumferential electrocautery versus non-denervation in relieving anterior knee pain following primary total knee arthroplasty.

Materials and methods

This is a randomised comparative study conducted in the department of orthopaedics, Gadag institute of medical sciences, Gadag during the period from November 2021 to February 2022 after obtaining institutional ethical committee clearance. We have included all patients undergoing primary total knee arthroplasty and are willing to participate in the study. We have excluded cases of Secondary osteoarthritis inflammatory arthritis previous high tibial osteotomy previous ipsilateral total hip arthroplasty, revision total knee arthroplasty and total knee arthroplasty BMI > 35. Total sample size was 20 in each group of patellar denervation and no patellar denervation groups. No patient was lost to follow up. All the patients were operated under combined spinal epidural anesthesia in supine position. Standard medial par patellar approach was used. Standard surgical technique was used till the placement of femoral and tibial components after cementation. Before closure one of the member in anaesthesia team opened the sealed opaque envelope, where instruction were written to denervate patella using circumferential electrocautery for randomization using chit method. These instructions were written by a nursing staff who was not involved in the study. Standard protocol for wound closure was employed further in both the groups. Standard procedure for dressings and suture removal were followed. All the patients were followed up at 2,4,8,12 weeks postoperatively and subsequently clinical and functional outcome was determined by knee society score, clinical anterior knee rating scale by waters and Bentley ^[15] and visual analogue scale and radiological evaluation done by using X ray AP & LAT in standing.

The clinical anterior knee pain rating system described by Waters and Bentley

Grade	Rating Description
0	No pain
I	Mild pain which does not intrude on daily activities
II	Moderate pain which is a nuisance
III	Severe pain

Results

Among the 40 patients 52.5% underwent TKA with patellar denervation, among the patellar

denervation group 61.9% were males and in the group without denervation 47.3% were males. Among the total patients, 52.5% were males. Statistical analysis was done using SPSS software. There is improvement in the anterior knee pain score and knee society score in both the groups at each follow-up visit which is statistically significant but there is no significant statistical difference between knee society score and anterior knee pain rating system. There is no statistical difference in AKP scores between the groups in terms anterior knee society score and its showing only increasing trend $P < 0.001$ at the end of 3 months.

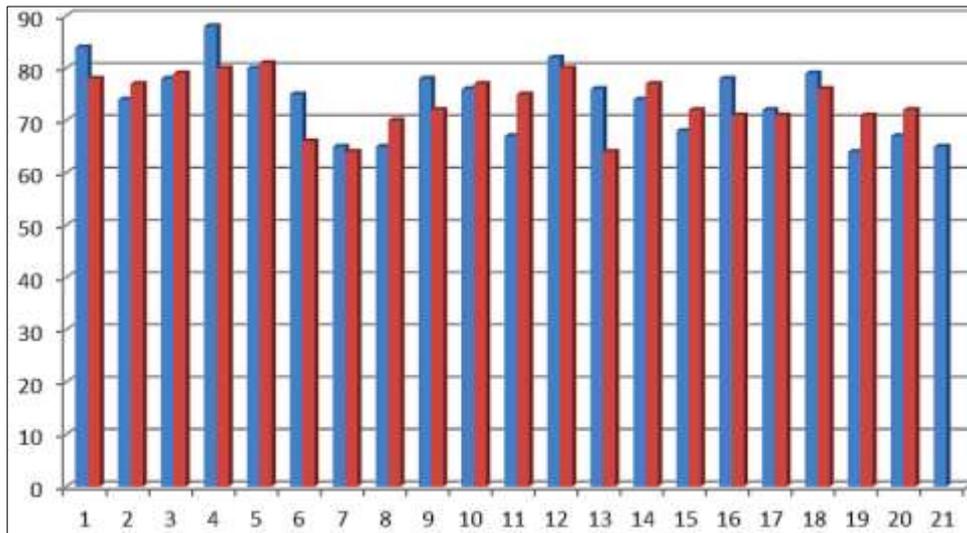


Fig 1: Knee society score at the end of 3 months in both the groups

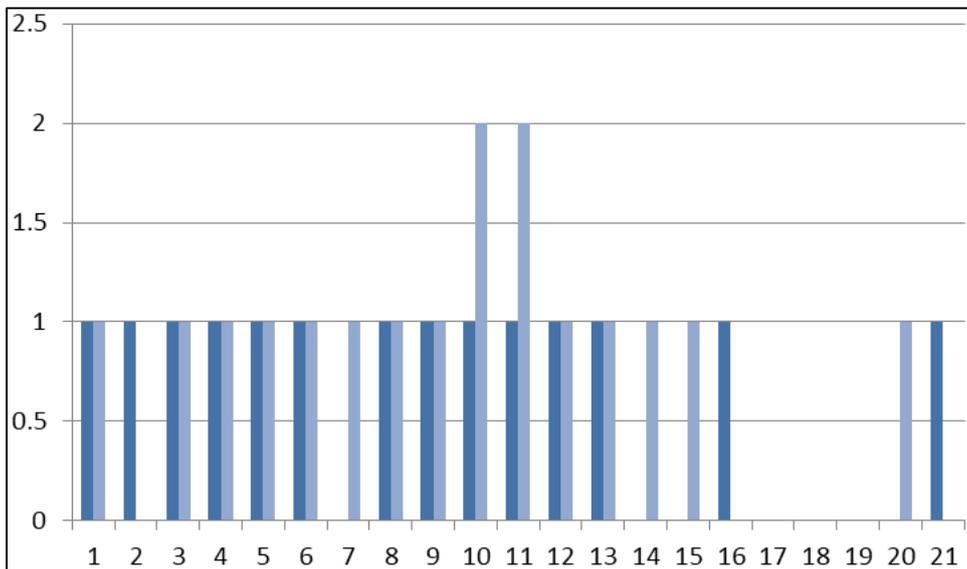


Fig 2: Anterior knee pain rating at the end of 3 months in both the groups

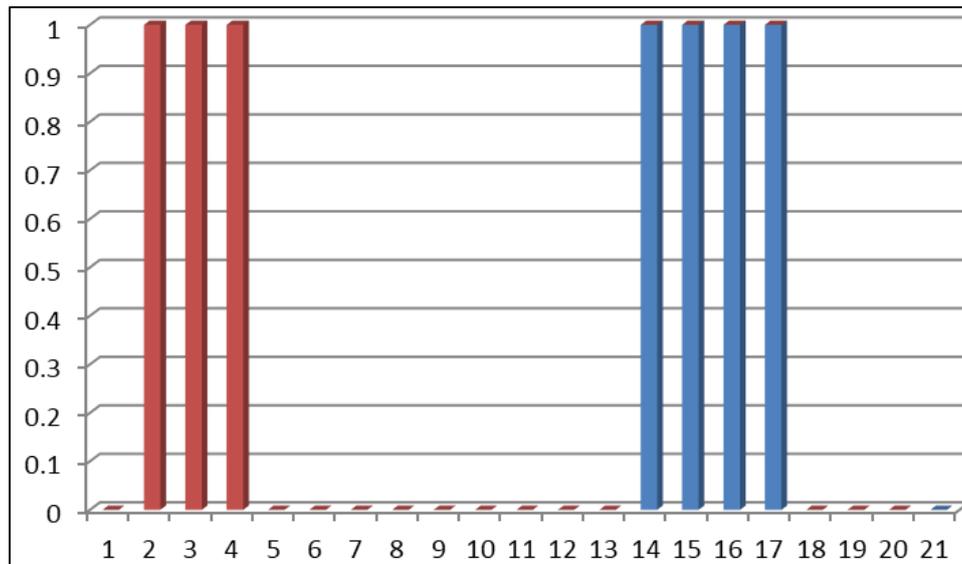


Fig 3: Visual analogue at the end of 3 months in both the groups

Discussion

Anterior knee pain is one of the complications in patients undergoing total knee arthroplasty and has been documented widely in the literature. There are many methods of prevention of anterior knee pain like denervation by circumferential electrocautery, patellar resurfacing, prevention of patellar maltracking and proper component position [12]. Patellar resurfacing happens to be an option to reduce anterior knee pain post total knee arthroplasty but it is still identified in 5% of cases [13]. Our study proposes that the circumferential electrocautery of patella may be beneficial in patients when patellar resurfacing is not possible in all cases of rural medical college for relieving anterior knee pain in post total knee arthroplasty cases. We have used waters and Bentley anterior knee pain grading system and knee society score in both the groups to grade anterior knee pain. Zhang *et al.* [16] showed there was a decrease in the incidence of anterior knee pain but no difference in patellar scores in contrary to our study where there was no statistical difference among the two groups. Yim *et al.* [17] reported in 50 patients who have undergone bilateral total knee arthroplasty with a minimum follow-up of 1 year and found that there were no statistical differences in terms of knee society score and it's correlating with our study. Cheng *et al.* [18] combined randomized and non-randomized controlled trials in their meta-analysis, which may have caused bias, and also showed no clinical difference between cauterized and non-cauterized patellae. Furthermore, their meta-analysis had heterogenous implants and surgical techniques. This will cause bias in comparing results. Additionally, most studies were performed in unilateral and at the end of 2 year followup, they found that there were no statistical differences between patellar denervation and non-denervation groups in terms of VAS score, Kujala score, and Knee Injury and Osteoarthritis Outcome Score.

Conclusion

Patellar denervation doesn't reduce the anterior knee pain following primary total knee arthroplasty

References

1. After total knee arthroplasty: gender-related differences. *J Arthroplasty*. 2011;26(8):1475-1480.

2. Bonnin MP, Basiglini L, Archbold HA. What are the factors of residual pain after uncomplicated TKA? *Knee Surg. Sports Traumatol Arthrosc.* 2011;19(9):1411-1417.3.
3. Liu SS, Buvanendran A, Rathmell JP, Sawhney M, Bae JJ, *et al.* Predictors for moderate to severe acute postoperative pain after total hip and knee arthroplasty. *Int Orthop.* 2012;36(11):2261-2267.4.
4. Schnurr C, Jarrous M, Güdden I, Eysel P, König DP. Pre-operative arthritis severity as a predictor for total knee arthroplasty patients' satisfaction. *Int Orthop.* 2013;37(7):1257-1261.
5. Forsythe ME, Dunbar MJ, Hennigar AW, Sullivan MJ, Gross M. Prospective relation between catastrophizing and residual pain following knee arthroplasty: two-year follow-up. *Pain Res Manag.* 2008;13(4):335-341.
6. Saleh KJ, Lee LW, Gandhi R, Ingersoll CD, Mahomed NN, *et al.* Quadriceps strength in relation to total knee arthroplasty outcomes. *Instr Course Lect.* 2010;59:119-130
7. Lin F, Wilson NA, Makhsous M, Press JM, Koh JL, Nuber GW, *et al.* *In vivo* patellar tracking induced by individual quadriceps components in individuals with patellofemoral pain. *J Biomech.* 2010;43(2):235-241.9.
8. LiK Ackland DC, McClelland JA, Webster KE, Feller JA, DE Steiger R, Pandy MG. Trunk muscle action compensates for reduced quadriceps force during walking after total knee arthroplasty. *Gait Posture.* 2013;38:79-85.
9. Bhattee G, Moonot P, Govindaswamy R, Pope A, Fiddian N, Harvey A. Does malrotation of components correlate with patient dissatisfaction following secondary patellar resurfacing? *The Knee.* 2013;21(1):247-251.18.
10. Pagnano MW, Hanssen AD, Lewallen DG, Stuart MJ. Flexion instability after primary posterior cruciate retaining total knee arthroplasty. *Clin Orthop.* 1998;356:39-4619.
11. Wetzner SM, Bezreh JS, Scott RD, Bierbaum BE, Newberg AH. Bone scanning in the assessment of patellar viability following knee arthroplasty. *Clin Orthop Relat Res.* 1985;199:215-219.
12. ABaco G. Bentley, Alyawer H. Patelloplasty in knee arthroplasty *J Bone Joint Surg. Br.* 2006.
13. Gupta R, Canty S, Ryan W. Anterior knee pain following total knee arthroplasty caused by isolated pagets disease of patella. *The international Journal of Orthopaedic surgery* 2007, 9(2).
14. Wojtys EM, Beaman DN, Glover RA, Janda D. Innervation of the human knee joint by substance P fibres. *Arthroscopy.* 1990;6:254-63.
15. Insall JN, Dorr LD, Scott RD, Scott WN. Rationale of the Knee Society clinical rating system. *Clin Orthop Relat Res.* 1989;248:13-4.28.
16. Waters TS, Bentley G. Patellar resurfacing in total knee arthroplasty: A prospective, randomized study. *J Bone Joint Surg. [Am].* 2003;85-A:212-17.
17. Zhang P, Liu H, Yan WS, Wang WL. Is patellar denervation necessary in total knee arthroplasty without patellar resurfacing? *Knee Surg. Sports Traumatol Arthrosc.* 2016;24:2541-2549.
18. Yim SJ, Jang MS, Kim WJ, Lee SH, Kang HK. The Effect of Electrocautery around the Patellar Rim in Patellar Non-Resurfacing Total Knee Arthroplasty. *Knee Surg. Relat. Res.* 2012;24(2):104-107.
19. Cheng T, Zhu C, Guo Y, Shi S, Chen D, Zhang X. Patellar denervation with electrocautery in total knee arthroplasty without patellar resurfacing: A meta-analysis. *Knee Surg. Sports Traumatol Arthrosc.* 2014;22:2648-2654.