Selective tibial nerve block for posterior knee analgesia after total knee arthroplasty: Are two concentrations of local anesthetics equivalent?

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Background

- Continuous femoral nerve block (CFNB) is often used for analgesia after total knee arthroplasty (TKA), but most patients complain of posterior knee pain postoperatively
- Sciatic nerve block (SNB) has been used to prevent posterior knee pain since 2009
- Orthopedic surgeons do not prefer SNB, because it may obscure the diagnosis of peroneal nerve paralysis postoperatively
- Therefore, since 2013, we have performed selective tibial nerve block (TNB) to prevent posterior knee pain

Study Goals

- To determine the minimum concentration of local anesthetics for tibial nerve block that would provide adequate analgesia for the posterior knee area

Material and Methods

- Retrospective study of 89 patients who underwent TKA from October 2013 to July 2015 at our hospital
  - 37 patients received CFNB and TNB with 10 ml of 0.15% ropivacaine (Group A)
  - 52 patients received CFNB and TNB with 10 ml of 0.375% ropivacaine (Group B)
- All Blocks were provided under ultrasound guidance before surgery
- After surgery, CFNB was performed with 0.2% ropivacaine 6ml/hour until postoperative day 4
- Postoperative analgesics (e.g. acetaminophen or buprenorphine suppository) were prescribed as needed

Outcome measures

- Post-operative pain assessed using the visual analog scale (VAS; range: 0-100 mm)
  - Posterior knee pain and overall knee pain at rest on POD 0, 1 and 4
  - Dynamic pain (knee flexion) on POD 1 and 4
  - Pain on walking on POD 4
- Postoperative knee flexion angles on POD 1, 4 and 7

Statistical Analysis

- Mann-Whitney's U and Fisher's exact tests
  - Evaluated the difference in post-operative pain and knee flexion angle between the two groups
  - $P < 0.05$ determined statistical significance

Results

Table 1. Baseline Characteristics of Patients Stratified by Group*

Characteristics	Group A, 0.15%† (n=37)	Group B, 0.375%† (n=52)	P-value
Gender, n (%)			
Male	20 (54.1)	7 (13.5)	
Female	17 (45.9)	45 (86.5)	<0.0001
Age, yr	75.6 (9.7)	80.6 (4.8)	0.02
BMI, kgm ⁻²	25.9 (5.7)	26.6 (3.7)	0.90
Duration of Operation, min	133.9 (45.7)	123.5 (12.7)	0.49
Duration of Tourniquet, min	98.0 (16.5)	99.2 (11.2)	0.56

*Values are mean ±SD, unless otherwise stated.
† Dose of Ropivacaine.

Table 2. Severity of Knee Pain Using the Visual Analog Pain (VAS) Score*

Post-operative day†	Group A, 0.15%† (n=37)	Group B, 0.375%† (n=52)	P-value
Posterior Knee Pain at rest			
POD 0	0 (0-0)	0 (0-0)	0.53
POD 1	37 (0-58.5)	31.5 (0-52.8)	0.99
POD 4	0 (1-12)	13.5 (0-39.8)	0.09
Overall Knee Pain at rest			
POD 0	0 (0-10)	0 (0-0)	0.17
POD 1	45 (17-66)	49.5 (20.5-60)	0.86
POD 4	9 (0-29)	25 (11-39)	0.016
Dynamic Pain (Knee flexion)			
POD 1	87 (69-100)	73 (61-86.5)	0.015
POD 4	65 (50-79)	71 (55-82)	0.31
Pain for walking			
POD 4	23(1.5-46)	34 (12.5-47.8)	0.4

*Posterior pain data are presented as median and interquartile range (IQR:25th- 75th quartile).
† Postoperative analgesics (e.g. acetaminophen or buprenorphine suppository) were prescribed as needed. All patients were on oral celecoxib 100mg twice daily beginning POD 1 and oral tramadol/acetaminophen 100mg twice daily beginning POD 4; POD is post-operative day. ‡ Dose of ropivacaine.

Figure 1.Preoperative and postoperative knee flexion angle

Limitations

- Retrospective study
- Took place at a single hospital
- Small sample size

Conclusion

- Selective tibial nerve block for the posterior knee area provided adequate analgesia
- Both concentrations of ropivacaine provided an equivalent effect for posterior knee pain after TKA

Implication

- Ropivacaine 0.15% may provide equivalent pain relief as ropivacaine 0.375% for selective tibial nerve block

Literature cited

- Sanjay K. Sinha, Robert S. Weller. Femoral nerve block with selective tibial nerve block provides effective analgesia without foot drop after total knee arthroplasty: A prospective, randomized, observer-blinded. Anesth Analg 2012;115:202-6

Acknowledgements

We are grateful to Dr. SY Moody, Professor-in-Resident, Kameda Medical Center, for her advice and support.