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Influence of femoral block on quadriceps strength recovery (QSR) after total knee replacement

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INTRODUCTION: Total knee replacement (TKR) is a frequent and effective surgery for knee osteoarthritis. Postoperative pain is under concern and can be relieved by different methods, including femoral block (FB). The efficacy of FB on pain relief was associated with the absence of clinical impact when measured with the range of motion (ROM). Recent studies suggest that the quadriceps strength is the best indicator of functional recovery after TKR.
OBJECTIVES: The goal of this study is to compare the quadriceps strength recovery after TKR according to the kind of analgesia (patient control analgesia (PCA) with or without FB) Hypothesis: the FB delays the QSR at short and mid-term follow-up.
METHODS: Prospective randomized trial with single-blind assessment involving 135 patients admitted for TKR in an academic center. Randomization into one of the three following groups: A) Continuous FB 48h + PCA B) Single-shot FB and PCA C) PCA alone. Groups were comparable for demographic and surgical data. The FB was realised and controlled (electric stimulation) by an expert anesthesiologist before the surgery. Follow-up standardised in all groups with blinded assessors. Quadriceps strength measured with a validated dynamometer at 6 weeks, 6 and 12 months. Secondary outcomes included clinical evaluation (ROM, pain, stability) and functional scores (SF-36, WOMAC). Multivariate analysis (Kruskal-Wallis, Mann-Whitney) for main outcomes and Spearman factor for correlation. Sample size calculated for alpha 5% and study power 80%.
RESULTS: 111 patients available for 6 weeks follow-up (A-B-C:40-38-33) and 104 (36-36-32) at 6 and 12 months. Two patients in group B excluded for direct fall in the first postoperative week with extensor mechanism rupture and peri-prosthetic femoral fracture. QSR is significantly decreased in patients with FB at all times (mean, 95% IC): 6 weeks (A 51.3%, 44.1-58.5; B 62.2%, 55.2-69.2; C 77.4%, 70.7-84.1; $p<0,05$), 6 months (A 65.4%, 57.9-72.9; B 82.1%, 74.2-90; C 95.7%, 88.5-102.9; $p<0,05$) and 12 months (A 87.8%, 82.1-93.5; B 97.8%, 89-106.6; C 104.8%, 96.1-113.5;$p<0,05$). No significant difference between continuous or single-shot FB. Higher ROM in group C at all times (p 6 weeks = 0,046; p 6 months = 0,159; p 12 months = 0,026). No correlation between ROM and QSR (rho=0,07; p=0,23). Better functional results in the group C at all times ($p<0,05$), with good correlation to QSR (rho=0,177; p=0,032). Slight difference in analgesic effect of FB (p=0,14).
CONCLUSION: Femoral block has a negative influence on QSR at short and mid-term follow-up and delays the rehabilitation after TKR. QSR is actually the most sensitive indicator of functional recovery after TKR and is better related to functional tests than ROM. This can explain the harmlessness of FB in previous studies. FB should not yet be recommended for analgesia after TKR.

Disclosure of Interest: None Declared

Keywords: femoral nerve block, Quadriceps strength, total knee arthroplasty