INPLASY PROTOCOL

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Support: **Nil.**

Review Stage at time of this submission: **Risk of bias assessment.**

Conflicts of interest:
None declared.

A comparison of adductor canal block and femoral nerve block analgesic techniques for pain management and postoperative rehabilitation following primary total knee arthroplasty: a systemic review and network meta-analysis

Yadgarov, MY[1]; Berikashvili, LB[2]; Smirnova, AV[3]; Kadantseva, KK[4]; Likhvantsev, VV[5].

Review question / Objective: **The aim of our study is to investigate the impact of various types of adductor and femoral nerve blocks on clinically relevant outcomes in patients following elective primary total knee arthroplasty (TKA).**
(i) population: adults undergoing primary TKA with general or neuraxial anesthesia receiving any of the analgesic techniques below.
(ii) intervention/comparator: single-shot or continuous adductor canal/femoral nerve block.
(iii) outcomes: VAS/NRS pain score at rest and mobilization at 24 and 48 h; amount of opioid consumption at 24h and reported consumption; quadriceps muscle strength at 6-8 and 24h; timed up and go (TUG) test at 24 and 48h; degrees of maximum flexion (range of motion); length of hospital stay and nausea/vomiting.
(iv) study design: randomized controlled trials (RCT); retrospective cohort studies.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 30 May 2023 and was last updated on 30 May 2023 (registration number INPLASY202350111).

INTRODUCTION

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Rationale: Currently, the gold standard of postoperative analgesia for total knee arthroplasty is continuous femoral nerve block (CFNB). Despite its good analgesic effect, CFNB has the undesirable effect of motor blockade of the quadriceps femoris muscle. This complication can lead to an increased risk of fall and prolonged hospitalization. New methods of postoperative analgesia for TKA that are free of this side effect are currently being discussed. One such method is the adductor canal block (ACB) due to the predominant location of the sensory nerves in this canal. The search for the optimal variant of the regional method of postoperative analgesia in TKA is a hot topic of modern anesthesiology. Therefore, we decided to conduct network meta-analysis as it exploits all available direct and indirect evidence and therefore yields more precise estimates of the intervention effects in comparison with a single direct or indirect estimate.

Condition being studied: Knee osteoarthritis, total knee arthroplasty.

METHODS

Search strategy: Systematic literature search of studies published in the past 10 years (2013-2023) was carried out in Medline, PubMed, Google Scholar and Cochrane Library by two independent authors. Additionally, the forward and backward snowballing methods were used. Medical Subject Headings (MeSH) terms were also applied. In addition, we searched ClinicalTrials.gov for any ongoing or unpublished trial.

Participant or population: Adult patients scheduled to undergo primary unilateral or bilateral TKA with general or neuraxial anesthesia.

Intervention: Any one of postoperative analgesic regimens: single-shot adductor canal block (SACB); continuous adductor canal block (CACB); single-shot femoral nerve block (SFNB); continuous femoral nerve block (CFNB).

Comparator: Any of the postoperative analgesic regimens could have been used to compare with intervention.

Study designs to be included: We will include RCTs or retrospective cohort studies (if no direct comparisons available from RCTs).

Eligibility criteria: Inclusion criteria: adults undergoing primary TKA with general or neuraxial anesthesia receiving any type of adductor or femoral nerve block.Studies were excluded if they met one of the following criteria: 1) review articles, case reports or case series; 2) non-randomized studies (if direct comparison for two interventions is available from RCTs); 3) no relevant outcomes; 4) combined blockade strategies in one group; 5) other surgical interventions; 6) duplicated publications.

Information sources: PubMed, MEDLINE, Google Scholar, Cochrane Library, ClinicalTrials, PROSPERO.

Main outcome(s): The main study outcomes included:
1) the visual analog scale (VAS)/ Numerical Rating Scale (NRS) pain score at rest and mobilization at 24 and 48 h;
2) amount of opioid consumption at 24h and reported consumption;
3) length of hospital stay;
4) timed up and go (TUG) test at 24 and 48h.

Additional outcome(s): Additional outcomes included:
1) degrees of maximum flexion (range of motion) at latest assessment in hospital;
2) quadriceps muscle strength at 6-8 and 24h;
3) rates of complications, including nausea/vomiting.

Quality assessment / Risk of bias analysis: The internal validity and risk of bias will be assessed by four independent reviewers using the Cochrane Risk-of-bias tool 2.0 (RoB2), for non-randomized studies ROBINS-I tool (Risk Of Bias In Non-randomized Studies - of Interventions) will be applied. Publication bias and small-study effects will be assessed using Bayesian network meta-analysis (NMA) meta-regression and funnel plot analysis. The certainty of evidence will be assessed with GRADE methodology integrated in CINeMA (Confidence in Network Meta-Analysis) approach.

Strategy of data synthesis: Data extraction was performed by two independent authors. These data included first author, year of publication, journal, design, blinding of participants, number of centers, sample size, mean age, gender, BMI, American Society of Anesthesiologists (ASA) status, intervention and comparator, type of anesthesia, surgery type, operation time and study outcomes.
Network meta-analysis will be performed using CINeMA (Confidence in Network Meta-Analysis) software, ROB-MEN web application and STATA 17.0 (StataCorp, College Station, TX) software. The risk ratio (RR) and mean difference (MD) will be calculated for binary and continuous variables, respectively, corresponding 95% CI will be calculated. Results of network meta-regression will be presented using network plots, league tables and rankograms.

Subgroup analysis: We will compare the following groups of patients:
1) SACB – CACB
2) SACB – SFNB
3) SACB – CFNB
4) CACB – SFNB
5) CACB – CFNB
6) SFNB – CFNB

Sensitivity analysis: Sensitivity analysis will be conducted by using two models of analysis (fixed and random effects), and by evaluating the results of only low/medium risk of bias studies.

Language restriction: No language limitation.

Country(ies) involved: Russian Federation.

Keywords: Total knee arthroplasty; adductor canal block; femoral nerve block; pain; opioids; rehabilitation; timed up and go test.

Contributions of each author:
Author 1 - Mikhail Yadgarov - collected the data, contributed data and analysis tools, performed the analysis, assessed risk of bias, certainty of evidence rating, wrote the paper.
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