Systematic review with meta-analysis

Review: femoral nerve block may be the most effective option for pain relief following total knee replacement

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Implications for practice and research

- Utilisation of continuous femoral nerve blockade (FNB) following knee replacement surgery can provide superior pain relief and fewer side effects, compared to traditional patient-controlled opioid analgesia.
- Further research is needed to compare the effectiveness of FNB to other pain management strategies, such as local anaesthetic infiltration and multimodal oral pain medication.

Context

Knee replacement surgery is a painful operation and patient satisfaction cannot be achieved without excellent postoperative analgesia. Traditional postoperative pain management, such as patient-controlled analgesia (PCA), can cause fluctuating pain levels with inconsistent relief and, commonly, side effects such as nausea.1 With advances in nerve-stimulating needles and ultrasound imaging technology, FNB has become more common and reproducible.2 In addition, its unilateral nature makes FNB appealing for knee replacement patients, as the contralateral limb can be used for mobilisation assistance early in the postoperative period.

Methods

The purpose of this systematic review was to evaluate the effectiveness and potential side effects of FNB compared to more traditional postoperative pain control modalities. Two authors independently reviewed randomised control trials (RCT) comparing FNB to PCA opioid, epidural analgesia, local analgesia and oral analgesia. The authors utilised meta-analysis with random-effects modelling, pooling results of 4 eligible RCTs that included over 2700 knee replacement patients.

Findings

During the first 72 h following knee replacement, FNB provided superior pain control, lower opioid consumption, lower risk of nausea and/or vomiting, greater knee flexion and overall greater patient satisfaction when compared to PCA. At 24 h, continuous FNB provided greater pain control and less opioid consumption than single shot FNB. There was insufficient data to compare the effectiveness of FNB to multimodal oral pain medication or local anaesthetic infiltration. Overall, there was not enough evidence in the RCTs reviewed to compare safety of FNB to other modalities.

Commentary

A meta-analysis can be a very effective method for analysing results of multiple RCTs to arrive at the best available evidence. In this large, well-performed and rigorous study, the authors implemented a random effects method of meta-analysis, which attempts to account for the heterogeneity or variability, of each individual RCT included in the study. By carefully managing these differences, the data clearly demonstrates the advantage of FNB compared to traditional PCA opioid analgesia with respect to pain control, less nausea and improved patient satisfaction.

While the merits of FNB compared to PCA are well demonstrated in this meta-analysis, it is important to understand the potential drawbacks of routine use of FNB in knee replacement patients. FNB requires added cost, time and an experienced anaesthesiologist to perform the blocks. Postoperatively, FNB causes quadriceps weakness, which has been implicated as a factor for inpatient falls when appropriate measures, such as knee brace or assistance with mobilisation, are not taken.3 In some cases, there may be subtle adverse effects, with one study suggesting subclinical femoral nerve palsy rates up to 24%, as diagnosed by electromyography at 4 weeks.4 In a younger population, this weakness may persist at least 6 months postoperatively.5

The ideal postoperative pain management is safe, effective, simple and easy to implement. While FNB has certainly advanced care of patients following knee replacement, further research needs to be performed to compare this modality to other measures, such as oral pain medication regimens and local anaesthetic infiltration. Improvements in perioperative anaesthetic techniques, rapid rehabilitation protocols and changes in patient education and expectation continue to improve patient experience and outcomes following knee replacement surgery.

Competing interests None.

References

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