

Femoral nerve block vs adductor canal block for total knee arthroplasty

Total knee arthroplasty is indicated in patients with severe, disabling osteoarthritis where conservative management has failed. The typical postoperative course involves a 3–4-day inpatient stay for physiotherapy, mobilization and adequate pain control. Fischer et al (2008) noted that while the long-term benefits of total knee arthroplasty are well established, considerable discomfort is common in the early postoperative period. Significant side effects are experienced in this typically older population when opioids are used as the mainstay of analgesia, most notably respiratory depression, fatigue, constipation, nausea and vomiting. Poor pain control is associated with an unsatisfactory patient experience and hinders mobilization (Fischer et al, 2008).

Femoral nerve block

More recently, femoral nerve blocks have been used for analgesia after total knee arthroplasty. Local anaesthetic is deposited immediately adjacent to the femoral nerve, as either as a single dose or as a continuous infusion via a catheter (New York School of Regional Anesthesia, 2017).

A Cochrane systematic review of 45 randomized control trials compared femoral nerve block with alternative pain control methods, including intravenous opioids, epidural analgesia, local infiltration and oral analgesics (Chan et al, 2014). Femoral nerve block significantly reduced pain both at rest and on movement, with increased joint mobility. Femoral nerve block resulted in lower overall opioid consumption, leading

to less postoperative nausea and vomiting, and increased patient satisfaction.

However, femoral nerve block also anaesthetizes the motor fibres supplying the quadriceps muscles. This significantly weakens knee extension, with a subsequent reduction in mobility and an increase in the risk of falls (Kandasami et al, 2009). Thus surgical preference has often been to omit femoral nerve block because of the impact on postoperative physiotherapy and rehabilitation.

Adductor canal block

Also known as Hunter's canal, the adductor canal is located in the middle third of the thigh. This aponeurotic intermuscular channel is bound by the vastus medialis (quadriceps), sartorius and adductor magnus muscles. The neurovascular contents of the canal include the femoral artery, femoral vein, the saphenous nerve, the medial femoral cutaneous nerve, the posterior branch of the obturator nerve, and the nerve to the vastus medialis. The infra-patellar nerve is a terminal branch of the saphenous nerve; it innervates much of the skin of the anterior knee.

Peripheral nerve blockade in this canal spares the motor supply to the remaining three quadriceps muscles. As a predominantly sensory block, the adductor canal block is therefore an ideal choice for post-total knee arthroplasty analgesia. Preservation of quadriceps strength facilitates early mobilization and physiotherapy.

The adductor canal is easily identified on ultrasound. Landmarks used include the femur, femoral artery and characteristically boat-shaped sartorius muscle. The effective dose in 95% of patients is 20 ml of injectate which will successfully fill the adductor canal (Jiang et al, 2016). This is a relatively straightforward block to perform with a good safety profile. There is a risk of intravascular injection but this can be minimized by aspiration before injection.

While some individual trials comparing the two techniques have proven inconclusive, in 2017 a meta-analysis of 647 patients compared the efficacy and safety of analgesia for total knee arthroplasty (Wang et al, 2017).

The primary outcomes were muscle strength (quadriceps and adductors) and pain at rest or activity. The results showed a statistically significant benefit in quadriceps strength in the adductor canal block group, with no significant difference in quality of analgesia. The adductor canal block group also had a 70% risk reduction in the incidence of falls which was statistically significant.

Conclusions

Adductor canal block provides equivalent analgesia to femoral nerve block for patients undergoing total knee arthroplasty, and has the significant advantage of preserving quadriceps strength. This increase in patient safety and earlier mobilization makes adductor canal block the obvious choice for routine total knee arthroplasty. **BJHM**

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