

Continuous peripheral nerve blocks and postoperative pain management

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Postoperative pain is a major concern after orthopedic limb surgery. Moderate to severe at rest, it is exacerbated on movement and, particularly after hip and knee surgery, by severe reflex muscular spasms. This not only causes patient discomfort but also compromises the early physical therapy, the most influential factor for good postoperative rehabilitation and ambulation. Postoperative pain relief can be achieved by a number of techniques, such as IV PCA with morphine or epidural analgesia. However, IV PCA does not provide efficient analgesia on movement and is associated with a high incidence of side effects such as sedation and nausea-vomiting. Continuous epidural analgesia is more effective in relieving pain on movement, and could reduce thromboembolic complications and blood losses. However, these benefits are offset by catheter-related problems and side effects, such as urinary retention and arterial hypotension. Moreover, because of the risk of epidural hematoma, the concurrent use of low molecular weight heparin and epidural analgesia remains controversial. Over the last few years, there was a growing interest for continuous peripheral nerve blocks in such setting. As it will be demonstrated hereafter, in addition to the facilitation of surgery of long duration, they provide prolonged and efficient postoperative analgesia after orthopedic limb surgery.

CONTINUOUS INTERSCALENE BRACHIAL PLEXUS BLOCK (ISB)

Its primary indication is major shoulder surgery. Although such surgery is performed under general anesthesia in a majority of centers, continuous ISB alone is well suited and accepted by most patients (1). Such surgery is often associated with severe postoperative pain, especially within the first 48 hours. More efficient than parenteral opioids, single shot ISB provides efficient but too short-lasting (15 ± 4 hours) postoperative analgesia even when a long-acting local anesthetic (e.g. 0.5% levobupivacaine or ropivacaine) is used (2). When

the block wears off, a shift to another analgesic technique (IV PCA) or performance of a new single dose ISB is required. This reduces patient's comfort and acceptance of the technique. That is why most authors advocate the use of continuous ISB. It provides better pain relief than IV PCA with morphine (3, 4) or single dose ISB (5). Recently, it has been safely used at home after outpatient rotator cuff repair (6, 7).

CONTINUOUS AXILLARY (ABB) OR INFRACLAVICULAR (IBB) BRACHIAL PLEXUS BLOCK

It is primarily indicated for major hand, forearm or elbow surgery or trauma (8, 9). Single dose ABB provides satisfactory but too short-lasting (i.e. < 20 hours) postoperative analgesia even when a long acting local anesthetic as 0.5% levobupivacaine or ropivacaine is used (10). Continuous ABB or IBB combines the advantages of prolonged pain relief and sympathectomy. After vascular injury and reimplantation surgery, it prevents vasospasm and improves circulation to the reimplanted limb (11, 12). For elbow surgery (arthrolysis, ...), it provides a significantly higher success rate and a lower incidence of complications than supraclavicular or interscalene approach (10).

Recently, continuous ABB (13) or IBB (14) has been safely used at home after outpatient hand surgery.

CONTINUOUS LUMBAR PLEXUS BLOCK

The primary indication of continuous lumbar plexus block is major hip, femoral shaft or knee surgery (15-22). When it is used to provide surgical anesthesia, a posterior approach (i.e. psoas compartment block) (PCB) has to be performed.

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Contrary to both anterior approaches (23), it reliably provides a complete lumbar plexus blockade (15, 24). When it is used to provide postoperative analgesia only, most authors advocate the use of a continuous femoral nerve sheath (FNSB) or fascia iliaca (FIB) block. Both approaches appeared to be equally effective in relieving pain after hip or knee surgery (23).

After total hip replacement, the choice of the analgesic technique has no influence on postoperative rehabilitation (hip flexion, length of hospital stay, ...) (25). The primary goal is thus to provide only postoperative patient's comfort (i.e. efficient pain relief with a low incidence of side effects and/or technical problems). Single-dose FNSB provided better postoperative analgesia than IV PCA with morphine, but only during the first 8 hours postoperatively even when a long acting local anesthetic is used (26). Comparable results have been obtained with a single-dose PCB (27, 28). When compared with a single dose technique or placebo, only continuous FNSB significantly reduced postoperative morphine consumption (29). A large scale (more than 1300 patients) study demonstrated that it is as efficient as IV PCA with morphine or PCEA. As it induces fewer technical problems and side effects, it would be the most appropriate technique. Note that, at the present time, its efficacy has not been compared with continuous PCB. Recent studies demonstrated the analgesic efficacy of such technique after hip surgery (15, 30). However, it is associated with a relatively high incidence of complications (15, 31).

After femoral shaft or neck fracture, continuous lumbar plexus block provided efficient postoperative analgesia (32-34). As it requires no patient's positioning, an anterior approach is more easy to perform in such circumstances. In the emergency room, such block provided efficient analgesia which would facilitate physical and radiological examinations, and manipulations of the fractured bone.

After major knee surgery, a better postoperative analgesia is obtained with a single-dose FNSB than with IV PCA with morphine, but only during the first 8-12 hours postoperatively even when a long acting local anesthetic is used. Adding a sciatic nerve block did not significantly improved the quality of pain relief (35). However, this remains controversial (36). Continuous FNSB or FIB provides better pain relief than parenteral (IV PCA, IM) opioid (17, 21, 22, 37, 38) or intraarticular analgesia (39). It is as efficient as continuous PCB (40) or continuous epidural analgesia (21, 22)

but induces less side effects. Recently, it has been demonstrated that regional techniques allow more complete and faster postoperative knee rehabilitation than IV PCA with morphine. Associated with fewer side effects than epidural analgesia, continuous FNSB or FIB block would be the technique of choice (17, 21, 22).

CONTINUOUS SCIATIC NERVE BLOCK (SNB)

The primary indication of continuous SNB is major foot (e.g. hallux valgus, metatarsal osteotomies, broken calcaneus, ...) or ankle (e.g. arthrodesis, ...) surgery.

It provides better pain relief than parenteral (IV PCA or IM) opioids (41). It is more efficient and induces much less side effects than epidural analgesia (42). It is thus become the standard technique of postoperative analgesia after foot surgery in many centres (41-45).

Recently, it has been safely used at home after outpatient foot or ankle surgery (46-48).

CONCLUSIONS

Postoperative pain is a major concern after orthopedic limb surgery. It not only causes patient discomfort but also compromises the early physical therapy, the most influential factor for good postoperative rehabilitation and ambulation. After major upper limb surgery, continuous peripheral nerve blocks provide more simple, better, and safer postoperative analgesia than IV PCA with morphine or cervical epidural analgesia. Continuous interscalene brachial plexus block is the most appropriate technique after major shoulder surgery. Continuous axillary or infraclavicular brachial plexus block is the analgesic technique of choice after major elbow, forearm, or hand surgery. After major lower limb surgery, continuous peripheral nerve blocks provide better analgesia than IV PCA with morphine. As efficient as epidural analgesia, they induce much less side effects or technical problems. Continuous femoral nerve sheath or fascia iliaca block is the most appropriate technique after major hip, femoral shaft, or knee surgery. Continuous sciatic nerve block is the technique of choice after major foot or ankle surgery.

Thus, continuous peripheral nerve blocks should have a place of choice in the armamentarium of all anesthesiologists involved in the treatment of orthopedic postoperative pain.

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