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Expert Recommendation

Clinical guideline for the use of peripheral nerve block in hip fractures at the emergency department in Belgium

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Abstract

Peripheral nerve blocks (PNBs) for hip fractures are standard of care in many countries at the emergency department and sometimes even in the prehospital setting. This type of analgesic care is however not standard in Belgium. The structural implementation of PNBs at the emergency department depends on the availability of personnel trained in regional anesthesia and a correct informed consent. Given the professionalization of emergency medicine in Belgium since 2005, anesthesiologists have become less involved in most emergency departments. This might cause a potential lack of personnel trained in regional anesthesia. In this article the authors propose a practical guideline with a decision tree to guide better analgesic care for patients with hip fractures in Belgium.

Keywords: **Trauma, hip fracture, regional anesthesia, peripheral nerve block.**

Introduction

Standard pain management for hip fracture patients consists of oral or intravenous paracetamol, non-steroidal anti-inflammatory drugs and opioids[1,2]. These drugs may induce systemic side-effects like gastro-intestinal bleeding, acute kidney injury, obstipation, respiratory depression, nausea, vomiting, confusion and delirium[3–5].

Evidence shows that early pain is often undertreated for hip fracture patients, especially in those with cognitive impairment, frequently present in older frail patients[5]. Inadequate analgesia prior to surgery is a risk factor for delirium itself and can possibly lead to sustained postoperative pain via central pain sensitization[6]. This interferes with early postoperative physiotherapy and rehabilitation and worsens long-term outcome.

Most important, pain needs to be scored accurately, not only on admission and after the PNB, but also over a longer period of time, as there is a relation between adequate analgesia in the first 48 hours and early mobilization and faster rehabilitation[7]. Surgical repair of a hip fracture should be done within 36[8,9] to 48 hours[10,11]. Although surgery is often performed within a shorter time frame than 36 to 48 hours, time to surgery should not be an eligibility factor for performance of a PNB. Moreover, PNBs facilitate optimal positioning of the patient for spinal anesthesia prior to their surgical treatment compared to intravenous analgesia alone, and obviate the need for sedatives[12,13].

Widespread evidence supports the use of PNBs over systemic analgesia for hip fractures. Due to its superior analgesic effect, PNBs reduce the need for systemic opioid use and diminish the pain on movement within 30 minutes[14,15]. This may obviate the use of skin traction as an analgesic technique, which in addition can cause complications such as skin tears and is therefore deemed obsolete16–19. Furthermore, PNBs also reduce the risk of delirium, the time to first mobilization, the length of stay and even overall mortality[5,10,20–22].

PNBs are indicated not only in curative settings for patients scheduled for a surgical procedure. In recent years, the role of PNBs in palliative settings in the non-operative management of hip fracture in frail elderly patients has been explored. In case of limited life expectancy, a shared decision model can be introduced at the emergency department to prevent surgical overtreatment[23–25]. For these patients, pain reduction is the most important factor influencing their comfort without the side-effects of systemic opioids, as well as the subjective feeling of adequate care as perceived by their relatives[26].

Supported by this overwhelming evidence, PNBs have been included in several national and international guidelines for the management of hip fractures[8–10]. Despite this, a recent survey showed that only about 6 percent of Belgian hospitals have included PNBs in their emergency analgesic protocol, while at the same time, almost 80 percent considered the formal implementation of PNBs in the future[27].

Multimodal analgesia – targeting pain by different pathways, systemically and regionally – should be the standard of care in hip fracture patients, overcoming the side-effects of systemic analgesia as well as the consequences of inadequate analgesia. This article aims to provide a practical guideline to optimize the preoperative pain management of hip fracture patients in Belgium.

Peripheral nerve blocks for hip fracture patients

PNBs provide an analgesic benefit in all types of hip fractures, with a slightly higher benefit in femoral neck fractures compared to intertrochanteric fractures[28].

A PNB is a technique where a local anesthetic is injected near a nerve responsible for the innervation of the body area requiring intervention, or between two fascial layers where the nerve is located. Depending on the location, the type of block and the choice of local anesthetic, PNBs can provide adequate analgesia for up to 24 hours. Regional anesthesia has historically been performed blindly, using anatomical landmarks. The use of ultrasound as a guidance tool increased the success rate and lowered the chance of accidental intravascular injection and is now considered standard practice[29–31].

The hip joint and proximal femur are innervated by branches of the lumbar plexus (anterior compartment) and sacral plexus (posterior compartment). For the majority of the patients, the anterior innervation by lumbar plexus branches, the femoral nerve and obturator nerve, is the most important contributor to posttraumatic or postoperative pain[32,33].

Currently, a supra-inguinal fascia iliaca compartment block (SFICB) is the proposed PNB option of choice for elective hip surgery according to the PROSPECT guidelines[34] and for all types of hip fracture[5,8,35]. This regional technique blocks at a minimum the femoral nerve and the lateral femoral cutaneous nerve[36]. Nevertheless, depending on the available experience, a well performed femoral nerve block or infra-inguinal FICB are preferred over no block at all.

Block technique

The SFICB technique as described by Hebbard et al. (Figure 1) differs from the 'infra-inguinal' lateral-to-medial technique, which is mostly used and taught among emergency physicians[37]. That technique is often performed without ultrasound and was historically developed as a safer alternative to the femoral nerve block for practitioners less experienced in regional anesthesia. By positioning the needle more laterally, below the fascia iliaca instead of in proximity to the femoral nerve, the risk of nerve damage was considered lower. Recent evidence however supports the supra-inguinal over the infra-inguinal approach and positions SFICB as a first choice[5,8,35].

More recently, a pericapsular nerve group (PENG) block – targeting the articular branches of the femoral, obturator and accessory obturator nerve – is a proposed valuable alternative to SFICB with theoretically less incidence of motor blockade[38]. More evidence is still needed to determine the benefit and safety of the PENG block compared to other PNBs[39–42]. The common considerations on motor blockade are less important in the preoperative setting of hip fracture analgesia compared to elective total hip arthroplasty, as the patients are not expected to mobilize preoperatively.

A single shot PNB can be repeated preoperatively in the operating room, as soon as 6 hours after the first block[8]. Currently there is not enough evidence to recommend the placement of a SFICB catheter for continuous blockade or for intermittent reloading[43,44].

Contraindications and risks

As with any invasive procedure there are risks to consider. Contra-indications for PNBs are limited and local. Apart from patient refusal, local obstruction (e.g. inguinal hernia) and infection or bleeding at the puncture site are the only absolute contra-indications[45,46]. Neuropathy at the targeted nerves is a relative contra-indication and requires

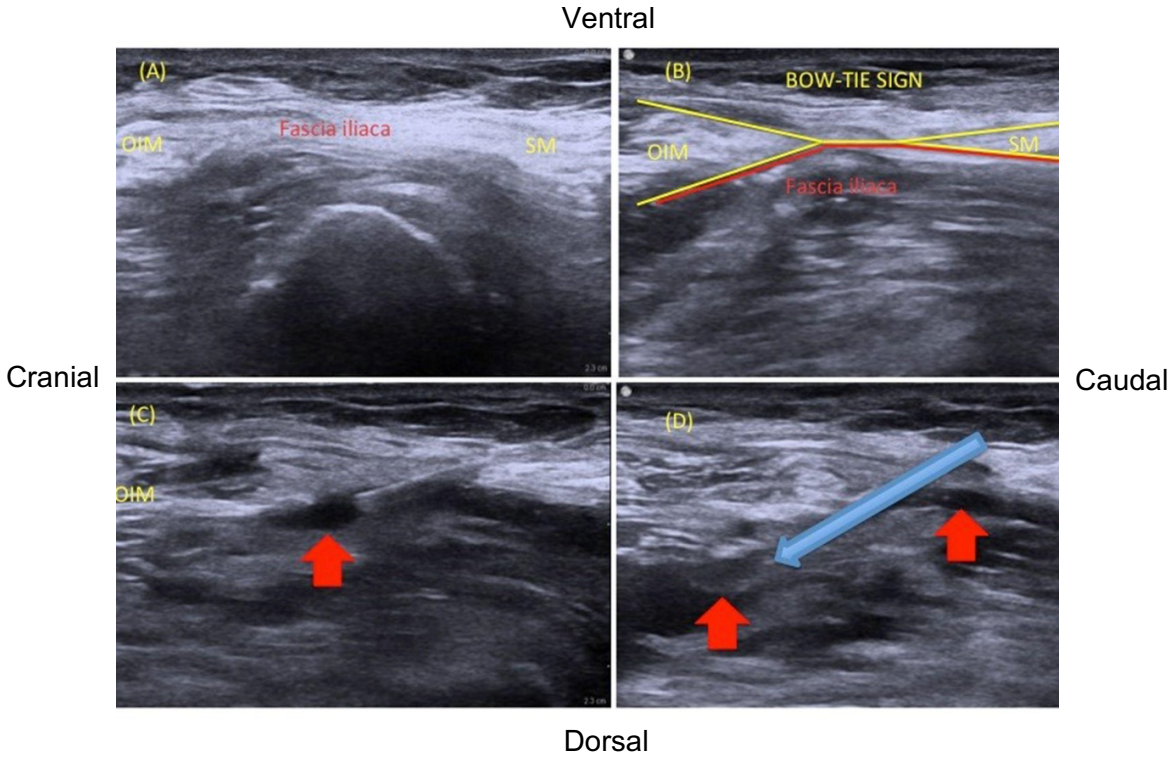

Fig. 1 — (A, B, C, F) SFICB technique - Ultrasound images of the probe in longitudinal craniocaudal direction on the anterior superior iliac spine. A: iliac muscle and the fascia iliaca, with internal oblique muscle (IOM) cranially and sartorius muscle (SM) caudally. B: 'Bow-tie' sign. C and D show the insertion of the needle (blue arrow), injecting a local anesthetic (red arrow) cranially to the inguinal ligament.

careful examination, documentation and risk-benefit analysis.

According to international guidelines the use of anticoagulants or antiplatelet drugs is not considered a formal contraindication. Albeit a distinction is made between deep and superficial blocks according to the compressibility and the consequence of possible bleeding at that specific site. SFICB and femoral nerve block are considered superficial blocks and should thus not be withheld in patients with an impaired – both iatrogenic and spontaneous – coagulation[47]. A PENG block on the other hand is considered a deep block, where stricter margins of coagulation control, similar to neuraxial blocks, are warranted[46,47]. The risk of perineural or intramuscular hematoma should be weighed against the risk of withholding the PNB on an individual basis.

PNBs are known to cause a variable degree of neurologic injury in 2 to 4 per 10.000 blocks[48]. The incidence varies according to the type of PNB and as a SFICB targets a fascial plane, the risk of intraneural injection leading to nerve injury is supposedly lower than with a direct nerve block such as a femoral nerve block[49]. Best precaution measures according to the safe clinical practice of regional anesthesia should be taken to avoid nerve damage[50]. Finally, there is a small risk of local anesthetic systemic toxicity, labeled LAST-syndrome. Therefore, in addition to standard resuscitation material, a LAST-therapy protocol must be in place with a 20 percent fat emulsion (Intralipid®) readily available on site.

Underlying barriers

Given the many benefits and few contraindications, it is worthwhile exploring why PNBs are not an integral part of the standard of care for hip fracture patients in Belgium. We identified three underlying barriers.

First, a PNB can be a time-consuming and potentially dangerous process in the hands of inadequately trained staff without supervision, with significant morbidity – and in very rare cases even mortality in the case of LAST-syndrome. On the contrary, in experienced hands it is a short procedure, provided the right equipment is readily available. The performance of a block like the SFICB should be a basic competence for every graduating anesthesiologist, with a sufficient number of supervised and autonomous procedures registered in an official (digital) portfolio, as described in the Belgian Quality Law, published in the Belgian Official Journal on 14 May 2019, in accordance with article 15 and 16 on the legal provisions on quality healthcare practice regarding anesthesia including locoregional anesthesia[51].

Second, unlike elective settings where the medicolegal situation is clear, the situation in

non-elective settings is unclear, with regards to who is competent and who is responsible in case of (rare) complications such as nerve damage. Indeed, the aforementioned law imposes special conditions regarding the practice of medicine when (locoregional) anesthesia is applied. The legislator considered this desirable and proportionate, given the inherent risks. Compliance with the set conditions can be readily realized when elective procedures are involved. However, there is not yet any case law on the interpretation of the legal requirements, in case the (locoregional) anesthesia is applied in the context of urgent medical assistance, such as prehospital treatment or in an emergency department. By comparison, in Anglo-Saxon countries PNBs are routinely performed by emergency physicians and even paramedics in both hospital and prehospital setting[52]. In Belgium however, there is no adequate formal PNB-training for emergency physicians and regional anesthesia is a skill solely mastered by anesthesiologists, applied for a variety of indications at different anatomic locations. And if a Belgian emergency physician-in-training acquires skills during training abroad, there is no possibility to validate these into a formal competence if they are not strictly provided for in the accreditation standards for the medical specialty in question. With the professionalization of emergency medicine as a specialty since 2005, less anesthesiologists are working in the emergency department. Consequently, an experienced practitioner with knowledge of regional anesthesia is not always available, obstructing an efficient flow with early performance of a PNB. Efficiency can by optimized by a local protocol for collaboration between emergency physicians and anesthesiologists and formation of so called 'block teams' with clear demarcations who is competent and who is responsible. Nevertheless, if the number of graduating anesthesiologists would further decline, the tension between staffing the operating theatre and on-demand availability at the emergency department will further increase.

Third, there is no specific nomenclature in Belgium's fee-for-service system for PNBs in non-elective settings, i.e. after trauma, neither for single shot nor for continuous patient controlled nerve blocks.

Decision tree

Figure 2 illustrates the decision tree to follow in a patient with a hip fracture at the emergency department.

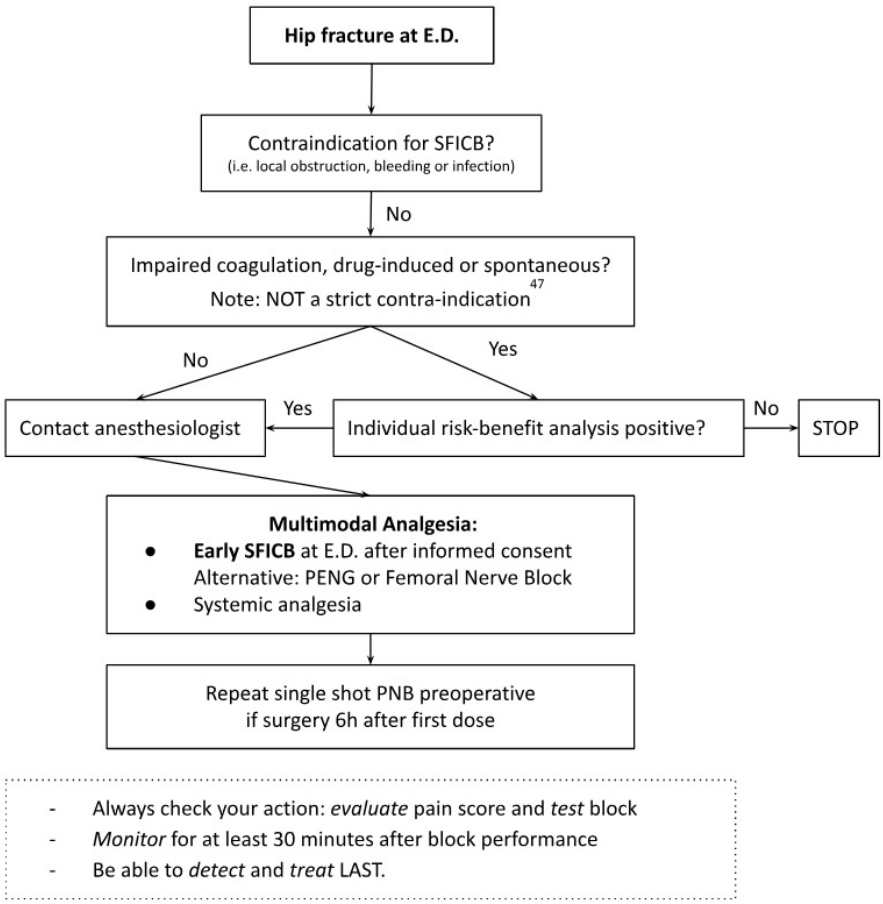

Fig. 2 — Decision tree.

Conclusion

SFICB for hip fractures – and perhaps more broadly PNBs for trauma – should become standard of care at the emergency department in Belgium, as is already the case in many other countries. The reason for the low performance of PNBs at the emergency department in Belgium is threefold: lack of adequately trained personnel, unclear medicolegal situation in emergency settings and lack of a proper financial incentive.

The first barrier can be overcome by (a) improving training of anesthesiologists, (b) transferring knowledge to emergency physicians and nursing staff, and (c) intensifying cross-disciplinary collaboration between anesthesiology and emergency physicians by local protocols and 'block teams'.

The second barrier can be overcome by amending the explanatory memorandum of the Belgian Quality Law with regards to the use of (locoregional) anesthesia in non-elective settings. We do not call however for a stipulation of specific acts regarding PNBs one can and cannot do, as the Belgian Quality Law intentionally provides a legal framework and does not include executive orders in order to overcome a too narrow interpretation by lawmakers and hindering clinical practice.

Finally, the third barrier can be overcome by adequate remuneration for a PNB, which is the performance of a technical act, requiring specific equipment and specific skills. It is in the best interest of patients with a hip fracture to have a tailored local protocol with the inclusion of SFICB as the prime PNB of choice, to be administered early on arrival at the emergency department, both in curative and palliative settings.

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