

Regional anesthesia for day-case procedures : a balanced CON

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Day-case procedures are occupying a progressively increasing part of daily operative practice. There is also a growing trend to perform more and more major interventions, especially orthopedic procedures, on an ambulatory basis. Interventions, requiring several days of hospitalisation in the past are now performed as day-case procedures. This has been made possible by better surgical, less invasive techniques but also better anesthetic techniques and drugs. As these procedures tend to be painful they may be extremely challenging for the anesthetic team to provide sufficient intra-operative and postoperative pain relief without the necessity to keep these patients overnight.

It is commonly accepted that the development of regional anesthetic (RA) techniques is one of the cornerstones in the increasing success of day-case surgery. On the other hand also general anesthesia has improved significantly due to the availability of shorter acting induction agents, analgesics, ... and better anti-emetic and anti-inflammatory drugs.

As expected it is extremely difficult to find studies in recent literature that have contested the superiority of regional anesthetic techniques. As a consequence, defending a CON-position seems quite challenging.

The purpose of the present manuscript is to evaluate on a critical basis the claimed benefits of RA techniques. While the use of pure local or topical (eye surgery) anesthesia, if possible, is beyond any discussion with respect to its superiority as compared to any other technique, a distinction should be made between the different types of regional anesthesia techniques. In this review some techniques will not be discussed such as intra-articular injections and combined techniques in adults i.e. RA with different planes of sedation/anesthesia.

quite high while also the onset is fast and costs are moderate being more important for equipment than medication (as mostly only one drug is used). Some experience exists with spinal techniques for laparoscopic surgery as well but some patients may not tolerate well the effects of position and pneumoperitonium on respiratory function and hemodynamics.

There are several other disadvantages that have made colleagues reluctant to recommend spinal anesthesia for use in day-case surgery.

Up to the early 90's lidocaine, either hyperbaric or plane was the local anesthetic of preference due to its fast onset, short duration of action and last but not least the cheapest price. The reports of cauda equina syndromes and transient radicular irritation (TRI) have made this substance extremely unpopular for intrathecal use (1). The incidence of TRI has been reported in up to 40% and has forced the search for solutions or alternative substances or combinations.

Lowering the baricity, the speed of injection... did not affect the incidence of TRI. Studies with other local anesthetics such as mepivacaine or prilocaine were not convincing enough to show any benefit over lidocaine.

As bupivacaine is the longest acting local anesthetic, studies have been done with the new local anesthetics but in spite of studies reporting less motor block, none of the studies was able to demonstrate that discharge times might approximate those obtained with lidocaine.

And even despite some acceptance that lidocaine 40-60 mg is still the best for spinal use in day-case settings, the still rather long discharge times are another reason for dissatisfaction. These times may depend on the necessity to void before discharge. Voiding has been recommended as discharge criterion following penile/urological

NEURAXIAL ANESTHESIA

Spinal anesthesia is still a very popular technique in some hospitals for inguinal, perineal and lower extremity procedures. The success-rate is

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surgery, neuraxial anesthetic techniques and pre-existing urinary problems (2). A patient with an empty bladder will not experience the urge to void while stimulating to fill it more rapidly may cause micturition problems requiring catheterisation if the patient is unable to void following bladder contents of 500ml or more. The choice between overdistention and the risk of urinary infection (due to catheterisation) is difficult. It has been suggested to send patients home even when voiding did not occur. A large review found only few patients requiring catheterisation but this was at the expense of a home-nursing protocol (3).

We have performed several studies on voiding capabilities after spinal anesthesia and have concluded that voiding does not necessarily mean acceptable post-voiding residual volumes, that males are more susceptible than women and that even with lidocaine more than 10% of patients have difficulty classified (using a 5-point scale) as marked to severe micturition problems (4). In our studies fluid was restricted to 500 ml until voiding to prevent overdistention of the bladder. Also in case of hypotension ephedrine was administered rather than accelerating the infusion of fluids.

While for RA discharge criteria are focused on mobilisation and micturition, for general anesthesia it is less clear which criteria the patients has to meet especially in terms of alertness. Nevertheless it is my opinion that general anesthesia allows faster discharge than spinal anesthesia also because LMWH may be given before induction (a 4 hr interval is recommended between after the spinal injection). A few studies were able to show that spinal anesthesia either prolonged time in the operating room or the time required for home-readiness (5, 6). In addition the use of spinal procaine and epidural chloroprocaine is not consistent with European practice.

Most studies report more side-effects with general anesthesia such as nausea, drowsiness, sore throat (intubation required ?), but mostly more pain. Indeed, the quality of analgesia is very important as a criterion for home discharge. RA may provide pre-emptive analgesia and many patients may be discharged without having experienced pain that requires additional treatment.

However, sooner or later patients will feel pain and it is difficult to predict on an individual basis when and how severe this pain will appear. With general anesthesia pain will appear sooner and this will allow individual titration of analgesics, started within the hospital and easier prediction of the home requirements during the subse-

quent hours and days.

Local anesthetic doses may be lowered by adding other *adjuvant substances* such as opioids, clonidine, epinephrine, neostigmine, ... but without any doubt these substances may affect micturition as well. Combinations with opioids such as fentanyl have enabled to reduce the dose of lidocaine to 20 mg (7) or have allowed to use bupivacaine doses as low as 3 mg (8) but I do not feel invited to experiment with these combinations in my patients surely not when tourniquets are used. Even with bupivacaine doses as low as 4 mg or 3 mg + fentanyl 10 µg discharge times were around 3 hours (8). The addition with clonidine was even found to delay home discharge times despite lower doses of the local anesthetic (9). In addition adjuvant substances may cause other undesirable side-effects such as nausea, sedation and pruritus.

Unilateral blocks by using hypo- or hyperbaric solutions at much lower doses may leave the unoperated extremity unaffected to a certain extent but also here questions remain whether a unilateral block allows faster mobilisation and micturition. In addition the patient has to stay 15-20 min. post-block in lateral decubitus before a change to the supine position is allowed. Very recently Casati performed a review of unilateral spinal anesthesia and concluded that it does not prolong discharge times, may 'potentially' reduce voiding problems and requires 15min. longer preparation times (10). Advantages cited were better hemodynamic stability, easier nursing, improved autonomy and better psychological acceptance.

Epidural anesthesia will require more expensive equipment and a longer anesthetic performance and installation time. The duration may also vary according to the selected drugs. It is unclear whether there is any benefit to be expected as compared to spinal anesthesia.

Combined spinal-epidural anesthesia has been recommended in some studies (11) because it allows a low-dose spinal technique with lidocaine doses as low as 40mg which in an acceptably low incidence of cases may require the administration of epidural supplementation (10%). Besides an additional more-cost another disadvantage of both epidural and CSEA is the delay in the administration of LMWH as this may require an interval of 4 hours between removal of the catheter and the first dose of an anticoagulant.

Caudal blocks are commonly performed in children in combination with general anesthesia. Studies have been performed to reduce motor block

by using the newer local anesthetics despite shorter-lasting motor impairment discharge times were not different (12)

PERIPHERAL NERVE BLOCKS

While many colleagues may agree that neuraxial techniques may not be the best choice in day-case procedures, they will argue that mainly the peripheral nerve blocks (PNB) should be considered as the techniques of choice for extremity surgery. Although brachial plexus blocks have been commonly popular for several decades, the increasing experience with lower extremity blocks has resulted in an explosion of studies comparing it other techniques. Knowledge of the anatomy and innervation of the different nerves may allow more specific approaches such as blocking the single upper extremity nerves, popliteal nerve blocks, limited wrist and ankle blocks, Undoubtly when no tourniquet is required the requirements of the block may differ considerably..

The installation of peripheral nerve blocks requires more time than general anesthesia. Although this time-loss may be compensated by doing the block in an adjacent area (has also been suggested for the neuraxial techniques), this may be only achievable in hospitals working with residents or by simultaneous anesthetic practice which is strongly dissuaded according to the Belgian Standards of Safety during anesthesia. Therefore the argument that peripheral nerve blocks do not signify time-loss by slower onset is misleading and subject to criticism. In addition the economical reflections by increased manpower demands are commonly overlooked.

The success-rate of PNB is highly variable and surely less than with neuraxial techniques. The success-rate may depend on the experience of the performer. As opposed to spinal or epidural anesthesia, there are (too) many approaches for PNB. Other points of disagreement or at least with lack of uniformity are the choice of needles or catheters, choice of local anesthetics, single or mixed, stimulation or paresthesias, single or multiple nerve stimulation,.... Anesthetists tend to 'butterfly' from one approach to another when they are not satisfied about their success-rate. Reported success-rates are not unfrequently overestimated and sometimes include rescue injections of unblocked nerves, supplemental local anesthesia or intravenous administration of sedative/analgesic substances.

Claimed advantages of PNB as compared to

general anesthesia are faster recovery, less pain, nausea and drowsiness. Less comprehensible are the findings of less hospital re-admittance and shorter non-surgical intra-operative time (13).

Upper extremity blocks may have a faster onset because they may require only one single injection unless the anesthetist prefers multiple stimulation techniques as recommended by some for axillary and midhumeral approaches (even more time consuming). Most of the time the surgical procedures are not so painful as with lower extremity surgery and patients can return home even when a motor block is present and the extremity is still insensate at discharge. The patient needs to be instructed and protected to avoid unnoticed injury. The extremity may be wrapped to prevent any harm that might occur.

Although the increasing success and experience with interscalene plexus blocks for operations in the shoulder region, there are not so many procedures that are performed solely under this type of block. Most of the time and for several reasons (intra-operative position, duration of surgery, ...) an additional alteration of consciousness, ranging between sedation and anesthesia is considered as desirable but counteracts the argumentation that PNB is the technique of choice.

Intravenous Regional Anesthesia (IVRA) is still popular in many hospitals mostly because of its ease to perform and the high successrate. The extra time needed to install a sufficient depth of sensory loss may be compensated by the early application of the tourniquet. Due to its simplicity and success still after 100 years, the block is considered by some as inferior, not worth the classification as RA technique. I would tend to classify this technique somewhere between pure local anesthesia and the real peripheral nerve blocks.

Whereas some arguments may exist in favor of upper extremity surgery to be performed preferably under PNB, the situation is quite different for *lower extremity surgery* (14). The doses required are larger and the nerves are located at a deeper level which may cause more discomfort than upper extremity blocks. The confusion with respect to approaches, positioning, doses, concentrations... is even more pronounced than with the upper extremity. As opposed to the upper extremity, anesthesia of the lower extremity may require more than one puncture. Recovery of the sensory block may be quite long or even unpredictable. Even with the assistance of a concomittant person, discharge of a patient with a persisting motor and/or sensory block causing difficulty to stand or walk should be

dissuaded.

Recently Casati et al demonstrated that there were no differences between spinal anesthesia and the combination of femoral and sciatic nerve block for day case arthroscopy (15). Discharge times were also similar. This allows me to conclude that PNB is equally bad as compared to spinal anesthesia.

Another study finding faster recovery than with spinal anesthesia (lidocaine hyperbaric 65 mg) used chloroprocaine / lidocaine for the popliteal and posterior cutaneous nerve of the thigh block resp.. (16).

In lower extremity surgery I would restrict PNB to popliteal and ankle blocks. Some colleagues consider the latter as ring anesthesia of the foot but anesthesia of all five nerves is rarely required. Popliteal blocks may be of interest as well but I would not recommend combinations of lumbar plexus blocks and sciatic nerve blocks for simple procedures such as routine diagnostic arthroscopy of the knee or ankle, procedures lasting significantly shorter than the interval between induction of PNB and readiness for surgery.

CONCLUSION

The ideal in day-case procedures consist of 4 major A's i.e. Awake, Ambulation, Alimentation and Analgesia. Being awake as fast as possible is no longer a problem with the availability of short acting substances such as propofol, remifentanyl and the newer volatile anesthetics. Ambulation is never a problem after general anesthesia but may be troublesome following RA. Alimentation is probably the least important criterion as it has been demonstrated that patients should not be forced to drink or eat until the moment they express this desire. Finally, analgesia is more likely to be (still) present at the moment of discharge but this does not necessarily mean permanent benefit. I prefer to observe a patient during the first postoperative hour(s) to predict and titrate the individual analgesic needs for the subsequent hours and days to come.

I also think that the time required to install a locoregional block should never exceed the time required to perform the surgical procedure itself (examples : a brachial plexus block for a carpal tunnel syndrome, femoral and sciatic nerve block for diagnostic arthroscopy, ...).

Finally, the author realises that the progress of peripheral nerve blocks can hardly be stopped but

indications, advantages and disadvantages should be balanced carefully. Despite the relatively lower frequency of PNB as compared to neuraxial techniques, more claims related to PNB existed in Belgium at the end of the previous century. The argument that PNB related problems never resulted in mortality as opposed to neuraxial block complications is no acceptable excuse in favor of the former.

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