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Perioperative management for one day hospital admission : regional anesthesia is better than general anesthesia

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Summary : The past ten years have showed real and considerable growth in the number and complexity of ambulatory surgeries. The remaining real problems are the postoperative pain and the adverse effects due to parenteral opioids promoting hospital readmissions anf increasing costs. This events limit the expansion of outpatient surgery . Regional anesthesia techniques such as spinal anesthesia and peripheral nerve blocks are ideal techniques for one day hospital admissions surgical procedures. It is now fully demonstrated that these techniques allowed rapid and complete anesthetic blocks, a limitation of adeverses events and unplanned hospital admissions and increased the quality of prolonged optimal postoperative pain relief if continuous peripheral nerve blocks are used.

Ambulatory surgery has gained massive growth in the past twenty years. 70% of all surgical procedures performed in the United States are done on an ambulatory basis. In addition, more complex and extensive surgical procedures are now being performed in the outpatient basis. This progress was due to the advent of rapid elimination anesthetics, short-acting sedatives and muscle relaxants, and modern surgical techniques. However, postoperative pain is still a major limiting factor to expanding the type of surgeries performed on a day-case basis. CHUNG *et al.* (1) quantified the failure of outpatient pain management on more than 10.000 outpatients reporting that 40 to 70% had severe postoperative pain (coted > 50 mm on a visual analog scale). As well , RAWAL *et al.* (2) reported that 35% of day-surgery patients experienced moderate-to-severe pain at home. These authors demonstrated that regional anesthesia technique really optimised pain relief. Regional anesthesia is the ideal technique for ambulatory surgery but is underutilized in this setting. DEXTER and colleagues (3) demonstrated this fact when analyzing data from the United States Data for Health Statistics between 1994 and 1996. They reported that only an average of 8% of ambulatory cases were performed under regional anesthesia.

We have to choose the best anesthesia technique for outpatient surgery. The patient must go home quickly and safely ; side effects that may be tolerated in the patient, such as nausea vomiting, and pain, become totally unacceptable in the outpatient setting, potentially resulting in delayed home discharge and even unanticipated overnight admission. In this setting, advantages and problems due to regional anesthesia are wel known (table 1). Obviously, regional anesthesia represents a good option for outpatient anesthesia, being associated with less nausea and vomiting than general anesthesia, and better postoperative pain relief (4-6).

SPINAL ANESTHESIA

Spinal anesthesia was one of the choices. The introduction of atraumatic pencil-point needles with small gauge become an optimum for outpatient anesthesia, providing a fast, reliable and deep surgical block with simple injection of very small doses of local anesthetics. Spinal anesthesia provide a fast, reliable and deep surgical block with a simple injection of small amounts of local anesthetics. Problems with using spinal anesthesia in the outpatient setting relate to the effect of spinal block on recovery of motor function after the block, bladder function, and postdural puncture headaches.

Recovery of motor function after spinal block is usually evaluated with the Bromage's scale, and the ability of the patient to flex the ankle, knee, and hip joints is considered as an index of complete moror recovery. A recent study (7) compared clinical markers of motor block resolution (Bromage'scale) and objective data of functional balance (computerized force platform method).

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Table 1

Potential Benefits and problems related to RA vs GA in One Day Surgery

Advantages to patients

- Improved quality of recovery
  - less postoperative pain (mainly for CPNB)
  - less postoperative nausea and vomiting
  - less unplannedhospital admissions
- able to observe the procedure
- communication with surgeon during procedure
- an option to receive no, light or heavy sedation
- earlier mobilisation

Advantages to Surgeon and staff

- assessment of function before wound closure
- possible to discuss treatment options with patient
- "fast tracking", i.e. by-passing phase I recovery room
- shortened recovery time
- less requirements in PACU/Phase II recovery room
- fewer unanticipated overnight admissions

Potential Disadvantages of RA in Ambulatory Surgery

- takes time and new organisation (block insertion, onset etc)
- needs active cooperation with patients and surgeons
- risk of complications (nerve damage, Transient neurological symptoms, e.g. after lidocaine spinal anaesthesia ?)
- variable failure rate (up to 10%with PNB)
- urinary retention with spinals

The results of the study suggested that the standard markers of motor function are poor predictors of functional balance following ambulatory spinal anesthesia, while actual ability to deambulate became more important for safe patient discharge.

Voiding is usually required before patient discharge. MULROY *et al.* (8) recently evaluated the efficacy and safety of applying an accelerated discharge patway after spinal block by not requiring the patient to void. Young patient, without a history of voiding dysfunction were included. Criteria for home discharge included all standard criteria but voiding. If patients voided before fulfilling home discharge criteria the were discharged, otherwise received a bladder ultrasound urine volume less than 400 ml, the patients were discharged ; volume more than 400 ml the patients were reassessed after 1 h and discharged after. Patients were discharged 22 min before patients with standard discharge criteria including voiding. None of these patients reported difficulty in voiding after home discharge. This study suggests that waiting for voiding after short-duration spinal anesthesia for surgical procedures at low-risk of urinary problems might be not necessary, and could result in prolonged discharge time.

Accordingly, the dose and drug used for spinal anesthesia must be balanced in order have the fastest recovery of unassisted ambulation after the procedure maintaining adequate efficacy of intraoperative nerve block. Lidocaine provide intense and short lasting spinal block. However, in the last ten years, the occurence of transient neurologic symptoms after spinal lidocaine has increased concerns about its use. FREEDMAN *et al.* (9) evaluating the epidemiology and risk factors for transient neurologic symptoms (TNS) after spinal anesthesia in more than 1800 patients, clearly demonstrated that TNS commonly follow lidocaine spinal anesthesia. Lithotomy and surprisingly outpatient procedures were other independent risk factors. TNS is a benign syndrome, usually resolving spontaneously and quickly, however, these symptoms may be particularly concerning to a patient that needs to go back soon at home and chooses to perform the procedure on an outpatient basis because of this (10).

The use of bupivacaine is recommended. Several agents have been suggested, like mepivacaine, bupivacaine and, more recently, ropivacaine. PAWLOSKI *et al.* (11) reported on the use of two different doses (60 and 80 mg) of mepivacaine for ambulatory spinal anesthesia. It has been reported that the incidence of TNS is only slightly lower or similar to that observed with lidocaine (11). Authors suggested the use of very low doses of local anesthetic (lidocaine or bupivacaine) with an incidence of side effects lower than that previously reported with 50-60 mg lidocaine and a time to discharge of 145 min (12,13). However, this reduction in doses of LA requires also the addition of intrathecal opioids (20-25 microg fentanyl) to implement analgesia. Very good results have been reported with small doses of long acting agents, such as bupivacaine (both with plain and hyperbaric solutions) as well as with the new concept of unilateral spinal block (14-17). Recently, ropivacaine has been suggested for outpatient spinal anesthesia providing some interesting advantages over similar concentrations of bupivacaine related to its shorter duration of sensory and motor blocks (18). It has been recently reported that small doses of ropivacaine could be an acceptable option for outpatient procedures allowing fast recovery of ambulation after the procedure, with discharge times similar to thoses of small-dose lidocaine (19). This approach provides recovery characteristics similar to desflurane anesthesia (20) , with lower costs.

In some patients, epidural anesthesia may be used with on without general anesthesia. WILLIAMS and colleagues (10) demonstrated that general-regional anesthesia care is better than general anesthesia alone. Patients with the combined technique

showed improved recovery profiles and lower unexpected hospital admission rates, and ther required fewer nursing interventions for common postoperative symptoms. Patients receiving epidural anesthesia showed discharge outcomes similar to those patients receiving general anesthesia with femoral nerve block. Postanesthesia care unit bypass (fast-tracking) was more likely in clinical patway regional anesthesia patients (regional or spinal), when compared with the clinical patway general anesthesia used.

Peripheral Nerve Blocks

Peripheral nerve blocks (PNB) with long-acting local anesthetics are an attractive anesthetic alternative for outpatient surgery (4-5). These techniques are site specific, have few side effects, provide excellent surgical conditions, as well as superior analgesia than systemic opioids use. PNB reduce the stress response to surgery, enhance patient satisfaction, and improve patient outcome. PNB are not associated with opiod-related side effects and are not contraindicated in patients receiving anticoagulants.

Williams and colleagues (21) reported in a recent study that the use of a Femoral-Sciatic block was associated with less pain of invasive knee surgery. If no nerve blocks were used, a complex (vs. less invasive) knee surgery was associated with a 10-fold greater risk of hospital readmission. The use of FNB or FSB (vs. no blocks) was associated with a 2.5-fold reduction in unplanned admissions.

However, the advantages of single-injection PNB are limited due to the duration of long-acting local anesthetics (10-24 hours) (4-5). After resolution of PNB, postoperative pain management is often difficult to manage and inadequate in the ambulatory setting. Patients usually have available oral opioids to control their pain. Continuous peripheral nerve blocks (CPNB) are a technology that allows prolonged site-specific local anesthetic delivery in the outpatient setting, profound analgesia, minimal side effects, and avoidance of premature regression of an analgesic block. CPNB can assist anesthesiologists with the ability to extend postoperative analgesia at home, treating patients in a more compassionate way. Case reports or series of ambulatory perineural infusion were described via peripheral nerve catheters in various locations (22-26). Klein *et al.* (27) involved 40 subjects undergoing major shoulder surgery who received an interscalene block and perineural catheter preoperatively, and were randomized to receive either perineural ropivacaine 0.2% or normal saline postoperatively (10 ml/h). Patients receiving perineural ropivacaine averaged a 10 mm on a visual analog pain scale (VAS) of 0-100, compared with a 30 mm for subjects receiving placebo. Since patients remained hospitalized, the investigators had the opportunity to provide more than oral analgesics ; patients had access to intravenous morphine via a PCA device. Therefore, patients receiving placebo theoretically received a greater degree of analgesia than that available to ambulatory patients who must rely on oral instead of IV opioids.

Recently, other randomized double-blinded, placebo-controlled studies provided data involving patients discharged at home with a PCNB (28-30). All of these studies involved patients scheduled for orthopedic surgery procedures who had an infraclavicular (28), interscalene (30), or posterior popliteal (29), perineural catheter placed. Patients receiving perineural local anesthetic achieved both clinically and statistically significant lower resting and breakthrough pain scores compared with those using oral opioids for analgesia. The patients required fewer oral analgesics to achieve their improved level of analgesia. Patients who received perineural local anesthetic experienced additional benefits related to improved analgesia. Zero to 30% of patients receiveing perineural ropivacaine reported insomnia due to pain, compared with 60-70% of patients using only oral opioids. Patients receiving perineural ropivacaine awoke from sleep because of pain an average of 0 times on the first postoperative night, compared with 2 times for patients receiving perineural saline. Obviously lower opioid consumption in patients receiving perineural local anesthetic resulted in fewer opioid-related side effects. Patients receiveing perineural local anesthetic reported satisfaction with their postoperative analgesia of 8.8-9.8 compared with 5.5-7.7 for patients receiving placebo.

In conclusion, the benefits of regional anesthesia techniques can be extended from the ambulatory surgery setting into the patient's home postoperatively via spinal anesthesia for the quality of the anesthetic blockade and for postoperative analgesia via perineural catheter placement, obviously, for a successfull program, new aspects of the facility's structures need to be adressed to be sure that RA techniques have the potential to decrease the hidden costs of procedures related to morbidity, hospital readmissions and delayed rehabilitation.

References

1. Chung F., Ritchie E., Su J., *Postoperative pain in ambulatory surgery*, ANESTH. ANALG., 1997, **85**, 808-16.
2. Rawal N., Hylander J., Nydahl P. A., *Survey of postoperative analgesia following ambulatory surgery*, ACTA ANAESTHESIOL. SCAND., 1997, **41**, 1017-22.
3. Dexter F., Macario A., *What is the relative frequency of uncommon ambulatory surgery procedures performed in the United States With an anesthesia provider ?*, ANESTH. ANALG., 2000, **90**, 1343-7.
4. Klein S. M., Pietrobon R., Nielsen K. C., Warner D. S., Greengrass R. A., *Peripheral nerve blockade with long-acting local anesthetics, of the Society for Ambulatory Anesthesia*, ANESTH. ANALG., 2002, **94**, 71-6.
5. Klein S. M., Nielsen K. C., Greengrass R. A., Warner D. S., Martin A., *Ambulatory discharge after long-acting peripheral nerve block 2382 blocks with ropivacaine*, ANESTH. ANALG., 2002, **94**, 65-70.
6. Williams B. A., Kentor M. L., Williams J. P., *Process analysis in outpatient knee surgery, effects of regional and general anesthesia on anesthesia-controlled time*, ANESTHESIOLOGY, 2000, **93**, 529-38.
7. Imarengiaye C. O., Song D., Prabhu A. J., Chung F., *Spinal anesthesia, functional balance is impaired after clinical recovery*, ANESTHESIOLOGY, 2003, **98**, 511-5.
8. Mulroy M. F., Salinas F. V., arkin K. L., Polissar N. L., *Ambulatory surgery patients may be discharged before voiding after short-acting spinal and epidural anesthesia*, ANESTHESIOLOGY, 2002, **97**, 315-9.
9. Freedman J. M., Li D. K., Drassner K., Jaskela M. C., Larsen B., Wi S., *Transient neurologic symptoms after spinal anesthesia, an epidemiology study of 1.863 patients*, ANESTHESIOLOGY, 1998, **89**, 633-41.
10. Williams B. A., DeRiso B. M., Figalloo C. M., *et al., Benchmarking the perioperative process, III. Effects of regional anesthesia clinical pathway techniques on process efficiency and recovery profiles in ambulatoru orthopedic surgery*, J. CLIN. ANESTH., 1998, **10**, 570-8.
11. Pawlowski J., Sukhani R., Pappas A. L., Kim K. M., Lurie J., Gunnerson H., Corsino A., Frey K., Tonino P., *The anesthetic and recovery profile of two doses (60 and 80 mg) of plain mepivacaine for ambulatory spinal anesthesia*, ANESTH. ANALG., 2000, **91**, 580-4.
12. Ben-David B., De Meo P. J., Lucyk C., Solosko D., *A comparison of minidose lidocaine-fentanyl spinal anesthesia and local anesthesia/propofol infusion for outpatient knee arthroscopy*, ANESTH. ANALG., 2001, **93**, 319-25.
13. Ben-David B., Maryanovsky M., Gurevitch A., *A comparison of minidose lidocaine-fentanyl and conventional-dose lidocaine spinal anesthesia*, ANESTH. ANALG., 2000, **91**, 865-70.
14. Vaghadia H., Viskari D., Mitchell G. W., Berril A., *Selective spinal anesthesia for outpatient laparoscopy I, characteristics of three hypobaric solutions*, CAN. J. ANAESTH., 2001, **48**, 256-60.
15. Lennox P. H., Vaghadia H., Henderson D., *et al., Small-dose selective spinal anesthesia for short duration outpatient laparoscopy recovery characteristics compared with desflurane anesthesia*, ANESTH. ANALG., 2002, **94**, 346-50.
16. Ben-David B., Frankel R., Arzumonov T., Marchevsky Y., Volpin G., *Minidose bupivacaine-fentanyl spinal anesthesia for surgical repair of hip fracture in the aged*, ANESTHESIOLOGY, 2000, **92**, 6-10.
17. Fanelli G., Borghi B., Casati A., *et al., Unilateral bupivacaine spinal anesthesia for outpatient knee arthroscopy*, CAN. J. ANAESTH., 2000, 47, 746-51.
18. McDonald S. B., Liu S. S., Kopacz D. J., Stephenon C. A., *Hyperbaric spinal ropivacaine, a comparison to bupivacaine in volunteers*, ANESTHESIOLOGY, 1999, **90**, 971-7.
19. Buckenmaier C. C. 3rd, Nielsen K. C., Pietrobon R., *et al., Small-dose intrathecla lidocaine versus ropivacaine for anorectal surgery in an ambulatory setting*, ANESTH. ANALG., 2002, **95**, 1253-7.
20. Lennox P. H., Chilvers C., Vaghadia H., *Selective spinal anesthesia versus desflurane anesthesia in short duration outpatient gynecological laparoscopy, a pharmacoeconomic comparison*, ANESTH. ANALG., 2002, **94**, 565-8.
21. Williams B. A., Kentor M. L., Vogt M. T., *et al., Femoral-sciatic nerve blocks for complex outpatient knee surgery are associated with less postoperative pain before same-day discharge. A review of 1.200 consecutive cases from the period, 1996-1999*, ANESTHESIOLOGY, 2003, **98**, 1206-13.
22. Capdevila X., Macaire P., Aknin P., *et al., Patient-controlled perineural analgesia after ambulatory orthopedic surgery, a comparison of electronic versus elastomeric pumps*, ANESTH. ANALG., 2003, **96**, 414-7.
23. Ilfeld B. M., Morey T. E., Wright T. W., *et al., Interscalene perineural ropivacaine infusion, a comparison of two dosing regimens for postoperative analgesia*, REG. ANESTH. PAIN MED., 2004, **29**, 9-16.
24. Ilfeld B. M., Morey T. E., Enneking F. K., *Infraclavicular perineural local anesthetic infusion : a comparison of three dosing regimens for postoperative analgesia*, ANESTHESIOLOGY, 2004, **100**, 395-402.
25. Ilfeld B. M., Thannikary L. J., Morey T. E., *et al., Popliteal-sciatic perineural local anesthetic infusion, a comparison of three dosing regimens for postoperative analgesia*, ANESTHESIOLOGY, 2004, **101**, 970-7..
26. Ilfeld B. M., Morey T. E., Enneking F. K., *Continuous infraclavicular perineural infusion with clonidine and ropivacaine compared with ropivacaine alone, a randomized, double-blinded, controlled study*, ANESTH. ANALG., 2003, **97**, 706-12.
27. Klein S. M., Grant S. A., Greengrass R. A., *et al., Interscalene brachial plexus block with a continuous catheter insertion system and a disposable infusion pump*, ANESTH. ANALG., 2000, **91**, 1473-8.
28. Ilfeld B. M., Morey T. E., Enneking F. K., *Continuous infraclavicular brachial plexus block for postoperative pain control at home, a randomized, double-blinded, placebo-controlled study*, ANESTHESIOLOGY, 2002, **96**, 1297-304.
29. Ilfeld B. M., Morey T. E., Wang R. D., Enneking F. K., *Continuous popliteal sciatic nerve block for postoperative pain control at home, a randomized, double-blinded, placebo-controlled study*, ANESTHESIOLOGY, 2002, **97**, 959-65.
30. Ilfeld B. M., Morey T. E., Wright T. W., *et al., Continuous interscalene brachial plexus block for postoperative pain control at home, a randomized, double-blinded, placebo-contrelled study*, ANESTH. ANALG., 2003, **96**, 1089-95.