Assessment of postoperative pain and hospital discharge after inguinal and iliohypogastric nerve block for inguinal hernia repair under spinal anesthesia: a prospective study

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Summary

Objective: This study was designed to evaluate analgesia (pain intensity and analgesic consumption) and the time of discharge of patients who underwent ilioinguinal (II) and iliohypogastric (IH) nerve block associated with wound infiltration with 0.75% ropivacaine, or not, after inguinal hernia repair surgery under spinal anesthesia. **Methods:** This was a prospective, randomized, double-blind study with 34 patients undergoing inguinal hernia repair. Patients were divided into two groups: control (C) and II and IH nerve block (B). Group C (n = 17) received spinal anesthesia with 15 mg hyperbaric 0.5% bupivacaine and Group B (n = 17) received spinal anesthesia with 15 mg hyperbaric 0.5% bupivacaine associated with II and IH nerve block (10 mL of 0.75% ropivacaine) and surgical wound infiltration (10 mL of 0.75% ropivacaine). The following data were analyzed: demographic data, pain intensity according to the visual analog scale (VAS), and number of doses of analgesics (dipyrone, ketorolac and nalbuphine) in the immediate postoperative period, as well as at the time of hospital discharge. **Results:** The VAS at rest was significantly lower in Group B compared with Group C ($p < 0.05$), three hours after the procedure, with no differences on VAS during movement in all postoperative periods. The number of doses of analgesics during the postoperative period was similar in both groups, but patients in Group B were discharged earlier than in Group C. **Conclusion:** II and IH nerve block associated with surgical wound infiltration with 0.75% ropivacaine provides better postoperative analgesia and early hospital discharge in patients undergoing inguinal hernia repair under spinal anesthesia.

Keywords: Local anesthesia; peripheral nerves; inguinal hernia; anesthesia, spinal; analgesia.

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Introduction

Inguinal herniorrhaphy is one of the most common surgical procedures[1-3]. Immediate postoperative pain is an important issue that can delay ambulation and return of gastrointestinal motility, therefore, delaying hospital discharge[4]. Besides, the presence of chronic pain after herniorrhaphy, which can affect up to 50% of patients, is a growing concern[5,6]. This picture seems to be related to inadequate postoperative pain treatment, which makes control of postoperative pain fundamental.

Despite several analgesic options, management of postoperative pain is oftentimes unsatisfactory. Opioids, non-steroidal anti-inflammatories, and analgesics are commonly used to treat postoperative pain, but they are associated with several undesirable effects and they do not seem to be completely effective on preventing and treating postoperative pain[7]. Ilioinguinal (II) and iliohypogastric (IH) nerve block represents a very popular regional anesthetic technique in surgical procedures in the sensitive area of those two nerves[8]. In fact, for inguinal surgery (e.g., inguinal hernia), II and IH nerve block is as effective as caudal block[9]. Pre-incision II and IH nerve block is recommended to decrease intraoperative opioid consumption, but preemptive analgesia with local anesthetic does not seem to be more effective in preventing postoperative pain than post-incisional administration[10].

The objective of the present study was to compare the quality of analgesia (pain intensity and analgesic consumption) and time of hospital discharge of patients who received post-incisional II and IH nerve block associated with surgical wound infiltration with 0.75% ropivacaine, or not, for inguinal herniorrhaphy under spinal anesthesia.

Methods

After approval by the Ethics on Research Commission and signing of the informed consent, 34 patients of both genders, ages between 18 and 80 years, physical status ASA I and II, who underwent non-relapsing unilateral inguinal hernia repair by the Lichtenstein technique from January 2008 to October 2009, participated in this study. Patients with chronic pain, daily use of central nervous system medications, body mass index (BMI) above 40 kg/m^2, and those with contraindications to the proposed anesthetic technique were excluded.

Monitoring consisted of electrocardiography, precordial stethoscope, pulse oximetry, and non-invasive blood pressure. All patients underwent spinal anesthesia with a 27G Quincke needle (15 mg of hyperbaric 0.5% bupivacaine) on the sitting position and puncture of the L2-L3 or L3-L4 space. Occasional hypotension was treated with infusion of crystalloids and, if necessary, fractionated 5 mg doses of intravenous ephedrine until correction of the hypotension. All patients received intravenous sedation with increasing doses of midazolam to obtain satisfactory sedation.

Before closure of the surgical wound, patients were randomly divided in two groups: Group B (II and IH nerve block; n = 17) underwent II and IH nerve block and surgical wound infiltration, and Group C (control; n = 17) did not undergo II and IH nerve block or surgical wound infiltration. Ilioinguinal and IH nerve block was performed by administering 10 mL of 0.75% ropivacaine 2 cm above and 2 cm medial to the anterior superior iliac spine, according to Hadzig[11]. Surgical wound infiltration was performed with 10 mL of 0.75% ropivacaine in the superficial and deep layers of the surgical wound.

After the end of surgery, patients were transferred to the post-anesthetic recovery unit. Pain intensity at rest and with movement (patient in the sitting position with legs hanging) was evaluated by the visual analogue scale (VAS: 0 – without pain; 10 – maximum pain) at 3, 6, and 12 postoperative hours and at the time of hospital discharge. Investigators evaluating postoperative parameters were unaware of the patient's group.

A VAS > 4 at rest was considered for analgesic rescue with intravenous dipyrone (2.0 g). In case it was ineffective, intravenous ketorolac (30 mg) and, whenever necessary, intravenous nalbuphine (3 mg), were added. The number of analgesic doses, time interval until the first dose of analgesic, and length of hospitalization were recorded. Discharge criteria included complete motor recovery, ability to urinate, absence of nausea and vomiting, bleeding, and excessive pain.

Sample calculation was based on the study of Toivonen et al.[12], who detected a 0.9 difference on VAS with standard deviation of 1.5 among patients who underwent II and IH nerve block and those who received saline (control group). Considering this data, 15 patients were necessary with power of 80% and type I error of 0.05. Due to the possibility of losing patients during the study, 17 patients were selected for each group.

Data is presented as mean (minimum-maximum), median (minimum-maximum), and numbers. Student's *t* test was used to compare age, duration of surgery and BMI. Mann-Whitney test was used to compare VAS, time until the first dose of analgesic, use of analgesics, and length of hospitalization. Fisher exact test was used to evaluate ASA. A value of $p < 0.05$ was considered statistically significant.

Results

Groups were homogenous regarding age, gender, ASA, BMI, and length of surgery (Table 1). The number of doses of dipyrone, ketorolac, and nalbuphine until hospital discharger was similar in both groups ($p > 0.05$). The mean time until the first dose of dipyrone, ketorolac, and nalbuphine did not differ between Groups C (4.0 ± 2.1; 6.2 ± 2.7; 6.6 ± 3.1 hours, respectively) and B (5.0 ± 2.6; 7.7 ± 5.0; 8.5 ± 5.9 hours, respectively). Anesthetic and surgical complications were not observed.

Table 1 – Anthropometric data, length of surgery, and ASA classification

	Group C (n = 17)	Group B (n = 17)	p-value
Age (years) *	61 (37 -80)	64 (50-80)	0.881
Gender (M/F)	13/4	15/2	0.443
BMI (kg/m^2) *	24 (15-29)	25 (18-31)	0.435
ASA (I/II)	6/11	5/12	0.167
Length of surgery (min)*	77 (50-105)	71 (50-100)	0.325

*Results expressed as mean (min-max).

Visual analogue scale median at rest was lower in Group B (median: 1; min-max: 0-4) than in Group C (median: 3; min-max: 0-8) 3 hours after surgery (p = 0.013; Figure 1). Figure 1 shows a lack of difference on VAS at rest 6 (p = 0.167) and 12 hours (p = 0.137) after surgery and at hospital discharge (p = 0.808). Differences were not observed between Groups B and C regarding the VAS during movements in all postoperative periods (p > 0.05). The median for length of hospitalization was lower in Group B (median: 18 hours; min-max: 14-26) than in Group C (median: 23 hours; min-max: 17-26) (Figure 2; p = 0.007).

Discussion

The choice of anesthetic technique for inguinal herniorrhaphy is based on the preference of the surgeon, anesthesiologist, and patient; complexity and duration of the procedure; ease of execution; length of recovery; and cost-benefit[13,14]. Field block and/or II and IH nerve block have better cost-benefit (speed of recovery, satisfaction, and costs) than general anesthesia and spinal anesthesia in herniorrhaphy[15]. Despite those advantages, according to the majority of studies, local anesthesia is used in only 10% to 15% of herniorrhaphies[16,17], which seems to be related to the lack of information of surgeons and anesthesiologists about the technique, surgical ability, and anatomical variations on the distribution of those nerves[13,18].

In the present study, we observed that pain, according to the VAS, was lower as to 3 hours after surgery in Group B compared to Group C. However, differences in analgesic consumption and time until the first dose of analgesics were not observed. A prior study demonstrated that preincisional II and IH nerve block with 0.5% bupivacaine (15 mL) in herniorrhaphy under spinal anesthesia reduced pain scores up to 2 hours after the surgery in relation to the group that underwent II and IH nerve block associated with general anesthesia[19]. Earlier hospital discharge was observed (difference in median of 5 hours) in the group of patients who underwent II and IH nerve block than in the control group. In fact, in another study, it was demonstrated that patients who received local anesthesia had shorter hospital stay (3 hours) than those who underwent spinal anesthesia or general anesthesia for inguinal herniorrhaphy[17].

Currently, most inguinal herniorrhaphies are performed as outpatient surgery. Thus, the use of anesthetic techniques that allow adequate postoperative analgesia as well as earlier recovery and hospital discharge is necessary[20].

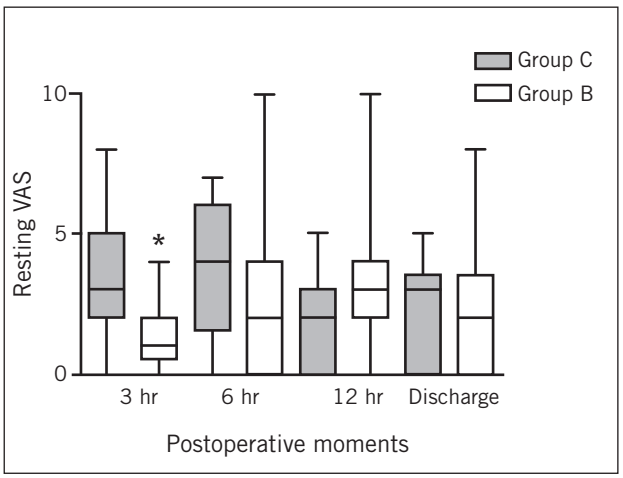

Figure 1– Postoperative evaluation of VAS at rest. Values represent median (min-max) VAS at rest during different postoperative periods (3 hr, 6 hr, 12 hr, and hospital discharge). *p = 0.013

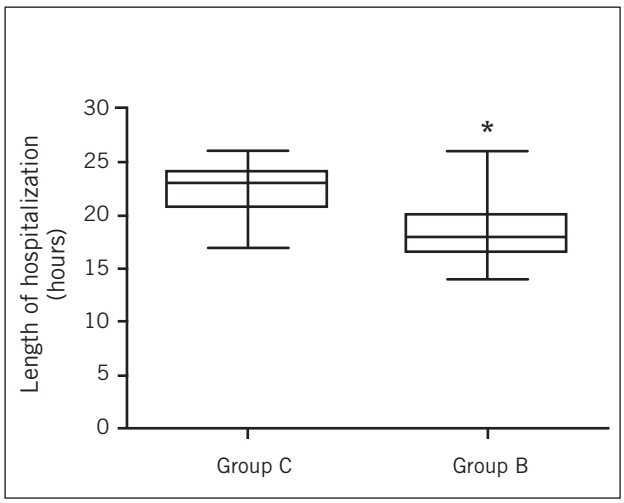

Figure 2 – Length of hospitalizations after the surgery Results represent median (min-max) length of hospitalization after surgery. *p = 0.007.

Earlier hospital discharge in the group that underwent II and IH nerve block can also be associated with the fact that we used ropivacaine, which causes shorter motor blockade than sensorial blockade. Despite observing a postoperative analgesia of shorter duration (3 hours), the reduction in length of hospitalization in the presence of II and IH nerve block suggests that, whenever inguinal herniorrhaphy is performed under spinal anesthesia, the use of this type of block could be an interesting strategy to reduce the length of hospitalization of those patients.

Other studies also have demonstrated shorter duration of analgesia in II and IH nerve block. In fact, pre-incisional administration of 10 mL of 0.5% bupivacaine in this type of block in patients undergoing inguinal herniorrhaphy under spinal anesthesia reduced analgesic consumption and increased the latency of the use of analgesics only in the first 6 hours after surgery, suggesting that this blockade is not long-lasting[12]. In another study, pre-incisional administration of 0.5% bupivacaine in II and IH nerve block associated with surgical wound infiltration reduced morphine consumption in the first 6 postoperative hours than in the group who received saline, and differences were not observed after this period[21]. Contrary to observed in our study, differences in resting VAS were not observed, but VAS on movements was smaller in the II and IH nerve block group. Another study demonstrated that the duration of analgesia after inguinal herniorrhaphy under general anesthesia was prolonged by approximately 9 hours when associated with surgical wound infiltration with 0.25% bupivacaine (40 mL)[22]. On the other hand, using the same type of blockade, volume, and local anesthetic, a reduction in pain scores and consumption of analgesics was observed up to 48 hours after inguinal herniorrhaphy in adults[23].

Conclusion

To conclude, post-incisional II and IH nerve block associated to surgical wound infiltration with 0.75% ropivacaine reduced pain up to 3 hours after surgery and the length of hospitalization in patients undergoing inguinal herniorrhaphy under spinal anesthesia. This last aspect is fundamental in outpatient surgeries.

References

1. Rutkow IM. Demographic and socioeconomic aspects of hernia repair in the United States in 2003. Surg Clin North Am 2003;83:1045-51.
2. Ilias EJ, Kassab P. O uso de telas resolveu o problema da recidiva na cirurgia da hérnia inguinal? Rev Assoc Med Bras 2009;55:240.
3. Trindade EN, Trindade MRM. Uso de telas na cirurgia da hérnia inguinal. Rev Assoc Med Bras 2010;56:139.
4. Hon SF, Poon CM, Leong HT, Tang YC. Pre-emptive infiltration of Bupivacaine in laparoscopic total extraperitoneal hernioplasty: a randomized controlled trial. Hernia 2009;13:53-6.
5. Aasvang E, Kehlet H. Chronic postoperative pain: the case of inguinal herniorrhaphy. Br J Anaesth 2005;95:69-76.
6. Eklund A, Montgomery A, Bergkvist L, Rudberg C, Swedish Multicentre Trial of Inguinal Hernia Repair by Laparoscopy Study Group (SMIL). Chronic pain 5 years after randomized comparison of laparoscopic and Lichtenstein inguinal hernia repair. Br J Surg 2010;97:600-8.
7. Bellows CF, Berger DH. Infiltration of suture sites with local anesthesia for management of pain following laparoscopic ventral hernia repairs: a prospective randomized trial. JSLS 2006;10:345-50.
8. Santos TOD, Estrela TG, Azevedo VLF, Oliveira OEC, Oliveira Júnior G, Figueiredo GS. Uso do tramadol venoso e subcutâneo em herniorrafia inguinal: estudo comparativo. Rev Bras Anestesiol 2010;60:522-7.
9. Markham SJ, Tomlinson J, Hain WR. Ilioinguinal nerve block in children. A comparison with caudal block for intra and postoperative analgesia. Anaesthesia 1986;41:1098-103.
10. Møiniche S, Kehlet H, Dahl JB. A qualitative and quantitative systematic review of preemptive analgesia for postoperative pain relief: the role of timing of analgesia. Anesthesiology 2002;96:725-41.
11. Hadzig A. Textbook of regional anesthesia and acute pain management. New York: McGraw-Hill; 2006. p.579-82.
12. Toivonen J, Permi J, Rosenberg PH. Effect of preincisional ilioinguinal and iliohypogastric nerve block on postoperative analgesic requirement in day-surgery patients undergoing herniorrhaphy under spinal anaesthesia. Acta Anaesthesiol Scand 2001;45:603-07.
13. Kehlet H, White PF. Optimizing anesthesia for inguinal herniorrhaphy: general, regional or local anesthesia? Anesth Analg 2001;93:1367-9.
14. Ozgün H, Kurt MN, Kurt I, Cevikel MH. Comparison of local, spinal and general anesthesia for inguinal herniorrhaphy. Eur J Surg 2002;168:455-9.
15. Song D, Greillich NB, White PF, Watcha MF, Tongier WK. Recovery profiles and costs of anesthesia for outpatient unilateral inguinal herniorrhaphy. Anesth Analg 2000;91:876-81.
16. Kehlet H, Bay Nielsen M. Anaesthetic practice for groin hernia repair – A nation-wide study in Denmark 1998-2003. Acta Anaesthesiol Scand 2005;49:143-6.
17. Nordin P, Zetterström H, Gunnarsson U, Nilsson E. Local, regional, or general anaesthesia in groin hernia repair: multicentre randomised trial. Lancet 2003; 362:853-8.
18. Wang H. Is ilioinguinal-iliohypogastric nerve block an underused anesthetic technique for inguinal herniorraphy? South Med J 2006:99:15.
19. Toivonen J, Permi J, Rosenberg PH. Analgesia and discharge following preincisional ilioinguinal and iliohypogastric nerve block combined with general or spinal anaesthesia for inguinal herniorrhaphy. Acta Anaesthesiol Scand 2004; 48:480-5.
20. Conceição DB, Helayel PE. Bloqueio dos nervos ilioinguinal e iliohipogástrico guiado por ultra-sonografia associado à anestesia geral. Relato de caso. Rev Bras Anestesiol 2008;58:51-4.
21. Harrison CA, Morris S, Harvey JS. Effect of ilioinguinal and iliohypogastric nerve block and wound infiltration with 0.5% bupivacaine on postoperative pain after hernia repair. Br J Anaesth 1994;72:691-3.
22. Tverskoy M, Cozacov C, Ayache M, Bradley EL Jr, Kissin I. Postoperative pain after inguinal herniorrhaphy with different types of anesthesia. Anesth Analg 1990;70:29-35.
23. Bugedo GJ, Cárcamo CR, Mertens RA, Dagnino JA, Muñoz HR. Preoperative percutaneous ilioinguinal and iliohypogastric nerve block with 0.5% bupivacaine for post-herniorrhaphy pain management in adults. Reg Anesth 1990;15:130-3.