BALKAN JOURNAL OF STOMATOLOGY

ISSN 1107 - 1141

Analgesic Efficacy of 0.75% Ropivacaine for Lower Third Molar Surgery

SUMMARY

Introduction*: Since there is no data concerning local analgesic efficacy of ropivacaine for lower third molar surgery, the aim of this double-blind study was to compare local anaesthetic parameters and postoperative analgesic requirements after the use of ropivacaine and bupivacaine for the inferior alveolar nerve block.*

Materials and Method: *20 healthy patients were equally randomised into the ropivacaine (0.75%, 2 ml) or bupivacaine (0.5%, 2 ml) groups. The onset and duration of anaesthesia (the lower lip numbness and pinprick test) and intensity of anaesthesia (visual analogue and verbal rating scales) were determined. The postoperative pain reports and analgesic requirements were also recorded.*

Results: *There were no significant differences concerning parameters of the achieved anaesthesia. 2 patients in the bupivacaine group felt postoperative pain without the need for pain medication.*

Conclusion: *Ropivacaine is suitable for achieving local anaesthesia in lower third molar surgery, especially when prolonged analgesia is desired.*

Keywords: Local Anaesthetics; Ropivacaine; Lower Third Molar Surgery

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ORIGINAL PAPER (OP)
Balk J Stom, 2008; 12:31-33

Introduction

Ropivacaine is an amide long-acting anaesthetic, which has been increasingly used for regional nerve blocks[1,2] as well as for epidural anaesthesia[3] because of its lower potential to induce cardiovascular and neural toxicity in comparison to bupivacaine[4,5]. Studies comparing ropivacaine 0.5% with bupivacaine 0.5% for brachial plexus block showed no clinical difference in onset or duration of sensory block after the injection of 30 ml of the solution[1]. Long-lasting analgesia of 10 to 12 hours was reported for both ropivacaine and bupivacaine used for peripheral nerve blocks[1], although ropivacaine exerted a slightly less potent analgesic effect than bupivacaine when used for epidural anaesthesia[6]. Used for intraoral block anaesthesia, 0.75% ropivacaine exerted an effective local anaesthetic action, producing long duration of inferior alveolar nerve block in volunteers, without surgical procedure[7].

Since there are no data concerning local analgesic efficacy of ropivacaine used for inducing intraoral block anaesthesia in dental or oral surgical practice, the aim of this study was to ascertain the achieved local anaesthetic parameters and postoperative analgesic requirements when 0.75% ropivacaine was used to induce the inferior alveolar nerve block for lower third molar surgery, and to compare them to the same parameters achieved with standard long-acting local anaesthetic (0.5% bupivacaine), sometimes used in the aforementioned indication.

Material and Method

After approval of the Ethical Board at the Faculty of Dentistry, 20 healthy patients requiring lower third molar surgery were randomly selected, in a double-blind fashion, into 2 groups: (1) a group of 10 patients receiving 2 ml of 0.75% ropivacaine for inferior alveolar nerve block; and (2) a group of 10 patients receiving 2 ml of 0.5% bupivacaine. No significant differences in patient characteristics, concerning the gender, age, body weight or difficulty of surgery concerning duration and need for root section, were reported between the groups (Tab. 1).

The onset of anaesthesia was evaluated using the patient's report of lower lip numbness and the pinprick test

performed immediately after the injection, and in 30 sec intervals, till the first sign of soft tissue anaesthesia of the lower lip were detected. The duration of anaesthesia was reported by the patient at the first control appointment. The response to visual analogue (VAS) and verbal rating scales (VRS), done immediately after surgery, determined the intensity of the achieved anaesthesia. The occurrence of postoperative pain and analgesic requirements were also recorded.

Table 1. Patient and Surgery Characteristics

Personal and Clinical Data	Groups	
	Ropivacaine 0.75%	Bupivacaine 0.5%
N	10	10
M/F	4/6	5/5
Age / yr (X ± SE)	23.2 ± 1.3	25.1 ± 2.4
Weight / kg (X ± SE)	72.4 ± 1.6	69.2 ± 3.4
Duration of surgery / min (X ± SE)	20.1 ± 2.4	18.3 ± 1.8
Impactions / partially impactions	3/7	4/6
Sections of molars (Yes / No)	4/6	5/5

Results

The inferior alveolar nerve block was successfully achieved in all 20 patients. Differences in onset time between groups were small and statistically insignificant (Tab. 2). Both groups of patients demonstrated duration of the long-lasting range, although the duration of bupivacaine induced anaesthesia was slightly longer, but not significantly different (Tab. 2).

Intensity of the achieved anaesthesia after the intraoral block was similar in both groups, estimated clinically by visual analogue and verbal rating scales, and no additional anaesthesia was needed in any of the cases (Tab. 3).

Postoperative analgesia, leading to a reduced need for administration of postoperative analgesics, was of long-duration; only 2 patients in the bupivacaine group felt some postoperative pain, without the need for pain medication (Tab. 4).

Table 2. Onset and Duration of the Inferior Alveolar Nerve Block

Groups	N	Onset/min (X ± SE)		Duration/min (X ± SE)	
		numbness	pinprick	numbness	pinprick
Ropivacaine	10	7.3 ± 3.5	5.6 ± 2.3	582 ± 67	450 ± 73
Bupivacaine	10	8.7 ± 2.2	7.4 ± 1.4	688 ± 85	550 ± 48

Table 3. Intensity of the Inferior Alveolar Nerve Block

Method of measurement		Intensity	
		Ropivacaine	Bupivacaine
V A S (mm)		12 ± 2	14 ± 3
V R S	no pain at all	7	5
	just noticeable pain	3	4
	weak pain	0	1
	moderate pain	0	0
	severe pain	0	0
	excruciating pain	0	0
Total number		10	10

Table 4. Postoperative analgesia

Parameters	Groups	
	Ropivacaine	Bupivacaine
Postoperative pain (No. of patients)	0	2
Need for pain medication No. of ibuprofen doses (400 mg)	0	0

Discussion

Ropivacaine 0.75% exerted good local anaesthetic properties to fulfil demands for painless oral surgery in the mandible, comparable with those obtained with bupivacaine. Differences in onset time between the groups were small which could be considered as clinically insignificant, because all the values were below the usual ones accepted for the onset of local anaesthesia achieved by long-acting local anaesthetics. A small reduction in the onset time noted after the inferior alveolar nerve block with ropivacaine could possibly be the result of the use of a higher concentration of the solution when compared to bupivacaine. Similarly, it was also reported that the onset of sensory block was shorter in the ropivacaine group than in the bupivacaine for cervical plexus block, again without significant clinical difference[2].

Concerning duration of the achieved inferior alveolar nerve block, both groups of patients demonstrated duration of the long-lasting range, although the duration of bupivacaine induced anaesthesia was slightly longer, but not significantly different. The slight difference in length of sensory anaesthesia following nerve blocks has also been reported when identical doses of ropivacaine and bupivacaine were applied for spinal[8], as well as for brachial plexus bock[9]. It was suggested that the shorter duration of anaesthesia achieved with ropivacaine, compared to that of bupivacaine, could be the result of

lesser lipid solubility of ropivacaine[10] and consequent lesser absorption by nerve tissue after local application.

The intensity of the achieved local anaesthesia is probably one of the most important concerns in dentistry. Probably due to the relatively shorter duration of anaesthesia, previous studies have established ropivacaine as a slightly less potent local anaesthetic compared with bupivacaine[6]. Our study, however, pointed to a similar intensity of the achieved anaesthesia after the intraoral block in both groups, estimated clinically by visual analogue and verbal rating scales. Profound block anaesthesia in the ropivacaine group, without any pain during surgery, was achieved in 70% of patients, which was even slightly higher than in the bupivacaine group. However, probably the most important result was that no additional anaesthesia was needed in any of the cases. Some favourable effects of ropivacaine, noticed in this clinical investigation, could be attributed to the slightly higher concentration of ropivacaine than bupivacaine used in the study and, additionally, by the already noticed vasoconstrictive properties of ropivacaine that interfere with the vascular resorption of the local anaesthetic[11,12], which is probably of special importance in intraoral use of this solution.

An advantage of using long-duration local anaesthetics in dentistry, especially oral surgery, is their longer postoperative analgesia, which leads to a reduced need for the administration of postoperative analgesic drugs. In this investigation, only 2 patients in the bupivacaine group experienced some pain postoperatively. If we have in mind that the duration of sensory block was longer in the bupivacaine group, and that both anaesthetics used in this study satisfied requests of postoperative pain control, we would possibly need a larger group of patients and further research to clarify the possible analgesic superiority of ropivacaine over bupivacaine when used in oral surgery.

On the basis of these preliminary results of this clinical study, ropivacaine seems to be suitable for achieving inferior alveolar nerve block during lower third molar surgery, exerting satisfactory intensity of local anaesthesia and prominent postoperative analgesic potency, similar to that of bupivacaine. Accordingly, ropivacaine could be recommended for use in oral surgery when a long-acting anaesthetic is indicated. Moreover, its faster onset and recovery of sensory block, as well as lowered cardio-toxicity[5], could be an attractive advantage over bupivacaine. However, further studies are needed to verify these favours.

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