

# Infiltration with ropivacaine decreases postoperative pain following extraction of third molar teeth in ambulatory surgery

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## Abstract

**Background:** molar teeth extraction induces moderate to severe pain that could be prevented by local infiltration with long acting local anaesthetic.

**Patients and Methods:** In a prospective double-blind randomised, placebo-controlled single- centre study we assessed the efficacy and safety of 0.75% ropivacaine for postoperative pain relief in 110 patients undergoing ambulatory surgery for extraction of third molar teeth under

general anaesthesia..

**Results:** Patients given ropivacaine had lower maximum visual analogue pain scores (VAS) during the first 6 postoperative hours and a longer delay before the use of rescue medication ( $P < 0.001$ ).

**Conclusion:** Local infiltration with ropivacaine provides effective postoperative analgesia lasting for 6 hours after third molar teeth extraction.

**Keywords:** ambulatory surgery; patient-controlled anesthesia; peripheral nerve block.

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## Introduction

Impacted molar teeth extraction is a common procedure performed in young adults [1]. It is responsible for moderate to severe pain in the immediate postoperative period [1]. Infiltration with long-acting anaesthetics has been demonstrated to produce postoperative analgesia lasting for several hours following various surgical procedures [1]. Bupivacaine, which is commonly used in this setting, conveys a risk of central nervous system and cardiac toxicity [2–6], that is less important with ropivacaine, a long acting local anaesthetic with a better safety profile [7]. In the current study, we assessed the efficacy of local infiltration with a 0.75 % ropivacaine solution to provide pain control after impacted molar teeth extraction.

## Methods

ASA I-II adults patients, scheduled for patients bilateral impacted mandibular molar teeth extraction under day case general anaesthesia were included in the study after local ethical committee approval. Patients were allocated randomly in two groups before anaesthesia, using a random numbers table, to receive ropivacaine (7.5 mg/ml) or isotonic saline solution for local infiltration. All the patients were premedicated with 50-100 mg of hydroxyzine and received 2 g of amoxicilline and of 2 mg/kg of solumedrol before surgery. Anaesthesia was performed with propofol for induction and maintained with sufentanil boluses (up to 10 µg) desflurane, and nitrous oxide 50 % in oxygen. Local infiltration with ropivacaine or saline was performed after anaesthetic induction For each mandibular molar tooth, 2.0 ml of the allocated solution were infiltrated close to the inferior alveolar nerve and 1.0 ml in the surrounding soft

tissue. Surgery was performed by a single surgeon using a standard technique, bone being removed by a water-cooled bur in a surgical drill. All patients were discharged on the same day, after 6 hours period of monitoring in the recovery room.

Postoperatively, patients received tramadol 100 mg intravenously when they complained of pain (VAS > 30). Paracetamol, 2 g every 6 hours, was given systematically after hospital discharge. Pain intensity was assessed postoperatively on a visual analog scale, graded from 0 (no pain) to 100 (the worst pain imaginable). Pain measurements were performed at 30 min, 1, 2, 6, 12 and 24 hours after completion of surgery, and at the time of i.v. tramadol administration. All patients were asked to complete a diary card for 24 h, reporting the VAS scores. The primary outcome aimed to detect a 50% difference between VAS scores in the both groups. Surrogates were the time of first rescue medication (tramadol) administration, the percentage of patients who required i.v. tramadol, the percentage of patients who did not require pain treatment during the first 24 hours, the maximum VAS score measured postoperatively and the VAS scores at 6, 12 and 24 h postoperatively.

Group size (55 patients per group) was selected by using proportion samples size estimates (power = 95%,  $\alpha = 5\%$ ) to detect a 50% difference in VAS scores that we expected to be at the advantage of infiltration with ropivacaine. A Mann-Whitney U-test was used for comparison of demographics. Statistical analysis used a two-way analysis of variance for VAS scores; when a difference was documented, a post hoc Scheffé's F test was performed for intergroup comparisons. Categorical variables were analyzed with a 2 test. Values are reported as mean  $\pm$  standard deviation excepted for VAS expressed as mean  $\pm$  standard deviation

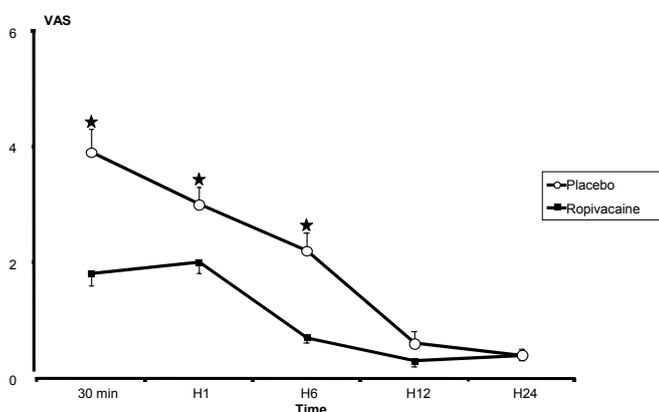
## Results

110 patients (55 in the placebo and 55 in the ropivacaine group) were included in the study. Demographics were comparable in the two groups (Table 1). VAS scores were significantly lower in the ropivacaine group during 6 hours (figure 1). The maximum VAS scores was higher in the saline group ( $39 \pm 23$  vs  $18 \pm 19$  at 30 min –  $p < 0.05$ ;  $30 \pm 17$  vs  $20 \pm 17$  at one hour –  $p < 0.05$  and  $20 \pm 22$  vs  $7 \pm 11$  at six hours –  $p < 0.05$ ) but not after ( $6 \pm 11$  vs  $3 \pm 8$  at 12 hours and  $4 \pm 8$  vs  $4 \pm 9$  at 24 hours in the saline and ropivacaine groups respectively). The percentage of pain-free patients was higher in the ropivacaine group (67% vs 35%;  $p < 0.001$ ). The time to the first tramadol administration was longer in the ropivacaine group (4h versus 1h).

**Table 1** Characteristics of patients. Data are expressed as means  $\pm$  SD excepted for the number of third molar extracted reported as median [extreme].

	Ropivacaine (n=63)	Placebo (n=45)
Age (years)	$19 \pm 7$	$20 \pm 8$
Sex (M/F)		
Height (cm)	$166 \pm 8$	$166 \pm 8$
Weight (kg)	$56 \pm 11$	$59 \pm 13$
Third molar extracted (n)	4 [2-4]	4 [2-4]

**Figure 1** VAS for pain during the first 24 hours. Data are expressed as mean  $\pm$  SEM (\*  $p < 0.05$  versus ropivacaine) faire une figure avec des SD et respecter les temps de mesure des scores VAS.



## Discussion

Postoperative pain control is critical in ambulatory surgery patients for it has been documented to be the primary cause of delayed or impaired hospital discharge [8]. This is because third molar extraction is a common procedure with pain frequently moderate or severe in intensity, and with sufficient numbers of patients to make studies relatively easy to perform [9]. In patients operated under general anesthesia and who do not receive any local infiltration, intravenous paracetamol or morphine are needed to treat postoperative pain [10].

The current study supports that local infiltration with ropivacaine versus placebo is effective to control postoperative pain after third molar teeth extraction. VAS scores and analgesic consumption are lower in the ropivacaine group when compared to saline group. These results are in accordance with a previous study comparing infiltration in the same purpose with 2.5 and 7.5 mg of ropivacaine. Only ropivacaine at 7.5 mg/mL produced sufficient anesthesia. The onset of pulpal anesthesia occurred less than 10 minutes after

injection and lasted for 2 to 6 hours [11]. The same drug was able to achieve a reduction of pain scores for 10 h with a single dose wound infiltration after shoulder surgery [12].

The importance of postsurgical blockade on the prevention of sensitization leading to increase pain at later time points is illustrated by the blockade of pain with bupivacaine when compared with lidocaine or sodium chloride in the well-designed study edited by Gordon et al [13]. Though most of the local anesthetics used are short-acting and it reduces their interest to prolong analgesia. In this indication, lidocaine was shown to be efficient no more than 2 hours when compared to others local anesthetics [6]. Bupivacaine, a local anesthetic agent widely used in surgical and obstetric practice, has a longer duration of action than lidocaine with a time of onset of anesthesia as rapid as lidocaine [14,15]. The duration of analgesia is considerably extended when bupivacaine is used, and as a result patients have less postoperative pain [16,19]. Even if ropivacaine appears to be less potent than bupivacaine in term of length of analgesia [20], preclinical studies suggest that it presents a lower arrhythmogenicity than bupivacaine [21]. This study shows that ropivacaine could be useful as a local anesthetic for molar extraction in dentistry in ambulatory surgery and that the very long duration of both pulpal and soft tissue anesthesia may be favorable in reducing postoperative pain.

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