

Hemodynamic and Cardiovascular Effects of 0.5% Ropivacaine and 0.5% Bupivacaine for Local Anesthesia in Impacted Third Molar Surgery: A Randomised, Double-Blind, Clinical Study

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ABSTRACT

Aim: To compare the anaesthetic efficacy, duration of action, hemodynamic changes and cardiovascular effects of 0.5% ropivacaine and 0.5% Bupivacaine, in bilateral symmetrical impacted third molars.

Materials and Method: This was a randomised double-blind trial involving 10 healthy patients in two groups consisting of 5 patients in each group who required bilateral removal of impacted mandibular third molars. In group A, 0.5% ropivacaine was used as local anaesthetic agent whereas in group B, 0.5% Bupivacaine was used. A classic inferior alveolar and long buccal nerve block was given in both the group. The time of onset and duration of action, pain, and haemodynamic changes were monitored throughout the procedure. Independent -t test was applied to compare the result.

Result: ECG abnormalities were detected in group A in which t wave micro inversion was seen in V3 lead which was clinically not significant (less 1 mm) and there was no ECG abnormalities seen in the group B. Mean systolic /diastolic pressure pre and post for group A surgical extraction was 118±5.33/78.6±5.4 and 129.6±4.5/80±5.08 respectively whereas in group B mean systolic /diastolic pressure pre and post are 125.08±23.02/79.6±15.27 and 131±18.84 /81.8±13.25 respectively. Mean pulse rate in group A pre and post surgical extraction are 76.2±6.79 and 69.6±10.33 whereas in group B are 83.2±1.87 and 86.8±10.18 respectively.

Conclusion: ECG changes are seen in ropivacaine group and hemodynamic changes are seen in both groups. Bupivacaine appears to be safer than ropivacaine.

Keywords: ECG, Cardiovascular effects, Bupivacaine, Ropivacaine, Impacted.

INTRODUCTION

Impacted lower third molar extraction is a most common procedure performed in young adults. It is responsible for moderate to severe pain in the immediate postoperative period¹. Infiltration with long acting anesthetics has been demonstrated to produce postoperative analgesia lasting for

several hours following various surgical procedures. Bupivacaine, which is commonly used in this setting, conveys a risk of central nervous system and cardiac toxicity that is less important with ropivacaine, a long acting local anesthetic with a better safety profile^{2,3}. Ropivacaine is a new long-acting amide local anesthetic with a potentially improved safety profile when contrasted with

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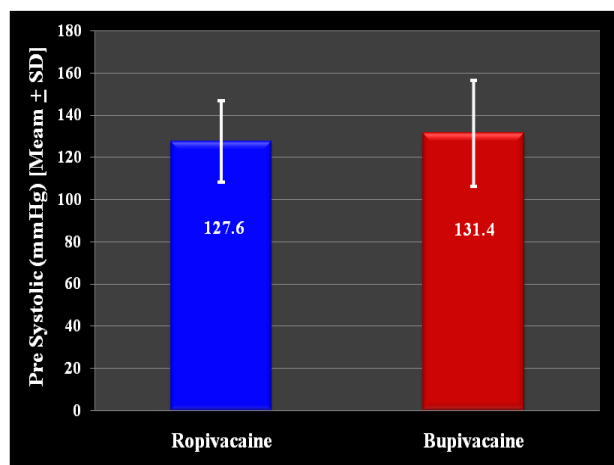


Fig 1: Preoperative systolic blood pressure in Group A – ropivacaine and Group B - Bupivacaine

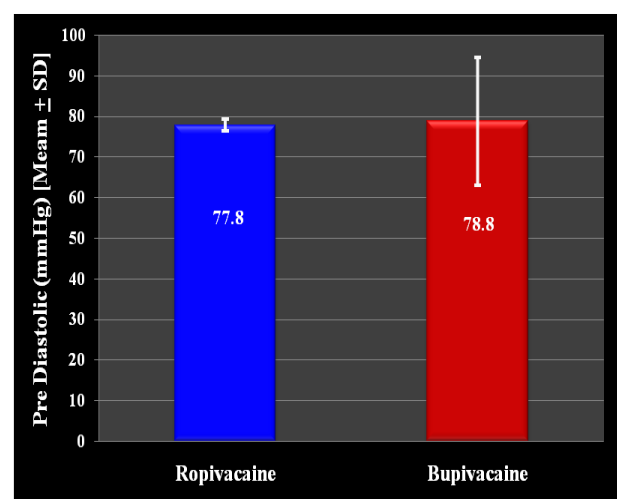


Fig 2: Preoperative diastolic blood pressure in Group A – ropivacaine and Group B - Bupivacaine

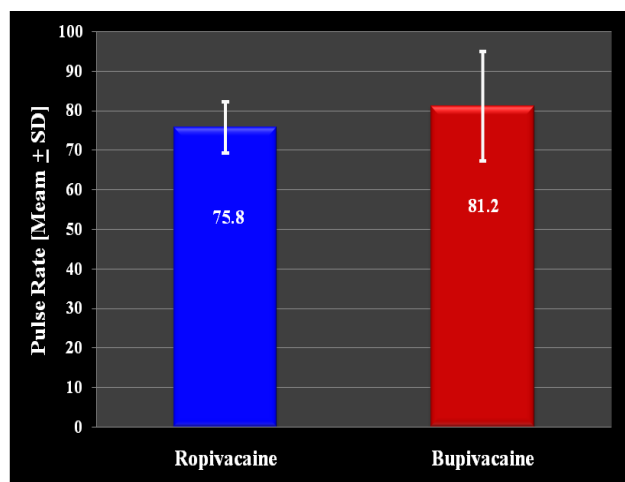


Fig 3: Preoperative pulse rate in Group A – ropivacaine and Group B – Bupivacaine.

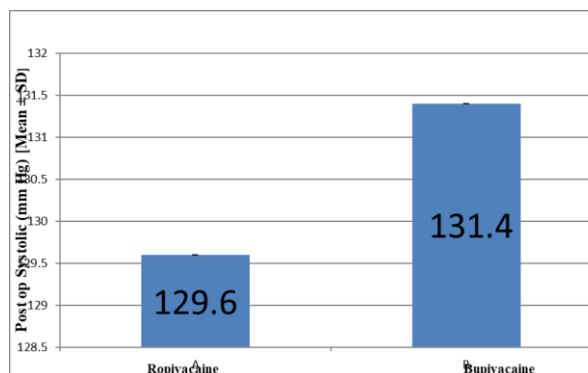


Fig 4: Postoperative systolic blood pressure in Group A – Ropivacaine and Group B - Bupivacaine

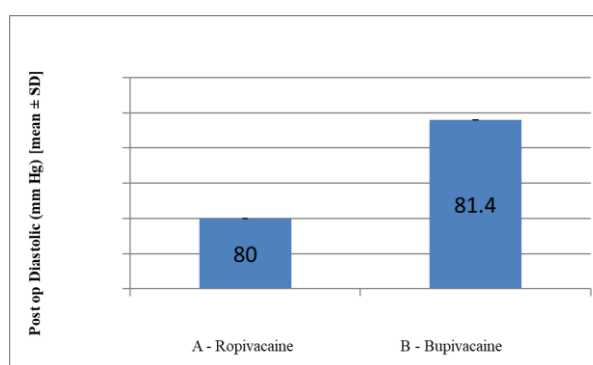


Fig 5: Postoperative diastolic blood pressure in Group A – Ropivacaine and Group B – Bupivacaine.

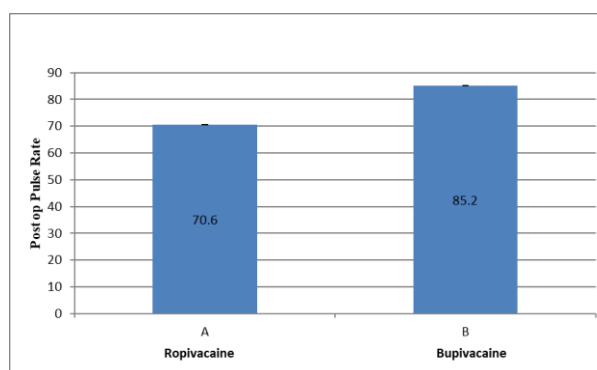


Fig 6: Postoperative pulse rate in Group A – Ropivacaine and Group B – Bupivacaine.

Bupivacaine for which potent cardiac and neurologic toxic effects, even in small doses, have been reported. Ropivacaine is less cardiac and neurologic toxic that suggests a potential clinical advantage of ropivacaine over Bupivacaine when large volumes of local anesthetics are required for peripheral nerve blocks, epidural or spinal anesthesia. Various controlled clinical studies have demonstrated that ropivacaine produces a dose-dependent peripheral anesthetic

effect. Electrocardiographs (ECGs) have been used to monitor the electrical activity of the heart for many years and are still routinely used in many situations. They are rarely used in routine outpatient dental practice. However, for many years it has been shown that unexpected and asymptomatic disorders of cardiac rhythm and conduction may be discovered during examination of apparently healthy individuals.^{3,4} Electrocardiographs (ECGs) have been used to monitor the electrical activity of the heart for many years and are still routinely used in many situations. However, for many years it has been shown that unexpected and asymptomatic disorders of cardiac rhythm and conduction may be discovered during examination of apparently healthy individuals.¹ There is little information on the efficacy of 0.5% ropivacaine and 0.5% Bupivacaine for local anesthesia in impacted third molar surgery. In volunteers, not undergoing a surgical procedure, showed that a long-acting duration of soft tissue.^{1,2}

AIM

To compare the anaesthetic efficacy, duration of action, hemodynamic changes and cardiovascular effects of 0.5% ropivacaine and 0.5% Bupivacaine, in bilateral symmetrical impacted third molars.

MATERIAL AND METHOD

This was a randomised double-blind trial involving 20 healthy patients in two groups consisting of 10 patients in each group who required bilateral removal of impacted mandibular third molars. In group A, 0.5% ropivacaine was used as local anaesthetic agent whereas in group B, 0.5% Bupivacaine was used. A classic inferior alveolar and long buccal nerve block was given in both the group. The time of onset and duration of action, pain, hemodynamic and ECGs changes were monitored throughout the procedure. Independent - t test was applied to compare the result.

RESULT

ECG abnormalities were detected in group A in which t wave micro inversion was seen in V3 lead which was clinically not significant (less 1 mm) and there was no ECG abnormalities seen in the group B. The mean systolic pressure of both group

A and B preoperatively were 127.6 ± 5.33 mmHg and 131.4 ± 23.02 mmHg (Figure 1). Mean diastolic blood pressure preoperatively in both group A and B was 77.8 ± 5.4 and 78.8 ± 15.27 (Figure 2). Preoperative pulse rate of both group A and B were 75.8 ± 6.79 and 81.2 ± 1.87 (Figure 3). Similarly the mean systolic blood pressure postoperatively in both group A and B were 129.6 ± 4.5 and 131 ± 18.84 mmHg (Figure 4). Mean postoperative diastolic pressure for group A and B were 80 ± 5.08 and 81.4 ± 13.25 mm Hg respectively (Figure 5). Mean postoperative pulse rate for both group A and B were 70.6 and 85.2 respectively (Figure 6).

DISCUSSION

According to Deleuze et al did a prospective double-blind randomized, placebo-controlled single-centre study they 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 anesthesia and found that local infiltration with ropivacaine provides effective postoperative analgesia lasting for 6 hours after third molar teeth extraction.²

Brkovic et al assessed that the clinical efficacy and hemodynamic effects of ropivacaine for infiltration anesthesia in patients undergoing surgical removal of upper third molars and suggested that 0.75 and 1% ropivacaine offers adequate and safe intraoperative analgesia but not successful postoperative pain control for the surgical removal of upper third molars.⁵

Leonardo et al compared the clinical efficacy of 4% articaine and 0.5% bupivacaine in fifty patients underwent removal of symmetrically positioned lower third molars, in 2 separate appointments, under local anesthesia either in a double-blind, randomized, and crossover manner. Time to onset, duration of postoperative analgesia, duration of anesthetic action on soft tissues, intraoperative bleeding, and hemodynamic parameters were evaluated. A statistically significant difference between the time to onset of A200 (1.66 ± 0.13 minutes) and B200 (2.51 ± 0.21 minutes) was found ($P \pm .05$). There was no statistically significant difference in the duration of analgesia, whether the patient was subjected to osteotomy or not, regardless of the local anesthetic

used (3 to 4 hours; $P \geq 0.05$). However, when patients received B200 they experienced a statistically significant longer period of anesthesia on the soft tissues as compared with when they had received A200 (around 5 hours and 4 hours, respectively, $P \geq 0.05$). The surgeon's rating of intraoperative bleeding was considered very close to minimal for both anesthetics. In the surgeries with osteotomy, the comparison between A200 and B200 showed statistically significant differences in the diastolic (64 mm Hg and 68 mm Hg, respectively, $P = 0.001$) and mean arterial pressure (86 mm Hg and 89 mm Hg, respectively, $P = 0.031$) when data from all the surgical phases were pooled. Additionally, the mouth opening at the suture removal was statistically different for A200 and B200 solutions (91.90% $\pm$ 3.00% and 88.57% $\pm$ 2.38% of the preoperative measure, respectively) when surgeries required bone removal ($P = 0.05$).⁶

CONCLUSIONS

In comparison with 0.5% Bupivacaine, 0.5% ropivacaine (both with 1:200,000 epinephrine) provided a shorter time to onset and comparable homeostasis and postoperative pain control with a shorter duration of soft tissue anesthesia in lower third molar removal.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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