

Bupivacaine as the Choice of Adjunctive Local Anaesthesia for Lower Third Molar Surgery Under General Anaesthesia: A Mini Review



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Abstract

Introduction: We describe the adjunctive use of local anaesthesia during surgical removal of lower third molars under general anaesthesia to manage postoperative pain. Our limited study shows that it is beneficial to administer a long-acting local anaesthetic such as bupivacaine with adrenaline for prolonged pain control.

Method: Eleven patients, requiring lower third molar extractions under general anaesthetic were included in this study. Parameters recorded were type, volume and concentration of local anaesthetic used +/- adrenaline as well as intraoperative analgesia prescribed by anaesthetist. All patients were administered bupivacaine by infiltration to the buccal and lingual vestibules in the anaesthetic preparation room immediately after induction and intubation. A pain questionnaire was filled by the patients a few days after their procedure.

Results: The overall low pain scores was low. A mean duration of postoperative anaesthesia was 9.4 hours. The average time to first rescue analgesic medication was 8.9 hours. The mean postoperative pain score was 3 after waking up from general anaesthesia and 5 after the anaesthetic effects of bupivacaine had worn off. Three patients did not require postoperative analgesic medication.

Conclusion: Bupivacaine with adrenaline provides excellent prolonged postoperative pain control and analgesia following surgical removal of lower third molars for up to twelve hours. The duration of anaesthetic effect is prolonged by the addition of epinephrine 1:200,000 [1]. Hence, the time to rescue analgesic medication is much longer and the need for analgesia is reduced [1,2]

Introduction

Local anaesthesia and pain management are the most important tenets in any oral surgical procedure [2,3]. Effective pain control in a surgical procedure facilitates patient cooperation and reduces patient anxiety [2,4]. The choice of local anaesthetic with or without a vasoconstrictor depends on the length of the dental procedure and weighed against the onset and duration of action of the local anaesthetic [2,3]. The adjunctive use of local anaesthesia during surgical removal of lower third molars under general anaesthesia (GA) is commonly used to manage postoperative pain [4-6]. Furthermore, the use of a long-acting local anaesthetic such as bupivacaine with adrenaline prolongs pain relief [2,6-8]. The purpose of this article is to discuss the benefit of adjunctive bupivacaine with adrenaline in lower third molar surgery under general anaesthesia.

Method

Eleven medically fit patients (Table 1), requiring lower third molar extractions under general anaesthetic were included. No alterations were made to the treatment plan, local anaesthetic or operative technique for the purpose of this article. Parameters recorded were type, volume and concentration of local anaesthetic used +/- adrenaline as well as intraoperative analgesia prescribed by anaesthetist. All patients were administered bupivacaine as infiltrations in the buccal and lingual vestibules via 2ml syringes with a 23 Gauge needle (23G Hypo Needle Safety BD Eclipse) and 0.5ml Insulin Syringes (BD Microfine Plus Demi 0.5ml Insulin Syringe 29Gx12.7mm). The local anaesthetic was administered in the anaesthetic preparation room immediately after induction and intubation. The patients were called a few days after their procedure to fill a pain questionnaire (Figure 1) with consent.

The visual analogue scale was used to help the patient decide their duration of anaesthesia as well as time to their first rescue their postoperative pain score (Table 2). Patients were also asked analgesic medication.

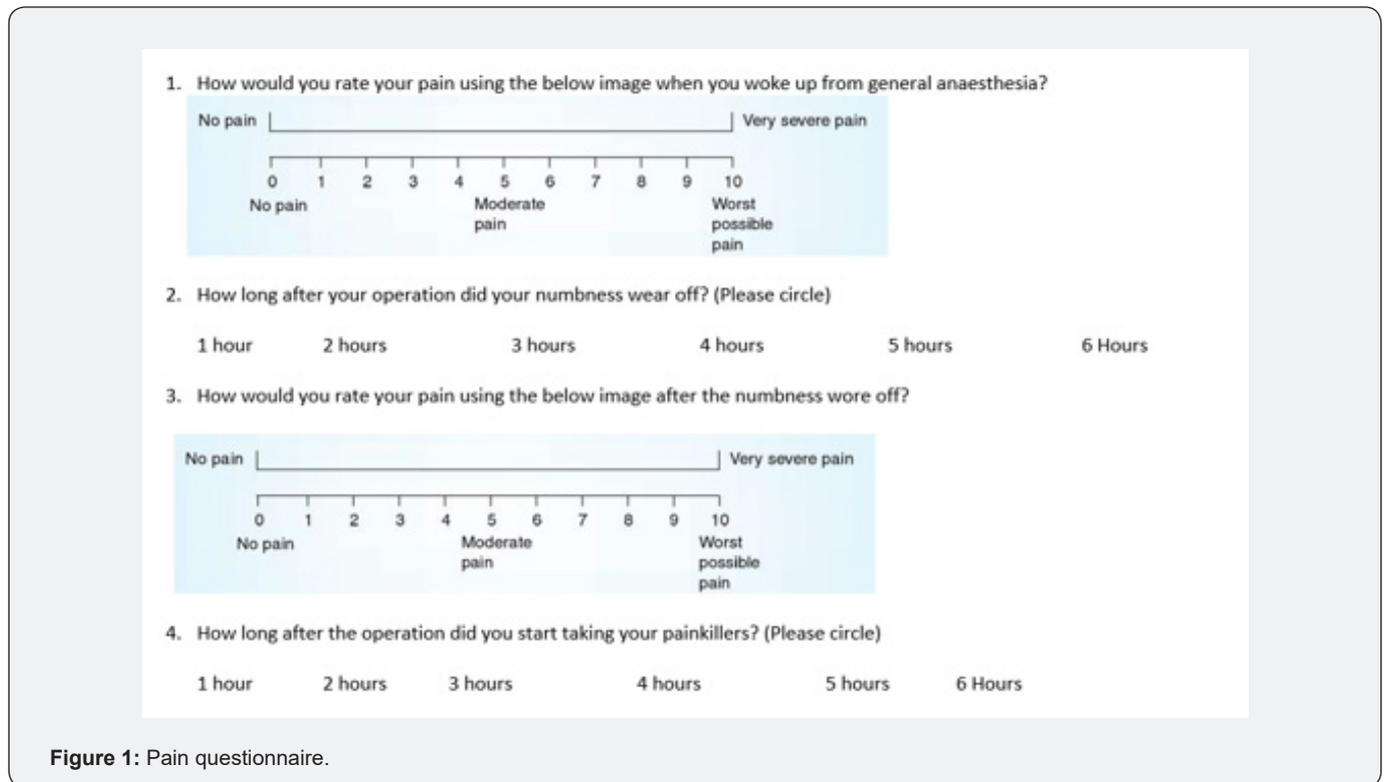


Figure 1: Pain questionnaire.

Table 1: Data Collection sheet for each case.

Case	Patient Demographics	Procedure under GA	Local Anaesthetic Used	Intraoperative Analgesia
1	Male, 51 years old, American Society of Anaesthesiologists Classification (ASA) 1	Extraction of Lower right third molar (LR8)	5ml, 0.25% bupivacaine, 1:200,000 adrenaline	Fentanyl 100mg Paracetamol 1g Diclofenac 75mg
2	Female, 29 years old, ASA 1	Extraction of LR8 and lower left third molar (LL8)	10ml, 0.5% bupivacaine, 1:200,000 adrenaline	Fentanyl 100mg Paracetamol 1g Diclofenac 75mg
3	Female, 18 years old, ASA 1	Extraction of LR8	3ml, 0.5% bupivacaine, 1:200,000 adrenaline	Fentanyl 100mg Paracetamol 1g Diclofenac 75mg
4	Male, 27 years old, ASA 1	Extraction of LR8, LL8, upper right third molar (UR8), upper left third molar (UL8)	10ml, 0.5% bupivacaine, 1:200,000 adrenaline	Paracetamol 1g Fentanyl 100mg Morphine 4mg
5	Male, 25 years old, ASA 1	Extraction of LR8, LL8, UR8, UL8	10ml, 0.5% bupivacaine, 1:200,000 adrenaline	Morphine 5mg Paracetamol 1g Diclofenac 75mg Fentanyl 100mcg
6	Male, 30 years old, ASA1	Extraction of LR8, LL8, UR8, UL8	14ml, 0.5% bupivacaine, 1:200,000 adrenaline	Morphine 5mg Paracetamol 1g Diclofenac 75mg Fentanyl 100mcg
7	Male, 22 years old, ASA 1	Extraction of LR8, LL8	8.5ml, 0.5% bupivacaine, 1:200,000 adrenaline	Paracetamol 1g Remifentanyl infusion (0.1micrograms/kg/min)
8	Male, 17 years old, ASA 1	Extraction of LR8, LL8	9ml, 0.5% bupivacaine, 1:200,000 adrenaline	Paracetamol 1g Remifentanyl infusion (0.1micrograms/kg/min)

9	Female, 22 years old, ASA 1	Extraction of LR8, LL8, UR8, UL8	8ml, 0.5% bupivacaine, 1:200,000 adrenaline	Paracetamol 1g Morphine 5mg Diclofenac 75mg Remifentanyl infusion (0.1micrograms/kg/min)
10	Female, 43 years old, ASA 1	Extraction of LR8, LL8, UL8	8ml, 0.5% bupivacaine, 1:200,000 adrenaline	Paracetamol 1g Diclofenac 75mg Remifentanyl infusion (0.1micrograms/kg/min) Fentanyl 100mcg
11	Female, 34 years old, ASA 1	Extraction of UL8, LL8	8ml, 0.5% bupivacaine, 1:200,000 adrenaline	Paracetamol 1g Remifentanyl infusion (0.1micrograms/kg/min)

Results

The results of our questionnaire (Table 2) showed that bupivacaine has a long duration of anaesthesia and time to first rescue analgesic medication. A mean duration of postoperative anaesthesia was 9.4 hours. The average time to first rescue analgesic medication was 8.9 hours. The mean postoperative pain

score was 3 after waking up from general anaesthesia and 5 after the anaesthetic effects of the bupivacaine had worn off. Three patients did not require postoperative analgesic medication. All cases requiring the lower third molars to be removed surgically involved bucco-gingival incisions prior to raising mucoperiosteal flaps, bone removal, sectioning of teeth with burs and repair of incisions with absorbable sutures.

Table 2: Table of results.

Case	Pain score from Q1	Hours from Q2	Pain score from Q3	Hours from Q4
1	4	12	9	8
2	0	10	3	12
3	0	12	5	8
4	0	6	0	No painkillers required
5	4	12	1	12
6	5	12	6	12
7	0	6	6	6
8	6	12	8	No painkillers required
9	5	6	8	8
10	10	3	8	5
11	0	12	5	No painkillers required

Discussion

The long-acting amide local anaesthetic bupivacaine does provide excellent surgical anaesthesia and extended postoperative analgesia [1,2,6-9]. Our limited study shows that bupivacaine with adrenaline provides prolonged postoperative pain control and analgesia in the surgical removal of lower third molars for up to twelve hours [7,8]. It is believed bupivacaine with adrenaline reduces analgesic requirements and delays the initial request for postoperative analgesia in the early postoperative hours when the maximum pain intensity is reached [1,7,8]. The addition of adrenaline to bupivacaine have several benefits including a decrease in the peak plasma concentration of the local anaesthetic agent, increase in the duration and the quality of anaesthesia, reduction of the minimum concentration of anaesthetic needed for nerve block, and reduction of blood loss [3,5,9]. Our patients had mild pain or no pain after waking

up from general anaesthesia. The onset of action of bupivacaine is approximately 2 to 10 minutes and anaesthesia may last two or three times longer than lidocaine and mepivacaine [1,9]. The administration of local anaesthetic infiltrations in the anaesthetic preparation room allows time to facilitate maximal anaesthetic effect before the surgical procedure is commenced. The volume of local anaesthetic required is low, demonstrating high anaesthetic potency and efficacy [6,8]. The duration of anaesthetic effect is prolonged by the addition of epinephrine 1:200,000 [9]. Hence, the time to rescue analgesic medication is much longer and the need for analgesia is reduced [1,9]. The overall pain scores were found to be low. The increased duration of action of bupivacaine to modify postoperative pain after surgical removal of lower third molars has allowed our patients wake up in a pain-free, relaxed manner. The use of intraoperative analgesics by the anaesthetist under general anaesthetic is considered the norm. It was noted

by one anaesthetist, that there was a significant reduction in pain stimulation from the patients under general anaesthesia due to the high anaesthetic potency and efficacy of 0.5% bupivacaine 1:200,000 adrenaline [6,7]. This, in turn, facilitated a dose reduction in intraoperative remifentanyl for some patients. None of our patients experienced complications owing to the long duration of effective local anaesthesia.

Conclusion

Several factors are responsible for the efficacy of local anaesthesia. There are multiple factors such as technique variability, route of administration, anatomical variations, pain threshold, complexity of the procedure, and reporting error [10]. There are only a handful of studies in the literature assessing the efficacy of bupivacaine in the surgical removal of lower third molars [6,9]. Our observations confirm that the use of bupivacaine provides profound local anaesthesia, lack of adverse reactions, and increased duration of action [1,8]. We therefore conclude that adjunctive bupivacaine 0.5% with 1:200,000 epinephrine is highly effective in controlling perioperative and postoperative pain after the surgical removal of lower third molars under general anaesthesia [4,6]. Further long-term randomised controlled trials are required to underscore clinical efficacy of bupivacaine and motivate its continued use and evaluation in oral and maxillofacial surgery.

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