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A COMPARATIVE STUDY BETWEEN LIGNOCAINE HYDROCHLORIDE WITH EPINEPHRINE AND LIGNOCAINE HYDROCHLORIDE WITH EPINEPHRINE & BUPRENORPHINE FOR ASSESSING POST OPERATIVE ANALGESIC EFFECT AFTER REMOVAL OF MANDIBULAR IMPACTED THIRD MOLARS

Maxillofacial Surgery

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ABSTRACT

The study was designed to evaluate the efficacy of 0.3mg buprenorphine hydrochloride added 2% lignocaine hydrochloride with adrenaline 1:200000 in providing postoperative analgesia after minor oral surgery. 60 adult patients who were scheduled to undergo surgical removal of impacted mandibular third molar were enrolled in this study. Patients were randomly assigned into one of the two groups based on whether they received 0.3mg buprenorphine hydrochloride added 2 % lignocaine hydrochloride with adrenaline 1:200000 (Group A) or (Group B) 2 % lignocaine hydrochloride with adrenaline 1:200000 alone. Visual analog scale method was used for evaluation of the postoperative analgesia. Addition of small amounts of 0.3mg buprenorphine hydrochloride (0.25ml) to (9.75ml) 2% lignocaine hydrochloride with adrenaline 1:200000 for surgical removal of impacted mandibular third molar results in significant improvement in postoperative analgesia up to 72 h and markedly reduces the need for excessive analgesic intake. Thus reducing the adverse effects associated with excessive use of NSAIDs.

KEYWORDS

Local anesthesia; Buprenorphine added LA ; Peripheral opioid analgesia.

1.INTRODUCTION:

Buprenorphine hydrochloride was first synthesized in 1966 in the laboratories of Reckitt and Colman in Britain. It is an N-cyclopropylmethyl oripavine and thebaine derivative with a more complex structure than morphine. It is at least 35 times more potent than morphine and about half as potent as fentanyl. It is a long acting, lipid-soluble, mixed agonist antagonist opioid analgesic[2]. Buprenorphine used in therapeutic concentrations in humans, does not appear to cause clinically significant interactions with other cytochrome P-metabolized drugs. The parenteral formulation of buprenorphine has an onset speed within 5-15 minutes of either intravenous or intramuscular administration. Analgesia onset occurs in 15-45 minutes with sublingual buprenorphine.

Buprenorphine is metabolized by the gut and liver. In humans, the majority of any dose by any route is excreted via the gastrointestinal tract. After administration, independent of the route, some 15% of the original dose is excreted in the urine. In short-term treatment with buprenorphine, end stage renal failure does not seem to affect excretion of the drug. Primarily buprenorphine is excreted through biliary route and its metabolites are secreted through renal excretion.

Lignocaine was first synthesized in 1943 by Lofgren and is the first amide type of local anesthetic agent to be marketed in year 1948 and used in dentistry also called as lidocaine, xylocaine. The drug is compatible with all vasoconstrictors and withstands boiling and autoclaving[6]. 4.4 mg /kg not to exceed 300 mg without vasoconstrictor and 7 mg/kg not to exceed 500 mg when used with epinephrine[6]. Onset of action- Rapid (2 to 3 minutes)Effective dental concentration- 2% Anesthetic half life: 1.6 hours (~ 90 minutes).

Lignocaine undergoes biotransformation in liver and its various breakdown products are excreted to some degree in urine 4-hydroxy-2, 6-dimethylaniline being major urinary metabolite.

2.AIMS AND OBJECTIVES:

To compare the efficacy between Lignocaine hydrochloride with epinephrine & buprenorphine and Lignocaine hydrochloride with epinephrine in respect to post operative pain intensity and duration was assessed with NUMERICAL RATING SCALE on 3rd day after removal of mandibular impacted third molar.

3.MATERIAL AND METHODS:

The study was done on 60 patients between age group of 20 – 40 years with impacted mandibular third molar who reported to the Department of Oral & Maxillofacial Surgery, Rajarajeswari Dental College & Hospital, Bangalore.

Patients were divided into two groups (30 each). Group A patients were injected with (2% lignocaine hydrochloride with 1:200000 epinephrine 9.75ml + 0.3mg buprenorphine hydrochloride 0.25ml) and Group B patients were injected with 2% lignocaine hydrochloride with 1:200000 epinephrine. Patients with impacted mandibular third molars with Pederson's difficulty index of mild to moderate were chosen. All cases were performed by single operator. Patients were explained about the procedure with possible complications and informed consent were taken before the procedure.

Inclusion Criteria:

1. Patient in age group 20 to 40 years irrespective of gender.
2. Impacted mandibular third molar teeth free of inflammation.
3. Systemically healthy subjects with no present medical history.
4. Patients not receiving any medications that will alter the perception of pain.

Exclusion Criteria:

1. Patients with history of allergic reactions to LA of amide group and sulphide.
2. Chronic use of CNS depressants or antidepressants.
3. Drug abuse or addiction, Alcohol abuse.
4. Medically compromised patients.
5. Patient giving history of allergic reaction to drugs.

6. Pregnant.
7. Breast-feeding.

Procedure:

Group A:

1. Preparation of the solution 10 units (0.25ml) of 0.3mg buprenorp hine hydrochloride taken in ultrafine insulin syringes (1ml). This measured quantity was mixed in a 10ml syringe containing 9.75ml of 2% ignocaine with adrenaline (1:200000) 2.5ml of this mixture was used per patient to give the local anesthetic block Classical Inferior Alveolar Nerve Block.
2. Under aseptic precautions surgical removal of impacted mandibular third molar was done and primary closure after achieving primary hemostasis.
3. Postoperative instruction were given.
4. Patient was prescribed with-

- Cap.AMOX 500mg TID x 5 days.
- Tab.METROGYL 400mg TID x 5 days.
- Tab.Dexona 2mg BD x 5 days.
- Tab.PAN 40mg OD x 5 days.

5. No analgesic were prescribed and patient was advised to inform at the onset of pain following that analgesics were prescribed.
6. Pain assessment was done on 3rd & 7th day using Visual Analogue Score (VAS).

Group B:

1. Patient were injected with 2% lignocaine with adrenaline (1:200000) in total of 2.5ml solution.
2. Under aseptic precautions surgical removal of impacted mandibular third molar was done and primary closure after achieving primary hemostasis.
3. Postoperative instruction were given.
4. Patient was prescribed with-

- Cap.AMOX 500mg TID x 5 days.
- Tab.METROGYL 400mg TID x 5 days.
- Tab.DEXONA 2mg BD x 5 days.
- Tab.-Tab.PAN 40mg OD x 5 days.

5. No analgesic were prescribed and patient was advised to inform at the onset of pain following that analgesics were prescribed.
6. Pain assessment was done on 3rd & 7th day using Visual Analogue Score (VAS).

4.RESULTS:

The amount of anesthetic injected, duration of anesthesia and duration of analgesia were recorded in each group. Pain experiences were recorded on visual analog scale and verbal response scale. Number of analgesic scale requirements postoperatively for each group were also recorded. The values were compared and statistically analyzed. The results are tabulated. Here statistical test used was student "t"- test.

2.5 ml of drug was administered to achieve adequate anesthesia in both the groups. The mean duration of anesthesia in patients in Group A was 125.66±6.92. The mean duration of anesthesia in patients in Group B was 135±0.00. (Table -I)

The mean duration of analgesia in Group A was 4320±0.00. The mean duration of analgesia in Group B was 190±0.00 with a P value of <0.001. (Table - II)

None of the patients in Group A take analgesics on the 3rd or 7th day. The number of analgesics taken by patients in Group B was 5 by the 3rd day and 10 by the 7th day. (Table -III)

Patients in the Group A none of the patients experienced pain (VAS : 0) Out of the patients treated in Group B, 17 patients experienced moderate pain (VAS : 4-6) and 13 patients experienced severely distressing pain (VAS : 7-9) with the P value > 0.001. (Table -IV)

TABLE I: DURATION OF ANESTHESIA

	GROUP A	GROUP B
MEAN±SD	125.66 ± 6.92	135± 0.00

TABLE II: DURATION OF ANALGESIA

	GROUP A	GROUP B	P value
MEAN±SD	4320±0.00	190±0.00	<0.001

TABLE III: ANALGESIC TAKEN

NO. OF TABLETS TAKEN	3RD DAY		7TH DAY	
	GROUP A	GROUP B	GROUP A	GROUP B
0	30	0	30	0
5	0	30	0	0
10	0	0	0	30
	P=<0.001		P=<0.001	

TABLE IV: VAS SCORE

CRITERIA	SCORE	GROUP A	GROUP B	P Value
NO PAIN	0	30	0	<0.001
MILD PAIN	1-3	0	0	
MODERATE PAIN	4-6	0	17	
SEVERE PAIN	7-9	0	13	
WORST POSSIBLE PAIN	10	0	0	

5.DISCUSSION:

When performing minor surgical procedures under LA, it may require longer duration of anesthesia intraoperatively and postoperatively. In addition to the intraoperative nociceptive barrage during the procedure, postoperative pain is common occurance following surgical and dental procedures due to the resulting tissue injury leading to the release of proinflammatory mediators, cytokines signaling and inflammatory cell infiltrate. Increased expression of proinflammatory cytokines and induction of COX-2, which results in increased prostanoid production 2 to 4 hours after surgery contribute to sensitization, resulting in prolongation of pain[4].

In our study, classical inferior alveolar nerve block technique was used for administering the LA. Lignocaine 2% with adrenaline 1:200000 was used as an anesthetic solution. It produces anesthesia for 1& ½ hour which is sufficient to complete routine minor oral surgical procedures. Buprenorphine was used as the opioid drug to be mixed with local anesthetic because it diffuses better into the perineurium and produces longer effect of analgesia compared to morphine and sufenatil and Buprenorphine HCl is at least 50 times more potent than morphine sulphate and has substantially longer duration of action.

Dobkin (1977) did a double-blind, random assignment study of four groups of 40 patients, relief of severe pain with buprenorphine hydrochloride 0.2 mg or 0.4 mg was evaluated and compared with morphine sulphate 5 or 10 mg. Evaluations included pain intensity, pain relief, sedation and other effects for up to 12 hours after drug administration, following recovery of wakefulness from anaesthesia for major abdominal surgery. Analyses of five parameters showed that the four groups were statistically comparable and that buprenorphine hydrochloride is at least 50 times more potent than morphine sulphate and has a substantially longer duration of analgesic action[5].

Sixty American Society of Anesthesiologists (ASA) P.S. I and II, consenting adults for upper extremity surgery, were prospectively assigned randomly in double- blind fashion to 1 of 3 groups. Group I received local anesthetic (1% mepivacaine, 0.2% tetracaine, epinephrine 1:200,000), 40ml plus buprenorphine 0.3mg, for axillary block, and intramuscular (IM) saline. Group II received local anesthetic-only axillary block, and IM buprenorphine 0.3mg. Group III received local anesthetic-only axillary block and IM saline. Postoperative pain onset and intensity were compared, as was analgesic medication use. Results of the study showed that buprenorphine-local anesthetic axillary perivascular brachial plexus block provided postoperative analgesia lasting 3 times longer than local anesthetic block alone and twice as long as buprenorphine given by IM injection plus local anesthetic-only block. This supports the concept of peripherally mediated opioid analgesia by buprenorphine[3].
A comparative study was done by Kumar S.P et al[1]. to assess the efficacy of Buprenorphine added 2% lignocaine 1:80000 in postoperative analgesia after minor oral surgery on 100 patients. The patients were divided in 2 groups, 50 each. Their study they found that in group 1 where Buprenorphine was added to the local anesthetic mixture, the duration of analgesia in Group I was found to be 36 ± 1.5 h whereas in our study group A which received mixture of local anesthesia and buprenorphine did not had any pain postoperatively even at followup on 7th day. In there study average consumption of NSAIDs was found to be significantly lesser than group 2 in group 1 whereas in our study no NSAIDs were taken by patients in group A while group B has taken 10 tablets. Thus they concluded that addition of small amounts of buprenorphine results in significant improvement in postoperative analgesia upto 36hrs and markedly reduced the need for excessive analgesic intake. Thus reducing the adverse effects

associated with excessive use of NSAIDs. Limitation of our study is smaller sample size. This study need to be carried out with larger sample size for minor surgical procedure.

6.CONCLUSION:

We conclude the addition of (0.25ml) 0.3mg buprenorphine hydrochloride to (9.75ml) of 2% lignocaine hydrochloride with epinephrine 1:200000 gives a prolong analgesic effect and is tolerated well by the patients. It also eliminates the need of postoperative analgesics in patients undergoing removal of impacted mandibular third molar tooth. The study with larger sample size and in different minor oral surgical procedure which need adequate postoperative analgesia needs to be documented.

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