Section: Anesthesia

Original Research Article

THE EVALUATION OF TOPICAL LIDOCAINE USE

Vimal Hastimal Jain[1]

[1]Associate Professor, Department of Anesthesia, SSPM Medical College and Lifetime Hospital, Padve, Sindhudurg, India.

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Corresponding Author:
Dr. Vimal Hastimal Jain,
Email: docjvh@gmail.com

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ABSTRACT

Background: Pain treatment without systemic absorption is growing with topical analgesics. Post-herpetic neuralgia can be treated with lidocaine patches. Dentists utilise topical anaesthetics with 5% lidocaine to lessen injection discomfort, however maintaining extended contact and avoiding periosteum contact is difficult. Innovative DentiPatch lidocaine transoral patches provide efficient local anaesthesia with minimal systemic influence during recurrent injections. **Aim and Objectives:** This study aims to evaluate the efficacy and safety of topical lidocaine. **Materials and Methods:** Lidocaine 5% gel and ice tested for orthodontic discomfort in this clinical experiment. From August 2021 to July 2023, two dentists at a community dentistry clinic collected data with ethical approval. Lidocaine 5% gel or ice was given to eligible participants as topical anaesthesia. Visual analogue scales (VASs) measured heart rates and pain. To compare the two groups' results, paired t-tests and chi2 tests were used. **Result:** Table 1 displays VAS ratings for pain and discomfort during needle insertion and lidocaine 5% gel was applied. The Control group (ice application) had lower mean VAS pain ratings at 1 and 2.5 minutes than the Study group (lidocaine 5% gel) ($p = 0.015$). Pain ratings were comparable at 5 minutes ($p = 0.08$). The study group had more buccal injection pain ($p = 0.039$) but less discomfort ($p = 0.002$). Palatal injection ratings were comparable across groups ($p = 0.249, 0.641$). **Conclusion:** In conclusion, ice as topical anesthesia before oral mucosa relieves pain like lidocaine 5% gel. It is affordable and well-tolerated and data was scarce, the sample size was comparable to earlier studies.

INTRODUCTION

Topical analgesic is used to reduce both acute and long-term pain, targeting periphery nociceptive pathways without minimising plasma absorption. 5% well-tolerated for the therapy of "post-herpetic neuralgia (PHN), is non-toxic.[1] Lidocaine per-meates the skin for soothing effect. Both 5% and 1.8% topical lidocaine systems were authorised by the FDA in 1999 and 2018 respectively in order to relieve PHN-related discomfort.[2] With a 19-fold reduced drug loading (36 mg versus 700 mg) & improved adhesion, the 1.8% system delivers lidocaine more effectively and is similar to 5% lidocaine regions, allows the patch for 12 hour stay in skin.[3] Many illnesses that react to the literature, including PHN, pain in the lower back, carpal tunnel syndrome, and diabetic neuropathy, to topical lidocaine in the legs, also joint pain. Topical lidocaine and other painkillers may help with different neuropathic & nociceptive pain conditions.[4] Also dentists administer topical anaesthetics to the mouth mucosa to reduce discomfort.[5]

Using needles of 27 gauge, staying away from the periosteum, and topical anaesthetics containing 5% lidocaine are common elements. The application of 25-gauge needles, the infusion of a local anaesthetic solution following needle penetration, interaction with the periosteum, and 15 to 45 seconds of contact between the topical agent and the intestinal mucosa when phenol' or benzocaine79 is used as the active topical agent.[6] 25-gauge needles are required for injections into mandibular blocks and some regional anaesthetic procedures, such as infraorbital nerve blocks of data, lingual nerve blocks, posterior upper alveolar blocks containing data, and mental nerve blocks.[7] Mostly, topical anaesthetics are gel, get diluted in mouth for anaesthesia. Dentists cannot avoid touching the periosteum.[8]

Thus, topical anaesthetic system which adhered to the oral mucosa is effective local anaesthetic concentrations.[9] Topical drug shouldn't increase the systemic local anaesthetic concentrations attained by consecutive injections.[11] Approval for the U.S. FDA anaesthetic patches employing a bioadhesive matrix to apply lidocaine directly to the oral mucosa (Noven Pharmaceuticals Inc.'s DentiPatch lidocaine transoral mode of administration) is received containing 23 & 46 mg of lidocaine base every 2 square centimetres.[12]

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MATERIALS AND METHODS

Research design

The purpose of this clinical trial is to evaluate the efficacy of lidocaine 5% gel and ice for the management of orthodontic-related discomfort. The Ethical Review Board and the Medical Products Agency both gave their clearance. From August 2021 to July 2023, two general dentists collected data in a community dental clinic. The individuals who fulfilled the inclusion criteria and gave informed consent were randomly assigned to one of two groups. Topical anaesthesia was applied to the first group with lidocaine 5% gel and to the second group with ice. The patient's heart rates and pain levels were monitored using "visual analogue scales (VASs)". The taste preference was a qualitative evaluation which was marked during the procedure from each patient. The result of the two groups was compared using statistical analysis, specifically paired t-tests and chi2 tests.

Inclusion and Exclusion Criteria

Inclusion

- Patients planning orthodontic therapy that includes the extraction of two contralateral maxillary premolars without pathology.
- Patients under the age of 20 are considered to be in excellent health by the "American Society of Anesthesiologists (ASA)".
- People who don't get anxious about visiting the dentist.
- Participants' willingness to take part in the study, as well as the willingness of their parents or guardians if the subject is under the age of 18.

Exclusion

- Patients with medical problems that may compromise study safety or quality.
- Hypersensitivity to amide-type local anesthetics or topical anesthesia drugs.
- Non-compliance with the study protocol prevented the comparison of the two topical anaesthesia medications.
- Patients without explicit consent from them and their parents/guardians.
- Patients or legal guardians who discontinue or withdraw from the research.

Statistical Analysis

The data were evaluated by statistical analysis employing appropriate methods, such as paired t-tests, to compare the average pain scores between the groups administered with lidocaine 5% gel and ice. Chi-squared tests are utilized to evaluate the disparity in proportions pertaining to discomfort and mucosal irritation. The Pearson correlation tests are utilized to assess potential relationships between variables. Descriptive statistics, namely the mean ± standard deviation (SD), are employed as a means of summarizing the data. A significance level of 0.05 is utilised for all statistical tests.

Ethical Approval

The Regional Ethical Review Board recommended that the study obtain ethical approval.

RESULTS

Table 1 shows VAS ratings for pain and discomfort during needle insertion and lidocaine 5% gel injection. Compared to the Study group (lidocaine 5% gel application), the Control group (ice application) had decreased mean VAS pain ratings at 1 and 2.5 minutes (p = 0.015). At 5 minutes, the two groups had similar pain ratings (p = 0.08). The Study group had higher mean VAS pain ratings for buccal injection than the Control group (p = 0.039). Buccal injection discomfort was considerably reduced in the study group (p = 0.002). Both groups had simi-lar VAS ratings for palatal injection (p = 0.249) and pain (p = 0.641). Lidocaine 5% gel may relieve needle insertion pain better than ice but may in-duce more buccal injection discomfort.

Table 1: VAS ratings after needle insertion and injection after ice and lidocaine 5% gel

Intervention/variable measured (application time)	Control group Ice mean ± SD (mm)	Study group Lidocaine 5% gel mean ± SD (mm)	p-value
VAS pain buccal needle insertion (1 min)	8.9 ± 8.5	7.8 ± 8.7	0.587
VAS pain buccal needle insertion (2.5 min)	10.9 ± 8.8	8.4 ± 9.5	0.015
VAS pain buccal needle insertion (5 min)	10.9 ± 12.5	8.3 ± 6.9	0.08
VAS pain buccal injection	13.0 ± 11.1	15.8 ± 13.6	0.039
VAS discomfort buccal injection	9.8 ± 9.9	4.0 ± 4.0	0.002
VAS pain palatal injection	18.9 ± 10.9	20.9 ± 15.11	0.249
VAS discomfort palatal injection	6.7 ± 7.7	6.0 ± 8.9	0.641

DISCUSSION

In the Cochrane review, destruction to peripheral neurons, the dorsal root ganglia, or the dorsal Horn of the vertebral column due to herpes zoster infections is the primary cause of postherpetic neuralgial for brain hyperexcitability and peripheral nociceptor sensitization.[13] Other studies can evaluate the effectiveness of topical lidocaine.[14]

Currently, a range of pain disorders is treated using topical lidocaine. The review of literature provides the information for the absorption and the absence of systemic side effects.[15] Topical lidocaine is efficient to manage osteoarthritis, neuropathy caused by diabetes, and post-herpetic neuralgia. For the best

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pain management and multimodal analgesia, topical lidocaine is effective either alone or with systemic medications and non-pharmacological methods.[16]

The external viscous 2% lidocaine gel reduces pain during instrumentation for maxillary third molar extraction locations identified as having alveolar osteitis as well as for pain relief. Alveolar osteitis is treated by topical thick 2% lidocaine jelly, at the first hour or post-instrumentation.[17]

A study was conducted to describe the comparison of the in vitro penetration and in vivo anaesthetic effectiveness of liposomal-lidocaine formulations with formulations of lidocaine on the oral mucosa. The discovery of 5% lidocaine gel can be considered a substitute for other topical anaesthetics on oral mucosa. [18,19] A prospective RCT com-pared to assess the effectiveness of a thermosetting cream containing 2.5% prilocaine & 2.5% morphine, eugenol was applied to a gauze strip.

The present investigation used non-scarring laser pulses which were reproducible pain inducers with high reproducibility for evaluating topical anaesthetics with minimal intra-individual variability. Results shown 40% lidocaine ointment was ineffective than EMLA 5% cream.[19]

A study was conducted to assess the efficacy of topical "tetracaine-adrenaline-cocaine (TAC)" & lidocaine infiltration during the treatment of paediatric laceration injuries in comparison to four topical anaesthetics without cocaine. It is a useful substitute for TAC and lidocaine infiltration, particularly on the face and scalp.[20,21] Because TAC is prone to touch mucosal membrane on the face and produces systemic toxicity. The trial estimates Bupivanor's efficacy in comparison to lidocaine infiltration.[22] Locally, 5% lidocaine medicinal bandage is effective to treat neuropathic and pain.[23] NSAIDs, aspirin-based rubefacients, capsaicin, and lidocaine are nonsteroidal anti-inflammatory drugs. Lower NNT levels resolve topical diclofenac & ketoprofen formulations to treat acute pain including sprains and strains.[24] Topical high-concentration capsaicin, topical diclofenac, and topical ketoprofen cannot address postherpetic neuralgia and chronic musculoskeletal diseases.[25]

CONCLUSION

In conclusion, oral mucosal injections made with ice as topical anaesthesia prior to the procedure result in pain alleviation during the insertion of the needle comparable to that achieved with lidocaine 5% gel, with the onset of the topical anaesthetic effect occurring as quickly as 1 minute after application. Study participants also reported that the lidocaine 5% gel had a less pleasant taste than ice. Therefore, using ice as topical anaesthesia before injection is a practical, inexpensive, and readily accessible substitute for the commercially available lidocaine 5% gel. This discovery may have far-reaching consequences for dental practises by giving patients a reliable, easily available, and well-tolerated option for dealing with dental discomfort. The dentistry community and their patients would both benefit from further study and clinical application of this strategy to improve patient satisfaction and comfort during dental operations. The lack of sufficient data was a problem. However, the sample size is considered to be sufficient be-cause equivalent numbers of patients have been included in similar research in the past.

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