



Review Article on Local Anesthetic Gel

Pankaj Dhyani, Arati Tamta, Dr. Praveen Kumar Ashok

Gyani Inder Singh Institute of Professional Studies, Dehradun, Uttarakhand

Address of the corresponding author

Name: Mr. Pankaj Dhyani

M.Pharm research Scholar

Gyani Inder Singh Institute of Professional Studies, Dehradun, Uttarakhand

ABSTRACT

One of the most crucial elements of dentistry is the application of local anaesthetic effectively. The patient will have the least amount of discomfort possible during dental operations with proper pain management, and the dentist will be better able to perform the therapy. Even though the contemporary dental syringes, the most popular way of administering local anaesthesia, were first developed many years ago, several advancements in the delivery of local anaesthetics have been made throughout time. Although local anaesthetic is very important in helping children manage their pain, researchers are always looking for more pleasant ways to administer local anaesthesia. The goal of the current overview is to inform paediatric dentists about modern local anaesthetic administration systems and other methods for reducing children's dental fear and discomfort.

Keywords: Local anaesthesia, Dental Anxiety, Children.

INTRODUCTION:

Pain is characterised as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" by the International Association for the Study of Pain. Children reported dental caries, pulpal involvement, and trauma-related odontogenic pain favourably. It is one of the main reasons why young people seek dental care, particularly in the case of an emergency. Anxiety management in paediatric dental treatment is crucial since it is frequently linked to the induction of pain and worsens pain perception. As a result, these people feel more pain, and that suffering lasts longer and is remembered more vividly. Effective anaesthesia for specific treatments with little to no systemic exposure to the medication is one advantage of topical local anaesthetics. However, the requirement for occlusive dressings to improve the epidermal penetration of topical anaesthetics frequently imposes limitations on their use. Other drawbacks of topical anaesthetics include the requirement for a lengthy application duration, messy application, and insufficient or uneven anaesthesia placement throughout the skin region. The stratum corneum is a rather impenetrable barrier, therefore topical anaesthetics should ideally be able to pass through it with little systemic absorption.

Local anaesthetics come in a variety of shapes and sizes. Each features an aromatic ring, an intermediary chain, and an amine group as part of its molecular structure. All local anaesthetics are soluble in water and

lipophilic. The anaesthetic may diffuse across nerve cell membranes thanks to its lipophilia, and its water solubility makes it easy to prepare, store, and administer. An ideal topical anaesthetic drug would be simple to administer, demonstrate great clinical efficacy in a short amount of time, exert its effects on intact skin without having any systemic effects, and produce only little discomfort or pain during treatment with few to no side effects. To suit these requirements, a wide variety of formulations have been produced.

Topical anaesthetics

Topical anaesthesia is a type of anaesthesia that is created by putting a medication directly on the skin or a mucous membrane. It comes in a variety of forms, including gels, lotions, patches, creams, solutions, and aerosols, and is used to numb minor wounds. Because it is simple to administer and causes less discomfort because there is no need for a needle, this sort of anaesthesia is most helpful for youngsters. Topical anaesthetics are categorised as non-aqueous or water insoluble and water soluble depending on the medium they are applied on.

Non aqueous topical anesthetics

These anaesthetics cannot dissolve in water but can do so in substances like alcohol, polyethylene glycol, propylene glycol, or carboxymethylcellulose. They consist of Lidocaine base and Benzocaine:

Benzocaine: Because it is an ester of amino-benzoic acid and lacks a cationic amino terminus, benzocaine has limited water solubility and is not a good option for parenteral administration. It is available as a spray, gel, gel-patch, ointment, and solution in concentrations ranging from 6 to 20%. Additionally, they come in a variety of tastes. Available brand names include Orajel and Hurricaine.

Combinations of benzocaine include Cetacine (14% benzocaine, 2% butamen, 2% tetracaine Hcl), Orabase (14% benzocaine, 2% butamen, 2% tetracaine Hcl), and gelatin, pectin, and sodium carboxymethyl cellulose. One of the most recent developments in topical anaesthetics for periodontal operations is Hurripak, a product that includes 20% benzocaine, an anaesthetic liquid. It is offered as a kit without needles. Deep into the gingival sulcus, it is implanted. Action begins and lasts for 30 seconds and 15 minutes, respectively. Because it is ineffective at generating sufficient anaesthesia with a single dosage, several administrations are advised.

Lidocaine: Lidocaine base is administered to the available mucous membrane of the oropharynx in cases of mild burns and skin abrasions at a 5% concentration to temporarily relieve the pain. Polyethylene and lidocaine are also present. It is offered in the form of flavoured gels and creams. Name of the brand includes Lidocream.

Water soluble topical anaesthetics

These anaesthetics are water soluble. As a result of its quick absorption into the bloodstream, hazardous responses such methemoglobinemia and allergic reactions should be anticipated. Therefore, it is not advised to spray on mucous membranes. Tetracaine hydrochloride, lidocaine hydrochloride, combinations of tetracaine hydrochloride, such as tetracaine, cocaine, and adrenaline (epinephrine), and lidocaine, epinephrine, and tetracaine (LET), are all included in this category.

Lidocaine hydrochloride

It is a topical anaesthetic with an amide basis that comes in the form of a Lidoderm patch made of an adhesive substance containing 5% lignocaine. Additionally offered are Dentipatch and Topicaine (4% lignocaine in a hydroethanolic gel microemulsion).

Mode of Action

Local anaesthetics work by inhibiting sodium channels, which stops nerve transmission and prevents the depolarization of nerve cells. Myelinated Pain and temperature are often controlled by nerve fibres. The depolarization of the cell and subsequent activation of the nerve are made possible by sodium ion flow across the nerve cell membrane. The local topical drug is frequently combined with epinephrine or another adrenergic

agonist to extend the anaesthetic effects by enhancing vasoconstriction and reducing the rate of systemic absorption. Vasoconstriction lengthens the time the substance is in touch with the nerve fibres, extending the anaesthetic effects.

Technique for application of topical anaesthetics

Before using a cotton roll to dry the oral mucosa, topical anaesthetic was applied. A cotton roll was used to apply 0.2 mL of 5% lidocaine gel (Apoteket, Stockholm, Sweden) to the oral mucosa. A 2.5 ml plastic syringe (BD Plastipak, 2 ml, Ref 300,185, Becton Dickinson, San Agustn del Guadalix, Madrid, Spain) was used to create ice by filling it with tap water and freezing it in the clinic's freezer. In order to prevent frostbite, the ice was between 4 °C and 0 °C in temperature. A knife was used to remove the plastic syringe's tip before to delivery so that the ice could be applied to the mucosa and forced to melt there. After each sequence of the investigation, the patient responded to the questionnaire.

Buccal evaluation

A 30-gauge 12 inch short needle was used to prick the buccal site 1 mm deep, without making contact with the bone, for 1 second at 1, 2.5, and 5 minutes, all times measured from the time the topical anaesthetic was initially administered to the mucosa. The same 30-gauge 12 inch short hypodermic needle used to inject The Wand (Milestone Scientific, Livingston, NJ, USA) was used to inject 1.5 ml of Xylocain Dental Adrenalin 20 mg/ml lidocaine + 12.5 micrograms/ml adrenaline (AstraZeneca, Södertälje, Sweden) 1.5 minutes after topical anaesthesia was applied. The injection was carried out at The Wand's slowest injection speed. A 100 mm visual analogue scale (VAS) was used by the subject to rate their level of pain following each poke and each injection. After injection, discomfort was also rated on a VAS scale. The participants completed a five-point Likert scale to rate the taste of the topical anaesthetic and noted any mucosal discomfort.

Palatal evaluation

The palatal mucosa was not subjected to topical anaesthetic until after the injection and examination of the buccal side were finished. The evaluation of the buccal side took place 3 minutes after the topical anaesthesia was administered. With the exception of the three needle sticks, which were not administered on the palatal side, the patient provided the same answers for the palatal and buccal sides.

Heart rate

The treating clinician measured heart rate (HR) in beats per minute (bpm) at baseline, before and after each buccal side needle poke, and after each injection on the buccal and palatal side. The HR change during each intervention (insertion or injection) was assessed using the relative HR change, which is calculated as HR immediately after each intervention divided by HR immediately before each intervention. The premolar was removed after these stages, however the study did not examine the extraction process. The PI phoned the patient a week after each treatment to see whether there had been any unanticipated adverse effects.

Safety and Tolerability

A safe treatment profile is essential because there are no established standard standards for the usage and safety of compounded mixes. This is especially relevant in light of reports of systemic toxicity and four fatalities linked to other topical anaesthetic preparations, particularly when used in conjunction with laser procedures where there is an obstruction. Although topical anaesthetics are often thought to be harmless, compounding in unusual amounts and prolonged exposure can have hazardous effects. Although there is a little chance that topical lidocaine may enter the bloodstream, several adverse symptoms, including as dizziness, sleepiness, muscular twitching, seizures, respiratory distress, loss of consciousness, and cardiac arrest, could indicate systemic effects. The use of ester-type local anaesthetics is more likely to cause allergic responses.

The normal side effects of EMLA cream, such as edoema, erythema, and blanching, are temporary and typically limited to the area of treatment. The dangerous disorder methemoglobinemia, which is brought on

by iron oxidation in red blood cells prohibiting haemoglobin from carrying oxygen, has also been linked to EMLA. A known side effect of various local anaesthetics, notably prilocaine, is this syndrome.

CONCLUSION

Dentistry is fortunate in that there are several top-notch medications available to relieve the preoperative and postoperative discomfort related to providing dental treatment. The use of local anaesthetics has significantly improved dentistry and altered patients' perceptions of dental operations. A significant contributor to a patient's lifetime acceptance of dental care is a clinician's capacity to provide an effective, safe, and painless local anaesthesia injection to a youngster (or adult). The practitioner should endeavour to study and apply the most recent modalities of local pain management to provide a positive and comfortable dental experience for the patient, rather than refraining from local administration out of concern about traumatising the paediatric patient.

Conflict of interest: NIL

ACKNOWLEDGMENT

The writers are appreciative of the Gyani Inder Singh Institute of Professional Studies in Dehradun as well as the author for their invaluable advice, collaboration, and assistance in providing resources for college students to use the library and the internet.

REFERENCES

- Treede RD. The international association for the study of pain definition of pain: as valid in 2018 as in 1979.
- Muller CE, Junior MF, Dadalto EC, et al. Prevalence of odontogenic pain and associated factors in children treated at a pediatric dental emergency service. *Revista Odonto Ciencia* 2017;32:115–120.
- Boeira GF, Correa MB, Peres KG, et al. Caries is the main cause for dental pain in childhood: findings from a birth cohort. *Caries Res* 2012;46(5):488–495.
- Al Absi M, Rokke PD. Can anxiety help us tolerate pain? *Pain* 1991;46(1):43–51.
- Chen JZ, Alexiades-Armenakas MR, Bernstein LJ, Jacobson LG, Friedman PM, Geronemus RG. Two randomized, double-blind, placebo-controlled studies evaluating the S-Caine Peel for induction of local anesthesia before long-pulsed Nd:YAG laser therapy for leg veins. *Dermatol Surg*. 2003;29: 1012–8.
- Bryan HA, Alster TS. The S-Caine peel: a novel topical anesthetic for cutaneous laser surgery. *Dermatol Surg*. 2002;28:999–1003 (discussion 1003).
- Kim WO, Song BM, Kil HK. Efficacy and safety of a lidocaine/tetracaine medicated patch or peel for dermatologic procedures: a meta-analysis. *Korean J Anesthesiol*. 2012;62:435–40.
- Kang C, Shin SC. Development of prilocaine gels for enhanced local anesthetic action. *Arch Pharm Res*. 2012;35:1197–204.
- Sobanko JF, Miller CJ, Alster TS. Topical anesthetics for dermatologic procedures: a review. *Dermatol Surg*. 2012;38:709–21
- Monheim Leonard M and Charles Richard Bennett. “Monheim’s local anesthesia and pain control in dental practice” CV Mosby (1984).
- Menon HM., et al. “Recent advances in local anesthesia”. *International Journal of Advanced Research* 7.10 (): 734-760.
- Berkman S, MacGregor J, Alster T. Adverse effects of topical anesthetics for dermatologic procedures. *Expert Opin Drug Saf*. 2012;11:415–23.