

Comparison Of Precooled Tetrafluoroethane Versus Lidocaine Topical Anesthetic As A Pre- Injection Anesthetic For Inferior Alveolar Nerve Block- A Split Mouth Study

Research Article

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Abstract

Background: Dental anxiety and fear of needle injection is one among the foremost common problems encountered by dental practitioners. This might affect the patient's quality of life. Several methods are suggested to lower the discomfort of local anaesthesia injection during dental procedures. Numbness of injection site is one among the recommended strategies.

Materials and Methods: During this Split Mouth design study, a complete of 60 healthy patients between the age of 18 and above were selected and were randomly divided into two equal groups. Sixty participants (120 sites) undergoing prophylactic orthodontic extraction received a five second application of a refrigerant (tetrafluoroethane, sixty sites) and a two minute application of a local anaesthetic (2% percent lidocaine, sixty sites) before an injection of an area anaesthetic solution was administered with a 30 gauge needle. Participants rated the pain they experienced after each injection by employing a 100-milimetre visual analogue scale (VAS). The pain was calculated by measuring the space in millimetres from the no pain end of the scale (VAS scale).

Results: The means of visual analogue scales (VAS) for the study and control groups were 42.20 ± 12.70 and 58.40 ± 16.83 , respectively; With statistically significant differences between the 2 groups ($P < 0.05$).

Conclusion: The utilization of a precooled refrigerant was simpler compared with lidocaine local anaesthetic in reducing the pain experienced by participants who received inferior alveolar nerve blocks.

Keywords: Cooling; Topical Anaesthesia; Pain Perception.

Introduction

Needle injection of a local anaesthetic may induce fear and anxiety to some patients, especially during dental procedures. The sensation of a needle being attached to a syringe and penetrating the oral mucosa is sort of distressing and carries a negative impact on a patient's psychology [1]. Research has shown that most of the patients postpone their dental visits primarily thanks to the fear of needles, pain and biting injury from injection [2].

Poor pain control alongside the fear and anxiety of the needle might interfere with appropriate dental management. So, profound local anaesthesia is critical, and several other methods are

introduced to scale back pain during injection like applying topical anaesthetics pastes, warming or buffering the local anaesthetic agents, and slow inflation of local anaesthetics [3]. Furthermore, some studies have focused on cooling the injection site for better pain relief before or after local anaesthetic injection [4].

Also, vibration or pressure to the injection site by high-tech mechanical delivery systems has been tried out recently. Topical anaesthetic agents are common to use before local anesthesia injection [5]. They are presented in various chemical bases with different potent and clinical indication; Therefore, toxic sequels thanks to over absorption by mucosa can't be prohibited [6]. Also, dissolution of those topical agents with saliva can impose negative impact on its anaesthetic efficacy [7].

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Previously our team has a rich experience in working on various research projects across multiple disciplines [8-22]. Now the growing trend in this area motivated us to pursue this project.

Materials and Methods

A total of 60 healthy adults with no history of systemic diseases (ASA Grade I status) and with non-allergic history to local anesthesia within the age above 18 years were selected from the outpatient clinics within the department of Oral and Maxillofacial Surgery at Saveetha Dental College Dental and Hospital, Chennai, Tamil Nadu . It was a split mouth randomized study, so patients requiring bilateral local anaesthetic block (bilateral inferior alveolar nerve block)for any patients undergoing prophylactic orthodontic extraction. Selected patients were then randomly divided into two equal groups (groups I and II) having 60 sites in each group. Randomization was done using the pc generated random equal numbers of blinded packages containing either of the group code. Blinded packages were prepared by the nonclinical staff consistent with the generated random chart and were available to the investigator only after the patient was recruited for the study. Once the group was selected, the sites for the application of local anaesthetic agents and precooling agents were selected randomly by coin toss method and therefore the selected sites were then named as site A and site B for his or her respective groups. Five Second application of a refrigerant (tetrafluoroethene, sixty sites) and a two-minute application of a local anaesthetic (2% percent lidocaine, sixty sites) before an injection of an area anaesthetic solution was administered with a 30 gauge needle. During the insertion of the needle, the patient’s pain perception was analysed using visual analogue scale (VAS) by the operator. The statistical analysis was done using Statistical Package for Social Sciences (SPSS) Version 15.0 Statistical Analysis Software. The values were represented in mean ± SD.

Results

The research comprised 60 patients (28 Males and 32 Females) with a mean age of 26.94 ± 0.76 years).

ANALYSIS OF VAS SCALE: The means of VAS values for the study and control groups were 42.20 ± 12.70 (range: 0-100) and

58.40 ± 16.83 (range: 0-100), respectively with statistically significant lower VAS scores within the study group (P < 0.05).The Figure 2 describes the vas score results.

Discussion

The aim of the study was to determine the effectiveness of a topical refrigerant compared with lidocaine topical anaesthetic in reducing the pain experienced during an inferior alveolar nerve block. The results showed use of a precooled refrigerant was simpler compared with lidocaine local anaesthetic in reducing the pain experienced by participants who received inferior alveolar nerve blocks.

The results of this study correspond with the study administered on cooling the skin before surgery of inguinal hernias, Chan et al, used a laser system with a cooling device to treat 37 patients with nevus of Ota removal [8]. They reported that cooling the location of injection resulted in less pain perception by their patients. However, the difference wasn't statistically significant and that they didn't specify the target criteria to evaluate pain. Also, we should always consider that the pain induced by laser therapy may differ from that of local anaesthesia.

The findings of Leff et al.'s study is according to the results of this study [9]. Furthermore, Kuwahara and Skinner and Goel et al, in several studies, reported reduction in pain perception by application of ice on injection site [10].The results of this study support the results reported by Harbert, who applied ice to scale back pain perception related to palatal injections. However, his study was not a randomized control trial, and he did not support his results with objective pain scoring systems. The results of this study are in accordance with the findings obtained by the study of Kosaraju et al., but their evaluation were not elaborated on an objective scale. That is difficult to gauge a sense like pain perception precisely just using the subjective scale (VAS) for assessment [11]. Aminabadi et al, reported the efficacy of 2 min application of ice before inferior alveolar nerve block injection in decreasing perception of pain.The finding would be more reliable if each single subject has been considered to be as a case and control simultaneously [12]. Several theories are suggestingelucidating the mechanism of effect of injuries and induction of analgesia at an area level, which include decreasing tissue rate and vasoconstriction re-

Figure 1

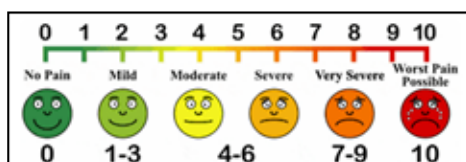
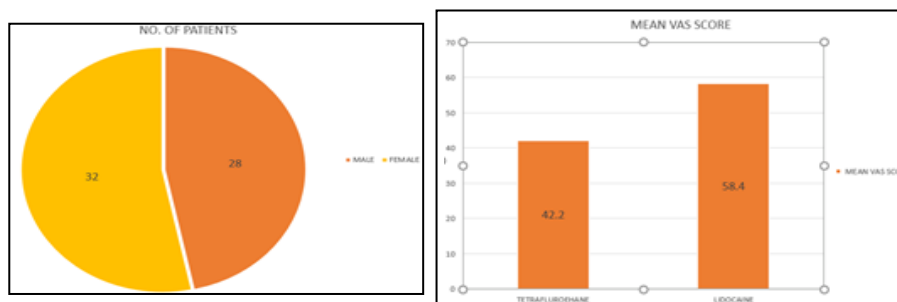


Figure 2



sulting in a decrease within the inflow of inflammatory mediators and a decrease in oedema [13]. This might explain the successful application of topical cooling to scale back bruising, bleeding, and oedema in sports injuries and after orthopaedic surgeries.

Local cooling is additionally believed to slow or eliminate pain signal transmission and to retard neuromuscular transmission. Additionally, cooling muscle tissue reduces its tone via a discount within the activity of muscular spindles [14]. Topical cold application stimulates myelinated A fibres, activating inhibitory pain pathways, which successively raises absolute threshold. Cold has also been demonstrated to figure at the spinal level to inhibit myotatic reflex and reduce spasm [15].

The results of this study support the thought that topical cooling amplifies absolute threshold to stimuli like needle stick during local anaesthetic injection and helps patient management during dental procedures.

Our institution is passionate about high quality evidence based research and has excelled in various fields [31-40].

Conclusion

The use of a precooled refrigerant was simpler compared with lidocaine local anaesthetic in reducing the pain experienced by participants who received inferior alveolar nerve block.

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