Effect of Local Anesthesia and Extraction on Mouth Opening

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Abstract

Background: Trismus is defined as painful limitation in mouth opening due to a muscle spasm. Trismus, also called lockjaw, (restricted jaw range of motion).There are various causes of trismus, one is spasm of the muscles of mastication. Assessment of the effect of local anesthesia and extraction on mouth opening ability. Methodology: Total sample of 40 patients included both genders (27 male and 13 female) participated in this study, all Patients were healthy with no allergy to local anesthesia, don't use alcohol or any drug therapy. Lidocaine HCL 2% with epinephrine 1:80,000 is used to anesthetize the inferior alveolar nerve using IAN block technique, while surgical tools were used for extraction in the usual way. Baseline mouth opening was evaluated pre-operatively, during the effect of local anesthesia and post-operatively by using digital Vernier caliper. Results: significant difference in mouth opening between the measurements (pre-operative, during anesthesia, post-operative) is found , mouth opening decreases when measurement is directed toward postoperatively.

Keywords: *local Anesthesia , Extraction , Mouth opening*

Introduction

Trismus is defined as painful limitation in mouth opening due to a muscle spasm[1]. Trismus, also called lockjaw, (restricted jaw range of motion).There are various causes of trismus, one is spasm of the muscles of mastication [2]. Permanent trismus occurs less frequently than temporary trismus, in the majority of cases trismus is temporary, and typically resolves in less than two weeks [3]. Many problems can arise as a result of restricted mouth's opening movement, these include difficulties in eating and swallowing, oral hygiene issues, and even speaking problems. Although trismus is not prevalent in the population, it can be commonly seen in specific groups, particularly in those who have had oral surgery to extract their wisdom teeth and those who had cancer involving structures that affect mouth movement[4]. Maximum mouth opening in the majority of people is beyond 35 millimeters (mm) wide, which is little more than the width of two fingers [5].There are many causes implicated in the development of trismus. One classification depends upon the involvement of the temporomandibular joint (TMJ) or intra articular versus extra articular etiologies[6]. Others have classified the causes into broad groups such as infectious, traumatic, and neoplastic sources [5]. As trismus can occur due to disease entity, otherwise, it may also be iatrogenic, caused by prescribed interventions and treatments[7]. Patients suffering from trismus, appears with many manifestations such as limited ability for mouth opening and deviation of jaw to the affected side, prevalent facial swelling and fever , sensation of muscle stiffness and sever pain in acute condition [8]. Fibrosis of the TMJ may be the result of prolonged trismus, necessitating directed therapy[9] . Management of trismus is commonly directed toward relieving symptoms. Symptom-directed interventions such as heat therapy, analgesics and muscle relaxants may be prescribed in the acute phase of uncomplicated transient trismus. In addition, stretching exercises is another treatment protocol that may also be considered for patients with post-traumatic and post-operative trismus, particularly when persisting longer than one week. Intensive physiotherapy and microcurrent therapy may be the treatment of choice for chronic trismus especially those cases resistant to more conservative approaches. Xanthine derivatives such as pentoxifylline also prescribed for trismus[5,9].

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SUBJECTS, MATERIALS and METHODS

This study was conducted on a total sample of 40 patients included both genders (27 male and 13 female) reporting to the Department of Oral and Maxillofacial Surgery, Babylon University/ College of Dentistry for extraction of their mandibular posterior teeth. Patients were coming to college between January 2019 and March 2019 with asymptomatic bilateral mandibular posterior teeth, patients' age was between 26 to 52 years regardless of their gender .

All Patients were healthy , with no allergy to local anesthesia, don't use alcohol or any drug therapy that may interfere with local anesthesia. Those with poor vital sings (hypoxia, hypotension, hypertension, heart rate, respiratory rate), untreated hypertension, severe cardiac failure, glaucoma, hyperthyroidism, raised intracranial pressure, neurotic traits or psychiatric illness or those with a history of cerebrovascular accident were excluded from the sample. Pregnant or lactating mothers were also excluded.

Lidocaine HCL 2% with epinephrine 1:80,000 is the type of local anesthesia that was used. The inferior alveolar nerve was anesthetized with one carpule of local anesthesia by using IAN block technique. surgical tools like straight elevator and lower posterior teeth forceps were used for extraction in the usual way (figure 1).

Baseline mouth opening was evaluated pre-operatively, during the effect of local anesthesia and post-operatively by measuring the distance between the mesio -incisal corners of the upper and lower right central incisors at maximum opening of the jaws (Figure 3) by using digital Vernier caliper (Figure 2) .

Fig. (1): Surgical tools used to extract mandibular posterior teeth.

Fig.(2) : Digital Vernier caliper

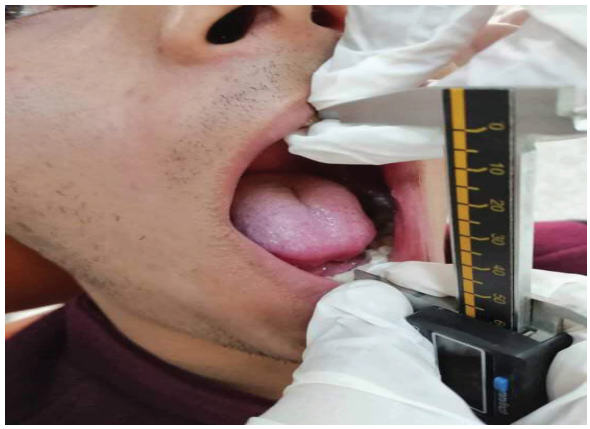

Fig. (3) : Depicts how mouth opening was measured using a Vernier caliper.

Results

Due to the use of local anesthesia, and extraction , a decrease in mouth opening was occur to all patients who participated in this study. When the mean value of all measurements (preoperative, during anesthesia, postoperative) were calculated, results show different in the measurements: where pre-op mean value is 47.07 , during anesthesia is 46.05 and post-op is 45.47. As a result the scores of mouth opening decreased when patients were subjected to anesthetic agent and extraction.Regarding to ANOVA test : when we compared between Group A (pre-op mean value) and Group B (after anesthesia), we found a significant difference in their values . Same results were found when comparing Group B and Group C (post-op.) . Whereas a highly significant difference was found between Group A and Group C.

Table(3.1): The statistical significance of the mean value of mouth opening between the different groups assessed by ANOVA test.

Group	Sum of Squares	df	Mean Square	F	Sig
Between group(A) and group(B)	439.160	13	33.7	4.092	0.001
Between group(B) and group(C)	469.781	13	36.137	5.130	0.001
Between group(A) and group(C)	577.310	13	44.408	11.088	0.000

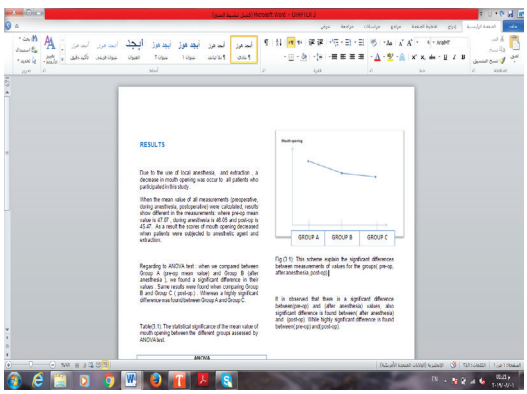

Fig.(3.1): This scheme explain the significant differences between measurements of values for the groups (A,B,C).

It is observed that there is a significant difference between group A and group B values, also significant difference is found between group B and group C While highly significant difference is found between group A and group C .

Discussion

In this study, in order to know the effect of local anesthesia and extraction on mouth opening , measurement of mouth opening in three stages (pre-operative, during anesthesia, and post-operative) is necessary. After that comparison of the values is done. There are many difficulties in this study that affect the accuracy of measurements , weakness of muscles due to trauma is one of these difficulties, trauma may be due to needle breakage as it is bent or otherwise used incorrectly[10]. Also, forceful insertion can cause sudden movement of the patient so may harm the muscles of mastication causing weakness which affect on mouth opening [10-12]. On the other hand Intramuscular injections can lead to hematoma formation and consequently fibrosis, which lead to trismus [5]. Hematoma is a blood-filled swelling, It can form when the injection needle strike a blood vessel [13,14]. After anesthesia, trismus is usually caused by intramuscular injection of the anesthetic agent into the pterygomandibular space, usually affecting either the lateral pterygoid muscle or the temporal muscle . Inflammation of these muscles usually occur and it is the result of the cytotoxic effect of the anesthetic solutions, eventually, the inflammation leads to contraction of the muscles leading to trismus [15]. Naturally, these cytotoxic reactions are commonly seen in block anesthesia more than in infiltration anesthesia[16]. Trismus can occur even 2 – 5 days after inferior alveolar block anesthesia[15]. The concentration and dose of local anesthesia may affect on mouth opening. When local anesthesia is injected into a highly vascular area, there is an increased risk of intravenous injection and this increases the concentration of local anesthesia in the circulation too rapidly, lastly a toxic reaction can occur. In addition, over dosage can lead to intoxication which result in an impairment in muscle movement eventually trismus results[15]. Kai Sundquist found that patients may experience difficulties in opening their mouth especially after the extraction of mandibular teeth and nerve block anesthesia to the lower jaw. These problems may continue for several months and are treated mainly by mouth opening exercises in order to stretch the related muscles[17]. Also Donna Christiano explained how trismus can arise after oral surgery, particularly after lower wisdom teeth extraction. Trismus can happen due to the inflammation the surgery creates or due to the hyperextension of the jaw during the procedure. It can also occur when a needle delivering the anesthetic solution damages the surrounding tissues[4]. Therefore these findings are both in an agreement with the findings of our study. It has been suggested that increased difficulty of third molar surgery may be attributed to patient factors; such as age, gender, size and ethnic background. Patient age , in particular, has been linked with increased surgical time and complications [18], so increases muscular tone that result in trismus. Therefore, there was a significant difference in mouth opening between the measurements (pre-operative, during anesthesia, post-operative), mouth opening decreases when measurement is directed toward postoperatively.

Conclusion

Various studies regarding the effect of local anesthesia and extraction on mouth opening have been done over the years, based on this study, the following conclusions are drawn: when local anesthesia is administered to patients it will cause several effects, one of them is decreased mouth opening by their anesthetic effect on inferior alveolar nerve which has branch that supply mylohyoid muscle and anterior digastric muscles which assist lateral pterygoid muscle in mouth opening. Also, extraction of mandibular posterior teeth leads to decrease mouth opening due to increased muscular tone during extraction so patients will suffer from decreased muscular movement that affect on ability to open their mouth in normal width.

Ethical Clearance: The project plan displayed on the scientific committee and scientific ethical committee and get approval

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Conflict of Interest: There is no conflict of interest

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