Journal of Positive Psychology & Wellbeing
2022, Vol. 6, No. 3, 314 – 319

http://journalppw.com
ISSN 2587-0130

Adverse Effect of Local Anesthesia for Disabled Patient During Dental Procedures Assessment: Review

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Abstract

The use of local anesthetic is essential in the field of dentistry. Injections of local anesthesia are performed on a yearly basis in the millions all over the world. These injections are usually considered to be safe invasive procedures. However, there is a possibility of undesirable consequences, which practitioners of dentistry ought to be aware of. The purpose of this scoping review was to offer a comprehensive summary of the published research on the detrimental effects of dental local anesthetic, particularly in patients who have disabilities. There was usually a lack of essential information on side effects, such as the amount or type of anesthetic solution, or the type of needle that was utilized. Because of this, there is a need for research of a high quality on this subject. Last but not least, the literature tends to overrepresent the negative impacts that are rarely observed in actual general practice in the real world.

Keywords*: Anesthesia, dental procedures.*

Introduction

Patients who are unable to get dental care due to mental or physical disability typically have a difficult time enduring treatment and have difficulty accessing dental services. When it comes to dental treatment, patients who are not cooperative and who have physical or mental disabilities frequently require sedation or general anesthesia in order to benefit from the procedure [1]. In spite of the fact that sedation has the potential to be an efficient and risk-free alternative to general anesthesia for patients with disabilities, administration of sedation may be challenging for patients who have severe compliance issues, particularly with regard to the maintenance of the airway [2].

There are some patients who have disabilities who find it difficult to participate in any treatment process that demands them to remain seated and maintain an open mouth without making any rapid movements. In spite of the potential hazards that are connected with anesthesia, clinicians may choose to execute comprehensive therapy for patients who have significant impairments while they are under general anesthetic with the goal of maximizing safety and effectiveness [3].

The skills of dental healthcare workers are regularly put to the test when they are providing oral treatment to individuals who have emotional and physical difficulties. It may be difficult, if not impossible, to provide routine dental care for patients who have behavioral and corporeal restrictions. Dentists frequently resort to the use of sedation while providing dental care for patients who have specific needs [4]. This is done to avoid the possibility of the patient being injured or experiencing needless stress. Throughout the course of history, there has been a lack of efforts to categorize and differentiate dental anesthetic difficulties, particularly in relation to the particular population that has special needs. Because the majority of the published research has concentrated on reporting morbidity and mortality, there has been no attempt made to conduct a study of the incidence of perioperative complications. As a result of the fact that the treatment of the population with special needs can result in complications that do not necessarily correspond with the models that have been established for the risk of anesthesia, it is essential to determine the overall complication rate and risk when treating this group [5].

Review:

It is estimated that over 300 million cartridges of anesthetic are used annually for dental treatment in the United States alone [6]. Dental local anesthesia is a fundamental component of dentistry.

In 1859, Albert Niemann extracted cocaine from the coca plant, which was the first anesthetic ever discovered. In 1884, Carl Koller employed cocaine for an ocular operation, which was the first time it was administered locally [7]. After that, Sigmund Freud noticed that applying cocaine topically to the tongue had a numbing effect on the tongue. In order to successfully and painlessly remove wisdom teeth, Halsted was the first surgeon to successfully give a nerve block in the jaw [8]. In the course of their experiment, Halsted and his students each administered a local anesthetic solution that contained cocaine to one another and performed nerve blocks on each other. The fact that cocaine is addictive and has a number of negative effects has been established beyond a reasonable doubt [9]. Regrettably, there have also been reports of local anesthetic failures during interventions, as well as some cases of systemic intoxication and even death in the early years of the program.

In dentistry, local anesthetic serves a variety of functions. Its most common application is to alleviate discomfort experienced by patients during dental procedures, which not only improves the overall health of the patient but also makes the treatment process easier for both the patient and the dentist. It is also possible for dental local anesthetic to have a therapeutic impact, such as temporarily alleviating the discomfort that is caused by pulpitis. Last but not least, dental local anesthetic can be utilized as a diagnostic tool to differentiate between dental discomfort and dysfunction of the temporomandibular joint [9].

Ester and amide types are the two categories that can be used to classify the active components of dental local anesthetic chemicals. It is the liver that is responsible for breaking down amide local anesthetics, while plasma cholinesterase is responsible for the metabolism of ester local anesthetics. Local anesthetics impede conduction in fibers that send nerve impulses by reducing sodium ion input through ion channels. The local anesthetic is rendered inactive by certain enzymes, which results in this inhibition being only temporary [10]. It is possible for unpleasant effects to occur following the administration of dental local anesthesia, just as they would be with any other invasive surgery. There is a spectrum of

severity that can range from moderate and manageable, such as blanching, to severe and potentially life-threatening, such as anaphylactic shock and poisoning. Both temporary and permanent durations are possible for the duration of unfavorable effects. It is important for general dentistry practitioners to be aware of the potential adverse effects that are linked with the administration of dental local anesthetic [11].

Additionally, a number of articles have stated that there was a disturbance in the muscles of the eye. According to Ngeow et al. [12], there were two instances in which the capacity to accommodate the eyes on the ipsilateral side was lost following an IANB. According to four different articles, either the eyeballs could not be abducted or the abduction process was restricted. Ten patients were found to have had external rectus muscle palsy, and one patient was unable to look down as a result of a disablement of the superior oblique muscle, according to the findings of Penarrocha-Diago et al. [13]. Additionally, it has been noted that the loss of function in the eye muscles might result in the posterior displacement of the eyeballs. Several articles [12,13] have described instances of paralysis of the muscles that are located outside of the eye.

It has been noted in a number of studies that the eyelids are drooping, and one article indicated a difficulty to close the eyelids. After receiving infiltration anesthetic, a patient experienced numbness in their eyelids and eyebrows, as described by Goldenberg [14]. Both excessive dilatation of the pupil and excessive contraction of the pupil have been described in two different articles. Both of these conditions have been recorded. Following the injection of dental local anesthetic, Uckan et al. [15] reported experiencing pain or a burning feeling in the eye on their patients. According to estimates, the overall incidence of harmful effects on the eyes ranged from 0.07% to 0.09%.

There have been a number of papers that have reported on the subject of trigeminal nerve injury caused by the administration of dental local anesthesia. The severity of these injuries ranges from mild and transitory to severe and irreversible. A total of 54 patients were documented by Hillerup et al. [16] as having had trigeminal nerve injury as a result of IANB treatment. There were 77.8 percent of instances in which the lingual nerve was damaged, and 22.2 percent of cases involved the inferior alveolar nerve. Injuries to the nerves can cause a variety of symptoms, including paresthesia, dysesthesia, and allodynia. It was found by Garisto et al. [17] that 89% of instances involved involvement of the lingual nerve, while 11% of cases involved involvement of the inferior alveolar nerve. Following an intra-aortic nerve block (IANB) or a mental nerve block using anesthetic solutions, Kingon et al. [18] recorded five examples of patients experiencing dysesthesia and paresthesia. On the ipsilateral side of the injection, there was a case of irreversible nerve injury that was described [19]. Ataxia, facial palsy, hearing loss, and facial numbness were some of the symptoms that were observed. The total incidence of permanent nerve injury among patients who received mandibular local anesthetic was reported to be between 0.000007% and 0.003%. One instance of paresthesia in the maxillary region was reported by Moorthy et al. [20] following the administration of infiltration anesthesia. The patient reported feeling numbness in the regions of the gingiva and top lip that are located in the anterior left quadrant of the maxilla. It was described that there was one instance of inflammatory trigeminal lesions. All of the symptoms, which included paresthesia and numbness of the tongue, mouth, face, hand, and forearm on the ipsilateral side, were only transient [20].

There have been multiple investigations that have revealed paralysis of the face nerves as well as the sympathetic nerves. According to Tiwari et al. [21], hemifacial palsy was observed in patients who had undergone an IANB. Hearing impairment, lowering of the mouth angle, and immobility of the hemifacial muscles were all symptoms of this condition. In addition, Tzermpos et al. [22] reported that the patient experienced transitory facial nerve palsy following an IANB. This condition manifested

itself in the patient's inability to raise their left eyebrow, as well as widespread weakness on the left side of their body and drooping of the corner of their mouth. Following infiltration anesthesia, Bell's sign and lower motor neuron weakening of the facial nerve were identified, according to one article that documented hemifacial palsy. There were two occurrences of temporary paresis that occurred after IANB, as documented by Baart et al. [23]. When the first patient received the injection, they were unable to pucker their lips at the injection site because the facial nerve had been paralyzed. Following treatment, the symptoms were no longer present. Another patient suffered paralysis of the vagus nerve, which resulted in tightness and difficulty swallowing. This patient also experienced difficulties swallowing. After diffusion of anesthetic fluid in the parapharyngeal space, a patient reported experiencing numbness in the region of the neck, difficulty swallowing, and pressure in the chest. This occurred after the patient had surgery.

The authors Sanchis et al. [24] documented a case of uvular paralysis that occurred after the injection of IANB. The patient reported having difficulty swallowing and a peculiar sensation in the throat a few of minutes after the administration of the medication. It was determined that the uvula was shifted toward the side that was not damaged, and the soft palate was paralyzed.

It is possible for dental local anesthetic solutions to contain components that could cause allergic responses. Lidocaine, articaine, diphenhydramine hydrochloride, prilocaine, mepivacaine, and procaine are some examples of local anesthetic solutions that have been associated with allergic responses. It was stated that there was one instance of anaphylactic shock that occurred after lidocaine was administered. Twenty minutes after the local anesthesia was administered, the orbits were closed, facial edema formed, and urticaria was visible on the cheek. Both of these developments occurred simultaneously. There were some mild breathing issues observed by the patient. It is [24].

A study was carried out by Baikin and colleagues [25] to investigate the safety of administering dental local anesthetic to patients who were taking anticoagulants. A total of 279 patients were included in the study group, all of whom had a therapeutic international normalized ratio (INR) ranging from 2 to 4. On the other hand, 73 patients were included in the control group, all of whom had a subtherapeutic INR of less than 2. In the group that was being studied, there were only two tiny hematomas discovered, and there was no evidence of continued bleeding. As a result of the degree of the patient's hemophilia (mild, moderate, or severe), Dougall et al. [26] were able to evaluate whether or not buccal infiltration anesthesia was safe for use in individuals who had the condition. The practitioners' clinical experience was classified as either less than three years of experience or more than three years of experience. After buccal infiltration was administered, there were no reports of hematomas that were greater than two millimeters in size. Furthermore, there were no variations reported in the amount of time it took for superficial bleeding to occur dependent on the severity of the hemophilia or the practitioner's level of skill. While participating in a practice exercise at a dentistry university, Brodsky et al. [27] reported on a patient who experienced ear issues as a result of receiving a Gow–Gates injection. Both the patient's hearing and the pressure in the region of the ear were affected, and the patient also reported difficulties hearing. Srisurang et al. [28] carried out a randomized clinical trial in which they examined the efficacy of articaine, lidocaine, and mepivacaine, as well as the adverse effects that each of these medications exhibited. After one hour had passed since the administration of local anesthesia, there were only two ecchymoses discovered at the site of injection. There were no major adverse effects that were documented.

Airway care may also be challenging for patients who have cerebral palsy because of the presence of excessive secretions and the danger of aspiration that occurs under anesthesia as a consequence of gastric reflux, which is a medical condition that frequently occurs. In

addition, these individuals have a greater likelihood of experiencing hypoxia while they are unconscious. Additionally, around thirty percent of kids who have cerebral palsy also have epilepsy, which is something that needs to be taken into consideration prior to dental treatment that is performed under general anesthesia. Patients who have issues with their skeletal muscles, such as those who have myasthenia gravis, require respiratory control both before and after the administration of anesthesia [28].

The preoperative dental examination is required in order to cut down on the amount of time needed for treatment [24]. This is because the surgical time is impacted by issues related to the anesthetic. The evaluation of the dental state, on the other hand, is tough and complex in patients who have significant disabilities; even collecting radiographic images is not an easy task. At the time when the patient is under general anesthesia, professionals frequently check the patient's oral condition, diagnose the patient, and formulate a treatment plan. The time of therapy is not determined by the medical issues, but rather by the manner in which the dental procedures that are required are performed [28].

Conclusion:

Patients who have severe disabilities and who have trouble coping with dental treatment in the dental practice are typically candidates for general anesthesia. Due to the patient's preexisting medical issues, the likelihood of experiencing complications during anesthesia is significantly increased. In order to reduce the likelihood of complications, it is essential to perform careful monitoring during the pre-, intra-, and post-operative phases. Due to the fact that the outcome of dental therapy in patients with impairments is not always favorable, dentists should carefully plan and offer the necessary dental treatment to their patients. Consequently, in order to achieve a favorable prognosis, it is essential for dentists and anesthesiologists to conduct a comprehensive evaluation of each individual case before to surgery and maintain close communication during the intra-operative and post-operative phases. This is evidence that the studies that have been conducted on this subject are extremely diverse, and more importantly, it demonstrates that there is a lack of research that is of a high quality that is available on this subject. In addition, it was discovered that the article frequently failed to include information that was critically vital regarding side effects. This information included the dosage, the type of anesthetic solution, and the type of needle that was used. In conclusion, the literature contains an excessive amount of examples of detrimental consequences that are so uncommon in actual general practice that they are overrepresented.

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