A Case of Needle Breakage during Dental Local Anesthesia: Prevention and Medico Legal Considerations

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Abstract: Despite the development of stainless, flexible alloys used in modern, disposable dental needles, reports of needle breaking during the administration of local anesthesia still occur.

Although uncommon, the breakage of needles remains one of the most distressing complications of local anesthesia, since it can lead to serious and potentially life-threatening consequences by violating adjacent vital anatomical structures; however, it is also one of the easiest to prevent. A meticulous injection technique is imperative and, if breakage occurs, the situation must be resolved appropriately.

Through the description of a case of needle breakage during inferior alveolar nerve block, the author discusses how it is possible to prevent this potentially severe event and the importance of its correct management in the light of possible medico legal consequences.

Keywords: Dental anesthesia, dental needle, broken dental needle, nerve block, inferior alveolar nerve.

1. INTRODUCTION

Pain control through local anesthesia represents an important aspect of management of painful dental procedures, including oral surgery, endodontic treatment, periodontal treatment, and prosthetic treatment. It’s a prerequisite in the reduction of patient’s discomfort to proceed safely in a pain-free environment and to receive quality care. It’s associated with a low overall incidence of serious complications, including systemic reactions such as hypertension, collapse, and toxic or allergic reactions, or local events such as pain, hemorrhage, infections, soft tissue damage, and ophthalmic or nerve disorders, as well as dislodgement of fractured needles [1]. Actually the injection of local anesthetics represents the single most fear-inducing thing that dentist does to the patient during a typical dental visit [2]. Since the introduction of disposable needles in the early 1960s and the use of flexible materials for needle fabrication, the frequency of needle breakage has been minimal, compared with the first quarter of this century when rigid, inflexible, non disposable needles were used. Despite this, reports of dental needle to break during the administration of local anesthesia still occur, especially in the pterygomandibular space during inferior alveolar nerve block [3-6]. Although rare, it’s a potentially serious event: it remains one of the most frustrating and distressing complications of local anesthesia since it can greatly damage important anatomical structures even with life-threatening consequences: lesions to vascular or neurological structures can occur secondary to the needle itself or to its migration into nearby anatomical areas [7]. However, this serious event is also of the easiest to prevent. It’s usually due to preventable reasons, such as poor operator skill/improper technique, using the incorrect needle or both, rather than defective materials.

2. CASE REPORT

A 39-year-old woman was seen in a private dental center because of a periodic dental check-out. The lower left primary and second molar teeth were affected by caries and needed to be cured. The dentist decided to administer local anesthesia with a standard direct technique mandibular nerve block, using a 21mm 30-gauge needle. While perforating infiltration anesthesia the patient swallowed and the dental needle broke. It fractured at the hub and was not clinically visible even if palpable. The dentist took two intraoral radiographs with different projection in attempt to locate the broken needle (Figure 1) and tried to retrieve the fragment with a hemostat several times, in vain. So, he decided to refer the patient to a hospital for the removal under general anesthesia (Figure 2). On the presentation at the maxillofacial department she had no pain, dysphagia or left inferior alveolar nerve paresthesia. The patient’s medical history was not significant; she tolerated the procedure well and made an uneventful recovery. The postoperative course was unremarkable, without any neurological or vascular deficits. However, the patient filed a civil suit against the dentist for her psychological suffering and the appearance of a specific dental phobia. She won and

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obtained compensation from the insurance which intervened to indemnify the dentist.

Figure 2: The broken needle was removed at the hospital under general anesthesia.

3. DISCUSSION

Needle breakages can occur if there is an unexpected movement of the patient, particularly the children [8, 9], during administration, incorrect technique, overmanipulation of the needle, incorrect choice of length or diameter needle, or a combination of those [10, 11].

Dental needles are designed to have a predetermined weak point at the base of the shank, where there is the hub with the hilt, to avoid the breakage of a small fragment of the needle (Figure 3). This is the reason why it is not advisable to re-bend the needle. Moreover, if the dentist changes syringe angulation during the injection, the risk for needle breakage in the hub area is high; an additional reason might be the dentist’s efforts to achieve needle–bone contact to reassure correct depth and placement of the needle [2, 3].

During inferior alveolar nerve block technique, the needle should be inserted between the muscle tendons of the temporalis muscle and the medial pterygoid muscle directly into the pterygomandibular space for optimal anesthesia. However, in the majority of cases, the needle penetrates into more dense, bulky structures such as the medial pterygoid muscle or the tendon of the temporalis muscle. Their higher tissue resistance, that increases even more when the mouth is opened maximally, can cause the needle to break [12-14]. It has been found that a smaller diameter needle is broken more easily, especially when 30-gauge needle is inserted up its hub, than one with a larger diameter [4, 15]. Most of the reported cases of needle breakage occurred with use of short 30-gauge needles which were used with the rationale that they would cause less pain at insertion. On the contrary, pain perception is highly subjective; sometimes, a thinner needle may increase local anesthetic pressure and cause more pain [16, 17]. The incorrect selection of dental needle length can cause breakage of the needle as much as the wrong dental needle diameter. If a longer needle is used, the risk of the needle dislodging in the soft tissues is greatly diminished, because a segment of the needle usually remains outside the soft tissues and can easily be grasped with a hemostat.

In the case of a broken needle inaccessible, a three-dimensional imaging technique should be taken to ensure the accurate location of the needle and to see surrounding structures like vessels and parotid gland [5, 18]. Because of the identification of needle location and the process of its removal can be very difficult, the dentist should avoid any further treatment and instead promptly refer the patient to an oral or maxillofacial surgeon [7, 19, 20]. The fragment should be removed as soon as possible and the choice of the removal of the fragment, whether under general or local anesthesia, should be dependent on the patient’s systemic condition [1, 21].
Prompt retrieval is strongly recommended to minimize symptoms of pain, dysphagia and trismus; anyway, regardless of the presence of symptoms, reasons for prompt removal of the needle are its possible migration through important anatomical structures and the development of severe complications. Finally, it’s noteworthy that the psychological trauma resulted from the knowledge that a needle has been retained “somewhere in the throat” may represent a damage to the patient in terms of emotional well-being [19, 22, 23].

4. CONCLUSION

The author reports the successful management of a 21mm 30-gauge broken needle following inferior nerve block for a dental procedure in an adult patient.

Nowadays, this potentially severe event is mainly due to the use of inappropriate needles, as in this case, inadequate technique, or both. For these reasons needle breakage it is mostly preventable and, as avoidable event, it cannot be considered a complication.

In order to prevent this event, it’s imperative to perform meticulous injection technique by following some simple essential rules. First, the injection needles should be checked to exclude defective materials; 30-gauge and short needles should not be used for inferior alveolar nerve block in adults or children, better 25-, 27-gauge; needles should not bend while inserting them into soft tissue; the needle should never be inserted completely to the hub and at least 5 mm needle have to be left outside the tissue during penetration; if changing needle angulation during injection, the dentist should take the needle off the tissue; last but not least, it’s mandatory to inform the patient before puncturing the mucosa and about possible abrupt pain.

If breakage occurs, the situation must be managed appropriately: every effort should be made to retrieve the needle immediately if the tip is visible, otherwise referral to a surgical unit is necessary.

AUTHOR’S NOTE

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