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Case Report

The significance of cone beam CT for accurate detection and removal of a broken dental needle from the pterygo-mandibular space- Case report and review of literature

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Abstract: Damage of a dental needle during local anesthesia is very rare complication nowadays. We present such an occurrence in which the needle was lost in the pterygomandibular space during routine dental practice. Patient was referred to Oral & Maxillofacial surgery department where he was treated and the needle was removed. Postoperative period was uneventful. We attribute this to the utility of Cone Beam Computed Imaging that made the exact locating of the needle in the soft tissues possible. We underline the significance of CBCT to precisely locate the broken needle and to facilitate its surgical retrieval.

Keywords: broken dental needle, pterygomandibular space, local anesthesia, inferior alveolar nerve block, cone beam CT

INTRODUCTION

Local anesthesia in Dentistry is sometimes related with complications either systemic related to overdose toxicity or hypersensitivity reactions or regional including side-effects as trismus, hematoma or neuralgia [1, 2]. Damage of a dental needle during local anesthesia is very rare complication nowadays [3, 4]. Rarity of this complication is attributed to the improvement of metallurgy, the quality controls in manufacturing and the use of disposable dental needles [5].

However, needle fracture cases are still reported in the literature [4,6-8], as the etiology of this complication is multifactorial and beyond the evolution in the quality characteristics of the manufacturing materials and the wide adoption of single-use needles, other factors such as bending the needle, sudden unexpected movement of the patient, or false anesthesia technique are implicated [4,9-11].

This complication more frequently occurs during inferior alveolar nerve anesthesia, and usually with long and thin (30 G) dental needles. The posterior maxilla is the other area were breaking of a dental needle has been is reported [12].

Even though a controversy in relation with the management of broken needle into the maxillofacial spaces existed in the past, today most authors agree that these should be removed as they could metastasize and traumatize important adjucent anatomic structures [13].

Detection of the broken needle can be achieved by plain radiologic methods but the exact location of the needle is feasible only with modern CT images.

In this manuscript we underline the significance of CBCT for the precise location of the broken needle to facilitate its surgical retrieval.

CASE REPORT

A forty-seven-year old woman was referred to the Department of Oral and Maxillofacial Surgery by her dentist for retrieval of a broken needle after inferior alveolar nerve block. The patient had visited her dentist for removal of the right first molar. During the process anesthesia was inadequate and the dentist administered repeated injections of local anesthetic solution. In the last effort he curved the needle and after the injection he realized that the needle broke at the hub. He tried to grasp the end of the needle but it was impossible as the needle had disappeared into the soft tissues of the right

pterygo-mandibular area. The characteristics of the needle were 25mm length and 30 gauges.

The dentist immediately referred the patient to our Department. Clinical examination revealed no trismus or tenderness at the site of injection. Her past medical history was non-contributory. A panoramic X-ray revealed the broken needle located at the level of the right mandibular ramus. This examination was considered inadequate for the exact location of the broken needle and a Cone Beam CT performed. According to the CBCT imaging the exact site of the fractured needle was detected comparing its site with stable anatomic structures of the mandible (Figure 1).

The operation performed under local anesthesia after infiltration with lidocaine and adrenaline solution 1:80.000 for better hemostasis. A 3 cm vertical incision parallel and medial to the anterior edge of the ramus. By superficial blunt dissection of the pterygomandibular tissue, the broken needle was identified at the expected site grasped with hemostat and removed (Figure 2). Of note the removed needle was found to be bent. Interrupted absorbable sutures Vicryl 3/0 were placed for immediate wood closure. The total time of the operation did not exceed 15 minutes. There was no intraoperative or postoperative bleeding and the patient did not report lingual or inferior mandibular nerve paresthesia either prior or after the operation. The patient was administered penicillin and clavulavic acid and oral rinses after the operation.

Postoperative period was uneventful and the patient discharged from the hospital the day after the operation. A mild postoperative difficulty in mouth opening resolved few days after the operation. At four week follow-up there was full recovery and the patient had no complaint.

Fig-1: CBCT reveals the broken needle located at the level of the right mandibular ramus

Fig-2: The broken needle was identified at the expected site grasped with hemostat and removed

DISCUSSION

The complication of a fractured dental needle after inferior alveolar nerve anesthesia has been reported long before [14-16], when it was attributed to the repeated sterilization of multiple use needles and the degrading quality and inflexibility of the metal alloys. Nowadays with the advent of disposable stainless steel needles, with stronger and flexible metals its incidence has decreased [17].

According to some authors 240,000 dental cartridges are used monthly in USA for local dental anesthesia [18, 19]. Pogrel estimated the possibility of needle breakage after inferior mandibular nerve block anesthesia to be 1:14,000,000 injections [20]. Reports about dental needle breakage in the published literature are not common, though they still occur.

From 1957 to 2010 there are 26 published cases of broken dental needles including the etiology

and the applied treatment. From 2010 until now 6 more documented cases have been published [1, 11, 17, 19, 21-25].

Most authors agree that needle breakage in modern dentistry occurs as a result of multiple factors. Correct application of local anesthesia and especially the inferior mandibular block anesthesia is mandatory to avoid needle fracture. Another important factor implicated for needle fracture, is bending of the dental needle for better access to the mandibular foramen during block anesthesia. This bending sometimes may be related with sudden pain and spasm of the internal pterygoid muscle that could lead in fracture and detachment of the needle, usually at the hub [26] as this occurred in our case. Review of the literature discloses that in most cases besides the bending, a thin 30 G and short 25 mm needle was related with needle breakage. A lot of dentists believe that the shorter the diameter of the needle, the less the pain the patient feels [27, 28]. However, in contrary the less the diameter, the more pressure needed to inject the anesthetic solution and this may possibly increase the pain [27].

It is well known that inferior alveolar nerve block necessitates a greater than 25 mm needle. Thus a long 35 mm dental needle is suitable for this kind of anesthesia. Use of short 25 mm needle in case of breakage has as a result the disappearing the needles end into the tissues; the possibility to grasp its end is minimized.

In case of needle breakage the first action of the dentist is to investigate the site of injection to see if the end of the needle is visible. This is the best scenario as grasping and removing the broken needle liberates the patient from removal related morbidity. If the end of the needle is not discernible any attempt to search the needle may dislodge it deeper in the pterygomandibular space. The patient should immediately be informed for the event and referred to an Oral & Maxillofacial Surgeon.

Confirmation and detection of the broken needle is necessary for appropriate treatment. In the past a debate about the necessity to remove the broken needle was raised [9, 29-31]. These authors had the opinion that the presence of the fractured needle in the tissue creates a connective scar tissue that envelops the needle. However, in some cases the broken needle was reported to have metastasized away from its initial position [32] allowing for the possibility to traumatize important adjacent anatomic structures or to be found in inaccessible anatomic structures making its removal more difficult.

Plain radiographs such as panoramic, lateral cephalometric or postero-anterior mandibular X-ray can confirm the presence of the broken needle. CT scan and 3D reformation are useful in detecting and locating the exact site of the needle in relation to important anatomic structures. However, the presence of dental restoration could create artifacts that distorts the quality of image obtained [33]. Some authors have used image intensifiers to produce fluoroscopic image with low-radiation exposure to present a bright image on the screen of a monitor [10]. Cone Beam Computerized Tomography (CBCT) can provide clear images for the exact localization of the broken needle in 3d dimensions and help the surgeon to minimize soft tissue trauma [10]. Intraoperative navigation has also been proposed to facilitate the safe removal of the fractured needle [7]. Although the utility of navigation is obvious, one may not be able to justify the increased cost, while the technique is not available in most centers. In contrast CBCT is widely available [34].

In most of the cases the broken needle removed under general anesthesia or under sedation. The procedure performed either through an incision medial to the anterior edge of the ramus through the tissue or the incision performed at the external oblique ridge subperiosteally recognizing the vital anatomic structures of the area. In our case the exact localization of the needle before intervention made possible the removal of the needle immediately through the soft tissue and in short time (within 15 minutes).

CONCLUSION

Dental needle breakage even though rare can still occur. The use of certified dental needles with appropriate dimension for inferior mandibular nerve block and careful technique can minimize the possibility of needle fracture. In case of needle breakage referring the patient to an Oral & Maxillofacial Surgeon is recommended.

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