Case report

Dental broken needle migration to the skull base. A case of dental broken needle migration to the skull base. Anatomical considerations and prevention.

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Abstract

Introduction: the needle fracture during the inferior alveolar nerve block is not a common accident, but when it occurs can cause great inconvenience to the professional and patient, because the surgical removal should only be performed without risk of sequelae to the patient. Aim: relate a case of broken dental needle during inferior alveolar nerve block and the needle fragment dislocation to the skull base becoming impossible its surgical removal. Described preventive procedures to avoid that complication with anatomical considerations related to the inferior alveolar nerve block. Case report: a young female, 18 years old required care after fracture of the dental needle during inferior alveolar nerve anesthesia. She was submitted to CT scan that determined the impossibility of surgical removal of the fragment because it has migrated to the skull base becoming close to vital anatomic structures because its could produce irreparable sequelae such loss of tongue sensation and movement of the lip. A conservative treatment was offered. Conclusions: surgical removal of its instrument should be correctly evaluated to avoided irreparable sequelae to the patient. The knowledge of anatomical structures in the pterigomandibular region may reduce the risk of injury to nerves and another structures and prevent further complications.

Keywords: anesthetic techniques, dental anesthesia, anatomy, inferior alveolar nerve, skull.

1 Introduction

The local anesthetics administration is the most common procedure executed in dental practice (LUSTIG and ZUSMAN, 1999). Factors as dental-alveolar topography, psychological conditions of the patient, anesthetic technique (MEYER, 1999), type and dosage of local anesthetic can contribute for the imperfections occurrence and failure on the procedure (DAUBLÄNDER, MÜLLER and LIPP, 1997).

Among some related complications in the dental practice, the needle breakage during the inferior alveolar nerve block deserves distinction, due to it rarity (DOJCINOVIC, HUGENTOBLER and RICHTER, 2007) and inconvenience to the patient and dentistry (MARKS, CARLTON and MCDONALD, 1984).

In the beginning of the twentieth century, the dental needles presented high stiffness and were not disposable, the frequency of fractures was significantly higher than the beginning of the 60s, when the industry began to produce more flexible and disposable needles (BEDROCK, SKIGEN and DOLWICK, 1999).

Retrospective studies (BLUM, 1924) and case reports (DOJCINOVIC, HUGENTOBLER and RICHTER, 2007) show 65 cases of broken needle in the pterygomandibular space during inferior alveolar nerve block in 10 years

Surgical removal of a broken needle during inferior alveolar nerve block can be a difficult procedure due to proximity to the vital anatomical structures of the region. This paper presents a case of dental broken needle during inferior alveolar nerve block that was lodged at the skull base and also describes the prevention aspects of this complication as well the anatomical consideration related to the inferior alveolar nerve block.

2 Case report

A 18 years old female patient, was conducted to the Hospital by her private dentist to remove a long needle (30G) fractured during the inferior alveolar nerve block. Both, dentist and patient confirmed that the abrupt movement of the patient's head during inferior alveolar nerve block was the cause of needle fracture.

The clinical exams confirmed absence of pain and perception of object-presence in the right pterygomandibular region of the patient during mandibular movements.

Sagittal Computed Tomography (CT) (Figure 1) and another axial CT (Figure 2) located the broken needle fragment approximately 30 mm in the right pterygomandibular region.

After the needle fragment localization with CT, a multidisciplinary team evaluated its removal. However, the surgical removal could not be performed because the fragment has migrated up to the skull base (Figure 3) and its relation to vital anatomic structures would produce irreparable sequelae, such as loss of tongue sensation and movement of the lip.

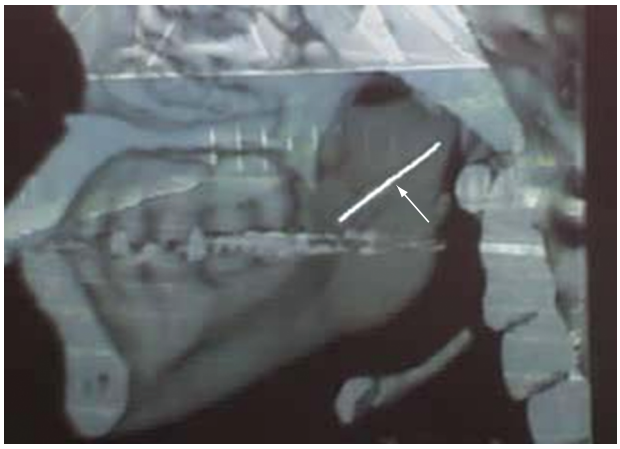

Figure 1. Sagital computed tomography showing the broken needle fragment (white arrow) near to the medial the right mandibular ramus.

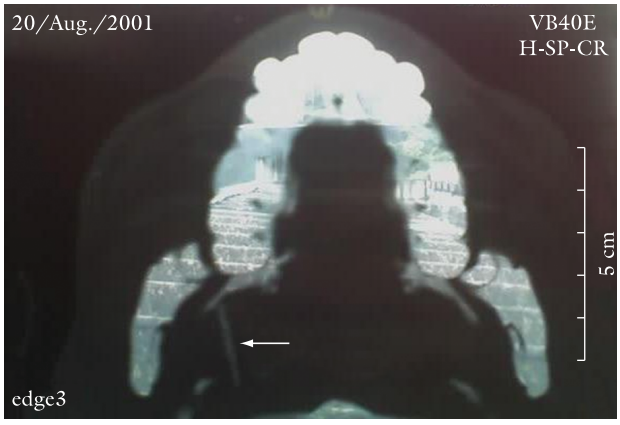

Figure 2. Axial computed tomography presents the broken needle fragment (white arrow) near to the medial face of the right mandibular ramus.

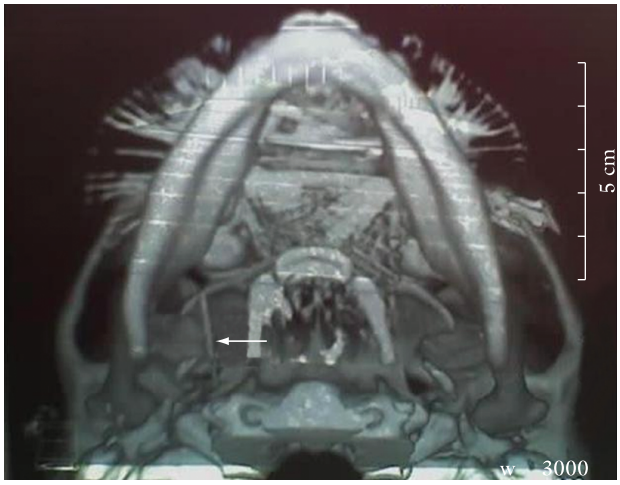

Figure 3. Computed tomography - inferior view of the skull showing the fragment of the broken needle (black arrow) lodged at the skull base.

After assessing the risks and benefits related to the surgical removal of the broken needle, was offered a conservative treatment and the patient should be evaluated clinically and radiographically over a predefined period, it was accepted by the patient with signature of informed consent.

3 Discussion

3.1 Methods of prevention

The prevention of broken needles begins before any dental procedure, as routine needles inspection, discarding them with any defect (BEDROCK, SKIGEN and DOLWICK, 1999). Repeated punctures with the same needle should be avoided, because its make it weak and susceptible to breakage (FITZPATRICK, 1967). The patient cooperation is essential in order to avoid any sudden or unexpected movement during anesthesia that can contribute to the needle fracture (CROUSE, 1970) as observed in this case.

The bending needle before its introduction into the soft tissues can become it more susceptible to fracture, especially when contact the bone (MALAMED, 1997). The full introduction of the needle inside the tissue and changes in the direction of the needle pathway inside the tissue also increases the chances of fractures.

The caliber and needle size used for inferior alveolar nerve block is a divergent factor presents in the scientific literature reviewed. According to Archer (1961) any needle shorter than 42 mm or smaller than 25G should be used for this block. Pietruszka, Hoffman and McGivern (1986), warned that caliber needles smaller than 30 G are stringer, presents minimal stiffness therefore should not be used for nerve blocks because they are more susceptible to breakage. Bedrock, Skigen and Dolwick (1999) recommended the use of needles with 27 and 35 mm for the inferior alveolar nerve block, and avoid the total introduction of needles to prevent fractures. However, it is important that dentist check the needles conditions before each procedure (MALAMED, 1997).

Scientific reports presents concordance about the use of computed tomography to locate the broken needle, to establish the correct diagnosis and appropriate treatment (ZELTSER, COHEN and CASAP, 2002). However, the definition about the surgical removal of the broken needle fragment still has discordant points of views (MARKS, CARLTON and MCDONALD, 1984; BEDROCK, SKIGEN and DOLWICK, 1999; FITZPATRICK, 1967; CROUSE, 1970). In the present case, surgical removal of the fragment could not be performed because the needle fragment had migrated to the skull base and its relation with other vital anatomical structures would cause irreversible sequelae such as loss of tongue sensation and movement of the lip. According to Fraser-Moodie (1958) the needle fragment has to be removed before it approach to the blood vessels and other vital anatomical structures of the head and neck, however, the absence of signs and symptoms such as pain, infection, numbness and swelling, gave support to the conservative treatment (BROWN and MEERKOTTER, 1963).

Before remove the broken needle fragment the possibility of it get close to the blood vessels, nerves, muscles and bones of the skull base or neck has to be evaluate, as well as the legal

aspects involving this procedure (MARKS, CARLTON and MCDONALD, 1984). The dentist has to plan adequately the situation and expose previously to the patient possible risks about the procedure, because those information ensures to the patient the option to accept or not the treatment (PETERSON, ELLIS, HUPP et al., 2000).

3.2 Anatomical consideration to the inferior alveolar nerve block

The knowledge about anatomical structures surrounding to the inferior alveolar nerve is important not just for the broken needles prevention but to the neurovascular trauma, intravascular injections, facial paralysis, (BARKER and DAVIES, 1972) paresthesias of the lingual and inferior alveolar nerves (POGREL and THAMBY, 2000) and muscle trismus (MALAMED, 1997; RODA and BLANTON, 1994).

Inferior alveolar nerve injuries caused by needles during anesthesia, can cause temporary or permanent paresthesia (loss of sensitivity), hyperesthesia (increased sensitivity to painful stimulus) and dysesthesia (painful sensation of something usually painless) (HAAS and LENNON, 1995). The paresthesia can persist weeks or months and therefore may lead to self-inflicted injury to oral tissue, tongue (lingual nerve) and lower lip (inferior alveolar nerve). If the lingual nerve is affected, the corda tympani nerve, branch of the facial nerve can be affected too, resulting dysgeusia (impaired sense of taste) and xerostomia (reduced salivation). Most of paresthesias have no treatment and after approximately eight weeks it is resolved (PRETTERKLIEBER, SKOPAKOFF and MAYR, 1991), avoiding one of the most frequent causes of litigation against dentists (HAAS and LENNON, 1995). In most cases these nerve injuries occur during needle removal after the inferior alveolar nerve block (STACY and HAJJAR, 1994)

The inferior alveolar nerve block anesthesia requires careful procedure because a needle introduction towards the infratemporal fossa can reach vessels of that region causing bleeding, hematoma or intravascular injection (MALAMED, 1997; RODA and BLANTON, 1994; TRAEGER, 1979; TURVEY and FONSECA, 1980). If a vein is reached the bleeding is minimum and evidenced few days later on the other hand, if an artery is smote the bleeding is fast and the hematoma shows up minutes latter. The bleeding may be reduced by the local pressure (BLANTON and JESKE, 2003).

Another aspect about the inferior alveolar nerve block is the complete insertion of the needle and deposition the anesthetic solution into the parotid gland, affecting the facial nerve (VII cranial nerve). It can cause temporary paralysis of the ipsilateral hemiface muscles and inability to blink the eye. These symptoms disappear after anesthetic absorption (RODA and BLANTON, 1994), however cause discomfort for the patient.

The medial pterygoid and temporal muscles insertions on the mandibular coronoid process and pterygomandibular space respectively, should be avoided during the needle puncture preventing muscle trismus (RODA and BLANTON, 1994). The introduction of the needle towards to the infratemporal fossa can also reach the lateral pterygoid muscle (MALAMED, 1997)

Accidents and complications during dental treatment are unpleasant situations that may occur with experienced professional. The continued study, correct planning, caution during the procedures execution, use of a consent form and especially the maintenance of good professional-patient relationship are conducts that ensure the health of the patient and minimize contests and process against dentists.

4 Conclusion

The prevention of broken needle begins before any dental procedure by the needles inspection and patient cooperation.

Surgical removal of a broken needle fragment ought not to be performed in cases involving risks of irreparable sequelae. A conservative treatment ought to be offered and if accepted, a consent form has to be signed by the patient. The knowledge about of anatomical structures of the pterygomandibular region may reduce the risk of nerve injuries, blood vessels, glands and muscles and prevent further complications.

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