

CASE PRESENTATION:FRACTURED NEEDLE IN THE PTERYGOMANDIBULAR SPACE AFTER AN INFERIOR ALVEOLAR NERVE BLOCK

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Abstract

Needle fracture during inferior alveolar nerve block is a very rare accident that can occur in the dental private practice. The incidence is reported to represent approximately 0,000007%. A fractured needle in the pterygomandibular area is considered an emergency so it is important to withdraw it. Although images like panoramic radiography (2D) and computed tomography (3D), are useful in the localization of the foreign body the removal can be very difficult. In this article we present the case of a 32 year old male patient, who experienced an inferior alveolar nerve block for the endodontic treatment of the tooth 47 at a private dental office. During the nerve block on the right side, a 30 G disposable needle tore and shifted posteriorly in the pterygomandibular space. We managed a successful outcome, in general anaesthesia with oro tracheal intubation. The needle removal was possible with the aid of the department of interventional radiology which provided imagistic support with guided fluoroscopy.

Key words: needle fracture, inferior alveolar nerve block, guided fluoroscopy

Introduction

Local anesthesia is a labor practiced daily in the dental office. Rarely unexpected complications may arise when handling the local anesthesia. The fracture of the needle is a very rare accident. The prevalence of the needle breakage was estimated at 0,000007 % and the most of the needles (70 %) break during the inferior alveolar nerve block located in the pterygomandibular space. [1] Since 1960 the needle breakage during surgery has become very rare because of the single use needles, the improvement of metallic alloys and manufacturing process. [2] Multiple

elements can result in the fracture of the needle: bending the tip of the needle or fabrication defects; patient's sudden move or mouth closure while performing the local anesthesia. Pediatric patients require attention because they can also have sudden moves while performing the injection. Broken needle is considered an emergency and it should be extracted immediately although sometimes it may be challenging. We will present a case in which the surgical team successfully removed a broken needle from the pterygomandibular space using endoscopy assisted fluoroscopy.

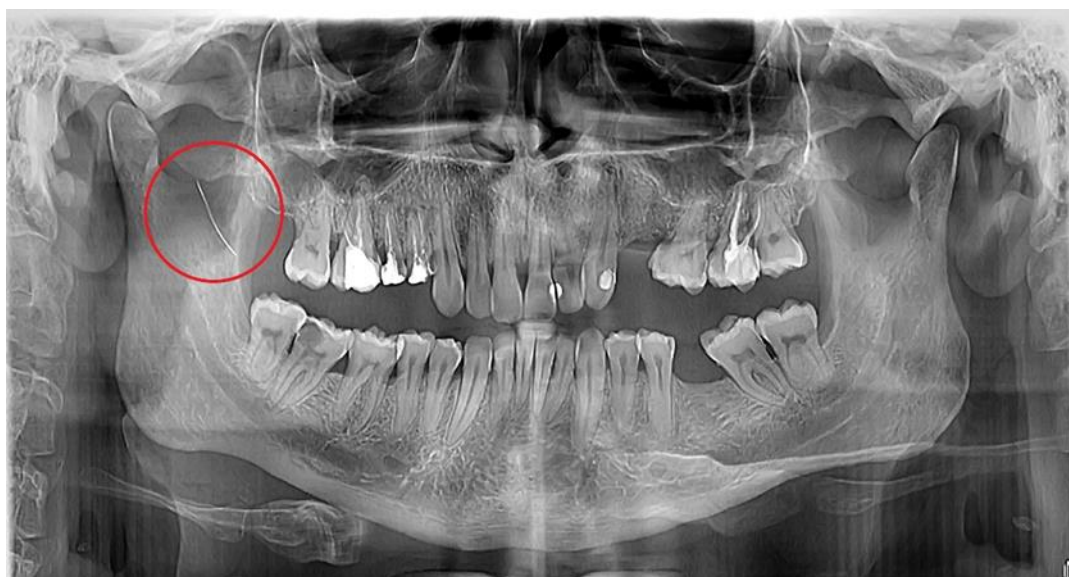


Figure 1. Panoramic X-ray showing the presence of a foreign body at the mandibular level

Materials and methods

A 32-year-old patient was admitted urgently in the oral and maxillofacial department for the removal of a foreign body, a dental anesthesia needle. The patient was accompanied by the attending physician, and the anamnesis and information about the current medical history were explained in detail. During the anesthesia of the right inferior alveolar nerve, a sterile single-use needle approximately two cm long and 30 G in diameter (0.30 mm) broke and migrated into the pterygomandibular space. The dentist has established the fracture of the needle, asked for a new panoramic X-ray (Figure 1) and a mandibular CBCT, and directed the patient to the hospital.

Imaging revealed the presence of a radiopaque object in the pterygomandibular space, representing the fractured needle. The patient was informed about the need to explore the pterygomandibular space and remove the needle. The patient was also informed about the risk of injuring the inferior alveolar nerve and the lingual nerve, understood the risks, and signed the

consent form. The patient accepted the situation well, being compliant and optimistic. The needle was embedded in the muscle, in a difficult area with multiple important anatomical elements. It was difficult to identify, and the surgical maneuvers posed an increased risk. For the first time in our hospital, image assisted intervention using fluoroscopic guidance was attempted (Figure 2), with the intervention performed in the interventional radiology department (Figure 3) under general anesthesia with orotracheal intubation. Fluoroscopy involves continuous X-ray exposure, allowing real time visualization of a dynamic image on a monitor, similar to a video X-ray. During the fluoroscopy procedure, an X-ray beam is passed through the patient's body. The image is transmitted to a monitor, allowing detailed visualization of the movement of a body part, a medical instrument, or a contrast agent. Fluoroscopy is a procedure that helps diagnose certain pathologies or can guide surgeons during specific procedures



Figure 2. Fluoroscopic system with X-ray, image intensifier, video camera, and monitor

Thus, intraoperative guidance was possible regarding the location of the foreign body and its extraction using surgical forceps. The operating team was able to track the foreign body on a screen and approach it from the optimal angle to safely extract it. With the help of the imaging procedure, the intervention lasted three minutes, successfully removing the foreign body

from the patient's mandible. Thanks to this multidisciplinary approach, the operating time was significantly reduced, potential complications were eliminated, and the patient's recovery time was shortened. After the intervention, the patient had a favorable outcome and was discharged the following day.



Figure 3. Fluoroscopy highlights the foreign body at the rimandibular level

Discussions

Needle fracture in soft tissues is a rare accident that can occur in private practice, and it is a distressing event for both the patient and the treating physician. Few cases are described in the literature following peripheral trunk anesthesia of the inferior alveolar nerve, with short needles being involved in most cases. [3-12] If the needle breaks and does not penetrate posteriorly into the muscle, it can be extracted with Pean forceps. If the needle does penetrate posteriorly into the muscle, the patient should be directed to the oral and maxillofacial surgery department. When the panoramic X-ray or CT scan is performed, the patient has their mouth closed. However, when exploration is done in the retromolar area, the patient's mouth is open, which can cause the foreign body to change position due to muscle-induced shifts, making it harder to identify. Needles for anesthesia were first introduced in 1853. Since then, needles have continuously improved, becoming more durable, thinner, flexible, sterile, and designed for single-use per intervention per patient. Anesthesia needles are packaged in sterile plastic containers to reduce the risk of infection. Currently, the most commonly used materials for manufacturing needles are alloys of chromium, nickel, or cobalt, which have resistance to corrosion and heat. The components of an anesthesia needle are: the protective sheath, the hub—a plastic component that attaches the needle to the syringe, the cannula—the metal shaft with a channel, and the bevel—the oblique cut at the end of the cannula where the needle tip is formed. Anesthesia needles used in daily dental practice come in various types

depending on their diameter and length. The diameter or thickness is expressed with the letter G in mm (millimeters) and ranges from 25 G to 30 G. The most commonly used needles are 25 G, 27 G, and 30 G. The smaller the needle diameter, the greater the bending when in use. On the other hand, needles with a larger thickness have a greater diameter, higher precision, and lower risk of breakage. Specialty stores sell needles classified as follows: 30 G with a diameter of 0.30 mm, 27 G with a diameter of 0.40 mm, 25 G with a diameter of 0.50 mm, 22 G with a diameter of 0.70 mm, and 20 G with a diameter of 0.90 mm. Needle lengths also vary: very short (8-15 mm), short (16-24 mm), long (25-29 mm), and very long (30-40 mm).

In our case, the broken needle was 30 G in diameter and 25 mm in length. The average time for needle extraction is described in the literature as approximately two days post-accident. [2] After the intervention, the patient had a favorable outcome and was discharged. This accident can be avoided if all preventive measures are taken. To reduce the risk of needle breakage during local anesthesia, it is recommended to use needles with a length of 35 mm and thickness of 25 G or 27 G [2]. The patient should be prepared and informed to keep their mouth open as possible and to avoid making sudden movements [6]. There is a risk of needle breakage if the wrong needle size is chosen, if the anesthesia technique is poor, if the needle is inserted completely, or if excessive force is applied. Needles have a weak point at the hub—the plastic component that attaches the needle to the syringe. Manipulating the needle, by

bending it during anesthesia, can generate forces that weaken the hub.

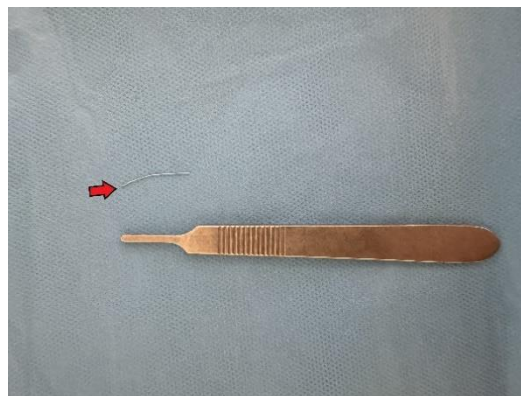


Figure 4 and 5. The operating team in the interventional radiology department and the 30 G needle extracted from the pterygomandibular space.

Conclusions

To avoid needle breakage during local anesthesia, the literature recommends using needles with a minimum thickness of 27 G without bending the needle before use. When working with anxious patients, treating physicians need to be cautious because there is a risk of sudden movements or opening and closing of the mouth, which can cause the needle to break. Interventional radiology is the medical field that includes minimally invasive procedures guided by imaging, used in the diagnosis and treatment of conditions that previously required open surgery. Interventional

radiology procedures can also be applied in oral and maxillofacial surgery, especially in cases involving foreign bodies, such as broken needles, projectiles from gunshot wounds, and others. For the success of this case, the specialties of oral and maxillofacial surgery, anesthesia, and the interventional radiology department collaborated. Thanks to this multidisciplinary approach, the operating time was significantly reduced, potential complications were eliminated, and the patient's recovery time was shortened.

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