



Fractured needle as an unusual complication of the lingual nerve block: a case report

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Although rare, hypodermic needle fractures can occur in the maxillofacial region. In cases of fracture, urgent intervention is required to prevent further complications. We present the case of a 37-year-old female patient with a fractured needle in the left sublingual fossa during a lingual nerve block 6 months before referral. The fragment of a 30-gauge needle was located using cone-beam computed tomography and retrieved under local anesthesia with blunt dissection. The patient recovered uneventfully, except for predictable postoperative inflammatory complications, which resolved within 2 weeks. Precautions should be implemented to prevent needle fractures, which are usually preventable. However, if the retrieval is unsuccessful, the patient should be referred to a well-equipped surgical unit without delay.

Keywords: Complications; Dental Anesthesia; Foreign Body Removal; Local Anesthesia; Needle Fracture.



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INTRODUCTION

Disposable hypodermic needles were introduced in the 1960s. Disposable syringes have gained wide acceptance in dentistry because they eliminate the disadvantages of reusable needles, such as sterilization, weight, common risk of needle fracture, and need to be sharpened [1].

With scientific developments in metallurgy and flexible alloys, the risk of breakage of standardized disposable needles has been reduced [2]. Pogrel claimed that the risk of needle breakage in an inferior alveolar nerve block (IAN) block (IANB) is approximately 1 in 14 million [1]. Although rare, most needle fractures occur during IANB (70%). Manual bending of the needle before injection, abnormal movements of the patient or physician, and

incorrect needle diameter selection are among the causes of needle breakage [3]. Surgical removal of the broken needle fragment is essential to prevent life-threatening complications such as infection and migration of the fragment to vital tissues [4]. In addition, a sharp foreign body that enters the body causes pain, trismus, and other inflammatory complications [3]. The present case report describes the surgical removal of a fractured needle fragment that broke during the lingual nerve block for mandibular third molar extraction.

CASE REPORT

A 37-year-old female patient was referred to the Department of Oral and Maxillofacial Surgery due to a

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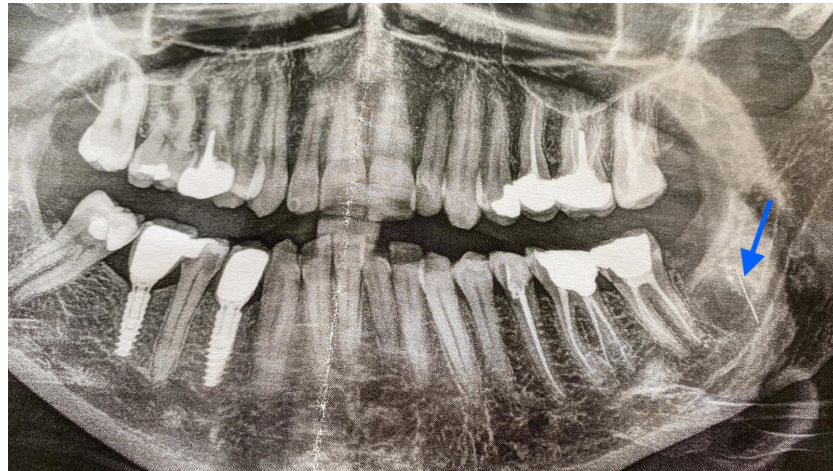


Fig. 1. Panoramic view of the fragment located adjacent to the extraction socket.

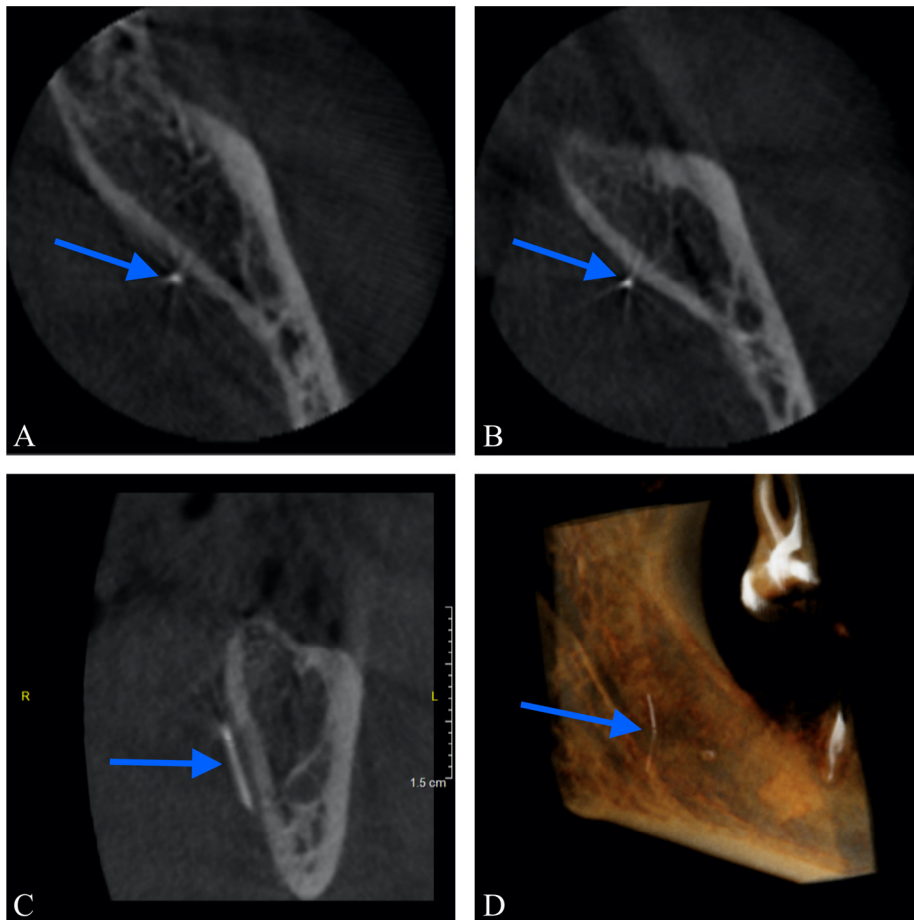


Fig. 2. CBCT views of the fragment obtained preoperatively. (A and B: Axial CBCT images, C and D: Coronal and sagittal planes, respectively). CBCT, cone-beam computed tomography.

broken needle in the left sublingual fossa of the mandible adjacent to the submandibular fossa. Six months earlier, the patient arbitrarily appealed to a dentist for an erupted mandibular left third molar extraction. Conventional

IANB was administered. However, during extraction, the patient experienced pain in the lingual soft tissues. The dentist attempted to perform a lingual nerve block below the cervical margin of the third molar. While performing

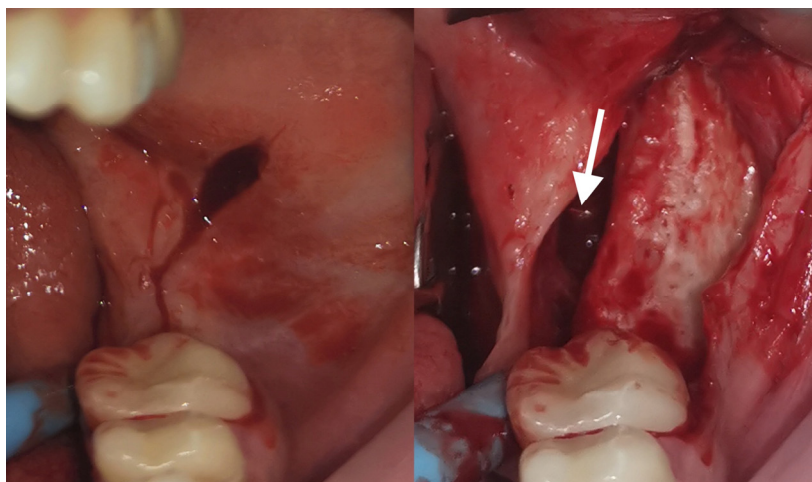


Fig. 3. Intraoperative view of the flap design and removal of the fragment after blunt dissection. The white arrow indicates the fragment.

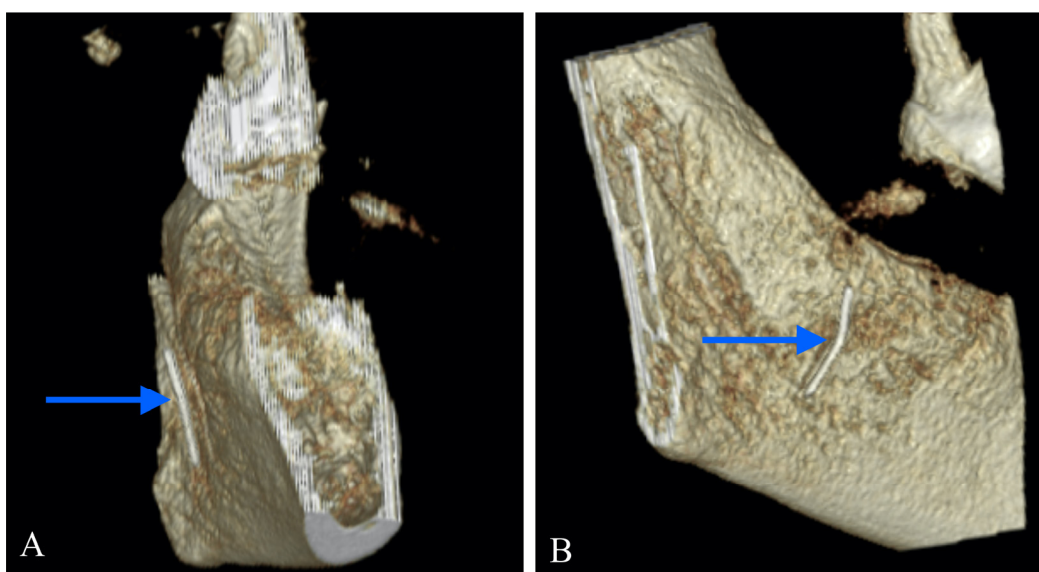


Fig. 4. Three-dimensional reconstruction of the cone-beam computed tomography scan with blue arrows pointing to the 30-gauge needle fragment (A: axial and B: sagittal plane images indicating the fragment located medial to the left mylohyoid line, extending to the left submandibular fossa).

the lingual nerve block, the patient stated that she felt a sudden, sharp pain, and the left half of her tongue was numb. The patient could not recall any further information regarding how the event occurred. After extraction, the patient was informed about the needle fracture during the lingual nerve block. An orthopantomogram was obtained postoperatively, and the radiograph revealed the fractured fragment adjacent to the extraction socket (Fig. 1). In the same session, needle fragment retrieval was attempted. After an unsuccessful attempt, the patient was referred for a follow-up visit after a week. The dentist and a colleague tried to retrieve the

fragment again without success during the follow-up visit. Subsequently, the patient declared that she did not wish to undergo another attempt, and a watch-and-wait approach was proposed. The patient reported self-resolving lingual paresthesia within 2 weeks postoperatively. The patient remained asymptomatic, except for 'the perception of object presence' at the injection site prior to the oral and maxillofacial surgery visit. The mandibular left second molar was extracted independent of the needle fragment.

On clinical examination, the fragment was neither visible nor palpable. Mandibular movements were within



Fig. 5. The retrieved needle fragment.

the normal range of motion. The patient did not report pain, dysphagia, or paresthesia. A cone-beam computed tomography (CBCT) scan (Instrumentarium OP300, Instrumentarium Dental Inc., Tuusula, Finland) revealed that the fragment was still in its position as determined 6 months ago (Fig. 2). The surgical removal of the fragment was recommended due to the risks of migration that could injure the surrounding vital structures such as the lingual or hypoglossal nerve, Wharton's duct, and sublingual or submandibular glands.

After obtaining informed consent, retrieval was planned with blunt dissection of the lingual flap to visualize the fragment under local anesthesia. A horizontal incision was made, starting from the distal aspect of the mandibular first molar, extending to the ascending ramus (Figs. 3 and 4). The lingual flap was bluntly dissected to minimize the risk of damage to the lingual nerve. The 30-gauge needle fragment was retrieved and noted to be bent (Fig. 5). The patient was discharged the same day and recovered uneventfully. The patient had no lingual paresthesia at the postoperative 2-week follow-up, and the postoperative trismus resolved.

DISCUSSION

Local anesthesia in the oral cavity has a low incidence of complications [3]. These complications include systemic reactions such as hypertension, collapse, and

allergic reactions or local complications such as hemorrhage, infections, soft tissue damage, pain, neuronal disorders, and fracture of needles [5]. To the best of our knowledge, this is the first report of a hypodermic needle fracture in the lingual aspect of the mandible during third molar extraction. Most needle fractures in the mandible occur during the IANB and in the pterygomandibular space [4]. The literature mentions a relationship between risk factors such as sudden head movements, excessive forces, angular or directional changes during administration, manufacturing defects, thin or short needle selection, embedding the needle till the hub, and pre-bending the needle and needle fractures [4]. In the current case, the inclination of the retrieved fragment indicated that the needle may have been pre-bent or that excessive force may have been applied during the injection. In addition, the force applied to a 30-gauge needle for an infiltrative injection on the lingual surface of the mandible on the superficial mylohyoid line in the third molar region may have caused the needle to bend and break. Along with factors such as injector type, injection technique, and cooperation with the patient, clinicians should consider the anatomical features of the tissues they inject.

Reports indicate needle migration to the facial artery, the lateral neck, and prevertebral spaces [5–7]. Surgical removal should be performed immediately to avoid significant complications such as needle migration and transection of vital structures [4]. In addition, some

authors recommend more conservative strategies, such as the wait-and-watch approach with frequent imaging in asymptomatic cases [8]; in the first two postoperative days, the retrieval rate was 73% [3], and the overall success rate was 95% [4]. Surgical intervention under general anesthesia instead of local anesthesia is recommended in most cases, as the fragment remains in the pterygomandibular space, where the local anesthetic solution is also injected, increasing the risk of fragment displacement [3]. Conversely, in the present case, surgical removal could be performed under local anesthesia owing to the fragment being in the sublingual space, good psychomotor condition, and patient cooperation. Moreover, operating 6 months after needle breakage may have been easier because the fibrotic tissue that developed around the foreign body during this period prevented migration [9]. Although it has been stated that needle fragments can migrate at an average rate of 0.16 mm/day [10], reports state that fibrosis occurring within 3-4 weeks after the fracture will ensure stabilization [11].

Two-dimensional radiographs are used for routine examinations, surgical removal of the third molars, and postoperative follow-up. However, detailed information on the needle fragment region is essential. For this, it was previously recommended to take additional radiographs, including posteroanterior and lateral views, to estimate the region's three-dimensional (3D) anatomy [12,13]. Since the early 2000s, CBCT has been used to locate fragments. In addition, CBCT has the advantage that essential anatomic structures, such as vessels and salivary glands, around the fragment can be observed [14]. Although magnets and metal detectors have been used to pinpoint fragments, hypodermic needles made of stainless steel respond unsatisfactorily to magnets. Only two cases have been reported describing the successful application of metal detectors [15,16].

More recently, techniques such as 3D navigation, 3D marking with indicator needles, C-arm fluoroscopy, intraoperative 3D imaging, angiography [17], and transoral endoscopy [18] have been used. Although high success rates have been reported with these methods, they

have technical difficulties and require expensive equipment, advanced software, and hardware [17]. In the last few years, with the development of 3D techniques, surgical stents with great detail and precision that can be used intraoperatively have been developed. Recent reports have described the use of mandible-supported surgical guides for retrieving broken needles [19].

Another risk factor for needle breakage is the use of short, thin needles. Considering that injection pain can be reduced with fine needles, most dentists (76%) used 30-gauge diameter needles, as in the present case [3]. However, it has been elucidated that there is no difference between the pain perceptions of patients while using 25-30 gauge needle diameters. The injection pressure is a determinant of pain and anxiety [20]. As low-pressure injections can be administered with large-diameter needles, the injection pain and fracture risk are reduced [21]. It is recommended to use 25-27 gauge needles with a sufficient length (e.g., 35 mm for IANB) to be able to grasp the fragment extending beyond the mucosa even if it is broken and to be resistant to fracture [3]. Measures for the prevention of needle fracture in light of the current information in the literature are [3,4]:

1. Inspection of the needle for manufacturing defects before injection
2. Choosing a needle of sufficient length (e.g., 35 mm long needles for IANB) and diameter (25-27 gauge needle) suitable for anesthesia
3. Avoiding bending the needle manually or puncturing the mucosa forcefully
4. Informing the patient of pain and warning to avoid sudden head or swallowing movements before puncturing the mucosa
5. Changing the needle when repeated injections are needed
6. Keeping the mucosa and the plastic hub at a distance
7. Avoiding prominent angular and directional changes while advancing the needle.

In conclusion, if precautions are followed, dental hypodermic needle fracture is a rare and preventable complication. Conversely, urgent intervention is required

to avoid major life-threatening complications associated with needle fractures. If fragment removal is unsuccessful, the patient should be referred to a well-equipped maxillofacial surgery unit for diagnosis and surgical removal.

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AUTHOR CONTRIBUTIONS

Aras Erdil: Conceptualization, Data curation, Investigation, Project administration, Visualization, Writing - original draft

Mustafa Sami Demirsoy: Conceptualization, Project administration, Writing - review & editing

Sefa Çolak: Data curation, Supervision, Validation

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