

Surgical Removal of Orthodontic Mini-screw Accidentally Displaced Into the Pterygomandibular Space Via Intraoral Approach

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Running title : Prevention and Treatment of Accidentally displaced Orthodontic Mini-screw

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ABSTRACT

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The mini-screw is widely used in orthodontic treatment for anchorage reinforcement. In mild skeletal Class III patient, retraction of mandibular dentition using mini-screw has been accepted as a reliable and stable treatment approach. In addition, the mini-screw placed in the retromolar area could be used for the uprighting of the lower molar. However, the placement of the mini-screw on the retromolar trigone or anterior ramus region need to be careful because of the possible risk of the "slippage" or "displacement". Once the mini-screw is displaced to the fascial space such as pterygomandibular space, sub-mandibular space or lateral pharyngeal space, it is difficult to remove. In this case report, we present a mini-screw removal case via an intraoral approach that was displaced into the pterygomandibular space while placing the orthodontic mini-screw on the anterior margin of mandibular ramus.

Key words : mini-screw; displaced, pterygomandibular space

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Introduction

Anchorage control is one of the most important factors for successful orthodontic treatment. It serves as the resistance to the reactive forces from the orthodontic appliance and prevents unwanted tooth movement^{1,2)}.

A mini-screw is the most common temporary anchorage device which leads to less tissue damage and a patient's discomfort than others³⁾. When placing the mini-screw, the anatomic consideration of the insertion site is important to increase its success rate. The maxillary buccal alveolar process, midpalate, palatal alveolar bone, mandibular buccoalveolar cortical plate, buccal shelf, retromandibular trigone and anterior ramus region are widely used as insertion sites⁴⁾. Among them, the retromolar trigone and anterior ramus region can be considered as an ideal anchorage to upright the horizontally impacted mo-

lars or to move the mandibular molar teeth distally^{5,6)}. Since this area is covered with thick, mobile soft tissue there always has been a risk of slippage into fascial space when placing the mini-screw⁷⁾. So far, the case of mini-screws displaced into the pterygomandibular space has not been reported. We present a case of an orthodontic mini-screw that was displaced into the pterygomandibular space.

Case report

A 41-year-old female patient visited a local dental clinic seeking orthodontic treatment. The dental practitioner attempted to place the mini-screw on the left anterior ramus area, but the mini-screw slipped and displaced into the posterior pterygomandibular space. The clinician immediately referred the patient to the department of oral and maxillofacial surgery at Wonkwang University Dae-



Figure 1. Panoramic radiograph taken on the first visit. Displaced mini-screw is observed in the left mandibular angle area.

CASE REPORT

jeon Dental Hospital.

During the clinical examination, there was no limited mouth-opening or pain when the patient attempted to swallow. On the panoramic radiograph, a displaced mini-screw in the left pterygomandibular space was observed (Fig. 1). A computed

tomographic (CT) scan confirmed that the mini-screw was located on the inferomedial aspect of the ramus, 7.5 mm inward from the mandibular lingual cortex and 29 mm from the distal surface of the left mandibular second molar (Fig. 2,3).

First, we decided to try a surgical removal proce-

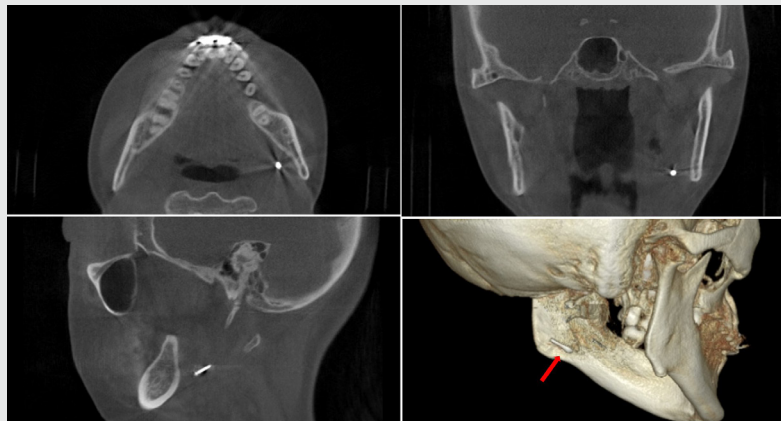


Figure 2. A computed tomographic(CT) scan confirmed that the mini-screw was on the inferomedial aspect of the ramus.

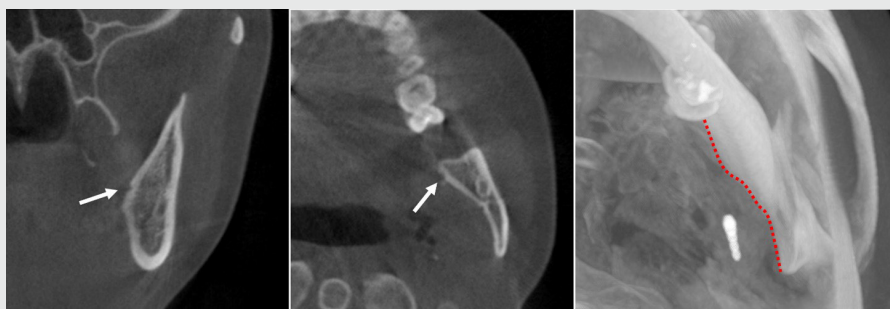


Figure 3. Bone notch caused by mini-screw sliding(white arrow). Note the concave surface of the mandible lingual side at the insertion site(dotted red line).

cedure under the local anesthesia. We made an incision along the external oblique ridge line and raised a lingual flap (Fig. 4). During dissection of the wound from the displaced mini-screw at the lingual mucosa, the patient underwent severe gag reflection so that the surgical procedure cannot be continued. Since we were not able to proceed with the removal procedure under the local anesthesia, general anesthesia was advised to the patient.

Two days later, under general anesthesia, the incision was made and extended to the left mandibular second molar with the number 15 blade. The approximate location was already verified from the panoramic x-ray and CT scan images taken previously. By the palpation and portable x-ray image of the site, the exact location of mini-screw was determined properly.

The displaced mini-screw was visible when we dissected inwards through the perforated periosteum of the medial ramus. It was removed from the medial lingual mucosa with a long hemostat. And the surgical incision site was closed primarily with 4-0 Vicryl suture. A pressure dressing was applied to the submandibular area. There was no atypical complication during the postoperative healing period (Fig. 5).

Discussion

During the placement of the mini-screw at the retromolar trigone and anterior ramus region, “slippage” can cause a great risk because it may

be displaced into the pterygomandibular, submandibular or lateral pharyngeal space. In addition, there is a risk of damage the lingual nerve or vessels and serious infection due to the foreign body entered in the anatomical space.

Usually, when using mini-screws to upright the impacted mandibular molar or to move the mandibular molar teeth distally, a mini-screw is placed between the external and internal oblique ridges of the ascending ramus.⁵⁾ Two main nerves are passing nearby; long buccal nerve runs the buccal side and then upwards from the retromolar trigone, and the lingual nerve runs along with the lingual side of the mandible. Therefore, the possible risks of the mini-screw placement are usually associated with nerve damage. In addition, on the lingual side of the mandible, there are many blood vessels including the lingual artery. In case of the damage to these blood vessels, it can lead to serious bleeding because the compression on the lingual side of the mandible for hemostasis is not easy to perform⁸⁾.

For our understanding, this case occurred due to the lack of understanding of the anatomy of the mandible (Fig. 3). The shape of the lingual aspect on the retromolar area is considerably thinner and narrower than the outer aspect (Fig. 4). Being ignorant of this point causes placing the mini-screw too lingually than the bone. Therefore, it is important to understand these anatomical characteristics of the mandible for the successful placement of the mini-screw⁹⁾.

In general, pre-drilling is not commonly performed when the orthodontic mini-screw is placed.

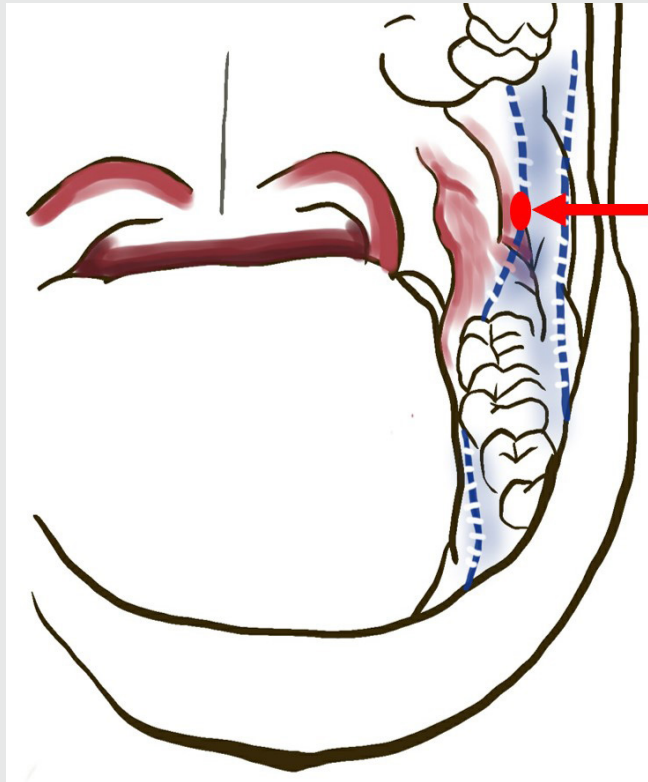


Figure 4. The location of the laceration generated by dislocation of the mini-screw(red arrow). Dotted blue line represents a mandible margin.



Figure 5. Panoramic radiograph taken after the mini-screw removal surgery.

However, pre-drilling is one of the methods when there is a thick mucous membrane which is preventing accurate identification of the lingual bony margin of the anterior ramus.

It is not easy to remove the displaced the mini-screw or the third molar fragment(displaced due to the lingual plate fracture during extraction) in the pterygomandibular space. The action of the medial pterygoid muscle makes the removal of the foreign body slipped into the pterygomandibular space difficult: each opening and closing movement have it go deep inside. In this case, the mini-screw slipped along with the inner aspect of the bone and displaced into the pterygomandibular space while the clinician placed the self-tapping type mini-screw. Immediately, the patient was referred to the university hospital. However, even in a short time, the

mini-screw was deeply drifted to the level of the inferior margin of the mandible. An extraoral approach is generally attempted to remove the foreign body near the inferior margin of the mandible. Fortunately, in this case, the laceration of the mucous membrane caused by the mini-screw remained, so it could be used for the removal as an intraoral approach.

In conclusion, in this case, the mini-screw displaced into the pterygomandibular space due to the displacement during the placement of the mini-screw in the anterior margin of mandibular ramus was removed via an intraoral approach. Through this case, we report that clinicians should be aware of the bony margin when placing the mini-screw in the anterior margin of the mandibular ramus and be cautious not to place the mini-screw too lingually.

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