

Implant Surgery Potential Complications from the Submandibular Fossa

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Introduction

Implant placement has become a widely acceptable treatment modality in the field of dentistry. It is crucial that the potential complications of this procedure be evaluated, especially with regards to the anatomical placement of the dental implants. The objective of this study was to evaluate potential complications from implant surgery exclusively in the submandibular fossa.

Materials and Methods

A literature review was conducted strictly using online databases. The inclusion criteria consisted of including preoperative and postoperative CBCT imaging, as well as reporting intraoperative and postoperative complications of implant placement in the submandibular fossa.

Anatomical Considerations

The submandibular fossa is a depression on the inferior medial surface of the mandible that extends to the mylohyoid line and contains the submandibular gland. Nearby arterial supply includes the submental and sublingual arteries, which are branches of the facial artery. There is a high prevalence of deep submandibular fossa concavity in patients, which may pose risks for implant placement. The increased depth of the concavity is associated with increased risk of lingual cortex perforation during endosseous implant placement.

Case 1: Accidental Displacement and Migration of an Endosseous Implant Into Submandibular Fossa

45-year-old woman presented with pain and swelling of the left submandibular fossa with **paresthesia and trismus**. She underwent dental implant surgery 5 days prior in the #16–17 region. Implant displacement into the submandibular space occurred due to inadequate evaluation of the submandibular fossa concavity prior to implant placement. Prevalence of the deep concavity in the submandibular fossa region **led to lingual cortex perforation**, diminished primary stability, and **displacement of the endosseous implant**.

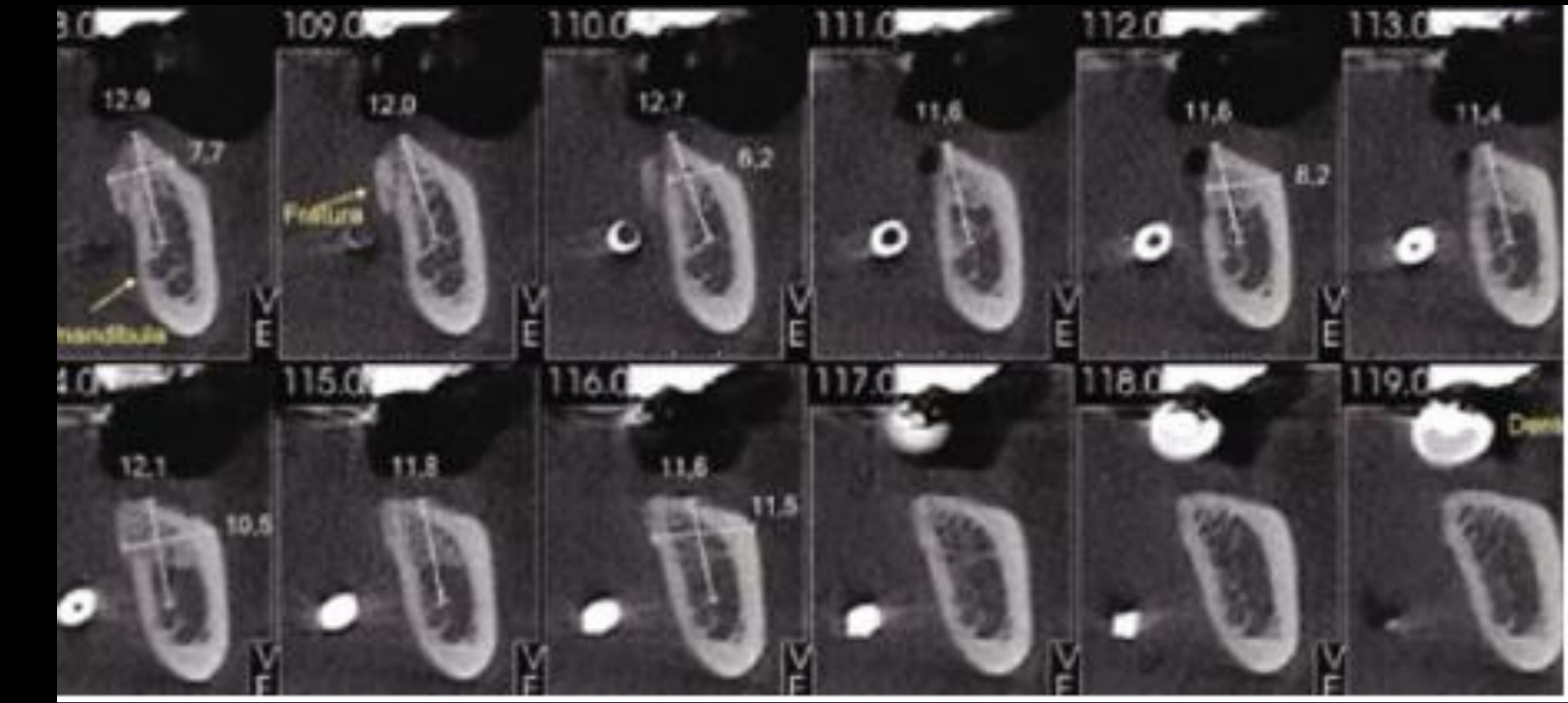
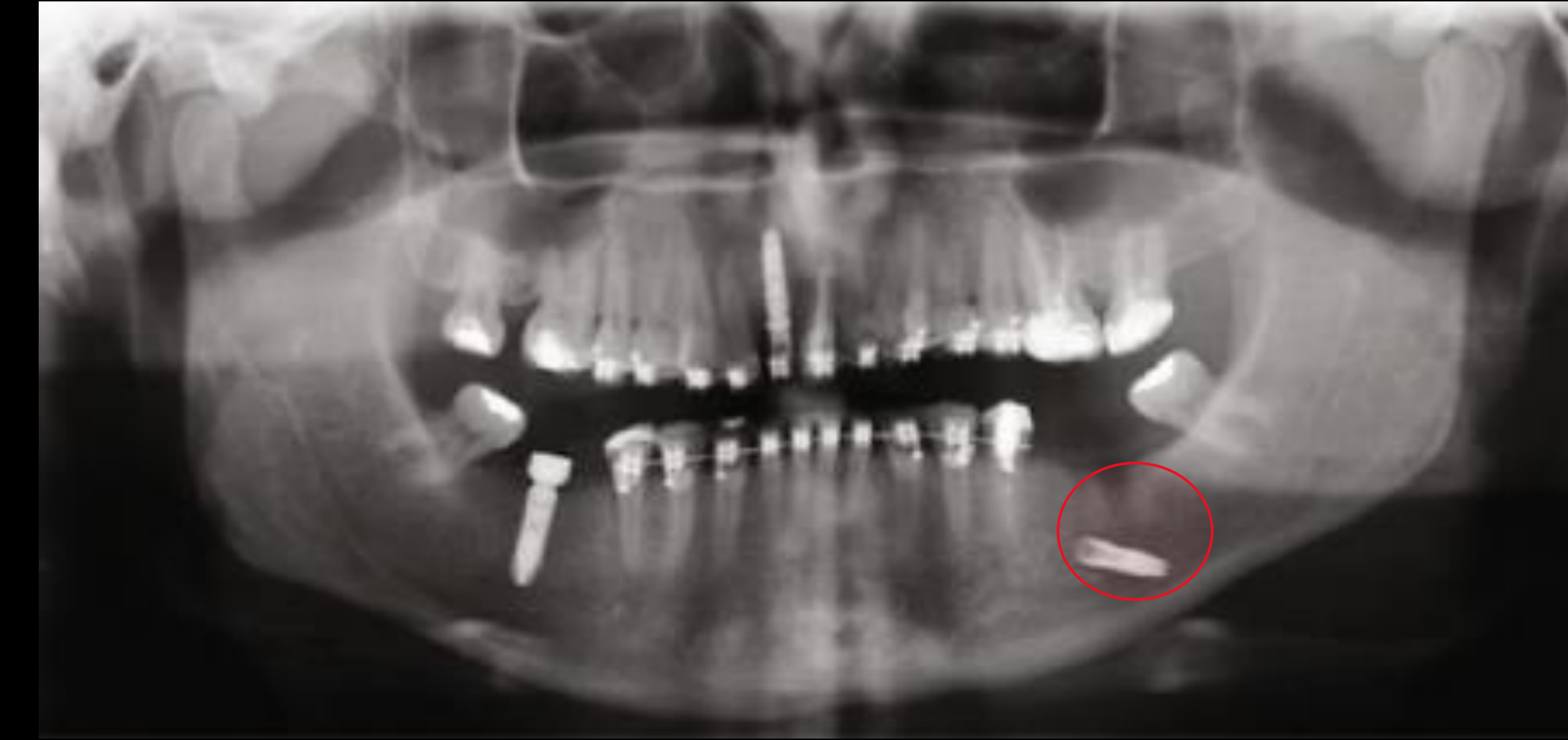


Case 2: Critical Hemorrhage in the Floor of the Mouth During Implant Placement in the First Mandibular Premolar Position: A Case Report

43-year-old male was referred to a dental clinic for implant placement in the area of #20. During osteotomy for implant placement, a lack of resistance was felt indicating possible lingual cortex perforation. After removal of the rotating drill there was **slight rising of the tongue and swelling at the floor of the mouth**. Within a couple of minutes, there was noticeable **sublingual and submandibular hematomas** presenting, due to cortex perforation and damaging arterial supply with the rotating drill.

Case 3: Successful Management of Ludwig's Angina due to Dental Implant Displacement: A Rare Case Report

47-year-old man underwent implant placement in a private dental clinic in the posterior region of the mandible. A 3.75 × 11 mm implant was placed in the #19 region. During implant placement, the surgeon reported fenestration of the lingual cortical plate. The fenestration was most likely due to inadequate evaluation of the submandibular fossa and improper surgical technique to avoid this high-risk area. Four months after implant placement, the patient presented with **submental, submandibular and sublingual edema**. Due to the **swelling, the patient presented with pain, trismus and intraoral purulent drainage**. A diagnosis of Ludwig's Angina was made.

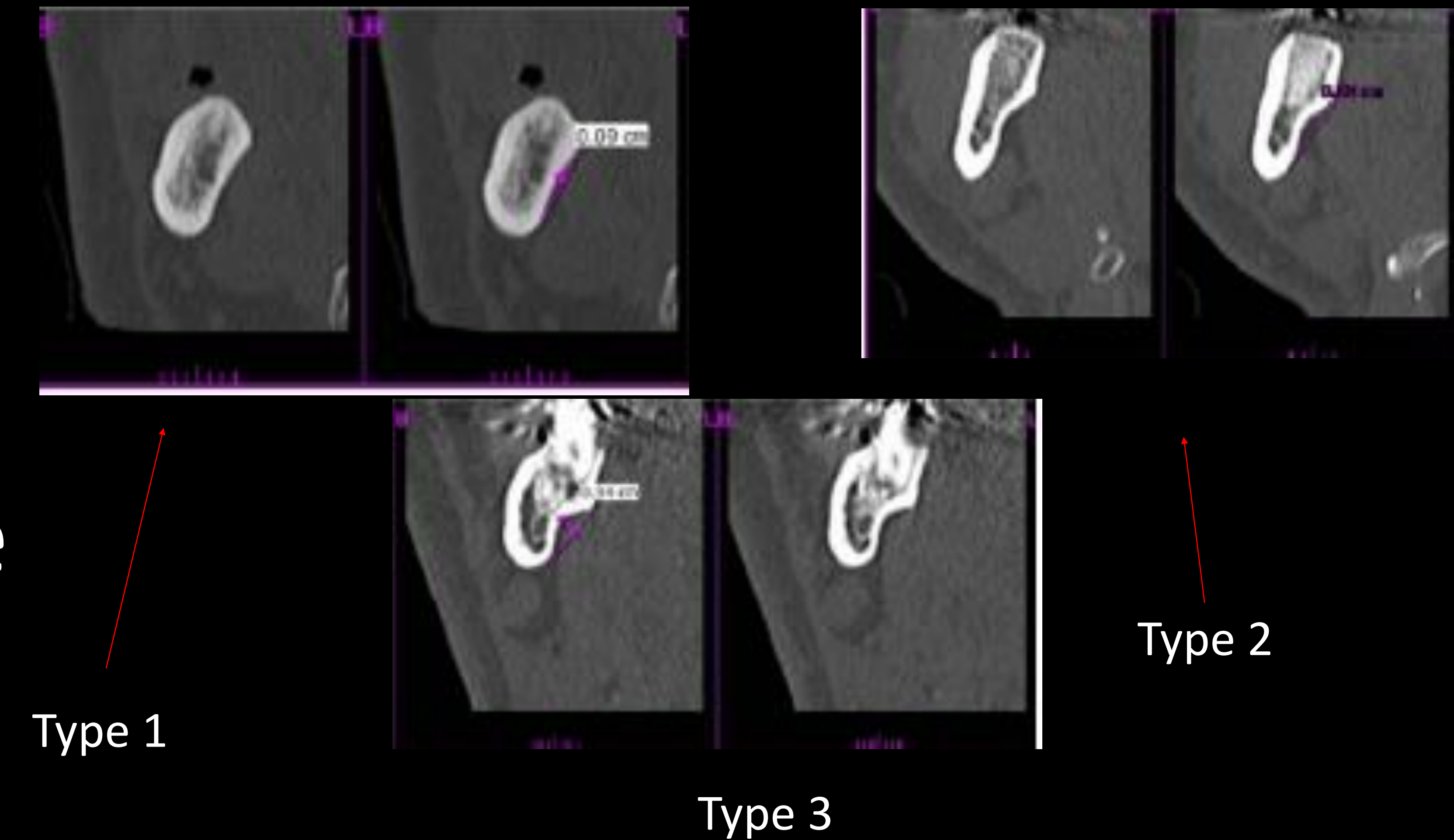


Case 4: Tomographic volume evaluation of submandibular fossa in patients requiring dental implants

The purpose this study was to evaluate the submandibular fossa volume and degree of concavity using multi-slice CT scans. 100 spiral CT preoperative examinations of patients requiring assessment of the mandible prior to implant placement were retrospectively evaluated to determine anatomical variations of bone morphology in the submandibular fossa region. Concavity depth was measured using a tangent line to the lingual surface of the fossa and the deepest point was then selected by moving a perpendicular line across the tangent line.

Case 4: Tomographic volume evaluation of submandibular fossa in patients requiring dental implants

A lingual concavity of 2 mm was seen in 80 patients. 20 of the patients possessed a concavity of less than 2 mm in depth (type I) and in 52 patients possessed concavities of 2 to 3 mm in depth (type II). An estimated 28 patients of the examined regions showed significant concavities more than 3 mm (type III). The high prevalence of lingual concavity greater than or equal to 2mm in the submandibular region shows a direct correlation with lingual cortex perforation and other potential implant complications in this region.



Discussion

As the number of practitioner's placing implants increase along with patients receiving implants increases, the potential risk of complications, during or after the procedure may also increase. The complications of endosseous dental implants has been studied before. However, it is important to note that the current review of the literature specifically focuses on the complication of implant placement in the submandibular fossa. From an anatomical standpoint, proper evaluation of the submandibular fossa is of the utmost importance to avoid various complications including bacterial space infections, lingual cortex perforation and implant displacement. Evaluation of the submandibular fossa region can be performed using a variety of approaches. The literature notes some of the most common practices to evaluate this region consist of Cone-beam computed tomography, lingual flap elevation, panoramic radiographs and palpation of the submandibular area prior to implant placement and surgical design. In patients with significant concavities measuring greater than or equal to 2 millimeters in depth, the risk of lingual cortex perforation is significantly increased, which has a direct correlation with increased risk of other potential complications listed earlier.

Discussion

In patients presenting with deep concavities in this region, the use of smaller dental implants, proper angulation of implants and careful lingual flap elevation to increase visibility may decrease the risk of adverse outcomes. In addition, the use of submandibular fossa augmentation may decrease the prevalence of adverse outcomes, when placing implants in an at-risk submandibular fossa region. Submandibular fossa augmentation includes the use of allographic or autogenous bone material to fill in the undercut in this region. Augmentation can also include recontouring of either the grafting material or mylohyoid line to prevent adverse outcomes.

Conclusion

Pre-surgical and intraoperative planning is critical to prevent life-threatening hemorrhages and submandibular fossa damage. The standard of care for presurgical planning of implants should include CBCT scans in addition to conventional 2D radiographs. Furthermore, diagnostic radiographs are not sufficient alone to prevent complications involving the submandibular fossa during implant placement. Different surgical techniques, such as lingual flap elevation and angulation of implants to gain visibility of the lingual cortex, are strictly recommended.

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