CASE REPORT

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Life-threatening airway obstruction after flapless implant placement in the anterior mandible

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Abstract (J Korean Assoc Oral Maxillofac Surg 2012;38:310-3)

This paper reports a patient who had an airway obstruction caused by a hemorrhage of the mouth floor that occurred after she underwent flapless implantation in the region of the mandibular anterior teeth. The hemorrhage may have been caused by iatrogenic malpositioned fixture and patient's hypertension. The lingual periosteum was not dissected during the flapless procedure. Therefore, when hemorrhage occurred, the blood did not drain easily into the oral cavity but instead drained into the deep neck region, which might have been the cause of the airway obstruction.

Key words: Airway obstruction, Dental implants

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I. Introduction

Complications may occur during dental implantation treatment including fixture fracture, nerve injury, and hemorrhage[1]. Flapless implantation provides the advantages of reduced pain, reduced edema, and shorter operation time but may result in fixture malpositioning since it is a blind method[2]. The anterior mouth floor (AMF) is rich in blood vessels, including the sublingual artery and submental artery[3,4].

Thus, when a fixture is placed by penetrating the lingual cortex for implantation in the area of the mandibular anterior teeth, severe hemorrhage may occur if the surrounding soft tissue and blood vessels of the AMF area are damaged. Airway obstruction may also occur in rare cases[5].

In this paper, we report the case of a patient who experienced airway obstruction due to AMF hemorrhage that occurred after she underwent flapless implantation in the region of the mandibular anterior teeth.

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II. Case Report

A 56-year-old female patient came to the emergency room (ER) with chief complaint of dyspnea due to swollen tongue and neck. The medical history was remarkable for hypertension. The dental history showed that, earlier on the day of her visit to the ER, the patient had undergone at a local dental clinic extraction of both lower central incisors followed immediately by flapless implantation. According to the patient's history of chief complaint, there was continuous oozing around the surgical site after the implant was installed at around 3 pm that day. Her dentist could not give her an acceptable explanation for her condition, so the patient visited the ER at 10:30 pm with the swelling aggregated around her neck area.

The patient said her symptoms of edema and dyspnea had begun on the AMF after the implantation. Clinical examination in the ER showed severe swelling of the AMF and tongue, accompanied by ecchymosis and orthopnea. The patient's respiration rate was 20 times per minute, and routine lab results including hemoglobin, T-CO_2, and PT and aPTT were all within normal limits. Her SpO_2 was over 98%, and systolic and diastolic blood pressure (BP) in sitting position were 160 mmHg and 100 mmHg, respectively. Note, however, that the patient's vital signs worsened in the Semi-Fowler's and supine positions. A computed tomography (CT) of the neck could not be performed immediately after the

patient arrived at the ER since she had difficulty breathing in the supine position. The neck lateral radiography showed that the airway had become obstructed by the swelling of the tongue at the level of the oropharynx.(Fig. 1) The patient was referred to the Oral and Maxillofacial Surgery Department for surgical site management and to the Ear, Nose, and Throat (ENT) Department for airway evaluation.

The patient continuously complained of dyspnea in sitting position until, two hours after her arrival at the ER, the otolaryngologists and ER doctors decided to perform tracheostomy. This was done under local anesthesia by an ENT doctor, with the patient in sitting position. The subsequent neck CT showed that the oropharyngeal airway was completely obstructed.(Figs. 2, 3) The implants in the lower central incisor area had been implanted in labioversion in the wrong positions through the lingual cortex.(Fig. 4)

Since the patient's hypertension continued following treatment in the ER, antihypertensive medication was started after a cooperative diagnosis with the Cardiology Department. After tracheostomy, hemostasis was performed under general anesthesia. The hematomas that had spread under the mouth floor were eliminated, and a drainage tube was inserted through the neck. The intraoperative examination showed that the periosteum was tightly bound to the lingual side

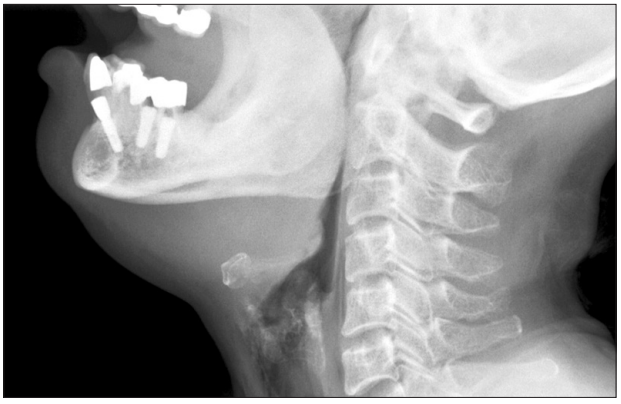

Fig. 1. Neck lateral plain radiography showing tongue swelling and airway obstruction.
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Fig. 2. Computed tomography axial view showing tongue swelling and airway obstruction.
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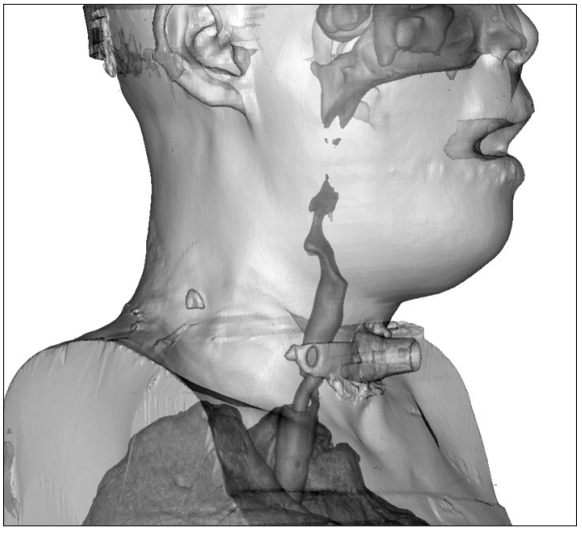

Fig. 3. Three-dimensionally reconstructed computed tomography image showing airway obstruction.
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Fig. 4. Malpositioned implant fixture penetrating the lingual bony cortex.
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above where the two fixtures had been implanted. Ruptured genioglossus muscle and moderate bleeding were also observed. Following postoperative concentrated monitoring in the intensive care unit, the swelling of the mouth floor and the tongue showed marked reduction after the operation, and the drainage tube was removed on the second postoperative day. The swollen mouth floor and tongue returned to normal size in postoperative week one. The tracheal intubation was removed, and the patient was discharged. The ecchymosis had also improved to normal state by the second postoperative week.

III. Discussion

Flapless surgery has several potential advantages including less swelling, pain, surgical time, and need for suturing. Other merits include the preservation of soft and hard tissues and maintenance of blood supply[2,6,7]. Despite these advantages, however, the flapless technique also has several potential shortcomings including the inability to visualize the anatomical landmarks and vital structures, potential thermal trauma to the bone due to limited external irrigation during the drilling osteotomy, and inability to check the vertical endpoint of the implant placement (too shallow/too deep). A flapless approach is also not advisable for the manipulation of circumferential tissues including alveolar bone and mucoperiosteum[2,8,9].

In the case discussed here, fixtures were implanted using a flapless method immediately after extraction of the mandibular anterior labioversioned teeth. During this process, the implantation path may not have been easily controlled in the area of the labioversioned teeth. Additionally, the fixture - which was larger than the original teeth and was implanted using a blind method - may have damaged the lingual soft tissue since the lingual cortex was pierced by the fixture.

Perforating the lingual cortex of the anterior mandible can invade the floor of the mouth and damage structures in the sublingual area. Sublingual anatomical structures are bound by the mandible laterally and anteriorly, by the base of the tongue medially and posteriorly, by the mucosa superiorly, and by the mylohyoid muscle inferiorly. The lingual space has sublingual artery and vein, perforating submental artery and vein, submandibular ganglion, lingual nerve, hypoglossal nerve, sublingual gland, and submandibular duct.

As a major branch of the lingual artery, the sublingual artery is one of the main nutrient vessels to the AMF. Thus, the importance of the submental artery in supplying blood to sublingual anatomical structures has been established[3,4]. In addition, the sublingual artery releases several alveolar branches for complementary blood supply to the lingual anterior cortical bone of the mandible[3,4,10].

The submental artery is the largest cervical branch of the facial artery, coursing anteriorly on the mylohyoid muscle and branching to anastomose with the sublingual artery and with the mylohyoid artery deep into the mylohyoid muscle. At the anterior mandible, it divides into deep and superficial branches, anastomosing with the inferior labial and mental arteries[3,4]. In human cadaver studies, the sublingual artery is located in the mandibular anterior region, and the submental artery perforates the mylohyoid muscle into the anterior mandible[4]. The sublingual artery may enter the lingual cortex of the anterior mandible. The perforating submental artery was present in the anterior mandible, whereas the sublingual artery was small or was missing in the submental area of the mandible[3].

Mechanical injury to the local arterial plexus may potentially lead to dangerous hemorrhage. Therefore, detailed knowledge of the regional fine arterial anatomy is both helpful and imperative for the surgeon performing implant surgery on the mandible.

In the case discussed here, the iatrogenic complication as well as the patient's medical history of hypertension may have caused the hemorrhage. Furthermore, the dyspnea caused by tongue swelling could be one of the factors that contributed to the patient's rising BP. In the flapless method that was used, the lingual periosteum was not dissected. Thus, when hemorrhage occurred, the blood did not drain easily into the oral cavity but drained into the deep AMF region instead. This may have contributed to the airway obstruction.

When a patient visits doctors due to bleeding after implant surgery, airway management must be the first consideration. Following airway management, hemostasis must follow, with compression with gauze[11], hemostatic agent[12], electric cauterization[13], etc. For severe bleeding, the vessel could be tied or clipped, but it is very difficult to perform those procedures under local anesthesia without general anesthesia. In cases of difficult intraoral approaches, extraoral approaches should also be considered[3-5]. Vascular angiography may be helpful[14]. In the case discussed here, when airway management was completed, compression with gauze and hemostatic agent were initially used, and bleeding was controlled under general anesthesia.

Computer-guided navigation implant surgery affords the possibility of optimizing implant position by engaging

more bone, leading to better primary stability. In computer-navigated flapless implant surgery, postoperative pain and swelling can be reduced, postoperative soft tissue dehiscence can be eliminated, and intraoperative safety for anatomical structures at risk of injury is enhanced[15]. Despite the high cost of equipment[16], computer-aided navigation technology in dental implantology has many medical benefits, and computer-guided implantation may be used as a predictable procedure in many cases[17]. Nonetheless, it has yet to be verified for use with all implant surgeries.

Airway obstruction due to hemorrhage of the mouth floor can occur after flapless implantation in the region of the mandibular anterior teeth. In the case described here, the iatrogenic malpositioned fixture and the patient' s hypertension may have caused the hemorrhage. When hemorrhage occurred during the flapless procedure, the blood did not drain easily into the oral cavity but drained into the deep neck region instead, which may have contributed to the airway obstruction.

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