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## Case Report

# Bone resorption after alloplastic chin augmentation found incidentally in a patient with a toothache: Report of a case

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## ABSTRACT

Genioplasty is a commonly performed operation especially in retrogenia. Osteotomy is generally performed to move the chin forward or downward in genioplasty. Alloplastic augmentation implants have been established in orthognathic surgery. The materials for chin augmentation are various, but in clinical practice, the most widely use ones include a solid flexible silicone elastic polymer. However, alloplastic implantation can be associated with several complications, including infection, bone resorption, and secondary soft tissue deformities. In this case, severe bone resorption in the chin augmentation region was found with pain in the mandibular front tooth along with apical periodontitis in the right mandibular second premolar. We suggested that the bone resorption in the present case may have been caused by apical periodontitis which infected of the chin alloplastic implants and incidentally found in a patient with a toothache. We treated with an iliac bone graft and titanium mesh. There was no evidence of recurrence of the lesion after two years of follow-up.

## 1. Introduction

The chin is the most prominent element of the lower third of the face, both in the frontal view and in profile [1]. A weak chin-mandibular complex suggests a lack of character strength, a deficiency in forcefulness [2,3].

Genioplasty is a commonly performed operation especially in retrogenia. Osteotomy is generally performed to move the chin forward or downward, with alloplastic augmentation in genioplasty, because the soft tissue response is more predictable for osteoplastic genioplasty [4,5]. When performing the genioplasty procedure, sufficient preliminary examination is indispensable, and careful pre-operative evaluation may identify patients who could benefit from concurrent augmentation genioplasty [6]. Alloplastic augmentation implants have been established in orthognathic surgery [7,8]. The materials for chin augmentation are various [8,9], and in clinical practice, one widely used material is a solid flexible silicone elastic polymer [10]. However, alloplastic implantation can be associated with several known compli-

cations, including infection, bone resorption, and secondary soft tissue deformities [11,12]. In this report, a case of severe bone resorption after alloplastic chin augmentation is presented.

## 2. Case report

A 39-year-old woman was referred to our department for evaluation of swelling and pain in the lower jaw incisor and gingiva of 3 months' duration. Before being referred to our hospital, she was treated at a private dental clinic with prescription painkillers that did not improve the pain. On general examination, her vital signs were within normal limits. On reviewing her medical history, it was found that solid flexible silicone elastic polymer (Silastic) chin augmentation had been done through an intraoral incision to correct her microgenia 14 years previously. Extraoral findings showed bilateral symmetry on frontal and lateral views and no swelling or pressure pain in the mental region (Fig. 1). There was also no abnormality of the facial profile. Intraoral examination showed oppressive pain and percussion pain in the lower

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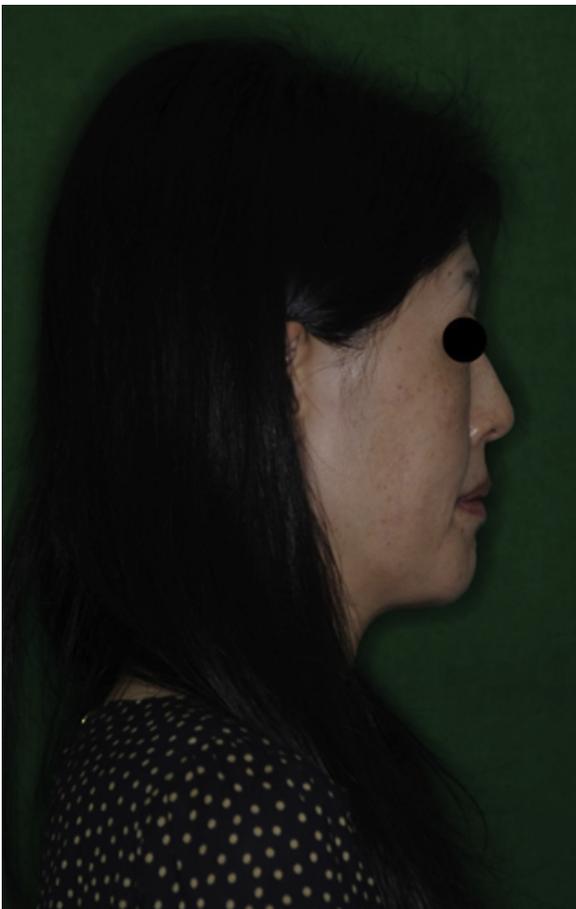


Fig. 1. Extra-oral findings at the first visit. There is no recession in the mental region.

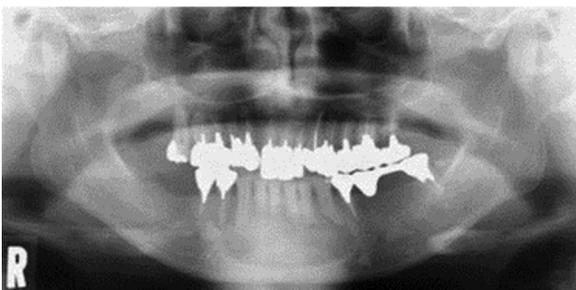


Fig. 2. Panoramic radiograph showing an oval, sharply marginated radio-opacity in the incisor region of the mandible.

jaw incisor teeth. There was an intraoral incision scar in the anterior mandibular gingiva and a fistula in the right mandibular second premolar.

An orthopantomograph was then done that showed an oval, sharply marginated, radio-opacity in the incisor region of the mandible (Fig. 2). A CT scan showed cortical bone absorption at the mental region and a low concentration region (Fig. 3a). The lesion was clinically diagnosed

as bone resorption after alloplastic chin augmentation (Fig. 3a,b) and apical periodontitis in the right mandibular second premolar.

The need to remove the foreign body in the chin, which was the probable cause of the pain in the mental region, was explained to the patient, and she demanded the same degree of retention of the chin. Foreign body removal were planned under general anesthesia. Also bone grafting using iliac crest bone with titanium mesh for repair the bony loss and root amputation of the right mandibular second premolar under general anesthesia were considered. Intraoral incision in the anterior mandibular gingiva was performed, and the foreign body surrounded by a capsule of connective tissue was cleared (Fig. 4a). The connective tissue was connected with the apical periodontitis in the right mandibular second premolar (Fig. 4b). The connective tissue that surrounded the foreign body was removed, and the bone around the foreign body was scraped (Fig. 4c). The foreign body was 15 mm × 31 mm × 10 mm, elastic soft, and crescent-shaped, and there were no holding holes for fixation of the foreign body at the chin (Fig. 5a). Bone grafting using iliac crest bone with titanium mesh was then performed (Fig. 4d). The removed connective tissue that surrounded the foreign body was submitted for histopathological examination (Fig. 5b). Histopathological examination showed a silicone tube that was surrounded by granulation tissue including macrophages, infiltrated lymphocytes, growing fibroblasts, and microvessels, with a background of more diffuse hemosiderin deposition. The small cavity contained transparent fibrous foreign substances (Fig. 5c).

At postoperative follow-up one month later, the right mandibular second premolar that had undergone root amputation showed movement. Infection of the titanium mesh was thought to be the cause, and the premolar was extracted in outpatient. At postoperative follow-up after eight months, the titanium mesh was removed under general anesthesia, and transplanted autologous bone was attached to the surrounding chin bone (Fig. 6). There was no evidence of recurrence of the lesion after two years of follow-up (Fig. 7a–d).

### 3. Discussion

The chin plays a very important role in the overall facial impression, and aesthetic procedures to augment the chin in patients with microgenia can improve overall facial balance [13]. Genioplasty is a useful tool for correction of congenital abnormalities, as well as microgenia [14,15].

A set of mandibular osteotomies has been defined in the course of the years to allow spatial movements of advancement [16]. First reported by Obwegeser and Trauner in 1957, it has become one of the more common facial osteotomies [17]. On the other hand, chin augmentation with alloplastic implants has been established for almost over 60 years and was first reported by Brown and Fryer in 1953 [8]. When it is necessary to perform osteotomy to move the chin forward, there is a low incidence of complications such as bone resorption and infection [18]. However, genioplasty with osteotomy that requires cortical bone osteotomy sometimes causes severe operative bleeding and requires careful management postoperatively [19].

Otherwise, alloplastic implantation can also be associated with several complications, including infection, bone resorption, and secondary soft tissue deformities [4,10,11]. In 1969, Robinson and Shuken first reported bone resorption beneath mandibular implants [20], and, in their opinion, pressure by the implants was the reason for bone resorption [21]. Several studies have suggested different etiological factors, including implant pressure, the type of material, the mobility of the implant, the duration of implantation, and whether the implant was

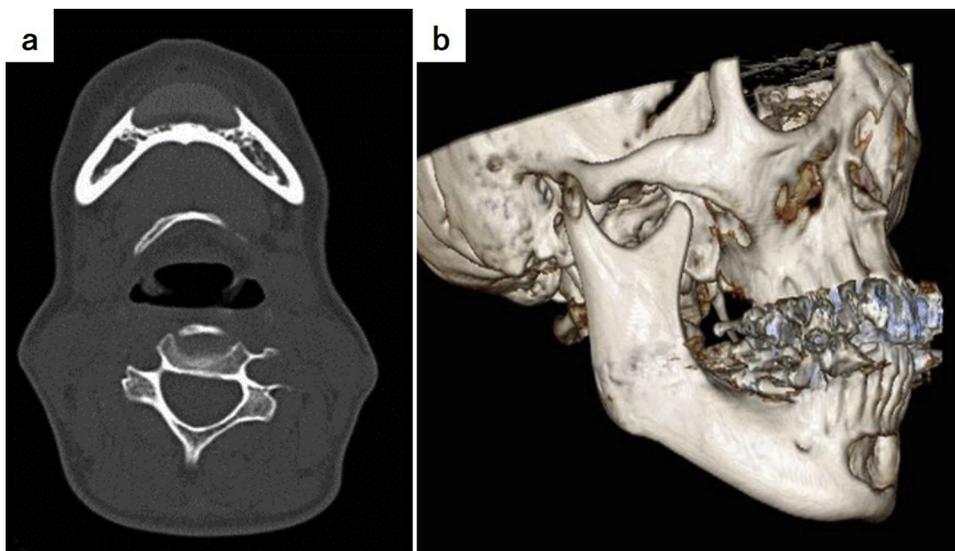


Fig. 3. a, b CT scan showing cortical bone absorption and a low concentration area at the mental region.

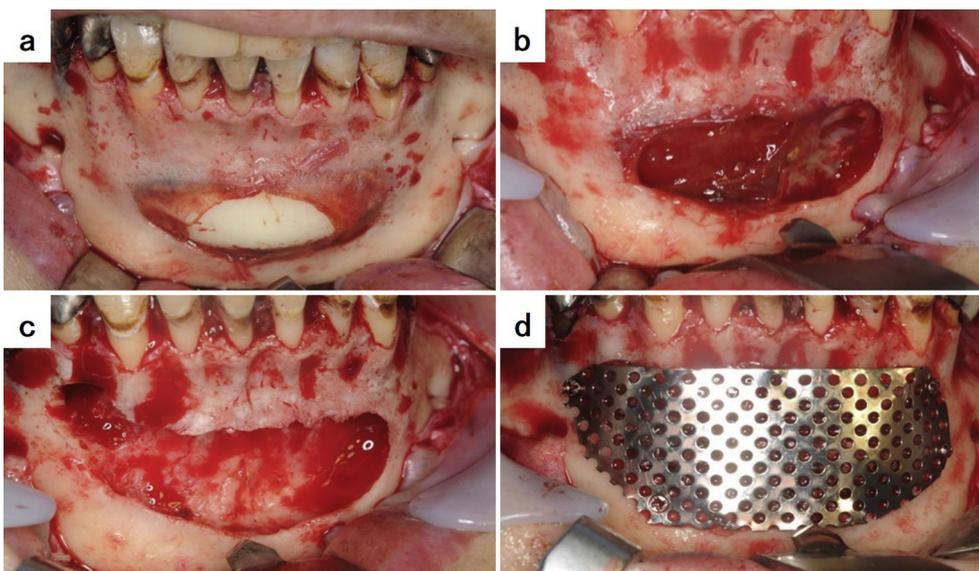


Fig. 4. Intraoperative findings. a: The connective tissue surrounding the silicone implants. b: The connective tissue between the silicone implants and mandibular bone. c: The mandibular bone after removal of the connective tissue. d: The titanium mesh.

superficial or deep to the periosteum [4]. Lilla and Takahashi reported that bone resorption caused by even with silicone, a PTFE tube, or stainless steel [22,23]. Furthermore some others who presented their experience with genioplasty patients noticed that most resorption occurs at the suprapogonion, where the alveolar bone is more vulnerable to pressure and resorption [24–26].

In the present case, severe bone resorption in the chin augmentation region was found with pain in the mandibular front tooth at the first medical examination, along with apical periodontitis in the right mandibular second premolar on X-ray. The bone resorption in the present case may have been due to various reasons, but the apical periodontitis caused an infection of the chin alloplastic implants, which

may have increased the bone resorption. It is not clear whether the apical periodontitis caused the infection of the implant or vice versa. The least one can say is that it is important to remove risks, such as apical periodontitis, in the operated region before and during operation. Furthermore, after a surgical silicone implant operation, there is still a risk of infection in the implant by apical periodontitis in the mandibular front teeth. Therefore, a dental check-up is necessary to prevent infection following chin augmentation.

In the previous study was reported that only implant removal and granulation curettage were performed for infected of the chin alloplastic implants caused the point B retreated in postoperatively [27]. Mandibular reconstructive surgery using a titanium mesh was adapted

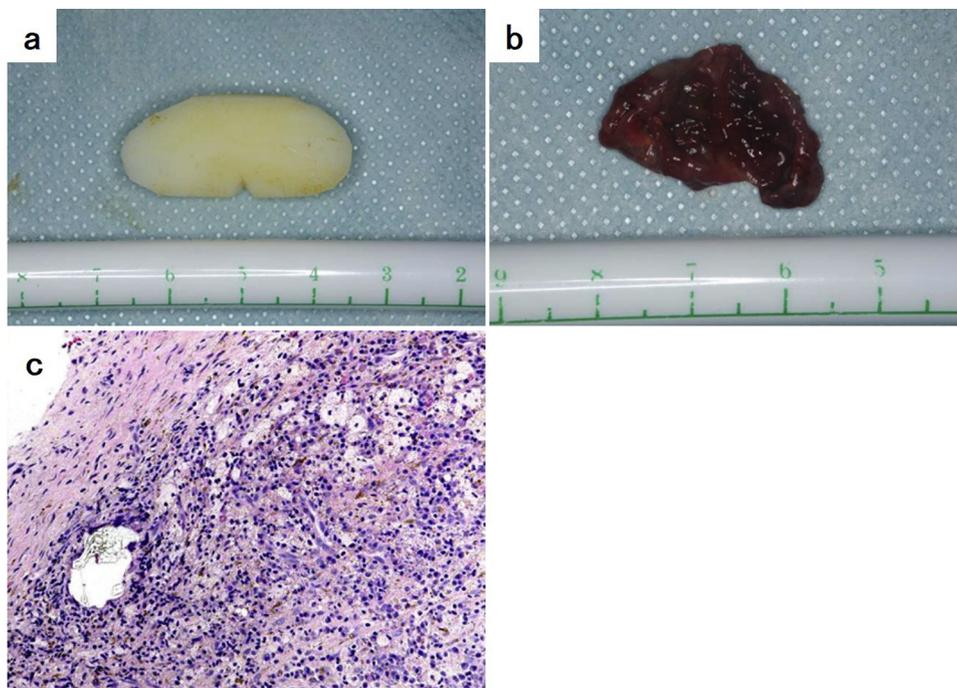


Fig. 5. a: The silicone implants. b: The connective tissue. c: Histological findings. Silicone is surrounded by granulation tissue that includes macrophages, infiltrated lymphocytes, growing fibroblasts, and microvessels.

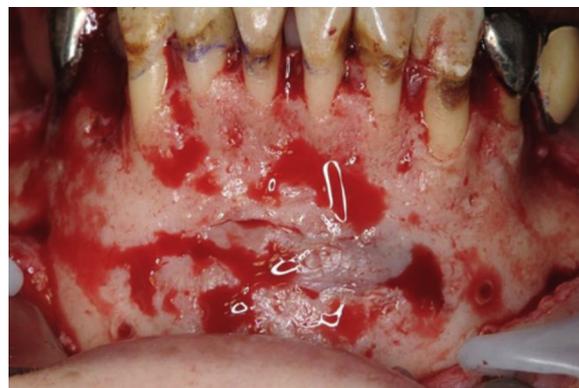


Fig. 6. At the 8-month postoperative follow-up, the titanium mesh is removed, and the newly-formed bone was observed.

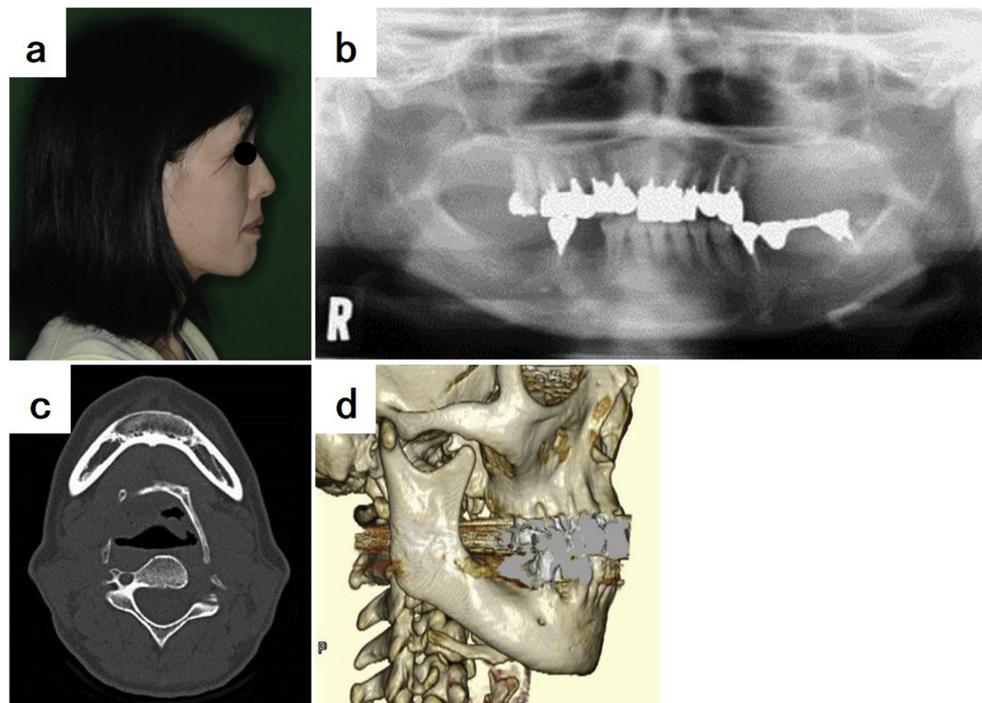
in this case because it is possible to faithfully reproduce the morphology of preoperative facial balance. The patients strongly hoped to avoid postoperative aesthetic disorder, maintain morphology of the chin. In this case, therefore we had to choose this procedure to reproduce the morphology of the preoperative chin under general anesthesia. In addition, particulate cancellous bone marrow that effective in morphological reproducibility and to prevent entering the granulation tissue, we provisional ossification was filled for purpose of eliminate the dead space of the postoperative defect.

Commonly, particularly when a large graft is needed, autogenous bone is still considered the gold standard in bone grafting [28,29]. The anterior iliac crest is most often used as a donor site for bone augmentation in cases of severe bone resorption and bone loss. Access to the anterior iliac crest is relatively easy; iliac crest harvesting can be set up in a two-team surgical approach to reduce surgical time, and this

donor site can provide large amounts of cortical and cancellous bone [30]. The major drawback of this procedure is donor site morbidity, with chronic donor site pain and sensory disturbances being common. In the present case, bone resorption was caused by the alloplastic material. Patients who never want to insertion of alloplastic materials might develop re-infections.

#### 4. Conclusion

A rare case of severe bone resorption after alloplastic chin augmentation that was incidentally found in a patients with a toothache and treated with an iliac bone graft and titanium mesh under general anesthesia was reported. This patient continues to be followed carefully.



**Fig. 7.** Extraoral findings after operation. a: Extra-oral findings after operation. b-d: Panoramic radiograph and 3DCT imaging show the newly-formed bone observed at the mental region.

### Conflicts of interest

None.

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