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CASE REPORT

Mandibular Torus Harvesting for Sinus Augmentation: Two-Year Follow-Up

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Abstract Maxillary sinus grafting is a commonly used treatment alternative in cases with insufficient bone height to enable insertion of implants in the posterior maxilla. It is commonly carried out with autogenous grafts, biomaterials or both. Autogenous bone grafts are considered gold standard for this procedure; however, due to donor site morbidity, it is not as commonly used as other biomaterials. Mandibular tori are hyperostoses on the lingual side of the mandible in the premolar region. This a case in which mandibular tori were used for a sinus augmentation procedure. The patient was then followed up for 2 years with no complaints, or objective symptoms.

Keywords Autogenous graft · Implantology · Mandibular torus · Sinus augmentation · Sinus lifting

Introduction

Dental implants have become the standard approach for partially or totally edentulous cases where indicated [1]. In the past, bone deficiency problems were considered a contraindication for implant dentistry, especially in the maxilla due to its cancellous character. Today, with the use of bone substitute biomaterials and various grafting techniques developed, implant surgery is applicable to most patients [2]. Autogenous particulate/block grafts, guided bone regeneration, allografts, xenografts, alloplasts or a combination of any of these grafting techniques may be used to eliminate bone deficiencies; however, due to its osteoinductive, osteoconductive and osteogenetic properties, autogenous grafts are considered gold standard [3]. Autogenous grafts can be harvested from both intraoral and extraoral sites in amounts that will enable clinicians to achieve adequate bone height and width for implant insertion [4].

Exostoses are bone overgrowths that originate from either the cortical or cancellous bone parts that possess no pathological characteristics. Most commonly encountered intraoral exostoses are torus palatinus and torus mandibularis [5]. Mandibular tori are dense bone prominences covered with a thin layer of mucosa usually seen bilaterally in the lingual side of the mandible, in the canine–premolar region [6, 7]. Although they have no pathological properties, mandibular tori may limit tongue space, cause phonetic problems or pose an obstacle for denture use. These circumstances may require the surgical removal of the tori [8]. Mandibular tori may also be used as an alternative source in autogenous grafting procedures. There are several reports in the literature demonstrating use of mandibular tori for horizontal and vertical bone augmentation and sinus lifting procedures; however, more reported cases and long-term follow-ups are required to demonstrate the feasibility of the use of mandibular tori as autogenous grafting material [3, 9].

Case Description and Results

A 45-year-old male patient referred to Gazi University, Faculty of Dentistry, Department of Oral and Maxillofacial Surgery, to receive implant surgery to have his missing left maxillary first molar tooth restored. The chief complaint of the patient was loss of function and difficulty chewing due

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to having lost his upper left maxillary tooth 3 years ago. On intraoral examination, bilateral mandibular tori were noticed (Fig. 1). The patient did not have any awareness of the tori. Radiographic images revealed a pneumatized left maxillary sinus in the area of the missing molar (Fig. 2). After a discussion of the treatment alternatives with the patient, a treatment plan was constituted to fulfill the patient's esthetic and functional needs and an informed consent was obtained from the patient. A two-staged sinus lifting procedure was included in the treatment plan in order to insert an implant of adequate length in the desired area. The graft required for the sinus augmentation procedure was to be obtained by resection of the previously mentioned mandibular tori.

Under local anesthesia, a full-thickness mucoperiosteal flap was raised between the mandibular second molar teeth on contralateral sides. The tori were resected using burs, chisel and mallet, and any sharp edges were eliminated (Fig. 3). The flap was sutured to obtain primary wound healing with 4.0 non-resorbable sutures. The bone particulates were then ground into smaller particles to be used in the sinus lifting procedure (Fig. 4).

The lateral window approach was used for the sinus lifting procedure. After injection of local anesthetics to the left maxillary molar area, a mucoperiosteal flap was raised to reveal the edentulous alveolar ridge and the lateral wall of the maxillary sinus. Using a diamond bur, a small window was created on the lateral wall of the sinus taking care not to harm the Schneiderian membrane. The sinus membrane was elevated carefully, and an absorbable collagen membrane (Botiss Biomaterials, Jason® membrane, Germany) was placed against the Schneiderian membrane to prevent displacement of bone particles into the sinus. The bone particulates acquired from the tori were inserted under the membrane (Fig. 5a). The window was covered with another absorbable collagen membrane (Fig. 5b), and the flap was closed with 4.0 non-resorbable sutures. After the surgery, a panoramic radiograph was taken immediately after the surgery (Fig. 6) and the patient was called

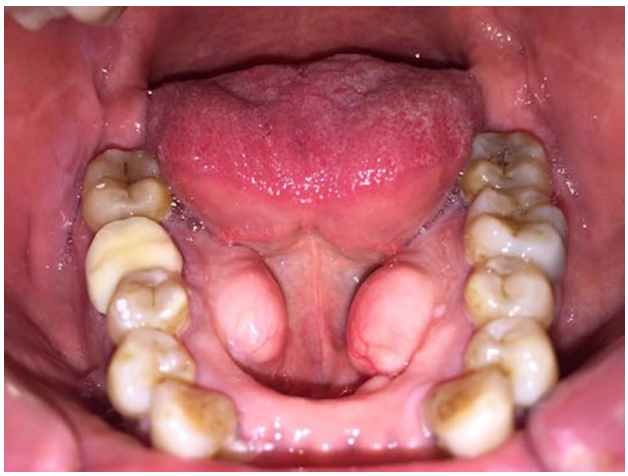

Fig. 1 Bilateral mandibular tori encountered upon intraoral examination

Fig. 2 Preoperative panoramic radiograph of the patient

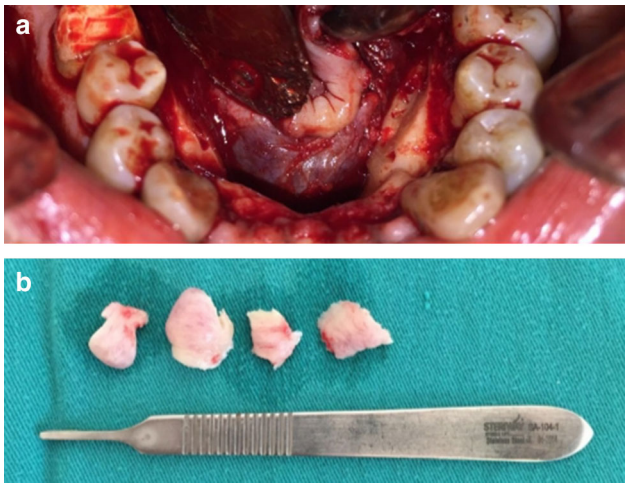

Fig. 3 **a** Surgical site after tori resection; **b** bone obtained from the tori

Fig. 4 Ground bone particles ready to be used in the sinus lifting procedure

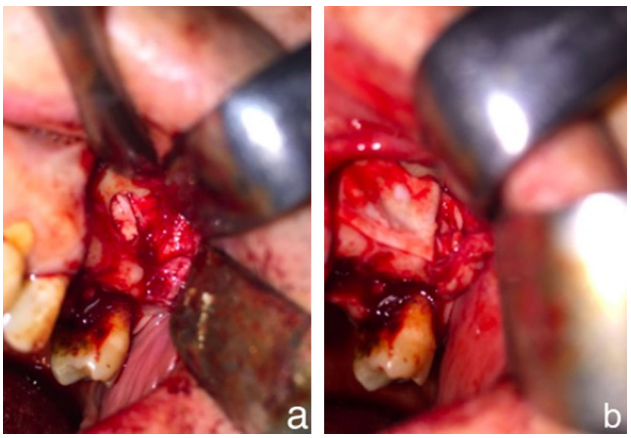

Fig. 5 Intraoperative photographs showing the sinus lifting procedure with the lateral window technique: **a** insertion of bone particles; **b** covering of the lateral window with an absorbable collagen membrane

Fig. 6 Panoramic radiograph taken immediately after the sinus lifting procedure

for follow-up every 2 days during the first week. Sutures were removed after 1 week. During the healing period, neither infections nor soft tissue complications were encountered.

Six months after the first operation, a panoramic radiograph was taken, which revealed enough bone height in the previously augmented area. One implant (DTI Dental Implants, Turkey) with a diameter of 5 and 10 mm of length was successfully placed into the bone. Primary stability of the implant was satisfactory, and it was checked by palpation and percussion. Six months after implant placement, prosthodontic treatment was done. There was no surgical or prosthodontic complication during the follow-up period. The implant was stable, the radiographs did not reveal any bone loss around the implant, there was no bleeding on probing, and marginal soft tissues were healthy (Fig. 7). Two years after the first surgery, the patient had no complaints of the implant or the prostheses and clinical and radiological parameters (Fig. 8) proved success.

Fig. 7 Intraoral photograph of the prosthetic restoration and soft tissues surrounding the implant 1 year after the implant surgery

Fig. 8 Panoramic radiograph of the patient 2 years after the first surgery

Discussion

Mandibular tori are bony overgrowths localized on the lingual side of the mandible in the premolar area, which patients may be unaware of until recognized by a dentist. Therefore, these exostoses do not require resection unless they cause symptoms such as speech problems, pain, chronic trauma and functional problems or prevent prosthetic appliances from properly seating on the alveolar mucosa [9, 10].

Tori may be used as an alternative graft source to autogenous grafts obtained intraorally from the ramus or symphysis areas when they are in close proximity to the recipient site and if the graft acquired from the tori is believed to compensate the required graft amount in the recipient site. Resection of tori also has lesser complications when compared to ramus or symphysis graft harvesting [9]. There have been several reports on vertical and horizontal augmentation and sinus lifting procedures in the literature where tori were used as autogenous grafts [3, 5, 8]. In an earlier article, Neiva et al. have used

mandibular tori as autogenous graft material for both horizontal bone augmentation and sinus lifting procedures and achieved adequate bone height and width for implant insertion [3]. In the present case, the patient had enough bone width; thus, no horizontal augmentation was necessary. In a recent study by Santhanakrishnan and Rangarao, torus grafts were used for alveolar defect reconstruction. One-year follow-up revealed good bone fill in the defects [11]. However, to our knowledge not many studies demonstrate long follow-up periods and long-term outcomes of such treatment. With this 2-year follow-up report, we intend to increase the reliability and predictability of tori grafts for augmentation procedures.

It is important for clinicians to keep in mind that mandibular tori may be used as autogenous bone graft for augmentation procedures, where present. However, future studies are needed to evaluate the treatment outcomes of using mandibular tori as autogenous bone graft.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Informed Consent Informed consent was obtained from the patient mentioned in this case report.

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