

# Benign Paroxysmal Positional Vertigo Following Sinus Floor Elevation in Patient with Antecedents of Vertigo

Huseyin Akcay<sup>1</sup> · Murat Ulu<sup>1</sup> · Seyfi Kelebek<sup>1</sup> · Ibrahim Aladag<sup>2</sup>

Received: 3 November 2015 / Accepted: 17 March 2016 / Published online: 2 April 2016  
© The Association of Oral and Maxillofacial Surgeons of India 2016

**Abstract** Benign paroxysmal positional vertigo (BPPV) is an unfamiliar and rare complication occurring following osteotome sinus floor elevation (OSFE) and simultaneous implant placement. Etiology of this disorder is commonly displacement of otoliths by vibratory forces transmitted by osteotomes and mallet along with the hyperextension of the head during the operation, causing them to float around in the endolymph. This report presents a case of protracted BPPV following OSFE and simultaneous implant placement. A 43-year-old female suffered intense vertigo and nausea immediately after implant placement using an OSFE procedure. Upon further questioning after the procedure she gave an account of two times vertigo history within the last 9 years. Despite nootropic drug medication and canalith repositioning procedure applied by a specialist at operation night, the condition did not improve. Patient did not totally recover and was admitted again after 1 month. After repeated maneuvers, nine dosage

intravenous serous fluid and piracetam administration the patient recovered. Duration of these procedures took 10 days and the patient was successfully treated with no recurrence of dizziness. Prevention and management of OSFE related BPPV are reviewed especially in patients having prior vertigo history in this report.

**Keywords** Benign paroxysmal positional vertigo · Dental implants · Mallet osteotomes · Osteotome sinus floor elevation

## Introduction

One of the maxillary sinus floor augmentation technique is generally used in less resorbed maxilla to graft the maxillary sinus in combination with the same time single implant placement in osteotome sinus floor elevation (OSFE) [1]. This technique used a crestal approach to perform a closed sinus lift requiring striking the bone with a surgical mallet until the desired osteotomy depth was reached. Percussive and vibratory forces transmitted by osteotomes and surgical mallets during preparation of implant beds can cause an unfamiliar and rare complication of this method called benign paroxysmal positional vertigo (BPPV).

BPPV is a common vestibular and organ disorder characterized by brief attacks of vertigo and nausea that are provoked by angular position changes of head [2]. Etiology of this disorder is removing of the calcium carbonate grains involved in the sensation of movement and verticality from the otoconial layer of the utricular macula by vibratory forces transmitted by osteotomes, causing them to float around in the perilymphatic fluid [3–5]. The otoconia descend into the ampullar crest when the patient straightens up by the end of the operation, which is triggering an

---

✉ Seyfi Kelebek  
kelebek\_67n@hotmail.com

Huseyin Akcay  
hus\_akcay@yahoo.com

Murat Ulu  
muratulu81@hotmail.com

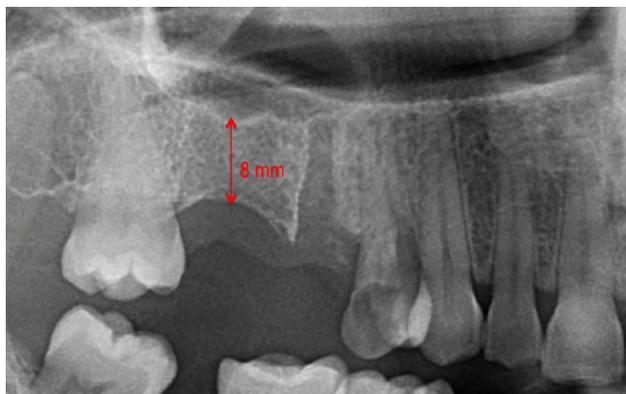
Ibrahim Aladag  
ibrahimal@hotmail.com

<sup>1</sup> Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Izmir Katip Celebi University, Aydinlikevler Mh., Cemil Meric Cd., 6780 Sk., No: 48 Cigli, 35640 Izmir, Turkey

<sup>2</sup> Department of Otorhinolaryngology, Izmir Katip Celebi University Atatürk Training and Research Hospital, Atatürk Eğitim Araştırma Hastanesi Basın Sitesi, 35360 Izmir, Turkey

anomalous stimulus causing iatrogenic BPPV. Patient's surgical head position, hyperextended and tilted reverse to the side on which the operator is applying osteotomy, favors the movement of otoconia into the posterior semi-circular canal of the operating site [6].

A case of protracted BPPV after the implant placement performed with the use of mallet osteotome technique is discussed in this article.

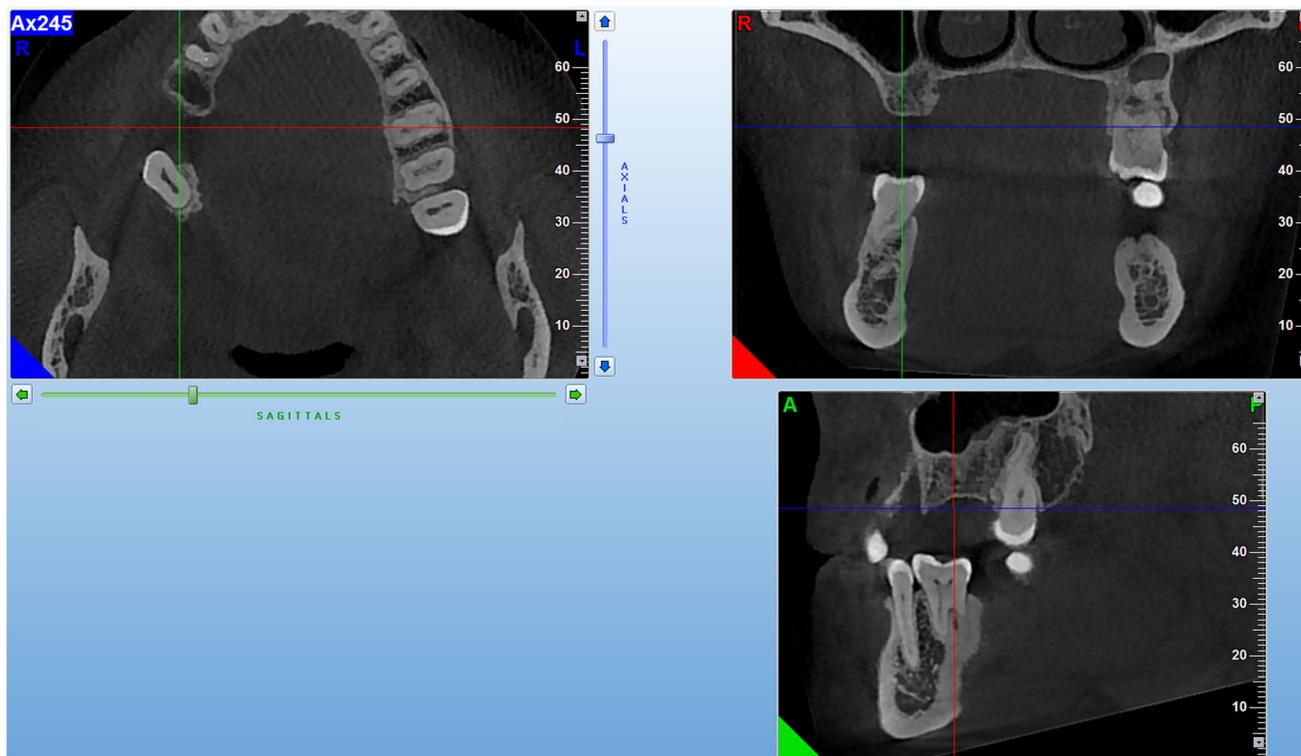


**Fig. 1** The panoramic view of the patient shows the preoperative bone level and extraction socket of maxillary right first premolar tooth. The 8 mm height of bone is sufficient for OSFE

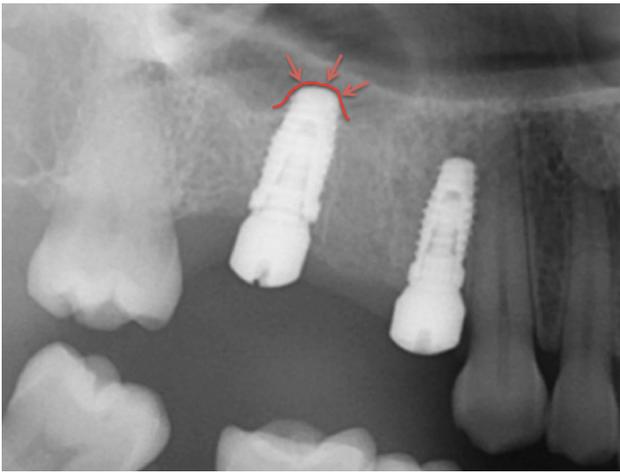
## Case Report

A 43-year-old woman presented to Izmir Katip Celebi University Faculty of Dentistry. Patient lost her maxillary right premolars and first molar and wanted them to be replaced with dental implants. Patient had no medical problems and took no medications and denied any allergic diseases. Maxillary second premolar and first molar were extracted approximately 3 years ago. First premolar tooth extracted due to fracture and caries 4 months prior to implantation (Fig. 1). Panoramic and CBCT were taken for evaluation of cystic lesion in left posterior maxilla and sinus prior to implant decision (Fig. 2). Alveolar ridge measured approximately 8 mm and OSFE procedure with simultaneous implant placement was chosen for first molar region under local anesthesia. OSFE was done by insertion and removal of osteotomes respectively for elevating the sinus floor to the desired depth. Recipient bed for the implant was created by elevating the sinus floor 3 mm and a 4 mm diameter, an implant was placed into first molar site (Fig. 3). One more similar implant was placed into first premolar site.

As soon as the operation finished, the patient complained of dizziness upon any attempt of sudden movements and suddenly tipped backward. Upon resting in sitting position for 30 min after surgery, the patient felt



**Fig. 2** The CBCT view shows the right posterior maxilla at three planes and the cystic lesion in left posterior maxilla



**Fig. 3** The sinus floor is displaced upward approximately 3 mm as showed by a curved red line on immediate postoperative radiograph

better and went home to rest. On the night of the operation, the patient complained that she could not stand and walk without help. The diagnosis of BPPV was confirmed by observing paroxysmal positional nystagmus with the Dix–Hallpike maneuver performed, by consultant, by rapidly moving the head from an upright to head hanging position with one ear 45° to the side. BPPV was treated by canalith repositioning procedure, Epley maneuver and also, Piracetam was administered. However, the patient did not totally recover and was admitted again a month later. After repeating maneuvers, nine dosage intravenous serous fluid and Piracetam administration the patient recovered. Duration of these procedures took 10 days and the patient was successfully treated with no recurrence of dizziness. The patient had not declared any head trauma history prior to the implant surgery, but upon further questioning after the procedure she related that she had suffered from vertigo two times within the last 9 years, with nausea and headache being her chief complaints.

## Discussion

BPPV is poorly recognized as a complication of OSFE among dental and maxillofacial surgeons [3–5]. To the best of our knowledge, there are six reported cases of BPPV after OSFE [7–12]. The deficiency of awareness with this clinical disorder can cause probable under-diagnosis and miss-out of BPPV cases. The benign progression and spontaneous reduction of this clinical disorder could be causative factors for the relative unfamiliarity of BPPV for dental and maxillofacial surgeons. To prevent this complication, care should be taken when using the osteotome technique. Gentle malleting or application of manual force

instead of mallet hitting and use of surgical drills in combination with osteotomes, can minimize the trauma to the adjacent structures as much as possible [13].

In suspected cases of BPPV with previous vertigo history, patient should be informed about the possible complaints of dizziness following OSFE because the nausea may be very unpleasant and prevent the patient from performing daily activities. Furthermore occurrence of this complication may become the source of considerable stress when one is uninformed of this very unpleasant problem. Therefore, it is important to mention the risk of postoperative vertigo when obtaining informed consent for an implant surgery using the OSFE procedure.

Eventhough such an association had not until now been described, a patient with a past history of vertigo might be more susceptible to BPPV following OSFE procedure and presently reported case and previous reports indicate that [12]. Probable spontaneous recovery of BPPV following OSFE limits the information about the incidence and delayed appearance of BPPV after OSFE may prevent correlation with dental implant surgery and would make diagnosis more difficult. Especially, patient with antecedents of vertigo may be liable to BPPV; in such cases, using other surgical kits for a crestal approach instead of mallet percussion or a lateral window approach should be considered instead of OSFE and patients should be always informed before closed sinus lift procedure. Also, prolonged hyperextended head positioning during closed technique should be avoided. The symptoms of BPPV may be very incapacitating and the implant surgeon should be able to recognize this complication and promptly refer the patient to an otorhinolaryngologist. Early diagnosis of BPPV and immediate application of Epley maneuver may help reduce patient's discomfort.

## Compliance with Ethical Standards

**Conflict of interest** All authors declare that they have no conflict of interest.

## References

1. Summers RB (1994) The osteotome technique: part 3—less invasive methods of elevating the sinus floor. *Compendium* 15:698–704
2. Fife TD (2009) Benign paroxysmal positional vertigo. *Semin Neurol* 29:500–508
3. Saker M, Ogle O (2005) Benign paroxysmal positional vertigo subsequent to sinus lift via closed technique. *J Oral Maxillofac Surg* 63:1385
4. Peñarrocha M, Garcia A (2006) Benign paroxysmal positional vertigo as a complication of interventions with osteotome and mallet. *J Oral Maxillofac Surg* 8:1324
5. Di Girolamo M, Napolitano B, Arullani CA, Bruno E, Di Girolamo S (2005) Paroxysmal positional vertigo as a complication of

- osteotome sinus floor elevation. *Eur Arch Otorhinolaryngol* 8:631–633
6. Peñarrocha M, Pérez H, García A, Guarinos J (2001) Benign paroxysmal positional vertigo as a complication of osteotome expansion of the maxillary alveolar ridge. *J Oral Maxillofac Surg* 59:106–107
  7. Vernamonte S, Mauro V, Vernamonte S, Messina AM (2011) An unusual complication of osteotome sinus floor elevation: benign paroxysmal positional vertigo. *Int J Oral Maxillofac Surg* 40:216–218
  8. Rodríguez Gutiérrez C, Rodríguez Gómez E (2007) Positional vertigo afterwards maxillary dental implant surgery with bone generation. *Med Oral Patol Oral Cir Bucal* 12:151–153
  9. Peñarrocha-Diago M, Rambla-Ferrer J, Perez V, Pérez-Garrigues H (2008) Benign paroxysmal vertigo secondary to placement of maxillary implants using the alveolar expansion technique with osteotomes: a study of 4 cases. *Int J Oral Maxillofac Implants* 23:129–132
  10. Kim MS, Lee JK, Chang BS, Um HS (2010) Benign paroxysmal positional vertigo as a complication of sinus floor elevation. *J Periodontol Implant Sci* 40:86–89
  11. Galli M, Petracca T, Minozzi F, Gallottini L (2004) Complications in implant surgery by Summer's technique: benign paroxysmal positional vertigo (BPPV). *Minerva Stomatol* 53:535–541
  12. Su GN, Tai PW, Su PT, Chien HH (2008) Protracted benign paroxysmal positional vertigo following osteotome sinus floor elevation: a case report. *Int J Oral Maxillofac Implants* 23:955–959
  13. Sammartino G, Mariniello M, Scaravilli MS (2011) Benign paroxysmal positional vertigo following closed sinus floor elevation procedure: mallet osteotomes vs. screwable osteotomes. A triple blind randomized controlled trial. *Clin Oral Implants Res* 22:669–672