Abant Sağlık Bilimleri ve Teknolojileri Dergisi

Abant Journal of Health Sciences and Technologies

2022;2(2):102–110

Buccally Tilted and Placed Implant: an Applicable Implant Insertion Technique Alternative to Conservative Implant Surgery for Patients with Extremely Atrophic Mandible

İleri Derecede Posterior Mandibular Atrofili Hastalarda Konservatif Implant Cerrahisine Alternatif Konforlu Bir Implant Yerlestirme Teknigi: Bukkale Eğimli İmplant Yerlestirme

Besime Ahu Kaynak

Geliş Tarihi (*Received*): 14.06.2022 **Kabul Tarihi (*Accepted*):** 25.10.2022 **Yayın Tarihi (*Published*):** 23.12.2022

Öz: Posterior mandibula bölgesi kısmen veya tamamen atrofik hastalarının rehabilitasyonu için yanağa doğru eğimli yerleştirilmiş implant ile kombine standart abutment yerleştirilmesi operasyonu yapıldı. İnferior alveoler sinirin lokalizasyonu ve implantın pozisyonu, implantasyonun eğim derecesi, horizontal ve vertikal mesafeler ve benzeri değerlendirmeler sinire zarar vermemek adına önceden yapıldı. Konik ışınlı bilgisayarlı tomografi görüntülerinin analizinden sonra, implantlar orta krestalden 3 mm bukkale doğru yatırılarak yerleştirildi. Bu şekilde altı hastaya implantları uygulandı ve bir yıllık takip süresinde değerlendirildi. Bukkal mesafe alt molar bölgede mandibular kanal seviyesinde lingual mesafeden daha yüksekti. Mandibular molar bölgede ortalama dikey kazanç mesafesi 4,92 mm'ydi. İmplant yerleştirme simülasyonu öncesi ilk değerlendirmede mandibular kanal üzerindeki dikey yükseklik yaklaşık olarak 7,25 mm'yken, elde edilen implant uzunluğu 10,25 mm'ye kadar çıkarıldı. İmplantların eğim derecesi ise ortalama 22°'ydi. Klinik vakalar bu metodolojinin cerrahi fizibilitesini doğruladı. İmplantların bukkale eğimli şekilde yatırılarak yerleştirilmesi yöntemiyle, herhangi başka bir cerrahi prosedür gerekmeksizin atrofik posterior mandibula hastalarında daha uzun, dolayısıyla da stabil implantların yerleştirilmesini sağlayabiliriz.

Anahtar Kelimeler: Atrofik Mandibula, İmplant Yerleştirme Tekniği, Kısmi Dişsizlik.

&

Abstract: A standard abutment placement operation combined with an implant placed towards the cheek was performed for the rehabilitation of patients whose posterior mandible region is partially or completely atrophic. The localization of the inferior alveolar nerve and the position of the implant, the inclination degree of the implantation, horizontal and vertical distances and similar evaluations were done beforehand in order not to damage the nerve. Subsequent to the analysis of cone beam computerized tomographic images, buccally placed and tilted implants were inserted for each patient placed 3mm buccally away from the midcrest. Implant operations were performed on 6 patients and there was a one-year follow-up period. The buccal distance was higher at the level of the mandibular canal in the lower molar region than the lingual distance. The average vertical gain distance in the mandibular molar regions was 4.92 mm. While the mean vertical height on the mandibular canal was 7.25 mm in the initial evaluation, before implant placement simulation, the obtained implant length was increased to 10.25 mm on mean. The average inclination degree of the implants was 22°. Clinical cases certified the surgical feasibility of this methodology. With the method of placing the implants by tilting them into the buccal, we can provide the placement of longer and therefore stable implants especially in extreme atrophic posterior mandible cases without the need for any other surgical procedure.

Keywords: Atrophic Mandible, Implant Placement Technique, Partially Edentulous.

Atıf/Cite as: Kaynak B.A. Buccally Tilted and Placed Implant: an Applicable Implant Insertion Technique Alternative to Conservative Implant Surgery for Patients with Extremely Atrophic Mandible. Abant Sağlık Bilimleri ve Teknolojileri Dergisi, 2022;2(2):102-110.
İntihal-Plagiarism/Etik-Ethic: Bu makale, en az iki hakem tarafından incelenmiş ve intihal içermediği, araştırma ve yayın etiğine uyulduğu teyit edilmiştir. / This article has been reviewed by at least two referees and it has been confirmed that it is plagiarism-free and complies with research and publication ethics. https://dergipark.org.tr/tr/pub/sabited/policy

Introduction

Vena Rehabilitation of patients with fully and partially edentulous maxilla and mandible is a very common clinical situation. The treatment of these patients has been provided with traditional total or partial removable prostheses for many years. Although these prostheses seem to solve the problem, they have many disadvantages, especially for the patient. In fact, even though many patients had such prostheses made, they could not use them and could not accept them. Increasing the quality of life of patients has become an inevitable necessity for clinicians today, where life expectancy is considerably longer than in the past. The rehabilitation of these patients, whose expectations have increased greatly, can be provided with implant-supported prostheses, which the patient can adapt more easily, functional and aesthetic, and increase the quality of life. Therefore, today's clinicians are more likely to encounter these patients in their clinics and are busy with such treatments. The long-term positive and reliable effects of these practices led to the widespread use of these methods (1).

Osseointegrated implants are more useful than traditional prosthodontics and can be easily used by patients. However, with an implant-supported prosthesis, it is not so easy to provide good function, phonation and aesthetics at the same time. The accuracy and success of the methods and surgical procedures to be followed in the implementation of this planning, as well as not causing an iatrogenic mistake, directly affect the success rate in the result (2). It should be noted that the jaw bone structure and the level in edentulous areas may be unsuitable for the implant insertion (3,4). In such cases, in order to increase the success of the operation, or in other words, to place a long-lasting dental implant, different additional treatment methods such as bone augmentation, alveolar nerve lateralization or shorter implant placement have been long since ventured (5,6).

Despite the efficient results of this methods, which have been shown in diverse clinical studies and been preferred by oral-maxillofacial surgeons for many years, we cannot ignore the complications that may occur. The most common complications are: donor site morbidity, bone graft resorption, paresthesia as well as long treatment time and high treatment costs. Pancko et al. who did many studies on this subject, have developed “lingually tilted endosseous implants” to eliminate the disadvantages of improved surgical process. The greatest problem with this method was the increased stress on the bone surface of the coronal implant and the mounting plane for these off-axis loaded implants (5).

Apart from that, in addition to the improvements in surgical reconstructive methods in direct proportion with the increasing demand for prostheses, an appropriate diagnosis, planning and placement is very important. Mandible before surgery and taking the teeth of the patient into account, enables the clinician to maximize the implant-bone interface, while also allowing the implants to be placed in the most appropriate areas, thus producing an optimal prosthesis in the final (5,7).

The aim of this clinical study is to present and compare the cases (which we consider to be advantageous in many aspects) of total or partial edentulous patients with excessively atrophied mandibular posterior region using this new method where implants are buccally tilted and placed, then combined with standard abutments.

Case Series

From January 2018 to June 2019 six patients, who have been admitted to our clinic for the rehabilitation of their partially missing teeth, especially those with posterior mandibular atrophy, were included in this study. First of all, for the indication and planning of dental implants, computed tomographies were taken of each patient; (CBCT) (1-CAT, Imaging Sciences International). In the clinical and radiographic examination inadequate bone height was found at the mandibular molar area. We have received official approval for this study from the local review committee in our region.

The jaw bone level above the inferior alveolar nerve of patients, whose mandibular posterior regions were partially or completely edentulous, was below 7mm and the width of the alveolar bone was approximately 4mm.

CBCT showed that patients had a mean vertical height (VH) of 5 mm afore the inferior alveolar nerve (IAN) and an alveolar ledge density of 3.95 mm on top of the alveolar ridge (TToAC). The transverse bone thickness was also restrained. The distance between TTBloMC (transverse thickness between the internal border of the buccal cortex and the buccal appearance of mandibular canal) and TTLoMC (transverse thickness between the internal border of the lingual cortex and the lingual appearance of the mandibular canal) at the level of mandibular canal (MC) was crosschecked. The measured values are shown at Figure 1. In the molar region, due to the insufficient jaw bone structure in many respects, it was planned positioning the implants to be placed in a more buccally tilted way (Figure 2).

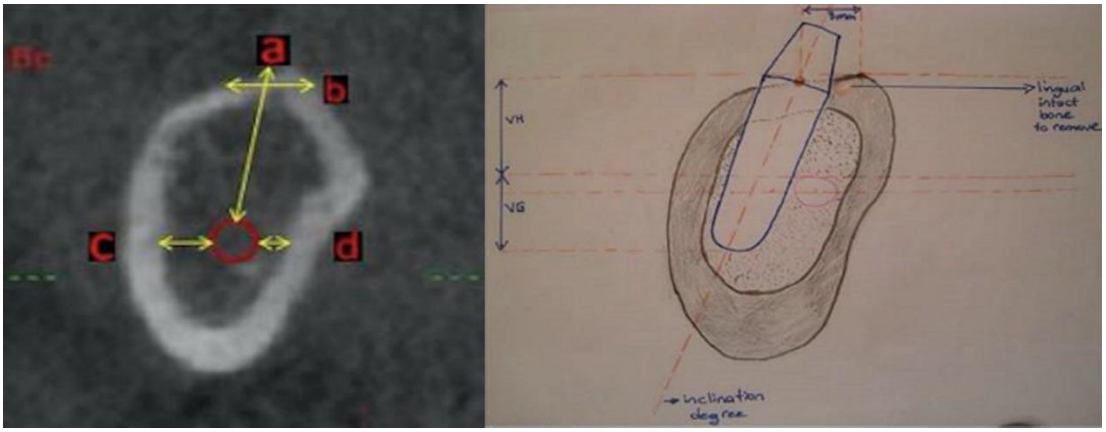

Figure 1. Schematic represantation of the buccally tilted and placed implant placement with different parameters.

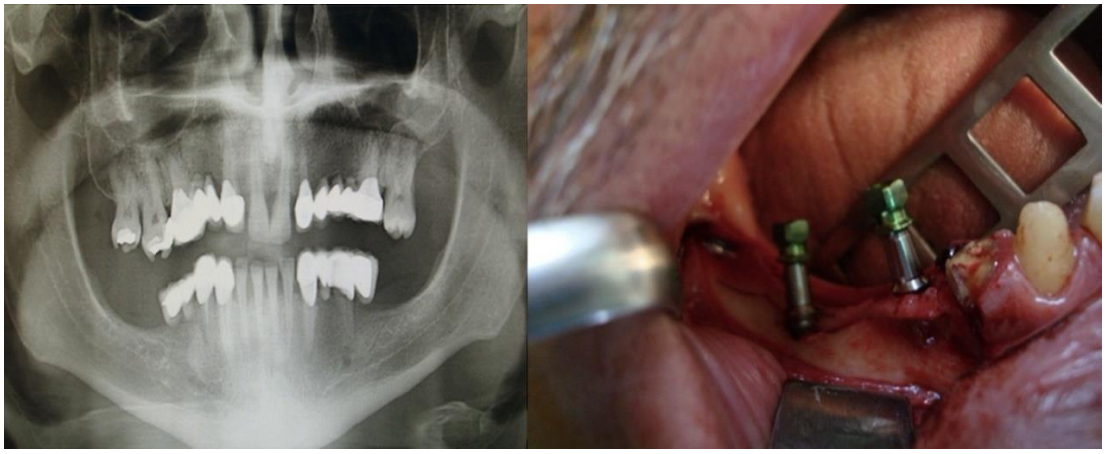

Figure 2. Preoperative panaromic view of the patient with prosthetic rehabilitation and intraoperatively taken intraoral view of the patient with implant insertion shown parallelism and positioned.

Implant placements were performed according to the standard surgical procedures under the effect of infiltrative local anesthesia (Ultracain DS, from firm Sanofi ventis in Istanbul-Turkey). To achieve the necessary visibility of the alveolar bone, crestal and vertical releasing incisions at the anterior and posterior sites were performed. A full thickness flap was elevated. The ideal position of the buccally tilted and positioned implant was estimated to be an average of 3 mm buccally from the mid-ridge in order to achieve the maximum implant length and provide parallelism by guiding the internal aspect of the buccal cortex without injuring the mandibular nerve.

Osteotomy was performed according to manufacturer's recommendation. Dental implants (3.7* 10mm or 3.7* 11.5 mm) (lmplant Direct LLC, Calabasas, Hills, CA, USA) were placed for each of the patient (Figure 2). The implants applied to patients are dental implants made of titanium, with high biocompatibility and

superior mechanical properties. The surface properties of titanium dental implants can modulate tissue reactions. Buccally placed and tilted implants (implant neck size 3.7mm and apically ended with 3.1mm) were inserted in each patient placed 3mm buccaly away from the midcrest. Towards the end of the operation silk cut sutures (from Dogsan Medical Supplies Industry, in Trabzon-Turkey) were used to close the wound. Patients received an oral antibiotic (Largopen 1g, Bilim Pharmaceuticals, Istanbul, Turkey) and analgesic (Majezik, Sanovel, Istanbul, Turkey) for the following first week of the surgery as a standard regimen. The patients were regularly called and invited to conduct their clinical examinations to visit us the next day after the operation.

CBCT images were also obtained to evaluate the implant position subsequent to the operation (Figure 3). Fixed partial prosthesis was supported by two implants with 3-unit. The loading of implants with a 3-unit bridge construction was managed with the final porcelain fused to metal prosthesis.

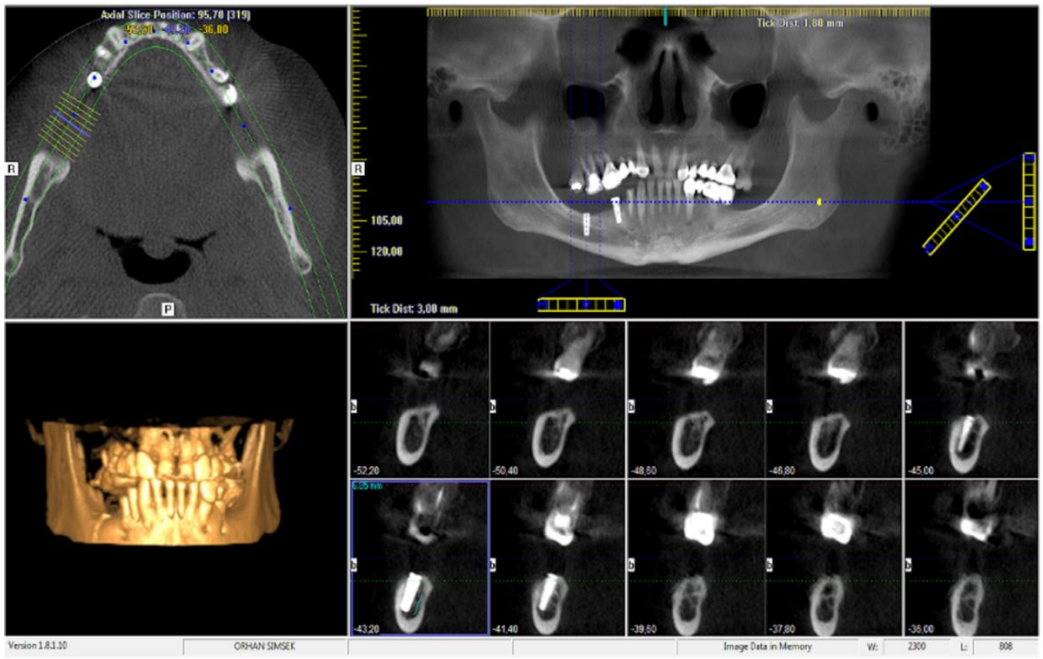

Figure 3. CT axial view showed vertical gain and panaromic view of the patient implant superimposition on mandibular canal.

In this study, six male patients (randomly selected) with the average age of 55 years accompanied us (Table 1). CBCT showed that the patients had an average of 6.21mm VH and 3.78 mm TToAC. The average measurements of TTBloMC and TTLoMC were 3.57 mm and 0.26, respectively (Table 2).

Table 1. Demographic data and parameters were shown.

	Age	Sex	VH	TToAC	TTBloMC	TTLoMC	Inclination Degree	VG	Implant size
Case 1	50	M	5 mm	3.95mm	3.35 mm	0.00 mm	21	6.85 mm	3.7 x 10 mm
Case 2	51	M	7 mm	3.61 mm	4.00 mm	0.00mm	25	4.50 mm	3.7x 11.5 mm
Case 3	62	M	6 mm	3.85 mm	3.45 mm	0.50mm	20	5.00 mm	3.7x 10 mm
Case 4	58	M	6.3 mm	3.7 rum	3.65 mm	0.40 mm	21	4.20 mm	3.7x 10 mm
Case 5	64	M	6.4 mm	4.00mm	3.20 mm	0.60 mm	22	4.60 mm	3.7x10 mm
Case 6	51	M	6.6 mm	3.60mm	3.80 mm	0.20 mm	23	4.40 mm	3.7x 10 mm

VH: Available vertical alveolar height above MC, **TToAC:** thickness of the alveolar ridge above or of the alveolar ridge in the molar area of the lower jaw, **TTBloMC:** Transverse thickness between the inner edge of the cortex and the buccal aspect of the MC, **TTLoMC:** Transverse thickness between the inner edge of the lingual cortex and the buccal aspect of the MC.

Table 2. The different parameters analyzed by CT.

Measurements	Mean Values (mm)

VH	6.21
TToAC	3.78
TTBloMC	3.57
TTLoMC	0.26
Inclination degree	22
Acquired length of implants	10.25
Vertical gain	4.92

VH: Available vertical alveolar height above MC, **TToAC:** alveolar ridge thickness on top of the alveolar ridge in the lower molar area, **TTBloMC:** Transverse thickness between the inner edge of the cortex and buccal aspect of the mandibular canal, **TTLoMC:** Transverse thickness between the inner edge of the lingual cortex and the buccal aspect of the mandibular canal.

The mean degree of inclination of the implant devices was 22°. The acquired implant length was increased moderately to 10.25mm. The average distance of VG was 4.92mm at the posterior mandibular region. As for the complications, in only one of our patients, partial numbness was observed in the right mandible region innervated by the nervus alveolaris inferior, which extends from the right cheek to the basal region of the mandible and anteriorly to the angular oris region, in the form of a sensory complaint. The return of sensation was evaluated by the same clinician with regular visits from the patient. Standardized neurosensory testing was repeated periodically in each 2 days for 2 weeks. Neurosensory testing is an innovative, noninvasive tool Franciscan Health physicians use to measure neuropathy. Neurosensory testing measures the pressure to the skin around a specific nerve, nerve damage can be determined by how much pressure is needed before the person feels the touch.

Vitamin B tablets (Nerox B, Abdi ibrahim, Istanbul, Turkey) were administered only patients with neurosensory problems during this period. Complete recovery was observed at the end of 2 weeks of the follow-up period; all symptoms and paresthesia were resolved.

As for the requirement for minor additional surgical procedure, cauterization is required for the coronally migrated gingiva around the implant neck region in 3 of 6 clinical cases. 4 out of 6 patients required the removal of intact lingual bone.

For each patient, osseointegration was completed uneventfully and prosthetic rehabilitation was administered on average 3 months after the operation. Standard abutments were used (because they were quite compatible and sufficient) in prosthetic rehabilitation without the requirement of custom-angled abutments for each patient. Fixed partial prosthesis functioned meanly well within the 48 months (range 36months- 60months) of the follow-up period (Figure 4). Otherwise, we would have to order custom-angled implants specifically for each patient. This would be both more expensive and it would waste time.

In the follow-up period, there was no other significant surgical or prosthetic complication observed.

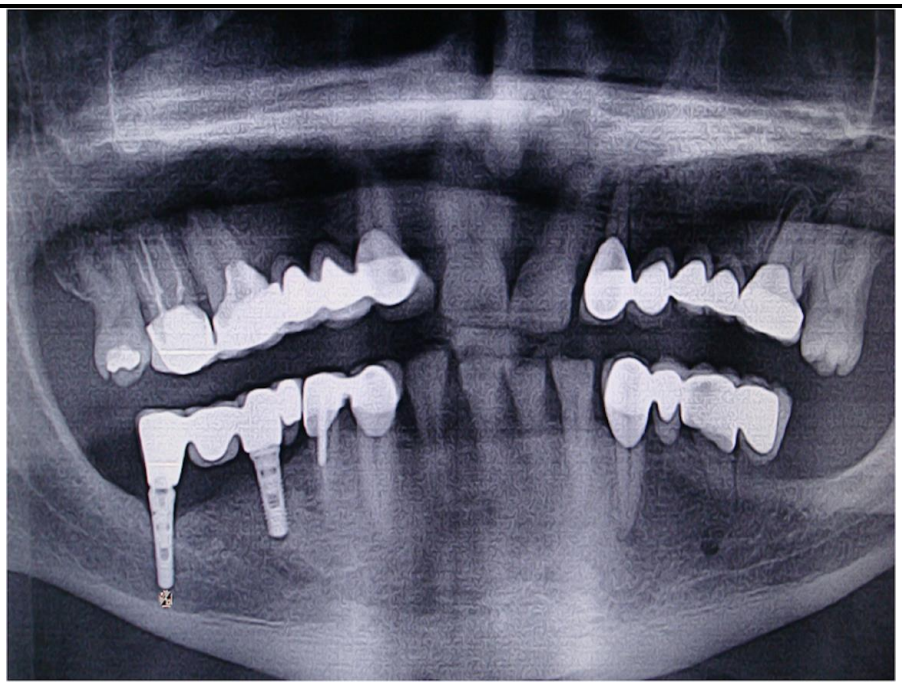

Figure 4. Postoperative panaromic view subsequent to prosthetic rehabilitation.

Discussion

In addition to the technical advantages applied in this study, it may contain some risks. Although it is not the case for every surgeon, the difficulty of implementation cannot be ignored for some cases. In addition to the experience of the physician, the well-planned preoperative preparations will eliminate most of the disadvantages and risks. Of course, planning the prostheses to be made on the implants and making the most appropriate prosthesis planning in order to prevent future occlusal and chewing forces from damaging the implant and surrounding tissues due to the special situation of the case should be included in the preoperative preparation.

An experienced maxillofacial surgeon and even a dentist can use this method to provide a more comfortable and quality life to their patients who have suffered from excessive bone loss for a long time and whose quality of life has decreased.

Moreover the tactile sense of the surgeon can predict the histologic properties of the bone, and we are able to estimate the healing prognosis of the bone in implant placement. Therefore, we can not fully explain which parameter influences the results in the histological evaluation on the basis of the sense of touch (8).

Any damage to the implants and surrounding tissues placed with the most accurate and ideal prostheses to be planned on these implants will be prevented during occlusal movements and chewing.

Meanwhile, in every case, as in the treatment of almost every disease, patient-physician cooperation and the patients' compliance with the recommendations and rules of the physicians are of great importance.

It is obligatory for physicians to inform their patients in detail about the complications that may occur, the risks that may arise from usage errors, and also the disadvantages (if any).

Recommendations

CBCT scanning has become an established tool in preoperative evaluation before placing an implant (9). lt has been suggested to use CBCT scanning when it is difficult to localize the Inferior Alveolar Nerve (and) or the Foramen mentale (10). In cases of edentulous posterior mandible with insufficient alveolar bone, the autogenous bone graft method, preferably taken from the crista iliaca, tibia or rib regions, have been applied by many researchers and clinician for many years, to reconstruct the mandible. Although this

method has generally had positive and effective results, it still has disadvantages such as continual bone graft resorption, patient morbidity, donor site morbidity, long treatment periods and high treatment costs.

Another method used in such cases is the lateralisation of the "Inferior Alveolar Nerve" via nerve transposition to enable appropriate length implant placement. However, "Nerve Transposition" is a surgical attempt that can have many harmful consequences and is technically quite difficult risky to apply. In the postoperative control, almost all patients had paresthesia along the mental nerve. The results of many studies have shown that most of these patients have permanent neurosensory loss rates of more than 20% and that a postoperative fracture of the mandible occurred (4,5).

Therefore, the measurements analyzed in CBCT and presented in the study, showed that the TTBloMC was higher than TTLoMC. Although we didn't need and use it in this study, it would be much safer for the physician to use Computer Tomography (CT) in order to completely avoid the risk of the permanent nerve damage. When measuring and comparing the distances at both the lingual and buccal sites of the MC, the presence of sufficient transverse thickness at the buccal site of the MC would assist the buccally placed implant management. Therefore, it was a forethought to place the implant in the buccal site of the MC to eliminate the risk of additional surgical interventions with the inclusion of vertical bone augmentation, nerve transposition and bone grafting applications. It has also been well-considered that the sifting of improved surgical interventions will reduce operating time and surgical morbidity and also increment the implant surface area using a full-length implant, reducing treatment duration and interval.

Placing lingually tilted implants has several different advantages: the avoidance of the necessity for a bone graft, alveolar bone regeneration or nerve transposition of the toothless posterior mandible. In addition to the benefits of placing lingually tilted implants, Pancko et al. identified a number of potential complications and concerns. Most significant was the increased load on the bone surface of the coronal implant and the attachment plane for these off-axis loaded implants (4). Studies by Hsu et al. have shown that the load on the cortical bone increases three to four times more for each 30° increase in the load angle, compared to similar axially loaded implants (11). Considering buccally placed and tilted implant management would have several other benefits in patients with partially or completely toothless mandibular posterior areas as defined for lingually inclined implants. As far as we research and know there has been no case in the international literature regarding a buccally tilted and placed implant administration, neither clinically nor radiologically. Slight buccally tilted and positioned implants (3mm buccally from the medial ridge) would reduce the tilt grade of implants and decrease the probable danger for IAN damage.

Carefully drilling the implant and placing the implant, regarding the internal aspect of the buccal cortex and parallel to the internal cortex, would also decrease the probable danger of IAN damage. For this reason, under these conditions, the average degree of buccal tilt evaluated in our study was 22°. Due to the fact that the resorption rate of the maxilla is higher than that of the mandible with time, the posterior maxillary arch has a more palatal position than the posterior mandibular region with age. Herewith, a buccally tilted and placed implant with standard abutments would also ensure low stress and tension on implant neck zone during interocclusal loading, which would have a positive effect on the survival of the implant with regard to interocclusal planning. Therefore, the interocclusal relationship between the mandible and the maxilla is very important.

In this study "Conical shaped" implants were used. Even though tapered shaped implants were used in all cases, adequate vertical reinforcement was acquired. The relationship between the clinical crown length and the root length should also take the implant indication into account, during surgical and prosthetic planning. Under the status of increment clinical crown length, due to the requirement of longer implant fixation than the clinical crown length in a fixed partial denture, tapered implant fixtures would be used instead of tapered implants to increment the VG. Therefore, tapered implants would be used when longer implant fixation is required. The VG acquired with this treatment method would result in the insertion of a longer implant with an increased implant surface area in order to obtain adequate stabilization. The

recommended implant length would be 10.25mm due to the detected vertical winnings. The longer implant with the larger implant surface has several advantages, which lead to increased stabilization and a long-term successful survival time.

The probable disadvantages of inserting buccally tilted and placed implants would occur with the placement of the healing screw and the placement of the abutment after the implant has been placed, as the the intact bone remains in the central crestal area. Therefore, removal of left lingual intact bone to the implant fixture neck region would be required in order to alleviate the placement of abutment or healing screw. Due to the placement of implant just 3mm buccally away from the mid crestal region, buccal gingiva migrated coronally and lingually, which makes it difficult to get an insight. This condition requires minor additional surgical procedures. Likewise, cauterization is required for the coronally migrated gingiva around the implant neck region. In such a case, it would still be more appropriate to correct the problematic gingival structures with classical surgical methods rather than cauterization (because dental implants are also metallic) in order not to damage the osseointegrated tissues around the implant. The removal of intact lingual bone is required in the case. When planning the operation, confidential distance has to be taken into account in order to avoid IAN violations. During implant placement, it would be a confidential IAN distance to leave 1mm of intact bone between the MC and the implant surface. There was no interval between MC and implant surface in the one clinical case presented here, therefore transient nerve paresthesia was observed which resolved within 2 weeks after the operation. Cauterization was required for the coronally migrated gingiva around the implant neck region in 3 of 6 clinical cases. 4 out of 6 patients required the removal of intact lingual bone.

Conclusion

In conclusion, the hypothesis of a buccally positioned and tilted implant placement would be preferable to advanced surgery in the case of atrophic posterior mandible. Although the outcomes of this case report support our hypothesis, the definitive evaluation should be obtained and confirmed with further similar clinical investigations with more clinical cases. In order to increase the quality of life of many patients who have problems in this regard, it is important to focus on the longer outcome evaluation of the rehabilitation of patients with excessively atrophic mandibles. Meticulous surgery and a correct prosthetic approach and regular follow-up after treatment the success rate of implants is high in patients. Success and risk of complications the way to reduce the risk is to choose the treatment correctly and to design it case-specific, systemic full dominance in the management of diseases, surgical principles of the person with high anatomy knowledge properly fulfilled and undergoes postoperative care. In today's technology one way to reduce complications and failures is through the physician's clinical team. Prosthetic specialist, laboratory staff and biomaterial officials are also of importance has. Therefore still the best treatment for complications is to prevent the occurrence of complications (12).

References

1. Felice P, Karaban M, Pistilli R, Bellini P. Minimally invasive rehabilitation of severely atrophic and fully edentulous maxilla using 4-mm-ultrashort implants: A case report with 1-year follow-up. Oral and Maxillofacial Surgery Cases 2020; 6:3 https://doi.org/10.1016/j.omsc.2020.100176.

2. Misch CE. Contemporary Implant Dentistry. 3rd ed., St. Louis.: Mosby Publications; 2007;20:687,691.

3. J PC, Marimuthu T, C K, Devadoss P, Kumar SM. Prevalence and measurement of anterior loop of the mandibular canal using CBCT: A cross sectional study. Clin Implant Dent Relat Res. 2018;20(4):531-534. doi:10.1111/cid.12609

4. Spear F. The challenges of presenting interdisciplinary treatment. Advanced Esthetics lnterdiscip Dent 2005; I: 2

5. Brum JR, Macedo FR, Oliveira MB, Paranhos LR, Brito-Júnior RB, Ramacciato JC. Assessment of the stresses produced on the bone implant/tissue interface to the different insertion angulations of the

implant - a three-dimensional analysis by the finite elements method. J Clin Exp Dent. 2020;12(10):e930-e937. Published 2020 Oct 1. doi:10.4317/jced.57387

6. Garcia LT, Chung KH. Diagnostic templates for implant treatment planning. Compend Contin Educ Dent. 2003;24(5):384-390.

7. Kola MZ, Shah AH, Khalil H, Rabah AM, Harby NMH, Sabra SA, Raghav D. Surgical Templates for Dental Implant Positioning; Current Knowledge and Clinical Perspectives. Nigerian Journal of Surgery 2015 ;2 I: I -5. doi:10.4103/1117-6806.152720

8. Rokn AR, Labibzadeh A, Ghohroudi AAR, Shamshiri AR, Solhjoo S. Histomorphometric Analysis of Bone Density in Relation to Tactile Sense of the Surgeon During Dental Implant Placement. The Open Dentistry Journal, 2018;12:46-52. doi:10.2174/1874210601812010046

9. Pancko F, Dyer I, Weisglass S, Kraut RA. Use of Tilted Implants in Treatment of the Atrophic Posterior Mandible: A Preliminary Report of a Novel Approach. J Oral Maxillofac Surg 20l0; 68:407-13.

10. Villaça-Carvalho MF, Manhães LR Jr, de Moraes ME, Lopes SL. Prevalence of bifid mandibular canals by cone beam computed tomography. Oral Maxillofac Surg. 2016;20(3):289-294. doi:10.1007/s10006-016-0569-y

11. Le BT, Borzabadi-Farahani A. Simultaneous implant placement and bone grafting with particulate mineralized allograft in sites with buccal wall defects, a three-year follow-up and review of literature. J Craniomaxillofac Surg. 2014;42(5):552-559. doi:10.1016/j.jcms.2013.07.026

12. Fincan N. Complications in Dental Implant Applications and Solutions. 2021. Bitirme Tezi, Istanbul Universty Faculty of Dentistry, Istanbul