Article published online: 2023-05-30

Extensive Rehabilitation of a Medically Compromised Patient with Vitamin-D Deficiency Using Dental Implants: A Case Report

Mayank Kumar Parakh[1] Manoj Shetty[2] Rakshith Hegde[2] Athma Shetty[2]

[1] Dr. Parakh's Dental and Implant Centre, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangaluru, Karnataka, India
[2] Department of Oral Implantology, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangaluru, Karnataka, India

Address for correspondence Manoj Shetty, MDS, Department of Oral Implantology, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Derlakatte, Mangaluru 575018, Karnataka, India (e-mail: drmanojshetty@nitte.edu.in).

J Health Allied Sci[NU]

Abstract

Patients often report to dental practice with a wide range of chief complaints. At times, young adult patients, seemingly fit clinically, report extensively damaged dentition. It is important that such patients be evaluated more extensively and the etiology if any, for such debilitated dentition, must be assessed. Dental implants are a successful treatment modality that helps to restore the function and esthetics of a patient. Early dental implant failure refers to the dental implant's failure to osseointegrate with the native bone during the phase of healing. This article describes one such young adult patient of 34 years, who presented with a history of dental implant failures without any underlying systemic comorbidities. The patient's elaborate history was taken and it was found that the patient had a severe vitamin D deficiency. Following treatment of the deficiency, the case was managed effectively with the help of a maxillary cement-retained implant-supported full-arch fixed prosthesis and, an implant and tooth-supported mandibular cast partial denture.

Keywords
- dental implants
- vitamin D
- rehabilitation
- cast partial denture
- fixed prosthesis

Introduction

Dental implants are a successful treatment modality that helps to restore the function and esthetics of a patient.[1] Long-term follow-up data have shown high survival rates. These studies have reinforced the predictability and success of dental implant prostheses.[2] It is of utmost importance that the dental implant is integrated into the alveolar bone during the initial healing phase.[3] Early dental implant failure refers to the dental implant's failure to osseointegrate with the native bone during the phase of healing.[4]

Bone metabolism is dependent on vitamin D levels. Low levels of vitamin D can have a negative impact on the repair process and the formation of new bone around the dental implant surface.[5] Vitamin D is a steroid hormone that can be produced by exposure of the skin to ultraviolet rays of the sun or can be supplied by oral supplementation. This case report describes a patient with no previous systemic medical illness and with a history of repeated failures of osseointegration of dental implants.

Case Report

A 34-year-old female reported to the department of oral implantology with the chief complaint of repeated failures of dental implants for the past 1 year. On further questioning, it was noted that the patient had undergone implant surgery in the maxillary arch 1 year back and a repeat surgery 3 months

DOI https://doi.org/10.1055/s-0043-1768595.
ISSN 2582-4287.

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

Fig. 1 Preoperative image of teeth.

Fig. 2 Extracted teeth and retrieved prosthesis.

ago, but the implants did not osseointegrate. On clinical examination, it was noted that the patient had a partially edentulous maxillary and mandibular arch (►**Fig. 1**). It was also noted that the patient had a desk job and was barely exposed to the sun. Furthermore, she had no comorbidities such as diabetes mellitus, thyroid ailments, or systemic hypertension. It was decided to test the patient for vitamin D3 levels and serum calcium levels. On assessing the reports, it was noted that her vitamin D3 level was 6.0 ng/mL that placed her under the severe deficiency bracket. Furthermore, she had low blood calcium level as well.

The patient was started on vitamin D and calcium supplements for 3 months after which surgical planning of the case was done using cone-beam computed tomography imaging. The treatment was planned with the extraction of the grade III mobile 23, 26,16,17, root stump in the 27 regions, and removal of the prosthesis with respect to 11,12,21,22. (►**Fig. 2**). The teeth were removed atraumatically using a periotome and extraction forceps. Following this, the previously placed Ankylos implant (Dentsply Sirona, 13320-B Ballantyne Corporate PI Charlotte, NC, United States) was explanted from 22 region. The implant in the 12 region was firm and anchored to the palatal bone with exposure of two implant threads on the buccal aspect. A lateral augmentation was done using a Rocky Mountain particulate bone graft (Colorado, United States) and a PerioCol-GTR membrane (India). Following this three Straumann implants (Basel, Switzerland) of 4.1 × 10 mm were placed in 23, 25,35 regions. The implants in 25,35 regions were angulated to 30 degrees to increase the anteroposterior spread. In the mandibular arch, two Roxolid implants of 3.3 × 12 mm were placed in 32,42 region (Straumann, Switzerland; ►**Fig. 3**).

In the present case, the implant system used was Straumann implant system; the second stage surgery was performed in 3 months as studies have shown no difference in success rates for early and delayed implant loading.[6] Following, the second-stage surgery multiunit abutments were placed; 30 degrees in 25,12,35 regions and 17 degrees in 23 region to obtain relative parallelism of the abutments (►**Fig. 4**). Healing abutments were placed in 42,32 regions.

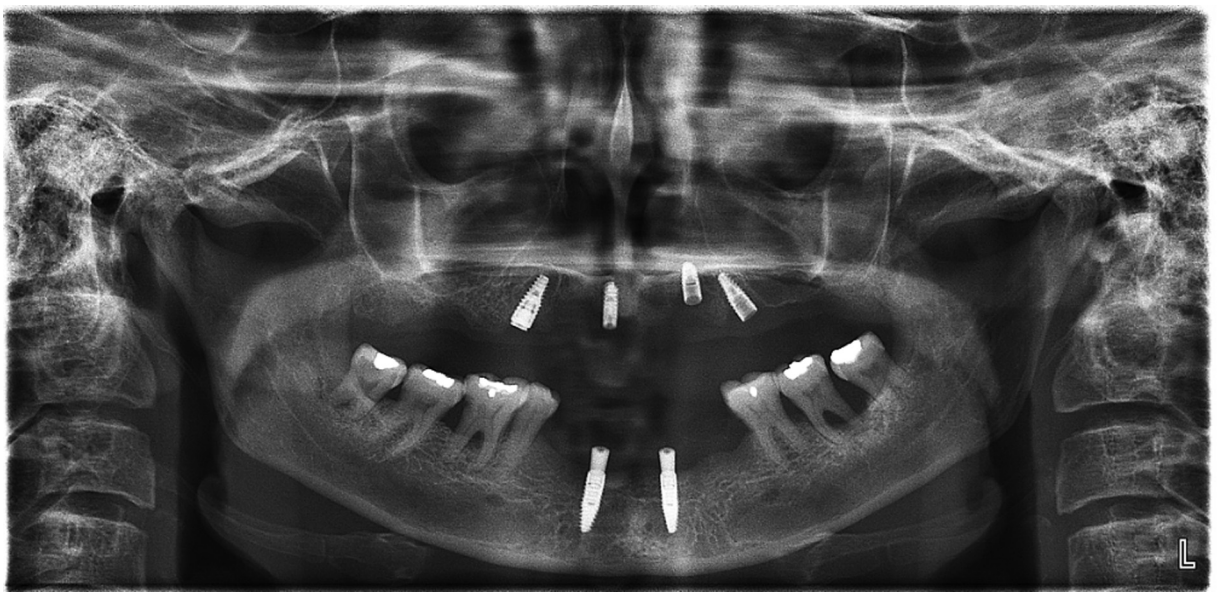

Fig. 3 Radiograph of implant placements.

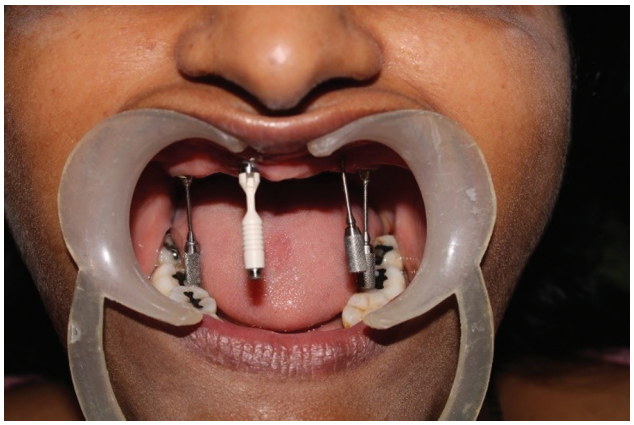

Fig. 4 Multiunit abutments to correct angulations.

Fig. 6 Metal try-in of the maxillary arch.

Following a 2-week healing period, an open tray impression was made of the maxillary arch and a jig trial was done to verify the implant position (►**Fig. 5**).

The treatment for the mandibular arch was an implant-supported cast partial denture. This prosthesis basically helps convert a long span partially edentulous situation such as a class II or a class IV into Kennedy's class III situation, thereby enabling better biomechanical stress distribution to both the implants and the tooth. Moreover, a 15-year follow-up study showed high success rates of the same technique.[7] As the present case is a Kennedy's class IV and since direct retainers are not used thus additional stabilization is achieved with the aid of implants. In the mandibular arch, rest seats were prepared in mesial aspect of 36,45 and NoVo lock abutments were torqued into the dental implants at 32 and 42 regions. Following this a closed tray impression was made. The mandibular implants enhance both retention and support as the NoVo lock attachment system was used.[8] Following this, jaw relation was recorded and a trial of waxed-up dentures was done. This enabled the exact buccolingual positioning of the metal framework.

Following this, a three-dimensional printed framework was obtained of the maxillary arch, which was cast using cobalt-chromium alloy. The metal framework was tried for passivity (►**Fig. 6**). Following this, ceramic buildup was done and the final prosthesis was cemented in the oral cavity using glass ionomer cement (►**Fig. 7**).

For the mandibular arch, a refractory cast was obtained over which a wax pattern was made for the fabrication of a framework using cobalt chromium base metal alloy. The framework was tried in patients' oral cavity (►**Fig. 8**) A maxillomandibular jaw relation was recorded and a try-in

Fig. 7 Cemented maxillary prosthesis.

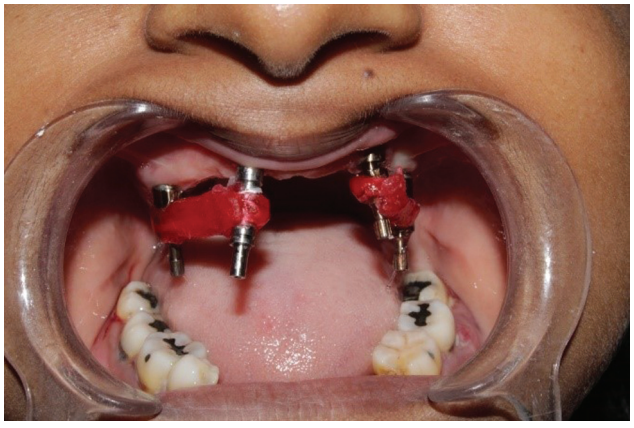

Fig. 5 Jig trial.

Fig. 8 Metal try-in of the mandibular arch.

Fig. 9 Pickup of the components.

Fig. 10 Final postoperative image of teeth.

of waxed-up dentures was done. The prosthesis was acrylized and polished. The NoVo lock abutments (Straumann, Switzerland) were torqued to 35Ncm and a pickup of the components was done onto the framework using dual-cured resin cement (►**Fig. 9**). The final fit-in of the prosthesis was done (►**Fig. 10**). The patient was recalled for a follow-up at 3 and 6 months, respectively.

Conclusion

It is of utmost importance that a comprehensive diagnosis and treatment planning of the patient needs to be done, including thorough history taking to rule out any probable deficiencies or underlying disorders of the patient. Furthermore, systematic planning of treatment must be done so that optimal outcomes can be achieved for a patient.

Financial Support
None.

Ethics Statement
None.

Funding
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interest
None declared.

Acknowledgments
Our acknowledgement extends to A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University).

References

1 Mangano FG, Mastrangelo P, Luongo F, Blay A, Tunchel S, Mangano C. Aesthetic outcome of immediately restored single implants placed in extraction sockets and healed sites of the anterior maxilla: a retrospective study on 103 patients with 3 years of follow-up. Clin Oral Implants Res 2017;28(03):272–282
2 Mangano C, Iaculli F, Piattelli A, Mangano F. Fixed restorations supported by Morse-taper connection implants: a retrospective clinical study with 10-20 years of follow-up. Clin Oral Implants Res 2015;26(10):1229–1236
3 Chrcanovic BR, Kisch J, Albrektsson T, Wennerberg A. A retrospective study on clinical and radiological outcomes of oral implants in patients followed up for a minimum of 20 years. Clin Implant Dent Relat Res 2018;20(02):199–207
4 Bra-nemark P-I, Zarb GA, Albrektsson T, Rosen HM. Tissue-integrated prostheses. osseointegration in clinical dentistry. Plast Reconstr Surg 1986;77(03):496–497
5 Javed F, Malmstrom H, Kellesarian SV, Al-Kheraif AA, Vohra F, Romanos GE. Efficacy of vitamin D3 supplementation on osseointegration of implants. Implant Dent 2016;25(02):281–287
6 Lai HC, Zhang ZY, Zhuang LF, Wang F, Liu X, Pu YP. Early loading of ITI implants supporting maxillary fixed full-arch prostheses. Clin Oral Implants Res 2008;19(11):1129–1134
7 Mijiritsky E, Lorean A, Mazor Z, Levin L. Implant tooth-supported removable partial denture with at least 15-year long-term follow-up. Clin Implant Dent Relat Res 2015;17(05):917–922
8 de Souza RF, Bedos C, Esfandiari S, et al. Single-implant overdentures retained by the Novaloc attachment system: study protocol for a mixed-methods randomized cross-over trial. Trials 2018;19(01):243

