# Functional Aesthetic Rehabilitation of a Patient with Dental Biocorrosion: A Case Report

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*The main goal of this report was to solve a clinical case of a 73-year-old man with diabetes, partial edentulism and a pathological occlusion with biocorrosion using conservative and adhesive techniques. A complete rehabilitative treatment was performed, increasing the vertical dimension of occlusion using indirect restorations with composite resins on teeth and resin crowns on implants and returning function using mutually protected occlusion. A 6-month posttreatment clinical and radiographic follow-up was performed.*

**Key words:** *composite resins, dental implants, dental prosthesis, implant-supported, tooth wear, vertical dimension*

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Dental biocorrosion is the progressive degradation of the dental surface by a chemical, biochemical or electrochemical action that is produced by exogenous chemical agents, endogenous biochemical agents, proteolytic enzymes and a piezoelectric effect on dentine caused by stress applied to teeth[1]. This generalised process seriously compromises the vertical dimension of occlusion (VDO). The loss of VDO caused by tooth wear results in facial collapse and alters the shape and function of teeth, affecting chewing and aesthetics. In some cases, although facial appearance is maintained by a dentoalveolar compensatory mechanism, the increase in VDO is still taken into account in order to restore the acquired occlusal scheme[2]. The purpose of an adhesive rehabilitation is to preserve more dental tissue with indirect or direct partial restorations by increasing the VDO[3-5].

The main goal of this report was to solve a clinical case of an older adult with diabetes, partial edentulism and a pathological occlusion with biocorrosion using conservative and adhesive techniques.

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## Case report

A 73-year-old man with type II diabetes presented to the Postgraduate Clinic of the School of Dentistry, National University Mayor of San Marcos. His main discomforts were sensitivity in some teeth and aesthetic alteration when smiling.

At the intraoral clinical examination, the absence of teeth 35, 36 and 37 was observed, with a reduction of mucogingival tissue in a horizontal direction, generalised severe dental wear and gingival recession (Fig 1). At the extraoral examination, a slight loss of facial contour was observed and the smile analysis presented a reverse incisal occlusal plane with a low smile line.

Complementary examinations were carried out, such as study models, photographs, radiographs, tomographies, diagnostic wax-up and glycosylated haemoglobin examination, obtaining a diagnosis of pathological occlusion associated with dental wear due to biocorrosion with VDO loss. An aesthetic jig (Pattern Resin LS, GC America, Alsip, IL, USA) was made in the central incisor with the purpose of developing a diagnostic wax-up, restoring an ideal occlusion plane with an increase in the VDO and simulating two restorations on two implants in the edentulous zone (Fig 2).

Before the definitive treatment, the patient signed an informed consent form approving the integral treatment at the Postgraduate Clinic, and provisional restorations were made with bis-acryl resin (Protemp 4, 3M ESPE, Seefeld, Germany) directly using a silicone matrix. The 4-mm increase in VDO at the incisal level

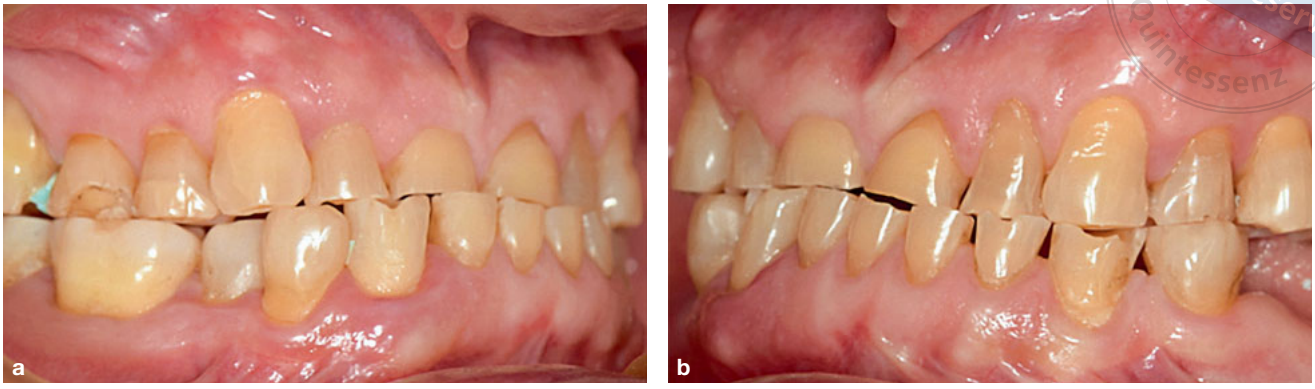


**Fig 1a and b** Intraoral clinical examination.

**Fig 2** Diagnostic wax-up with a new VDO and levelling of the occlusal plane.

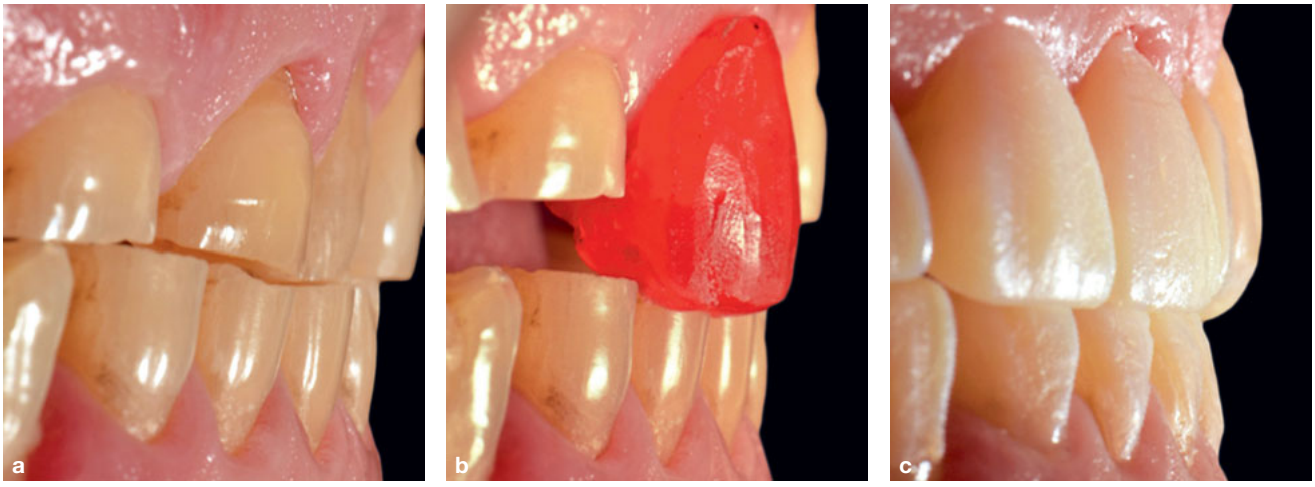


**Fig 3** **(a)** Initial VDO at the incisal level. **(b)** New VDO with the multifunctional jig. **(c)** VDO determined by the provisionals.

was evaluated for 3 weeks with provisionals, resulting in good patient acceptance (Fig 3). The hygiene phase was carried out, comprising dental prophylaxis and physiotherapy.

A glycosylated haemoglobin test was requested 2 days before the placement of dental implants, resulting in an adequate glucose level for the surgical phase. During the planning of the treatment according to the diagnosis wax-up, the placement of two dental implants with an internal connection of 4.5 × 10 mm was determined (Superline, Dentium, Seoul, Korea) (Fig 4).

During the rehabilitation phase, the restoration material was changed from provisional to definitive by sextants. In the fifth sextant, restorations were made with composite resin directly on teeth 33, 32, 31, 41, 42 and 43. In the first, third and sixth sextants, morphological dental preparations guided by wax-up were made to create indirect partial adhesive composite resin restorations (Palfique LX5, Tokuyama Dental, Japan) on teeth 14, 15, 16, 24, 25, 26, 46 and 47 (Fig 5).

In the second sextant, the anterior clinical erosive classification (ACE) proposed by Vailati and Belser[6]

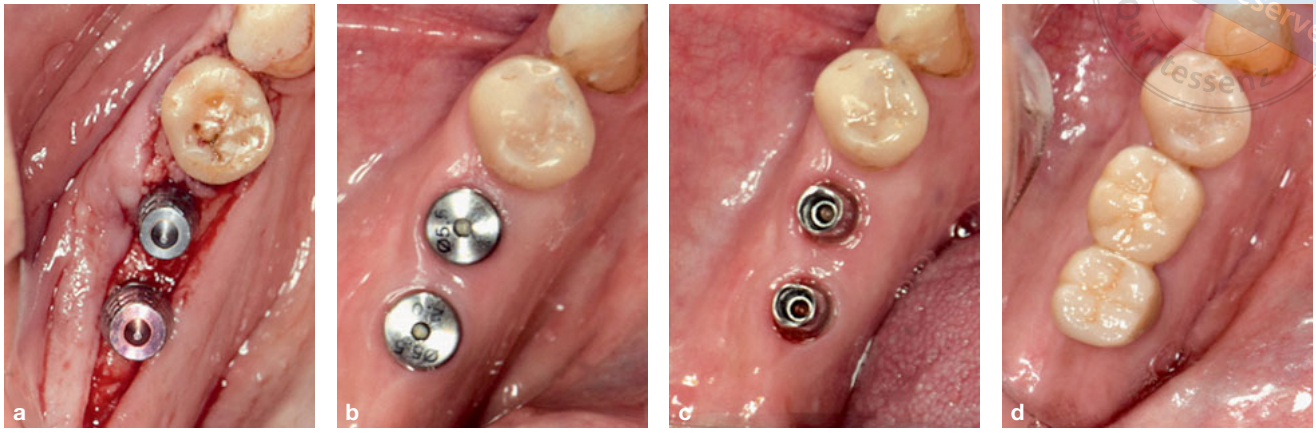


**Fig 4** **(a)** Surgical phase, placement of dental implants 35 and 36. **(b)** 4 months later with healing abutment. **(c)** Custom abutment. **(d)** Resin crowns on implants by CAD/CAM.

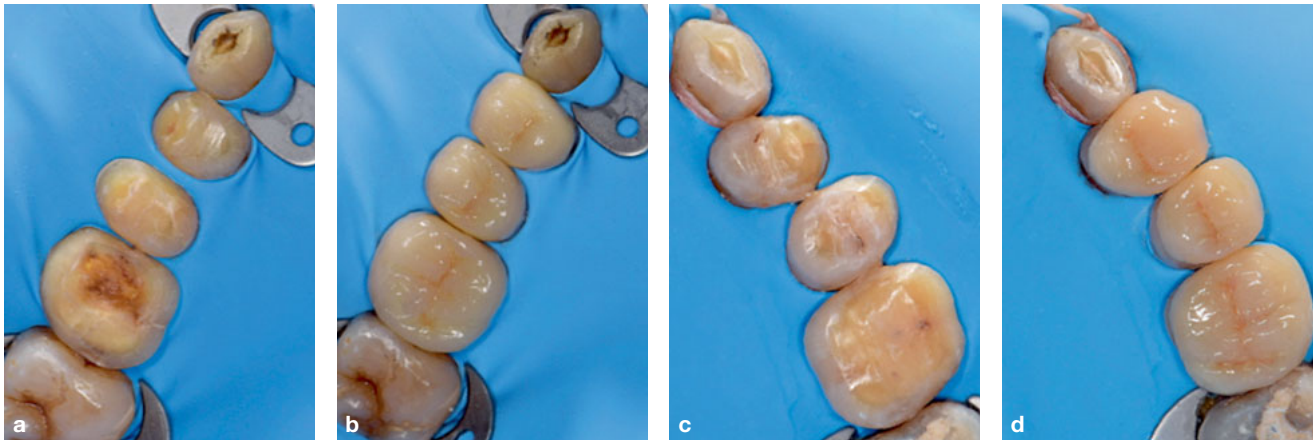


**Fig 5** **(a)** Morphological preparations on teeth 14, 15 and 16. **(b)** Partial restorations on teeth 14, 15 and 16. **(c)** Morphological preparations on teeth 24, 25 and 26. **(d)** Partial restorations on teeth 24, 25 and 26.

was used for diagnosis and treatment. This classification consists of six different types of wear; in this case, class IV was assigned due to the amount of wear with dentine exposure and a loss of dental tissue at an incisal level (> 2 mm) (Fig 6).

The suggested treatment was the sandwich technique, which consists of the minimum preparation of the palatal surface for the fabrication of palatal veneers so that the tooth is finally complemented with veneers. In this case, the sandwich technique was used with indirect palatal veneers and direct veneers on teeth 12, 11, 21 and 22 (Fig 7).

After 4 months of implant osseointegration, a radiographic and clinical evaluation was performed. The implants were then restored with block resin crowns (Shofu Block HC, Shofu, Kyoto, Japan) with CAD/CAM (Fig 4). Posttreatment clinical and radiographic controls were performed at 6 months, with 50 micron indicators to assess the occlusal stability of the tooth and implants (Figs 8 to 10).

## Discussion

The glossary of prosthodontics terms[7] defines erosion as "the progressive loss of tooth substance by chemical processes that do not involve bacterial action"; this definition does not involve biochemical and electrochemical degradation, so the term biocorrosion, suggested by Grippo et al[1], is considered more accurate.

Patients with severe dental wear used to be treated with crown coverage, which requires more tooth preparation; current treatments take a more conservative approach with adhesive techniques[3-5].

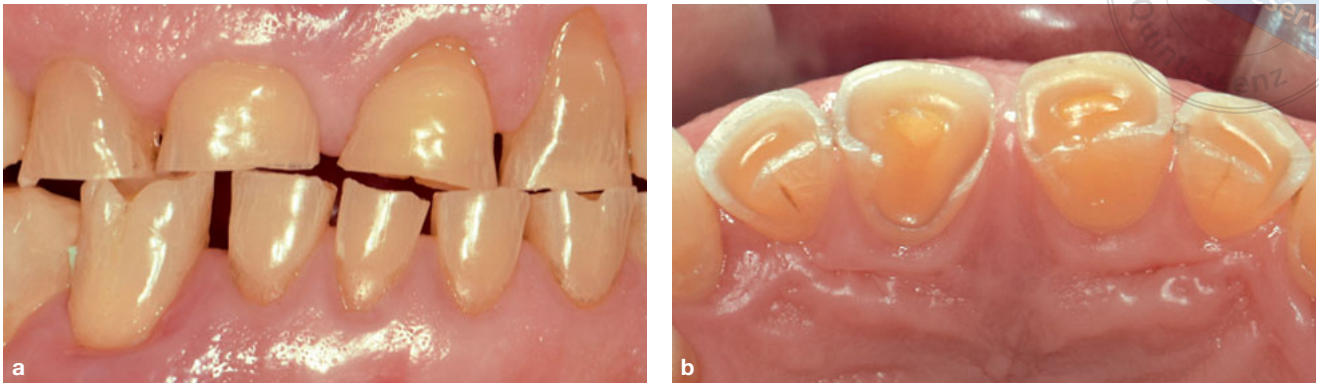


**Fig 6** **(a)** Loss of tooth length greater than 2 mm. **(b)** Dentine exposure.

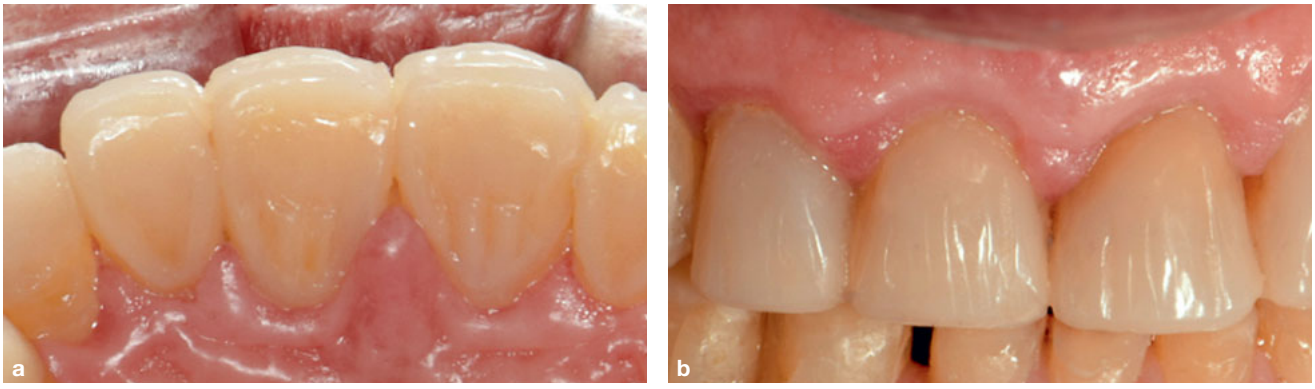


**Fig 7** Modification of the sandwich technique on teeth 12, 11, 21 and 22. **(a)** Indirect palatal veneers. **(b)** Direct restorations.

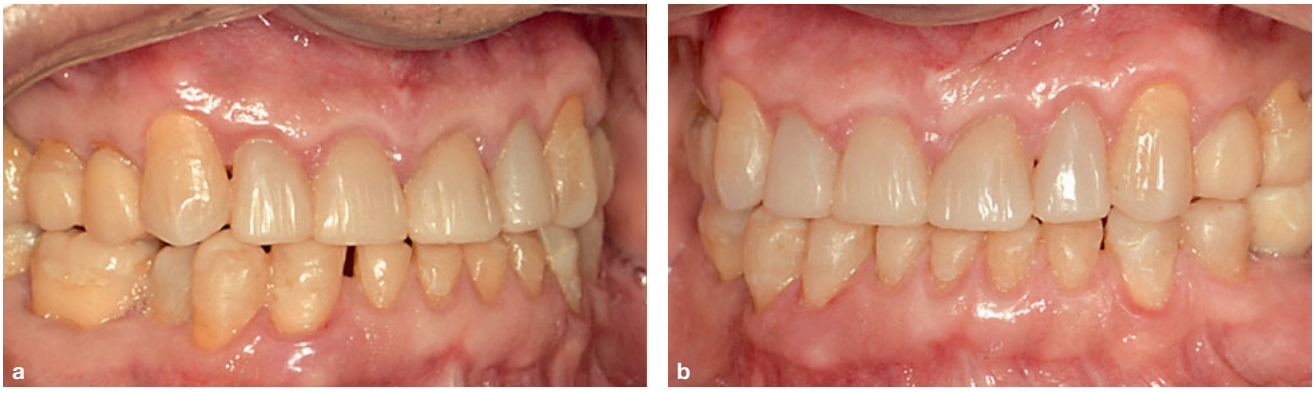


**Fig 8a and b** Posttreatment intraoral clinical photographs after 6 months of function.

In this case, the three-step technique described by Vailati and Belser[3-5] was modified; a wax-up was made and a multifunctional jig was used to obtain centric relation and determine a new VDO. These procedures are not described in the three-step technique, because the registration is done at the maximum intercuspation position and the VDO is determined by the increase in the incisal pin in the semi-adjustable articulator.

An increase in the VDO up to 5 mm is considered a safe and uncomplicated method for the patient, as Abduo[2] described. In this case, the increase in the VDO was 4 mm at an incisal level and corroborated for 3 weeks, obtaining an asymptomatic response in the temporomandibular joint. This positive result ensured the adaptability of a new VDO.

**Fig 9a and b** Posttreatment clinical occlusal photographs after 6 months of function.

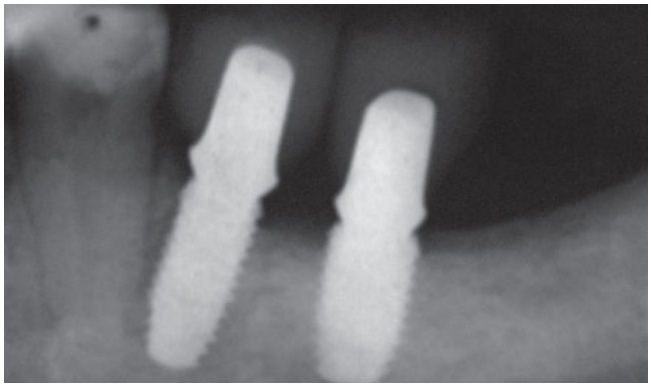

**Fig 10** Radiograph of dental implants 35 and 36 after 6 months of loading.

One of the advantages of directly making a full-mouth provisional is the fact that it enables function and aesthetics to be assessed; it also serves as a guide to avoid excessive wear in dental preparations for definitive restorations[8]. Dental preparations were guided by morphology, following a clinical protocol based on adhesthetics, using two types of designs: occlusal veneers, which provide full coverage of the canines, and veneerlay, which provides total coverage of the canines with buccal extension[9,10].

Surgical treatments with dental implants in diabetic patients are predictable when there is an adequate level of blood glucose; however, there is no significant difference in the rate of implant failures between diabetic and non-diabetic patients[11]. The new classification proposed by the International Team for Implantology (ITI) evaluates the combination and load of dental implants; this clinical case was classified as a type 4C, which consists of late implant placement and a conventional load. This protocol is clinically well documented and scientifically validated with a success and approval rate of 98%[12].

## Conclusion

The use of complementary tests is essential for a correct diagnosis and treatment plan in order to obtain satisfactory results, including the provisional phase to evaluate the VDO and aesthetics. It is convenient to increase the VDO in patients with severe dental wear in order to preserve the dental tissue and create space for the restorative material. Integral treatment with composite resins on teeth and implants is an alternative that simplifies clinical procedures, reduces costs and is easy to maintain. Clinical studies of resin restorations in long-term implants should be conducted to obtain information about their behaviour over time.

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## Conflicts of interest

The authors declare no conflicts of interest related to this study.

## Author contribution

Drs Henrry Cardenas-Sallhue and Sergio Alvarado-Menacho contributed to the planning and execution of the treatment and the drafting and revision of the manuscript; Dr Juana Delgadillo-Avila participated in the revision of the manuscript. All authors gave their final approval.

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