Mucogingival therapy to treat implant fenestration in the esthetic zone: a case report after 2 year follow up

Encarna Dominguez, DDS
Postgraduate Program in Periodontics, University of Valencia, Spain
Clinica Perio (Grupo Plénido), Madrid, Spain

Margarita Vazquez, DDS
Specialist in implant dentistry, University de Santiago de Compostela, Spain
Clinica Perio (Grupo Plénido), Madrid, Spain

Oscar González-Martín, DDS
Adjunct Assistant Professor, Periodontal-Prosthesis Department,
University of Pennsylvania School of Dental Medicine, Philadelphia, USA
Visiting Lecturer, Department of Fixed Prosthodontics and Occlusion,
School of Dental Medicine, University of Geneva, Geneva, Switzerland
Clinica Perio (Grupo Plénido), Madrid, Spain

Javier Alandez, DDS, PhD
Postgraduate Program in Periodontics, University Complutense, Madrid, Spain
Director, Clinica Perio (Grupo Plénido), Madrid

Corresponding author: Encarna Dominguez
Clinica Perio, Madrid, Paseo San Francisco de Sales 10,1, Madrid. E-mail: edominguez@perio.es

Abstract

Soft tissue fenestration in implants is considered not only as a situation that could negatively influence the long-term stability of the implant, but also creates an esthetic problem when it occurs in the visible area of the mouth. This article describes the resolution of a case that presented a vestibular fenestration of an osseointegrated implant placed to substitute the upper right incisor, which does not respect the recommendations of ideal three-dimensional position in a young patient with a high smile line. The case was treated using two mucogingival surgical techniques to avoid a more invasive approach. A prosthetic immediate final abutment was inserted in the day of the second surgery. The fenestration was successfully covered and 2 years later it remains stable. In this article, the details about the treatment are described.

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Introduction

Long-term success of osseointegrated implants in the treatment of full and/or partially edentulous patients, has been well documented in the literature, this being one of the treatments with greater predictability in dentistry.[1-6] A fact to consider, especially in the maxillary anterior implants, is the great difficulty in obtaining a good appearance. Thus, although several studies have shown a survival rate of 94% of the implants rehabilitating in the anterior superior sector and 97.9% in single teeth in the same area after 8 years of follow up,[7] other authors mention a 10% failure from an esthetic point of view.[8,9]

The causes for this failure are frequently associated with soft tissue reaction around the implant prosthesis. Bone loss and gingival recession after extraction, the absence of papilla, and the difficulty of a predictable healing are phenomena negatively associated with implant-supported restoration treatments. Several studies argued that the recession of the soft tissues after extraction range between 1.5 to 4 mm.[10,11,12] Correct placement and angulation of the implant, as well as respect for the biologic width and accurate diagnosis of the gingival biotype of the patient appear to have adequate influences in the esthetic result of the final restoration.[2,3] Buser et al described the comfort zones in the three dimensions of the space for the proper placement of dental implants in the esthetic zone. Specifically, in the vestibule-palatal direction, 2 mm of buccal plate must be preserved at least, so that the outer surface of the implant must be placed 2 mm palatal to an imaginary line defined by the arch formed by the labial surface of the adjacent teeth and the center of the implant 2 mm of this imaginary line.[2] Finally, correct management of the contours of the temporary and final restoration also seems important to achieve predictable results.[13,14]

Resolution of serious esthetic problems associated with placement of integrated implants is complicated. Explantation and placement of a new implant, normally associated to reconstructive techniques of bone and gingival tissues, is often required. Unfortunately, in many cases it is difficult to return these patients to a natural appearance after various surgical procedures.

This article describes the management of mucogingival and prosthetic techniques in a case of a young patient with a high smile line, who presented a vestibular fenestration of the gingival soft tissue in the esthetic zone after receiving an implant that does not respect the recommendations of ideal three-dimensional position. The objective was achieved, using a conservative approach. An improvement of soft tissues appearance, preservation of the interdental papilla and a gingival line in harmony with the neighboring teeth were finally achieved, restoring a natural aspect of the patient.

Case presentation

A 25-year-old woman presented at the private clinic to evaluate the esthetics in her anterior superior area. Her complaint was the aspect of her smile because of a fenestration that occurred in the right central incisor of an osseointegrated implant. Esthetics was the main reason for her consultation.

Fig 1 Initial presentation. (a) The patient presented a high smile line showing leveled gingival margins, except for the right upper incisor, which presented a fenestration. (b) A correct esthetic final restoration, seamless integration with the neighboring teeth, but a fenestration appears on the vestibular area a few millimeters from the gingival margin in the abutment–implant interface.

Clinical findings

During the first appointment photos and radiographs were taken. A comprehensive clinical examination revealed the presence of the fenestration associated with a high smile line, showing the clinical crowns of the anterior superior teeth and a significant portion of the gingiva (Fig 1).

Radiographic analysis

Radiographic examination evaluated the position of the implant in the alveolar ridge, noting the absence of buccal bone in the coronal 4 mm and a moderately vestibular position of the implant, which could be the possible cause of the fenestration (Fig 2). Nowadays, it is well known that correct implant place-

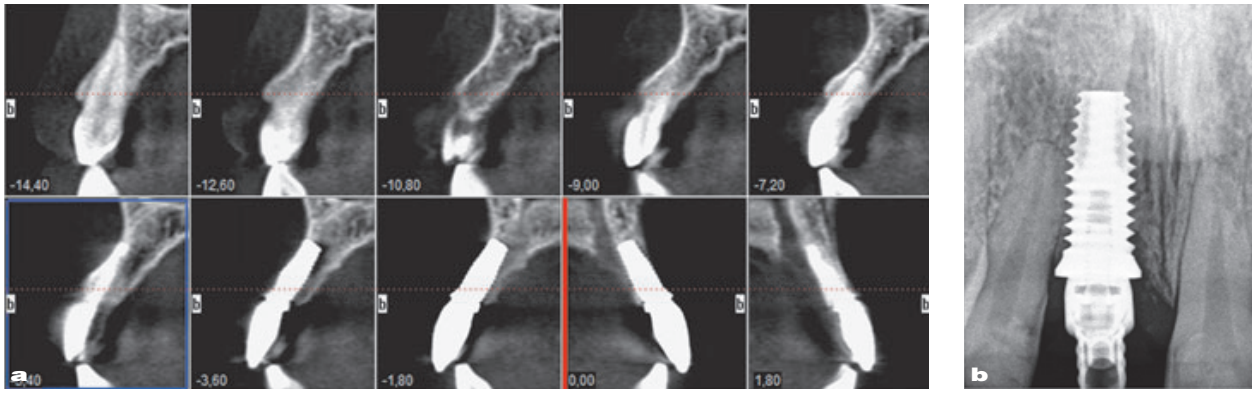

Fig 2 Radiographic examination. (a) CT Scan demonstrates the vestibular inclination of the implant and the absence of buccal plate in the coronal portion. (b) A wide platform implant can be observed from a periapical radiograph.

Fig 3 Clinical status 18 months later. The soft tissue fenestration has increased and the patient is concerned about her esthetic appearance.

ment in all three planes of space is crucial for avoiding esthetic complications. It is generally accepted that the shoulder of the implant should be located 2 mm above the midbuccal gingival margin. In this area the scalloping is much more pronounced, remaining at a distance from the interproximal margin of 5 to 7 mm. The distance between tooth implant must be greater than 1.5 mm to preserve the interproximal bone and to maintain the interdental papillae.[15-17] Also, a more vestibular or palatal position has an important functional and esthetic impact. In the first circumstance, the trend of the soft tissue is to the recession. In cases of a palatal positioned implant, a restoration with a long vestibular cantilever would be required, which subsequently will impair the hygiene of the prosthesis.

Diagnosis and treatment plan hypothesis

After studying the case, different treatment options were explained to the patient, including explantation and replacement of the implant combined with augmentation techniques. All alternatives were preceded by periodontal prophylaxis, oral hygiene instructions and maintenance. The ultimate goal was to re-establish optimal esthetics, giving the age of the patient and the type of smile. Unfortunately, these specific situations seem unpredictable to solve. In

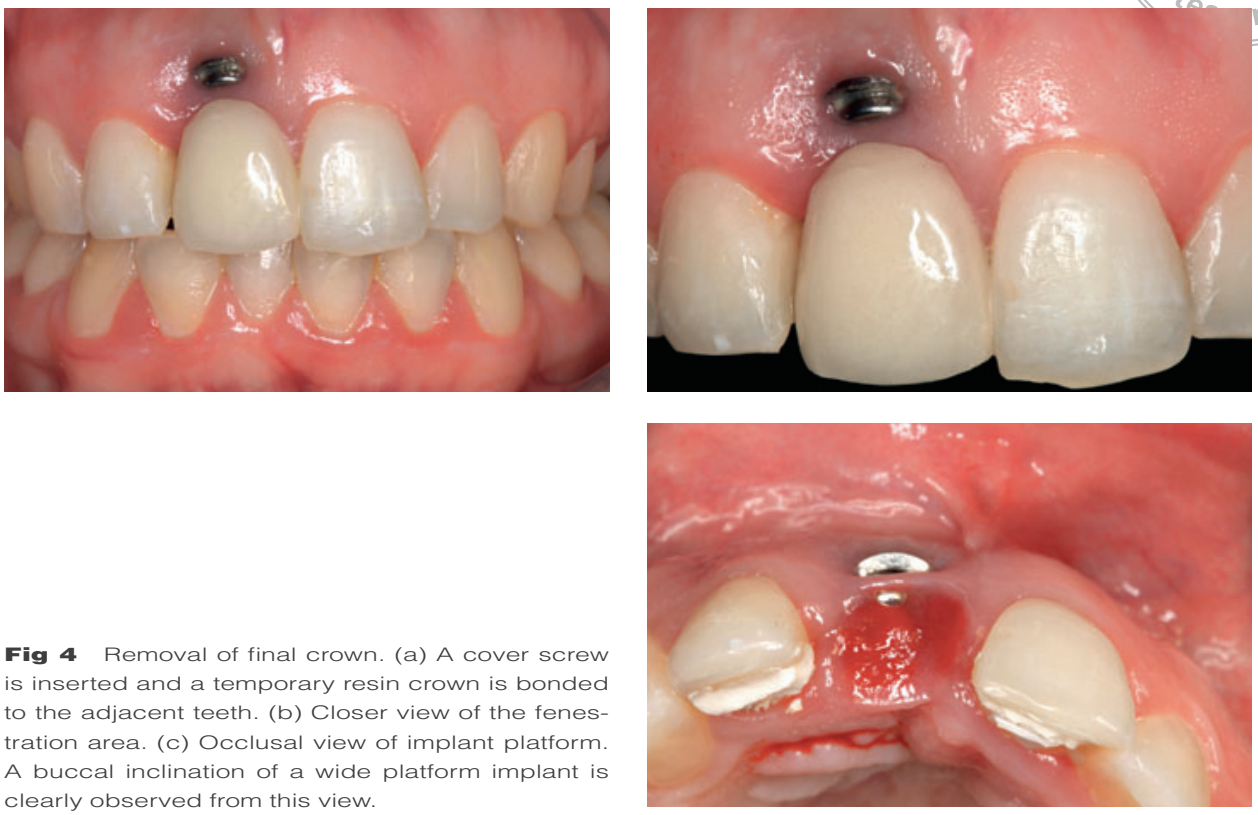

Fig 4 Removal of final crown. (a) A cover screw is inserted and a temporary resin crown is bonded to the adjacent teeth. (b) Closer view of the fenestration area. (c) Occlusal view of implant platform. A buccal inclination of a wide platform implant is clearly observed from this view.

this particular case, the peri-implant plastic surgery was a therapeutic option to consider. The treatment of mucosal defects at implant sites should be attempted by following well-documented recommendations that include a sufficient thickness of the buccal bone[18] and a firmly attached, keratinized mucosa at the buccal implant site.[19] Burkhardt et al[20] stated that in cases of dehiscence of soft tissue around integrated implants, all implant sites revealed a substantially, clinically significant improvement following coronal mucosal displacement in combination with connective tissue grafting. Unfortunately, in this study, none of the sites could achieve a complete coverage of the implant soft tissue dehiscence. Also, when compared with the percentages of soft tissue recession coverage around teeth as indicated in systematic reviews, the outcome at implant sites was clearly inferior.[21]

At this time, the patient did not accept the proposed therapeutic options. Eighteen months later, she came back to the clinic because the fenestration got worse, and the platform of the implant was completely exposed. The patient demanded an esthetic solution (Fig 3).

After re-evaluation of the case, it was concluded that the implant platform was wide and bucally inclined so it had led to reabsorb the buccal bone plate, being partially covered only by soft tissue (Fig 4). In this scenario, despite the

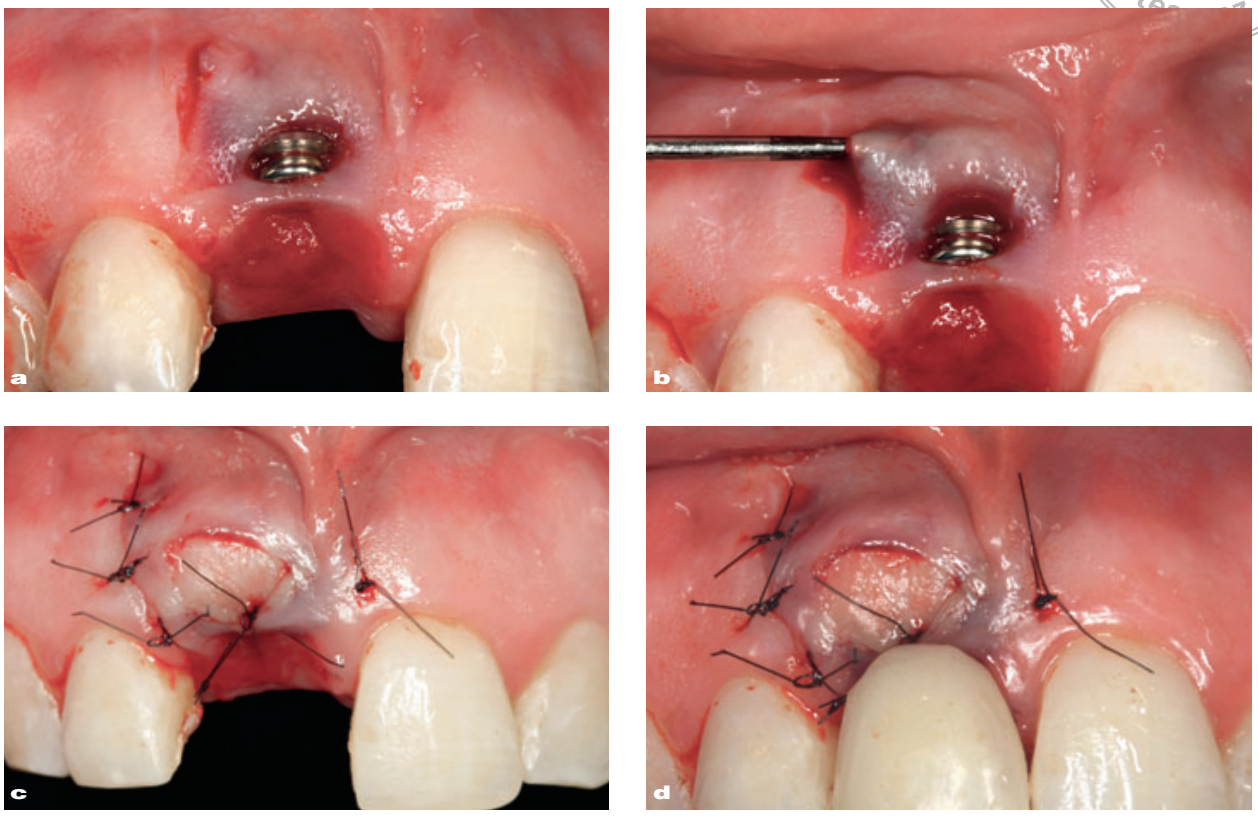

Fig 5 First soft tissue graft. (a) Vertical incision lateral to fenestration. (b) Partial thickness detachment around to the fenestration (c) Connective tissue harvested from the palate is sutured using vertical mattress (d) Suture of vertical incision by simple stitch. Provisional crown is bonded, avoiding excess of pressure over the surgical area.

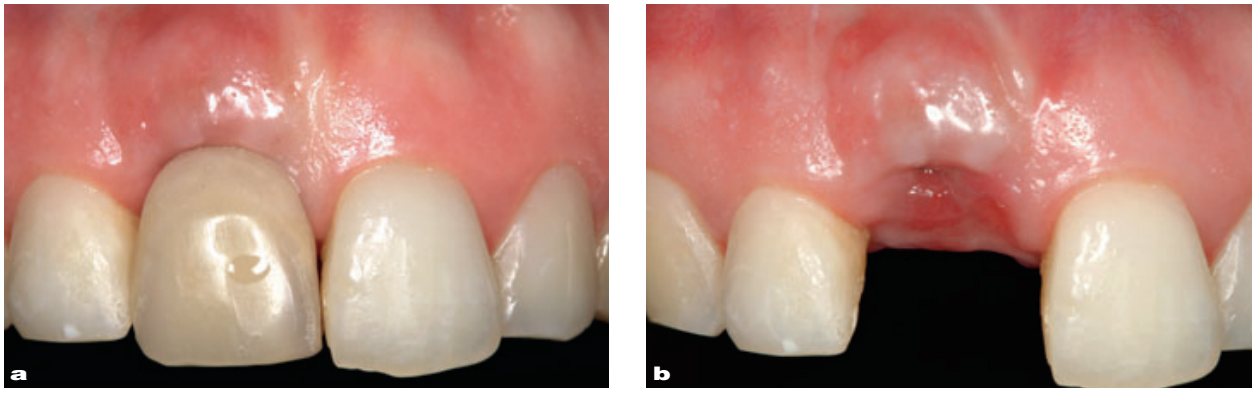

Fig 6 Follow up of the first graft. (a and b) One month follow-up. Good appearance and full coverage of the implant surface.

unfavorable position of the implant and the inappropriate selection of the size of the platform, a soft tissue procedure was proposed to the patient to intend to cover the implant shoulder, giving that the periodontium of the patient was thick and after explaining the patient the possibility of an unpredictable outcome. At this point, reduction of the buccal implant platform was a possibility of treatment to be considered. However, in this specific case it was decided to perform a first attempt of grafting and evaluate the evolution before doing a more irreversible treatment.

During the first phase of treatment, the existing final prosthetic restoration was removed, a cover screw was inserted and the implant was left submerged by placing a temporary crown bonded to adjacent teeth. The patient was instructed in hygiene techniques.

Two months after the implant crown was removed, a connective tissue graft in the area of the fenestration was scheduled. A vertical lateral pouch was performed to access the implant shoulder, carefully keeping the thin soft tissue bridge present on the gingival margin. The intention was not to cause a potential recession of the gingival margin. A connective tissue graft measuring approximately 12 x 6 mm was harvested from the premolar area of the palate. Vertical mattress suturing was used to introduce the graft through the lateral incision and to cover the exposed metal of the fenestration (Fig 5). The vertical incision was sutured with simple sutures using non-absorbable monofilament 6/0. Provisional prosthesis was bonded back, the pontic was adjusted in order to avoid pressure in the surgical area, and the patient received postoperative instructions. Ten days later, the sutures were removed (Fig 6).

Fig 7 Three months later, connection of the implant using an angled abutment and screwed retained temporary crown. At this time, an area of "false healing" is observed.

Three months after surgery, an implant connection was performed and a final abutment (2 mm angled abutment) and provisional crown were inserted over the implant. When the patient came to remove the suture after the abutment connection, an appearance of "false healing" in the implant-abutment interface was noted (Fig 7). Then, a second connective tissue graft was decided. It was planned that a customized zirconia final abutment would be inserted on the day of the surgery to avoid implant-abutment interface disconnection during the healing time.

Seven months after the first graft, the second graft was performed, this time by accessing the gingival margin that was thicker after the first graft, using an envelope technique.[22] Using a microsurgical scalpel, a large partial thickness flap envelope was performed without releasing incisions. Connective tissue graft

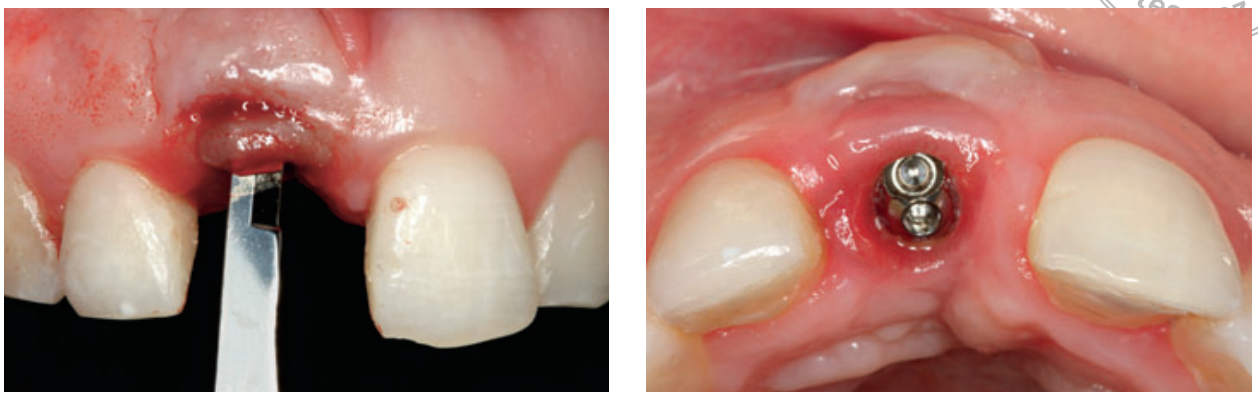

Fig 8 Second graft seven months after the first surgical procedure. Partial thickness incision from the gingival margin is made following an envelope approach.

Fig 9 (a) Introduction of the graft in the pocket and suture by horizontal mattress. Suture of the thin soft tissue bridge with simple stitch. Zirconium abutment insertion the day of surgery. (b) Occlusal view of the sutured graft.

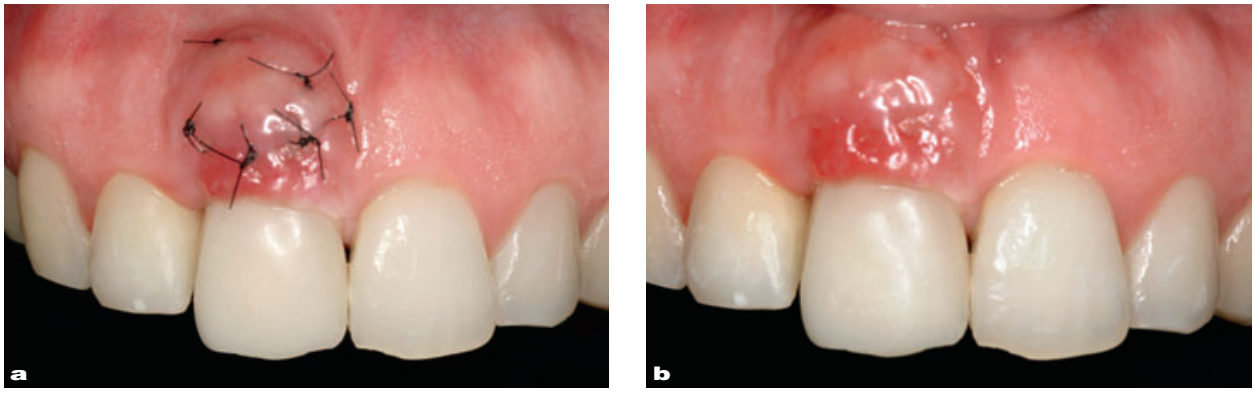

Fig 10 (a) Ten days follow-up. (b) Removal of stitches and healing. Provisional crown is temporarily cemented.

Fig 11 Healing 2 months after surgery. Note the high smile line and the bulky appearance of the grafting area.

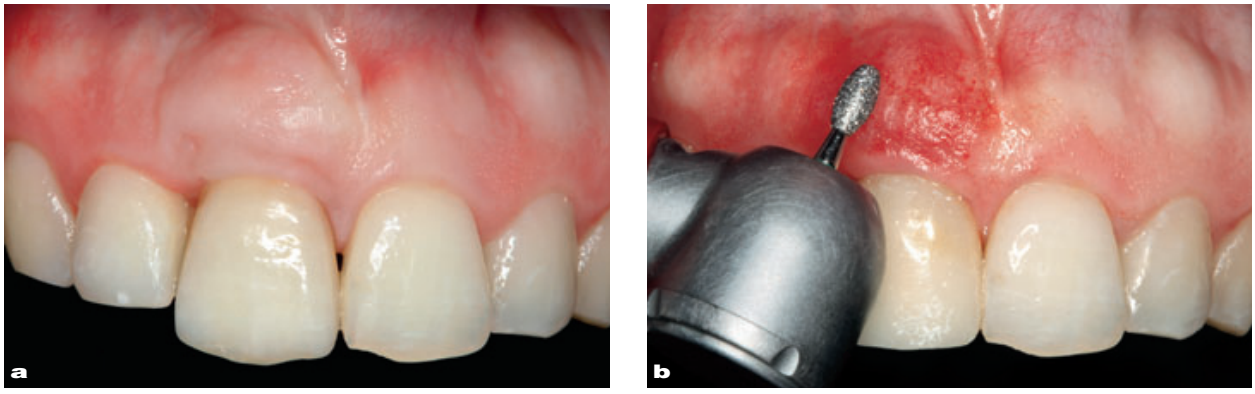

Fig 12 (a) Healing 12 months after the second surgery. (b) Gingivoplasty is proposed to reduce excessive contours in the grafting area.

sized 12 x 6 mm was harvested from the premolar region of the palate. With the help of horizontal mattress sutures, pulling from the more apical part of the pocket and also from the side, the graft was properly secured. The fenestration area was, in this occasion, sutured to avoid exposure of the connective tissue graft on the facial surface. Non-absorbable 6/0 monofilament suture was used (Fig 8). At the same event, the individual zirconium abutment was screwed, and a provisional immediate crown was temporarily cemented (Fig 9). This could be in agreement with several authors stating that removing the abutment and then reconnecting it at different times in the two-stage implant process produces alterations in the establishment of the integration of soft tissue, increasing the risk for marginal bone loss and soft tissue retraction.[13,23,24] Ten days later, the sutures were removed (Fig 10).

After a year of healing, the final crown was placed following standard protocol. During this follow-up time, regular

Fig 13 Healing 24 months after second surgery. Complete coverage of the fenestration.

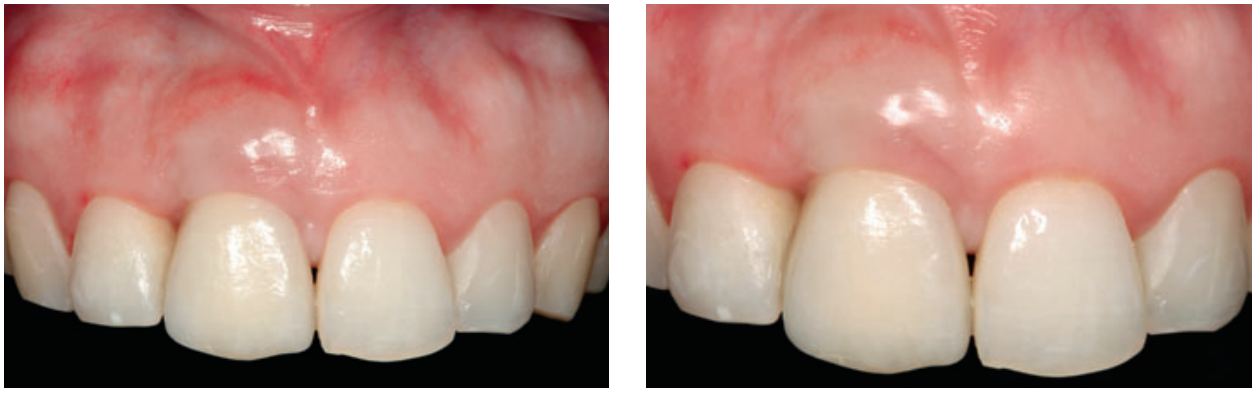

Fig 14 Definitive crown integrated in healthy gum with gingival margins leveled. Papillas were present.

hygiene appointments were scheduled to properly reinforce plaque control. Fenestration was fully covered (Fig 11). Moreover, in the vestibular area, the tissue looked thicker due to the grafting procedure and it was displayed when the patient smiled. A gingivoplasty of the graft area was proposed to obtain a more integrated result. Although the patient initially refused because she was happy even with the appearance, she finally agreed. A rotatory hand piece with a coarse fine diamond bur was used to improve soft tissue harmony and to obtain a natural look (Fig 12). The patient was included in an exhaustive maintenance program to continuously monitor the evolution of the treatment and to prevent reinfection. The case remained stable 2 years after the second grafting procedure (Figs 13 to 17). However, a longer follow-up would be interesting to assess the stability of the clinical outcome.

Fig 15 (a) Initial situation. High smile line showing the fenestration. (b) Final situation. High smile line showing the resolution of the fenestration 2 years after the first graft.

Fig 16 Intraoral image of the initial and final situation.

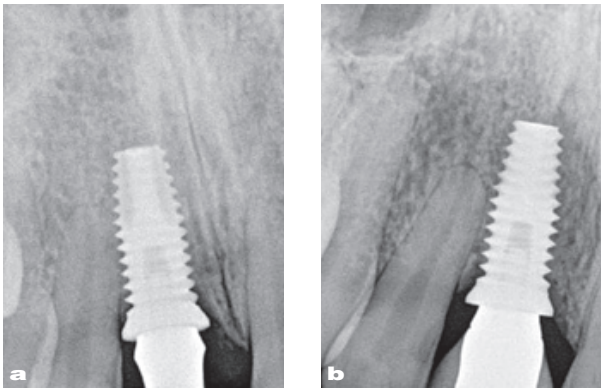

Fig 17 Final radiographic. (a) With decustomized zirconia final abutment. (b) Definitive crown.

Conclusion

Although implant fenestration is considered a difficult clinical situation, this case was successfully solved with peri-implant plastic surgery, avoiding the implant explantation and posterior placement of another narrow platform and palatally positioned implant. Mucogingival techniques in combination with the immediate final insertion of the prosthesis on the same day of the surgery seemed to help to improve the final esthetic result and stability of the procedure after a 2-year follow-up.

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