British Journal of Medicine & Medical Research

21(11): 1-7, 2017; Article no.BJMMR.33979
ISSN: 2231-0614, NLM ID: 101570965

Surgical and Prosthetic Approach for Oral Rehabilitation of Patient with Excessive Gingival Display and Gummy Smile

Romeu Felipe Elias Calixto[1], Frederico Bordini Chaves Faleiros[1], Eugênio Carlos Marangoni[1], Flávia Regina Machado de Medeiros[1], Amanda Fucci Wady[1] and André Gustavo Paleari[2*]

[1]University of Franca - UNIFRAN, Av. Dr. Armando Salles Oliveira, 201, Zip Code: 14404-600, Franca, SP, Brazil.
[2]Department of Restorative Dentistry, Alfenas Dental School, Federal University of Alfenas, UNIFAL-MG, Rua Gabriel Monteiro da Silva 700, Centro, Zip Code: 37.130-001, Alfenas, MG, Brazil.

Authors' contributions

This work was carried out in collaboration between all authors. Authors RFEC and ECM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors FBCF and FRMM managed the analyses of the study. Authors AFW and AGP managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/BJMMR/2017/33979
Editor(s):
(1) Ahmet Altan, Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Gaziosmanpasa University, Turkey.
Reviewers:
(1) Verica Pavlic, University of Banjaluka, Bosnia-Herzegovina.
(2) Luay Thanoon Younis, Universiti Teknologi MARA, Malaysia.
Complete Peer review History: http://www.sciencedomain.org/review-history/19324

Case Study

Received 7th May 2017
Accepted 31st May 2017
Published 3rd June 2017

ABSTRACT

Aims: The aim of this study is to describe the surgical and prosthetic approaches of oral rehabilitation of a partially edentulous patient with a vertical maxillary excess with excessive gingival display when smiling.
Presentation of Case: A 40-year-old female patient complaining of cosmetic dental problems reported to the School of Dentistry at Franca University (UNIFRAN). After a clinical examination and radiographic imaging, it was determined that the patient was partially edentulous with vertical maxillary excess with excessive gingival display when smiling. A diagnostic wax-up was performed to determine the ideal position of the anterior teeth in relation to proper oral posture at rest, to the

**Corresponding author: E-mail: andre.paleari@unifal-mg.edu.br*

smile line, and to the bone level. In light of the ideal position of the anterior teeth for reducing gingival display when smiling, it was decided to remove the remaining teeth and perform a maxillary ostectomy. After performing the pre-prosthetic surgery, six implants were installed in the remaining maxillary bone, and a provisional conventional complete denture was installed and left in position until the osseointegration period. Later, a complete arch fixed implant-supported prosthesis was manufactured, since the prosthesis–tissue junction was above to the high smile line.

Discussion and Conclusion: Pre-prosthetic ostectomy and treatment by means of a complete arch fixed implant-supported prosthesis produced an effective and predictable outcome, resulting in a very favorable esthetic and functional outcome for the patient.

Keywords: Prostheses and implants; maxillary ostectomy; smile.

1. INTRODUCTION

Improved surgical and prosthetic treatment protocols and simultaneous advancements in the development of new materials have resulted in the rise in popularity of maxillary complete arch fixed implant-supported prostheses [1]. Therefore, patients seeking this treatment are no long limited to older individuals, but are now patients from all age groups who exhibit specific characteristics such as excessive gingival display, discordant occlusal plane, different bone levels, and unfavorable jaw relationships [1,2].

All of these factors require that the dental surgeon make an adequate diagnosis of the oral conditions and carefully develop a treatment plan that will provide high quality rehabilitation for these patients, since most of them are willing to make a significant financial investment in their treatment and to manage the difficulties in oral hygiene and the possible maintenance complications of fixed implant-supported prostheses [1,2].

Candidates for maxillary fixed arch implant-supported prostheses can be divided into four categories in terms of the design of a maxillary prosthesis [2]. Class I patients require a gingival prosthesis for adequate tooth proportion, prosthesis contour, and lip support. Class II patients require gingival prostheses for adequate tooth proportion and prosthesis contour. Class III patients do not require gingival prostheses. All of these patient groups are characterized by a low or medium smile. However, the patients who belong to Class IV are unique in that they have a high smile or excessive gingival display when smiling.

Excessive gingival display, also known as “gummy smile,” is characterized by excessive display of the maxillary gingival while smiling and is commonly found in the general population [3,4]. Tijan et al. [5] found that, in a sample of more than 450 adults between 20 and 30 years of age, 7% of men and 14% of women presented with excessive gingival display.

Various etiologies can be associated with excessive gingival display when smiling, and they include extraoral and intraoral causes. Some extraoral causes of excessive gingival display are vertical maxillary excess, hypermobile upper lip, or a short upper lip [5,6].

Pre-prosthetic surgery and specially customized prostheses are provided according to the results obtained from initial interventions. These cases are very challenging and require special care during oral rehabilitation so that the desired clinical objectives can be met.

The purpose of this article is to describe the surgical and prosthetic approach to oral rehabilitation in a patient who presented with vertical maxillary excess with excessive gingival display when smiling (Class IV), in whom a maxillary segmental ostectomy was performed followed by a complete arch fixed implant-supported prosthesis.

2. PRESENTATION OF CASE

Patient known as VM, a 40-year-old female, reported to the Implant Specialization Clinic at Franca University (UNIFRAN), Franca - SP, Brazil. The patient complained of missing anterior and posterior teeth and of being unsatisfied with her smile (Fig. 1). After an examination and radiographic imaging, it was determined that the superior arch including teeth 6, 8, 9 and 11 only. The inferior arch included all teeth, with the exception of the molars. During the extraoral examination, it was determined that the patient had vertical maxillary excess, which resulted in excessive gingival display when

smiling and absence of lip seal at rest (Figs. 2 and 3).

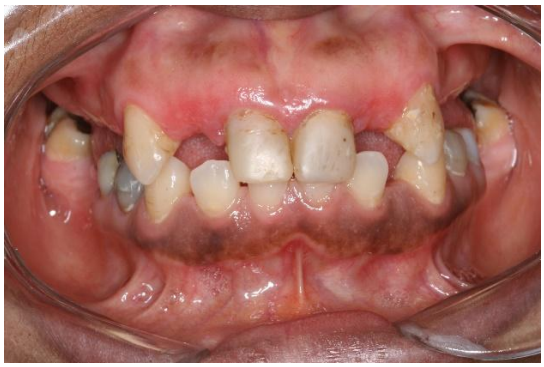

Fig. 1. Intraoral view of the patient

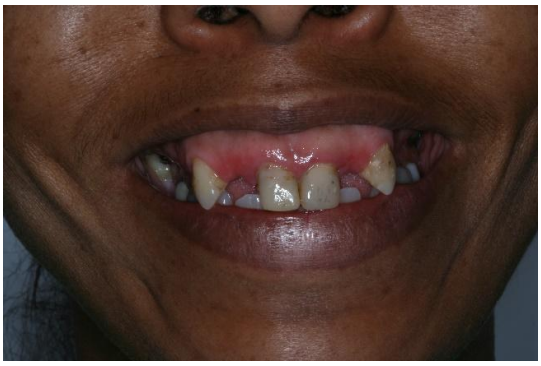

Fig. 2. Patient smile showing excessive gingival display

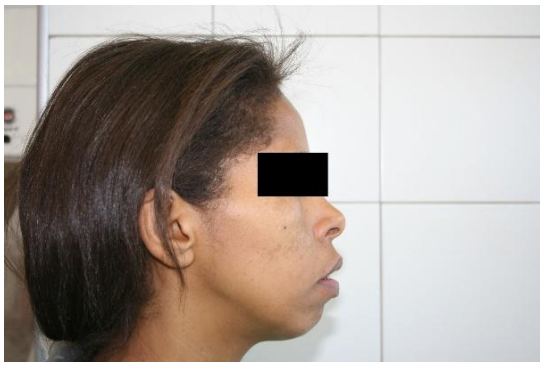

Fig. 3. Patient at rest: Absence of lip seal

Given the case of vertical maxillary excess, maxillary impaction orthognathic surgery (LeFort I) was proposed. This way, we could also obtain maxillomandibular counter-clockwise rotation and mandibular advancement, and, in doing so, improve the anterior, posterior, and vertical harmony of the face. However, the patient rejected this option due to the time spent between orthodontic preparations and the final surgery. She also appeared scared of the possibility of having hospital-level surgeries and of the postoperative symptoms she would have to face.

Because of this, an extraction of the upper teeth following a maxillary segmental ostectomy to diminish gingival display when smiling was planned. A complete arch fixed implant-supported prosthesis was planned as a type of rehabilitation to be installed over the implants.

After the patient's agreement and acceptance, a written informed consent was assigned and the clinical procedures were initiated with an impression of the superior and inferior arches using a polydimethylsiloxane (Zhermarck, Zetaplus, Badia Polesine, Italy). This was followed by recordings of the intermaxillary relationships and the tests with the teeth in the edentulous spaces to obtain the diagnosis and therefore determine the bone height that should be removed during surgery. The height was marked and initially removed from the cast from which a provisional complete denture was made to be used immediately after surgery and during the osseointegration period.

Maxillary nerve block techniques involving the infraorbital nerve, the greater palatine nerve, and incisive nerve with local anesthesia (4% articaine at 1:100.00) were applied (Articaíne, Nova DFL Indústria e Comércio S.A, Rio de Janeiro, Brazil). After elevation the mucoperiosteal tissue from the buccal and palatine surfaces, the remaining upper teeth were extracted (Fig. 4). Next, a ruler was used to measure the bone height to be removed (Fig. 5) so that the ostectomy, in which a micro reciprocating saw was used, could be performed at the height indicated (Figs. 6 and 7).

After these procedures, the bone was regularized with a handpiece and a Maxicut drill under constant irrigation. Six maxillary implants (5 Alvin CM; 1 Titamax EX – Neodent, Curitiba, Paraná, Brazil) were then installed on the region of the teeth 3, 5, 8, 9,12 and 14 (Fig. 8). After the implants were installed, sutures were placed using nylon 4.0 suture thread (Fig. 9). After the suturing, a provisional conventional complete denture was immediately installed with a tissue conditioner (Dentusoft; Densell; Buenos Aires, Argentina).

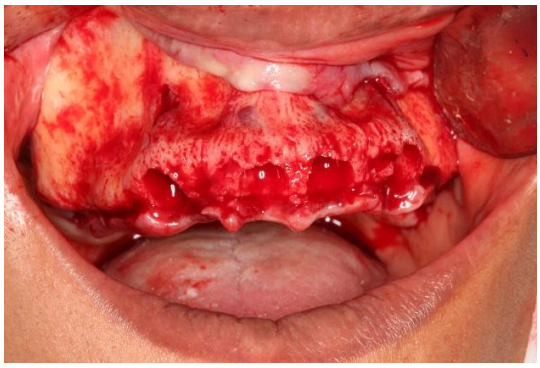

Fig. 4. Alveolar bone after the extraction of the upper teeth

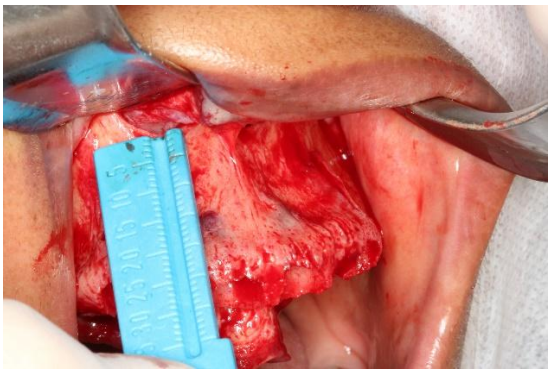

Fig. 5. Measurements of the bone height to be removed

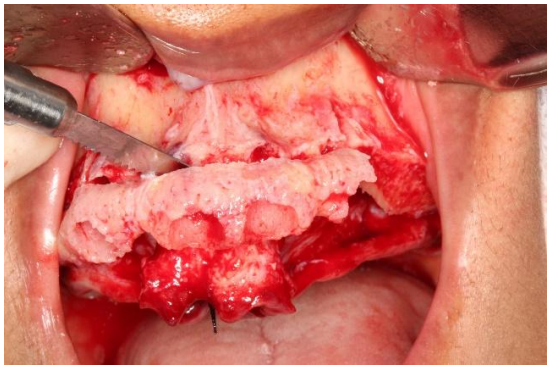

Fig. 6. Ostectomy being performed using a micro reciprocating saw

The postoperative medication prescribed was Nimesulide (100 mg every 12 hours for 3 days), Metamizole (500 mg every 6 hours as needed for pain) and Amoxicillin (500 mg every 8 hours for 7 days). The sutures were removed 15 days after surgery. Occlusal adjustments and relining of the prosthesis of the superior arch were also performed.

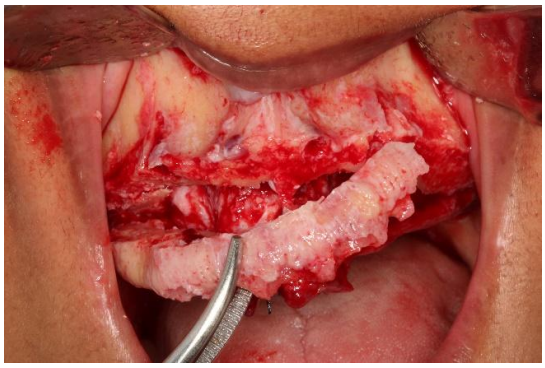

Fig. 7. Bone segment removed after section

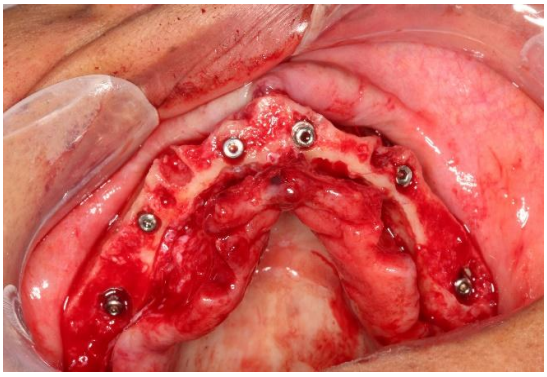

Fig. 8. Implants installed after ridge regularization

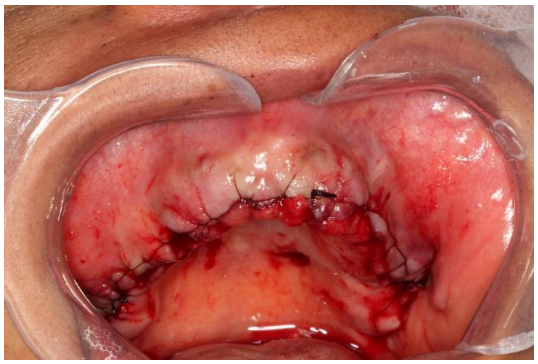

Fig. 9. Sutures placed after the surgical procedure

After the osseointegration period (six months) of the implants (Fig. 10), installation of the healing caps, new sutures with nylon 4.0 suture thread, and new relining of the provisional complete denture were all performed. Seven days after these procedures were carried out, the sutures were removed, and the procedures to manufacture the definitive arch fixed implant-supported prosthesis began. Transmucosal

abutments (Mini pillars, Neodent, Curitiba, Brazil) were installed and later impressed using a multifunctional guide and polyvinilsiloxane. After the impression was obtained and the semi-adjustable articulator was assembled, a metal framework was manufactured to be placed on it and artificial teeth were also assembled in accordance with the multifunctional guide parameters.

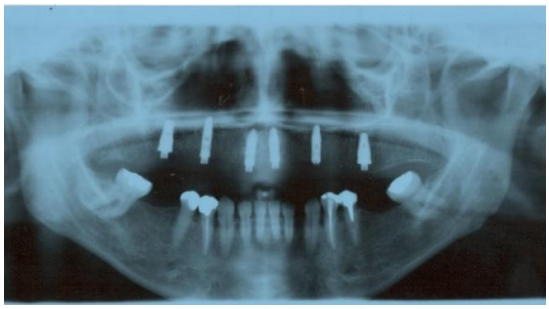

Fig. 10. Panoramic radiograph after the osseointegration period

Next, the clinical tests for the prosthesis were performed, as were esthetic evaluations, metric tests, and phonetic tests to verify harmony in the intermaxillary relations. After approval from the patient and the surgeons involved, the prosthesis was polymerized and installed (Fig. 11). Significant improvement was noted in the patient's facial profile (Fig. 12), as were harmony in the lower third of the face, proper oral rest posture, and an improvement in the appearance of her smile (Fig. 13). Patient follow up has been ongoing for one year at the Implant Specialization Clinic at Franca University (UNIFRAN), and she is very satisfied with the treatment provided.

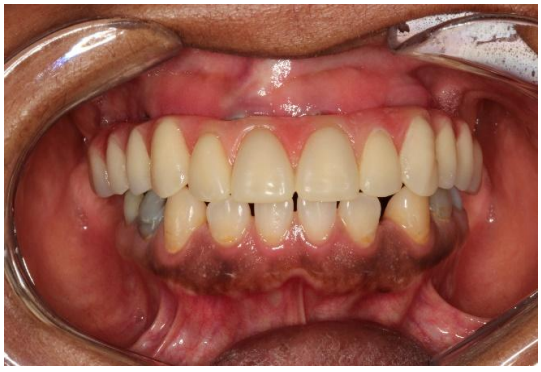

Fig. 11. Complete arch fixed implant-supported prosthesis immediately after its installation

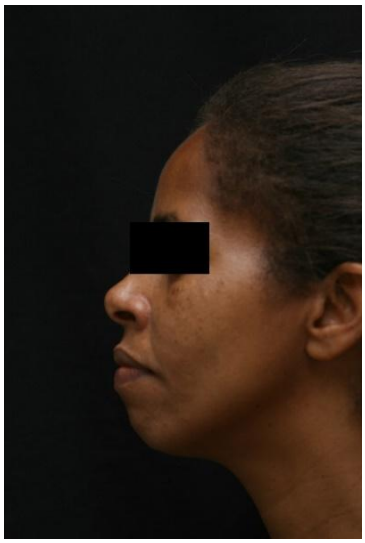

Fig. 12. Patient at rest: Proper oral posture

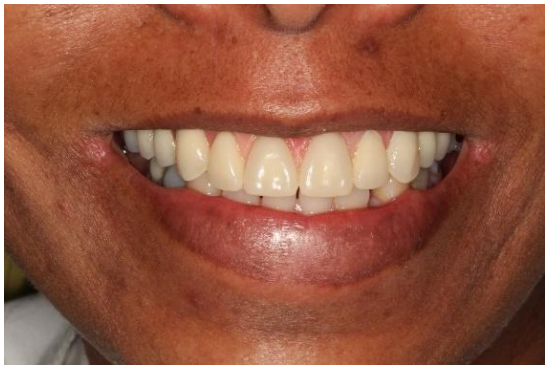

Fig. 13. Patient smile after treatment

3. DISCUSSION

Patients who present with excessive gingival display and/or vertical maxillary excess are in need of special care for a fixed implant-supported prostheses treatment. First, it is fundamental that an appropriate diagnosis be made based on the principles of conventional complete dentures. The ideal position of maxillary incisors should be previously determined by a diagnostic wax-up, which should be performed with the aid of record bases [2]. It is fundamental that the prosthesis–tissue junction not be visible during the maximum smile. In this clinical case, the ideal position of the anterior teeth was determined with the aid of a record base, as described, which allowed for the bone height necessary for the ostectomy to be determined.

Bidra et al. [2] used a classification system of patients for esthetic fixed implant-supported prostheses in the edentulous maxilla. They categorized maxillary fixed implant-supported prosthesis into 4 groups. Class IV patients have a high smile or excessive gingival display. Pre-prosthetic treatments that can be used on Class IV patients prior to rehabilitation are ostectomy procedures, LeFort I osteotomy, orthodontic intrusion, and plastic surgery [1]. If the option is to avoid any type of pre-prosthetic surgical intervention, then the possibilities would be the use of prostheses without gingival reconstruction or the use of completely or partially removable prostheses.

In this case, an ostectomy was performed using a micro reciprocating saw to remove the vertical maxillary excess, thus creating a platform for implant installation at the appropriate height. This procedure is in accordance with Jensen et al. [7], who states that, in cases such as the one described here, an ostectomy must be performed in such a way that the bone platform is superior to the apical position of the upper lip during the maximum smile before implant installation. The authors [7] also state that the bone platform should have an adequate width and sufficient height for implant installation without invading the nasal floor or the maxillary sinus. Bidra et al. [1] state that, depending on the extent of gingival display and prosthetic plan, an ostectomy can be performed in the maxillary anterior region, and the posterior region can be treated with a fixed prosthesis without artificial gingiva.

The use of the LeFort I osteotomy to correct excessive gingival display in an edentulous patient was also reported by Massad et al. [8]. The procedure involved surgical maxillary impaction followed by mandibular and posterior autorotation and new conventional complete dentures. Although prosthetic rehabilitation was not a fixed implant-supported prosthesis as in the present case, the same approach is recommended. The purpose is always to ensure that the LeFort osteotomy can position the upper bone platform to the most apical position of the lip to avoid displaying the prosthesis–tissue junction. This treatment option was presented to the patient, but she refused to receive it.

Given the pre-prosthetic solutions for this case, there was the possibility to treat the patient using a complete fixed implant-supported prosthesis without artificial gingiva or a traditional, complete arch fixed implant-supported prostheses with artificial gingiva. Bidra et al. [2] state that rehabilitation of young patients with a complete fixed prosthesis without gingival tissue is a significant challenge. This difficulty is largely due to obtaining interdental papilla between two implants or between an implant and a bridge [9,10].

In this clinical case, we noted that the ostectomy contributed to reducing the vertical maxillary excess as well as gingival display when smiling. However, it should be noted that the prosthesis–tissue junction would have been visible during the maximum smile if we had opted to use a complete fixed implant-supported prosthesis without artificial gingiva. Therefore, we chose to manufacture the complete arch fixed implant-supported prostheses with artificial gingiva, which allowed for the interface to be masked and which guaranteed better esthetic predictability for the patient.

4. CONCLUSION

Given the limitations of the clinical case in question, it was concluded that pre-prosthetic ostectomy and treatment using a complete arch fixed implant-supported prosthesis resulted an effective and predictable resolution, including a very favorable esthetic and functional outcome for the patient.

CONSENT

All authors declare that written informed consent was obtained from the patient (or other approved parties) for publication of this paper and accompanying images.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Bidra AS, Agar JR, Parel SM. Management of patients with excessive gingival display for maxillary complete arch fixed implant-supported prostheses. J Prosthet Dent. 2012;108:324-31.

2. Bidra AS, Agar JR. A classification system of patients for esthetic fixed implant-supported prostheses in the edentulous maxilla. Com pend Contin Educ Dent. 2010;31:366-79.
3. Baek ES, Hwang S, Kim KH, Chung CJ. Total intrusion and distalization of the maxillary arch to improve smile esthetics. Korean J Orthod. 2017;47:59-73.
4. Humayun N, Kolhatkar S, Souiyas J, Bhola M. Mucosal coronally positioned flap for the management of excessive gingival display in the presence of hypermobility of the upper lip and vertical maxillary excess: A case report. J Periodontol. 2010; 81:1858-63.
5. Tjan AH, Miller GD, The JG. Some esthetic factors in a smile. J Prosthet Dent. 1984; 51:24-28.
6. Robbins JW. Differential diagnosis and treatment of excess gingival display. Pract Periodontics Aesthet Dent. 1999;11:265-72.
7. Jensen OT, Adams MW, Cottam JR, Parel SM, Phillips WR 3rd. The All-on-4 shelf: maxilla. J Oral Maxillofac Surg 2010;68: 2520-27.
8. Massad JJ, Brannin DE, Goljan KR. Gingival smile enhancement for the edentulous patient by using a LeFort I osteotomy. J Prosthet Dent. 1991;66:151-54.
9. Pradeep AR, Karthikeyan BV. Peri-implant papilla reconstruction: Realities and limitations. J Periodontol 2006;77:534-44.
10. Tarnow D, Elian N, Fletcher P, Froum S, Magner A, Cho SC, et al. Vertical distance from the crest of bone to the height of the interproximal papilla between adjacente implants. J Periodontol. 2003; 74:1785-88.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/19324