



RESEARCH ARTICLE

ESTHETIC AND FUNCTIONAL MANAGEMENT OF INSUFFICIENT PROTHETIC SPACE USING A GUIDED OSTEOPLASTY APPROACH

*Oubbaih, A. and Bellemkhannate, S.

Resident Doctor, Service of Removable Prosthesis, Faculty of Dentistry, Casablanca, Morocco

ARTICLE INFO

Article History:

Received 08th November, 2018
Received in revised form
11th December, 2018
Accepted 03rd January, 2019
Published online 28th February, 2019

Keywords:

Total edentulous,
Pre-prosthetic surgery,
Aesthetic.

Copyright © 2019, Oubbaih and Bellemkhannate. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

A prominent osteomucosal ridge with a high smile line in the complete edentulous patient should not escape our vigilance during the clinical examination, as it may compromise the aesthetic result of prosthetic rehabilitation. This prominence will create insufficient prosthetic space, which makes it difficult or even impossible to assemble the anterior teeth. The aesthetic problem becomes even more complicated in the case of asymmetry of the osteomucosal defect. In such a situation, pre-prosthetic surgery is required. We will illustrate the management of such a similar clinical case, by proposing an appropriate therapeutic approach for better aesthetic and occlusive-functional result.

INTRODUCTION

The remodeling and resorption process after teeth extraction lead to bone loss (6). The greatest resorption occurs during the first year following the loss of teeth. Thereafter, the vertical alveolar loss reaches the maxillary alveolar process, it is estimated at 0.1 mm per year and sometimes even 0.5 mm per year (10). In total edentulous patients, there are large individual variations in bone ridges often with irregular architecture that is either atrophied or enlarged depending on the anatomical sites. This makes prosthetic rehabilitation more delicate and the upper anterior teeth assembly impossible when it concerns the anterior maxillary area. These bone changes can be explained first, by uncompensated extractions that induce the antagonistic teeth to regress with their periodontium, which can later create an enlarged ridge that is highly visible in the patient's smile; or by the asynchronism of dental extractions, causing delayed, anarchic and asymmetric bone resorption patterns. This situation is similar to the combined syndrome described by Kelley, which is characterized by resorption of the alveolar bone in the weakest area of the upper arch, namely the region of the anterior teeth, a process accentuated by the occlusal stress exerted by the anterior mandibular teeth (7). A highly visible hypertrophied ridge at the patient's smile compromises the management of the occlusion plan and sometimes the prosthetic space. The treatment of this type of edentulous situation remains a real biological and technical challenge.

The management of these situation may require pre-prosthetic surgery which may be more delicate in patients with an altered general condition (2). Pre-prosthetic surgery will be indicated whenever it is likely to improve local structures for total prostheses and it requires the application of rigorous protocols to achieve good results. (8)

Clinical Case

We report a case of a prominent and asymmetric anteromaxillary ridge. A 54-year-old patient with balanced type I diabetes, under insulin treatment, consulted for a prosthetic rehabilitation. Clinical examination revealed total edentulous jaw with an irregular and enlarged anterior ridge of greater vertical height on the left side, adherent mucous fibrosis, shallow palate, conjunctival hypertrophy of the left tuberosity and atrophy of the right side (Fig1a, b).

A subtotal edentulism at the mandible with 3 residual teeth, 34, 43 and 44, very extruded, with a gingival recession of 3 mm and a mobility degree 2 of both premolars according to the MUELLMANN classification (Fig1c). Clinical analysis revealed, an extreme difference in the degree of resorption at the maxillary ridge, which is very accentuated on the side where the antagonistic teeth 43, 44 persist. The resorption process is accentuated by the occlusal stress exerted by these teeth. During the smile, the anterior osteomucosal ridge is very visible, which disrupts the situation of the future occlusion plane and reveals an insufficient prosthetic space for successful aesthetic outcomes (Fig3a,b). The radiological examination

*Corresponding author: Oubbaih, A.

Resident Doctor, Service of Removable Prosthesis, Faculty of Dentistry, Casablanca, Morocco

completes the clinical one and reveals the presence of an impacted canine tooth that is erupting (Fig. 2).



(a)



(b)



(c)

Figure 1. (a,b) : hypertrophy of the maxillary ridge on the left side c: 34, 44, 43: teeth with gingival recession from 1 to 3 mm



Figure 2. Radiological examination revealing the presence of an impacted mandibular canine tooth

Pre-prosthetic study

Study impressions were taken, and the models derived from these impressions were mounted on articulators according to a clinically validated vertical occlusion dimension. The analysis of the articulator models confirmed our clinical diagnosis of a very small prosthetic space requiring surgical intervention to improve the local conditions of the prosthesis insertion (Fig 4).



(a)



(b)

Figure 3. Smile analysis (a: light smile, b: large smile)



Figure 4. Insufficient prosthetic space for placing anteromaxillary teeth

Therapeutic decision

To obtain a favourable environment for making a conventional bimaxillary complete prosthesis, it was decided to perform a larger resection of the maxillary bone ridge in the left quadrant. As for the mandible, we considered the extraction of the residual teeth given their unfavourable prognosis; including the canine tooth impacted, to avoid any subsequent prosthetic discomfort. The avulsion of the residual teeth and the reduction of the maxillary alveolar ridge considerably widen the space

for the adjustment of the new occlusion plan. It remains to determine the osteotomy value necessary for a better aesthetic result. For this reason, we have evaluated the quantity of bone to be resected using a graduated ruler placed under the upper lip against the anterior ridge (lips at rest). This height has been estimated at 5 mm, this area to be eliminated has been delimited on the arch model on which a silicone key has been made first to guide its correction (Fig 6, 7). On the corrected model, a transparent resin surgical guide was made to lead the surgical resection.



Figure 5. Value assessment of reduction estimated at 5 mm



Figure 6. Delimitation of the area to be reduced on the model



Figure 7. Silicone key on the model to be corrected

Pre-prosthetic surgery

Pre-prosthetic surgery must always be preceded by a general examination properly conducted to identify all the pathological processes that may compromise the desired result (diabetes,

cardiovascular diseases, etc.) (5). In the present case, we revealed that the patient is a type I diabetic under insulin treatment. Surgical management of diabetic patients requires a specific clinical approach to identify the type of diabetes, evaluate the degree of metabolic control and take into consideration the different precautions in collaboration with a diabetologist. After the extraction of the residual teeth, the patient underwent two time surgical procedures. First, the extraction of the impacted tooth, then the maxillary osteoplasty. Both surgeries were performed in the service of surgical pathology according to the Protocol:

General precautions

In order to have an appropriate glucose level during the procedure, the intervention is scheduled in the morning. This time concurs with 2 hours after the insulin injection (the peak activity). Care was also taken to ensure that the patient ate properly before the appointment to avoid any risk of hypoglycemic discomfort.

Precautions regarding stress

Our patient being very anxious, we proceeded with a premedication with Atarax ®. Indeed, because of the stimulating effect of stress on the production of adrenaline and cortisol, which are hyperglycemic, it seems appropriate to perform sedation if the patient seems anxious. Possibly, a change in insulin dosage may be considered by the attending physician in the event of very high physiological and/or psychological stress (9).

Precautions during anaesthesia

Provided that low concentrations are chosen, the use of vasoconstrictors in anesthetic products is not contraindicated. However, it seems desirable to use the lowest dosages so as not to overly aggravate existing vascular disturbances.

Precautions regarding the risk of infection

The diabetes is an important risk factor in the development of infection after surgery. It may delay wound healing, especially if the pathology is poorly or uncontrolled. Thus, preventive and therapeutic measures were taken (3). The patient, although balanced, antibiotic prophylaxis was administered in view of the planned invasive surgery, which began within one hour before the procedure and continued for 7 days after the procedure.

Bone resection controlled by the surgical guide

Bone resection was performed after a scalpel incision and mucosal elevation flap to provide good visibility of the bone relief. The excess of bone was first cut with a bone cutter under abundant irrigation of saline solution and then regularized with a gouge forceps under the control of the surgical guide. The finishing is done with bone rape. The mucosa is brought together edge to edge and any excess was removed. Non-resorbable sutures are used due to delayed healing (Fig 8, 11). Sutures were removed eight days after the procedure due to the lack of temporary prostheses; the surgical guide was used during the healing period to guide it and to contain post-operative oedema.



Figure 8. Delimitation of the bone block to be removed

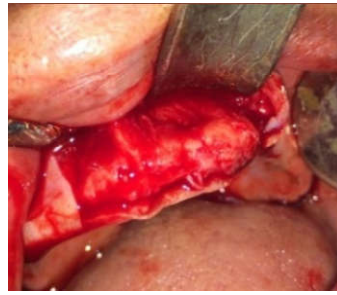


Figure 9. Ridge after reduction

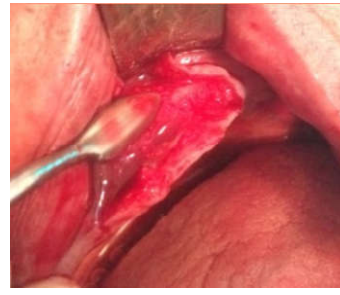


Figure 10. Regularization with a bone rasp



Figure 11. Checking the reduced height with the surgical guide

Healing and delay phase



Figure 12. Surgical site after suture



Figure 13. Surgical guide filled with retard resin (Fitt de Kerr) used for healing control



Figure 14. Surgical site after 1 week



Figure 15. Surgical site after 2 weeks

Result of the surgery

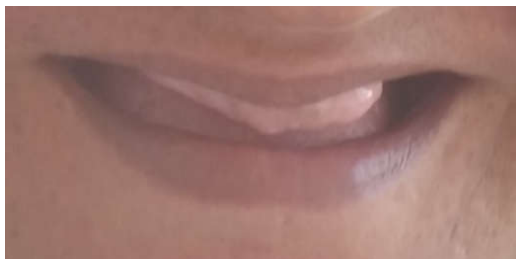


Figure 16. a: before surgery, b: after

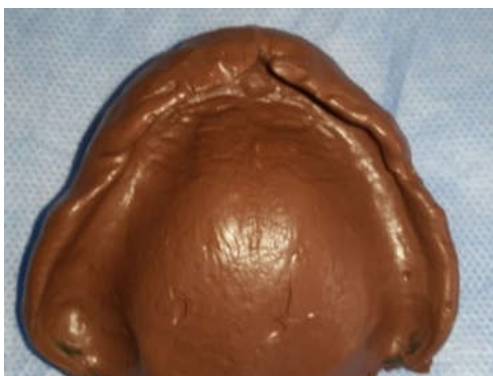


Figure 17. Maxillary secondary impression with Permlastic regular®



Figure 18. Impregum® mandibular secondary impression



Figure 19. Aesthetic result

Prosthetic phase

The final prosthetic treatment is started after 3 weeks of provisionalization. This treatment consisted of a conventional bimaxillary complete prosthesis. After recharging with KERR® maxillary and mandibular paste, an anatomical-

functional impression was taken with Permlastic Regular® on the maxilla and Impregum® on the mandible (Fig17, 18). The occlusion models from the secondary impression allowed the adjustment of an adequate and smooth occlusion plane after the improvement of anatomical conditions and inter-maxillary relationships. The centric relation is performed appropriately to

the patient's vertical dimension. Regular follow-up was ensured for a better psychological and functional integration of the new prosthesis (Fig 19).

DISCUSSION

The sudden change from a subtotal to a total edentulism without immediate prosthetic rehabilitation causes a differential in the degree of ridge resorption within the same arch. The duration of uncompensated edentulism influences the degree of bone resorption. A complete prosthesis that is well adjusted and integrated into its anatomical-functional environment through the forces it absorbs generates a bio-stimulation of bone cells, thus maintaining the balance between resorption and apposition and preventing asymmetries of osteomucous ridges. According to Tolstunov (2007), occlusal pressure exerted by solid teeth on toothless regions of the alveolar ridge could cause small, moderate or even marked changes (atrophy/hypertrophy) in the toothless region of the alveolar ridge. These bone reactions are in accordance with Wolff's (1892) theory that "bone adapts its external shape and internal structure in response to mechanical stresses" (11). The use of osteoplasty after pre-prosthetic analysis, thus allowing an adequate estimate of the amount of bone to be resected, avoids any unwanted and aggressive surgical procedure that may sacrifice the patient's bone capital (4). The present case, is a complex situation, explained by the long duration of edentulism, more than 3 years without prosthesis. In addition the persistence of a few antagonistic mandibular teeth increased the extent bone resorption process asymmetrically. The effect of daily microtrauma, promoting the regression of the anterior mandibular area with hypertrophy of the adjacent maxillary ridge this made the prosthetic environment similar to a Kelly's syndrome. Regarding the general conditions of the patient, we chose a conservative and codified surgical protocol. Our therapeutic approach consists of a bone osteotomy at the left anteromaxillary ridge using a surgical guide designed after a pre-prosthetic study, thus allowing a good aesthetic and functional prosthetic integration.

Conclusion

The purpose of pre-prosthetic surgery is to give the complete prosthesis a better fit and to allow patients to adapt faster and better to their prosthesis.

However, it must always be justified by a pre-prosthetic, economical study and preceded by a general examination properly conducted in order to adapt the management protocol to each clinical situation.

REFERENCES

- Bassetti R, Bassetti M, Kremer U, Mericske-Stern R: Le «syndrome combiné» existe-t-il? *Rev Mens Suisse Odontostomatol* Vol. 120 9/2010
- Davarpanah M, Rajzbaum P, Demurashvili G, Szmukler-Moncler S: L'édenté total au sourire gingival. *Inf Dent* 2015; 33: 2-8.
- Drouri S, Lahlou Kh, El Ouazzani A: Diabète et thérapeutiques endodontiques. *Le courrier du dentiste*. Avril 2014
- Geramipannah F, Sadighpour L, Hendi A: Management of limited Interocclusal Distance With the Aid of the modified Surgical Guide: A clinical Report. *J dent (Tehran) Mars* 2017; 14(2): 105-108.
- Jivraj S, Chee W, Corrado P: Treatment planning of the edentulous maxilla. *British Dental Journal* Sep 2006; 201: 261-271
- Korunoska Stevkovska V, Guguvcevski L, Menceva Z, Gigovski N, Mijoska A, Nikolovska J, Bajraktarova-valjakova E : Prosthodontic Rehabilitation of Patient with anterior hyper function syndrome. *Open Access Maced J med Sci* 2017; 5(7): 1000-1004
- Rajendran S, Baburajan: Combination syndrome (review article). *(IJOPRD) international journal of prosthodontics and Restorative Dentistry* 2012; 2(4): 156-160.
- Regragui A, Sefrioui A, Merzouk N, Berrada S: Hypertrophie osseuse buccale chez l'édenté complet: une fatalité à contourner! *AOS* 2016; 275: 1-7.
- Taisse. S, Benyahya. I. Diabète et odontologie. *Le courrier du dentiste*. Novembre 2000
- Tallgren A. The continuing reduction of the residual alveolar ridges in complete denture wearers: a mixed-longitudinal study covering 25 years. *J Prosth Dent* 1972;27(2):120-132.
- Tolstunov L: Combination syndrome: classification and case report. *J Oral Implantol*. 2007;33(3):139-51.
