

Single Maxillary Complete Denture: Particularities and Treatment Considerations

Rahma Bounaouara, Oumaima Tayari, Lamia Mansour, and Jamila Jaouadi

ABSTRACT

The prosthetic restoration of a unimaxillary edentulous arch is a complex treatment and a challenging clinical situation. This type of edentulous is more frequently encountered in the maxilla than in the mandible. It is opposed to a natural dentition, that can be the origin of aesthetic, occlusal and biological problems affecting the integration of the future prosthesis. Achieving harmonious occlusal plane and obtaining occlusal balance and aesthetic satisfaction of the patient are the principal objectives of the treatment. The practitioner must perform a reasoned analysis of the clinical case, detect the existing difficulties, and establish a strategy of adapted treatment. This article aim's is to present, through two clinical cases, the particularities of this type of edentulism, and the therapeutic approach for the management of the aesthetic and functional difficulties.

Keywords: Aesthetics, balanced occlusion, occlusal plane, satisfaction, single complete denture.

Published Online: January 23, 2023

ISSN: 2684-4443

DOI:10.24018/ejdent.2023.4.1.240

R. Bounaouara*

Research Laboratory LR12ES10,
Faculty of Dental Medicine, University
of Monastir, Monastir, Tunisia.
(e-mail:

rahma.bounaouara.11@gmail.com)

O. Tayari

Research Laboratory LR12ES11,
Faculty of Dental Medicine, University
of Monastir, Monastir, Tunisia.
(e-mail: oumaimatayari0@gmail.com)

L. Mansour

Research Laboratory LR12ES10,
Faculty of Dental Medicine, University
of Monastir, Monastir, Tunisia.
(e-mail: mansourlamia64@yahoo.fr)

J. Jaouadi

Research Laboratory LR12ES11,
Faculty of Dental Medicine, University
of Monastir, Monastir, Tunisia.
(e-mail: jamilajaouadi2@gmail.com)

**Corresponding Author*

I. INTRODUCTION

A Single Complete Denture (SCD) opposing natural dentition is a challenging clinical situation. Several difficulties are encountered due to fixed position of the opposing natural teeth, as the difficulty to obtain an occlusal balance and to achieve a satisfactory esthetics [1]-[3].

But often, practitioners, think only of restoring the edentulous arch without considering these multiple pitfalls that cause a variety of problems with the future prosthesis including instability, mucosal inflammation, pain, bone resorption, frequent prosthesis fracture and ultimately leading to patient's dissatisfaction [2].

According to [4], there is an imbalance between the extent of the surface developed by the roots of the teeth of each arch and the mucosal support surfaces".

In fact, obtaining the balance between the unimaxillary prosthesis and the antagonist teeth requires on the one hand, a good impression to guarantee the tissue integration of the future prosthesis and respecting an equitable occlusal schema: balanced occlusion, on the other hand. For the latter, it was sometimes necessary to make rectifications to the natural teeth [5].

Thus, the success of a complete unimaxillary restoration requires the rigorous clinical and radiographic observation

and pre-prosthetic analysis (clinical assessment of tissues and residual teeth, occlusal analysis on articulator) [5]. Various oral situations can exist in the opposing arch: partial edentulism, attrition, or supra-eruption of teeth [2].

This article illustrates, through two clinical cases, the therapeutic approach for the management of the aesthetic and functional difficulties in this type of treatment.

II. CASE REPORT N 1

A 60-year-old patient, with a good general health was presented to the consultation of the department of complete removable denture at the Dental Monastir. The patient complained about the mobility of the maxillary teeth and wanted a prosthetic rehabilitation with a major aesthetic demand.

The extra oral examination showed an asymmetry of the face and a flat inferior profile (Fig 1a and 1b).

In the intraoral examination, (Fig. 2a) the patient had a unilateral terminal maxillary edentulism bordered by the 13, and two ceramic-metal bridges. The anterior one has a defective dento-prosthetic joint with a degree 3 mobility and a gingival inflammation of the supporting teeth.

In the mandibular arch, (Fig. 2b) all the teeth are present except the 36. The radiographic examination (Fig. 2d)

revealed an important resorption of the bone support of all the maxillary teeth. Therefore, the prosthetic decision was to extract all the maxillary teeth and to indicate an immediate total maxillary prosthesis in order to satisfy the patient aesthetic requirement.



Fig. 1. Extra oral view; a) Front view b) Profile view.

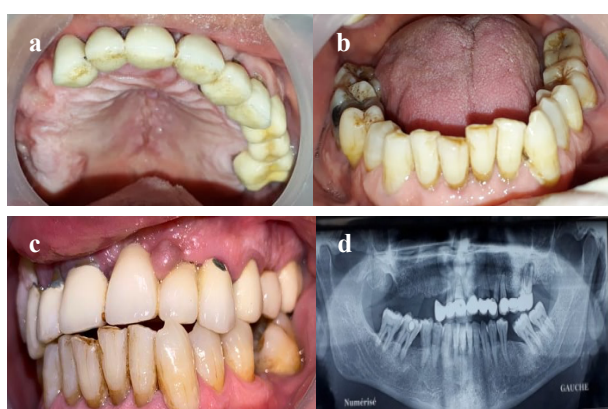


Fig 2. Pre -operative figures; a) Pre-treatment maxillary occlusal view, b) Pre-treatment mandibular occlusal view, c) Occlusal maxillo-mandibular relationship, d) Pre operative panoramic radiograph.

A. Primary Impression

Small quantity of high viscosity silicone was placed on the undercut areas of the maxillary teeth in order to avoid the adhesion of the impression material, which could further mobilize the residual teeth or even risk their premature extraction. After the select and rectification of the impression tray, the primary impression was made with Alginate. A conventional impression with alginate was made for the mandibular arch (Fig. 3a, 3b, and 3c).

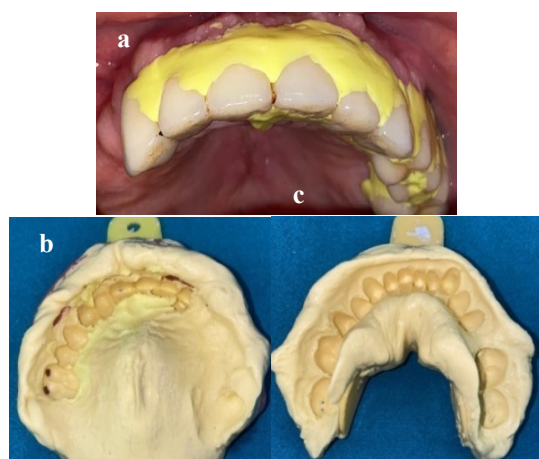


Fig. 3. Primary impression: a) High viscosity silicone without catalyst placed on the undercut teeth areas, b) Maxillary primary impression, c) Mandibular primary impression.

B. Secondary Impression

An individual impression tray was made with self-curing resin using the cast derived from the pouring of conventional primary impression. The peripheral joint was made. Then, maxillary secondary impression was taken under digital pressure with polysulfide (Fig 4).



Fig. 4. Maxillary secondary impression.

C. Occlusal Bite Registration

The stability of the occlusal base was checked. It should be spaced from the residual teeth (Fig. 5a).

The intermaxillary relationships on the occlusal vertical dimension (OVD) and centric Relation (CR) was determined then secondary casts were mounted on a semi-adaptable articulator (Fig. 5b).



Fig. 5. Occlusal Bite registration; a) Verification of the stability of the occlusal base, b) Casts mounted on a semi-adaptable articulator.

D. Mounting of Teeth

For our patient we chose to not start with the extraction of the posterior teeth to avoid the risk of mobilizing the anterior bridge during luxation. That's why, all maxillary teeth were extracted in one step.

After mounting and trying-in of the posterior teeth respecting the OVD/CR previously recorded (Fig. 6a and 6b), and to establish a suitable aesthetic and functional aspect of the future artificial anterior teeth, some considerations were taken:

1. The initial midline had to be materialized and respected when mounting the anterior artificial teeth after the simulation of the extraction
2. The mounting of the anterior teeth was done one side after the other
3. The anterior occlusal plane is located at a lower level than that of the residual teeth to avoid an unaesthetic appearance of anterior open occlusion and to be able to establish an adequate vertical overbite and create an ascending occlusal curve that respects the occlusal concept of the future removable prosthesis (Fig. 6c).
4. The anterior teeth are mounted more vestibular to create a horizontal overlap in the anterior region (Overjet) that is not present in the natural teeth, to ensure adequate

labial support and to improve the esthetic profile of the lower face (Fig. 6d).

Anterior teeth were then mounted respecting the new situation of the plane (Fig. 6e and 6f).



Fig. 6. Teeth mounting; a) Mounting of the posterior teeth on the edentulous side, b) Traying-in mouth of the posterior teeth, c) prosthetic frontal plane, d) sagittal view of the anterior teeth mounting, e) Frontal view of the teeth mounting, f) Occlusal view of the teeth mounting.

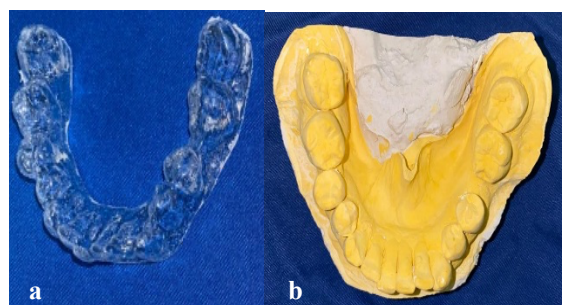


Fig. 7a and 7b. Elaboration of the occlusal splint.

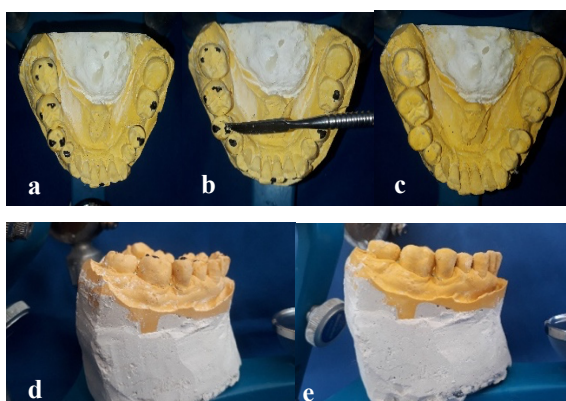


Fig. 8. Occlusal adjustments marking; a) marking of occlusal interference points, b) elimination of occlusal interference points, c) occlusal view of the mandibular teeth after simulated ameloplasty, d) sagittal occlusal curve before ameloplasty, e) sagittal occlusal curve after ameloplasty.

However, up to this point, the mounting of the posterior teeth was done without taking into consideration the repercussions of the occlusal disturbances due to the presence

of the mandibular teeth on the respect of the principle of the balanced occlusion. In fact, the mandibular teeth in malposition (egression, version...), preventing the design of an ascending sagittal compensation curve essential for the static and dynamic stability of the future complete removable prosthesis, required some subtractive adjustments.

For this purpose, an occlusal splint with a minimum thickness of 0.5 was elaborated on the initial mandibular arch (Fig 7).

Then, the orientation of the initial mandibular occlusal plane was analyzed on a semi-adaptable articulator and occlusal disturbances due to positional anomalies of opposing teeth were objectified. Then, occlusal adjustments by subtraction (cranioplasties) were simulated on the objectified points on the mandibular cast (Fig 8).

This final mandibular plane thus obtained, made it possible to finalize the mounting of the maxillary teeth validating the concept of the balanced occlusion (Fig. 9a and 9b).

The maxillary complete removable prosthesis was then, polymerized.

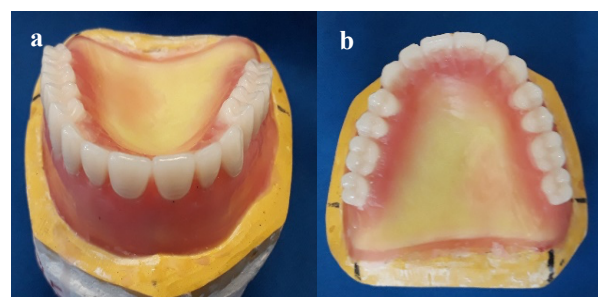


Fig. 9. Final prosthetic teeth mounting respecting balanced occlusion: a) Frontal view, b) Occlusal view.

E. Occlusal Adjustments

In order to be able to transcribe the same occlusal adjustments already made on the mandibular model, on the natural teeth in the mouth, we have based on the resin splint.

After repositioning this latter on the corrected mandibular model, empty areas were observed on the teeth that were adjusted, revealing the topography and quantity of the ameloplasty. Thus, the height of the transparent resin splint placed on the cast, exceeding the new occlusal level obtained after plaster subtraction, was eliminated by a blade to respect the exact limit of the cusps after correction (Fig. 10).

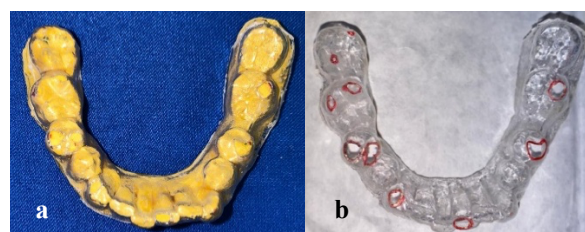


Fig. 10a and 10b. Occlusal splint after plaster and resin adjustment.

On the same day of extraction, after adjusting of the limits of the prosthesis in the mouth, occlusal balancing would be performed to reproduce the occlusal situation in which the polymerized prosthesis was made.

The ameloplasties were then reproduced in the mouth using the splint that has been perforated at the level of the concerned areas. With the same logic, the part of the cusp that

emerges from the splint hole must be cut until it reaches the level dictated by the resin (Fig. 11).

The patient was thus satisfied on the aesthetic and functional level of the final result (Fig 12).



Fig. 11a, 11b and 11c. Ameloplasty reproduced in the mouth using the splint.



Fig 12: Final results, a) Intraoral view, b) Post-treatment patient smile.

III. CASE REPORT N°2:

A 48-year-old female patient was presented at the department of complete removable dentures in the dental clinic of Monastir for a prosthetic rehabilitation. The clinical examination revealed that the patient presented a mandibular proclia, a collapse of the lower face height, and limited mouth opening (Fig. 13a and 13b).

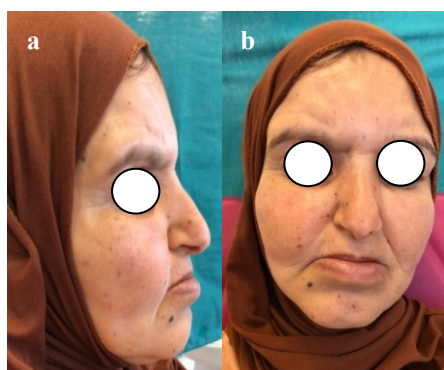


Fig. 13. Extra oral view; a) Profile view, b) Front view.

The intraoral examination showed maxillary edentulism, with an advanced bone resorption (cl III of Sangiulolo). At the mandibular arch, all the teeth are present except molars (Fig. 14a and 14b).

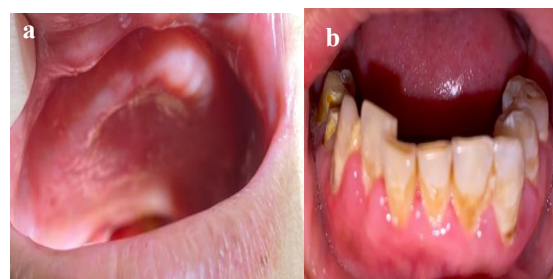


Fig. 14. Endo oral view; a) Pre-treatment maxillary occlusal view, b) Pre-treatment mandibular occlusal view.

The panoramic radiograph showed a favorable periodontal factor for all mandibular teeth (Fig. 15a).

Then, cephalometric analysis was performed on profile telerradiograph confirming the diagnosis of skeletal III (Fig. 15b).

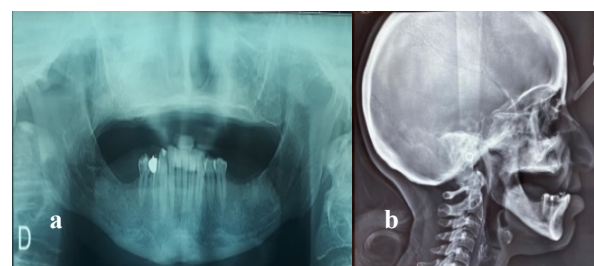


Fig. 15. Preoperative radiographs; a) Panoramic radiograph, b) Profile telerradiograph.

Primary and secondary impressions were made, and an occlusion base was fabricated on the secondary model. Then, the occlusal wax rim was adjusted to correct the inverted anterior bite and to search contact with the antagonist teeth on propulsion (Fig. 16a).

The intermaxillary relationships (OVD and CR) were determined in the mouth (Fig 16b) and the casts were mounted on the articulator.



Fig. 16. Occlusal bite registration; a) Occlusal wax rim, b) Recording Intermaxillary relations.

To solve vertical prosthetic height reduction, small prosthetic teeth had been chosen according to the antagonist ones (Fig. 17a). Then, the mounting was performed respecting the occlusion recording previously made in the mouth according to the concept of bilaterally balanced occlusion (Fig. 17b and 17c).

An under-occlusal-pressure impression using the prosthetic teeth was made with low viscosity silicone flowing teeth try in (Fig 18).

The removable prosthesis was polymerized. An occlusal balancing was performed, and advice of use and maintenance are also reminded to the patient. The final result respected the bilaterally balanced occlusion and restored an aesthetic convex profile (Fig. 19a and 19b).



Fig. 17. Mounting of prosthetic teeth; a) Choice of prosthetic teeth, b) Sagittal view of prosthetic teeth mounting, c) Occlusal view of prosthetic anterior teeth.



Fig. 18. Under occlusal -pressure impression.

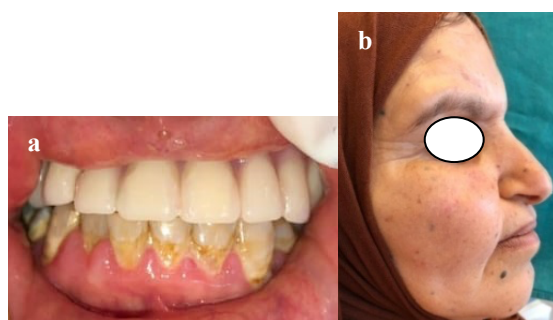


Fig. 19. The final result; a) Endo oral view, b) Extra oral view

IV. DISCUSSION

The rehabilitation of isolated edentulous maxilla opposed by mandibular dentition is a frequent challenge. Presence of opposing natural residual teeth can create aesthetic, functional and biological difficulties [5].

From an aesthetic standpoint, prosthetic success ensuring the harmony and the smile of the face requires the analysis of the various aesthetic parameters (the types of morphology of the patient, age, and gender...). It will be necessary to restore a correct occlusal vertical dimension, provide adequate lip support, respect the symmetry of the face and give back to the patient the most natural smile possible [6].

For single complete denture, opposing teeth can complicate achieving these objectives. Thus, the sagittal position of the maxillary anterior teeth is imposed by anterior mandibular teeth, and it directly influence the position of the lips and determines the profile.

Following the positions of the mandibular teeth, single complete denture can be obtained with an important overjet which gives an unsightly profile, or an important overbite with opposing the balanced occlusion concept, or alternatively with an anterior open bite when trying respecting this concept [7].

Therefore, the mounting of the prosthetic teeth must be harmoniously done and ensure the symmetry of the face. This symmetry is modeled by the inter-incisal midline, coinciding with sagittal median plane during the smile that must be marked on the occlusal rim [7].

Initially in the first clinical case, the overjet on the anterior teeth was insufficient, which caused a flat profile. In addition, the inferior teeth had a slight egression that would influence the mounting of the prosthetic teeth. Among the objectives of the prosthetic rehabilitation were to rest or anesthetic harmonious convex profile face, to respect the bilaterally balanced occlusion with restoring of overjet and absence of overbite without risk to create an open bite. It was, therefore, necessary to make a personalized recording in order to reach a compromise between esthetics and functional occlusion.

For the second clinical case, the anterior teeth were mounted in add vestibulum to compensate squelettic shift in the sagittal plane and to create an adequate overjet with antagonist teeth. Also, the aesthetic success depends on the harmony and the good integration of the new teeth in the residual context. This was conditioned by a reasoned choice of the dimensions and shade of the prosthetic teeth while being guided by the natural teeth, as it is done for both cases.

Edentulous maxillary arch opposed by natural and/or restored dentition is a delicate situation to manage from an occlusal point of view [8], [9]. The occlusal plane is generally imposed by residual teeth that often present occlusal disturbances [8]. Therefore, it is sometimes difficult to manage: the occlusal reorganization of the partially or totally opposite dentate arch.

After an occlusal analysis, practitioners must implement all the means intended to create the "balanced occlusion concept" of the future complete removable prosthesis [5].

All disciplines of dentistry can be concerned to reconstruct the occlusal curves (in the sagittal and frontal planes), in the exclusive concept of the balanced occlusion: Extractions of mobile teeth, subtractive amelo-plasty, correction of versions or egressions by orthodontic treatment, partial removable prosthesis to compensate for any partial edentulism, or even single or multiple fixed prosthesis. For our first clinical case a simple amelo-plasty of equilibration allowed to solve the problem [5]. This procedure must be simulated on the cast, transferred to the mouth by a reliable transfer tool, and must be performed by the same practitioner in order to guarantee the reproducibility of the result.

In the literature, several other techniques have been used for achieving a harmonious occlusion in single complete dentures without modifying the natural dentition of the patient. Reference [10], described the first functional chew-in technique (1928), the principle was to realize a unique prosthesis adapted to the existing conditions of the opposite arch. In his technique, he mounted the maxillary and mandibular casts on an articulator in centric relationship. A new base plate was then fabricated, and an occlusal rim was made from an impression on the edentulous model. This occlusal rim was placed in the patient's mouth, and he was asked to perform eccentric chewing movements to generate the functional paths of the antagonist teeth cusps. This recording will guide the subsequent assembly of the prosthetic teeth. Reference [3] and [11] have also described similar techniques.

All these techniques have made it possible to obtain functional single complete dentures, but it may not be feasible: if the residual denture is not stable, when the patient does not have good neuromuscular control, or if there was severe occlusal plane discrepancy which requires to sacrifice the cuspid anatomy of the prosthetic teeth and it would be difficult to obtain a balanced occlusion [3], [12].

The inter-arch relationships due to bone resorption can also be an obstacle and constitute an unfavorable situation for creating a functional occlusal pattern. As it was detailed in the second clinical case, a mounting in add vestibulum of the prosthetic teeth to avoid the sagittal shift between the two arches must be done. However, if the shift is very important, a mounting with null overjet can be tolerated, but the reverse bite should be avoided because it tends to cause biting and prosthetic instability.

From a biological point of view, duality of the tissues involved an additional difficulty to the integration of the prosthesis and to the success of the treatment [5]. Indeed there is a difference of somesthetic order between the two arches: mucosal exteroception in the edentulous arch opposed to periodontal proprioception in the dentate arch. That's why, it is important to reduce as much as possible the existing difference of repressibility to prevent occlusal overloads and functional constraints by making functional impressions under occlusal pressure as it was performed on the second case.

Overall, the integration of the complete bimaxillary prosthesis is easier than the complete single maxillary prosthesis.

In 2016, [13], aimed to re-emphasize the importance basic prosthodontic principle of preservation of the remaining teeth, which is largely been ignored in patients of the single maxillary complete denture (CD) opposing natural teeth. According to this study [13], all patients had a difficult prosthodontic experience and were unsatisfied with regard to their single complete denture. Then, no attempt was ever made to treat the opposing dentition in any patients. Despite being under regular prosthodontic care for fabrication and repairs by many dentists, none of the patients was aware of their clinical situation and the alternative treatment options available.

In fact, the absence of occlusal balance during function thereby, compromising stability and retention and eventually leading to frequent mechanical failures of the prosthesis under functional masticatory forces [13].

By the way, several studies [3], [13], [14] are interested to the fracture of single maxillary complete Denture, a common complaint in the presence of mandibular teeth, due to the inadequate occlusal distribution.

Another study [15], also showed that the majority of the complaints of the unimaxillary prosthesis were related to prosthetic instability, followed by pain and discomfort.

Thus, the patient should be thoroughly informed of some of the difficulties that may be encountered. The patient's chewing may not be as efficient and reorientation of masticatory and swallowing habits may be necessary.

V. CONCLUSION

The challenge to provide comfort, retention, function, and esthetics for the patient with edentulous maxillae opposing natural teeth is often difficult.

Complete unimaxillary removable prosthesis is a complex treatment which must be perfectly reasoned to ensure the prosthetic durability.

Faced with the multiplicity and diversity of clinical situations, it is necessary to remember that each patient is unique, and that prosthetic care implies an analytical approach to detect all the pitfalls: anatomical, functional, and aesthetic difficulties and to establish the chronology of treatment steps adapted for each patient.

Thus, the success and durability of complete unimaxillary denture rehabilitation requires a thorough pre-prosthetic analysis and diagnosis to ensure the stability of the prosthetic appliance on the edentulous arch.

ACKNOWLEDGMENT

Authors are grateful to all of those with whom they have had the pleasure to work during this project.

A special thanks to Mrs. Basma Mansour, the prosthetic technician in the complete removable department, for her efforts in the elaboration of the prostheses for the illustrated clinics.

CONFLICT OF INTEREST

The authors have no competing interests to declare that are relevant to the content of this article.

REFERENCES

- [1] Ellinger CW, Rayson JH, Henderson D. Single complete dentures. *J Prosthet Dent*. 1971; 26(1): 4-10.
- [2] Foong KW, Patil PG. Fabrication of maxillary single complete denture in a patient with deranged mandibular occlusal plane: A case report. *Saudi Dent J*. 2019; 31(1): 148-54.
- [3] Upadhyay SR, Singh SV, Bhalla G, Kumar L, Singh BP. Modified functionally generated path technique for single complete denture against non-modified natural dentition. *J Oral Biol Craniofac Res*. 2012; 2(1): 67-71.
- [4] Hue O, Berteretche MV. Prothèse complète: réalité clinique, solutions thérapeutiques. Paris: Quintessence International, 2004. French.
- [5] Archien C, Louis JP, Helfer M, Mahiat Y, Minette C. La prothèse amovible complète unimaxillaire: un traitement complexe, de nombreux pièges à éviter. *Stratégie Prothétique*. 2006; 2(6): 85-96. French.
- [6] Fajri L, Berrada S, Abdedine A. L'apport de l'exploration clinique dans le choix et l'orientation de la thérapeutique prothétique chez l'édenté complet. *Rev Odont Stomat*. 2008; 37(2): 91-107. French.
- [7] Fajri L, Abdelkoui A, Abdedine A. Approche esthétique en prothèse amovible complète. *Actual Odontostomatol* 2013; 266: 16-26. French.
- [8] Fajri L, Berrada S, Merzouk N. L'articulateur dans l'étude pré-prothétique en Prothèse amovible partielle-Partie 2. *Actual Odontostomatol*. 2016; 276: 1-6. French.
- [9] Driscoll CF, Masri RM. Single maxillary complete denture. *Dent Clin North Am*. 2004; 48(3): 567-83.
- [10] Stansbury CB. Single denture construction against a nonmodified natural dentition. *J Prosthet Dent*. 1951; 1: 692-9.
- [11] Vig RG. A modified chew-in and functional impression technique. *J Prosthet Dent* 1964; 14: 214-2.
- [12] Rudd KD, Morrow RM. Occlusion and the single denture. *J Prosthet Dent*. 1973; 30: 4-10.
- [13] Bhandari S. Outcome of single maxillary complete dentures opposing mandibular teeth: A need to introspect on the prosthodontic treatment protocol. *J Indian Prosthodont Soc*. 2016; 16(1): 15-9.

- [14] Dhiman RK, Chowdhury SR. Midline fractures in single maxillary complete acrylic vs flexible dentures. *Med J Armed Forces India*. 2009; 65(2): 141-5.
- [15] Mahfoudhi AE, Tayari O, Mizouri A, Jaouadi J. Rehabilitation by single complete removable denture: a follow-up in a Tunisian clinical study. *Dental News*. 2021.



8074

R. Bounaouara, resident in the removable partial denture, born in Mahdia, Tunisia, in 1993. Received a baccalaureate degree in 2012. Admitted to the national competition for residency in dental medicine, in December 2018 session at the Clinic of Dental Medicine of Monastir. And received the national diploma of Doctor of Dental Medicine in 2021, at the faculty of dental medicine of Monastir. ORCID ID: [https://orcid.org/0000-0002-7593-](https://orcid.org/0000-0002-7593-8074)