



## EVALUATION OF FUNCTION, OCCLUSION AND ARTICULATION IN PATIENTS WEARERS OF TOTAL DENTURES

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### ABSTRACT

Patients with total edentulousness that come to our dental offices everyday are a specific category of patients. For many reasons we are obliged to take meticulous attention to details for providing the best possible solutions of manufacturing total dentures that are satisfactory. Living in the XXI century we are obsessed with the digital era, with possibilities for digital impressions, digital dental smile design, exocad, exocam programs etc. Then there is implant prosthetics with implant overdentures, with indication for usage of two, four, six even eight implant. There are many reasons that suggest that some patients have relative or absolute contraindications for implants. Others cannot afford them, nor can they afford CAD/CAM designed total dentures. For all of the above factors, still conventional prosthetics worldwide is a golden standard for a wide category of patients.

**KEYWORDS:** digital dental smile design, exocad, exocam programs etc.

### INTRODUCTION

Total edentulousness has been known starting from the 5 century b. c.<sup>[1, 2]</sup>

Wooden dentures were made for centuries from the Japanese, as literature states from the 16 century, as a wonderful imitation of nature.<sup>[3]</sup>

In 1728 Pierre Fauchard has developed dentures designed with the usage of metal frames and teeth carved from animal bones.<sup>[1]</sup>

The first porcelain teeth were designed in 1770 from Alexis Duchâteau.<sup>[2]</sup>

The president of the United States of America George Washington (1732-1799), had several sets of total dentures. Losing all of his teeth at the age of 21, therapists have made efforts throughout the centuries to design teeth that he can actually use, from using elephant bone, hippopotamus teeth, to using real human teeth that were attached to each other with a golden wire.<sup>[4]</sup>

In 1820 Samuel Stockton, goldsmith by profession has designed high quality dentures, made out of 18 carat gold plates and with quality porcelain teeth.<sup>[5]</sup>

After vulcanite was discovered dentures were manufactured from that material.<sup>[5]</sup>

In the 20<sup>th</sup> century with the discovery of acrylics, composite and other types of plastic, a huge industry became revolutionized up until today.<sup>[5]</sup>

Today we still have beautiful dentures made from acrylics or composite.

Studies from 1968 show that 79% of the patients from 65-74 years of age have total edentulousness, and this proportion in 1998 has lowered to 36%.<sup>[6]</sup>

Predictive studies realize that in the year 2050 there will be still unchanged if yet increased percentage of patients with total edentulousness due to the increased quality and life span of patients.

That is why therapists need to realize what concepts of function, occlusion and articulation to choose. It is still debated what is the best for total dentures.<sup>[7]</sup>

It remains for the therapists to decide whether to make a compromise concerning the patients conditions in the mouth and their financial condition or to use modern concept (implants or digital design), or pure classic-conventionally made dentures.<sup>[8,9]</sup>

Total dentures were individually designed with the concept of respecting the skeletal class (I,II or III).<sup>[10]</sup>

**PURPOSE**

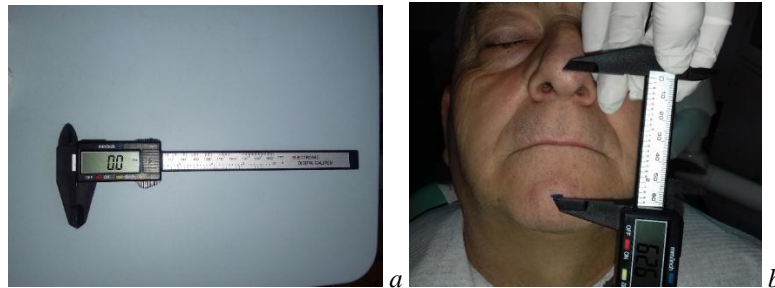
The purpose of this article is to show that conventional prosthetics is a huge challenge for the dentist prosthodontist, for the dental technician and dental assistant as a team to recreate the lost bone and dental structure applying suitable function, occlusion and articulation for each patient with achieving the thorough basic prosthetic principles.

**MATERIAL AND METHODS**

Before the treatment patients were given consent formulary for the procedure and interventions.

Each patient was extraorally examined with analysis of the lower third of the face.

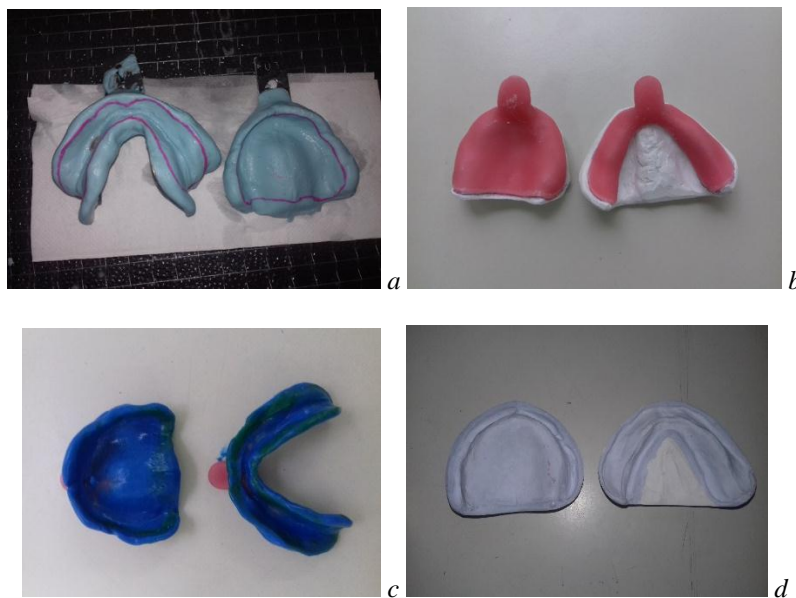
Measurements were taken with the usage of digital caliper, measuring the intermaxillary relations in physiological rest and in centric relation (Fig.1 a, b).



*Fig. 1a,b Digital Caliper.*

Then patients were examined clinically intraorally, with analysis and determination of the skeletal intermaxillary relations, whether it is class I, class II/1, II/2, or class III (congenital or acquired).

Anatomical impressions were taken upon which individual trays were made for reproduction of the definitive model (Fig 2a,b,c,d).



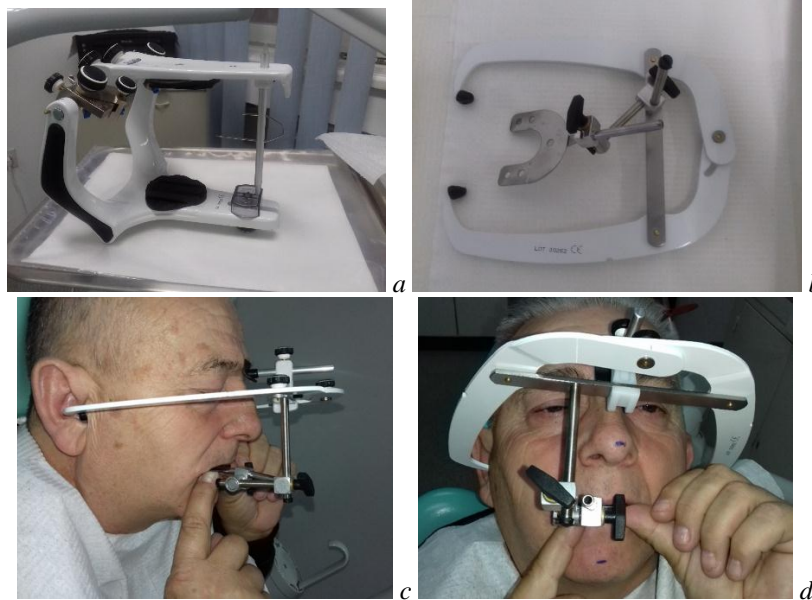
*Fig. 2 a Preliminary impressions.*

*Fig 2b Individually designed impression trays*

*Fig 2 c Definitive impressions*

*Fig 2 d Definitive Studio Models*

After developing of the wax ridges on shellac base plates, Bio-Art A7 plus Articulator was used with the set of facial bows (Fig 3 a, b, c, d).



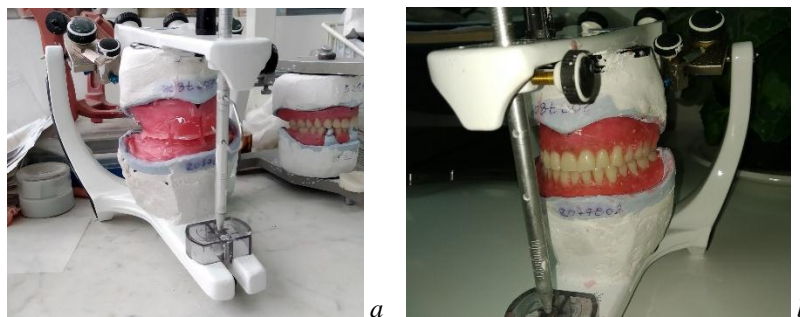
*Fig. 3 a Bio Art A7 Plus Articulator*

*Fig. 3 b Set of face bows*

*Fig. 3 c, d Registration of intermaxillary relation.*

After registration of intermaxillary relations the models were fixated in the articulator, upon which teeth were

selected individually and were adapted and positioned on the wax ridges (Fig. 4 a,b).



*Fig. 4 a, b Wax ridges fixated and with positioned teeth.*

After that teeth were tried in the patient mouth and proceeded the stage of development of individually designed total dentures.

process of recreating her new pair of dentures. She had no complains other that the previous dentures were abraded, as she has used them for 6 years and with all the measurements the vertical dimension was increased (Fig. 5 a, b).

**Case study (patient number 1)**

The patient was a female, 74 years old and interestingly she was a dental technician, thus directly involved in the



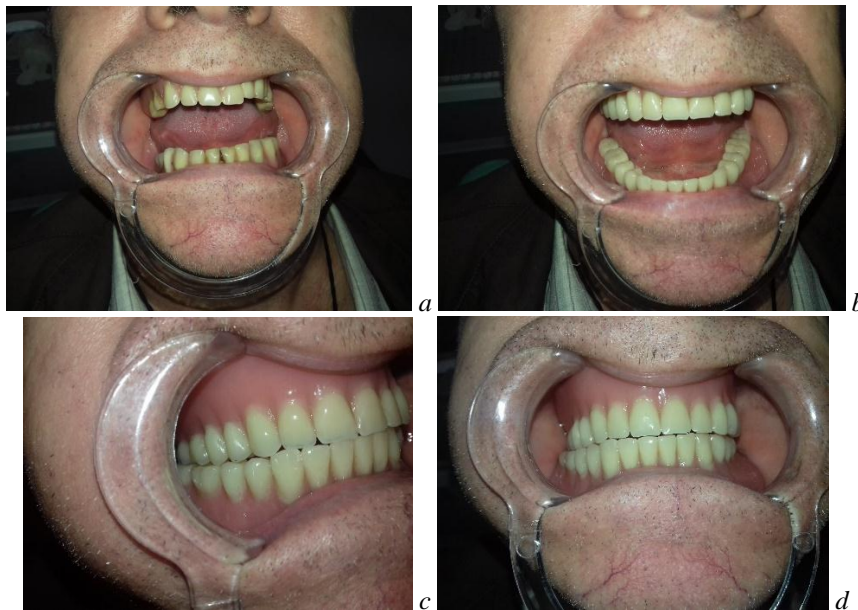


*Fig. 5 a The patient with the old pair of dentures*  
*Fig. 5 b The patient with the new pair of dentures*  
*Fig. 5 c Contrast view of the dentures in occlusion*  
*Fig. 5 d Lateral view with flash light showing the occlusion.*

**Case study (patient number 2)**

The second patient was a 65 year old male, who had lost his teeth due to periodontal changes. He had previously wore classical skeletal dentures and had subtotal

edentulosis. His new dentures were adapted in the mouth following the previously shown material and methods used (Fig. 6 a, b, c, d).



*Fig. 6 a The patient with the old dentures*  
*Fig. 6 b The patient with the new dentures*  
*Fig. 6 c, d Checking the occlusion and articulation.*

**Case study patient (number 3)**

This patient is a 92 year old male who had wore his previous dentures for 25 year. He was in a need of

complete reconstruction of his lost intermaxillary relations (Fig 7 a,b,c,d).







**Fig. 7 a** The patient with his previous dentures

**Fig 7 b** The older dentures in occlusion

**Fig 7 c** The patient without dentures

**Fig 7 d** The patient with the new dentures

## RESULTS AND DISCUSSION

Conventional prosthetic is a challenge, because of the fact that it takes a great effort to make a pair of total dentures.

Patients of different ages need different approaches, especially in terms of choosing suitable teeth. Also the skeletal classes needed analysis. In this study, it was possible for a normal occlusion to be achieved in all three cases. The third patient had acquired progeny due to the abrasion of his dentures.

Finlay Sutton explains that we need to respect the way teeth erupted. So in his works he respects prosthetic principals in restoration of the previously lost intermaxillary relations similar to this research.<sup>[10]</sup>

The individual design of total dentures has extraordinary functionally aesthetic value, while respecting the principles of function, occlusion and articulation.

Achieving aesthetics in total dentures has been accomplished, whilst function especially in the lower total dentures still represents a challenge for the therapist and the patient. The lower total prosthesis needs special reference to its shape for reaching up and covering the retromolar triangle, also the patient needs to learn how to control it with the position of the tongue.<sup>[11]</sup>

The upper total dentures usually has accomplishment of adhesion and a high degree of retention and stabilization.

The development and manufacturing of solid total dentures understands achieving also solid function.<sup>[11]</sup>

The occlusion represents the static contact relation between incisal and occlusal surfaces of teeth.<sup>[12]</sup>

It is an important factor contributing to the retention and stabilization of total dentures - in vivo.<sup>[12]</sup>

In this research balanced occlusion was used. Thus balanced articulation was also applied. There were bilateral simultaneous contacts among the anterior and posterior teeth. And the new vertical dimension of the

dentures was in harmony with the temporomandibular joint and thus with the neuromuscular control as in other researches.<sup>[13]</sup>

## CONCLUSIONS

The creation of manufacturing individually designed total dentures must be in accordance with the prosthetic principles.

The function depends of the way the dentures are made, the conditions in the mouth and the control of the patient.

The occlusion used was balanced yet individual for each patient.

The articulation, despite the contemporary method of determining intermaxillary relations, teaches us that the mouth is the best articulator. The technician can achieve perfect occlusion and articulation on the articulator while the last adaptations are made by the therapist in the mouth.

Lastly the satisfaction should be shared by the entire team - the dentist prosthetist, the dental technician, the dental assistant and the patient himself.

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