



## Making of Primary Impression Made Easy for Severely Resorbed Mandibular Ridge – A Clinical Case Report

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### Authors' contributions

This work was carried out in collaboration between all authors. Authors MSK, DC made the impression. Authors MSK, DC, IMG, SK, MZK and BS did the case selection, wrote the first draft of the manuscript and managed literature searches. All authors read and approved the manuscript.

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### ABSTRACT

This article describes the making of a functional primary impression for severely resorbed mandibular ridge type IV. In this technique metal wire of 1.5 mm diameter was adapted on the ridge of a mandibular arch from one retromolar pad to another retromolar pad. On the metal wire

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addition silicone putty was adapted and phonetics was used for making an initial primary functional impression. The prepared initial primary functional impression was under extended. Thus correction was done by adding putty addition silicone impression material. Later wash impression was made using addition silicone light-bodied impression material. The prepared impression was accurate in term of reproduction of details, and in term of extensions it was a functional impression. An impression was not deformed by the manipulations done by the dentist or by using oversized or undersized stock trays.

**Keywords:** Primary functional impression; resorbed mandibular ridge; impression technique; resorbed residual ridge; addition silicone impression material putty; addition silicone light bodied impression material.

## 1. INTRODUCTION

Making of primary impression is often ignored and all emphasis are placed on making of final impression, thus leading to making of failed complete denture. Making of primary impression using stock trays for resorbed mandibular ridge class III & IV becomes very difficult [1,2]. The reason behind is, it does not fit accurately in this ridge, this leads to making of inaccurate primary impression and finally, it leads to making of ill-fitting dentures [1]. All the shortcomings of primary impression cannot be rectified while doing border moulding because the anatomical landmarks which are not recorded in primary impression cannot be recorded in border moulding, as low fusing impression compound can extend only up to 2 mm. Thus, a dentist should give full emphasis on making an accurate primary impression [3]. The accurate primary impression is a road to success because this leads to making of extended border moulding [4], accurate wash impression, and well-contoured denture [2].

The making of mandibular impression possesses a great technical challenge because mandible is surrounded by the movable tissue in facial as well lingual side. In facial side, it is surrounded by the lips and cheeks and in the lingual side there is a floor of mouth and the tongue. The presence of tongue and its individual size, form and activity complicate the impression procedure for the mandibular denture. The prepared functional mandibular primary impression should be such that it should be well extended and during normal function example speaking, swallowing and deglutition, denture should not interfere with muscles and the prepared mandibular denture should be stable and retentive [1,5].

This article describes an alternate technique in which primary functional impression was made for resorbed mandibular ridge class IV using metal wire (Fig. 1), addition silicone impression

material putty, addition silicone light bodied impression material, phonetics and functional movements were also used for making this primary functional impression.



**Fig. 1. Type III residual mandibular alveolar ridge**

### 1.1 Required Elements for Making Primary Functional Mandibular Impression

#### 1.1.1 Stainless steel metal wire

Stainless steel metal wire of 1.5mm diameter was manually contoured to follow the mandibular residual alveolar ridge. The wire was contoured intra orally easily with out any difficulty. The metal wire cross-section dimension was kept 1.5 mm only so that it does not interfere with movable tissue.

The functions of metal wire are

1. The metal wire helps to carry the impression material to the patient's mouth.
2. The metal wire strengthen the impression material. After polymerization of impression material, metal wire prevents the impression material from distortion [1].

### **1.1.2 The impression material**

The required impression material for making functional impression should have sufficient working time. Characteristics of the impression materials should be such that it can be easily moulded by the muscle forces, this can only be possible when materials will be having low initial viscosity [6]. Addition silicone putty impression materials (President, Coltene/ Whaledent Private Ltd, Mumbai, India) and addition silicone light bodied impression material (Affinis, Coltene/Whaledent Private Ltd, Mumbai, India) were used for making an impression, both impression materials were easily moldable and have sufficient working time, and can record borders accurately [1,4-7].

### **1.1.3 Speech**

Speech is a very sophisticated, autonomous and unconscious activity [5]. Oral motor function, such as mastication and speech production, shares many common features. They are intimately related because mouth, lower lip, teeth and tongue are used for both activities. The tongue has a critical impact on speech production and needs optimal mobility to lift, protrude, flatten, form a groove and contact adjacent tissue freely [8]. Dentist should train patient to speak certain words clearly before impression making. This procedure should be repeated till patient gets full control of words. Speech causes various functional movements of tongue, cheeks and lips that cause functional moulding of tissue while impression making. Advantage of this technique is, all such movements are done by the patient intraorally thus allowing for functionally moulded impression borders.

## **2. REQUIRED CLINICAL STEPS FOR FUNCTIONAL PRELIMINARY IMPRESSION TECHNIQUE**

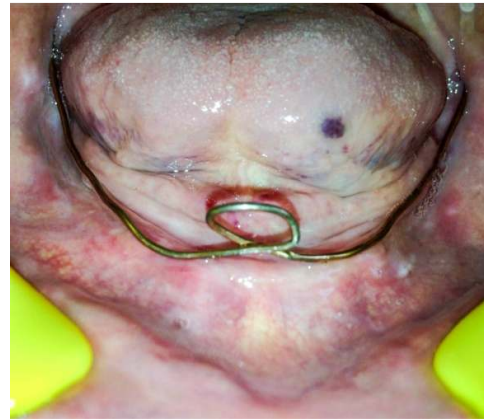
The impression was made in four steps –

- Adaptation of metal wire
- Making of initial impression
- Correction of initial impression
- Final wash impression

### **2.1 Adaptation of Metal Wire**

The stain less steel metal wire was adapted manually on the curvature of the resorbed residual mandibular ridge type IV, from one

retromolar pad to retromolar pad area on opposite side of the arch and in midline a loop was formed which acted as a handle (Fig. 2).The contoured wire was placed in the patient mouth. Metal wire was stiff enough to remain in its shape, and to prevent tissue injury wire ends were rounded off. The patient was instructed to speak certain words mainly /S/ sound [8] example sixty, sixty-one, sixty-two, sixty-three, sixty-four.



**Fig. 2. Contoured metal wire adapted to the mandibular residual alveolar ridge**

The metal wire should not move during speech and while doing this the patient must be able to feel and confirm the stability of metal wire. Another way of ensuring stability is to instruct the patient to do various tongue movements. Dentist should reflect cheek to ensure the metal wire is not interfering with the movable tissue. If due to any reason the metal wire is unstable then contour of metal wire is modified and the said procedure is repeated to conform the stability of metal wire.

### **2.2 Making of Initial Impression**

1. For making impression addition silicone putty impression materials (President, Coltene/ Whaledent Private Ltd, Mumbai, India), addition silicone light bodied impression material (Affinis, Coltene/Whaledent Private Ltd, Mumbai, India) and auto mixing gun (GC Dental Products Corp, Japan,) was used.
2. Tray adhesive ((President, Coltene/ Whaledent Private Ltd, Mumbai, India), was applied on the metal wire for 15 minutes and then ice-cooled putty (President, Coltene/ Whaledent Private Ltd, Mumbai, India) was taken out from a

refrigerator. Afterwards, 2 equal scoops of base and accelerator were taken out and they were kneaded for 15 -30 seconds to get a uniform mix of putty silicone impression material.

3. Later putty was placed in bowl of chilled water, by doing this we can mould the putty without sticking to the vinyl gloves. Putty silicone impression material and gloved fingers are kept in ice cooled water, and putty was manually shaped like a roll and was manually adapted and pre shaped around the contoured metal wire using wet fingers.
4. The metal wire was held by the mid-line loop with fingers, and dentist uses his fingers to adapt putty properly all around especially in the mylohyoid sulcus and alveololingual sulcus.
5. The patient was instructed to take out his tongue forward and touch the vermillion borders of lower lip, later patient was instructed to touch the corner of the mouth with his tongue [9]. This movement causes moulding of the lingual flange of the impression. While doing this procedure dentist's fingers were withdrawn from the patient's mouth.
6. The patient was asked to speak loudly, clearly and slowly few letters like OOOO and EEEE alternatively [9] and repeatedly and the months of the year, days of the week [1,2] and names which are common in his area. While the patient is speaking, dentist should check that impression material is moulded by the muscles but it is not lifted by muscle. If impression material is lifted then it is better to stop and make sure that arch-shaped wire is properly placed and again this procedure is repeated till impression is not lifted while speaking. Once impression was completely set, then it was checked intraorally for proper extension and stability. The prepared initial impression was neither stable nor retentive because it was under extended.
7. The impression was removed and washed under running tap water, later it was checked for any voids, holes and exposed areas.

Usually, till this stage what we have obtained is the skeleton of the impression, which is either under extended or over extended impression and does not have proper shape especially in some areas like retromolar pad, mylohyoid sulcus and

in the labial anterior region. In this initial impression, significant deficiency was noted in retromolar pad area, post mylohyoid area, and in buccal shelf area.

### 2.3 Correction of Initial Impression

The putty impression was again mixed as described before and placed in those areas where the impression was significantly deficient with wet fingers. This was done first for retromolar pad and mylohyoid sulcus and later for buccal sulcus and labial sulcus simultaneously. Then impression was again placed in the patient's mouth and the patient was instructed to speak and do various tongue movements as described previously. Stability of the impression was repeatedly checked and was confirmed by the patient. At any given point where the impression was not stable, the last extension was removed and above mentioned procedure was repeated (Fig. 3). The prepared impression was stable and retentive.



Fig. 3. Corrected initial impressions

### 2.4 Final Wash Impression

A small amount of light bodied impression material (Affinis, Coltene/Whaledent Private Ltd, Mumbai, India) was spread over the tissue surface of an impression with auto mixing gun (GC Dental Products Corp, Japan). Then impression was again placed in the patient's mouth and was held carefully and firmly by index fingers of both hands for 10 seconds. The patient was instructed to speak and to do tongue movements as described previously till the light bodied impression material was completely set. Once impression was completely set then it was checked for proper extension intraorally, the stability of the impression was again checked and was confirmed by the patient. The

impression was removed and was washed in running tap water, later it was checked for voids, holes and exposed areas (Fig. 4). The functional impression was stable, retentive and includes all the functional areas including the retro molar pad.



**Fig. 4. Final wash impression**

### 3. DISCUSSION

As we all know that success of the complete denture largely depends on the accuracy of a primary impression. To achieve accurate impression dentist should have a thorough understanding of limiting structure, supporting structures, properties and manipulations of impression materials [10-12]. The accurate primary impression is a road to success because this leads to making of accurate custom impression tray, final impression and further accurate complete denture.

The primary functional impression concept was first proposed by Dr Klein [13]. He developed impression technique in which impression was made without a stock tray using functional movements of the mouth. In this technique, he used a polysulfide impression material which was reinforced by stain less steel metal wire which was contoured over the residual ridge between the tongue and lips / cheeks. To mould the materials speech exercise was used. The advantage of this technique is that dentist's fingers are no longer required to manipulate the tissues or control the tray. Thus, two sources of errors are eliminated by this technique.

Polyvinyl siloxane impression material putty and light bodied [10] were used for making functional impression. The reason for selecting this material was it can be easily mixed, it provides satisfactory working time, it comes in all four

consistencies, it can be delayed pour up to 1 week, repeat pour, it's reproduction of detail is also excellent [6].

Poly ether cannot be used for making of functional impression as putty consistency is not available thus it was not used in this technique. Polysulfide impression can be used for making functional impression as it comes in all four consistencies. But due to its disadvantages like low dimensional stability, messy to work, reproduction detail is not as good as poly vinyl siloxane, delayed pouring of impression up to 1 week is not possible and repouring of impression is also not possible. Thus it is not use now days for making functional impression [6].

Functional impressions can be made using tissue conditioner [14,15] but it was not possible in this clinical situation as patient was not a previous denture wearer. This technique gives satisfactory result by providing accurate functional impressions [5]. Low fusing impression compound cannot be used in for making functional impression because its reproduction details are poor [5,16], it has limited working time. Thus it is not used for making functional impression.

For making primary impression in this given clinical situation alternate technique described by Boucher was not possible. In this technique primary impression is made initially by using stock tray and high fusing impression compound and then impression is removed from stock tray and borders are redefined. This technique cannot be used in this given clinical situation reason, stock tray does not fit accurately on the severely resorbed ridge type III & type IV [17,18].

Digital impression [3] – With the help of computer aided designing and computer aided machining with Rapid Prototype technology [19] making primary [20] and final impression are possible. The prepared impressions are accurate, well extended and tissue displacement and denture base interface was same in digital impression as compared to conventional impression technique [21]. The uses of digital technology has many advantages like increases the predictability of the treatment outcome, reduces the number of appointment [22] and chair side time of patient. It also decreases the dependence on operator's skill, subjective experience, improves efficiency, and standardizes the process of making restoration [23]. But in same time it has many limitations too like technology is very costly and

requires qualified worker to operate the machine [24].

This technology was one of the option for making functional impression in this case but it was not used because the CAD/ CAM machine is very expensive, it requires skilled workers and CAD/ CAM was not available.

For this alternate impression technique the most suitable material was poly vinyl siloxane impression material because putty can be used for making initial impression as it has very high viscosity and has sufficient working time of 4-6 minutes, it can be easily adapted on the ridge and can be easily reinforced by stain less steel metal wire. The initial impression prepared by putty can be re corrected if required. On the initial impression wash impression can be made by using light bodied poly vinyl siloxane impression material [12,15,16]. The prepared final impression using poly vinyl siloxane impression material has excellent surface detail, dimensional stability up to 1 week, it can be re poured also [5].

For making primary impression instead of using conventional impression technique in which stock impression tray is used for making primary impression, stiff metal wire made of stain less steel wire was used along with putty and light bodied addition silicone impression material to make primary functional impression.

For this technique any stiff metal wire can be used. There is no such precise constituent regarding this wire. It can be of stainless steel, plastic coated garden wire or galvanized wire. Diameter of wire can be 1.5, 2.0 or 2.5 mm, it is not specific, but it should be stiff as mentioned before and it should not move during speech and while doing this the patient must be able to feel and confirm the stability of metal wire. While doing various tongue movements also metal wire should not interfere with the movable tissue.

In this alternate functional impression technique, three things were different from the conventional open mouth impression technique.

First - Making of accurate impression in this given clinical situation was not possible using conventional impression technique. The reason behind were

- a. If we would have used conventional impression technique and selected the smallest stain less steel stock impression

tray U 0 to make primary impression the stain less stock impression tray would have not be able to cover retro molar pad. If we had chosen large stain less steel stock impression tray U4 than it would have cover the retro molar pad but that would have created a space of 3 to 4 mm between the stain less stock impression tray and the ridge which is not acceptable. The reason for the space is retro molar pad area ascends posteriorly. Thus conventional impression technique cannot be used for making impression in this given clinical situation.

- b. Another reason is that the stock tray does not accurately fit in the severely resorbed mandibular ridges type III and type IV. Thus, impressions prepared using stock impression trays are either under extended or over extended impressions. On under extended impressions prepared custom impression trays are also under extended thus proper extension cannot be achieved in border moulding as well as in final impression. So the prepared final impression is usually under extended. On over extended impressions, over extended custom impression tray prepared, this over extended custom impression tray can cause ulceration of the mucosa and adjusting over extending custom tray takes lot of times. Thus alternate technique was used in which stock tray was not needed and the prepared functional impression was accurate and well extended.

Second – In this technique instead of stock tray, metal wire was used along with putty and light bodied addition silicone impression material to make impression.

Third - As it is always desirable to make an impression on the floor of the mouth raised to the functional position thus dentist uses speech activity to make a functional impression. This way the dentist can achieve ideal moulding of muscles. The prepared functional impression is more retentive and stable than impression prepared by conventional open mouth impression technique [15,25].

The procedure is technique sensitive, thus an operator should keep in mind certain points while making an impression like, impression material should be able to mould and record borders easily and accurately. The impression material should have required desirable properties of

impression material and the required properties of border moulding material. Addition silicone impression material putty and light bodied impression material have all the desirable properties as mentioned above thus it was used in this technique [6]. Sometimes when an operator is skilled enough he can prepare an accurate as well as extended impression, with the possibility that the operator may choose to use this impression as a final impression [1].

If the operator is not skilled enough then he can pour this primary impression with type II dental stone to retrieve primary cast. On that primary cast dentist can make conventional custom impression tray for border moulding and final impression, to achieve accurate final impression.

#### 4. CONCLUSION

This is an alternate impression technique. It can be used for making functional impression for excessively resorbed edentulous ridges class III & IV which are difficult to record using a stock tray. Whenever this type of situation is faced this alternate impression technique can be used for making primary functional impression. The advantage of this technique is that the patient takes part actively in making an impression. The prepared impression meets all the objectives and principles of impression making.

#### CONSENT

All authors declare that written informed consent was obtained from the patient for publication of this paper and accompanying images.

#### ETHICAL APPROVAL

As we don't have an ethical committee in our college but I took permission from H.O.D (Head of the Department of Prosthodontics) to treat the patient.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. Aiche H. A preliminary functional impression for the mandibular complete denture. *Int J. Prosthodont.* 1989;2(6):543-548.
2. Juneja S, Arora A, Garg S, et al. Creating a denture using customized multi-step approach: A case report. *IJDS.* 2013; 4(5):99-101.
3. Kinra M, Kinra M, Kalra A, et al. Custom impression trays in prosthodontics- clinical guidelines. *Indian J Dent Sci.* 2012; 4(4):93-95.
4. Mc Cord JF, Grant AA. Impression making. *Br Dent J.* 2000;188:484-492.
5. Zarb GA, Bolender CL. Prosthodontic treatment for edentulous patients. 12<sup>th</sup> ed. St. Louis, MO: Mosby- Year Book; 2001.
6. Anusavice KJ. Phillips science of dental materials. 10<sup>th</sup> ed. WB Saunders Co: Philadelphia. 1996;161-2.
7. Daou EE. The elastomers for complete denture impression: A review of the literature. *Sau Den Jou.* 2010;22:153-160.
8. Palmar JM. Analysis of speech in prosthodontic practice. *J Prosthet Dent.* 1974;31:605-614.
9. Devadi A, Vyas R. Theories of impression making and their rationale in complete denture prosthodontics. *Jou of Orofac Res.* 2013;3(1):43-37.
10. Madhav VNV, Desai P. Elastomeric impression technique for complete denture impressions. *Jou Int Den & Med Res.* 2012;5(2):122-128.
11. Bitragunta RP, Purna SCR, Mallikarjun M. Systemic review of complete denture impression techniques. *Indian J Dental Adv.* 2011;3(4):673-680.
12. Kinra MS, Verma R, Nagpal PR, et al. Innovative impression technique for complete denture patients. *Indian J Dent Sci.* 2013;1(5):34-36.
13. Klein P. La peizographie en prothese adjointe mandibulaire. Thesis, Paris; 1971.
14. Craig RG, Power JM. Restorative dental materials. 11th ed. St. Louis: Elsevier; 2002.
15. Yadav B, Jayna M, Yadav H, et al. Comparison of different impression techniques for management of resorbed mandibular ridge. A case report. *Case Rep Dent.* 2014;2014:6.

16. Alqattan WA, Alalawi HA, Khan ZA. Impression technique and materials for complete denture construction. *Dent Health Curr Res.* 2016;2(1):1-3.
17. Solomon EGR. A critical analysis of complete denture impression procedures: Contribution of early prosthodontists in India- Part I. *J Indian Prosthodont Soc.* 2011;11(3):172-182.
18. Zarb GA, Bolender C, Hickey C. Boucher's prosthodontic treatment for edentulous patients. 6<sup>th</sup> ed. St. Louis, MO: Mosby-Year Book; 1985.
19. Neumeier TT, Neumeir H. Digital immediate dentures treatment. A clinical report of two patients. *J Prosthet Dent.* 2016;116:314-9.
20. Matsuda T, Goto T, Kurahashi T, et al. Digitizing system of impression and inter occlusal records for complete denture fabrication. *J Prosthet Dent.* 2016; 25(6):503-9.
21. Rignon-Bret C, Dupuis R, Gaudy JF. Application of a 3 dimensional measurement system to complete denture impressions. *J Prosthet Dent.* 2002;87(6): 603-12.
22. Infante L, Yilmaz B, Mc Glumphy E. Fabricating complete dentures with CAD-CAM technology. *J Prosthet Dent.* 2014; 111(5):351-5.
23. Zhang P, Li W, Wang Y. Multi- source data acquisition technology in the restoration of the complete denture restoration. *Zhonghua Kou Qiang Yi Xue Za Zhi.* 2016; 51(2):124-8.
24. Alghazzawi TF. Advancements in CAD-CAM technology: Options for practical implementation. *J Prosthet Dent.* 2014; 60(2):72-84.
25. Rao S, Chowdhary R, Mohoorkar S. A systematic review of impression technique for complete denture. *J Indian Prosthodontic Soc.* 2010;10(2):105-11.

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