

Maxillary Midline Complete Denture Fracture Management Using Base Metal Denture Base

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ABSTRACT

A maxillary completely edentulous ridge that has opposing natural teeth poses a mechanical challenge to a prosthodontist since the maxillary denture is subjected to frequent fractures, that classically occur in the midline. We present a unique case of an elderly female patient who had a brachycephalic face type and reported with frequent breakage of maxillary dentures (three within 13 months and all in the middle). The patient had also developed flabby tissue on the maxillary ridge, which was due to, alteration of tissue surface (excessive relief) of the maxillary denture in an attempt to prevent breakage by her regular dentist. Ridge relation was unfavorable to withstand forces developed due to closure of mandible. A metal denture base (chrome cobalt alloy) was fabricated for the maxillary complete denture to which denture base resin was added. The occlusion was adjusted to conform to the biomechanical forces. The patient was able to perform her functions with no report of breakage in the coming one year.

Keywords — chrome, cobalt alloy, single complete denture, treatment, partial denture, interim denture, midline denture fracture

INTRODUCTION

It was in the year 1937, when denture base resin in the form of polymethylmethacrylate was introduced to the dental profession. ¹ They still continue to be used in the fabrication of complete and partial dentures with no challenge from any other material. Their chief advantage is their ability to provide multiple desirable properties at an affordable cost. Their chief drawbacks are related not to inherent properties, but maybe clinical factors like poor adaptation, ² presence of bony exostoses, ^{3,4} or processing changes. ⁵ They lack strength in properties like impact strength which has been slightly improved by various additions that range from plastic to metal. ⁶ Failures or fractures of denture resin, however, are not common during functioning within the oral cavity. One clinical condition where it is definitely the outcome is when a single complete denture is opposed by natural dentition on either side. In such cases, the mandibular forces generate forces in two different directions from the midline. ⁷ Mandibular closures direct forces buccally away from the center of the palate, and with underlying bone unyielding,

the result is often a midline fracture of the complete maxillary denture. This clinical case report presents one such case of existing occlusion in which frequent fractures had taken place within a short span of 13 months.

CASE REPORT

An elderly female patient aged 46 years was referred by a student of the college to the postgraduate section of the Department of Prosthodontics with a chief complaint of three midline fractures of maxillary dentures in the last 13 months. All previous dentures had fractured in the midline shortly after fabrication of the denture. At all times, the patient was eating her regular meals (flour) when she heard the sound of a break in her maxillary denture. The patient was suffering from diabetes, but was under control. Other histories were irrelevant, except she was a non-vegetarian and enjoyed eating non-vegetarian frequently. Patient had a chubby face with a brachycephalic type of face with hyperactive masticatory muscles (Fig 1 A). Intra-oral examination of the patient revealed a slightly flabby and edematous tissue on the right side of the maxillary arch (Fig 1 B), which had developed with the last denture after she had complained to the last dentist about breakage of the two dentures. The fractured denture in that region was over relieved that had caused the tissue to grow within the relief area. Patient dental history also revealed that she had spacing in mandibular anterior teeth, and she also felt they were slightly proclaimed anteriorly.

All her past three dentures were fabricated by the same local dentist in her village. Temporomandibular joint presented no crepitation/click on any side. The treatment plan suggested to the patient included an implant-supported fixed maxillary denture, implant-supported overdenture (maxillary), conventional complete denture with a cast metal base, or a conventional complete denture with mesh. Due to her financial condition and time taken for implant prosthesis, the consent was given for modification of conventional procedures. All clinical and laboratory procedures were done using routine procedures. The only exception was that for the final maxillary impression in which the flabby area was recorded using a window technique (paint on impression plaster within zinc oxide eugenol impression) (Elite Model; Zhermack, Badia Polesine, Rovigo, Italy) (Fig 1C).⁸ The technique allowed to eliminate extra time that was otherwise necessary to heal tissues.⁹ Fabrication of a cast metal denture base was



initiated immediately after fabrication of the master cast. The cast was duplicated using laboratory reversible hydrocolloid impression material (Bego, Bremen, Germany) followed by pouring of the mold with refractory investment. The refractory investment underwent regular treatment like hardening and dipping in wax which was followed by placement of 0.6 mm thickness wax pattern (Bego, size 15/7.5 cm) in the desired shape for metal denture base (Fig 1 D). Regular casting procedure was done after sprue attachments (3mm; Bego)

Casting was obtained and finished, and polished (Fig 2 A). Occlusion for the complete maxillary denture was arranged on a semi-adjustable articulator (Whip Mix series 3000; Elite Dental Services, Inc, Orlando, Fla) using a synergistic face bow (#8645 Quick Mount Face-Bow; Whip Mix Corp). Due to the opposing occlusion, some

minor compromise in canine position on the left side of the complete denture was necessary. Balanced occlusion was developed to improve patient comfort, stability, and prompt denture adaptation. The metal denture base was incorporated within the heat cure denture base during processing (Fig 2 B). Processed denture was finished and polished for acrylic before delivering the denture to the patient. On the day of insertion, a clinical remount was done to correct the occlusal errors, following which the patient was given instructions regarding the maintenance and care of the prosthesis (Fig 2 C). The patient was put on a strict and regular follow-up (24 hours, 7 days, one month, three months, and 1 year). At the end of one year after denture insertion, the patient reported with the normal functioning of the denture without any inadvertent breakage or failure of the denture (Fig 2 D).

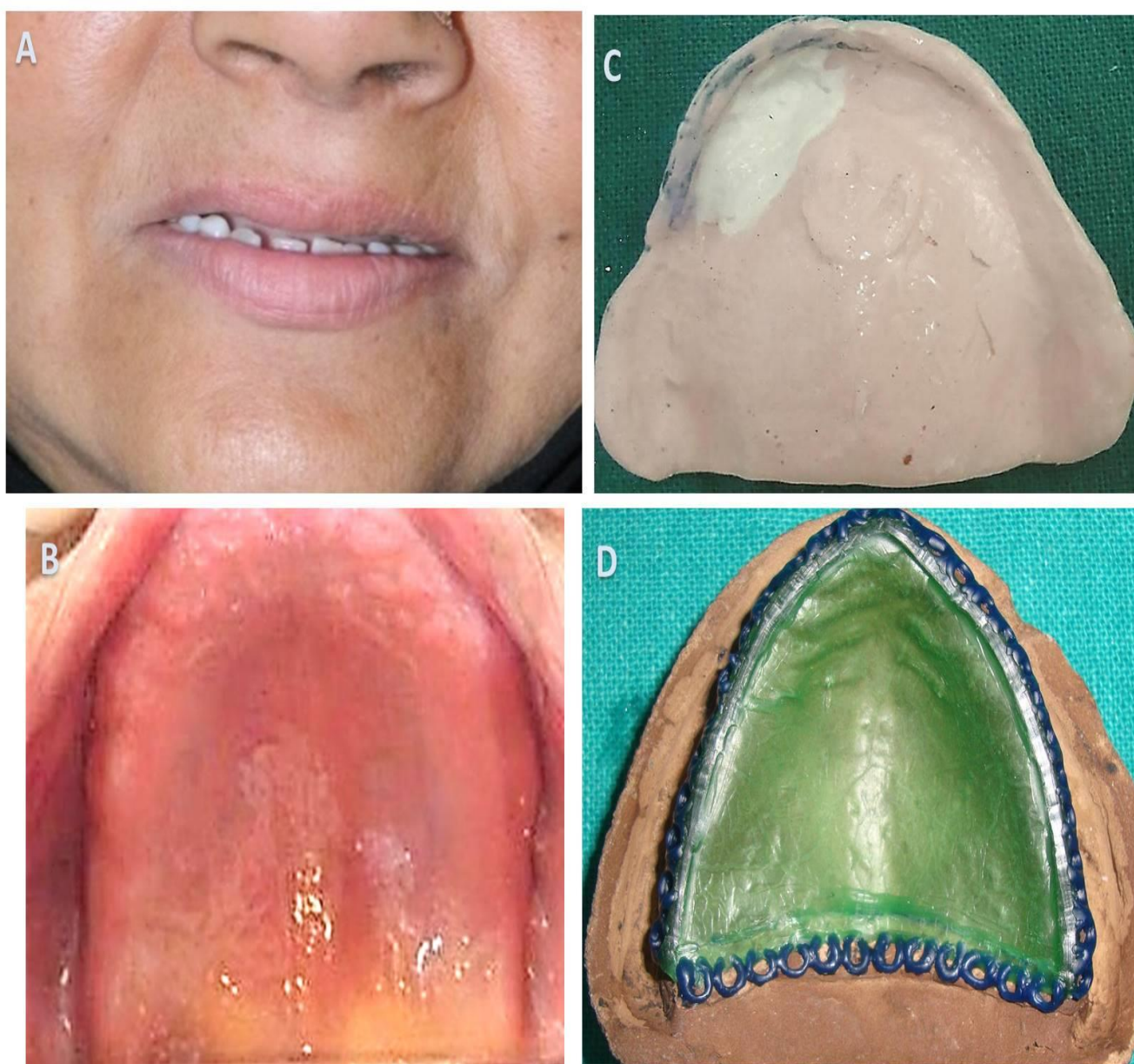


Figure 1: (a) Extraoral view showing well-developed musculature (b) Intraoral view of maxillary arch showing flabby tissue on the right side (c) Paint on the technique used for making final impression (d) Wax pattern for metal denture base on a refractory cast



Figure 1: (a) Pattern wax of 0.6 mm thickness adapted on the outlined refractory cast (b) Spruing of the wax pattern before casting procedure (c) Finished complete maxillary denture with a permanent denture base and complete mandibular denture with heat cure denture base resin

DISCUSSION

Frequent fractures of complete maxillary dentures are mostly as a result of mechanical factors related to existing occlusion. With this case report of an elderly female patient who has had three previous clinical failures of complete denture prosthesis, one can understand the importance of mechanical forces that exist when natural teeth are present. The main feature of the completed case is fabricating a metal denture base on a compromised residual alveolar ridge (flabby tissue) and denture characterization of palatal rugae, which, according to the knowledge of the authors, has not been reported in the literature. Flabby tissue management still continues to be mainly based on the principles of recording flabby tissue laid down by Liddelov,⁹ recent modifications have only been in the techniques¹⁰ or different instruments used to record the flabby tissue.¹¹ Rugae duplication is considered as a form of denture characterization,¹² which can range from copying natural dentition features like dehiscence,¹³ to imparting pigmentation within the denture base acrylics.¹⁴

The midline fracture of maxillary denture is not usually associated with fracture due to impact forces, which usually result in many fracture pieces rather than fewer. The clinician should be able to suspect for every case where opposing natural teeth are present, especially posterior teeth on either side. The inability of the previous dentist to identify the clinical situation did prompt him to seek ineffective measures like relieving the denture on one side. On the contrary, it resulted in worsening of the situation, like the one reported in this case in the form of flabby tissue formation underneath the relieved area. The base metal alloy (chrome cobalt in this case) is ideal for making metal denture bases as it can be made thicker with adequate strength,¹⁵ is hard and strong, to prevent denture fractures.¹⁶ Their strength can be clinically sufficient even if the thickness of the denture base is about half a millimeter. Decreasing the thickness has other clinical advantages like less interference with phonetics and improved thermal conductivity.¹⁷ The only difficulty in the fabrication of a thin metal denture base is the provision of uniform space under the metal base for the acrylic to

engage the retentive struts, which has been addressed in the literature by providing additional relief while fabricating a metal denture.¹⁸

While studies have shown that pressure generated in special trays during impression making is minimum during impression making (less pressure due to provision of holes),¹⁹ the same cannot be applied to the complete denture, which is totally different from an impression tray. Besides the indication mentioned in this article, the use of a metal denture base is also advised in female patients who have the problem of menopausal gingivostomatitis.²⁰

CONCLUSION

Understanding the biomechanics of adjacent and opposing natural dentition is mandatory if one does not want treatment failures due to improper denture designing. While it may not be easy to identify such factors directly during the clinical examination, all clinicians must spend time on analyzing the findings of the diagnostic casts before committing a treatment plan to a patient.

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REFERENCES

- [1] Peyton FA. History of resins in dentistry. *Dent Clin North Am.*, 19:211-22 (1975).
- [2] Grunewald AH. Gold base lower dentures. *J Prosthet Dent* 1964;14:432-41.
- [3] Mattoo KA, Krati J. Multiple maxillary tuberosity exostoses. *J Med Sci Clin Res. Jan* 3 : 4389-91 (2015).
- [4] Rahman S, Deep A, Mattoo KA. Bony Exostoses on Hard Palate - Prosthetic Inferences. *Archives of Dentistry and Oral Health.*, (2019) 2: 01-03
- [5] Belfiglio EJ. Using metal base in making complete dentures. *J Prosthet Dent* (1987) 58:314-7.
- [6] Diaz-Arnold AM, Vargas MA, Shaull KL, et al.: Flexural and fatigue strengths of denture base resin. *J Prosthet Dent* (2008) 100:47-51
- [7] Chow, W.S.; Khim, L.Y.A.; Azlan, A.; Ishak, Z.A.M. Flexural properties of hydroxyapatite reinforced poly(methyl methacrylate) composite. *J. Reinf. Plast. Comp.*, 27 (2008) 945-952.
- [8] Mattoo KA, Kumar L, Rehman SU. Flabby Ridge Management Using Paint on Technique - Meticulous Review. *Journal of Medical Science and Clinical Research* 7(10) (2019) 518-521.
- [9] Liddelow KP. The prosthetic treatment of the elderly. *British Dental Journal* 117(5) (1964) 307-315.
- [10] Singh V, Yunus N, Mattoo K. Flabby ridge management by unconfining freely flowing impression material. *International Journal of Medical Reviews and Case Reports* 4(6) (2020) 1-2.
- [11] Mattoo KA, Rathi N, Jindal S. Applying the principle of hydraulic press for recording flabby tissue. *East African Scholars J Med Sci* 2(12) (2019) 684-685
- [12] Kapoor A, Singh M, Mattoo KA. Abridged duplication of palatal rugae for complete denture prosthesis. *SSRG International Journal of Medical Science* 6 (2019) 1-2
- [13] Mattoo KA, Khare S., Nagaraj K. Characterizing extreme dehiscence of a maxillary molar. *American Journal of Medical Case Reports* 3(2015) 13-15
- [14] Mattoo KA and Sarvar S. Characterizing Single Complete Denture Opposing Natural Teeth and Partial Denture. *J Dental Sci* 2(2017) 000148.
- [15] Allen LR. Improved phonetics in denture construction. *J Prosthet Dent* (1958) 8:753-63.
- [16] Phillips RW. Skinner's science of dental materials. 9th ed. Philadelphia: WB Saunders, (1991) 177-213.
- [17] Faber BL. Lower cast metal base denture. *J Prosthet Dent.*, (1957) 1 : 51-4.
- [18] Mattoo KA. The need of additional tissue relief required under a minor connector. *J Clin Res Dent.*, (2019) 2:1-2.
- [19] Kumar L , Mattoo KA, Yunus N, Singh M, Yadav A. Comparative evaluation of pressure produced on maxillary denture bearing areas by different impression techniques-an in vivo study. *Int J Oral Health Sci Adv* (2015) 3: 38-43.
- [20] Zachariassen RD. Oral manifestations of menopause. *Compendium* (1993) 14: 1586-91.