"Use of a permanent metal denture base to avoid recurring denture fracture"

Falak Naz [1], Humaira Tanvir [2*], Jasmeena Bhatt [3]

[1] Postgraduate student, Department of prosthodontics, Government dental college, KU
[2*] Assistant professor, Department of prosthodontics, IDST, CCSU
[3] Post Graduate student, Department of prosthodontics, IDST, CCSU

ABSTRACT

Frequent breakage of maxillary complete denture prosthesis is a source of dissatisfaction to the patient and thus identifying the underlying cause of such mechanical failures is mandatory to solve the problem. We present a case of an elderly female patient who reported with a history of two maxillary dentures both breaking in the midline. Maxillo mandibular ridge relations were the primary cause of fracture. The maxillary and mandibular residual alveolar ridges were aligned parallel to each other posteriorly due to which the direction of the forces generated by the mandibular closure were focussing on the midline of the maxillary complete denture. A metal denture base was fabricated for the maxillary complete denture to which denture base resin was added. The patients lower third facial height was restored to normal, which removed her pseudo prognathism that was related to decreased lower third facial height.

Keywords — *midline denture fracture, denture repair, base metal alloy, vertical dimensions of face, free way space*

INTRODUCTION

Polymethyl methacrylate resin was introduced to the dentistry in year 1937,[1] and till now continues to be used in various applications for fabrication of dental appliances and prostheses. Their acceptance is mainly based on their biocompatible physical, biologic, chemical and aesthetic properties which are at a moderate cost. They have been reported to fail in cases where there is a poor adaptation[2] (presence of bony exostoses), [3,4] high degree of processing changes are expected while fabricating a denture, [5] and where additional strength is needed. While there have been many reports regarding the above mentioned indications, there are very less reports that suggest its use in conditions of abnormal masticatory directions of forces. One such clinical condition exists when the relation between the maxillary and the mandibular residual alveolar ridges (RAR) is such, that the forces from the mandibular closure are directed bidirectionally opposite from the center of the denture. This occurs when posterior RAR in the mandible does not diverge posteriorly towards the respective ramus of the mandible which in turn places the mandibular teeth far lingually against the maxillary counterpart. When the mandible is closed in such situations, the mandibular teeth strike against the maxillary teeth with forces being directed more bucally than towards the center of the ridge. Repeated loading ultimately gives rise to a midline stress concentration where it may become clinically evident as midline fracture of the maxillary complete denture.

This article in the form of a clinical case report presents one such clinical situation where respective positions of maxillary and mandibular RAR resulted in a midline fracture of two previous dentures.

CASE REPORT

An elderly female patient aged 65 years reported to the post graduate section of the department of prosthodontics with a chief complaint of poor facial aesthetics. She claimed to have developed the current problem as a result of her two previous dentures worn over a period of 8 years. The patient had stopped wearing the dentures about 6 months back after the maxillary denture had broken a second time. Patients social history revealed that she was married to a school teacher and had three children, all of them were settled in both personal and private lives. Currently the patient was living with her eldest son and their respective children. Patients medical history revealed that she had hypertension since last 3 years and that she was allergic to certain contents of dust which sometimes resulted in difficulty to breathe. Patients dental history revealed that she had started wearing her first denture 8 years back and continued to wear it for the next 6 years which was then replaced by a new set of dentures. Both dentures were fabricated by a local dentist in her village and both maxillary dentures had fractured in the middle without ever falling down. The patient did not possess her old dentures, which she claimed to have disposed 6 months back, after a midline fracture of the maxillary denture. Extra oral examination showed a prognathic appearance of the mandible with decreased lower third facial height **(Fig 1a)**. Lateral view also demonstrated an evident prognathic mandible **(Fig 1b)** with lips appearing everted. Temperomandibular joint presented click on the right side with a deviation of the mandible upon opening, but no pain or discomfort was reported by the patient. Intra oral examination revealed a well formed maxillary and mandibular completely residual alveolar ridge (RAR) with a class 1 ridge relation

(Fig 1c). The normal ridge relations suggesting that could be corrected by establishing proper vertical dimensions. Other prominent intra oral features included bilateral labial undercuts in the maxillary arch, decreased inter ridge space, especially anteriorly, mucositis that was not related to denture wearing and high labial frenum in the maxillary arch. Treatment plan suggested to the patient included an implant supported fixed complete denture, implant supported overdenture, conventional complete denture with a cast metal base or a conventional complete denture with mesh. The first two options were subjected to approval after medical consultation. The patient consented for a complete denture with a cast metal base. All clinical and laboratory procedures were done using routine techniques and procedures. The only exception was in making the final impressions of maxillary arch where bilateral undercuts were present. The maxillary final impressions were made using a sectioned tray. [6] The fabrication of a cast metal base started after fabrication of the master cast, which was duplicated using laboratory agar agar (Bego, Bremen, Germany) following which a refractory cast was obtained. On the wax dipped refractory cast, pattern wax of 0.6 mm thickness (Bego, size 15/7.5 cm) was adapted the prognathic mandible was pseudo in nature which **(Fig 2a),** palatine rugae were also duplicated in the wax pattern at this stage. This was followed by spruing of the wax pattern using 3 mm wax sprue (Bego;40089) **(Fig 2b)**. Retention for denture base acrylic was obtained by adding wax on the borders of the wax pattern. Routine casting procedure was then carried out to prepare the metal framework. Casting was obtained and finished and polished. After jaw relations were recorded, the metal denture base was incorporated within the heat cure denture base during processing. Various denture characterization features like melanin pigmentation on gingiva, stippling of gingiva and dehiscence of a molar tooth were incorporated within the fabricated denture. The processed denture was finished and polished for acrylic **(Fig 2c)** before delivering the denture to the patient. On the day of insertion a clinical remount was done to correct the occlusal errors following which patient was given instructions regarding the maintainence and care of the prosthesis. The patient was put on a regular follow up (24 hours, 7 days, one month, three month and 1 year). During subsequent patient visits, the patient was highly satisfied with the esthetic outcome of the prosthesis and no fractures had resulted in a case of the maxillary denture **(Fig 3)**

Figure 1: (a) Collapsed lower third of the face (b) Lateral view showing pseudo prognathism as a result of decreased vertical dimensions and overclosure (c) Maxillary and mandibular completely edentulous residual alveolar ridges

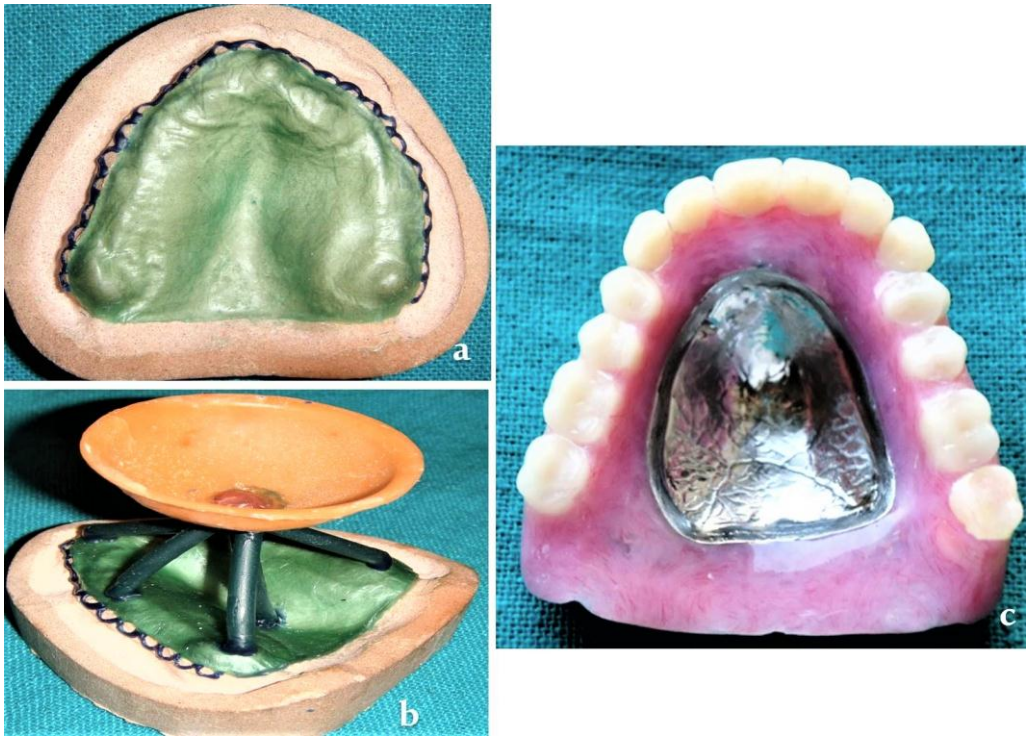

Figure 1: (a) Pattern wax of 0.6 mm thickness adapted on the outlined refractory cast (b) Spruing of the wax pattern before casting procedure (c) Finished maxillary complete denture with a permanent denture base and mandibular complete denture with heat cure denture base resin

Figure 3: Patient at a subsequent follow up visit with the restored lower third of the face and improved aesthetics of the face

DISCUSSION

A clinical case report of an elderly female patient has been presented. The main feature of the completed case being unusual reason of patients cessation of using dentures due to frequent breaking, inability of previous dentist to identify ridge relations that generated excessive masticatory forces in the center of the denture, duplication of palatine rugae within metal denture base[7] and various characterization features (stippling, melanin pigmentation and dehiscence) [8,9] that were incorporated within the complete denture prosthesis. However, the most important being a clinical situation where RAR generate abnormal masticatory forces. The metal denture base is cast from base metal alloys (nickel chrome or cobalt chrome) and

they display excellent strength to volume ratio, which allows them to be cast in thin sections with the least compromise in strength. [10] They maintain their rigidity and fracture resistance even when they are half mm thick.[11] Decreased thickness of the denture base provides least interference with phonetics, excellent adaptation (castability) and thermal conductivity (inherent ability of all metals). [12,13] Fabrication of a metal denture base on an edentulous cast has been a little tricky since the proper space between the metal denture base and the cast is required for proper and uniform flow of acrylic denture base resin at the borders (the flange area). However, this can be easily achieved by providing some additional relief as is done while fabricating a cast partial denture. [14]

The midline fracture of the maxillary denture occurs when the mid area is put under tensile forces which happens when on either side, the mandibular teeth are being forced to direct the forces on the maxillary occlusal surface in a buccal direction rather than towards the crest of the residual ridge. Although, studies have found that pressure generated in the midline are minimum during impression making, but the same does not apply for occlusal forces. [15] Metal denture base has also been widely used in female patients who have the problem of menopausal gingivstomatitis. [16]

CONCLUSION

Intra oral evaluation of ridge relationship should not be limited to space determination, but should be analyzed for possible biomechnical forces that are generated as a result of such relation. Diagnostic mounted casts which are not conventionally and routinely used in complete denture service provide clues to such problems. It is advised that posterior ridge relation should be therefore recommended while making an intra oral examination in complete denture patients.

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