

FABRICATION OF METAL MESH REINFORCED SINGLE MAXILLARY DENTURE

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Abstract:

Single complete dentures pose a great challenge to clinician. Chances of denture fracture are more when natural teeth are present in opposing arch. Heat cure acrylic resin cannot resist the heavy occlusal loads alone and it leads to denture fracture. This problem can be solved by use of innovative materials and appropriate techniques. Metal mesh reinforcement in denture provides satisfactory and economic solution for such cases. This case report describes a procedure of fabrication of metal mesh reinforced single maxillary denture, which is easy to fabricate and better in resisting masticatory loads of natural mandibular teeth.

Key words: Single denture, Metal mesh, Denture fracture.

Introduction

The conventional acrylic resin denture fracture is a challenging condition to prosthodontists. Most common fractures are midline denture fractures as reported in a recent dental survey. Midline denture fractures 46.87% were seen in maxillary complete dentures and 61% were seen in mandibular dentures.¹ The incidence of midline

fractures increases in case of single maxillary dentures opposing natural mandibular teeth.²

There are several factors contributing for denture fracture including flexural fatigue resulting from cyclic deformation and factors which alter the stress distribution of the base.^{3,4} To avoid such fractures, advancement in materials and techniques is prime requirement. Use of metal reinforced denture base,⁵ acrylic resin base reinforced with wire netting, carbon fibre, E glass fibre reinforced PMMA,^{6,7} lucitone 199, Trevalon high, Paladon ultra and visible light polymerized resin⁸ are different methods of increasing denture fracture resistance and decreasing chances of failure. Out of all these methods, metal mesh reinforcement is an economic and less time-consuming method, which significantly increases the denture strength.⁹ This case report describes a case of single maxillary denture fabrication reinforced by use of commercially available preformed metal mesh.

Case Report

A 57-year-old male patient reported to Department of Prosthodontics and Crown & Bridge, with the chief complaint of difficulty in chewing due to missing upper and lower teeth. Patient had no significant medical history. Intraoral examination

revealed completely edentulous maxillary arch (Fig.1) and Kennedy's class IV partially edentulous mandibular arch (Fig.2). Patient was explained about different treatment options-

1. Implant supported overdenture in maxilla and individual implants in mandible,
2. Cast metal maxillary denture and mandibular removable partial denture,
3. Metal mesh reinforced maxillary denture and mandibular removable partial denture.

Due to financial reasons, Patient was not willing to go for implants and cast metal maxillary denture. Metal mesh reinforced maxillary denture with mandibular removable partial denture was selected by patient. It was an economic option with the benefit of increasing strength and fracture resistance of denture.

Procedure

1. Primary impression of maxillary arch was made with impression compound (Rolex). For mandibular partially edentulous arch, alginate (DPI, Algitex) was used (Fig. 3).
2. Maxillary special tray was fabricated using auto polymerizing acrylic resin (DPI-RR) (Fig.4). Border moulding with green stick compound (DPI Pinnacle) and final impression with zinc oxide eugenol (DPI Impression paste) was made. Master cast was poured using dental stone (Kalabhai Kalstone).
3. Maxillary and mandibular base plate and occlusal rims were made on respective master casts (Fig.5).
4. Orientation relation was recorded using facebow (Fig.6). Facebow record was transferred to Hanau wideview articulator (Fig.7).



Fig.1: Completely edentulous maxilla

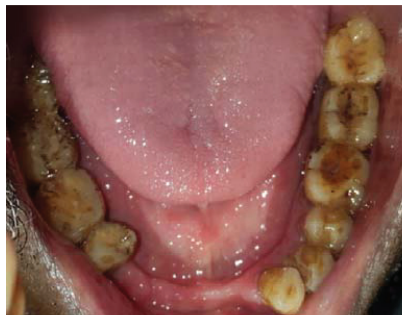


Fig. 2: Kennedy's Class IV partially edentulous mandibular arch

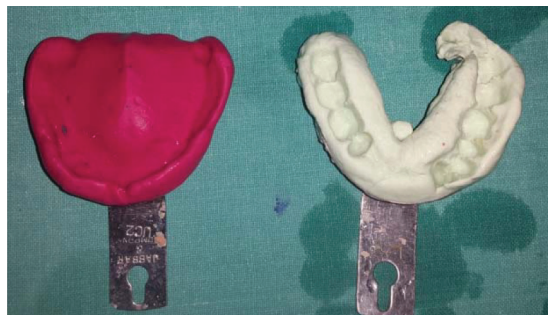


Fig.3: Maxillary and mandibular primary impressions

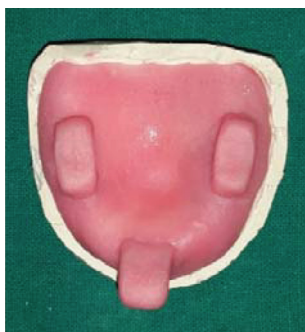


Fig.4: Maxillary Special tray Impression

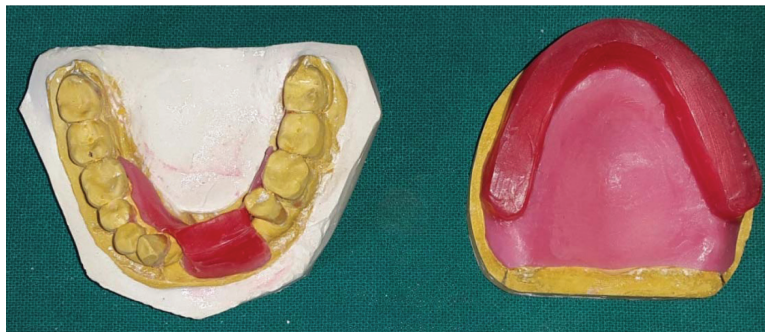


Fig. 5: Base plate and occlusal rim on mandibular and maxillary master cast



Fig.6: Facebow transfer

5. After recording centric relation, mandibular cast was mounted on articulator (Fig.8).

6. Teeth arrangement was done in class III relation (Fig.9).

7. Try-in was done in patient's mouth to verify fit, function and esthetics of trial denture (Fig.10). Patient's approval of trial denture was taken.

8. Maxillary master cast was duplicated with alginate. It was poured with dental stone. Duplicated cast was used for adaptation of metal mesh (Fig.11). A pen was used to mark the size of metal mesh. Extra areas of metal mesh were cut using carborundum disk. Metal mesh was adapted to the cast using universal plier.

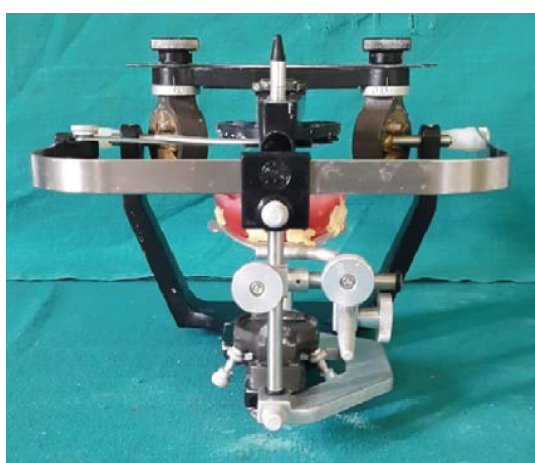


Fig.7: Facebow transfer to Hanau articulator



Fig.8: Mounted cast on articulator

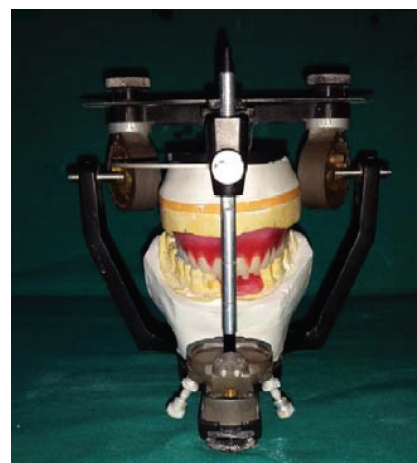


Fig.9: Teeth arrangement done



Fig. 10: Try in done

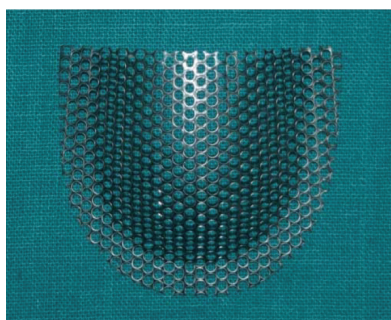


Fig. 11: Metal mesh



Fig.12: Metal mesh incorporated in maxillary single denture

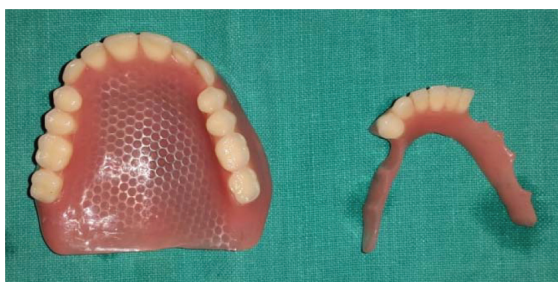


Fig.13: Finished maxillary and mandibular Prosthesis



Fig.14: Denture insertion in patient's mouth



Fig.15: Happy and satisfied patient

9. Conventional laboratory steps of denture acrylization were carried out. After dewaxing and separating medium application, metal mesh was placed on maxillary master cast to check for adaptation. A sort of sandwiched procedure was implemented which involved adapting some amount of the dough resin (Heat cure resin, Triplex) on the maxillary cast over which the metal mesh was placed accurately and the denture was packed in the conventional manner. After curing and deflasking, denture was retrieved, finished and polished (Fig.12).

10. Metal mesh reinforced maxillary denture and mandibular removable partial denture (Fig.13) insertion was done. Occlusal adjustments were made in maxillary denture. Patient was given post denture insertion instructions (Fig.14,15). Patient was recalled after two days for follow up checkup. Function and esthetics of denture were well accepted by the patient.

Discussion

Denture fracture results from two different types of forces, namely impact and flexural fatigue. Impact fracture occurs due to sudden blow to the denture or accidental dropping of denture from hands or mouth. Flexural fatigue occurs due to repeated stress of lower dimension constantly, which results in micro cracks formation in denture base. Conventional denture base material Poly methyl methacrylate (PMMA) shows poor mechanical properties when put in an environment of heavy occlusal loading and tends to fracture.¹⁰ Repeated denture fracture is a problem for both patient and clinician.¹¹

Metal strengthener has a beneficial effect on the fracture resistance of the polymethyl methacrylate.¹² Metal base and metal mesh reinforcement increases the strength of denture and reduces the micro crack propagation. Metal mesh is commercially available in both stainless

steel and gold plated metal. They have a thickness of 0.4mm and their mesh design helps to produce a good resin bond. Metal mesh does not increase the denture weight and decreases the chances of fracture.^{13,14} Metal mesh is also economic to patient. Stock perforated trays, which are used for making alginate impression can be cut and modified to be inserted in denture. Modified portion of tray is used for reinforcing the denture.¹⁵

Using metal mesh has few disadvantages. It looks unaesthetic if it appears on labial portion of denture when patient smiles. It is prone to corrosion and has poor adhesion to acrylic denture base. In some cases patient may be allergic to metal contact. Some authors have proposed a technique of masking colour of metal mesh using self cure acrylic resin to avoid unaesthetic display of metal.¹⁶

Advancement in materials and techniques is required to completely fulfill the requirements of patient and clinician. Implant supported overdentures are newer treatment approach for single dentures.¹⁷ Due to financial reasons, not all patients can afford implant treatment. Metal mesh reinforcement is an economic and promising solution for such cases.

Conclusion

It is a challenge for prosthodontists to provide successful treatment for patients presenting one completely edentulous arch opposing natural teeth in other arch. Such condition places more amount of force on single denture. Metal mesh reinforced dentures offer better strength and fracture resistance. This is a viable treatment option for all patients who suffer from repeated denture fractures due to heavy occlusal loading.

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