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Making of Cast Partial Denture Using Alternate Treatment Plan: A Clinical Case Report

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ABSTRACT *In spite of various modern treatment options available, removable partial denture still holds its place in a situation where the condition of the patient doesn't allow for conventional fixed prosthetic treatment. Designing of cast partial framework involves strategic placement of direct and indirect retainers, rest seat, major and minor connectors for the longevity of prosthesis and maintenance of the health of tissues. This article describes an alternate treatment plan comprising of three novel variations from the conventional treatment plan. These modifications were opted because all three different modalities had a positive effect on the treatment outcome.*

KEYWORDS : dimpling, cast partial denture, removable partial denture, surveyed full cast crown, rest seat, temperature, delayed pouring

Introduction-

Various available treatment modalities like fixed partial denture, removable partial denture, implant-supported fixed partial denture, and implant supported removable partial denture are there, but still the challenge remains as clinically each patient presents different challenges. The desired results in all aspects can be attained by an implant-supported fixed prosthesis, but due to anatomical, physiological, medical and economic considerations, the implants are not possible in every clinical situation. The cast partial denture is a good treatment option as a definitive prosthesis.

Apart from providing desirable aesthetics, it is also economical as well as comfortable for the patients.

Case report-

A female patient aged 50 years reported to the Department of Prosthodontics, Jaipur dental clinic, Abohar, Punjab. The patient was partially edentulous for last 6 months and missing teeth no. were 37, 38,45,46,47 and 48. The patient was not able to eat properly since 6 months and has lost 5 kg of weight, her prime concerns for replacement of missing teeth were loss of weight and poor aesthetics. Various treatment modalities like an interim partial denture, cast partial denture and implant supported fixed partial denture were explained to her. The patient opted for the mandibular cast partial denture.

This clinical report describes an alternative treatment plan for cast partial denture fabrication.

Procedure step by step –

Maxillary and mandibular diagnostic casts were prepared and with the help of face bow, casts were mounted on a semi-adjustable articulator (HANAUTM Wide – Vue Articulator, Whip Mix., Corp., USA).

A duplicated mandibular diagnostic cast was surveyed and designing was done, proposed treatment plan was

Guide plane was planned on the distal surface of tooth no. 44.Since the desired undercut was not found on the buccal surface, thus to achieve desired retention dimpling[1] was proposed on the buccal surface and mesial occlusal rest seat was also planned.

The full cast crown on tooth no. 36, mesial occlusal rest seat

Mesial rest seat on tooth no. 34

Finger extension as rest seats for an indirect retainer on tooth no. 33 and 43

The circumferential clasp as direct retainer on tooth no. 36

I bar as a direct retainer on tooth no. 44

Lingual bar as major connector

Ladder like minor connector

Mouth preparation-

The Cylindrical flat carbide bur no 56 (Mani, INC, Japan) was used to

create a guide plane on the distal surface of tooth no. 44. The prepared guide plane on the distal surface of tooth no. 44 was 3mm wide in bucco –lingual direction and 4 mm wide in cervico- incisal length. The guide plane was located in the middle third of the crown.

Dimpling[1] which is a simple form of enameloplasty was performed on tooth no. 44. This procedure created a gentle depression on the buccal surface of the tooth, which engaged the terminal end of the I bar. This procedure gave added retention to the mandibular cast partial denture. A small round end tapered carbide bur no 4 (Mani, INC, Japan)) was used for making a dimple. A small bur creates a 2mm depression in the M-D direction and 3 mm depression in occluso- gingival direction; this resulted in a desired undercut of 0.01inch.

The mandibular diagnostic cast was prepared with type III dental stone (M.P Sai Enterprises Pvt Ltd, India) and was transferred to the surveyor to check the prepared guide plane and dimpling, it was satisfactory.

At last proposed mouth preparation was done in the patient's mouth by preparing mesial occlusal rest seat on tooth no. 34 & 44, canine finger extension (cingulum rest seats) on tooth no. 33, and 43.

Tooth preparation of tooth no. 36-
Tooth preparation was done on root canal treated tooth for the full cast crown. Functional cusp was prepared 1.5 mm, non-functional cusp was prepared 1.0 mm and on the marked outline of mesial occlusal rest seat, maximum clearance of 3mm was achieved to provide sufficient strength to rest and rest seat.

Making of final impression for a surveyed full cast crown –
For making conventional custom impression tray commercially available auto polymerizing acrylic resin material (M.P Sai Enterprises Pvt Ltd, India) was used.

The final impression was made using single step (auto mixing tech) heavy body and light body polyvinyl siloxane impression materials (Aquasil Ultra Impression material, Dentsply/ Caulk, Milford, DE) in a perforated custom impression tray. Later final impression was stored for 48 hours at 22^{0}C instead of room temperature, which was very high 50^{0}C, and then the final impression was poured with type IV die stone (Kal Rock Kalabai, Mumbai, India).

Making of wax patterns –
Master cast was retrieved from the final impression and die was prepared for tooth no 36. With the help of inlay wax (Kerr Corporation, Orange, CA, U S A) wax pattern was tentatively made, including occlusal contacts on the prepared die. Later the wax pattern along with the cast was transferred to surveyor (Unident instrument Pvt Ltd, New Delhi, India) and the surveyor was conformed for a selected path of placement. The distal proximal surface was carved to act as a guide plane with the help of surveyor blade. The guide plane was prepared in middle third of the crown, this was about 4 mm long, and then facial and lingual surfaces were contoured for desired undercuts (0.01inches).

On the last proposed ideal outline of mesial occlusal rest seat was prepared to make a wide, long and a spoon-shaped occlusal rest seat. The base of the mesial occlusal rest seat was made 2.5mm wide bucco lingually and 2.5 mm long mesio-distally.

The casting of a wax pattern was done with Ni- Cr alloy (Wirosil Bego Dental, Bremen Germany) and then the full cast crown was finished and polished with great care so that the desired contours are not lost. Full cast crown was transferred to the surveyor, for final conforming of the contours. Buccal, lingual and the distal guide plane were again recontoured with the help of bur no 558, 559 (SS White, Lake wood, New Jersey, USA). After this procedure a well- polished full cast crown with desired contours, rest seat and guide plane was achieved and it was cemented on tooth no. 36, which was essential for a retentive mandibular cast partial denture.

Making of final impression for mandibular cast partial denture –
Auto polymerizing custom impression tray was prepared as mentioned earlier and later final impression was made using single step (auto mix technique) heavy body and light body polyvinyl siloxane impression materials (Aquasil Ultra Impression material, Dentsply/ Caulk, Milford, DE).

The final impression was removed from the patient's mouth, it was disinfected and an impression was stored at 22^0 C for 48 hours instead of the room temperature 50^{0}C which was very high, later final impression was poured with type IV die stone (Kal Rock Kalabai, Mumbai, India). Master cast was retrieved and it was sent to a dental laboratory where wax up for mandibular cast partial denture was done and the casting was done with Co- Cr alloy (Wirosil Bego Dental, Bremen Germany) (Pic -1).

Metal framework was tried in the patient's mouth, as fitting of cast partial denture framework was good, mandibular master cast along with the metal framework was transferred onto the previously mounted semi-adjustable articulator, the occlusion was developed using maximum intercuspation and a very light contact was developed between maxillary and mandibular anterior teeth.

Anatomic teeth were arranged and try in was done. Later trial denture was send to a laboratory for acrylization. After acrylization cast partial denture was inserted in the patient's mouth and it was found satisfactory from all aspects, especially from aesthetics and retention part (Pic- 2, 3, 4).

Discussion–
Fabrication of satisfactory cast partial denture was a challenge in such a clinical situation. Thus, an alternate treatment plan was opted to achieve desirable results, in this alternate treatment plan three different modalities were opted which was different from the conventional treatment plan. All three different modalities had a positive effect on the treatment outcome.

a) In this alternate treatment plan on tooth no. 44 dimpling was done to achieve the desired retention. This treatment plan was different, a conservative treatment plan and provided the desired retention as compared to conventional treatment plan in which direct retainer on buccal surface was proposed. Which could have never provided the desired retention.
b) A full cast surveyed crown was opted for tooth no.36 as it was distally tilted and to achieve the desired contours on a selected path of placement without surveyed crown, a judicious removal of tooth structure was needed which could have exposed dentin, and much of crown structure would have lost leading to compromised occlusion, aesthetics, and sensitivity. On this full cast surveyed crown, guide plane was created on the distal surface and the desired contours which provided the desired undercuts and height of contour was created on the buccal, lingual surface, this helped in achieving excellent retention.
c) For making final impression custom impression tray was made and stored for 9 hours because maturation time is always needed for auto polymerizing custom impression tray[2]. Instead of storing the final impression at room temperature, which was very high 50^{0}C final impression was stored at 22^{0}C for 48 hours. Because there are a number of studies which states that higher temperature has adverse effect on dimensional stability[3,4,5,6] and there are a number of studies also which states that polyvinylsiloxane impression can be delayed poured up to 48 hours without affecting the dimensional stability of final impression [4,5,7,8,9,10,11,12].

Thus final impressions were stored at 22^0 C for 48 hours and they were dimensionally stable.

Conclusion-
Proper treatment planning is key to achieving successful cast partial denture. The prepared full cast crown and mandibular cast partial denture were satisfactory from retention, occlusion and aesthetic point of view as proper treatment planning was done.

Pic 1 Mandibular master cast along with metal framework

Pic 2
Insertion of cast partial denture : Occlusal view

Pic 3
Insertion of cast partial denture : Right lateral view

Pic 4
Insertion of cast partial denture : Front view

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