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FULL MOUTH REHABILITATION INVOLVING MULTIPLE CAST POST CORE AS FOUNDATION RESTORATIONS – CASE REPORT

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Abstract
With the advent of prefabricated posts, tedious fabrication of restorations like cast post core is becoming obsolete. However, the advantage of cast post cores in strengthening the existing weakened tooth structure, especially when natural dentition that participate in distributing abnormal occlusal forces is severely compromised cannot be ignored. A geriatric male patient reported with chief complaint of decreased masticatory performance in spite of natural teeth being present. Clinical examinations disclosed severe occlusal wear of maxillary and mandibular teeth, loss of anterior guidance, supraeruption of mandibular anterior teeth and a loss of vertical dimension in occlusion as a problematic aspect of the rehabilitation. A multidisciplinary approach that included endodontic treatment, crown lengthening and fabrication of cast post cores was used to initiate full mouth rehabilitation. Fabrication of multiple cast post core in one stage is the key feature of this clinical case report.

Introduction

The choice of the type of restoration and the material to be used is largely dictated by the amount of the existing natural tooth structure. However, certain situations demand that natural tooth structure needs to be detached in order to facilitate proper functioning of occlusion. One such condition is supraeruption of natural teeth, especially mandibular anteriors. The balance between providing an aesthetic restoration and fulfilling normal occlusal functions largely depend upon the clinician's judgement that depend on knowledge and understanding of basic material science. When mandibular anterior teeth supraerupt in unison, the main problem in rehabilitating occlusion includes establishing an anterior guidance that allows disclusion of posterior teeth throughout protrusion and disclusion of all teeth except canines during lateral excursions. To achieve such complex rehabilitation, an understanding of normal occlusal plane is mandatory. An average plane (occlusal plane) that is established by the incisal and occlusal surface of the teeth 1 promotes masticatory efficiency, aesthetics, stomatognathic balance, proprioceptive control of muscles 2 and more importantly normal occlusal function.

Further reduction of already reduced coronal structure weakens the tooth and in such cases only cast restorations are eligible to enhance strength to the natural tooth even if the size of the core is less. However, the same can do reverse if the design of the post promotes binding of the post within the root canal. [3-5] Passive fit of post with good adaptation prevents wedging effect on the tooth that could lead to root fracture. [6] The present case report describes full mouth rehabilitation of a worn dentition with lost vertical occlusal dimension in which multiple cast post core foundation restorations were fabricated simultaneously and were the key to the long term success of the treatment. The case also describes an impression technique where multiple direct patterns of the post space were taken in a single impression.

Case report

A geriatric male patient aged 68 years, retired from government service was asked to consult the department of prosthodontics with chief complaint of diminished masticatory performance in spite of natural dentition. Masticatory

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inability included problems in tearing, shredding and grinding of food. Personal, social, medical and drug history were irrelevant to the treatment plan. Extra oral examination demonstrated normal temperomandibular joint, facial form and symmetry, lymph nodes, speaking and smiling lines, although when the patient occluded, there was an evident loss of occlusal vertical dimensions **(Fig 1a)**.

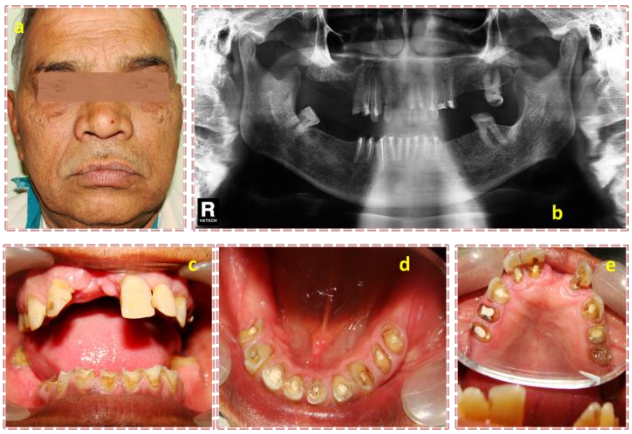

Figure 1: Extra oral preoperative view (a), Orthopantomograph after endodontic treatment (b), intral oral view demonstrating attrition and partial edentulous situations (c to e)

Intra orally the natural dentition presented features of attrition (mostly vertical), supraeruption of mandibular anterior teeth, kennedy class 2 modification 2 in the maxillary arch and kennedy class 3 modification 1 in the mandibular arch. Other significant clinical findings were loss of anterior guidance during protrusion, loss of canine guidance during lateral excursion and mesially angulated mandibular right molar. Radiographic and endodontic investigations revealed little or no tooth structure present over the existing pulp in most of the severely worn teeth. Diagnostic impressions were made using irreversible hydrocolloid (CA 37; Cavex, Holland) and the patient then was put on a regime of muscle deprogramming. Maxillary cast was mounted on a semi adjustable articulator (Whip Mix 3000; Elite) using an arbitrary face bow while the mandibular casts were mounted through interocclusal records. Occlusal analysis was performed using a custom made Broadrick occlusal plane analyzer. [2]

The occlusal analysis recordings were later used during fabrication of the definitive restorations. Based on the occlusal analysis intentional endodontic treatment and crown lengthening was determined. After the diagnostic cast analysis was done the patient was presented with a treatment plan that involved endodontic treatment of seven maxillary and nine mandibular teeth followed by crown lengthening procedures for all supra erupted teeth **(Fig. 1 b to e)**. For mandibular teeth, post space was prepared followed by conventional preparation of coronal tooth structure for post core **(Fig. 2 a,b).** A stock perforated partial edentulous tray was then modified by cutting the area of the tray in the region of the mandibular anterior teeth **(Fig. 2 c)**. Wooden toothpicks were modified in length and shape so that they could passively fit in the prepared post spaces **(Fig. 2d)**. These wooden toothpicks were then lined with inlay wax (Harvard, Germany). Two separate pick up impressions using irreversible hydrocolloid were then made for the mandibular arch **(Fig. 2 e)** following which casts were poured using Type IV dental stone (Ultrarock, Kalabhai Dental, India). Three maxillary teeth were restored with prefabricated fiber posts (Rely X fiber post 3M – ESPE) while the remainder of maxillary teeth was restored with conventional composite **(Fig. 2 g)**. While the cast restorations were fabricated in the laboratory, all the teeth were built up with composite following which temporary crowns at an increased vertical dimension were given to the patient **(Fig 3 a-c)**. The temporary crowns were then used to evaluate the effect of increased vertical dimensions after

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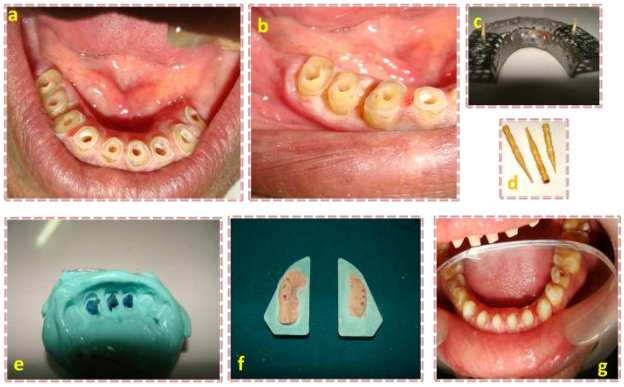

Figure 2: Multiple post space preparations in mandibular arch (a,b), modified stock partial edentulous tray and tooth pick (c,d), pick up impression of post space using tooth pick lined with inlay wax (e), working cast (f), restored maxillary arch with prefabricated posts and light cure composite core material.

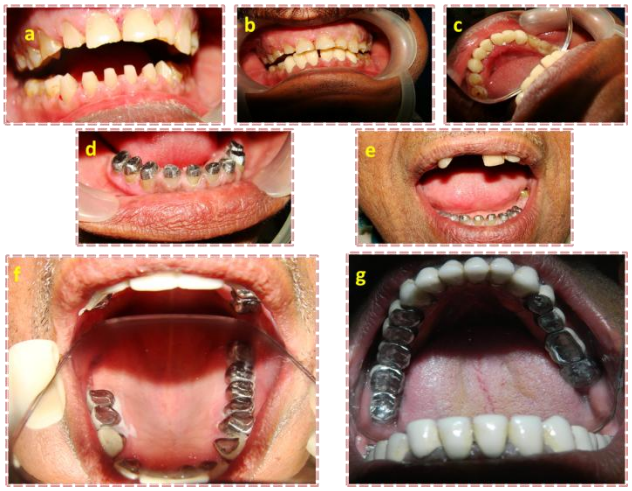

Figure 3: Temporary build up of mandibular and maxillary teeth followed by temporization (a to c), cemented cast post core foundation restorations (d,e), cemented maxillary crowns and fixed partial denture (f), cemented mandibular crowns (g)

necessary adjustment over a period of three months. Once the temporary crowns showed stable occlusal results, the process of definitive restoration was initiated by cementing the cast post cores with zinc phosphate cement **(Fig 3d, e)**. Definitive crowns and fixed partial dentures were first prepared for maxillary arch **(Fig 3 f)** followed by the crowns for mandibular arch **(Fig 3 g)**. All restorations were fabricated with occlusal metal and porcelain facing except mandibular anteriors. Occlusion on both sides was evaluated **(Fig 4 a,b)** before giving home care instructions to the patient. The patient was cooperative and demonstrated good oral hygiene maintenance during follow up period of six months **(Fig 4 c, d)**. The patient was highly satisfied with the treatment outcome, especially with the improved masticatory efficiency and enhanced aesthetics.

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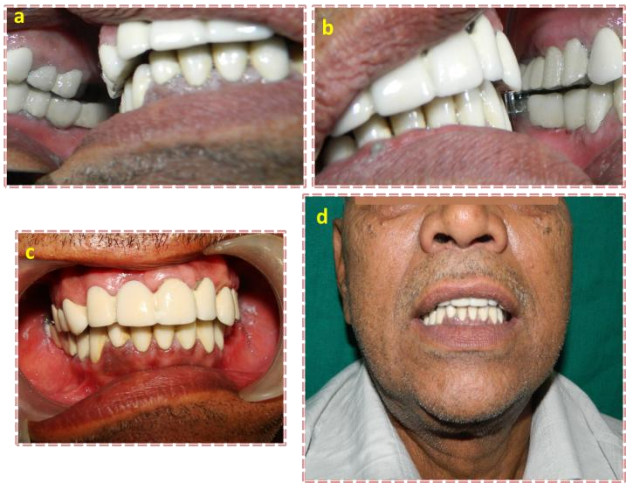

Figure 4: Intra oral view showing right and left side occlusion (a,b), frontal view during trial cementation (c) and completed occlusal rehabilitation (d)

Discussion

For any foundation restoration of cast post core type to be successful, five factors are essential for consideration. These are the post space design, casting fit, coronal preparation (ferrule), the nature of the cement and finally the role of the particular tooth in occlusion. For any post space design, resistance form is more critical than retention form because the dentition is subjected to a 180 degree field of force vectors. [7] Degree of taper and provision of internal grooves greatly enhance resistance form and are key to avoid detrimental stresses within the root. Selection of the core material becomes more important as residual intact tooth structure decreases as physical properties of material dictate the indicated material. [8] Essential properties of the core material include adequate compressive and flexural strength, resistance to microleakage, thermal coefficient of expansion and contraction similar to tooth structure and dimensional stability. Cast post and cores are the restorative method of choice for endodontically treated anterior teeth that show moderate to severe destruction. [9]

Although the fabrication of custom dowel core can be done by the direct fabrication of the pattern, in this case we selected indirect method for fabrication. This allowed us to fabricate multiple cast post cores, refinement of the core on the cast, the passivity of fit on the cast and duplication and finishing of the ferrule within the surface anatomy of the remaining tooth structure. Materials that have been advocated to capture post space anatomy include wax with a plastic rod as a carrier and support, [10,11] wax with a dental bur, [12] acrylic resin with a solid plastic sprue[13] and acrylic resin with an endodontic file. [14] Whatever material is used for support depends on the complexity of the post space and the technique involved. For recording multiple post space preparation, we preferred wooden tooth pick [15] as they could be adjusted easily with a sharp blade with an IOPA x ray as a guide in terms of both width and length. The external tip of the wooden tooth pick is predesigned so as to be retained by the pick up impression material. However, due to the presence of supraeruption of mandibular teeth the stock tray needed modification which was easily done. Vertical stops were also placed within the stock tray so as to ensure correct placement of the impression tray without disturbing the wooden tooth picks placed within the post space.

Conclusion

The use of cast post core as foundation restorations is an inevitable choice when remaining tooth is weak and requires strength from the restoration. Extreme care is required to ensure the passive fit of cast post core restorations. Long term success of such foundation restorations, however need to be determined.

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