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FULL MOUTH REHABILITATION COMPRISING METAL COLLAR RESTORATIONS - CASE REPORT

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Abstract

Attrition of natural teeth is a continuous process and can occur in any natural dentition. As the cusps of natural teeth are worn, masticatory efficiency and the biological stomatognathic stability are affected. Nature compensates the wear of teeth by supra eruption of the teeth, which, when further worn initiates a chain reaction. As time progresses, the teeth expose roots while the gingiva recedes. In such patients, the choice of fixed partial denture becomes tricky because when tooth preparation is done on the roots, the probability of over reduction is more. An elderly male reported for treatment of his excessive tooth wear. Extra oral examination revealed favorable clinical features. Full mouth rehabilitation was done with most of the crowns having a metal collar design. A fixed, movable bridge was part of the treatment plan. Indications of such crown designs are discussed.

Introduction

Attrition of teeth is a common problem in the present scenario of stressful life. Wearing of teeth in most of such cases is generalized and follows no definite pattern once the natural protective mechanism of occlusion is involved. As the teeth wear down there is an appropriate response of the pulp by deposition of secondary or tertiary dentin within the pulp chamber. Most of these cases when they land to the dentist's office are recommended for intentional root canal treatment irrespective of any evidence of pulpal pathology. This is considered to be an anticipatory preventive measure. Most of these patients have to undergo unnecessary endodontic treatment which, besides additional expense also consumes lot of time. Such intentional endodontic treatment is also time consuming. Another problem usually presents in such cases is gingival recession with an exposure of roots, in the absence of any periodontal pathology. It may be argued that nature compensates loss in coronal tooth structure by exposing tooth beneath gingival tissues. For any prosthodontist or a general practitioner the biological, mechanical, esthetic and psychological advantage of preserving remaining coronal tooth structure and therefore performing conservative tooth reduction cannot be confronted. [1]

Rehabilitation of patients with moderate to severe attrition in the past have been undertaken in the form of full mouth rehabilitation using metal ceramic or all ceramic or a combination of both. For a porcelain fused to metal restoration to be considered successful, biological, mechanical and aesthetic concerns have to be satisfied. [2] Incorporation of an appropriate finish line is key to achieve these objectives.Supragingival margins are recommended, though studies have shown maintenance of periodontal health in intracrevicular margins also.[3] Historically, many types of finish lines have been used for metal ceramic crowns like chamfer, bevelled chamfer, shoulder and bevelled shoulder.[4-7] However, in situations where gingival recession is present, one of the problem area is that if one places the recommended shoulder finish line then one cannot prevent excessive reduction on the facial surfaces because beyond the gingival margin or cement enamel junction the contour of the tooth changes inwards. As the diameter of the tooth reduces from this point, one requires excessive reduction to place shoulder finish lines. This is one of the reasons why most of the practitioners recommend endodontic treatment as in many

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instance where adequate crown length is present, reduction on facial surfaces will encroach upon pulp chamber while reducing the surface if one follows the minimum taper principle. This article in the form of a clinical case report presents a situation where through innovative designing of the crown, one can avoid multiple intentional endodontic treatment for patients benefit while fulfilling all the principles of fixed restorations.

Case report

A male patient aged 73 years, was referred by her daughter (pursuing dentistry) to the department of Prosthodontics for a permanent solution to an existing problem of excessive tooth wear. Patient retired from government service, belonged to a different state, had travelled more than 600 miles, was highly motivated and willing to adjust the odds associated with long standing dental treatment. Patient's medical history revealed that the patient has suffered from hypertension since last 7 years and was taking medicines regularly. All relevant histories were non contributing except that the teeth were discolored because of tobacco staining. Extra oral examination demonstrated a long maxillary lip, hypomobile maxillary and mandibular lip with very less visibility of anterior teeth. Intra orally, the natural dentition exhibited severe generalized attrition of the teeth with generalized gingival recession. Radiographic evaluation revealed periapical pathology in relation to mandibular first molars and maxillary first molar **(Fig.1)**. Evaluation of the mounted diagnostic casts on a programmed semi adjustable articulator revealed few teeth, which had less remaining coronal structure. After thorough observations and a multidisciplinary consultation, a treatment plan was consented by the patient, which included extraction of mandibular right first molar, oral prophylaxis and endodontic treatment of teeth with periapical involvement followed by selective crown lengthening in relation to two teeth (#14, 15). Restorations fabricated would be single crowns with metal collar margins, three unit fixed fixed prosthesis and a fixed movable prosthesis for maxillary left side. The patient was educated for the reason why the metal collar design was chosen for him.

Preliminary impressions were made using irreversible hydrocolloid (Thixotropic, Zhermach, Italy) from which diagnostic casts were obtained. They were then mounted and programmed on a Hanau Widevue semi adjustable articulator (Waterpik, Ft Collins,CO, USA). Vertical dimensions were maintained by a few of the existing posterior teeth unaffected by tooth wear. After mock preparation of the casts an occlusal plane was decided that would best serve for aesthetics and function within the biological dynamics of the stomatognathic system. Preparations were made for porcelain fused to metal restorations that would allow a metal collar in the cervical area with chamfer and heavy chamfer kept as a finish line depending upon providence of adequate metal thickness near the gingival margin. Full mouth rehabilitation was based on the principles given by Pankey Mann Schulyer [8] while following Dawsons quadrant arch approach. [9] Mandibular and maxillary anteriors were crowned first with a new anterior guidance that would allow posterior disclusion. Maxillary restorations included a fixed partial denture in which a provision for the fixed, movable bridge was made using a combination of dove tail and occlusal rest seat **(Fig. 2a)**. A three unit fixed partial denture was

Then fabricated that carried the male component of the fixed, movable bridge **(Fig. 2b-e)**. In the next phase the right side posterior teeth were restored, followed by left side **(Fig. 2f-h)**. All molars were given full veneer crowns whereas premolars were capped with porcelain fused to metal with buccal facing.

All the crowns and bridges were cemented with zinc phosphate cement except those whose crown length was less. The patient was given instructions regarding oral hygiene maintenance. The patient reported extreme satisfaction with his new restorations **(Fig 3a, b)**. In one week follow up, a mandibular anterior crown had decemented while eating sticky food which was duly cemented again **(Fig.3 c, d)**.

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Figure 1: Orthomopantograph of the patient showing excessive tooth wear, periapical lesions and Kennedy class 3 partial edentulous space

Figure 2: Anterior fixed partial denture with a fixed movable prosthesis (a-d), posterior metal ceramic crowns with buccal facing (e-h)

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Figure 3: Extra oral photographs (a,b), cement failure of mandibular anterior crown before and after correction (c,d)

Discussion

Contacts and contours are an essential part of fixed prosthodontic care. Biocompatible margins always maintain the essential contours of the remaining natural tooth. For a porcelain jacket crown, shoulder with few variations is an acceptable finish line, [10] because it increases restoration strength, porcelain bulk and fabrication accuracy. [11] When the porcelain is fused to metal it produces significantly greater marginal metal distortion, though less (50 μm). [12,13] Selection of finish lines used with metal, ceramic crowns should not be based on marginal fit, but on personal preference, aesthetics, ease of formation, and the type of metal-ceramic crown (metal marginal collar versus collarless design) being fabricated. Recommended metal-ceramic finish line depths are based on the minimal material thickness required for strength and aesthetics as well as the minimal space required to develop a physiologically emergence profile. [14]

Emergence profile of remaining natural tooth after occlusal wear is an important guide to determine the thickness of metal collar. As can be seen in this case that all the crowns have different thickness of metal near the cervical margin. Within each tooth also there is a variable height of metal collar. This height should be totally determined by the contours of the underlying gingiva and the root portion of the tooth, which is accomplished in the laboratory by a procedure called ditching of the cast. Extreme caution was taken at the time of wax pattern fabrications, especially their cutbacks and porcelain firing. During metal trial of each tooth, one should ensure that the margins blend with the underlying contour of the root.

Patients do not want display of metal in the anterior teeth, except in some cultures where it is a tradition. Patients with long lips with both lips hypomobile during a speech and smile is an ideal candidate for metal collar design. In this case, even when the patient laughed, the lips would still cover the cervical portion of the crowns thus making the display of metal insignificant. Proper clinical examination and patient education motivated the patient for metal collar design. Another criteria that supported use of metal collar design included patients will to prevent endodontic treatment of natural teeth, which was time consuming and would have delayed his rehabilitation. The patient continues to feel satisfied with his rehabilitation after a period of three years and has not reported any problem till date.

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Conclusion

The use of metal collar porcelain fused to metal crowns should be judiciously planned and practiced and should be chosen when it is duly indicated as in this case.

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