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Rehabilitation of a severely worn dentition & partially dentate patient with fixed and removable prosthethics: A Case Report

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ABSTRACT

In patients with multiple edentulous areas, evidence of tooth wear and occlusal alterations; a combined crown and bridge and removable partial denture treatment plan may be recommended. This treatment plan involves the placement of both fixed and removable prostheses to restore function and aesthetics. Combined restorative cases typically involve placement of crowns and bridges together with a removable partial denture. Patients often present seeking treatment to restore aesthetics and function, temporomandibular joint (TMJ) discomfort and sensitivity due to tooth wear. During the treatment of such combined cases it will often be necessary to reorganise the occlusion by increasing the occlusal vertical dimension (OVD) prior to the placement of fixed and removable prostheses thus allowing for adequate space to accommodate additional restorative material. In addition, the dental practitioner should always provide accurate and step-wise clinical input and instructions to the dental technician in relation to the removeable partial denture (RPD) design in order to facilitate retention, stability and support.

INTRODUCTION

Tooth wear is described as the irreversible, non-carious loss of tooth structure. A combined fixed and removable treatment plan is an option when there are edentulous spaces in addition to the remaining teeth. The dental practitioner would evaluate the remaining tooth structure for bonding, evidence of tooth wear and the ferrule effect. An additional matter of interest for the dental practitioner is the assessment of the patient's face height and whether the occlusal vertical dimension should be increased.[1]

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The prevalence of tooth wear has shown a marked increase in recent years, and has been attributed to various factors. These are changes in lifestyle with the increased consumption of acidic food and drinks and the increase of gastro-oesophageal reflux disease (GERD) leading to chemical erosion; while mechanical tooth wear is related to bruxism. [3,4] In addition, tooth wear has shown a marked increase with increased patient age. Extensive tooth wear can result in dental pain (due to the exposure of dentinal tubules) and poor masticatory function. Many patients also report a change in aesthetics, which impacts patients on a personal and social level. These factors may have an impact on patient's quality of life. [3,4] Often patients are not cognizant of tooth wear, as it is a gradual process. Quite often patients seek treatment when the tooth wear process has progressed extensively and when symptoms appear; or when aesthetics is compromised. The restoration of functional occlusal relationship and aesthetics will often require a full mouth rehabilitation with an increase in the occlusal vertical dimension.[2,3,4] Localised tooth wear is commonly seen in anterior maxillary teeth. The decision-making process to optimally restore these teeth depend on various factors, such as: the pattern of tooth loss, the occlusal space availability, space that the proposed restorations require, the condition of the remaining tooth structure and the aesthetic concerns of the patient.[5,6]

A systematic review conducted by Kassardjian *et al.,* 2020 examining the restoration of teeth affected by tooth wear, determined that all included studies prescribed an increase in the occlusal vertical dimension, where interocclusal space for restorations are required. This can be achieved by the reorganising of the patient's occlusion.[7]

For patients with severe tooth wear and altered occlusion, increasing the occlusal vertical dimension (OVD) is often essential. This is a key step in planning comprehensive full-mouth rehabilitation. Prior to increasing the OVD, the dental practitioner needs to consider the following: remaining tooth structure, the remaining space for restorations, and the changes in occlusion and aesthetics. Change in OVD is a debated topic amongst dental researchers, as some state that changes to OVD will interfere with the masticatory process and be difficult for a patient to adapt to.[8] Hyperactivity of masticatory muscle, increased bruxism, change in occlusal forces and TMJ dysfunction are considered by some researchers as consequence of increasing the OVD. Contrary to these findings, others have found that those symptoms are temporary and resolve within a period of time.[8] By approximating the difference

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between the ideal tooth height and the loss of clinical crown height, a new OVD can be planned.[9]

CASE REPORT

The patient presented to the Postgraduate Prosthodontics Department for a full mouth rehabilitation, referred from our service rendering clinic at the UWC Oral Health Centre. She presented with severe tooth wear and ill-fitting cobalt-chromium removable partial dentures in the maxilla and mandible. Her occlusion needed to be re-organised due to wear on her natural and acrylic denture teeth. Her incisors and canines revealed minimal space available for adequate crown placement, hence a surgical crown lengthening procedure was indicated and subsequently completed, thus gaining clinical crown height of 1.5 - 2mm. The patients existing lower denture was adjusted and used as a diagnostic denture, in order to evaluate her tolerance to the improved OVD before progressing to the provisional phase with increasing the OVD. The improved OVD was achieved by placing provisional crowns (anterior maxillary and mandibular) and composite restorations on teeth with minimal surface loss, in addition to the newly constructed acrylic removable partial dentures in the maxilla and mandible.

This clinical case involved obtaining increased clinical crown height by a crown lengthening procedure, followed by increasing the OVD by manufacturing provisional crowns and new and improved acrylic partial dentures. After a 6-months period on the provisional prostheses, final prostheses construction was initiated.

For the definitive restorations, the maxillary crowns were constructed first, with palatal milled guide plane surfaces prepared on the abutment teeth, by the dental laboratory which was identified and prescribed in the partial denture design. These preparations on the occlusal and palatal or lingual surfaces will assist in direct occlusal load to the long axis on the abutment teeth, as well as aid in retention of the cobalt-chromium removable partial denture. The dental laboratory (University of the Western Cape – Dental Laboratory) was instructed to incorporate these milled surfaces on the design of the metal ceramic crowns, as per instructions from the partial denture design. The metal ceramic crowns were cemented, with a resin self adhesive cement (Rely X)®. Final impressions for the removable partial dentures were made after cementation on the metal-ceramic crowns. A polyether impression material (Impregum ®) was used. The mandibular teeth were then refined for its definitive metal-ceramic crowns. An impression was made with Impregum™ impression material.

Crowns were cemented with Rely X ®, followed by the final impression for the RPD in the mandible. Imgregum ® impression material was also used for the RPD impression.

The patients occlusion was evaluated, and periodic recall visits set up. On recall the patient reported an improvement in aesthetics, function and comfort with her removable partial dentures.

Summary of treatment steps:

1. OVD assessed based on tooth surface loss.
2. Surgical crown lengthening procedure – lower anterior teeth. This procedure increased the clinical crown height, needed for cementation of the indirect restorations.
3. The patient's occlusion was re-organised by means of using her existing RPD's, adding self-cure resin polyethyl methacrylate (SNAP®) to her dentures occlusal surfaces, to increase her OVD. (Period – 3-6 months use).
4. Teeth were prepared for provisional crowns and interim acrylic RPD's in the maxilla & mandible, at the improved OVD. (Period - 2-4 months use).
5. Proceed with the ceramic & metal-ceramic crowns in the maxilla first, followed by placement of the cobalt-chromium RPD.
6. After delivery of the maxillary crowns & RPD, completion of the mandibular crowns, followed by fittings and placement of the RPD.

Throughout the whole procedure, the patients vertical height was maintained and her occlusion remained stable.

Figure 1: Maxillary Pre-operative partially dentate view

Figure 2: Mandibular pre-operative partially dentate view

Figure 3: Lower partial diagnostic denture used to increase OVD

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Figure 4: Post-operative view with maxillary removable partial denture and anterior all ceramic crowns (12-23), posterior PFM crowns (13, 24 & 25) with palatal milled guide surfaces.

Figure 5: Post-operative view with mandibular removable partial denture

DISCUSSION

With implant supported prosthesis yet to become the first-choice treatment for patients, the combination of a fixed dental prosthesis with removable partial dentures with precision attachments as retentive elements can be considered as the most sophisticated form of care. The combination of fixed prosthesis and removable partial dentures involves full coverage porcelain fused to metal crowns on teeth retaining the RPD with the inclusion of milled guide planes on the lingual/palatal surfaces which serve as a guide plane to enhance the stability and retention of the removable partial denture.[10]

By using a milled guide plane on the palatal area of a partial denture, increased stability and support is afforded to the partial denture. Guide planes are precision milled to the palatal area of the denture in order to ensure a secure and snug fit against the palatal area. By using a guide plane on the palatal surface, it provides a guide for remaining natural teeth, and in this way prevents rotation and movement of the denture during function.[11]

The major and minor connector should cover minimum amount of soft tissue while being in contact with the remaining teeth. The milled palatal and proximal surfaces which are left in the as-cast state, create frictional retention and enhance stability. Axial surfaces, milled to perfection, are only half of the equation. The framework must have maximal possible contact with the milled surfaces so that they function as precision attachments.[12]

Clinicians should bear in mind that errors could occur due to a discrepancy between the milled surface and the cast partial denture due to finishing and polishing. The uncontrolled loss of metal that normally occurs in the fitting phase dramatically alters the fit of the casting to the milled surface. Every effort must be made to leave the internal surface of the casting in the as cast condition in the areas of desired contact with the milled surfaces. The laboratories must neither electro strip these surfaces nor grossly grind them to fit the frame to the master cast. Rather, the fitting of the frame must be first done in the mouth with all restorations present. By integrating the milled guide plane on the palatal aspect of a fixed partial denture, improvement in the stability of an RPD increased its resistance to rotational movements and most importantly eliminated the need for visible anterior clasping, thus achieving the basic principles of retention, stability, and support along with patient compliance.[13]

Figure 6: Pre-operative facial view

Figure 7: Post-operative facial view

CONCLUSION

Combined fixed and removable prosthetic cases allow for a thorough treatment plan that may address various patient concerns. As there is often circumstances in which dental practitioners cannot complete the ideal treatment plan of implant retained prosthesis, combined cases allow patients to benefit from a customised, cost-effective and aesthetic alternative with great success.

No conflict of interest

Informed consent taken was for all images.

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