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Challenges in the Management of Elderly Patients with Severe Tooth Wear: A Conservative Approach

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ABSTRACT

The present case involves the management of severe tooth wear in elderly patient using a multidisciplinary treatment approach, which includes full mouth rehabilitation to restore upper and lower generalized tooth wear due to attrition, re- treatment of failing root treated teeth, stabilizing localized periodontal problem, restoring the missing multiple upper teeth (sparse dentition) and management of bruxism. The treatment provided include non- surgical management of localized moderate chronic periodontitis affecting the posterior teeth, re-root treatment of the lower anterior teeth, direct resin composite restorations at an increased occlusal vertical dimension (OVD) and an upper removable cobalt-chromium partial denture (overdenture) with tooth 24 and 28 as abutments. Finally a lower soft splint was given to protect the restorations and remaining dentition due to bruxism.

Introduction

Restoration of worn dentition posed a great challenge to the clinician. In terms of restoring the functions, and maintaining the remaining dentition, the clinician needs to identify the etiology and the severity of the tooth wear. As this will determine the management of the problem which either restoring the worn dentition with conforming or reorganizing the occlusion. A reorganized occlusion simply means the occlusion is being deliberately changed. Full mouth rehabilitation is a clinical procedure that should not be taken lightly and has to be done with careful planning and execution. When full mouth rehabilitation or reorganized occlusion was proposed, the procedures appear somewhat mystical or something impossibly technical to the clinicians. But, the underlying principles are relatively simple and easy to comprehend. Therefore, reorganized occlusion or full mouth rehabilitation should not be viewed as a complex or intimidating procedures. Haven't said that the understanding of the importance of the basic technicalities should not be underestimated. A full mouth rehabilitation often takes a multidisciplinary approach which may involves the coordination of a dental professional team. Depending on the complexity of the case, it often requires multiple visits to the clinic and lengthy treatment time. However, with careful and detailed treatment planning, the execution of the treatment should be easy and its outcome should be predictable.

Clinical Case Report

A 69 year-old man presented to the clinic with complaint of severely worn teeth especially the lower teeth. He noticed that the tooth wear was getting serious (wear rate very rapid) and he wished to avoid further depletion of his dentition. Furthermore, the sensitivity of the lower teeth has set in and the sharp edges of the worn teeth were causing discomfort to the patient. Patient suffered from osteoarthritis and currently on analgesic such as Tramadol 50 mg and Paracetamol 500mg, otherwise he is fit and healthy. Patient attended the dental clinic regularly and undergone a series of dental treatment including tooth extraction due to caries, root canal treatment, and what brought the author's attention was the dental composite build ups to address the current problem. However, according to the patient, the dental composite build ups did not last long and deterioted over a short period of time. This mean that either the occlusion was not properly controlled or the underlying parafunction habit such as bruxism was not addressed accordingly. During thorough examination and history taking, it revealed that patient has bruxism. At the time of examination, patient was wearing an upper cobalt chromium partial removable denture (horse shoe major connector) which was made 5 years ago. Patient has a rather unremarkable social history. He is a retiree who previously worked as a coal miner. An ex-smoker who quit smoking 4.5 years ago, drinks alcohol occasionally (8 units/week) and do not consume large amount of sugary or acidic diet.

Clinical Examination

Extraorally, no abnormalies detected apart from very prominent muscles of mastication, which are indicatives of parafunction habits. Intraorally, oral hygiene status is satisfactory. All the gingivae and oral mucosae appeared to be healthy. However, during periodontal charting, some localized deep pocketing were noted on tooth 18 distal, 14 mesial and 38 distal. For general dental condition, it was found that patient has sparse maxillary and moderately mandibular remaining dentition which were widely restored. Generally non carious tooth surface lost of tooth 11, 21, 22, 23; 34 to 44 with its severity graded using Smith & Knight Index number 3. There were lost of occlusal vertical dimension (OVD). Besides that, tooth 24 fractured vertically

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but it was above the gingival level and suffered from substantial tooth wear too. Generalized grade I tooth mobility were noted on tooth 14, 31, 32, 41, 42 and 43. Patient also suffered from multiple missing teeth due to caries and periodontal problem which leads to lost of posterior support. One of the upper wisdom tooth 28 was partially erupted.

Occlusal examination was performed. Patient presented with class I skeletal profile. For static occlusion, patient showed incisor relationship Angle class I, overjet 4.0mm, overbite 80-85%. While for dynamic occlusion, minimal retruded contact position to intercuspal position slide was noted, with first contact on the left sides. Right lateral excursion contact on tooth 14 and canine guidance for the left excursion. Lastly, contact noted on between 11 opposing tooth 41 and 42; tooth 21 opposing tooth 31.

Dental panaromic and long cone periapical tooth 14 radiograph was taken and interpreted. Dental panaromic showed generalized horizontal bone resorption on maxillary involving 30 to 50 percent of bone loss and tooth 18 showed 75 percent of bone loss. While for mandibular region, it showed generally 30 percent of horizontal bone loss. Tooth 14, 22, 23, 24, 31, 32 and 33 were root treated. Periapical radiolucency was noted on tooth 33. Long cone periapical radiograph tooth 14 showed adequate root filled with no periapical lesion.

With the thorough history taking, comprehensive clinical, occlusal examination and radiographic findings, the diagnoses were made. Localized moderate chronic periodontitis of 18, 14 and 38. Severe tooth wear involving maxilla and mandibular anterior teeth due to mechanical (attrition) and erosive wear; the Gutta Perca for root treated 32 and 33 were exposed to the oral cavity due to the tooth wear, hence the root canal therapy of teeth were considered failed. The tooth wear further caused reduction of OVD. Patient also presented with loss of posterior support due to loss of posterior teeth which then contributed to occlusal instability. Besides that, the history and clinical signs also revealed that the patient suffered from parafunction habit, bruxism which further explained the tooth wear.

The aims and objectives of the treatment were to stabilize the periodontal condition, re-treatment of the failing root canal fillings, identified the cause and prevent further non carious tooth surface loss, to increase the occlusal vertical dimension (OVD) with the aim to create sufficient inter-occlusal space for the upper denture construction, replacement of the missing upper teeth with a more stable upper partial denture and lastly to improve the function and aesthetics of the patient.

Hence, the treatment plan was constructed which consisted of three main phases, namely 1. Preventive or stabilization phase; 2. Definitive phase and lastly 3. Maintenance phase. Preventive or stabilization phase involved in motivating the patient to keep his good oral and denture hygiene. This followed by non-surgical management of periodontal disease including root surface instrumentation (RSI) under local anesthetic agent for periodontal pocket more or equal to 5.0 mm. After stabilizing the periodontal condition, definitive phase which included re-treatment of root canal therapy of tooth 32 and 33 under rubber dam, composite build up at planned increase OVD (3-4mm) which involved tooth 15, 11 to 23,34 and 35. Composite coverage of tooth 24 to prepare as overdenture abutment. An upper cobalt chromium partial overdenture was planned to replace the missing teeth and 24 as an abutment. Lastly, lower soft splint was prescribed to protect the direct restorations and the remaining dentition from patient's parafunction habit and subsequent review to monitor the progression of tooth wear and other dental condition. Maintenance phase is very crucial besides monitoring the direct restorations that were placed but also the other prostheses that were given to the patient like the denture and splint. Besides that, patient's oral hygiene and periodontal condition needs to be well maintained all the time. All these would contribute to the longevity of the restorations and the health of the supporting tissues.

Among the key stages in the treatment progress were to reinforce the oral and denture hygiene after through history taking and clinical examinations. Basic records like study models, facebow (Denar® Slidematic facebow) record and bite registration were taken as preparation for the treatment planning. During the second visits, non- surgical management of periodontal disease including RSI under local anaesthetic agent (Septodont Lignocaine HCL 2% with adrenaline) for periodontal pockets more or equivalent to 5.0mm and full mouth scaling polishing, followed by periodontal review after three weeks. Once the periodontal condition was well maintained, re treatment of root canal therapy of tooth 32 and 33 were commenced under rubber dam and completed in two clinical visits. This was followed by composite build ups using dental composite (Coltene Whaledent Miris 2 Dental Hybrid Composite) to increase the OVD approximately 3.0mm to 4.0mm, these were done under rubber dam (Figure 1).

Figure 1. Rubber dam placement for Sandblasting and composite build ups.

All teeth involved were sandblasted with aluminium oxide particles (50um) prior composite placement to increase the surface of retention and to remove the pellicle layer.

Figure 2. Composite build ups for the mandibular arch.

Composite build ups were done on the mandibular arch (Figure 2) followed by the maxillary arch and occlusion was checked to make sure there was no introduction of any form of interferences, lastly the composites were polished to a luster. The design of maxillary cobalt chromium partial overdenture was discussed with the patient and agreed, rest seats preparation was done accordingly and final impression was taken using the upper special tray and regular bodied silicone impression material (Dentsply Sirona Reprosil VPS Impression Material Regular Body). The impression was then sent to the laboratory for cobalt chromium framework

constructions. Once the framework ready, framework try in stage where the fit and stability of the framework were checked. Bite registration (maxilla-mandibular relationship) was recorded and tooth shade chosen. Two visits of tooth try in was needed due to the tooth shade discrepancy noted by the author and patient complaint of cheek biting on right posterior region, problem was rectified by changing the tooth shade with the present of the lab technician to confirm and adjustment made on the flange. Patient is happy with the new shade and flange adjustment.

Figure 3. Maxillary removable cobalt chromium partial denture fitted.

One week later, the maxillary removable Co-Cr overdenture was fitted (Figure 3). Good fitting, stability and retention of the denture were achieved. Minor occlusal adjustments were carried out. Patient felt comfortable with the fit and appearance of the denture. Post insertion review after one week. Lower impression using alginate (Lascod Kromopan Alginate) taken for soft splint and will be sent out to patient via post. Final review was done after 3 months, patient was extremely pleased with the final outcome of the treatment (Figure 4 and 5).

Figure 4. Pre-treatment frontal view.

Figure 5. Post-treatment frontal view.

Discussion

The management of the patient's dental problems involved a multidisciplinary approach with combination of non-surgical management of periodontal disease, root canal therapy, direct restorations and replacement of the missing teeth. His main concerns were the progressing tooth wear and deteriorating dentition over a long period of time. Therefore, the main aim of the treatment was to improve function, preventing further tooth surface loss and restoring a stable occlusion, while improving the aesthetic was the least concern for the patient. Our aims were determined after lengthy discussion with the patient, the clinician (the author) to ensure that the patient's expectations were met and it was within the clinician's ability to deliver the prescribed treatment to a high standard.

It was difficult to determine the etiological factors involved in the presenting tooth surface lost. The wear pattern presented by the patient was consistent with attrition and erosion. The clinician managed to identify the attrition to be related to patient's bruxism habit (both asleep and awake) judging by the flattening of cusps and interdigitation of upper and lower tooth wear surfaces. However, we were uncertain of the cause the erosion (31's tooth coloured restoration was 'standing proud' and palatal wear). The diet history showed no particular acidic foods intake and there was no history of acid regurgitation/ reflux from the stomach. This came down to the patient's previous job as a lorry driver. Assumptions were made that the long distance lorry driver tend to consume vast volume of high sugar and caffeine drinks via soft drinks or energy drinks due to long working hours during night shift and to keep them awake.

The need to protect the exposed dentine and prevent further pulp involvement of the remaining vital tooth determined the need for immediate action. Composite resin was chosen as placement of direct restorations which would restore the function, improve the shape and contour of the teeth hence the aesthetic. It is a conservative approach which it can be done with minimal or no tooth preparations and the most importantly, it is reversible[1]. Besides that, the whole treatment procedure is within the clinician's control which means it does not involve laboratory work. The down side of it are discolouration[2], debonding and fracture of filling especially in thin section[3], technique sensitive (need good moisture control) and lengthy chair-side time (dependant on operator skills)[5]. However, repairs can be done easily without any further catastrophic damage to the underlying tooth structure and pulp [1]. In the patient's case, adequate bulk of composites was placed to restore the worn dentition to prevent it from fracturing and just before the placement of the composite; the teeth were sandblasted under rubber dam to enhance the retention of the dental composite. The practice of good moisture control and incremental technique would ensure a good survival rate for the restorations. It has been reported that the survival rate of direct restorations in tooth wear management is about 4 years 9 months [4] to 5 years 10 months [5]. It means, he may require some maintenance in about 5-6 years, which is reasonably good given the simplicity and straight forwardness of the procedure.

The need to increase the patient's OVD was crucial to provide space for prosthodontic restoration and to improve the aesthetic of anterior teeth. It has been reported that a fixed restoration would be a better option in increasing OVD due to good patient adaptation [6]. There are several considerations when deciding on the amount of OVD increase.

This includes facial profile, lip competency, smile line, incisal height of the remaining teeth, and phonetics and health status of temporomandibular joint [6]. Studies have shown that an increase between 2.0m to 5.0mm is still within patient's ability to adapt without any pathological reactions [6-12]. Therefore, we decided to provide a 3-4mm of increase in OVD for the patient, to ensure adequate space for prosthodontic restorations without compromising the phonetics, aesthetic, and neuromuscular activity.

The patient's previous horseshoe-shaped denture was replaced by a new set of partial denture. An upper removable partial Cobalt Chromium overdenture was provided to improve oral function efficiency especially mastication [13] and also to ensure occlusal stability. 24 and 28 as the abutments would provide some form of retention for the denture while preserving the alveolar bone. A study about swallowed dentures have shown that the horse-shoe shaped denture was unstable, likely to rotate and compromised the retention of the dentures [14]. Therefore for the patient's new denture, the author has provided a wider coverage of the major connector across the palate, and he seemed to be tolerating it well.

The author managed to complete the patient's treatment within one year. The author believe that the ability to achieve functionally satisfying results with aesthetic is a bonus. The patient is very grateful and happy with the treatment outcome. Based on his feedback during the review visits, the author seem to have managed to meet his expectations. The author has discharged the patient back to his GDP for periodontal supportive care including maintenance of his restorations and monitor his bruxism habits.

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