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Full Mouth Rehabilitation: A Review Article

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Abstract:
A healthy, confident smile is the foundation of a healthy, confident life. A replaced tooth is a renewed chance to smile brighter and live fuller. The process of complete dental rehabilitation involves the clinician in developing a roadmap, a structured plan aimed at achieving predictable outcomes. Frequently, the requirement for complete mouth rehabilitation stems from wear patterns that compromise the teeth. In other instances, rehabilitation is necessary to replace all old restorations or to substitute missing teeth with implants. The combined effects of attrition, abrasion, and erosion, each varying in intensity and duration, can create diverse patterns of wear. This article outlines a methodical strategy for treating patients suffering from these conditions.

Keywords: *Full mouth rehabilitation, Occlusion, Rehabilitation, TSL(Tooth surface loss)*

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I. Introduction

The goal of dentistry is to increase the lifespan of the functioning dentition, just as the goal of medicine is to increase the lifespan of functioning individual. Restoration of occlusion in patients with severely worn dentition is a challenging situation as every case is unique in itself. Oral rehabilitation is the restoration of the form, function, and esthetic qualities of the masticatory mechanism. The rehabilitation of a mouth therefore, can be the satisfactory placement of a single restoration, or it can encompass the rebuilding of the remaining teeth and replacing of any number of missing teeth. Perhaps the best term to designate extensive restorative treatment that involves most or all of the teeth and that is accomplished according to sound anatomic and physiologic concepts might be 'complete oral rehabilitation'[1].

The four prime objectives of oral rehabilitation are optimum oral health, functional efficiency, mouth comfort and esthetics. Full mouth rehabilitation (FMR) is an individualized treatment where the entire dentition is reconstructed and restored to optimize the health of teeth, gingiva, occlusion, and stomatognathic system. However, full mouth rehabilitation possesses a significant challenge to dentistry, to get good functional and esthetic results we have to follow various prosthodontic principles.

The restoration of normal functioning of the masticatory apparatus and the peri oral musculature is the ultimate goal of full mouth rehabilitation. Full mouth rehabilitation helps to convert all unfavourable forces on the teeth and the adjoining structures of the oral cavity, which inevitably induce pathological changes into favourable forces there by promoting normalcy in the oral cavity[1].

Occlusion plays a key role in establishing the needed harmony between the muscles of mastication, teeth, temporomandibular joint. So, the selection of an appropriate occlusal scheme will result in a successful full mouth rehabilitation. After through diagnosis and clinical examination of worn out dentition and patients who are wearing complete dentures, appropriate occlusal schemes should be chosen that would promote not only occlusal function but also muscle and joint function in a individual[2].

II. Etiology Of Wornout Dentition

Tooth surface loss (TSL) is a multifactorial condition defined as surface loss of dental hard tissues by causes other than caries, trauma or developmental defects. The prevalence of TSL increases with age. The prevalence of severe tooth wear was 3% at the age of 20 years, rising to 17% at the age of 70 years. Tooth wear occurs as a physiologic process; normal ranges for specific populations have been reported[3].

The phenomenon of dental wear is specifically allied to both clinical dentistry and to comparative odontology and palaeo-anthropology. Different categories of teeth wear at different rates. Thus, incisors suffer the greatest wear (97%), followed by the molars (85%), then the canines (74%), with the premolars the least worn (60–68%). Characteristics of tooth surface loss include

- Acid erosion - The occlusal surface displays cupped lesions into dentine.
- Attrition - Has a flattened tip matching the opposing tooth's lateral excursive movement.
- Cervical abrasion. The molar appears smooth and rounded
- Abfraction -The defect is angular and deep.

Causes of pathological tooth surface loss include, congenital abnormalities like amelogenesis imperfecta , dentinogenesis imperfecta, parafunctional occlusal habit-bruxism ,abrasion, erosion, loss of posterior support.

III. Goals Of Full Mouth Rehabilitation

The modern practice of renewing and reorganizing the teeth by prostheses began with the idea of "raising the bite" to rectify closure resulting from excessive wear of the occlusal surfaces. Later, such closure was associated with hearing loss, noted by Costen. To accomplish this, these teeth were rebuilt to harmonize with the movements of the joints in order to protect them from further injury. With our present understanding of traumatic occlusion and its deleterious effect upon the supporting structures, the procedure known as "bite raising" has shifted in emphasis and broadened in scope and is now designated by a term that describes it accurately[1]. Full mouth reconstruction, as of now includes therapy which will, by improving the relationship of the teeth, improve the condition and health of the supporting structures. A few guidelines must be followed if the goals are to be achieved. They are as follows

- Requirement of reorganizing the occlusion
- Suitable occlusal scheme
- Change in occlusal vertical dimension
- Requirement of replacement of missing teeth
- The effects of the type of restorative material used on occlusal stability of TMD and parafunctional habits

The clinician must decide on the occlusal approach and an appropriate occlusal scheme after evaluating and classifying the patient's current clinical situation but before beginning the reconstruction procedure.

IV. Indications

The reasons for undertaking occlusal rehabilitation may include the restoration of multiple teeth, which are missing, worn, broken-down or decayed. Increasingly occlusal rehabilitation is also required to replace improperly designed and executed crown and bridge work. In certain circumstances treatment of temporomandibular disorders may also be considered an indication for rehabilitation, but great caution is advisable in such cases. Regardless of the clinical reason, the decision to carry out any treatment should be based upon achieving oral health, function, esthetics and comfort, and treatment should be planned around these rather than the technical possibilities.

V. Occlusal Classification

Various classifications, have been proposed to classify patients requiring full mouth rehabilitation; however, Turner and Missirlian's classification is the most widely used. According to them, patients with occlusal wear can be broadly classified as follows[4]:

Category 1: Excessive wear with loss of vertical dimension of occlusion (VDO).

Category2: There should be excessive wear with little or no loss of vertical dimension of occlusion, but be patient with the available space.

Category 3: Excessive wear without loss of vertical dimension of occlusion, but with limited available space.

VI. Occlusal Approach

a) Conformative approach - The occlusion is reconstructed based on the patient's existing intercuspal position. It is used when only a small amount of restorative treatment is required.
b) Reorganised approach - New occlusal scheme is established around a suitable condylar position which is the centric relation position.
c) Monitored Development Approach – Features include the use of conventional orthodontics or the Dahl technique. Direct restorations in adhesive material on minimally prepared or unprepared teeth are used.

VII. Occlusal schemes

According to the tooth contact condition, the ideal occlusion for eccentric movements can be classified into three schemes: mutually protected articulation, group function, and balanced articulation. For complete denture patients, the balanced occlusion concept is used, whereas for natural dentition, mutually protected occlusion and group function are used.

- Mutually protected articulation/organic occlusion (Stuwart and Stallard, 1961)

- Canine guided occlusion(Gysi, 1915)
- Group Function Occlusion (Schuyler, 1929)

There are mainly thee methods for establishing the plane of occlusion which includes analysis on natural teeth through selective grinding, analysis of models with fully adjustable instrumentation, use of Pankey - Mann –Schuyler methods of occlusal plane analysis Spherical theory of occlusion G S Monson, sphere of 8 inch diameter (4 inch radius for class I, 3.75 inches for class II, 5 inch for class III) Monson's maxillomandibular articulator.

VIII. Occlusal Philosophies

There are two important basic steps which must be recognised in any technique. These are: preliminary equilibration of occlusion and establishment of incisal guidance. The fundamental principles of occlusion must be understood and followed, and specific goals must be visualised and achieved whenever possible. Following are the occlusal philosophies[5]:

- Gnathological concept (McCollum, Stuart, Stallard)
- Freedom in centric concept (Schuyler)
- Simplified occlusal design (Wiskott and Belser)
- Pankey, Mann and Schyuler Philosophy (1960)
- Twin Table Technique- Hobo (1991)
- Twin stage procedure- Hobo and Takayama
- Youdelis Scheme
- Nyman and Lindhe scheme

IX. Phases In Complex Rehabilitation:

Creating a detailed list of aesthetic and functional issues for each patient is essential.
Initial Phase: Begin by removing any defective restorations and evaluating all teeth for their structural integrity.
Surgical Phase: This includes extractions, implant placements, and crown lengthening as needed, alongside any required periodontal treatments. Perform any necessary endodontic treatments during this phase.
Restorative Phase: Proceed with the final restorations following the ten outlined steps.
Maintenance Phase: Implement a long-term care and maintenance plan.

X. Steps In Full Mouth Rehabilitation

Data Collection and Diagnosis:

Start by gathering comprehensive patient data and make an accurate diagnosis. A thorough clinical examination, comprehensive dental photography, and pre-operative video analysis should be performed, with all findings meticulously documented. This includes examining the musculature and the temporomandibular joint (TMJ) to conduct a load test, identifying if there's any negative response. In scenarios where the load test yields a positive result, indicating potential TMJ issues, splint therapy is advised. Often, pain in the TMJ area stems from muscular problems, which can be addressed through careful deprogramming[6].

Radiographic examinations are crucial for assessing bone health and identifying any pathological conditions. This includes the detection of caries, assessment of endodontic treatments, and examination of old restorations for open margins, all through pre-operative radiographs. For cases requiring implants, a Cone Beam Computed Tomography (CBCT) scan is incorporated early in the process for detailed imaging. Additionally, cephalometric analysis is conducted to assess the preoperative vertical dimension of occlusion and the spatial relationship of the jaws and teeth, providing a comprehensive overview necessary for planning effective treatment.

Mount Upper Cast with Correct Orientation Relation

Position and secure the upper dental cast accurately according to the patient's natural orientation. The upper cast must be mounted with a facebow record that allows aesthetically correct orientation relation. The pre-existing cant in the maxilla must be recorded in relation to the facial midline to allow accurate decision making regarding the midline and the axial inclinations of the upper anterior teeth and an upper occlusal plane that is parallel to the horizon. We prefer using a dentofacial analyzer to orient the maxillary cast due to its obvious advantages from aesthetic standpoint and not the ear piece facebow with a plethora of anterior reference points that can lead to an aesthetically erroneous mounting if not done with due diligence.

Deprogram and Mount Lower Cast with Centric Relation:

Remove any existing dental appliances and align the lower cast in its centric relation to the upper cast. Before capturing the centric bite record, it's essential to deprogram the patient to ensure the jaw relation record

can be accurately taken at the most favorable joint position. This deprogramming helps in relaxing the patient's muscles and temporomandibular joint, allowing for a more precise recording of the jaw's position. An aluwax wafer can be utilized to document the centric relation. Alternatively, tools like a Lucia jig or a Kois deprogrammer might be employed for recording the centric relation (CR) at an elevated vertical dimension of occlusion. These methods facilitate the accurate positioning of the lower cast relative to the upper, crucial for effective treatment planning and restoration.

Finalize Vertical Dimension and Get Diagnostic Wax-Up Commissioned:

Determine the optimal vertical dimension of occlusion and order a diagnostic wax-up to visualize the final outcome. Integrating aesthetics, phonetics, and cephalometric analyses provides the necessary criteria to decide on an increase in the vertical dimension of occlusion for cases exhibiting generalized wear. Making careful adjustments to the vertical dimension enables more conservative tooth preparations, preserving the vitality of most teeth. Patients with healthy joints and a stable, friction-free occlusion generally tolerate changes in vertical dimension well[11].

Once a provisional vertical dimension has been established, the case is forwarded to the laboratory for a diagnostic wax-up. This wax-up should incorporate all the desired changes and improvements for the patient's dentition. At this stage, decisions regarding the types of restorative designs needed—whether onlays, veneers, or full coverage restorations—must be finalized through the wax-up process, setting a clear path for the subsequent restorative work.

Fabricate Bonded Mock-Ups or Provisionals:

Create temporary bonded mock-ups or provisional restorations to test the planned adjustments. The creation of provisional restorations plays a crucial role in full mouth rehabilitation, serving as a pivotal phase that bridges the gap between diagnosis, planning, and the final restorative phase. Provisionals offer the opportunity to "test drive" the planned restorative outcome without irreversible changes to the patient's dentition, ensuring the proposed treatment meets both functional and aesthetic expectations.

There are two primary methods for fabricating provisional restorations: indirect (lab-fabricated) and direct techniques. Indirect provisional restorations are typically fabricated off-site in a dental laboratory. They are designed to fit over the existing dentition without significant alteration, making them ideal for cases without extensive undercuts or where minimal tooth preparation is preferred. These restorations often come in the form of overlays that cover the entire dental arch[12].

Direct techniques, on the other hand, involve fabricating the provisional restorations intraorally using a matrix derived from the diagnostic wax-up. This method allows for immediate bonding and adjustments, closely mimicking the final restorative outcome. However, precision during placement is paramount to avoid any unintended changes to the vertical dimension or occlusal relationships, which can complicate the treatment process.

Decision Making for Final Restorative Material:

Choose the appropriate material for the final restorations based on aesthetics, function, and durability. Whether opting for porcelain fused to metal, zirconia, or lithium disilicate, the decision hinges on several factors including the available occlusal clearance, the need for aesthetic considerations especially in anterior teeth, and the functional demands placed on posterior teeth. The innovative approach of superimposing the scan data of approved provisional restorations onto the definitive preparations aids in ensuring the final restorations meet both aesthetic and functional expectations meticulously.

Volume Based Tooth preparations:

Prepare the teeth for restoration, considering the required material volume for optimal strength and aesthetics. Once the patient feels satisfied with the function and look of the temporary dental work, the next phase involves completing essential groundwork on the teeth. This includes performing endodontic treatments, fillings, and, as required, post and core procedures, focusing on one quadrant at a time.

Temporary solutions from one quadrant are removed by cutting, and new ones are crafted at the end of each session upon finishing the foundational work. Through this method, all necessary teeth receive treatment, preparing the patient for the final impressions. It's possible to take final impressions for complete arch restorations in a single session. The main goal here is to ensure the previously agreed upon vertical dimension remains unchanged. To avoid alterations in the vertical dimension of occlusion, the front teeth of both the upper and lower jaws are addressed first. Controlled preparation is achieved using depth cuts on the temporary restorations.

Tissue Management, Impressions & Bite Records:

Manage gum tissue health, take precise dental impressions, and record the bite relationship for accurate restorations. To manage tissue, a gingival retraction cord drenched in aluminum chloride can be utilized. Both digital and analog impressions are made of the upper and lower teeth that have been prepared. The bite record focuses on the back teeth, utilizing the lucia jig to maintain the vertical dimension, acting as a stop for the front teeth. It's also important to repeat the facebow record process to ensure the maxillary cast is accurately positioned for aesthetic alignment[19].

Bonding/Delivery:

Securely bond the final restorations to the teeth and ensure proper fit and function. Trials are essential for making final aesthetic checks. It's important to verify that the proximal contacts are correct and that the occlusion is marked to ensure the achievement of even and equal intensity bilateral contacts.

Following the final glaze, the restorations are bonded following the specified adhesive protocol. . For lithium disilicate restorations thicker than 1mm, dual cure resin cement should be applied to the silanated intaglio surface to ensure complete curing of all resin. Any excess cement must be meticulously cleared from the gingival sulcus and all interproximal spaces. Radiographic verification is advised to ensure all residual cement has been completely removed.

Diligent Occlusal Management:

Carefully adjust and monitor the bite (occlusion) to prevent issues and ensure long-term success. An occlusion check should be conducted to ensure that all teeth make contact uniformly and with equal intensity, using 40-micron articulating paper for identification. After identifying these contacts, final adjustments should be made using 8-micron articulating paper to achieve uniform and equal intensity contacts across all teeth, from the canines to the molars. After making any adjustments post-bonding, all adjusted surfaces should be polished using a system specifically designed for the intraoral finishing and polishing of lithium disilicate restoration[20].

XI. Conclusion

Occlusal rehabilitation is a major procedure that should be carried out according to the dentist's treatment plan, which is based on his knowledge of various treatment philosophies and clinical skills. The principles of treatment are universal, all functional factors are interrelated, and every effort should be made to create an occlusal interface in which the periodontium of teeth, mastication muscles, and TMJs all work in harmony. This necessitates a precise diagnosis of the deranged condition's etiology, intra - oral changes, and other negative effects on jaw relations. Optimal occlusion according to the needs of the patient should be attained in rehabilitation procedures. Occlusal rehabilitation of full mouth is a thorough course of action and must be carried out in conformation with dentist choice of treatment modality established on his knowledge of various philosophies of full mouth rehabilitation followed and clinical skills. A broad scope or content as well as practical perspective must be directed towards reconstruction, restoration and conservation of health of entire oral mechanism. However, recent advancements in dental technology, materials, and equipment have made the task of rebuilding, restoring, and rehabilitating diseased mouths much easier. Dentists have been able to save many teeth that would have been lost otherwise.

Ethical Considerations:

Not applicable.

Conflict of Interests:

None.

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