ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at:www.ijdsir.com

Volume – 7, Issue – 4, August – 2024, Page No. : 92 - 98

Techniques in Full Mouth Rehabilitation

[1]Dr. Mamata Dugaraju, Post Graduate Student, Department of Prosthodontics & Crown and Bridge & Implantology, Drs. Sudha & Nageswara Rao Siddartha Institute of Dental Sciences.

[2]Dr. Sunil Chandra Tripuraneni, MDS, Professor and HOD, Department of Prosthodontics & Crown and Bridge & Implantology, Drs. Sudha & Nageswara Rao Siddartha Institute of Dental Sciences.

[3]Dr. Satya Harshini Chandra, Post Graduate Student, Department of Prosthodontics & Crown and Bridge & Implantology, Drs. Sudha & Nageswara Rao Siddartha Institute of Dental Sciences.

[4]Dr. Sri Harsha Babu Vadapalli, MDS, Reader, Department of Prosthodontics & Crown and Bridge & Implantology, Drs. Sudha & Nageswara Rao Siddartha Institute of Dental Sciences.

[5]Dr. Sarath Kumar Devineni, MDS, Senior Lecturer, Department of Prosthodontics & Crown and Bridge & Implantology, Drs. Sudha & Nageswara Rao Siddartha Institute of Dental Sciences.

Corresponding Author: Dr. Mamata Dugaraju, Post Graduate Student, Department of Prosthodontics & Crown and Bridge & Implantology, Drs. Sudha & Nageswara Rao Siddartha Institute of Dental Sciences.

Citation of this Article: Dr. Mamata Dugaraju, Dr. Sunil Chandra Tripuraneni, Dr. Ch. Satya Harshini, Dr. Sri Harsha Babu Vadapalli, Dr. Sarath Kumar Devineni, "Techniques in Full Mouth Rehabilitation", IJDSIR- August – 2024, Volume –7, Issue - 4, P. No. 92 – 98.

Type of Publication: Review Article

Conflicts of Interest: Nil

Abstract

Historically, prosthetic rehabilitation primarily focused on replacing missing teeth, with little attention given to restoring the optimal functioning of the stomatognathic system. While several authors proposed various concepts for oral rehabilitation, detailed reviews encompassing all these techniques are lacking. This article comprehensively reviews the techniques and concepts utilized for full mouth rehabilitation.

Keywords: Rehabilitation, Functionally generated pathway, Anterior guidance, Occlusion.

Introduction

The restoration of form and function in patients with severely worn dentition is a complex undertaking often surrounded by a sense of mystery. Rehabilitating a dental condition of this magnitude not only replicates the patient's dentition but also reinforces the entire masticatory system.[1] The choice of technique for full mouth rehabilitation is entirely contingent upon the patient's intraoral condition and the convenience of prosthodontic procedures.

The rationale for mouth rehabilitation includes: loss of vertical dimension, decreased freeway space, need for reorganisation of occlusion, unacceptable function, and aesthetics. Etiology includes congenital anomalies, para functional habits, attrition, and loss of posterior support.

Turner and Missirlian classified the patients based on available freeway space into the following categories.[2]

Category 1: Excessive wear with loss of vertical dimension at occlusion.

Category 2: Excessive wear without loss of vertical dimension at occlusion with available space.

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

For comprehensive oral rehabilitation, it's imperative to commence with a diagnostic wax-up and provision of a splint. This should be followed by a four-week observation period to ensure the temporomandibular joint is adapted to the increased vertical dimension.

Occlusion

The occlusion found in natural dentition is termed mutually protected or organic occlusion.[3] Mutually protected occlusion is further divided into group function occlusion and canine-guided occlusion. The preferred occlusal scheme for complete denture fabrication is Bilateral balanced occlusion. However, balanced occlusion has demonstrated adverse effects when incorporated into fixed dental prostheses, hence its avoidance.

Occlusal concepts in full mouth rehabilitation

1. Gnathological concept
2. Freedom in centric concept
3. Simplified occlusal design
4. Youdeli's scheme
5. Nyman and Lindhe scheme
6. Pankey, Mann and Schuyler scheme
7. Twin table technique
8. Twin stage procedure

Gnathological concept – McCollum, Stuart, Stallard

The earliest concept for comprehensive dental restoration was initially outlined by Beverly B. McCollum and Charles E. Stuart in their 1955 publication, "A Research Report."[4] McCollum, who founded the Gnathological Society in the 1920s, contributed to significant advancements in the understanding of mandibular movements, the hinge axis, and the development of the arcon articulator. They mentioned that condylar guidance is a constant factor that does not vary from one individual to another. Furthermore, they held the belief that anterior guidance functions independently from the path of the condyle.[5]According to gnathological approach, both anterior and posterior teeth are simultaneously replaced based on articulator settings, which are determined by pantographic records. The complexity of achieving precise gnathologic restorations is heightened by the requirements for point centric and cusp-to-fossa tripodization without freedom in centric occlusion, the necessity of an articulator which is completely adjustable, and the cast metal transitional restorations.

Freedom in centric concept (Schuyler)

Initially, Shuyler advocated for balancing contacts in rehabilitation but later discovered that the contact of posterior teeth in protrusion, and balancing contacts in lateral excursive movements, have harmful effects not only on the entire dentition, and alveolar bone but also on the temporomandibular joint.[7] This led to the shift of rehabilitating the dentition from bilateral balancing occlusion to mutually protected occlusion.

Schuyler pioneered the "Freedom in Centric" concept. It stated that centric relation is a region of the TMJ rather than a fixed point. In this concept, opposing cusps are given a slight freedom of movement from the centric

relation position by providing a flat region at the central fossa in eccentric movements that help the condyle to slide from the centric to the habitual rest position. Without this freedom in centric relation, the cusps interlock, which might lead to noxious stimuli that affect the temporomandibular joint.

To provide this freedom, the first step is to record centric relation (most retruded position of condyle). After the articulation, the mandibular member is slightly advanced by placing a 0.5-0.75mm tinfoil in between condylar elements of the instrument, and the restorations are fabricated in this position. Then, the foil is removed, and the articulator is retruded back to the original position. Restorations are adjusted in this position so that anteroposterior freedom of movement is provided at the maximum intercuspation there by providing freedom in centric. The rehabilitation is well tolerated, and adapted by the patient when freedom in centric is provided.[8]

Wiskott and Belser's occlusal scheme

They suggested a simplified occlusal scheme which stated that natural dentition typically has few occlusal contacts, which are not optimally positioned. Additionally, functional and para-functional forces often are not parallel to the tooth's long axis. Consequently, they proposed a simplified occlusal approach: a single occlusal contact for a single tooth, with tight interproximal contacts to stabilize teeth mesiodistally[9].They advocated for organic occlusion and freedom in centric occlusion which is provided by fabricating concave internal slopes on posterior tooth cusps. This anteroposterior freedom eliminates lateral excursion interferences. This technique reduces the total number of occlusal contacts, making the scheme suitable for small and extensive restorations.[9]

Youdelis Scheme

In 1971, Youdelis proposed an occlusal approach tailored for patients with severe periodontal scenarios. The objective was to design the occlusion such that centric relation coincides with maximum intercuspation and the forces are directed parallel to the long axis of teeth. He advocated the concept of mutually protected occlusion for rehabilitation. The occlusal anatomy was structured in a manner that if canine-guided occlusion became compromised due to the worsening of existing periodontal condition, then canine-guided occlusion would transition into group function.[10]

Nyman and Lindhe Scheme

This scheme is implemented in cases of severe periodontitis, particularly those involving long tooth-borne cantilevered restorations. In these conditions, achieving balanced occlusion becomes imperative. When posterior stops are available, disocclusion of anterior teeth is incorporated. However, the specific types of contacts within this scheme are not specified.[11]

Pankey Mann Schuyler Concept

This concept stems from the Monsoon's spherical theory and the functionally generated path technique introduced by Meyer and Brenner. It adopts group function occlusion as a modification of canine-guided occlusion. In the past, a PM device was typically used to determine the occlusal plane of the posterior teeth in the mandible.[12] The sequence of restoring teeth within this concept involves:

1. Rehabilitating the lower posterior teeth initially.
2. Subsequently, anterior guidance is established using the upper cuspids.
3. Finally, rehabilitating the upper posterior teeth.

Broadrick's occlusal plane analyzer and functionally generated pathway are used in this technique.

Diagnostic casts are obtained and articulated in a centric relation position. Broadrick's occlusal plane analyzer is used to determine the plane of the mandibular teeth and teeth preparation guides are fabricated accordingly. Following the preparation guides, the plane is scribed intraorally with indelible pencils, and preparation is done such that the finished mandibular preparations will have adequate clearance and the plane of the final restorations facsimiles the predetermined occlusal plane.

Fabrication of maxillary anterior restorations

All the maxillary teeth are prepared at once with a minimum clearance of 1 mm. A definitive impression is made for the maxillary arch and an impression of the mandible is made with finished restorations. After taking interocclusal records, the maxillary and mandibular casts are articulated in centric relation position. Now wax patterns are fabricated for canines at established vertical dimensions by eliminating the interferences in excursive movements. Now only canine wax patterns are cast and adjusted intraorally by providing freedom in centric. These restored canines act as incisal guides. The cuspids have been corrected to the exact vertical dimension and centric and eccentric occlusions. Even more important, nothing is touching in the back of cuspids.

Fabrication of maxillary posterior restorations

The method of rehabilitating the upper posterior teeth using ‘functionally generated path’ is based on a modification of the principles outlined by Meyer and Brenner in 1933. Mann and Pankey used this procedure for complete occlusal rehabilitation.

Extra-hard baseplate wax is used to make a base for the functional wax (brittle hard wax so that it does not bend without breaking) and checked in the patient’s mouth for stability.

Cast bases could also be used with a cross arch stabilization. After the base has been tried in the patients mouth and accepted, it is returned to the articulator for the addition of functional wax.

This softer wax must be luted securely to the base. The patient closes in centric and the dentist guides the mandible through all the excursive movements. Once this functionally generated path is checked, fast setting stone must cover all these recordings and the anterior restorations (that were fabricated prior) in front .

The FGP should be tried on the model, and it must adapt precisely to the key tooth in front. There should not be any space between the functional core (FC)and the model. Stone is built up from the lower articulator ring until it almost touches the stone core. an inverted cup with a bottom cut makes a good stone-pouring platform.

The articulator is closed onto the lower stone mix and joined to the functional stone core with more stone/ plaster. The master die model is related to the FC. Now, the maxillary posterior teeth are waxed up according to the functionally generated path and all the interferences are eliminated and casted. The use of the functionally generated path technique provides restorations that are in synchrony with the functional lateral excursive mandibular movements.

Twin table technique – Sumiya Hobo

The initial understanding was that incisal and condylar guidance were regarded as distinct entities until Hobo's description suggested otherwise. This study associates the deviation in the condylar path during eccentric movements due to the shock-absorbing function of the articular disk. It terms this deviation in the condylar path as a "buffer space". [(13)] On average, the buffer spaces measure 0.3 mm on the working side in lateral movements and 0.8 mm along the protrusive and nonworking sagittal condylar paths. To prevent occlusal interferences during eccentric movements, molar disclusion should exceed the buffer space.

This concept includes preparation of two incisal guide tables, hence the name – Twin table. Following the recording of jaw relations using pantographic records and mounting the casts, begin by removing the maxillary anterior segment. Proceed to perform eccentric movements and eliminate any interferences. This procedure results in a cusp shape factor that harmonizes with the condylar path.

Fabricate two incisal guide tables, without disocclusion. To achieve this, place a flat incisal table and shape chemical-cured resin by guiding the incisal pin through eccentric movements.

Use one of the incisal tables without disocclusion on the articulator. Place two 3mm plastic spacers behind the condyle to simulate a protrusive position. Place a 1.1 mm thick spacer on the mesiobuccal cusp tip of the mandibular first molar, then close the articulator. The lateral movement can be simulated by placing a 3 mm thick plastic spacer behind one of the condyles on the articulator. A 1 mm thick vinyl sheet is positioned on the tip of the mesiobuccal cusp of the mandibular first molar on the nonworking side and a sheet 0.5 mm thick can also be placed on the working side. The incisal pin is directed laterally and upward when the articulator is closed. This creates the angle of hinge rotation to ensure the average disclusion during lateral movement. [14]

Following the final impression, the master casts are mounted on the articulator using a face bow transfer. Initially, the anterior maxillary segment is removed, and posterior wax patterns are fabricated, starting with an incisal guide table lacking disclusion. Once the wax-up of the posterior teeth is completed, the incisal guide table with disocclusion is placed in the articulator. Subsequently, the maxillary anterior segment is reinserted, and wax is melted onto the lingual surfaces of the maxillary anterior teeth. Border movements are executed, and the wax is contoured by the incisal edges of the mandibular anterior teeth to ensure even contact. This process establishes the angle of hinge rotation and develops anterior guidance in accordance with the condylar path. As the anterior guidance set up in this manner is steeper than both the condylar path and the molar cuspal inclinations, the posterior restorations facilitate predetermined disclusion during eccentric movement.

Twin stage procedure

In the Twin-Stage technique, a restoration is initially designed with a standard cusp angle, followed by establishing anterior guidance required to achieve the standard degree of disocclusion. This calculation is based on a mathematical model of mandibular movement. The adjustment values employed to achieve the standard cusp angle were termed "Condition 1- 25°." Similarly, the adjustment values utilized to establish anterior guidance were referred to as "Condition 2- 1mm."[15]

Table 1: Articulator adjustments for canine-guided occlusion

	CONDITION 1	CONDITION 2
CONDYLAR PATH-SAGITTAL INCLINATION	25	40
CONDYLAR PATH-BENNETT ANGLE	15	15
ANTERIOR GUIDE TABLE-SAGITTAL INCLINATION	25	45
ANTERIOR GUIDE TABLE-LATERAL INCLINATION	10	20

Table 2: Articulator adjustments for Group function occlusion

	CONDITION 1	CONDITION 2
CONDYLAR PATH-SAGITTAL INCLINATION	25	40
CONDYLAR PATH-BENNETT ANGLE	15	15
ANTERIOR GUIDE TABLE-SAGITTAL INCLINATION	25	45
ANTERIOR GUIDE TABLE-LATERAL INCLINATION	10	0

Table 3: Articulator adjustments for Group function occlusion

	CONDITION 1	CONDITION 2
CONDYLAR PATH-SAGITTAL INCLINATION	25	25
CONDYLAR PATH-BENNETT ANGLE	15	15
ANTERIOR GUIDE TABLE-SAGITTAL INCLINATION	25	25
ANTERIOR GUIDE TABLE-LATERAL INCLINATION	10	10

Master casts are mounted on the articulator. The anterior segment is made removable. Posterior teeth are waxed to meet

Condition 1: The sagittal condylar pathandanterior guide table were adjusted to

Condition 2: to create anterior guidance. The anterior segment at the maxillary working cast is then replaced and restorations are fabricated according to anterior guidance.

Conclusion

In conclusion, full mouth rehabilitation represents a comprehensive approach to restoring oral health and function, addressing various dental issues across the entire dentition. Through careful planning, precise execution, and meticulous attention to detail, this transformative process aims to improve aesthetics, restore proper occlusal function, and enhance overall oral health and quality of life for the patient. By gaining thorough knowledge on various techniques and their rationale full mouth rehabilitation offers patients a renewed sense of confidence, comfort, and functionality, enabling them to enjoy a healthy, beautiful smile for years to come.

References

1. Jones SSM. The principles of obtaining occlusion in occlusal rehabilitation. J Prosthet Dent. 1963; 13:706–713
2. Turner KA, Missirlian DM. Restoration of the extremely worn dentition. J Prosthet Dent 1984; 52:467-74.
3. D'Amico A. Canine teeth-normal functional relation of the natural teeth of man. J South California Dent Assoc. 1958; 26:239–241.
4. McCollum BB, Stuart CE (1955) A research report. Scientific Press, South Padasena
5. McCollum BB (1939) Fundamentals involved in prescribing restorative dental remedies. Dent Items Interest 61:522, 641, 724, 852, 942
6. Stuart CE. The contributions of gnathology to prosthodontics. J Prosthet Dent 1973; 30:607–608
7. Schuyler CH (1969) Freedom in centric. Dent Clin North Am 13:681–686
8. Schuyler CH. Factors of occlusion applicable to restorative dentistry. J Prosthet Dent 1963;772–782
9. Wiskott HWA, Belser UC (1995) A rationale for a simplified occlusal design in restorative dentistry: historical review and clinical guidelines. J Prosthet Dent 73:169–183

10. Schuyler S, Youdelis RA, Page RC (1971) Periodontal disease. Lea &Febiger, Philadelphia
11. Nyman S, Lindhe J (1977) Considerations on the design of occlusion in prosthetic rehabilitation of patients with advanced periodontal disease. J Clin Periodontol 4:1–15.
12. Mann AW, Pankey LD. Oral rehabilitation. Part I: Use of the PM-instrument in treatment planning and in restoring the lower posterior teeth. J Prosthet Dent 1960; 10:135-50.
13. Pankey LD, Mann AW. Oral rehabilitation. Part II: Reconstruction of upper teeth using a functionally generated path technique. J Prosthet Dent 1960; 10:151-62.
14. Hobo S. Twin tables techniques for occlusal rehabilitation. Part I. Mechanism of anterior guidance. J Prosthet Dent 1991; 66:299-303.
15. Hobo S. Twin-tables technique for occlusal rehabilitation: Part II-clinical procedures. J Prosthet Dent 1991; 66:471-7.Hobo S, Takayama H. Twin-stage procedure. Part l: A new method to reproduce precise eccentric occlusal relations. Int J Periodontics Restorative Dent 1997; 17:112-23.
16. Hobo S, Takayama H. Twin-stage procedure. Part 2: A clinical evaluation test. Int J Periodontics Restorative Dent 1997; 17:456-6.
17. Stuart CE, Stallard H. Principles involved in restoring occlusion of the natural teeth. J Prosthet Dent 1960; 10:304–313.
18. Schwartz H. Occlusal variations for reconstructing the natural dentition. J Prosthet Dent. 1968; 55:101–105
19. Elkins WE (1973) Gold occlusal surfaces and organic occlusion in denture construction. J Prosthet Dent 30:94–98
20. Pokorny PH, Jonathan PW, Litvak H (2008) Occlusion for fixed prosthodontics: a historical perspective of the gnathological influence. J Prosthet Dent. 2008; 99:299–313.
21. Gysi A. Masticating efficiency in natural and artificial teeth. Dent Digest. 1915; 21:74.
22. Schuyler CH. An evaluation of incisal guidance and its influence on restorative dentistry. J Prosthet Dent. 1959; 9:374–378.
23. Schuyler CH (1963) The function and importance of incisal guidance in oral rehabilitation. J Prosthet Dent. 1963; 13:1011– 1029.