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Mechanics of Full Mouth Rehabilitation

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Diagnosis: in prosthetic treatment the dentist must have a practical & scientific approach to the problem. Diagnosis of disease is a prerequisite before planning any treatment. A thorough diagnostic planning must be completed. A programmed approach should be followed. These include the following:-

Diagnosing the problem

- To identify an existing abnormal condition
- To investigate the abnormality
- To find all factors that contribute in deterioration of oral health
- To determine the best method for elimination of deteriorating factors

Diagnostic factors:

1) Patient's medical and dental history:- before formulating the treatment plan.
   E.g. Stroke → hamper oral hygiene and therefore may preclude the use of specific restoration.
   History of allergy to nickel or acrylic, infection: HIV, syphilis.
   History of unsuccessfully adopting to a specific type of removable restoration may a contraindication to that type of restoration.
2) Clinical dental examination:- May reveal pathologies or other factors that will dictate the type of restorations is indicated or not.
   e.g. Certain critical teeth may have unacceptably short clinical crown
   Important areas may have inadequate interocclusal clearance.
   Key teeth may have inadequate zone of attached tissue
   High-frenum or supra-erupted teeth may be present
   Treatment of TMDs is also necessary
3) Full mouth series of radiograph:- This may also reveal non-physiologic processes that must be considered.
   e.g. Vertical bone loss, peri-apical pathologies, retained roots, impacted teeth and poor bone factors.
   These may have an influence upon the sequence of treatment and the final restorations placed.
4) Behaviour evaluation
5) Diagnostic casts fixed to an articulator:- Give 3-dimensional relationship of patient's opposing arch.

- Viewing of occluded arches from lingual aspect → cannot be visualized otherwise
- Show occlusal clearance problems
- Occlusal relationships
- Causes of tooth were by opposing teeth

6) Diagnostic Waxup

Indications:

a. Anterior guidance requires alteration
b. Existing occlusal scheme requires alteration
c. Vertical dimension need to be changed
d. Mutilated dentition

Purpose:

a. Arch Shape and contour
b. To rehearse a proposed restorative plan
c. To explain the intended procedure to the patient
d. optimum contour and occlusion of the eventual prosthesis
e. Dentist can explore all the treatment alternatives before selecting a therapy
f. Provisional restoration
g. To provide additional information to the technician
h. Guide the surgeon during implant placement

7) Digital imaging: demonstrate various treatment option.

TYPE OF TREATMENT:
Distinction can be made between those therapeutic modalities that modify the occlusal scheme (occlusal treatment) and those which do not modify it (collateral treatment).

Occlusal Treatment	*Collateral Treatment*
Temporary occlual treatment, occlusal splints Definitive occlusal treatment: Orthodontic treatment, selective grinding, prosthodontic treatment Occlusal and articular Surgical therapy	Biofeedback Other relaxation techniques Exercises Physiotherapy Electrogalvonic stimulation Drug treatment

Treatment Planning:
- Treatment plan is developed on the basis of diagnostic data.
- Careful evaluation on the articulator of discrepancies between ICP and therapeutic position allows → exact programming of most adequate occlusal splint and planning of definitive occlusal treatment.
- Definitive occlusal treatment may require selective grinding only, or orthodontic or prosthodontic treatment of various level of complexity
- In more complex cases, exact planning of definitive treatment is possible only after the stage of temporary occlusal treatment and evaluation of results.
- Definitive occlusal treatment is initiated when subjective and objective symptoms have disappeared permanently or at-least improved significantly.

➢ 1st stage → Temporary occlusal treatment and collateral therapy: Duration of treatment, few weeks to 5-6 months or more.
➢ 2nd sage → Definitive occlusal treatment and collateral therapy: Duration depends on the complexity of therapeutic program. E.g. Ortho treatment + FPD.

Treatment plan is divided into-
1) Pre- prosthetic phase
2) Prosthetic phase
3) Maintenance phase

PRE-PROSTHETIC PHASE: Interdisciplinary approach is needed:

Orthodontic consideration- Minor orthodontic tooth movement that can significantly enhance the prognosis of treatment.
- A tooth can be uprighted, rotated, moved laterally, intruded or extruded.
- Orthodontic movement by use of modified Dahl appliance can be used to regain lost vertical dimension of occlusion.

Periodontal consideration
- Surgical crown lengthening to improve esthetics, retention.
- Free autogeneous gingival graft is used to increase width of inadequate attached gingiva.
- Proper pontic fit and esthetic consideration indicate need for surgical intervention.

Endodontic consideration
- Elective endodontic treatment may be necessary for supraerupted or malaligned teeth .
- Extremely worn down teeth with inadequate support for restoration may require post and core after endodontic treatment

Oral surgical consideration
- Infected root stumps, hopeless mobile teeth
- Elective soft/ hard tissue surgery include alteration of muscle attachment, alveoplasty.

PROSTHETIC PHASE
-
- **Immediate treatment phase :**
  - postponing treatment like amelogeneis imperfect in child, transitional treatment is done to stabilize occlusion.
  - occlusal spint therapy

- **Definitive treatment**

  - Once all teeth have erupted and adulthood is reached, the size of pulp horns decreases compared to newly erupted teeth. A definitive treatment can then be planned.

Selection of instruments for FMR

Articulators: Articulator is defined as "a mechanical instrument that represents the temporomandibular joint and jaws, to which the maxillary and mandibular casts may be attached to simulate some or all mandibular movements."

Primary purpose of articulator are:
- To hold opposing casts in fixed predetermined relationship
- To open or close
- To produce border and intraborder diagnostic sliding motion of teeth similar to those in the mouth.

Awni Rihani[12] has classified articulators as-
1) Fully adjustable articulator
2) Semi adjustable articulator
3) Non- adjustable articulator

Fully adjustable articulators can accept all the following five records-
1) Face bow record
2) Centric jaw relation record
3) Protrusive record
4) Lateral record
5) Inter condylar distance record
   Examples- Hanau Kinoscope, Mc Collum Gnathoscope, Stuart articulator, Hanau 130-21, Denar D4-A

Semi adjustable articulators can accept all the following three records-
1) Face bow record
2) Centric jaw relation record
3) Protrusive record
Examples- Hanau H, Wardsworth, Dentatus, Hanau 130-28, Whipmix

Non- adjustable articulators can accept one or two of the following three records-
1) Face bow record
2) Centric jaw relation record
3) Protrusive record
Examples- Snow, Gysi simplex, Monson, Stransbery, Transograph, Pankey Mann

Semi adjustable articulators
The two basic types if semi adjustable articulators are
1) Arcon type
2) Non-arcon type

In **arcon articulator**, the condylar sphere is attached to the lower component of the articulator and the mechanical fossa attached to the upper member of the instrument. Thus it resembles the human anatomy. The angulation of the mechanical fossa is fixed relative to the occlusal plane of maxillary cast. In non-arcon articulator it is fixed relative to the mandibular cast and hence can lead to errors when protrusive record is being used to program the articulator. Hence arcon articulator is preferred.

Semi-adjustable articulator cannot record the full range of protrusive and lateral condylar movement but tooth movement can be recorded with much accuracy if instrument's shortcomings are compensated.

The instrument's shortcomings are compensated with –
1) Customized anterior guidance
2) Simplified fossae contour technique to relate lower fossae form to anterior guidance
3) Functionally generated path procedures to capture the precise border movements of posterior teeth at correct vertical dimension.

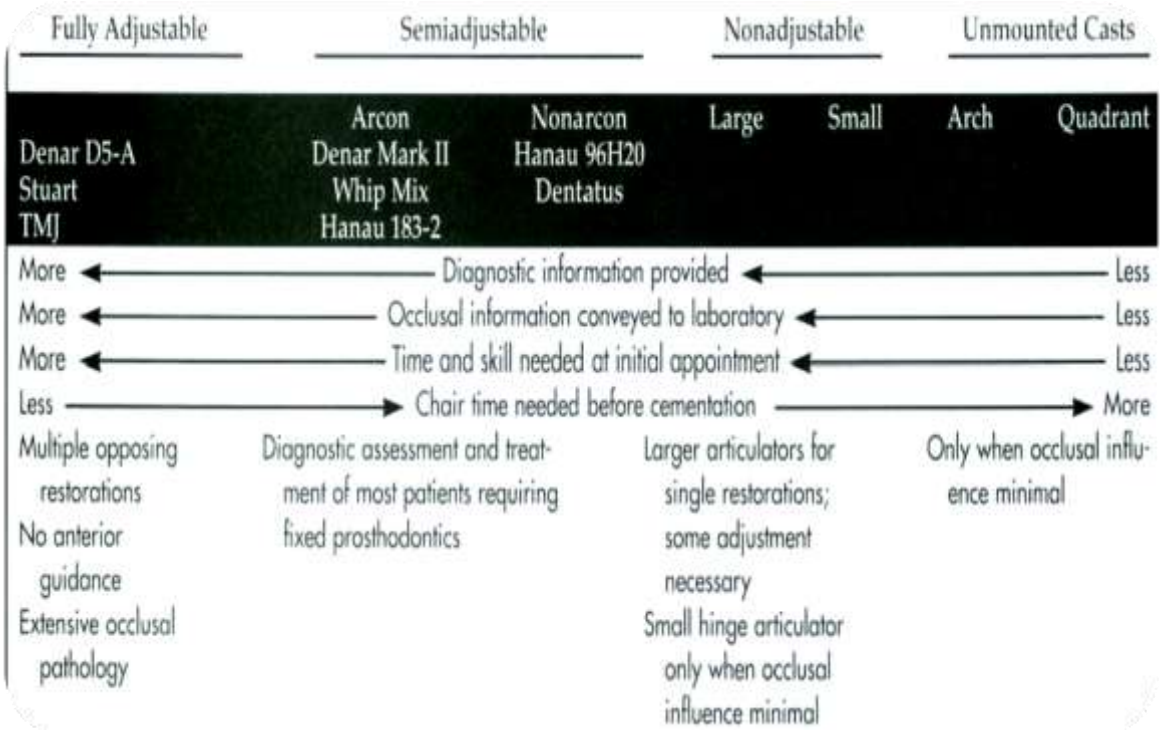
Semi-adjustable instruments do not precisely record the Bennett shift. If immediate side shift is 0.75mm or less and anterior guidance is acceptable, semi-adjustable articulator can be used. Otherwise a fully adjustable articulator should

be used to minimize intraoral adjustments. Semi-adjustable articulators can be used on most fixed bridges and most tooth- supported or distal extension removable partial dentures with a cuspid protected occlusion.

Fully adjustable articulators

Fully adjustable articulators can reproduce a wide range of condylar movements including protrusive lateral paths. It can reproduce multiple pathways of each condyle during all possible excursions The two basic methods for recording condylar paths are –

1) Pantographic tracings
2) Stereographic tracings



Facebow selection:

A facebow is a caliper-like device that is used to record the relationship of the jaws to the opening axis of the jaws and to orient the casts in this same relationship to the opening axis of the articulator.

Hinge axis / Hinge axis of mandible or transverse horizontal axis/ terminal hinge axis : An imaginary line around which the mandible may rotate within the sagittal plane (GPT-8).

NEED TO RECORD AND TRANSFER HINGE AXIS

- Mounted cast determine if the patients centric occlusion is in harmony with centric relation.
- It is possible to increase or decrease the vertical dimension on the instrument without disturbing centric relation
- It is a starting point of lateral movements
- To reproduce the opening and closing movements of the mandible.

Vertical dimension: static relationship

Initially determined by interaction

- Genetic Growth Potential
- Environmental factors
- Dynamics of Neuromuscular
- Function during growth
- Dentoalveloar Compensation: [Berry & Poole 1976] TSL compensated by alveolar growth which maintains occlusal vertical height eg.: Bruxism
- **Rate of wear > comp alveolar growth = Loss of VDO**

Evaluation of vertical dimension of occlusion

- Phonetics, closest speaking space
  - Pronunciation of ‘s’ normal value range is 1mm
  - If position greater than 2-3 mm, loss of vertical

- Swallowing and pronunciation of 'm'
  - Space greater than 4-5 mm signifies loss of vertical dimension
- Measurement of interocclusal distance
  - Diverse, inaccurate and inconsistent
  - Good clinical judgment
  - Normal FWS 2-4 mm – greater than normal signifies loss of OVD
- Facial appearance
  - Diminished facial contour
  - Thin lips and drooping commissures

Necessity to restore the VDO

- Wear occasionally results in loss of vertical dimension due to compensatory eruption of teeth and alveolar growth so rarely the need arises to restore the dentition by increasing the VDO
- Alteration in VD should be avoided
- Alternative treatment plan should be sought

Consequences of loss VDO

- Functional surfaces of teeth: flatter and wider, disrupting the occlusal plane
- Overclosure and deep bite
- Distalising effect on the condyles
- Overcontraction of muscles and are stressed and fatigued
- Thinning of lips
- Forward positioning of mandible causing chin prominence and chin closer to nose
- Exaggeration of facial folds

Sicher (1949) & silverman (1952) the teeth and alveolar bone elongate through growth to maintain the original vertical dimension with the maintenance of the same closest speaking space. Occlusal wear may occur more rapidly than continuous eruption depending upon the etiology of the wear.

Harry kazis & albert kazis: reduced vertical dimension is not designed to increase the vertical dimension beyond the normal, but is intended to restore the amount of vertical dimension that has been lost.

Landa(1955) stated 'bite raising' is contraindicated as it causes strain in TMJ joint.

Dawson (1974) When it is not practical to restore severely worn dentition without restoring the vertical dimension to obtain space for the restorative material, the dimension can be increased to 1-1.5 mm.

Carlson et al (1979) moderate increase in vertical dimension of occlusion does not create problem provided that occlusal stability is provided.

Rivera-Morales (1991) Experiments in animals proved that moderate changes in occlusal vertical dimension do not cause hyperactivity of masticatory muscles and symptoms of temporomandibular dysfunction.

METHODS OF OBTAINING SPACE TO RESTORE WORN ANTERIOR TEETH

- Dahl Appliance - If wear is localized eg. Upper anterior teeth
- Grind opposing teeth - Possible esthetic and pulpal problems
- 'Distalize Mandible' - Extensive occlusal adjustment needed to eliminate slide from RCP- ICP (retruded axis position to intercuspal position) Only if large anterior slide present
- Crown Lengthening - May be required to increase axial wall height to aid in crown retention
- Extraction/ Surgical Repositioning - Rarely indicated but may be required where gross over-eruption has occurred

Establish New Vertical

- Use of splint for 4-6 weeks
- Occlusal composite restoration at the new vertical (with help of diagnostic wax up)

Reversible Irreversible

Occlusal Splint / occlusal device/ stent/ occlusal appliance

Any removable artificial occlusal surface affecting the relationship of the mandible to the maxillae used for diagnosis or therapy; uses of this device may include, but are not limited to, occlusal stabilization for treatment of TMD, diagnostic overlay prior to extensive intervention, radiation therapy. Occlusal positioning and prevention of wear of the dentition or damage to brittle restorative materials such as dental porcelain.

Functions:
1. Stabilization of weak teeth
2. Distribution of occlusal forces
3. Reduction of wear
4. Stabilization of unopposed teeth

Two types:
1) Permissive splint 2) Directive splint

Permissive splint : permit the teeth to slide on a smooth surface so that condyle can move freely with no direction from intercuspal seating contours. These are designed -
- To unlock the occlusion
- To remove deviating tooth inclines from contacts
- Allow the muscles to function according to their own coordinated interaction
- Also work as **Muscle Deprogrammer**

Types:
a. Anterior Bite Plane
b. Posterior Bite Plane
c. Centric Relation Occlusal Splint
d. Full Occlusal Splint
e. Centric relation occlusal splint

Centric relation occlusal splint
- Provides no obstruction on positioning of the condyles
- Condyles are free to travel up and down on eminentiae to the most antero-superior seated position with no limitation of movement.

Uses of permissive splint:
- Serve dual purpose : Diagnostic as well as it break muscle engram thus facilitate centric relation recording
- Assess the new vertical dimension in terms of patient comfort & esthetics
- All permit free horizontal movement of mandible.
- Post treatment maintenance

Directive Splint:
- **Position the mandible in a specific relationship to the maxillain order for definite intercuspation to occur at the teeth.**
- Sole purpose is to **position or align the condyle disc assembly**
- Eg. Anterior repositioning appliance

Centric relation
It is defined as "the maxillo-mandibular relationship in which the condyles articulate with the thinnest avascular portion of their respective discs with the complex in the anterior-superior position against the shapes of the articular eminencies. This position is independent of tooth contact. This position is clinically discernible when the mandible is directed superior and anteriorly. It is restricted to a purely rotary movement about the transverse horizontal axis (GPT).
Purpose: To create occlusal contact in posterior teeth that stabilizes the mandibular position

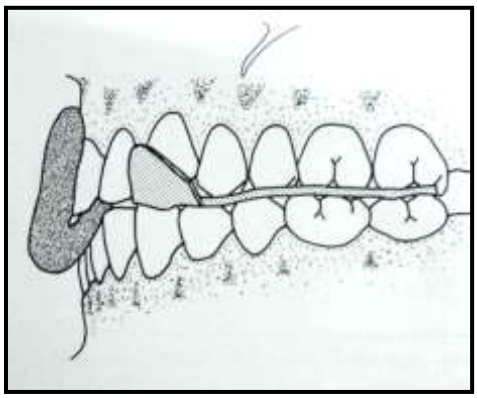
Centric occlusion (ICP, MIOP, acquired position of the mandible): relationship of mandible to the maxilla when the teeth are in maximum occlusal contact, irrespective of the position or alignment of the condyl-disk assemblies.
Manipulation of mandible necessary for equilibration position

Recording of centric relation
Inter-occlusal bite record for correct articulation of mounted casts

Muscle Deprogramming: Ask the patient to bite on these with anterior teeth for 5 -10 minutes. The memory position of teeth intercuspation is lost.
1) Cotton role
2) Central bearing point technique (excellent muscle de programmer).
2) Anterior Jig/ Lucia Jig **by lucia**
3) Leaf Gauge by long
4) Tongue blade

Anterior stop/ jig: Principle: Anterior jig prevents posterior teeth from occluding and thus disrupts the proprioceptive memory. The jig incline must stop the mandible before posterior tooth contact and should be angled 45-60 degrees

posteriorly and superiorly from the occlusal plane. The jig can also be made of autopolymerizing acrylic resin/ impression compound on mounted casts and then adjusted intraorally. After the jig is adjusted; posterior bite record is taken.



Leaf Gauge: was first introduced by **Dr. James .H. Long** in 1973
It is the most useful and practical alternative to anterior jig.
Leaf gauge can be used for-

1) Centric relation interocclusal records
2) Occlusal equilibration
3) Relieve painful spasms of lateral pterygoid muscle.

Previously they were made of unexposed X- ray films after developing to remove the emulsion coating. Clear film was then cut into **1 cm X 5 cm** sections. Recently, leaf gauges of **uniform 0.1mm thickness** which are sequentially numbered are described. They are convenient and measure the exact vertical opening between the incisors.

Solomen and Shetty (1996) found obtaining centric relation with the use of leaf gauge to be accurate compared to unguided technique and operator guided closure.

Procedure: Arbitrary number of leaves is placed at the maxillary anterior midline parallel to the lingual plane of central incisors. Patient is instructed to close on back teeth until lower incisors touch on back side of leaf gauge. Leaves are added or subtracted until patient can barely feel a posterior tooth touch while closing firmly on leaf gauge. Often the patient can often feel a posterior tooth contact in 15- 52 seconds after the jaw is closed with a 'half hard' closing force (bite while swallowing). This procedure is repeated after adding a leaf gauge until the patient can close for 2-5 minutes without feeling a posterior tooth contact.

Central bearing point technique: is the excellent muscle deprogrammer because it allows full movement of the mandible in any direction. Elevator muscle contraction can seat the condyles with no chances of occlusal interference.

Manipulation for Centric Relation

A) **Bilateral manipulation**: Most consistently repeatable and it provides a method of verification:

- Correctness of Condylar position
- Alignment of Condylar disc assembly
- Integrity of articular surfaces.

Steps:

1. Recline the patient all the way back; point the chin up
2. Firmly stabilizes the head of patient from behind while working from a seated position
3. Position four fingers of each hand on the lower border of mandible
4. Bring the thumb together to form a "C" with each hand
5. With very gentle touch; the jaw is manipulated so that it slowly hinges open & close
6. Verify centric relation position upward finger pressure; downward thumb pressure
7. When it possible to freely & painlessly arc the mandible while exerting firm pressure; the dentist is ready to close the mandible to the first point of contact .the mandible shouldn't translate off its terminal hinge axis.

B) Three finger chin point guidance

C) Central bearing point technique

D) One handed manipulation: downward chin-point pressure by Anderson & tanner.

Technique for taking bite records

1) Wax bite procedure

2) Anterior stop techniques
3) Use of preformed bases
4) Central bearing point technique

Wax bite procedure

Most popular technique not only because of its **simplicity but rates with best technique** in regard to accuracy if it is properly used. Extra hard base plate wax is an excellent bite material.

Precautions:

- Wax wafer: sufficiently thick so that it doesn't bend.
- Wax bite records store by floating them in water ina sealed plastic container.

Anterior stop technique: the term "anterior stop" as it is used here refers to contact in the incisor area only.

Advantages:

- Easiest to learn & offer greatest flexility.
- It allows the condyle to seat up without any possible deviation or restriction from posterior teeth.
- May be modified and adapted to almost any clinical situation.

Material of choice for record:

- Plaster: set quickly and easy to use.
- Zinc oxide eugenol: effectively used.
- Self cure acrylic resin: require special attention because of its heat generation while setting.
- Firm setting silicone impression material: excellent bite material because of its accuracy and non-distorting flow before it sets.

Centric bite records on preformed bases

Indications:

- Chances of movement of teeth
- Soft tissue compression while making bite records.
- Opposing edentulous ridges
- Hypermobile teeth

Procedure:

1) A triple layer wafer of extra hard base plate wax is adapted to an accurate model that has been dampened so that the warm wax will not stick to it.
2) The wafer should extend across from one side of arch to other in order to provide cross arch stabilization.
3) The wax should be adapted around the teeth on the model in manner that not only will hold the teeth firmly but will also stabilize the base.

Requirement:

- Wax over any occluding surfaces should be thinned to allow maximum closure without tooth to tooth contact.
- Wax should be at least three thicknesses for strength and should be extra hard & brittle enough to break rather than bend when it is cool.

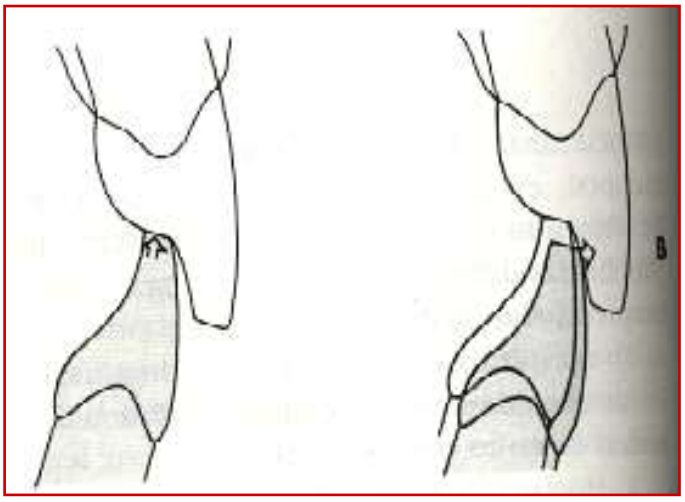
Choice of technique used:

- Dentist experience
- Degree of difficulty in occlusal registration
- If easy movement : bilateral manipulation & wax record
- Moderate difficulty manipulation: anterior stop technique
- Great difficulty in manipulation: occlusal splint for recording CR

Condyle position

There has been a considerable amount of debate regarding both position of condyle in centric relation and need for precision in recording it. Centric relation is not a precise position and the condyles are really seat into a fairly broad area with no particular specificity. The term long centric has frequently been misinterpreted as referring to an area of centric.

Long centric: The term 'Long Centric' could be defined as freedom to close the mandible either into centric relation or slightly anterior to it without varying the vertical dimension of occlusion



When CR & CO do not coincide "it is the freedom to close the mandible either into centric relation or slightly anterior to it without varying the vertical dimension at the anterior teeth." (*Peter Dawson*) It is a freedom into centric, and out of centric

- *Schuyler* preferred term freedom in centric
- *Ramfjord* preferred play in centric
- *Beyron* prefers the term Area centric, (an area contact is obtained during function in centric)
- If front teeth hit together harder than back teeth, then there is no freedom in that centric occlusion.

Examples:

- Angles Class II div (ii) incisor relationship
- Anterior crowns provided with palatal surfaces too thick.
- Not all patients require long centric. Their centric closure and closure from rest are identical.
- If such patients are given a long centric, they will not use it but it will not hurt them either.
- There are no contraindications for providing the freedom.

Anterior guidance:

The dynamic relationship of lower anterior teeth against upper anterior teeth through all ranges of function.

Importance of Anterior Guidance

- Principle determinant of posterior occlusal form
- Esthetics
- Protection of posterior teeth
- Phonetics

Establishment of Anterior Guidance

- Stable holding contact for each anterior teeth
- Uniform and simultaneous anterior and posterior centric relation contacts
- Position and contour in harmony with
  - envelope of function
  - neutral zone
  - lip closure path
- Immediate posterior disclusion

Harmonization of Anterior Guidance

Preliminary steps

- Reshaping of lower anterior teeth
- Equilibration of posterior occlusal contacts
- Establish coordinated centric relation stops on all anterior teeth
- Extended centric stop to incorporate long centric
- Establishment of anterior group function in straight protrusion
- Ideal anterior stress distribution in lateral excursion

Techniques: Occlusal Rehabilitation

1. Simultaneous arch restoration
2. Individual quadrant restoration
3. Segmented simultaneous restoration

Simultaneous Arch Restoration

Advantages:

Flexibility in developing

- Occlusal plane, Occlusal scheme
- Crown contour
- Aesthetics

Disadvantages

- Long patient visits
- Full arch anesthesia
- Multiple occlusal records
- Loss of vertical dimension

Quadrant Arch Restoration

- Advantages
  - Predictable appointments
  - Maintain vertical dimension
  - Quadrant Anesthesia
- Disadvantages
  - Multiple Appointments
  - Occlusal plane
  - Crown contour
  - Aesthetic

Segmented Simultaneous Arch Technique

- Combined desired features of both the techniques
- Simplified essential basic procedures for reconstruction

Temporization:

Temporary restorations is fabricated to provide protection, positional stability, mastication, esthetics and to obtain certain diagnostic information.

Biological Requirements

- Pulp protection
- Periodontal health maintenance
- Occlusal compatibility
- Tooth position maintenance
- Prevent fracture

Mechanical Requirements

- Resist functional load
- Resist removal force
- Maintain inter abutment alignment

Esthetic Requirements

- Easily contourable
- Color compatible
- Translucency
- Color stability

Fabrication Procedure

- Direct technique
- Indirect technique
- Indirect-direct technique

OCCLUSAL EQUILIBRATION'

- The term 'occlusal equilibration' refers to the correction of stressful occlusal contacts through selective grinding. It involves the selective reshaping of tooth surface that interfere with normal jaw function.

- Occlusal equilibration is a phase of treatment that eliminates only that part of tooth structure that is in the way of harmonious jaw function

Objective

- Centric relation occlusion
- Coupling of anterior teeth
- Acceptable disclusion of anterior teeth in harmony with condylar movement.
- Stability of occlusion
- Resolution of temporomandibular joint symptoms

Procedures:

They can be divided into four parts-

- Eliminating interferences to terminal hinge axis closure(centric relation)
- Eliminating interferences to lateral excursions
- Eliminating posterior tooth interferences with protrusive excursions.
- Harmonization of anterior guidance.

Locating the occlusal interference

- The centric relation position for each condyle should be confirmed before the tooth contacts are marked.
- Condyle-disk assembly must be free to seat in their superior position without any forced displacement when the teeth intercuspate.

Centric relation interferences

- Centric relation interferences can be differentiated into two types-
  1) Interferences to arc of closure
  2) Interferences to line of closure

Interferences to arc of closure Any tooth that interferes with this arc of closure displaces the mandible forward causing the condyle to move forward,called as **anterior slide.**

Rule to correct anterior slide – MUDL

- Grind the mesial inclines of upper teeth or distal inclines of lower teeth.

Interferences to line of closure

It refer to those primary interferences that cause the mandible to deviate to the left or the right from the first point of contact to the most closed position.

- Grinding Rules refer to inclines and not cusps.
- If the interfering incline causes the mandible to deviate off the line of closure toward the cheek, grind the buccal incline of upper or the lingual incline of lower or both inclines: **BULL**
- If the interfering incline causes the mandible to deviate off the line of closure toward the tongue , grind the lingual incline of the upper or the buccal incline of the lower or both inclines: **LUBL**

Moving the cusp tip by selective grinding

- Tilted teeth or wide cusp tips can be adjusted to improve stability as well as to eliminate interferences.
- If the mark on the upper tooth is buccal to the central fossa, the lower tooth is ground to move the cusp tip lingually without shortening the cusp tip out of centric contact.
- To grind only the upper tooth may mutilate the upper cusps unnecessarily without improving the direction of forces.

Lateral excursion interferences

Lateral interferences that can be found only by firm manipulation of the mandible all the way out to its border limit from a verified centric relation.

Lateral interferences can be divided into –

- Interferences of the balancing side
- Interferences of the working side

Interferences of the balancing side

- Balancing side interferences are usually adjusted first and are the least complicated.
- The goal here is to eliminate all contact on inclines as soon as the lower teeth move out of centric relation and start toward the tongue.
- Grinding rule – BULL

Interferences of the working side

Before adjustment of the excursion on the working side, it is necessary to determine the type of occlusion that will best suit the particular patient.

- **Group function:**

- The lower posterior cusp tips and the lower working side incisal edges maintain continuous contact from centric relation out toward the cheek

Posterior disclusion:

- Posterior teeth contact only in centric relation
- The anterior guidance should immediately disclude all posterior tooth contact the moment mandible moves from centric relation.
- Disclusion effect come from cuspid protected occlusion or anterior teeth.
  Grinding rule – LUBL
- Grind the lingual inclines of the upper teeth or the buccal inclines of lower teeth, or both sets of inclines.
- Since cusp tips are used for centric holding stops, all adjusting is done on the walls of the fossae or the sides of the cusps.

Posterior interferences

- Posterior disclusion in protrusion is accomplished by both the anterior guidance and the downward movement of the condyles.
- With steep anterior guidances, correction of protrusive interferences is usually minimal. Flat anterior guidance require extensive corrections.
- During protrusion only anterior teeth should touch and all posterior contact should be eliminated.
- Grinding rule –DUML

Distal inclines of the upper or the mesial inclines of the lower teeth.

Steps in harmonizing the anterior guidance

1. Establish coordinated centric relations stops on all anterior teeth.
2. Extend centric stops forward at the same vertical light closure from the postural rest position.
3. Establish group function in straight protrusion.
4. Establish ideal anterior stress distribution lateral excursion.

Problems associated with selective grinding-

- Irreversible damage – sensitivity, caries, wear.
- Alter VD
- Positive occlusal awareness
- Increases interference
- Problems in masticatory function
- Patient co-operation
- Time consuming

Plane of occlusion

Imaginary line that touches the incisal edges of the incisors and the tips of the occluding surfaces of the posterior teeth.

Basic requirements of a proper plane of occlusion.

Better esthetics is in most cases also dependent on the curvatures of the occlusal plane.
Antero posterior plane of occlusion.
Mediolateral plane of occlusion.

Curve of spee: Anteroposterior curvature of the occlusal surfaces, beginning at the tip of the lower cuspid and following the buccal cusp tips of the bicuspid and molars and continuing to the anterior border of the ramus.

Curve of Wilson:

- Upper posterior teeth normally slant outward and lower posterior teeth are tilted inward towards the tongue.
- Generally depicted in the lower arch.
- Effect of Curve of Wilson on occlusal contours of posterior teeth.

Establishing the plane of occlusion

1. Analysis on the natural teeth through selective grinding.
2. Analysis on models with fully adjustable instrumentation.
3. Use of Pankey Mann Schuyler method of occlusal plane analysis.
4. Cephalometrically

- PMS technique provided a excellent and practical for determining an occlusal plane that will fulfil all requirements of correct occlusion.
- The simplest method is the use of **Broadrick Occlusal Plane Analyzer.**

1. After upper model has been oriented to articulator by facebow registration, mounting is completd and lower model is related to upper by means of centric bite record.
2. Flag is secured to the upper bow of articultorand plastic sheet is snapped onto one side.
3. A pencil with caliper set to 4 inches radius. Width of flag is 4 inches and act as a convenient arbitrary guide.
4. The point on the lower cuspid from which an aesthetically pleasing occlusal plane is emanate is located. The needle point of the caliper is placed against the selected point on the caspid and arc ascribed on the flag. This arc is referred to as **anterior survey line**.
5. Caliper point is held against the condyle ball of the articulator & another arc is marked that intersect the anterior survey line, which is refer to the "condylar survey line"
6. A line is ascribed on the model from distal lower tooth forward to the cuspid. Then line is represent the height of the buccal cusp tip.
7. To determine the preparation line, the caliper is opened an amount equal to the desired occlusal thickness of the proposed restoration (usually about 1.5mm) and second line is scribed. This will represent the buccal cusp after the teeth have been prepared.
8. Occlusal plane cutting guide is fabricated with extra hard base plate wax.
9. Cutting guide is placed snugly against the buccal surfaces of dried teeth while preparing lower posterior teeth and a line is drawn on the teeth according to the guide.
10. The wax is removed and teeth are prepared along the line. The preparation should be about 1.5mm lower on lingual thn it is on buccal to accommodate for the curve of wilson.
11. The occlusal plane cutting guide represents only preparation height for buccal cusps.
12. After occlusal reduction, preparation is completed as per predetermined treatment plan.

Cephalometrically :

- the purpose of analysis is to determine its correct vertical position in both anterior & posterior segments.
- An esthetically pleasing plane of occlusion is close to center of ramus (Xi point) at the posterior and slightly below the lip embrassure at the anterior.

Criteria for success:

1. Loading test:
2. Clenching test:
   - One of the simplest yet most effective tests for determining if occlusal interference is a factor in orofacial pain
   - Patient t is asked to close and squeeze the teeth together/ empty mouth clench.
   - Discomfort in a tooth is certain sign of premature or deflective contact

3. Grinding test:
- Posterior Interferences & lack of posterior Disclusion
- test modified to check the group function on the working side

4. Fremitus :
- Light contact on the labial surfaces of each upper anterior tooth using the edge of fingernail, when the patient taps the teeth together lightly then firmly .
- Any movement of any ant teeth is an indication that the tooth is in interference This interference can occur from a restrictive envelope of function/ failure to provide a needed long centric
- Commonest cause: deflective posterior incline that forces the man forward into hard contact with the anterior teeth

5. Stability test:
- Refers to stable TMJ and stable dentition:
- if both joints and the teeth are stable, there should be no need for readjustment of the occlusion for a prior of at least 3 months.
- Once instability , then the treatment goal becomes one that of "**manageable stablity**"
- Conditions that may not satisfy stability include osteoarthritic breakdown of condyle/ eminence, excessive wear of teeth, Hypermobility, shifting of tooth position

6. Comfort test:
- Comfortable & unstrained speech,
- Correctly placed incisal edges,
- Harmony with the neutral zone.

7. Aesthetic test: Patient should be happy with the appearance of the smile Functional harmony= Anatomic harmony

Postoperative care/ maintenance

- TMJ evaluation
- Condition of supporting structure of teeth
- Presence of habit pattern
- Ability or willingness to follow a meticulous oral hygiene program
- General health problem

CONCLUSIONS

1. Definitive diagnosis and treatment planning
2. Follow the sequential steps for occlusal rehabilitation rather than guess work
3. Harmony of stomatognathic system
4. Occlusal equilibration

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