Procedural Dentistry

for

Complete Dentures

Shivangi Gajwani Jain

JAYPEE

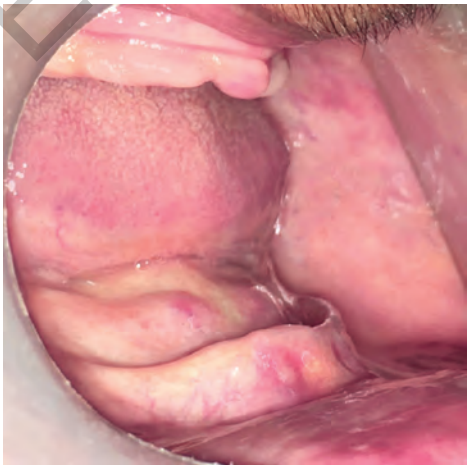
Contents

Step 4

Registration of Maxillo Mandibular Relations

"The patient's maxilla-mandibular relationships are dynamic and change during life"

Sheldon Winkler



Step 4

Registration of Maxillo Mandibular Relations

INTRODUCTION

There are three relations of maxilla to the mandible which are recorded for complete denture fabrication:

1. Orientation Relation
2. Vertical Dimension
3. Centric Relation.

All three are important but the centric relation has been the most confusing and controversial relation to define and implement in complete denture fabrication. There are more than 26 definitions to explain the centric and these have been changed and modified according to our understanding of anatomy.

Most acceptable definition has been given by Ash which describes how this maxilla mandibular relation is determined clinically. "A maxilla to mandible relationship in which the condyles and disks are thought to be in the midmost, uppermost position **(Fig. 4.1)**. The

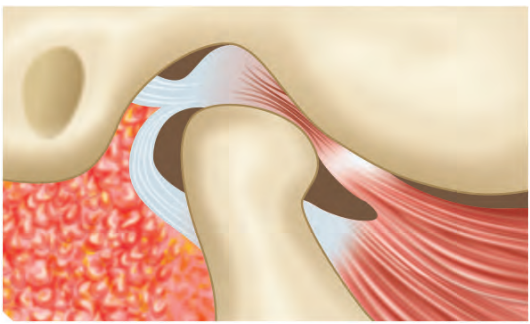


Fig. 4.1: The condyle disk assembly

position has been difficult to define anatomically but is determined clinically by assessing when the jaw can hinge on a fixed terminal axis (up to 25 mm). It is a clinically determined relationship of the mandible to the maxilla when the condyle disk assemblies are positioned in their most superior position in the mandibular fossae and against the distal slope of the articular eminence".

Clinically relevant definition according to Dawson, "A properly aligned condyle disc assembly in centric relation can resist maximum loading by the elevator muscles with no signs of discomfort". Centric occlusion is the tooth relation present when the jaws are in centric relation.

Vertical dimension is considered at two levels:

1. Vertical at rest position
2. Vertical at occlusion.

According to GPT8, vertical dimension is defined as: "The distance between two selected anatomic and marked points (usually one on the tip of the nose and the other upon the chin) one on a fixed and one on the movable member".

Though this is a widely accepted definition, one must understand that VDR is a physiological position, the VDO reflects a position chosen by the clinician after assessing all the clinically derived information and is subject to patient and doctor preferences and choices. This relation is subject to change with time as the anatomic points, temporo mandibular joint and denture bearing areas used for assessing vertical dimension have potential for continuous change making jaw relations dynamic in nature.

The scope of achieving the orientation relation, which in simple terms is the orientation of the maxilla to the TMJ is limited as it can only be achieved by using a face bow **(Fig. 4.2)** which can transfer this relation to a semi adjustable articulator **(Fig. 4.3)**. If using a simpler articulator as in many cases, this relation is not accessible.

Once the clinician has recorded the final impressions, the laboratory technician is instructed to construct the denture bases and the occlusal wax rims for recording the jaw relations. There are various materials available to be used as denture bases such as:

- Acrylic resin:
  - Self cure resin
  - Light cure resin **(Figs 4.4 and 4.5)**
  - Heat cure resin.

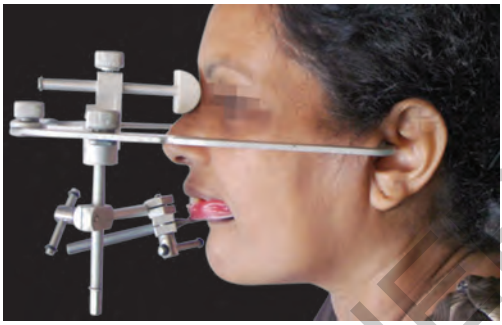


Fig. 4.2: Orientation of the maxilla to the mandible achieved using a facebow

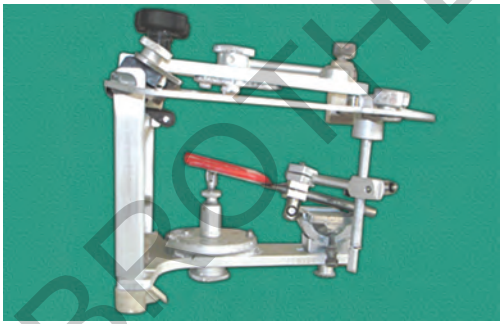


Fig. 4.3: Orientation relation transferred to a semi adjustable articulator

Fig. 4.4: Light curing machine having ultraviolet tubes for curing

Fig. 4.5: Light cured denture base material and adapted mandibular base

- Base metal alloy
- Shellac base plate: Thermoplastic
- Wax.

These materials can also be classified according to their incorporation in the final dentures **(Table 4.1)**.

Table 4.1: Denture base classification

Temporary Denture Bases	*Permanent Denture Base*
Thermoplastic materials: Shellac	Non precious metal alloy: Base metal
Self cured and light cured acrylic resin	Heat cured acrylic resin
Wax	

Both temporary and definitive denture bases are utilized by various dentists on a regular basis and both have their set of advantages and disadvantages.

Temporary Denture Bases

Advantages	*Disadvantages*
Ease of manipulation construction	Less stable in the mouth especially if resorbed ridge is present
Cheaper	Less rigid
Less time consuming	Difficult to use during jaw relation
Working cast stays intact for final denture fabrication	Inferior adaptation to the underlying tissues

Permanent Denture Bases

Advantages	*Disadvantages*
Superior tissue adaptation	Working cast is destroyed
Dimensionally very stable	Expensive
Extremely rigid	Acrylic is subject to an additional curing cycle which theoretically may lead to warpage of the base
Ease and accuracy during jaw relation	Technical and time consuming fabrication

Fabrication of Permanent Denture Base

Procedure for inclusion of the permanent denture bases into the final dentures:-

As the final impressions are poured, the stone working cast is obtained by cast duplication. The waxed up base is placed onto the cast and it is flasked, dewaxed, processed, deflasked and polished. Metal denture bases are used in patients with a history of midline(palatal) denture fractures and bruxism. Their selection should be made keeping in mind that they are heavier and are difficult to adjust as compared to heat cured acrylic bases. Newer high impact alternatives are also available these days.

Occlusal Wax Rim Fabrication

Modeling wax is utilized to fabricate rims on the denture bases. Wax is heated and placed in the form of the underlying arch form. For maxilla it is usually a horse shoe shape and for mandible it is a wide "U" shape following the arch form **(Fig. 4.6)**.

Maxillary Occlusal Wax Rim

Many factors contribute to the height of the rim:

- The lip length
- Lip fullness
- Tooth visibility: Patient's choice.

Though, the rim has to be adjusted in the patient's mouth by the dentist, the reductions and additions are a tedious process. Using a scale or a papillometer, just under the lip near the labial frenum helps in determining the approximate height of the wax rim which

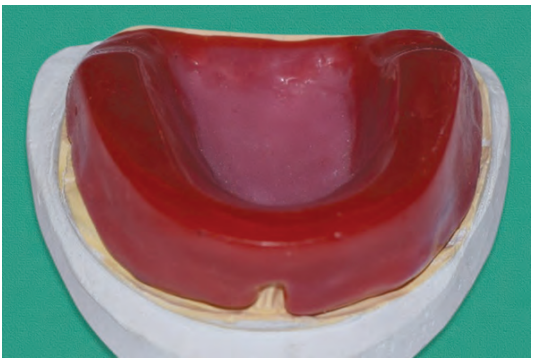


Fig. 4.6: Horse shoe shaped maxillary wax rim

can then be conveyed to the technician. This helps in getting the correct height of the maxillary rim saving chair time.

Other important factors:

- Orientation of the rim:
  - Interpupillary line parallelism to the anterior wax rim
  - Ala tragus line parallel to the posterior rim forming the curve of spee **(Fig. 4.7)**. Confirmed with the help of fox plane or assessed by a thorough visual examination.
- Naso labial angle: Approximately 90 degrees to check the labial profile of the patient **(Fig. 4.8)**.

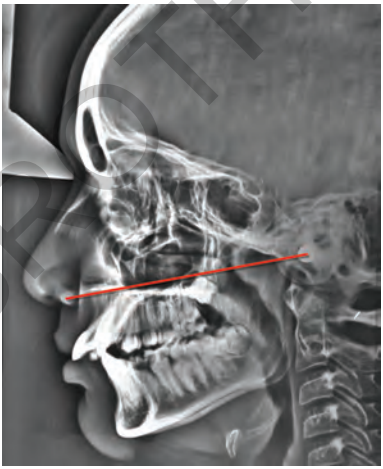


Fig. 4.7: A line drawn through Ala tragus is parallel to the posterior teeth (Posterior occlusal rim in denture patients) forming the curve of spee

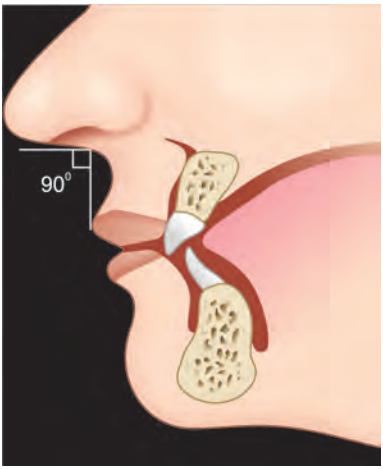


Fig. 4.8: Nasolabial angle: 90 degrees

Mandibular Wax Rim

Reference points **(Fig. 4.9)**:

- Posteriorly, the wax rim should be placed on the center of the ridge. This ensures that the fossa of the mandibular denture teeth lie on a line bisecting the width of the mandibular rim
- The height of the rim should intersect the retromolar pad at 2/3rd or half level. It is subject to alteration in the oral cavity. The occlusal plane thus formed is important as a high plane will cause difficulty in mastication and food bolus placement on the teeth where as a low plane will result in cheek bite
- Anterior rim should be at the level of the vermilion border and flush with the level of the modiolus at the corner of the mouth
- With age the visibility of the mandibular teeth increases, thus the height of the rim may be kept in the visibility range of 0.5-1.5 mm
- Lingual contour of the wax rim should be concave with a slight gingival roll to it. This allows the tongue to settle/sit partially there. Advantages: Prevention of tongue bite and stability of the lower denture as the tongue keeps it in place **(Fig. 4.10)**.

Determination of the Vertical Dimension

Various methods used are:

- Rest position (Vertical Dimension ot Rest) **(Fig. 4.11)**:
  - Freeway space of 2-4 mm in the first premolar region
  - Asking patient to swallow, relax lower jaw, part lips to view space between the teeth.
- Phonetics: "s" sounds to evaluate average speaking space
- Esthetics and phonetics

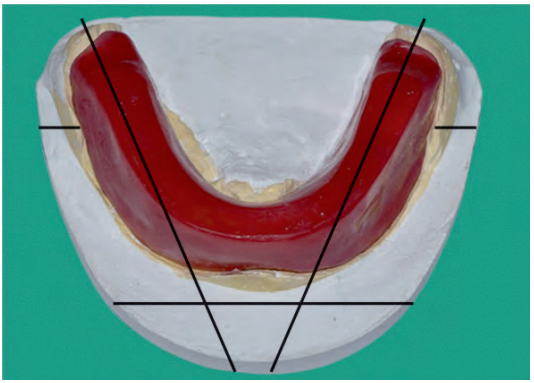
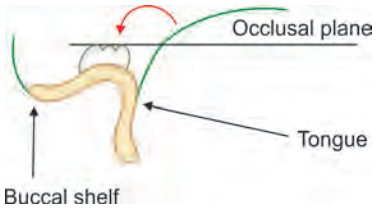
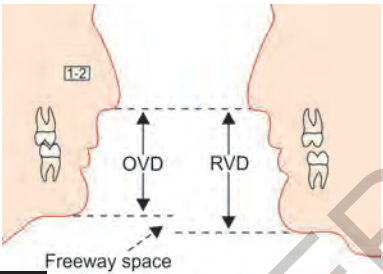


Fig. 4.9: Mandibular wax rim: Teeth should be placed on the center of the ridge to enhance stability



4.10



4.11

Fig. 4.10: Space for the tongue to settle in. **Fig. 4.11:** Freeway space of 2-4 mm

- Swallowing threshold.
- Tactile sense and patient perceived comfort:
  - Neuromuscular perception.
- Facial parameters for VDO versus VDR with dots on face, specifically using landmarks such as chin to nose distance-Niswonger's method **(Fig. 4.12)**.

One and all methods are used in combination to determine the vertical dimension. The amount of free way space can be checked with a measuring gauge or a divider and still remains the principal method of recording the vertical dimension **(Fig. 4.13)**.

Signs and symptoms of excessive increase and decrease in vertical dimension (VD) are mentioned in **Table 4.2**.

Table 4.2: Excessive increase and decrease in VD

Excessive Increase in VD	*Excessive Decrease in VD*
Clicking sound as teeth touch sooner than intended	Inefficiency: Masticatory ability is hampered
Trauma: Temporomandibular joints, mucosa, underlying bone	Cheek biting
Enhanced bone resorption	Pain in temporomandibular joints
Swallowing difficulty	Dribbling of saliva from the corners of the mouth
Long face: Elongation of face **(Fig. 4.14)**	Older senile appearance with smaller looking face and deeper line angles **(Fig. 4.15)**
Dry mouth: Lips parted all the time	Angular chelitis

When adjustments are complete, the wax rims are ready for centric relation record. There are various methods that have been used in

Fig. 4.12: Facial support for Vertical Dimension at Occlusion versus Vertical dimension at rest measured with dots/reference points on the face

Fig. 4.13: A Caliper is used to measure, record and lock the vertical dimension

Fig. 4.14: Long face syndrome: elongation of face due to increased vertical dimension in the complete dentures

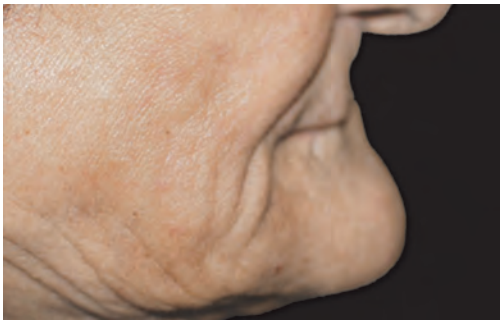


Fig. 4.15: Smaller looking face with wrinkled appearance due to decreased vertical dimension

the past and are still relevant when it comes to recording the centric relation. Clinicians still use the following methods to retrude the mandible in a comfortable, repeatable position:

- Swallowing method: Patient is asked to swallow and close the mouth. As the mandible moves back the condyle comes in a favorable, recordable position
- Placing the tongue on the posterior aspect of the palate and taking it further back as the mouth closes. Disadvantage of this technique is that there are chances of over retrusion
- Dawson's Bimanual manipulation: This method though used commonly in dentate patients, helps to achieve centric relation with ease even in edentulous patients.

Procedure: **(Fig. 4.16)**:

- **Step 1:** Recline the patient all the way back in a supine position
- **Step 2:** Stabilize the head level. Top of the patient's head in center of the abdomen, cradle the head between the ribcage and the forearm.
    - Lift the patient's chin up, to slightly stretch the neck
    - Position the four fingers of each hand on the lower border of the mandible
    - Bring the thumbs together to form a "C" with each hand
    - Gently manipulate the jaw so it slowly hinges open and closed: It will slip in to centric if no pressure is applied.

Once the patient goes into centric without difficulty, the clinician must check the position and make the patient repeat it before locking the rims in place. The material used most commonly to record and lock the rims in centric relation is Aluwax. Some clinicians prefer to use hard, silicon bite registration materials for ease of workability and to do away with hot water manipulation which is required to soften the wax.

Creation of Seal: A seal is created between the two rims at centric relation by the Nick and notch method. Many clinicians use hot instruments such as wax knife to seal the rims **(Fig. 4.17)**, it is not the method of choice. Chances of distortion, movement and errors in orientation are some of the disadvantages of this technique. Once the rims are sealed there is no way to check the centric again in the mouth which is considered a major disadvantage. Score marks are placed on the rims to ensure correct reassembling if the rims get separated.

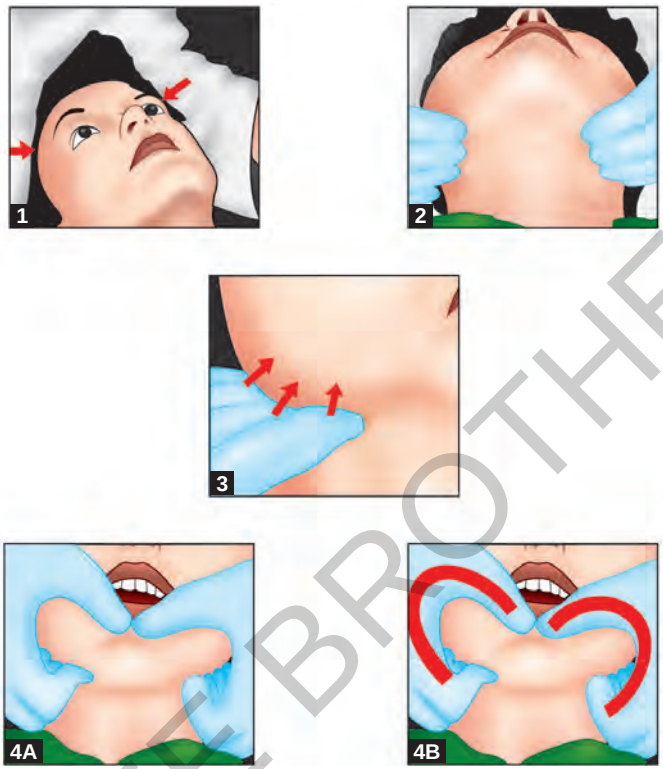


Fig. 4.16: Dawsons Method of Bimannual manipulation; Step 1: Stabilize the head. Step 2: After the head is stabilized, lift patient's chin again to slightly stretch the neck. Step 3: Gently position four fingers of each hand on the lower border of the mandible. Step 4A and B: Bring thumbs together to form a C with each hand

Nick and Notch method: The most accepted procedure. **(Figs 4.18 to 4.20)**

- Cut a trough of 3-4mm on the mandibular wax rim, ending just before the most mesial part **(Fig. 4.21A)**
- Nick and notch are created in the maxillary occlusal rim on the area corresponding the trough **(Fig. 4.21B)**
- Both nick and notch have the distal slope at 90 degrees to stop the flow of bite registration material further, where as the distal slope is at an angle to allow the material to fill the space
- Bite registration material is placed and the mandible is manipulated into centric as the patient closes the mouth

Procedural Dentistry
for Complete Dentures

The success or failure of a Complete Denture Prosthesis depends not only on form, function and esthetics but also on preservation of the remaining oral tissues. This book intends to

- Help revise the basics for practicing clinicians
- Understand the fundamentals for dental students
- Create awareness about newer materials
- Learn concepts to simplify the process of denture fabrication.

Shivangi Gajwani Jain MDS, Diplomat, IBP (I) is a Prosthodontist and Ex-Faculty, Bharti Vidyapeeth Deemed University, Navi Mumbai. She is the recipient of ICD Merit Award for outstanding performance in the field of Prosthodontics by International College of Dentists in 2003. She is currently working at her own multispecialty clinic, iDENT with her team of specialists and also is a consultant at various other clinics. She has also coauthored Elsevier Comprehensive Guide to PGDEE in 2009 (Prosthodontics section) and has international and national publications to her credit. Her profile was featured in July, 2014 in an International Dental Magazine: Dental Town, USA. She is a keen academician and actively conducts continuing dental education workshops all over the country with special attention to Removable Prosthodontics.

Available at all medical bookstores
or buy online at www.jaypeebrothers.com

JAYPEE BROTHERS
Medical Publishers (P) Ltd.
www.jaypeebrothers.com

Join us on facebook.com/JaypeeMedicalPublishers

Shelving Recommendation
DENTISTRY

ISBN 978-93-5270-022-6