COURSE GUIDE

DNT 411
DENTAL PROSTHETICS AND TECHNOLOGY

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INTRODUCTION

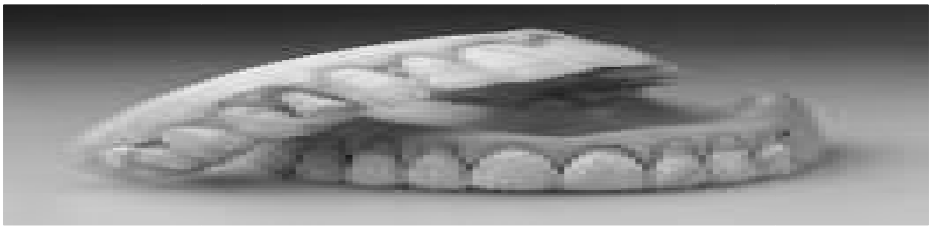
DNT 411: Dental Prosthetics and Technology is a 2-credit unit course for distance learners in the Bachelor of Science in Dental Technology Programme of the National Open University of Nigeria. It is broken down into 5 modules and 13 units.

Dental prosthetics and technology is the branch of dentistry pertaining to the restoration and maintenance of oral function, comfort, appearance, and health of the patient by the restoration of natural teeth and/or the replacement of missing teeth and craniofacial tissues with artificial substitutes.

Tooth replacement has been around nearly as long as teeth themselves. A few highlights of the history of dental prosthetics include:

- In ancient times, people used bits of seashells, stones and even carved animal teeth and tusks to replace their missing teeth. Well into the 19th century, people could even opt for using real human teeth to replace missing dentition.

- The first functional set of full dentures was created from the wood of the boxwood tree in 15th century Japan. By the early 20th century, dental technologists were crafting durable, well-fitting dentures out of acrylic resin.



Olden Day Dentures

This Course Guide therefore tells you briefly what the course: DNT 411 is all about, the type of course materials to be used, what you are expected to know in each unit, and how to work through the course material. It suggests the general guidelines and also emphasises the need for self- assessment and tutorial classes that are linked to this course and students are encouraged to attend.

WHAT YOU WILL LEARN IN THIS COURSE

The course content consists of a unit of Course Guide, which informs you briefly on what the course is all about, what course materials you need and how to work with such materials. It also gives you some guideline for the time you are expected to spend on each unit, in order to complete it successfully.

The Course Guide guides you concerning your tutor-marked assignment, which will be placed in the assignment file. Regular tutorial classes related to the course will be conducted and it is advisable for you to attend these sessions. It is expected that the course will prepare you for challenges you are likely to meet ahead.

COURSE AIM

This course aims to give you an in-depth understanding of dental prosthetics and technology which includes the principles and techniques involved in the fabrication of dental prostheses. It is hoped that the knowledge will equip you with the necessary skill to excel in your examination and beyond.

COURSE OBJECTIVES

Note that each unit has specific objectives. You should read them carefully before going through the unit. You may want to refer to them during your study to check on your progress.

You should always look at the unit objectives after completing a unit. In this way, you can be sure that you have done what is required of you by the unit. However, below are overall objectives of this course.

On successful completion of this course, you should be able to:

- Describe the model surveyor
- Understand the principles of surveying
- List types of articulator
- Know how to mount models on different types of articulator
- Give an overview of immediate denture
- Highlight the advantages and disadvantages of immediate denture
- List types of immediate denture
- Explain the construction techniques of immediate denture/delivery
- Illustrate overview of complete denture
- Describe the construction procedure for complete denture

- Discuss factors affecting retention and stability of complete denture
- Identify class I, II and III occlusions/jaw relationships
- Differentiate between class I, II and III occlusions/jaw relationships

WORKING THROUGH THIS COURSE

To complete this course, you are required to read the units, the recommended text books, and other relevant materials. Each unit contains some self -assessment exercises and tutor- marked assignments. There is also a final examination at the end of this course. Stated below are the components of this course and what you have to do.

COURSE MATERIALS

The major components of the course are:

1. Course Guide
2. Study Units
3. Text Books
4. Assignment File
5. Tutorials

STUDY UNITS

There are 13 study units and 5 modules in this course as follows:

Module 1

Unit 1 Model Surveyor
Unit 2 Principles of Surveying

Module 2

Unit 1 Articulators
Unit 2 Mounting on Different Articulators

Module 3

Unit 1 An Overview of Immediate Denture
Unit 2 Advantages and Disadvantages of Immediate Denture
Unit 3 Types of Immediate Denture
Unit 4 Construction Techniques/Delivery and Care of Immediate Denture

Module 4

Unit 1	An Overview of Complete Denture
Unit 2	Procedure for Construction of Complete Denture (Normal Occlusion)
Unit 3	Factors Affecting Retention and Stability of Complete Denture

Module 5

Unit 1	Identification of Class I, II and III Occlusions/Jaw Relationships
Unit 2	Differentiation between Class I, II and III Occlusions/Jaw Relationships

RECOMMENDED TEXTS AND REFERENCES

These texts will be of immense benefit to this course.

Deepak, N. (2003). *Textbook of Prosthodontics*. India: Jaypee Brothers Medical Publishers Ltd,

Shaw, F G. & Scott, D.C. (1968). *Practical Exercises in Dental Mechanics.* (3rd ed.). London:

Soratur, S. H. (2006). *Essentials of Prosthodontics.* India: Jaypee Brothers Medical Publishers Ltd.

Vinay, .C.G., Sridhar, R. K. (2004). *Handbook of Complete Denture*. India: AITBS Publishers

ASSIGNMENT FILE

The assignment file will be given to you in due course. In this file, you will find all the details of the work you must submit to your tutor for marking. The marks you obtain for these assignments will count towards the final mark for the course. Altogether, there are 13 tutor- marked assignments (TMAs) for this course.

PRESENTATION SCHEDULE

The presentation schedule included in this Course Guide provides important dates for completion of each unit and tutor-marked assignment. You should therefore try to meet deadlines.

ASSESSMENT

There are two aspects to the assessment of this course. First, there are tutor-marked assignments; and second, the written examination.

You are expected to apply knowledge, comprehension, information and problem solving gathered during the course. Your final TMA will be presented in e-format and this account form 30% of your exam score. At the end of the course, you will need to sit for a final written examination. This examination will account for 70% of your total score.

TUTOR -MARKED ASSIGNMENTS (TMAs)

You are expected to attempt all the TMAs in your study material. However, 4 TMAs will be uploaded in your portal. The best 3 will count towards your final exam grade.

FINAL EXAMINATION AND GRADING

The final examination for DNT 411 will be of 2-hours and have a value of 70%. The examination will consist of questions which reflect the tutor- marked assignments that you have previously encountered. Furthermore, all areas of the course will be examined. It is also better to use the time between finishing the last unit and sitting for the examination, to revise the entire course. You might find it useful to review your TMAs and comment on them before the examination. The final examination covers information from all parts of the course.

COURSE MARKING SCHEME

The following table includes the course marking scheme.

Table 1 : Course Marking Scheme

Assessment	**Marks**
TMAs	30%
Final Examination	70%
Total	100%

COURSE OVERVIEW

This table indicates the units, the number of weeks required to complete them and the assignments.

COURSE ORGANISER

Unit	Title of work	Weeks Activity	Assessment (End of Unit)
	Course Guide	Week 1	
Module 1			
Unit 1	Model surveyor	Week 1	Assignment 1
Unit 2	Principles of surveying	Week 1	Assignment 2
Module 2			
Unit 1	Types of articulator	Week 2	Assignment 3
Unit 2	Mounting on different articulators	Week 2	Assignment 4
Module 3			
Unit 1	An overview of immediate denture	Week3	Assignment 5
Unit 2	Advantages & disadvantages of immediate denture	Week3	Assignment 6
Unit 3	Types of immediate denture	Week 4	Assignment 7
Unit 4	Construction techniques/Delivery & Care of immediate denture	Week4	Assignment 8
Module 4			
Unit 1	An overview of complete denture	Week 5	Assignment 9
Unit 2	Procedure for construction of complete denture (Normal Occlusion)	Week 6	Assignment 10
Unit 3	Factors affecting retention and stability of complete dentures	Week 7	Assignment 11
Module 5			
Unit 1	Identification of class I, II and III occlusions/ jaw relationships	Week 8	Assignment 12
Unit 2	Differentiation between class I, II and III occlusions/jaw relationships	Week 8	Assignment 13

HOW TO GET THE MOST OUT OF THIS COURSE

In distance learning, the study units replace the university lecturer. This is one of the huge advantages of distance learning mode; you can read and work through specially designed study materials at your own pace

and at a time and place that suit you best. Think of it as reading from the teacher, the study guide tells you what to read, when to read and the relevant texts to consult. You are provided exercises at appropriate points, just as a lecturer might give you an in-class exercise.

The following are practical strategies for working through this course:

1. Read the course guide thoroughly
2. Organise a study schedule
3. Once you have created your own study schedule, do everything you can to stick to it. The major reason that students fail is that they get behind with their course works. If you get into difficulties with your schedule, please let your tutor know before it is too late for help.
4. When you have submitted an assignment to your tutor for marking. Do not wait for its return before starting the next unit. Keep to your schedule. When the assignment is returned, pay particular attention to your tutor's comments, both on the tutor marked assignment form and also written on the assignment. Consult your tutor as soon as possible if you have any questions or problems.

FACILITATORS/TUTORS AND TUTORIALS

There are 16 hours of tutorial provided in support of this course. You will be notified of the dates, time and location together with the name and phone number of your tutor as soon as you are allocated a tutorial group.

Do not hesitate to contact your tutor by telephone, e-mail or discussion board if you need help. The following might be circumstances in which you would find help necessary: contact your tutor if:

- You do not understand any part of the study units or the assigned readings.
- You have difficulty with the self test or exercise.
- You have questions or problems with an assignment, with your tutor's comment on an assignment or with the grading of an assignment.

You should try your best to attend the tutorials. This is the only chance to have face to face contact with your tutor and ask questions which are answered instantly. You can raise any problem encountered in the course of your study. To gain the maximum benefit from the course tutorials, prepare a question list before attending them. You will learn a lot from participating in discussion actively.

SUMMARY

This Course Guide gives you an overview of what you expect in the course of this study. The course teaches you the basic principles underlying the manifestation of crime and delinquency. We wish you success with the course and hope you will find it interesting and useful.

GOODLUCK!

MAIN COURSE

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MODULE 1 SURVEYING

UNIT 1 MODEL SURVEYOR

CONTENTS

1.0 INTRODUCTION

The idea of the model surveyor was introduced in 1918 and the first surveyor developed specifically for use in Prosthodontics was made commercially available in 1921. There are two (2) types of model surveyors:-Electronic model surveyors and mechanical model surveyors. The electronic surveyors are complicated and expensive, hence their use is restricted to research and large commercial dental laboratories.

In this unit, we will be discussing the mechanical surveyors which are relatively inexpensive and easy to use. Every dental technologist learns to use a mechanical model surveyor as a student and should continue to use one in practice when constructing removable partial dentures.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- describe a model surveyor
- name the parts of a model surveyor
- list the accessories of a model surveyor and their functions.

3.0 MAIN CONTENT

3.1 Description of a Model Surveyor

A model surveyor can be described as an instrument used to determine the relative parallelism of two or more surfaces of the teeth or other parts of the cast of a dental arch. It can also be referred to as a Parallel meter.

A Model Surveyor with the Accessories

3.1.1 Parts of a Model Surveyor

A mechanical model surveyor consists of the following:-

1. Surveying platform –It is a metal plate parallel to the floor where a cast holder can be placed. It forms the base of the surveyor onto which all the other components are attached and supported.
2. Cast holder/surveying table –It is a stand placed over the surveying platform .This stand has a base and a table to place a cast.
3. Vertical arm – It arises vertically from the surveying platform. It is designed to support the surveying arm at its free end.
4. Horizontal arm – It extends horizontally from the top of the vertical arm, designed to support the surveying arm at its free end. It is fixed in some surveyors, while in some it can be revolved horizontally.
5. Surveying arm (Chuck) – It extends vertically from the free end of the horizontal arm. It is parallel to the vertical arm and can move upward and downward .The lower end of this arm has a mandrel into which tools used for surveying can be locked in.

3.2 Model Surveyor Accessories and their Functions

These are tools attached to the mandrel of the surveying arm during different stages of surveying.

1. Analysing rod – A parallel sided rod used to determine the parallelism of the tooth surfaces before marking the survey line. It is more of a diagnostic tool which helps to analyse the height of contours, the presence/absence of favourable and unfavourable undercuts for a particular path of insertion.
2. Carbon markers – They resemble the lead points commercially available for the micro-tip pencils. They are used to draw lines along the most bulbous area of the cast being surveyed (e.g. teeth).The resultant line formed by the carbon marker is known as a survey line.
3. Undercut gauges – These are parallel sided rods with lips or heads of specific sizes used to measure the depth and location of the undercuts on the analysed tooth. Stewart states the availability of undercut gauges in three standard sizes namely, 0.010 inch, 0.015 inch and 0.020 inch while McCracken states the availability of undercut gauges at 0.010, 0.020, and 0.030 inch. All these gauges have the same shank, only the size of the tip or bead varies. The area of the tooth that matches the gauge is chosen as the undercut.
4. Wax carving knives (chisel) - They can be attached to the mandrel of the surveying arm. They are used to directly trim the excess wax used in blocking-out while surveying.

3.3 Uses of a Model Surveyor

1. Surveying and blocking out the master cast.
2. Contouring crowns and cast restorations.
3. Contouring wax pattern.
4. Measuring a specific depth of undercut.
5. Surveying ceramic veneers before final glazing.

4.0 CONCLUSION

In this unit, you have learnt about the model surveyor, as an important device to use when constructing removable partial dentures. It is expected that by now you should be able to describe a model surveyor.

5.0 SUMMARY

This unit has focused on the definition of a model surveyor, the functions of its various parts and accessories and the use of a model surveyor in general.

The next unit will highlight the principles of surveying, as a continuation of this unit.

6.0 TUTOR-MARKED ASSIGNMENT

1. Describe a model surveyor.
2. Mention two (2) parts of a model surveyor.
3. Name three (3) model surveying accessories, and their functions.

7.0 REFERENCES/FURTHER READING

Deepak, N. (2003). *Textbook of Prosthodontics*. India: Jaypee Brothers Medical Publishers Ltd.

Kraljevic, et *al.* (2011). “Dental Surveyor and its Uses”.

UNIT 2 PRINCIPLES OF SURVEYING

CONTENTS

1.0 INTRODUCTION

A partial denture must be designed so that it can easily be inserted and removed by the patient, will be retained against reasonable dislodging forces and will have the best possible appearance. The main objective in surveying is to determine the most advantageous path of insertion bearing these principles in mind.

In unit 1, we have studied the model surveyor, its component parts, accessories and functions, Hope you enjoyed it. In this unit, we are going to learn how to use the device in surveying models for partial denture design.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- define surveying and other related terms
- state the principles of surveying
- describe how to use a model surveyor
- classify survey line.

3.0 MAIN CONTENT

3.1 Definitions

Surveying can be defined as the procedure of locating or delineating the contour and position of the abutment teeth and associated structures before designing a removable partial denture.

Survey line-It is a line produced on a cast by a surveyor marking the greatest prominence of contour in relation to the planned path of placement of a restoration.

Path of insertion-It is defined as the direction in which a partial denture is placed upon and removed from the abutment. There may be a single or multiple path of insertion.

A single path of insertion may be created if sufficient guide surfaces are contacted by the denture; it is most likely to exist when bounded edentulous areas are present. Occasionally, a rotational path of insertion can be used.

Multiple paths of insertion will exist where guide surfaces are not utilised e.g. where the abutment teeth are divergent.

Path of insertion coincides with the path of withdrawal and may or may not coincide with the path of displacement.

Path of displacement-It is the direction in which the denture tends to be displaced in function. It is variable but is assumed for the purpose of design to be usually at right angles to the occlusal plane.

Guide surfaces or guide planes-Are defined as two or more vertically parallel surfaces of abutment teeth so oriented as to direct the path of placement and removal of removable partial dentures. It may occur naturally but more commonly need to be prepared.

3.2 Principles of Surveying

A thorough knowledge about surveying is essential for one to understand the designing procedure of a removable partial denture, in order to determine the part of insertion of the denture and also position/ type of components to be used in the prosthesis. Hence, surveying is done during partial denture designing, because of the following:-

1. To design a removable partial denture such that it’s rigid and flexible components are appropriately positioned to obtain good retention and support.
2. To determine the path of insertion of a prosthesis such that there is no interference to insertion along this path.
3. To mark the height of contour of the area (hard or soft tissues) above the undercut.
4. To mark the survey lines (Height of contour of a tooth).
5. To locate the undesirable undercuts into which the prosthesis should not extend.

3.3 Techniques of Surveying

- Position the cast on the cast holder locking it in position without tilt, and then place the cast holder on the surveying platform.
- Adjust the horizontal arm in such a way that it can contact at least three (3) different spaced out points on the cast and lock it.
- Insert the analysing rod in the mandrel of the surveying arm.
- Rotate the cast against the analysing rod to determine the

- Presence of Undercuts.
- The cast can be tilted to not more than 10 degree so that the prosthesis can be placed using a different path of insertion without interference.
- The carbon marker is then attached to the mandrel (chuck), the height of contours is marked using the flat surface of the carbon marker to form the survey line.

- Replace the carbon marker with the undercut gauges to measure the depth of undercut at a level where the retentive terminal of the clasp arm is to be placed.

- Block-out unwanted undercuts with plaster or hard wax (unwanted undercuts are those beneath the survey lines). Ensure that the blocking out material does not cover any part of the survey line.
- Insert the wax carving knife, position it on the survey line and trim the blocked out areas. Avoid trimming the teeth in the process.
- The model may be removed and later returned to the adjustable platform, but the original tilt must be maintained. Hence, it is necessary to record the orientation of the cast during surveying by tripoding (clearly marking the cast on three points in the same plane) or by clearly scribing vertical lines on the sides and rear of the model.

3.4 Classification of Survey Line (Blatterfein)

Survey lines are nothing but the height of contour of the abutment teeth marked by a carbon marker during surveying. The height of contour is defined as a line encircling a tooth designating its widest circumference at a selected position.

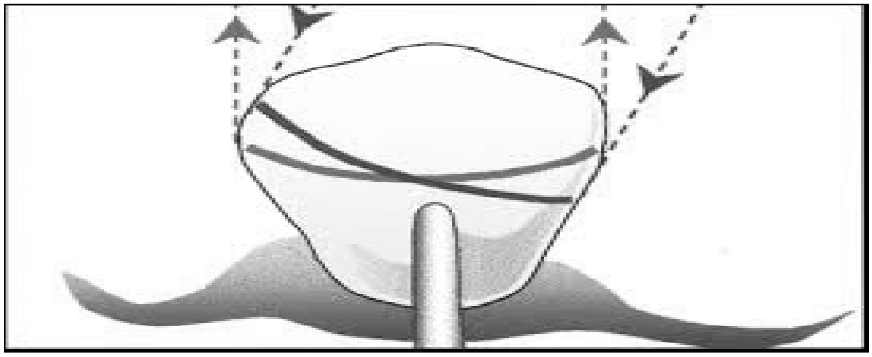
Blatterfein divided the buccal and lingual surfaces of the tooth adjacent to the edentulous space into two halves by a line passing through the center of these surfaces along the vertical axis of tooth.

The area closer to the edentulous space is known as near zone and the other which lies away from the edentulous space is called far zone.

Survey lines are classified as-

1. High survey line-Is found near the occlusal surface of a tooth, often runs parallel to the gingiva margin. It is common in inclined teeth and in teeth with larger occlusal diameter compared to its cervical diameter. When a high survey line is present, the undercut will be deep and hence a wrought wire which is more flexible should be used.

2. Medium survey line- It is located across the center of the tooth and exhibits a slight occluso-gingiva incline from the near zone to the far zone. During surveying, the cast should be tilted such that a maximum number of teeth have medium survey line.



3. Diagonal survey line-This survey line runs diagonally near the occlusal surface in the near zone to the cervical area in the far zone. It is more common on the buccal surfaces of canines and premolars.
4. Low survey line-This survey line is closer to the gingiva area of the tooth in both near and far zone. It frequently occurs as a result of marked inclination of the tooth and may also occur on conically shaped tooth

. 

Low survey line

4.0 CONCLUSION

We have learnt how indispensable surveying is in removable partial denture design.

5.0 SUMMARY

In this unit, you have learnt about the following:

- Definition of surveying, path of insertion, path of displacement, guide planes and survey line.
- Principles of surveying, which includes-determining the path of insertion and removal, marking the survey lines and locating undercuts.
- Surveying technique and classification of survey line.

6.0 TUTOR-MARKED ASSIGNMENT

1. Define surveying.
2. Mention three (3) principles of surveying.
3. Write briefly on path of insertion and path of displacement.
4. Classify survey line.

7.0 REFERENCES/FURTHER READING

Deepak, N. (2003). *Textbook of Prosthodontics*. India: Jaypee Brothers Medical Publishers Ltd.

Saloni, J. *et al.* (2011). "Surveying and Principles of Removable Partial Denture".

MODULE 2 MOUNTING ON DIFFERENT ARTICULATORS

UNIT 1 ARTICULATORS

CONTENTS

1.0 INTRODUCTION

In dental prosthetics, appliances and restorations are produced from positive reproduction of the oral cavity known as models. Thus, the challenge of having a patient keep his mouth open for a long period of time during construction of a prosthesis if it were to be done in his mouth is overcome. However, in the absence of the patient, an open mouth with the accompanying jaw movements is still needed to carry out the fabrication process, hence, the invention of articulator.

In this unit, we shall be discussing how this instrument fulfills its function. Hope you will find it very interesting.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- define articulator
- mention the uses of articulator

- list the requirements of an articulator
- name the types of articulator.

3.0 MAIN CONTENT

3.1 Definition of Articulator

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

3.1.2 Uses of an Articulator

1. To diagnose the state of occlusion in both natural and artificial dentitions.
2. To plan dental procedures based on the relationship between opposing natural and artificial teeth e.g. evaluation of the possibility of balanced occlusion.
3. To aid in the fabrication of dental restorations and appliances.
4. To correct and modify completed restorations.
5. Helpful in teaching and studying of occlusion and mandibular movements.

3.1.1 Requirements of an Articulator

These requirements will be considered in two headings, the basic and additional requirements.

Basic requirements of an articulator:

i. It should hold the casts in the correct vertical and horizontal relationship.
ii. It should open and close in a hinge like movement.
iii. Removable mounting plates that can be repositioned accurately, without loss of horizontal and vertical relationship.
iv. There should be adequate space between the upper and lower members to permit easy vision.
v. It should accept a face bow transfer record using an anterior reference point.
vi. It should simulate protrusive and lateral jaw motions.
vii. The moving parts should move freely without any friction.
viii. The non-moving parts should be of a rigid construction.
ix. It should be made of non-corrosive and rigid materials that resist wear and tear.

Additional Requirements of an Articulator

i. The condylar guides, it allows protrusive and lateral jaw movements.
ii. Adjustable horizontal and lateral condylar guide elements.
iii. There should be a provision for Bennett movement.
iv. There should be a mechanism to accept a third reference point during a face bow transfer.
v. Adjustable incisal guide table in both frontal and sagittal planes.

3.2 Types of Articulator

In the patient the mandible moves forwards and side to side while the maxilla remains stable but the articulator members work in reverse of the natural state.

- The base or lower member of the articulator (mandible) remains stable on the lab bench.
- Raising the upper member of the articulator (maxilla) actually demonstrates a mandibular depression (opening).
- Pushing the upper member backwards demonstrates mandibular protrusion (bringing the mandible forward).

Articulators are classified according to the accuracy of the reproduction of the movements of the mandible.

Thus articulators can be classified as:-

Non-adjustable (simple hinge)
Semi-adjustable
Fully-adjustable

3.2.1 Non-adjustable (Simple Hinge) Articulator

The simplest type of articulators, it is a simple holding device for the upper and lower casts and reproduces only the vertical (open &close) movement. Only simple static occlusion can be developed on this articulator and the distance between the teeth and the axis of rotation is considerably shorter than it is in the patient's mouth (shorter radius) with a resultant loss of accuracy, hence, it is not recommended for complete denture construction. However, it is still routinely used in many dental laboratories around the world for orthodontic and ceramic work.

Simple Hinge Articulator

3.2.2 Semi-adjustable Articulator

There are two types of semi adjustable articulators called arcon and non-arcon.

Arcon-The term arcon was derived by Bergstrom from the words articulator and condyle. The condylar element is attached to the lower member of the articulator and the condylar guidance is attached to the upper member. The upper member is rigid while the lower is moveable like the mandible, simulating the natural jaw movement.

Non-arcon-These articulators have the condylar element attached to the upper member and the condylar guidance attached to the lower member. It is reverse of the TMJ (here, upper member is movable and lower member is rigid).e.g. are Hanau H series and Gysi.

In this unit we will be focusing on the non-arcon semi adjustable

Articulator

It is recommended for prosthodontics work. It has adjustable condylar and incisal guides and is capable of accepting a face bow record. The condylar guides are programmed from protrusive and lateral records obtained from the patient.

3.2.3 Fully Adjustable Articulator

For more routine procedures like dentures, crowns and bridges the semi adjustable articulator is usually sufficient. However, some procedures require complex articulators which simulate the patient's mandibular movements more closely.

Fully adjustable articulators are capable of being adjusted to follow the mandibular movement in all directions. They have numerous adjustable readings which can be customised for each patient. Depending on the articulator, the condylar pathway can be selectively angled or contoured with acrylic dough to form customised condylar and incisal guidance. They are not commonly used due to their complexity e.g. Stuart instrument.

Gnathoscope

It is used in gnathologic studies, occlusal rehabilitation through selective grinding of natural teeth and full mouth crowns or restorations. The patient's movements are recorded using stereographic recording (i.e. studs in auto polymerising resin) or by a pantographic tracing procedure.

Pantograph- It is an instrument used to graphically record in one or more planes, paths of mandibular movement and to provide information for the programming of an articulator. It consists of six styli and tracing

tables attached to the maxilla and mandible by means of a special kinematic face bow and clutches, two tables are adjacent to each condyle and two anteriorly on either side of the mouth. The tracings produced are called pantograms and are formed by the movement of the styli and tracing tables when the patient performs various mandibular movements. Pantograms are used to program a fully adjustable articulator.

4.0 CONCLUSION

In this unit, you have learnt the importance of articulators in dental practice, as it is easy to visualise the occlusion and so make a better diagnosis of the condition when casts are mounted on the articulator. It is easier to communicate the facts of the case to the patient as well as other dental professionals, and of course it would have been very tedious, if not impossible constructing prostheses without an articulator, i.e. in the patient's mouth.

5.0 SUMMARY

This unit has considered the definition of articulator, its requirements both basic and additional, highlighted its uses and the different types in use. The next unit will focus on how these articulators are used.

6.0 TUTOR-MARKED ASSIGNMENT

1. List two (2) basic and one (1) additional requirements of an articulator.
2. Mention three (3) uses of articulator.
3. Differentiate between the three (3) types of articulator

7.0 REFERENCES/FURTHER READING

Deepak, N. (2003).*Textbook of Prosthodontics*. India: Jaypee Brothers Medical Publishers Ltd.

Mannappallil, J. J. (2011). *Complete Denture Prosthodontics*. (2nd ed.). India: Arya(medi)Publishing House.

Shaw, F. G. & Scott, D.C. (1968). *Practical Exercises in Dental Mechanics*. (3rd ed.). London:

Vinay, C.G. & Sridhar, R. K. (2004). *Handbook of Complete Denture*. India: AITBS Publishers.

UNIT 2 MOUNTING ON DIFFERENT ARTICULATORS

CONTENTS

1.0 INTRODUCTION

Mounting of models on different articulators is a follow up to unit 4, which discussed the different type of articulators, requirements and uses. Mounting, also called articulation is the procedure of attaching the maxillary and mandibular casts in their recorded jaw relation to an articulator.

In this unit, you will be able to gain an in depth knowledge on how to mount on these articulators.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- describe the method of preparing model and occlusal rim
- explain how to mount on simple hinge, semi adjustable and fully adjustable articulators.

3.0 MAIN CONTENT

3.1 Preparation of Models

Prior to mounting models on an articulator, the models need to be prepared and occlusal rims fabricated.

On receiving an impression, the impression should be disinfected, and then the right quantity of water and powder (dental stone) is mixed and

poured in the impression, vibrating it to remove air bubbles. At the initial setting, a mix of plaster is spread over a glass plate or tile and the poured impression inverted over it to form a base or a base former can be used. The base should have a thickness of 10mm at its thinnest portion, which are-at the centre of hard palate in the upper cast and at the depth of lingual sulcus in the lower cast.

The cast should be separated from the impression at its final setting, care being taken when doing this around the undercut areas to avoid fracture; small nodules on the model surfaces should be removed. If a base former is not used, then the base of the model should be trimmed using a model trimmer, ensuring that the depth and width of the sulcus is preserved.

After trimming the model, it is then indexed. Indexing involves creating some reference markings on the casts to accurately remount them on an articulator in a proper position. Some of the indexing methods in use are grooving, notching, and use of metal and plastic mounting plates. V-shaped grooves are made on the base of the models, one anteriorly and two marked posterior, it should be marked on the thickest areas of model, to avoid weakening of the models.

The model is now ready for the fabrication of the temporary denture base and occlusal rims. The denture base can be made using auto polymerising resin, heat cure resin, shellac or modeling wax. The base plate acts as a base to support the occlusal rims and the artificial teeth for procedures like bite registration, mounting and try-in, while the occlusal rims are the occluding surfaces constructed on base plates to be used in recording jaw relations and for arranging teeth. The simplest and most commonly used being the wax base and rim.

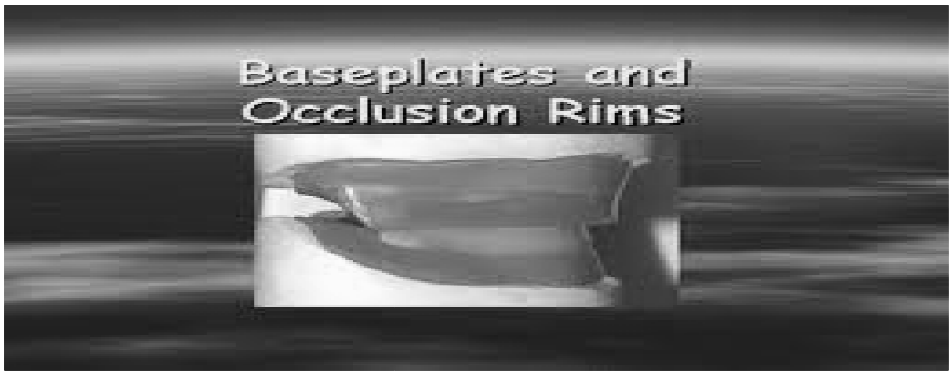
Fabrication of wax occlusal rim- Occlusal rim also known as bite block or registration block can be done using either the rolled wax technique or pre-formed wax rim –which is commercially available in standard sizes.

Rolled wax technique- This is the most commonly used technique. The periphery of the model is outlined with pencil and French chalk applied as a separating medium, a sheet of modeling wax is softened and adapted on the model and cut to shape of the pencil outline. Then another sheet of wax is softened over flame on one end and rolled carefully to avoid trapping in of air bubbles to a width of 4mm, the roll is again heated and consecutive rolls are made to form a single thick cylinder of wax, which is then adapted over the base plate following the arch curvature. Upper occlusal rims are usually U shaped while lower occlusal rims are V shaped or a less wide U.

The adapted wax is sealed to the base plate on the lingual/palatal surface using hot wax knife or molten wax, mild pressure is applied on the wax to make it overhang a little labially, the depression created below the over- hanging wax on the labial/buccal surface should be filled with wax. The occlusal rim is shaped such that it tapers towards the occlusal plane with a trapezoidal cross section. Stainless steel wire is bent and fitted just below the crest of the ridge lingually to strengthen the wax block. The occlusal plane is shaped by marking the height and removing the excess wax using a hot plate. The measurements are checked and wax is added wherever there is deficiency.(the dimensions are, for upper occlusal rim-the anterior edge at the midline should be about 8mm away from the incisive papilla and 4-6mm wide, while the posterior region should be 5-7mm high when measured from the crest of the ridge and 8-12mm wide. For lower occlusal rim-the anterior region should be 6-8mm high when measured from the crest of the ridge and 4-6mm wide; the posterior region should be 3-6mm high when measured from the crest of the ridge and 8-12mm wide and the occlusal plane should flush to two-third (2/3) height of the retro molar pad).

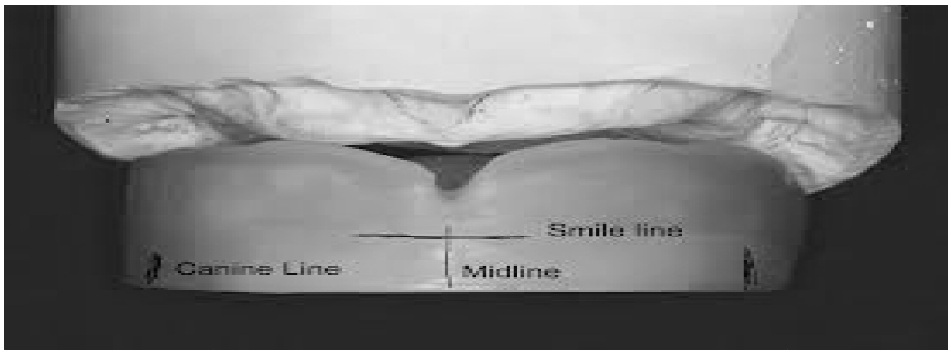
The sides are smoothened and the occlusal rim removed from model to trim the edges, after which it is swiftly flamed over Bunsen burner and polished by wiping it gently with a loose mass of wet cotton wool.

It is now ready to be used for recording the jaw relations and then mounting on articulators.



3.2 Mounting on a Simple Hinge Articulator

The prepared occlusal rims are used to record the jaw relation of the patient and returned to the laboratory with the following markings – midline, smile line and canine lines for mounting.



When mounting on a simple hinge articulator, the lower model is often mounted first, but before then, the locking and adjustable screws are checked to ensure that it is moving in only one plane i.e. upward and downward without any sideway vibration, the articulator arms are greased with petroleum jelly or other lubricant. The models to be mounted having been grooved is soaked in water for few minutes.

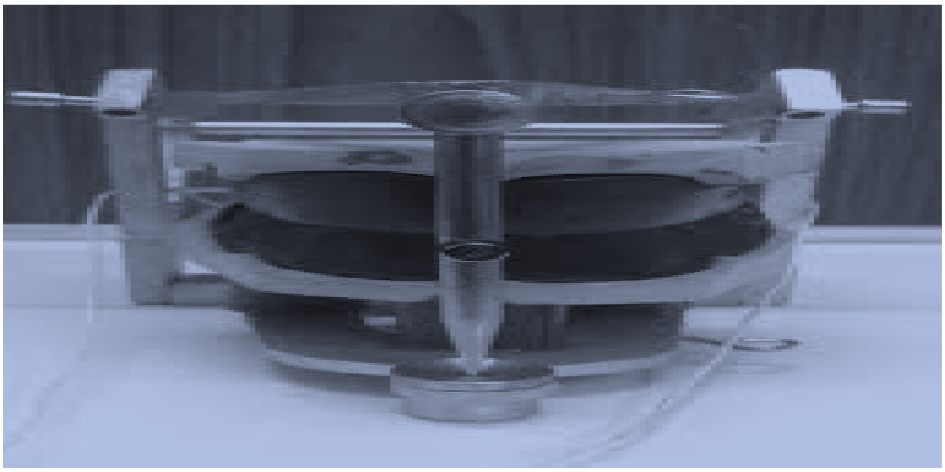
Hold the whole unit (both casts along with occlusal rims) in the space between upper and lower arms of articulators to make sure there is enough space for the mounting plaster, if the thickness of cast bases comes in the way of mounting, the bases should be trimmed to proper thickness. Seal the casts to the base of the occlusal rims at the borders in 2-3 places with sticky or modeling wax. Make a thick mix of Plaster of Paris and water and put a small amount of it on a flat smooth bench surface, position the lower arm of the articulator in it, put some more plaster over it, lift the upper arm of the articulator and position the whole mounting unit (both casts along with occlusal rims) over the lower arm and positioned properly, making sure the occlusal plane is parallel to the bench surface when viewed from front and sides. The whole unit may be tilted this way or that before the plaster sets to achieve this, shape the sides of wet plaster removing excesses, allow the plaster to set.

Raise the upper arm of the articulator, make a mix of Plaster of Paris and water, place some amount on the base of the upper cast and lower it into it, cover with some more plaster mix, flatten the upper surface and make the sides vertical, remove excess ,allow it to set and trim.

3.3 Mounting on a Semi Adjustable Articulator

Prior to mounting on a semi adjustable articulator, the models should be soaked in water for few minutes for proper union with the mounting plaster and the models secured firmly to the occlusal rims with sticky or modelling wax, the upper and lower arms of articulators lubricated with petroleum jelly.

Most often, the upper cast is mounted first, make three round balls of modeling wax, soften and place them on the lower arm of the articulator in a triangular arrangement, one in the front and two at the sides, seal to the arm with a hot wax knife. Place the whole mounting unit on these wax balls, adjusting the front wax ball first, by increasing or decreasing its height in such a way that the junction of the midline and occlusal plane of rims makes contact with the tip of the incisal guidance pin then the two side wax balls adjusted like the front one ,in such a way that the posterior occlusal plane on either side lies coinciding with the imaginary line from the tip of the incisal guidance pin to a horizontal bar on the posterior bar on the posterior pillars of the articulator. A piece of thread can be held from the head of the incisal guidance pin to the posterior bar will help to establish this adjustment.



Position the whole mounting unit in the centre of the articulator space, making sure it does not move at all until the upper model is mounted , to ensure this ,two wax strips are sealed between the base of lower cast and articulator arm temporarily, then withdraw the incisal guidance pin from its housing ,lift the upper arm of articulator, make a thick mix of plaster and water, place some amount on the base of upper model and lower the arm into it, put some more plaster and shape it to a at top and tapering sides before the plaster sets , remove the excess plaster, trim to shape

and allow to set. When set, invert the articulator on the table with the upper arm down and lower arm up, remove the wax balls, lift the lower arm of articulator, pour a mix of plaster on the lower cast, lower the arm of articulator into the plaster mix, making sure the incisal indicator pin touches the incisal table, put some more mix and shape to a flat bottom and tapering sides, remove the excess, trim to shape and allow to set.

3.4 Mounting on a Fully Adjustable Articulator

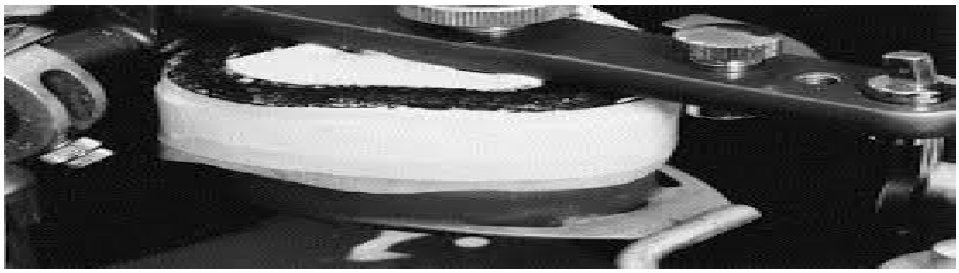
Before mounting, the articulator should be checked for the following:-

- The movable parts are moving freely without any hindrance.
- The incisal pin should be tightly fitted at the level of the darkest marking in the pin and also positioned to touch the zero point in the incisal table.
- The condylar track in the condylar guidance should be inclined to 30 degree, if an accurate value is measured with a pantograph, then that value is used to determine the condylar inclination.

The upper model is first mounted after orientation of jaw relation with the aid of a face bow while the lower model is mounted after recording the vertical and centric jaw relations.

The upper cast is attached to the articulator using the face bow transfer; the face bow with its bite fork attached to the upper occlusal rim is positioned in the articulator. The earpiece of the face bow is attached to the roll pin of the articulator to transfer the posterior reference point of the face bow to the articulator. After that, the anterior reference points should be positioned by making the orbital indicator (attached to the upper member of the articulator) contact the orbital pointer of the face bow. The face bow can be held in this position with the help of a face bow support; a pivot stand (casts support attached to the lower member of the articulator) also helps to prevent vertical displacement of the occlusal rim during mounting.

Once the face bow support is attached, the upper member is opened completely so that it does not interfere with the placement of the cast, the upper cast which should have been grooved and soaked in water is placed onto the record base of the occlusal rim, and a thick mix of plaster is placed over it, the upper member is then closed and the mounting plaster is contoured to obtain a good finish and allowed to set.



After the final setting of the upper mounting plaster, the articulator with the mounted cast is inverted with the lower occlusal rim positioned on the cast using the centric relation records, the lower cast is attached to the lower member of the articulator using dental plaster in the same way the upper cast was done, contoured to a good finish and allowed to set.

4.0 CONCLUSION

This unit has taken you through the procedures involved in mounting of models on different type of articulators. It is expected that by now you should be able to mount on any of the articulators.

5.0 SUMMARY

In this unit, we have been able to, define mounting, steps taken before a model can be mounted, such as preparing the model from the impression, indexing the model by either grooving or notching, fabrication of occlusal rims according to dimension as well as mounting on simple hinge, semi adjustable and fully adjustable articulators.

6.0 TUTOR-MARKED ASSIGNMENT

1. State the anterior and posterior dimensions of an upper/lower occlusal rim.
2. Name two (2) model indexing method.
3. Describe how to mount on a simple hinge articulator.
   a. (3rd ed.).

7.0 REFERENCES/FURTHER READING

Deepak, N. (2003). *Textbook of Prosthodontics*. India: Jaypee Brothers Medical Publishers Ltd.

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MODULE 3 IMMEDIATE DENTURE

UNIT 1 AN OVERVIEW OF IMMEDIATE DENTURE

CONTENTS

1.0 INTRODUCTION

In recent times, dentures are no longer associated with aging, as younger people are now using dentures. Thus, immediate denture have become popular as many people are usually embarrassed and uncomfortable going out in public without teeth.

In this unit, we are going to define immediate denture and study its indications and contraindications. Hope you will find it enriching.

2.0 OBJECTIVES

At the end of this unit, you should be able to:-

- define immediate denture
- enumerate the indications and contraindications of immediate denture.

3.0 MAIN CONTENT

3.1 Definition of Immediate Denture

Immediate denture as the name implies can be defined as dentures which are fitted into place immediately after the tooth/teeth are removed. It can be either partial or complete denture.

According to the glossary of Prosthodontics terms definition, an immediate denture is a removable, complete or partial denture that is constructed prior to the extraction of tooth/teeth which it will replace and is inserted immediately following the removal of natural teeth.

Immediate dentures are often fabricated before the extraction of tooth/teeth to be replaced, so that it will be ready for insertion at the time of extraction.

3.2 Indications for Immediate Denture

i. Educated people with daily social activities (lawyers, teachers, doctors, and artistes etc.) who cannot face their clients without teeth/denture.
ii. Patients with stable health conditions.
iii. Hopeless remaining teeth (advanced carious, non-vital, severely tilted teeth).
iv. Mobile teeth indicated for extraction.

3.3 Contraindications for Immediate Denture

Immediate dentures can be contraindicated in the following conditions:

i. Mentally disturbed persons and persons with limited mental ability as they are neither able to cooperate nor able to take care of the dentures and their oral hygiene.
ii. Elderly and ill persons who find it difficult to endure extraction of more teeth at the same sitting.
iii. Patients with heart defect, systemic disease, dysfunction of glands, blood coagulation disorder, slow healing potentials and disturbed tissue regeneration.
iv. Patients with acute infections (periapical or periodontal) which may need surgical drainage.

v. Extensive alveolar bone loss.
vi. When cost of treatment is to be considered as it is relatively more costly at the long run.
vii. Patient under radiation therapy in the head and neck region.
viii. Patients with limited or no neuromuscular control.

4.0 CONCLUSION

This unit have enlightened us on immediate dentures, as well as listed its indications and contraindications.

5.0 SUMMARY

In this unit, we have been able to define immediate denture, as any denture inserted immediately after extraction of one or more teeth, studied the indications which includes, people with daily social activities, those with stable health condition and those with mobile teeth. We also considered those that immediate dentures may not be recommended for, which include mentally disturbed persons, the elderly and those with certain health conditions.

Module 3, units 2 will be focusing on the advantages and disadvantages of immediate dentures as a continuation of this unit.

6.0 TUTOR-MARKED ASSIGNMENT

1. Define immediate denture.
2. Mention two (2) indications for immediate denture.
3. List four (4) contraindications for immediate denture.

7.0 REFERENCES/FURTHER READING

Ahlam, El-Sharkawy. “Immediate Dentures”.

Hadeel, M. A. (2012). “Immediate Denture”.

Sonja, K. *et al.* (2001). *Complete Immediate Denture Case Report.*

UNIT 2 ADVANTAGES AND DISADVANTAGES OF IMMEDIATE DENTURE

CONTENTS

1.0 INTRODUCTION

In module 3, unit 1, you will recall that the overview of immediate denture, its indications and contraindications was studied. In this unit, we are going to find out apart from the aesthetic and psychological reasons why patients request for this treatment option, other advantages as well as disadvantages of immediate dentures. Happy Reading!

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- state the advantages of immediate dentures
- list the disadvantages of immediate dentures.

3.0 MAIN CONTENT

3.1 Advantages of Immediate Dentures

Immediate dentures has many advantages, some of which are-

1. Maintenance of mental and physical wellbeing as the patient is not to be edentulous at any point in time.
2. Aesthetic is maintained easily by placing the artificial teeth in a position similar to the natural teeth or improved, by changing the position.
3. Maintenance of the masticatory movement patterns of the mandible by enabling the existing reflexes to continue.

4. Possible control on alveolar ridge resorption as well fitting denture contributes to healing of surgical site after extraction due to controlled hemorrhage.

3.2 Disadvantages of Immediate Dentures

1. Denture try-in is not possible as the denture is often made before extraction.
2. Denture retention is often jeopardised due to alveolar bone resorption, hence the need for relining, rebasing or a new denture.
3. The anterior ridge undercut that is caused by the presence of the remaining teeth may interfere with the impression procedures.
4. Poor oral hygiene may lead to infection following extraction.
5. Patient may require several aftercare visits for close supervision.

4.0 CONCLUSION

Functional, aesthetic and psychological reasons justify fabrication of immediate dentures wherever possible, however, prior to the beginning of treatment patient should be introduced to the plan, advantages and possible disadvantages.

5.0 SUMMARY

This unit has extensively covered the advantages of immediate dentures as the following:

- Controls hemorrhage
- Prevention of infection
- Preservation of alveolar ridge
- Maintenance of appearance.

We also learnt that some of the disadvantages of immediate dentures include- The impossibility of denture try-in, overall high cost of treatment as well as jeopardised denture retention.

Module 3, unit 3 is expected to build on this as a continuation.

6.0 TUTOR-MARKED ASSIGNMENT

1. List five (5) advantages of immediate dentures.
2. Mention three (3) disadvantages of immediate dentures.

7.0 REFERENCES/FURTHER READING

Hadeel, M. A. (2012). “Immediate Denture”.

Vinay, .C.G. & Sridhar, R. K. (2004). *Handbook of Complete Denture*. India: AITBS Publishers.

UNIT 3 TYPES OF IMMEDIATE DENTURE

CONTENTS

1.0 INTRODUCTION

Immediate dentures can be classified in different ways, as mentioned earlier in the overview; immediate denture can be partial or complete. It can be classified based on the intended duration of use and also based on its design.

Conventional (classic) immediate denture-these are those immediate dentures intended to be relined to serve as the long term prosthesis.

Transitional (interim) immediate denture-these are those immediate dentures which are intended for a short term use as a second new denture is to be fabricated after healing as the long term prosthesis .

Interim immediate denture is defined as " A dental prosthesis to be used for a short interval of time for reasons of aesthetics, mastication, occlusal support, or convenience or to condition the patient to the acceptance of an artificial substitute for missing natural teeth until more definitive prosthetic therapy can be provided.

Based on its design, immediate dentures can be, Socketed (flangeless-gum fitted), Modified flangeless (winged) or Flanged.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- classify immediate denture
- enumerate the indications and contraindications of each type of immediate denture
- state the advantages and disadvantages of gum fitted and flanged immediate denture.

3.0 MAIN CONTENT

3.1 Socketed (Flangeless/Gum fitted) Immediate Denture

Socketed immediate denture as the name implies is a type of immediate denture made in such a way that the cervical area of the artificial teeth fits in the sockets left by the natural tooth\teeth upon extraction without a labial flange.

After Extraction

On Insertion

3.1.1 Indications for Socketed Immediate Denture

1. Prominent pre maxilla may prevent a conventional flange e.g. in a class 11 malocclusion.
2. When sufficient retention can be obtained from the rest of the denture bearing area.
3. A high lip line\hyperactive lip.
4. Deep undercuts on the labial surface.

3.1.2 Contraindications for Socketed Immediate Denture

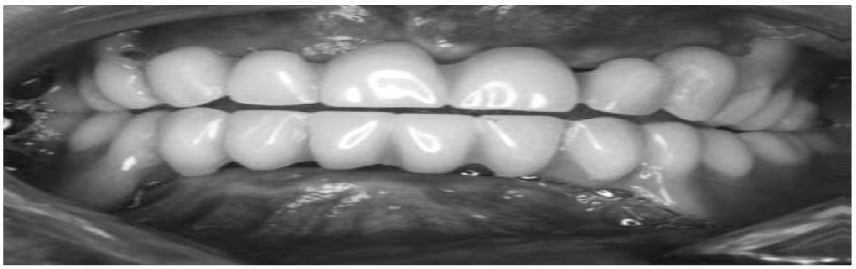
1. In case of periodontal disease with excessive amount of bone loss (unsatisfactory aesthetic).
2. An uneven contour of the residual anterior ridge.
3. Contraindicated mostly in lower dentures because of poor stability of lower dentures during function.

3.1.3 Advantages of Socketed Immediate Denture

1. Teeth fit into sockets of the extracted teeth and give more natural appearance.
2. Exact reproduction of tooth/teeth position if necessary.
3. No interference with the lip movements.
4. Easy insertion in the presence of undercuts.

3.1.4 Disadvantages of Socketed Immediate Dentures

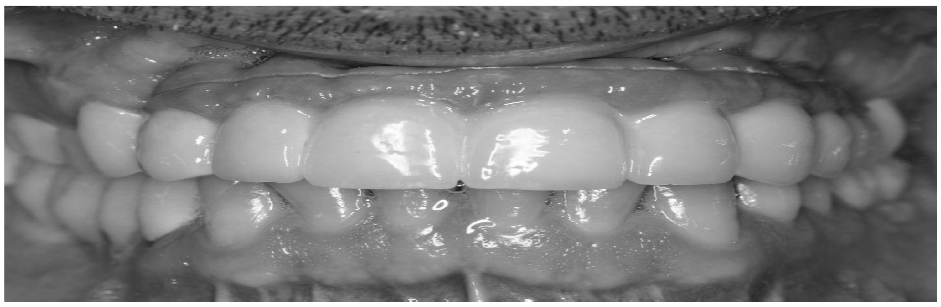
1. Prone to loss of aesthetic as resorption continues (natural appearance is not maintained for a long time).



2. It is difficult to reline and rebase.
3. It has poor retention and support.
4. Irregularities of anterior ridge may develop.

3.1.5 Modifications of Flangeless/Socketed Immediate Denture

When constructing socketed (flangeless) immediate denture sometimes considerations are made regarding it's retention as well as undercut issues in which case it may carry a partial flange. Provisions for solving undercuts/retention issues may include horizontal modification or vertical shortening (winged) of the labial flange. The vertical flange relief is preferred to the horizontal relief if it can be provided without unduly compromising the denture retention. When horizontal relief of a flange is required the borders must be frequently and carefully checked for sharpness and overextension.



Winged denture

3.2 Flanged Immediate Denture

Flanged immediate denture is a type of immediate denture that have a complete labial flange. It is mostly preferred unless when it is contraindincated.

3.2.1 Contraindications for Flanged Immediate Denture

1. When there is pronounced undercut at the labial region.
2. Fullness of the lip would produce an unaesthetic result.

3.2.2 Advantages of Flanged Immediate Denture

1. It has good stability,support and retention.
2. It is easier to reline/rebase.
3. Rapid healing with smooth ridges.
4. Denture is stronger.

3.2.3 Disadvantage of Flanged Immediate Denture

1. Maybe difficult to insert where there is undercut.

3.3 Comparison between Socketed/Flanged Immediate Denture

	Socketed Immediate	**Flanged Immediate Denture**
1	Appearance	
	• Good initially-deteriorated rapidly after healing and bone resorption. • Does not allow freedom in positioning the anterior teeth for optimum aesthetic.	• Not affected after healing and bone resorption. • Allow considerable freedom in positioning the anterior teeth for optimum Aesthetic.
2	Stability and Retention	
	• Absent of labial flange: • The denture tends to move backward. • Reduce effectiveness of border seal. • Less retention and stability.	• The labial flange resist backward movement greater stability. • More effective border seal. • More retention and stability.
3	Strength	
	• Less strength resulting to less resistance to flexion so the danger of midline fracture is increased.	• It resists flexion so the danger of midline fracture is minimised.
4	Maintenance	
	• Difficult to reline.	• Easy to Reline.
5	Homeostasis	
	• Less Effective.	• It exerts pressure so reducing bleeding. • Cover the clots and protects them more effectively.
6	Remodeling of the Ridge	
	• It Produces Scalloped Ridge.	• It Produces Smooth Ridge.

4.0 CONCLUSION

Today, most people request for immediate dentures mainly for aesthetic and psychological reasons, but the type of immediate denture to be constructed for each person will vary due to the oral conditions indicating or contraindicating each type as discussed in this unit

5.0 SUMMARY

This unit has considered the various types of immediate denture, indications, contraindications, advantages and disadvantages of each type. In addition, comparisons were made between flanged and flangeless immediate dentures.

In unit 4, module 3 we will look at the different techniques used in the fabrication of immediate dentures.

6.0 TUTOR-MARKED ASSIGNMENT

1. State two (2) indications of flangeless immediate denture.
2. List three (3) advantages of flanged immediate denture.

7.0 REFERENCES/FURTHER READING

Ahlam, El-Sharkawy. “Immediate Dentures”.

Sonja, K. *et al.* (2001). *Complete Immediate Denture Case Report.*

UNIT 4 CONSTRUCTION TECHNIQUES/DELIVERY AND CARE OF IMMEDIATE DENTURE

CONTENTS

1.0 INTRODUCTION

Construction techniques of immediate denture is a follow up on units 1, 2 and 3 of module 3, which covered the overview of immediate denture, advantages and disadvantages and types of immediate denture.

In this unit, you will be able to learn that with due care in preparation and fabrication, immediate dentures can be recommended in the majority of patients who request for them. Have a great study time!

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- describe the construction techniques of immediate denture
- explain the delivery and care of immediate denture.

3.0 MAIN CONTENT

3.1 Construction of Immediate Denture Using Wax Teeth

This is a method whereby a wax mould of the tooth is obtained and the original position exactly maintained.

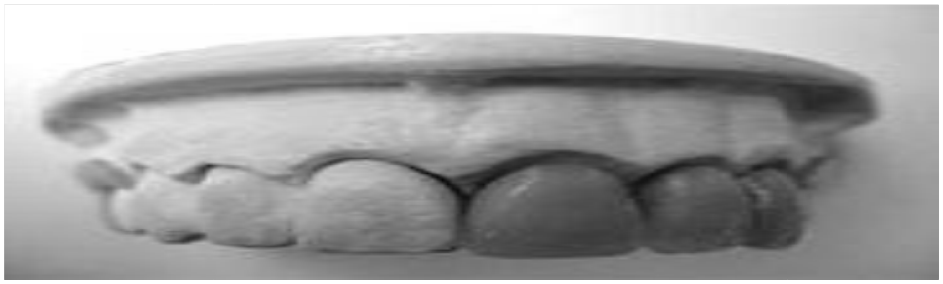
Upon receiving an impression, it is disinfected and molten wax poured into the teeth (to be extracted), once the wax cools the cast is poured in dental stone. The cast will have all the anatomical features in dental stone except the teeth to be extracted, which will be in wax. The denture

is then waxed up, flasket and boiled-out, the teeth to be extracted will be hollow in the flask mould. Acrylic tooth material of selected shade is then placed into the teeth area of the mould after which acrylic denture base resin is packed into the remaining mould space and processed. When deflasked the denture will come out carrying the teeth to be extracted exactly the way it is, the denture is then trimmed and polished ready for fitting.

3.2 Construction of Immediate Denture Using Stock Teeth

The received impression is disinfected and dental stone mixed with proper amount of water poured into it to make a cast. After the final setting the tooth/teeth to be extracted is cut one tooth at a time, up to the level of the gingiva leaving a rough area on the cast (a pencil mark can be drawn round the gingiva margin of each tooth as a guide). The center of this rough area is made deeper to resemble a shallow tooth socket, after cutting the teeth, the cast is scrapped in the labial surface of the tooth socket over an area of 4-5mm and a depth of 1mm, so that the prepared denture will adapt closely to the socket upon extraction thus, compressing the site, thereby acting like a surgical splint.

The selected stock teeth is then trimmed and positioned on the prepared area accordingly(i.e. with or without flange) after which it is waxed-up, flasked, boiled out, packed in acrylic, cured, deflasked, trimmed and polished ready for insertion.



Socketed Immediate Denture Waxed-Up with Stock Teeth

3.3 Delivery/Care of Immediate Denture

Post operatively and prior to the delivery of the denture, which must have been fabricated before the extraction, delivery of immediate denture involves four important stages. These include:

- Post- operative care
- Post -operative instruction
- Denture insertion
- Post insertion instruction.

Post- operative care

Achieve haemostasis- After tooth extractions, it is important for a blood clot to form to stop the bleeding and begin the healing process. 1-2 Gauze pads are placed on the socket for 20minutes or until bleeding stops Sutures are placed where necessary and these will resorbed on their own in 10-14 days.

Prevent infection- To achieve this; usually the patient is placed on antibiotics. Routinely Amoxicillin and Metronidazole is used for a minimum of five days.

Control pain- In addition to the antibiotics, analgesics is given to control pain. Usually Diclofenac is given routinely for 3days. This is taken not later than 1hour after the extraction so as to begin its effect by the time the local anaesthesia given during the extraction wears off.

Post- operative instructions

To promote healing- Commence warm saline mouth bathe the day following the surgery. (80z. glass lukewarm water 1teaspoon salt) gently swishes the solution around the affected area, and spit carefully. You should do this first thing in the morning, before and after every meal, then last thing before going to bed for 2 weeks. Try not to allow food pack in the extraction site.

NB: always take off your immediate denture to do this.

To reduce complications

To avoid nausea do not take pain medication on empty stomach.
Once the numbness has worn off, you should eat, as nourishment is important to the healing process. Limit your food to soft diets for the first 48 hours.

Avoid touching the extraction site with your tongue or fingers so as to not dislodge the blood clot and hence the healing process.

Do not drink through a straw so as not to raise the intra oral pressure and cause fresh bleeding.

Do not spit vigorously.
Avoid alcohol, carbonated drinks such as coke.
If you smoke, don’t smoking for at least 5days.
Avoid chewing for at least 24hours.
Avoid any strenuous activity for the first 24hours following surgery.

Drink at least 8 glasses of water each day.
Always have your dentist number at hand in case of any complication.

Delivery: The patient should be seated comfortably on the chair and taught how to insert and remove the denture with ease.

Post insertion instructions

Do not remove your denture for 24 hours.
Sore spots (ulcers) may develop that will be adjusted by your dentist. Failure to do so will result in severe denture sores (Stomatitis) which will prolong the healing process.

Your salivary flow will increase because your body thinks your denture is food. This will adjust after 2 weeks.

You need to chew in small pieces equally on both sides after 24 hours.
You will develop a lisp (slight change in speech) in your speech which will fully adjust after 1 month.

If bleeding reoccur outside the clinic, remove the denture and bite on a moist tea bag for 10 minutes remove and bite on another tea bag for another 10minutes.

Call the clinic or you dentist if bleeding persists.

You can also decrease pain and swelling by applying an ice pack – twenty minutes on, twenty minutes off – for the first 24 hours following the insertion of the denture.

Your denture might feel loose as the operative site heals so you need to see your dentist for relining 4 weeks post- delivery.
You are to see your dentist 48 hours after insertion of your immediate replacement denture.

Care of the immediate denture

The denture while not in the mouth should be kept inside a cup of clean water to avoid dimensional change.
The denture should be removed before sleeping at night to avoid possible aspiration.
The denture should be washed with mild toilet soap and water every morning and night during teeth brushing.
The denture should not be used on hard substances such as bones and to open bottle tops to avoid breakage.

The denture should be relined whenever it feels loose to avoid it from dislodging and falling off.

Ultimately, the denture should be handled with care and kept away from reach of children.

Follow up

This is done 48 hours, 2 weeks, 1 month and 6 months post -delivery in order to prevent any complication, monitor the patient and evaluate the overall success of the immediate denture and when to reline.

4.0 CONCLUSION

The construction technique to be used in the fabrication of an immediate denture depends mainly on what you want to achieve. For instance, if there is need to preserve the patient's teeth arrangement exactly as it is, the wax teeth method will be ideal but in most cases where the teeth are malpositioned, the stock teeth will be used and arranged more aesthetically.

5.0 SUMMARY

This unit has focused on the construction techniques, using wax teeth or stock teeth, and also post- operative care, post -operative instructions, denture delivery and care as well as follow-up visits that will be required.

6.0 TUTOR-MARKED ASSIGNMENT

1. Write briefly on delivery and care of immediate denture.
2. Name the two (2) methods used in fabricating immediate dentures.

7.0 REFERENCES/FURTHER READING

Deepak, N. (2003). *Textbook of Prosthodontics*. India: Jaypee Brothers Medical Publishers Ltd.

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MODULE 4 THEORIES AND PRACTICE OF COMPLETE DENTURE (CLASS1 NORMAL OCCUSION)

UNIT 1 AN OVERVIEW OF COMPLETE DENTURE

CONTENTS

1.0 INTRODUCTION

Generally, complete dentures are fabricated for the elderly but some young people who are born with congenitally malformed teeth or edentulous arches also require complete dentures.

In this unit, we shall be discussing, the objective of complete denture, and types of complete denture and definition of terms associated with complete denture.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- define complete denture and its related terms
- enumerate the objective of a complete denture
- give examples of complete denture.

3.0 MAIN CONTENT

3.1 Definition of Complete Denture

A complete denture is a dental prosthesis that replaces the entire dentition and associated structures of the maxilla and/or mandible. It can be removable or fixed. We are going to be discussing removable complete denture.

3.1.1 Definition of Terms

i. Occlusion – The static relationship between the incising or masticatory surfaces of the upper and lower teeth when they are in contact in either centric or eccentric jaw relation.(static tooth contact) .
ii. Centric occlusion-It is the occlusion of opposing teeth when the mandible is in centric relation. It may or may not coincide with the maximal intercuspal position.
iii. Articulation- The contacting of teeth as the mandible moved to and from centric and eccentric relation (dynamic tooth contact).
iv. Balanced occlusion-The stable simultaneous contact of the opposing upper and lower teeth in centric position and a continuous smooth bilateral gliding from this position to any eccentric position within the normal range of mandibular function.

3.2 Parts of a Complete Denture

The parts of a complete denture are:

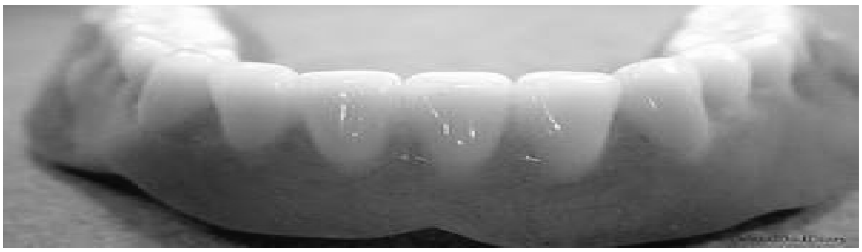
a. Denture base-It is defined as," that part of a denture which rests on the oral mucosa and to which teeth are attached"-GPT. It covers the edentulous tissue areas and carries the artificial teeth. It is usually made in acrylic resin and sometimes metal. The denture base forms the foundation of the denture, helping to distribute and transmit all the forces acting on the denture to the basal tissues, it has the maximum influence on the health of the oral tissues and it is the part responsible for retention and support.
b. Denture teeth-This is the most important part of the complete denture from the patient's point view, as it is attached to the denture base for the purpose of aesthetics, mastication and speech. They are usually made of acrylic resin or porcelain. Denture teeth can be classified based on the morphology of the teeth into-anatomical, semi anatomical, non-anatomical (cusp less), cross-bite teeth and metal insert teeth.

A complete denture has the following surfaces:-

Fitting surface-It is defined as," that portion of the denture surface which has its contour determined by the impression"-GPT. This surface refers to the surface of the denture that will be in contact with the tissues (basal seat area and limiting structures) when the denture is seated in the mouth. It is a negative replica of the tissue surface of the patient, should be free of voids and nodules to avoid injury to the tissues.

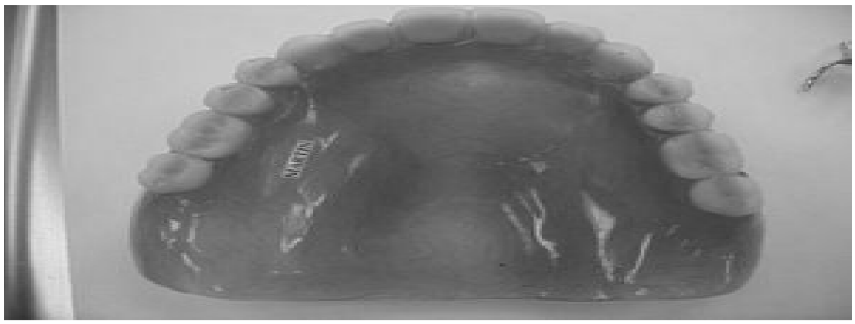
Polished surface- It is defined as," that portion of a surface of a denture which extends in an occlusal direction from the border of the denture and includes the palatal surfaces. It is the part of the denture base which is usually polished, and it includes the buccal and lingual surfaces of the teeth"-GPT.

This surface refers to the external surfaces of the lingual, buccal, labial flanges and the external palatal surface of the denture, this surface should be well polished and smooth to avoid adherence of



Food debris

Occlusal surface- It is defined as, "that portion of the surface of a denture or dentition which makes contact or near contact with the corresponding surface of the opposing denture or dentition"-GPT. It resembles the natural teeth and usually contains cusps and sluice ways to aid in mastication.



3.3 Objectives of a Complete Denture

- Restoration of aesthetics
- Restoration of speech
- Restoration of mastication
- Preservation of remaining tissue health
- Patient satisfaction and comfort

3.4 Types of Complete Denture

Various design / modification of complete dentures are available to suit the specific needs of the patient. The most commonly used complete dentures are:

- Conventional complete dentures
- Single complete dentures which can be:

- Maxillary complete denture opposing a mandibular natural dentition.
- Maxillary complete denture opposing a mandibular partial denture.
- Mandibular complete denture opposing a maxillary natural dentition.
- Mandibular complete denture opposing a maxillary partial denture.

Immediate dentures

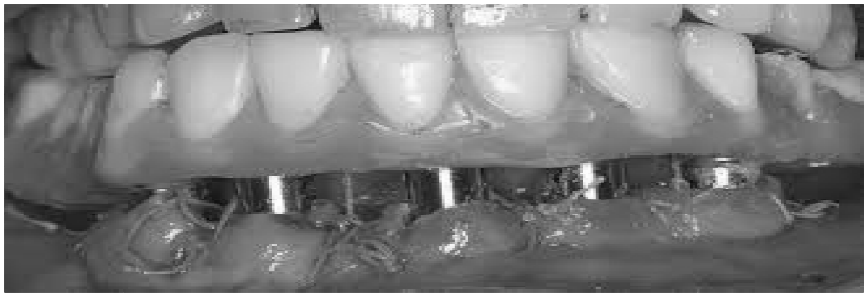
- Interim immediate denture (transitional).
- Conventional immediate denture (classic).

Over dentures

- Tooth-supported over dentures : It is defined as," a dental prosthesis that replaces the lost or missing natural dentition and associated structures of the maxilla and/or mandible and receives

partial support and stability from one or more modified natural teeth". It is also known as Hybrid dentures or tooth-supported complete dentures. It can be fabricated as a conventional over denture or an immediate over denture.

- Implant supported over dentures: Implants are the latest trend in dental prosthetics. Implant supported over denture can be designed



Implant supported over denture

For patients who are unable to use conventional dentures irrespective of its perfect contour.

Obturators

It is defined as "a prosthesis used to close a congenital or acquired opening in the palate"-GPT. Obturators can be used to close the defect as well as serve as a complete denture. It is often used in edentulous patients who have undergone surgeries for malignancies in the jaw or patients who have lost their teeth and supporting bone during surgery.

4.0 CONCLUSION

Despite significant tooth retention and the advent of implant systems, complete denture still offers significant advantage using conventional, immediate, tooth-supported, implant supported and obturators as the case may be, thus, they are applicable to a wide range of commonly occurring clinical situations.

5.0 SUMMARY

This unit has focused on description of complete denture, identifying its parts and surfaces, it also defined some terms related to complete denture, enumerated the objectives of a complete denture which includes-restoration of aesthetics, mastication and speech. Various complete denture designs was also discussed. The next unit will be

taking us through the procedures involved in the construction of a removable complete denture.

6.0 TUTOR-MARKED ASSIGNMENT

1. Enumerate four (4) objectives of a complete denture.
2. List three (3) types of complete denture.

7.0 REFERENCES/FURTHER READING

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UNIT 2 PROCEDURE FOR CONSTRUCTION OF COMPLETE DENTURE (NORMAL OCCLUSION)

CONTENTS

1.0 INTRODUCTION

The belief that appearance and function can be restored by complete denture provides hope for edentulous patients, but restoration by a denture is not always successful, as an approximate 10% of denture wearers remain dissatisfied with either the performance or appearance of their prosthesis.

In this unit, we shall be discussing the step by step procedure which if followed accurately; a complete denture that will meet its entire objective will be produced. Some of these steps like model preparation, fabrication of occlusal rims and mounting have been discussed in Unit 4, we will continue from setting up to finishing.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- explain the principles of setting up
- describe steps in complete denture fabrication.

3.0 MAIN CONTENT

3.1 Setting Up of Teeth

After mounting of models on the articulator of choice, the next step in the fabrication of complete denture is teeth arrangement (setting up).The teeth to be used are selected considering size, shape/occlusal form and shade as this determines the aesthetics and function of the complete denture. Also the patient's age, sex and complexion are to be considered when selecting teeth.

The selected artificial teeth should be arranged according to certain principles to avoid the deflection of any destructive forces towards the supporting tissues. Ideally, the artificial teeth should occupy the positions of the natural ones (neutral zone), because it is the area where there is least interference with the teeth, an important factor in denture retention. Hence, the facial contour, muscular function and speech will be maintained.

The setting of posteriors is in a saucer-like arrangement known as the compensating curve (combination of curve of monson & curve of spee) which ensures that the teeth are in a multi-point contact when the mandible is exercised.

An artificial tooth is set by softening the wax in that portion of the occlusal rim and positioning the tooth on it. First, upper anterior, then lower anterior, next upper posteriors and finally lower posteriors.
The reference planes are used as guide and individual teeth positioned in relation to these planes.

- Vertical plane: An imaginary vertical axis passing from the centre of
- Occlusal plane: Plane passing antero-posteriorly.

A good understanding of the principles of arranging teeth in relation to vertical and occlusal planes is very important during setting up thus a principle have to be followed.

Principles of setting up

Each tooth is attached to the occlusal rim based on the following principles:

Upper central incisor

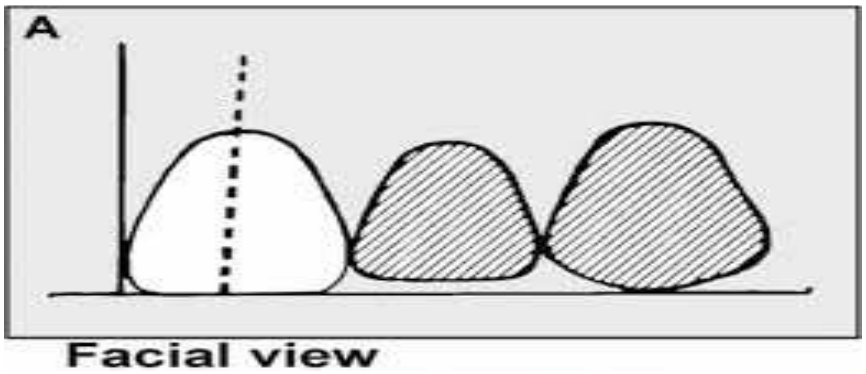
- The long axis of the tooth is parallel to the vertical axis when viewed from the front.
- The long axis of the tooth is sloping labially when viewed from the side.
- The incisal edge of the tooth contacts the occlusal plane evenly.

Upper lateral incisor

- The long axis of the tooth is tilted towards the midline when viewed from the front.
- The long axis of the tooth is sloping labially when viewed from the side with an inclination more than that of the central incisor.
- The incisal edge not touching the occlusal plane and tilted towards the midline.

Upper canine

- The long axis of the tooth is parallel to the vertical axis when viewed from the front, and side with the neck out.
- The cuspal tip touches the occlusal plane.



Upper first premolar

- The long axis of the tooth is parallel to the vertical axis when viewed from the front and side.
- The buccal cusp touches the occlusal plane while the palatal cusp is positioned about 0.5mm above the occlusal plane.

Upper second premolar

- The long axis of the tooth is parallel to the vertical axis from both the front and side views.
- Both the buccal and palatal cusps should touch the occlusal plane.

Upper first molar

- The long axis of the tooth is tilted ducally when viewed from the front and distally when viewed from the side.
- The mesio-palatal cusp alone should touch the occlusal plane, both buccal cusps slightly higher than lingual cusps, this gives rise to the lateral curves.

Upper second molar

- It is arranged similar to a first molar, as regards the long axis tilt except in a higher level.
- The mesio-palatal cusp should be the nearest cusp to the occlusal plane but not touching it.

Lower central incisor

- The long axis of the tooth is parallel to the vertical axis when viewed from the front.
- The long axis of the tooth slopes slightly labially when viewed from the side.
- The incisal edge should be about 2mm above the occlusal plane.

Lower lateral incisor

- It is arranged similar to the central except that the labial slope is not as steep as the central incisor.

Lower canine

- The long axis of the tooth is very slightly tilted lingually when viewed from the front.
- The long axis of the tooth slopes slightly mesially when viewed from the side.
- The canine tip is slightly more than 2mm above the occlusal plane.

Lower first premolar

- The long axis of the tooth slopes slightly lingually from the front.
- The long axis of the tooth is parallel to the vertical axis when viewed from the side.
- The lingual cusp is below the occlusal plane and the buccal cusp should be 2mm above the occlusal plane.

Lower second premolar

- The long axis is similar to that of the first premolar.
- Both the cusps are 2mm above the occlusal plane.

Lower first molar

- The long axis of the tooth slopes slightly lingually when viewed from the front, but shows a mesial tilt when viewed from the side.
- All the cusps are above the occlusal plane with the mesial and lingual cusps being lower than the distal and buccal cusps.

Lower second molar

- It is arranged similar to a first molar except that all the cusps are above the level of the first molar.

Start set up with upper central of one side, by softening the wax on the region where tooth is to be placed, place the tooth in it and align it in relation to vertical and occlusal planes. Then follow the same procedure for each tooth until the second molars, each tooth should be sealed around the neck once it is properly positioned. The tooth surface should be free of wax during and after setting.

3.2 Waxing Up

Waxing up is defined as," the contouring of a pattern in wax generally applied to shaping in wax of the contours of a trial denture"-GPT. It is also defined as the contouring of a wax pattern or the wax base of a trial denture into a desired form. A proper wax up is necessary for better and easier evaluation of aesthetics and functions of a complete denture.

Procedure

- A roll of modeling wax should be softened and adapted over the cervical area of the teeth; this should be done in such a way that it gives a convex contour to the denture flange. A depression should be created between the central and lateral incisors and buccal gingiva bulge more prominent near the molar regions.
- Festooning is produced by creating depressions interdentally, wax around the neck of each tooth is carved using a wax spatula/lecron carver, and excess wax is removed till the finish line of the teeth and thinned down near the necks of the teeth to resemble the free gingiva.
- Stippling can be produced interdentally using a toothbrush.

- The contoured pattern can now be polished by flaming it swiftly and immediately wiping with wet cotton under running water.

The trial denture is now ready for the try-in appointment; it should be placed on the mounted cast and preserved carefully till the try-in appointment.

3.3 Trying-In

Try-in is defined as, “A preliminary insertion of a removable denture wax-up or a partial denture casting or a finished restoration to determine the fit, aesthetics and maxillomandibular relation”.-GPT

During try-in, all the procedures carried out in the fabrication of the complete denture are verified

The following are evaluated during try-in:-

- Denture coverage/extension
- Denture retention and stability
- Aesthetics
- Lip and cheek support
- Occlusal plane/vertical height
- Centric and eccentric relation
- Posterior palatal seal

After trying-in and adjustments made, where needed, the denture is now ready for processing.

3.4 Denture processing

This procedure is a substitution of the wax denture by hard acrylic resin. It involves, preparation of the wax pattern, disarticulation, flasking, dewaxing, mixing of polymer and monomer, packing, curing, cooling and deflasking.

- Preparation of the wax pattern: The trial dentures are placed on the cast and sealed to the cast using additional wax to ensure that the relationship of the trial denture and the cast is not altered during disarticulation.
- Disarticulation: If the articulator has remounting plates, disarticulation is easily done by unscrewing the remounting plates but in an articulator without remounting plates, the mounting plaster is carefully broken away from the cast by placing the articulator on a cloth to avoid damage to the trial

denture, tilt it sideways and split the junction between the mounting plaster and the cast with the help of a plaster knife and a plastic mallet.

Flasking: The pattern is invested in a dental flask with dental plaster using either open or hooded method of investing. In complete denture processing, open method is more preferable, with the denture invested to the periphery in the shallower part of the flask so as to have the mould in the deeper part of the flask for better support during acrylic packing and bench-pressing. The flask is made up of three components namely, a rounded triangular base, counter or body and the lid, when fit together the flask is held in position with the help of a clamp.

Prior to investing, the flask should be greased for easy deflasking, then the base of the flask is filled with dental plaster, the cast with the wax pattern is immersed into the centre of the plaster-filled base in such a way that the occlusal plane of the trial denture is parallel to the floor.

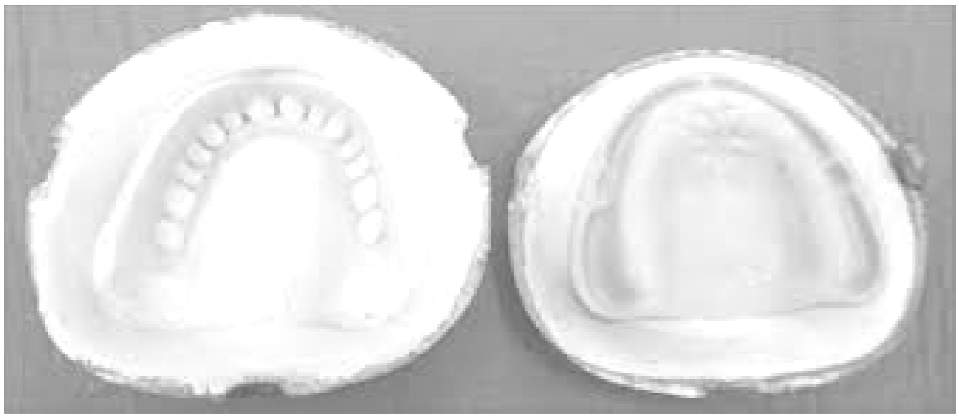
The investing plaster is smoothened to form a gradual slope from the land area of the cast to the edge of the base of the flask, in lower casts, it is difficult to produce a gradual slope because of the height of the retro molar pad, hence, and care should be taken to obtain the maximum gradual slope possible.

When the plaster sets, a separating medium usually cold mould seal is applied in all areas where plaster is exposed and allowed to dry. Once the cold mould seal dries, the body of the flask is placed and fit on to the base. A mix of plaster is poured into the body until is filled up, the lid is then placed on the body and closed, excess plaster is allowed to escape out, the clamp is tightened to hold the flask in position and left undisturbed for about 10-30 minutes to reach its final setting.

Boiling out (Dewaxing) this is the elimination of wax so that a mould is created for acrylic resin to occupy. The flask is placed in boiling water for 5minutes, having been loosened from the clamp. Care is taken not to melt the wax but only soften it. After 5minutes, the flask is taken out of the water bath, the base and the body is carefully separated and the softened wax flushed out with hot water. Even the finest traces of wax should be removed to avoid contamination of the denture base during curing.

Separating medium e.g. cold-mould seal is then applied to the mould, in order to prevent water from the mould entering into the acrylic resin and also prevent monomer entering into the mould material, causing plaster to adhere to acrylic resin. Care should be taken not to apply cold mould seal on the teeth as it will prevent bonding of teeth with the

denture base. Excess cold mould seal is removed with cotton wool, and the mould is allowed to dry.



Packing: This step involves mixing polymer and monomer of specified proportion of about 3:1 to 3 ½:1 that is 21mg polymer to 6ml monomer by volume. In practice, it is about 1 ½ capful of monomer bottle cap to 1 large capful of polymer bottle cap is enough for one upper complete denture and a little less for a lower complete denture. Pour the required quantity of monomer in a clean porcelain or glass jar, sprinkle the polymer into it in a slow and steady stream until the excess appears on the surface, and tap the jar to bring free monomer to the surface then add a little more polymer to absorb the excess monomer. Mix vigorously with a clean stainless steel spatula or glass rod for a minute or so, cover with the lid. The acrylic immediately after mixing looks like it's wet stand (wet sandy stage), then comes the stringy stage and finally the dough stage. The time taken to get to this stage is dough forming time and it varies from product to product but in general it is between 8-10 minutes. This is the most suitable stage for packing, as it is not sticky but soft and plastic.

The acrylic dough is now removed from the jar, kneaded between fingers, rolled into thick pencil shape and place it in the teeth containing part of flask directly over the teeth, put some extra dough over the palate area of the mould in case of upper denture. Place a sheet of damp cellophane over the dough, assemble the flask and put on a bench press, apply pressure slowly and steadily but intermittently until the excess dough known as flash appears between the two halves of the flask at the edges. Carefully open the flask, remove the cellophane sheet then trim off flash with a sharp knife. Close the flask, apply pressure until both halves of the flask makes metal to metal contact, then transfer the flask to the bench press and apply pressure, leave on the bench for some time before curing (bench curing).

Curing (polymerisation): This is a heating process used to convert the acrylic dough into a hard mass by a chemical reaction known as polymerisation. It can be done using different method, either the long curing cycle or the short curing cycle.

i. Long curing cycle (one step): The clamped flask is placed in water bath at a temperature of 74^{o}C maintained for 8-9hours (overnight) and there is no terminal boiling since curing takes place at one constant temperature it is known as one step method.

ii. Short curing cycle

a. Start with cold water, bring it to 70^{o}C and maintain the temperature for 1 ½ hours, then raise to 100^{o}C and maintain for another 30minutes. Total curing time is 2hours.
b. Start with cold water, bring the temperature to 100^{o}C in 30minutes and maintain it for another 30minutes. Total curing time is 1hour, it is a quick method.

Principles of curing

- Accurate temperature control i.e. always start with cold water, slow rise in temperature and terminal boil of at least 30 minutes, to prevent gaseous porosity.
- Sufficient curing time to ensure complete polymerisation.
- Just adequate and sustained pressure throughout the curing period to avoid contraction porosities.

Cooling: After curing, remove the flask from the hot water bath and keep it on the laboratory bench to cool slowly on its own (bench cooling). Sudden cooling can result in internal stresses and strains developing in dentures.

Cooling overnight is ideal; however bench cooling for 30 minutes followed by placing under cold tap water for 15 minutes is sufficient in practice.

Deflasking: This is done to recover the cured acrylic denture out of the flask and has to be done very carefully to prevent fracture of the denture. Gently tap the side of the flask with a wooden mallet to remove the top lid, investing plaster surrounding the denture is removed en bloc from flask, using a fret saw make saw cuts into the plaster at equal distance all around, using a plaster knife pry out the investing plaster between the cuts, make cuts into the cast as well and remove it in pieces, denture is recovered and rinsed.

3.5 Denture Finishing

Finishing includes, trimming, sand papering and then polishing.

3.5.1 Trimming

Plasters at the neck of the teeth are removed, using appropriate bur mounted on a trimming machine, the denture borders are carefully trimmed, frenal relief is given using a straight fissure bur, tissue surface nodules are removed and the thickness of the palatal surface reduced on the polishing surface. Uniform thickness of about 2-2.5mm should be maintained.

3.5.2 Sandpapering

Sand paper is fixed on to a mounted sand paper mandrel to remove even the finest of all scratches; some technologists prefer using a wet sand paper for a finer finish.

3.5.3 Polishing

The commonly used material for polishing is pumice, wet pumice is loaded on a lathe mounted rag wheel or polishing brush and the finished denture pressed intermittently against the rotating wheel. Care should be taken not to apply too much pressure to prevent warpage or even fracture. After polishing, the denture is washed thoroughly in soapy water and a clean toothbrush used to remove remaining plaster and pumice.

The dentures are labeled and stored in water until the insertion appointment.

4.0 CONCLUSION

This unit has extensively covered the laboratory procedure of complete denture construction and it is expected that by now we are more

conversant with the step by step procedure of complete denture fabrication.

5.0 SUMMARY

This unit has discussed the following:

- Setting up of teeth according to the principles of setting up of each tooth in relation to the vertical and occlusal planes.
- Waxing up of the arranged teeth, contouring, festooning and stippling ready for trying-in.
- Trying-in, that is evaluation of the wax denture and possible modifications.
- Denture processing which includes-disarticulation, flasking, de-waxing, mixing of acrylic powder and liquid, packing at dough stage, bench pressing, bench curing, curing (polymerisation) , bench cooling, deflasking and recovering of the processed denture.
- Denture finishing by trimming, sand papering and polishing.

6.0 TUTOR-MARKED ASSIGNMENT

1. Write briefly on the principle of setting up.
2. Enumerate the steps involved in denture processing and finishing.

7.0 REFERENCES/FURTHER READING

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UNIT 3 FACTORS AFFECTING RETENTION AND STABILITY OF COMPLETE DENTURES

CONTENTS

1.0 INTRODUCTION

This unit is a follow-up to units 3 in module 4, and unit 1 in module 5, which focused on the overview and construction procedure of complete dentures.

In this unit, we shall be discussing the factors affecting the retention and stability of complete dentures.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- define retention and stability
- enumerate factors affecting retention in complete dentures
- explain factors affecting stability in complete dentures.

3.0 MAIN CONTENT

3.1 Definition of Retention

Retention is the ability of the denture to withstand displacement against its path of insertion. It is defined as "that quality inherent in the prosthesis which resists the force of gravity, adhesiveness of foods and the forces associated with the opening of the jaws"-GPT.

Heartwell defined it as the resistance of a denture to removal in a direction opposite that of insertion.

3.1.1 Anatomical Factors Affecting Retention of Complete Dentures

The various anatomical factors that affect retention are:

- Maximum coverage of the basal seat area: Retention increases with increase in size of the denture-bearing area, the size of the maxillary denture bearing area is about 24cm^2 and that of mandible is about 14cm^2. Hence, maxillary dentures have more retention than mandibular dentures.
- Quality of denture-bearing area: If the ridges are parallel and well formed the better the retention as tissues displaced during impression taking will lead to tissue rebound during denture use, leading to loss of retention.
- Oral facial musculature: The oral and facial musculature can supply supplementary retention provided that-

a. The teeth are positioned in the neutral zone.
b. The polished surfaces of the dentures are properly shaped-the buccal flanges of the upper, slope up and out from the occlusal surfaces of the teeth while the buccal flanges of the lower denture slope down and out from the occlusal plane with the lingual flanges sloping toward the centre of the mouth so the tongue can fit against them

3.1.2 Physiological Factors Affecting Complete Denture Retention

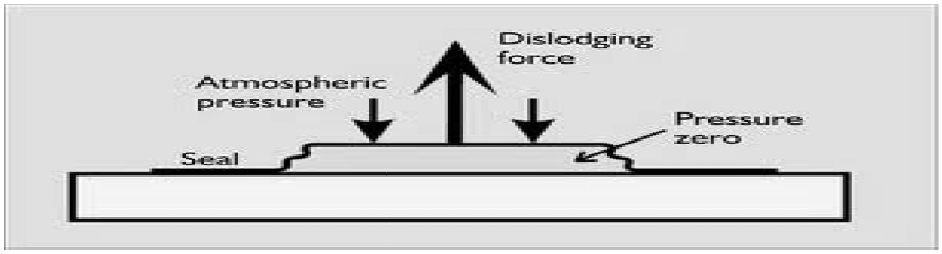
Saliva: the viscosity of saliva determines retention. Thick and ropey saliva leads to loss of retention as it tends to accumulate between the tissue surface of the denture, also, thin and watery saliva can lead to compromised retention. In ptyalism patient suffers gagging sensation and in xerostomia, dentures can produce soreness and irritation.

3.1.3 Physical Factors Affecting Retention in Complete Dentures

Many physical forces and factors have been credited with causing or enhancing retention e.g. atmospheric pressure, adhesion, cohesion, gravity, surface tension, base adaptation, border seal and muscular control. However, while the majority of this list has survived for a long time in teaching texts (and examination answers) they don't all survive scientific scrutiny.

Factors not Important in Complete Denture Retention are:
Atmospheric pressure

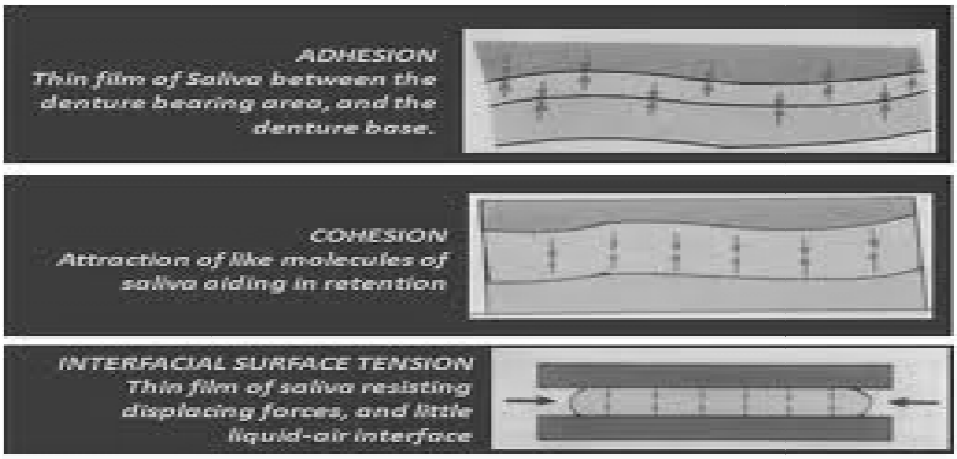
The pressure of the atmosphere has commonly been claimed to be an aspect of complete denture retention, but this is not important. It could only operate by way of a pressure difference, that is, beneath the denture there must be a lower pressure, and the full effect could only be felt if there were a vacuum there.



Adhesion

Adhesion is defined as the physical attraction of unlike molecules to one another. Adhesion ordinarily means some specific chemical interaction across the interface of two solids. Whether this is through covalent bonds or chelation, the concept is of fixed relationship at the molecular level. This has never been claimed for dentures, there being no known mechanism for a direct acrylic-mucosa reaction that would achieve this. Even so, the concept is frequently expressed in the denture retention field so vaguely as to be irrelevant, the fact that there is a resistance to

separation is called adhesion regardless of the inability to identify specific mechanism, and it does not play a major role in patients with xerostomia.



Cohesion

Cohesion is defined as the physical attraction of like molecules for each other. The cohesive forces act within the thin film of saliva. Cohesive failure therefore means the separation of molecules within the body against inter- or intermolecular forces, it has never been claimed that a denture has failed to be retained because of such a breakdown, which might perhaps be expected to occur in the soft tissue rather than the acrylic. Indeed, the tensile strength of water (and therefore saliva) is very high, although demonstrating this is very difficult because of the need to avoid the nucleation of bubbles. Great negative pressures are required. The formation of bubbles in a saliva film would certainly cause loss of retention, but the effect is caused by the ease of their flow, not the loss of cohesion.

Thus, although one can state that the cohesive strength of the materials involved is necessary for retention, but not very important, in that cohesive failure never indeed could occur without damaging the patient or the denture.

Gravity

This is a trivial force and clearly only applies to the denture that is resting on the mucosa under its own weight. Gravity obviously needs to be overcome to raise the denture, but equally it contributes to the lack of retention of the uppermost denture (depending on the orientation of the wearer at the time). Since gravity would be of no benefit there, or for a wearer in a face-down position for any reason, it can be discounted as unhelpful. The mass of a lower acrylic denture is typically only a few

grams, and increasing this appreciably can only be at the expense of fatigue for the jaw carrying the load.

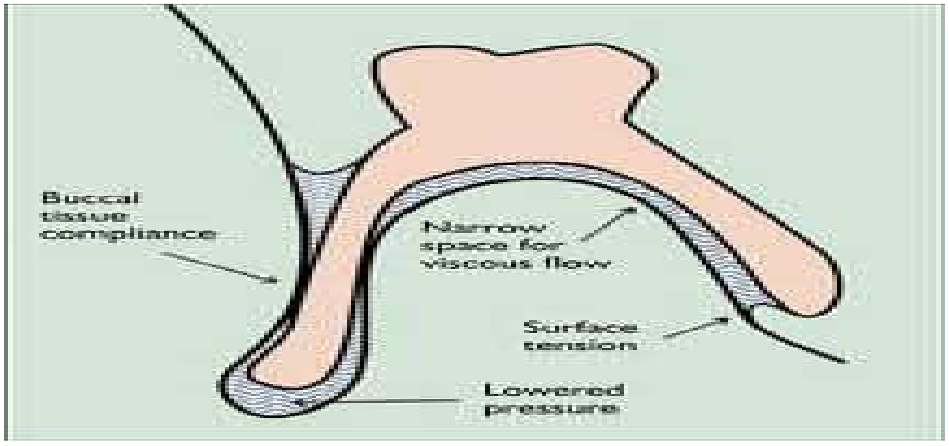
Muscular control

Muscular control is frequently cited as an important contributor to retention. However, reference to the definitions of retention will show that although it is an important aspect of successful complete denture use, it is not relevant to retention in the strictest sense because, as observed above, retention is a quality of the denture rather than the patient. Furthermore, muscular control is perhaps better referred to as the 'patients' manipulative skill' and as such goes beyond retention, including therefore other related aspects of denture design.

Factors Important in Complete Denture Retention

Surface tension

It is defined as the tension or resistance to separation possessed by the film of a liquid between two well- adapted surfaces. These forces are found within the thin film of saliva separating the denture base from the tissues.



This film of saliva tends to resist the displacing forces which tend to separate the denture from the tissue; it plays a major role in the retention of upper denture. It is totally dependent on the presence of air at the margins of liquid and solid contact (liquid air interface).One of the consequences of the surface tension of liquids is the tendency to minimize the area of the free surface, generating the familiar curved surfaces of raindrops and menisci. This is the force that retains two wet microscope slides together against a straight pull (not a sliding action). At the edge is a very thin film of water, with a large negative curvature because the separation of the slides is small, thus the force is great.

Base adaptation

In plain terms, how well the denture fits is singularly important. This is so because the measure of the fit is the size of the gap between the fitting surface and the mucosa, since it is this that controls the flow occurring there. For a fully immersed system (that is, no air being admitted), the force required for separation at a given rate depends inversely on the cube of separation. Once air is admitted at the edges, the force depends inversely on the fifth power of separation, i.e. collapses more readily but still implying the benefits of close adaption (this is because, as indicated above, the flow of the air is so much easier that it provides no appreciable resistance to separation in comparison with the effect of the saliva). These relationships also show that the fit must be uniformly good over the entire tissue surface: the viscous retardation contribution from a region of even slightly greater separation will be substantially less than that from a closer fitting area, perhaps even negligible. A secondary feature to note is that the narrowness of the gap contributes a retentive force through the effects of surface tension, via the curvature that results in the liquid surface. The deduction from this is that the retention of dentures against a tipping action will be less effective than against a straight pull.

Border seal

Attention was drawn under ‘Surface Tension’ to the fact that along most of the border of a denture there is double contact of acrylic and soft tissue such that displacing the denture in the separation sense does not open a gap along that border. There are two effects arising from this. Firstly, the cross section through which saliva must flow in order to fill the space is small, and the viscous retardation of displacement correspondingly large. Secondly, the compliance of the buccal tissues in particular means that the lowered pressure beneath the denture caused by that displacement would tend to hold them in place in close approximation to the acrylic, maintaining the seal.

It is therefore apparent that the design of the denture should take this into account in terms of extension into the buccal sulcus and in ensuring a smooth enough; fewer surface so that no leaks occurred.

3.1.4 Mechanical Factors Affecting Retention of Complete Dentures

- Unilateral undercuts: Acts as a mechanical locking system in retention while bilateral undercuts will interfere with denture insertion.

- Rubber suction disc: It is buttoned onto a side, sunk into the tissue surface of the denture; partial vacuum created by the disc will help in denture retention.
- Magnets: Steel magnets are fixed on the upper and lower dentures in the premolar and molar area with like poles facing each other, repulsive forces between like poles will force the dentures to press against the basal seat thereby increasing retention in highly resorbed ridges.
- Denture adhesives: Are non-toxic, water soluble material that is placed between the denture and the tissues to enhance the normal physiological forces that hold dentures in place. Denture adhesives are particularly useful for maladaptive patients such as those who have severely compromised residual ridge morphology, those who suffer from xerostomia and those who are neurologically compromised due to stroke, multiple sclerosis or head injury.

The coherence of the denture adhesive is far greater than that of saliva.

3.2 Definition of Stability

Stability of a denture is its quality of being firm, steady and constant in position when forces are applied to it. It is the resistance against horizontal movement and forces that tend to alter the relationship between the denture base and its supporting foundation in a horizontal direction.

3.2.1 Factors Affecting Stability

- Vertical height of the residual ridge: The residual ridge should have sufficient vertical height to obtain good stability as highly resorbed ridges offer the least stability.
- Quality of soft tissue covering the ridge: The ridge should provide a firm soft tissue base with adequate sub mucosa to offer good stability, flabby tissues with excessive sub mucosa offer poor stability.
- Occlusal plane: The occlusal plane should be oriented parallel to the ridge and dividing the interact space equally. If the occlusal plane is inclined, then the sliding forces may act on the denture to reduce its stability.
- Balanced occlusion: The position of the teeth and their occlusion play an important role in the stability of the denture. Balanced occlusion facilitates the even distribution of forces across the denture, while its absence may produce unbalanced lever type forces on any one side of the denture leading to loss of stability. The teeth in the denture should be arranged in the neutral zone.

The neutral zone is defined as "the potential space between the lips and cheeks on one side and the tongue on the other. Natural or artificial teeth in this zone are subject to equal and opposite forces from the surrounding musculature"-GPT.

- Contour of the polished surface: The polished surfaces of the denture should be harmonious with the oral structures; they should not interfere with the action of the oral musculature.
- Quality of the impression: An impression should be as accurate as possible, devoid of voids and any rough surfaces and duplicate all the details accurately. It should be dimensionally stable and the cast should be poured as soon as possible.

4.0 CONCLUSION

This unit has made us to understand which factors are relevant to complete denture retention in the light of the current understanding of physics and materials science and thus to guide design. Atmospheric pressure, adhesion, cohesion, surface tension, base adaptation, border seal, and muscular control have all been cited at one time or another as major or contributory factors, but usually as an opinion without proper reference to fundamental principles. In fact, denture retention is a dynamic issue dependent on the control of the flow of interposed fluid and thus its viscosity and film thickness, while the timescale of displacement loading affects the assessment. Surface tension forces at the periphery contribute to retention, but the most important concerns are good base adaptation and border seal. These must be achieved if full advantage is to be taken of the saliva flow-related effects.

5.0 SUMMARY

This unit has discussed the following:

- Definition of retention.
- Factors affecting complete denture retention, divided into anatomical factors, physiological factors, mechanical factors and physical factors which was considered as those physical factors that are really important and those that are not scientifically proven to be important in complete denture retention.
- Definition of stability
- Factors affecting stability in complete denture which includes- vertical height of the residual ridge, quality of soft tissue covering the ridge, occlusal plane, balanced occlusion, contour of the polished surface and quality of the impression.

6.0 TUTOR-MARKED ASSIGNMENT

1. Define retention and stability.
2. Write briefly on two (2) factors affecting retention.
3. Enumerate four (4) factors affecting stability in complete dentures.

7.0 REFERENCES/FURTHER READING

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MODULE 5 CLASSIFICATION OF OCCLUSIONS/ JAW RELATIONSHIPS

UNIT 1 IDENTIFICATION OF CLASS I, II, AND III OCCLUSIONS/ JAW RELATIONSHIPS

CONTENTS

1.0 INTRODUCTION

In this unit, we shall be discussing how the three classes of occlusion/ jaw relationships can be identified both in dentate and edentulous patient/models. You will recall in unit 2 module 4, that the setting up procedure described was for a normal occlusion, hence there is a need for us to study other possible occlusions that we may encounter in practice. Hope you will find it very enriching.

2.0 OBJECTIVE

At the end of this unit, you should be able to:

- identify class I, II and III occlusion/ jaw relationships by facial profile, teeth arrangement (occlusion) and jaw relationship.

3.0 MAIN CONTENT

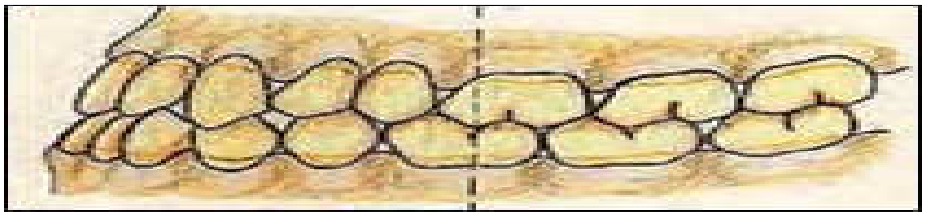
3.1 Identification of Class 1 Occlusion/ Jaw Relationship (Neutrocclusion)

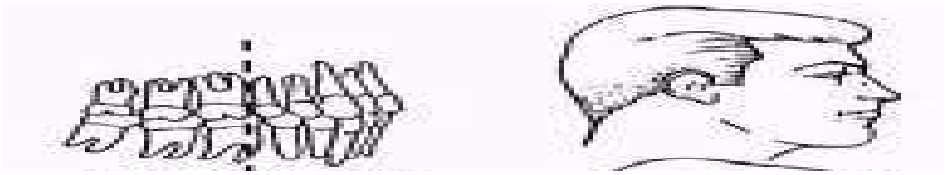
Class 1 occlusion is always referred as the normal jaw relationship as most people are in this class and it is the only jaw relationship that comes with little or no discrepancy. It is the dental relationship in which there is normal anteroposterior relationship of the jaws, as indicated by correct interdigitation of maxillary and mandibular molars, but with crowding and rotation of teeth elsewhere, i.e., a dental dysplasia or arch length deficiency. In this classification, the maxillary first molar is slightly back to the mandibular first molar; the mesio buccal cusp of the maxillary first molar is directly in line with the buccal groove of the mandibular first molar.

This system is based upon the relationship between the permanent maxillary and mandibular first molars.

The maxillary canine occludes with the distal half of the mandibular canine and the mesial half of the mandibular first premolar (in dentate patient/model). The facial profile is termed mesognathic.

In an edentulous case, the maxilla is wider and overlaps the mandible, after setting up the teeth of the maxilla usually overlaps that of the mandible anteriorly and posteriorly.





3.2 Identification of Class 11 Occlusion/ Jaw Relationship (Distocclusion)

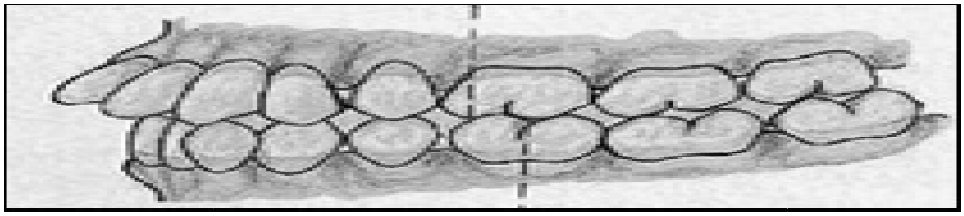
The dental relationship in which the mandibular arch is posterior to the maxillary arch is call lateral segments i.e. the mandibular first molar is distal to the maxillary first molar. Class II can be further subdivided into two divisions.

Division 1: bilateral distal retrusion with a narrow maxillary arch and protruding maxillary incisors. Subdivisions include right or left (unilaterally distal with other characteristics being the same).

Division 2: bilateral distal with a normal or square-shaped maxillary arch, retruded maxillary central incisors, labially malposed maxillary lateral incisors, and an excessive vertical overlap.

In this classification, the maxillary first molar is even with, or anterior to, the mandibular first molar; the buccal groove of the mandibular first molar is distal to the mesiobuccal cusp of the maxillary first molar. The distal surface of the mandibular canine is distal to the mesial surface of the maxillary canine by at least the width of a premolar. (in dentate patient/model). The facial profile of both divisions is termed retrognathic.

In edentulous case, it is either that the mandible is abnormally positioned posteriorly to the normal maxilla or that the maxilla protrudes abnormally to the normal mandible.

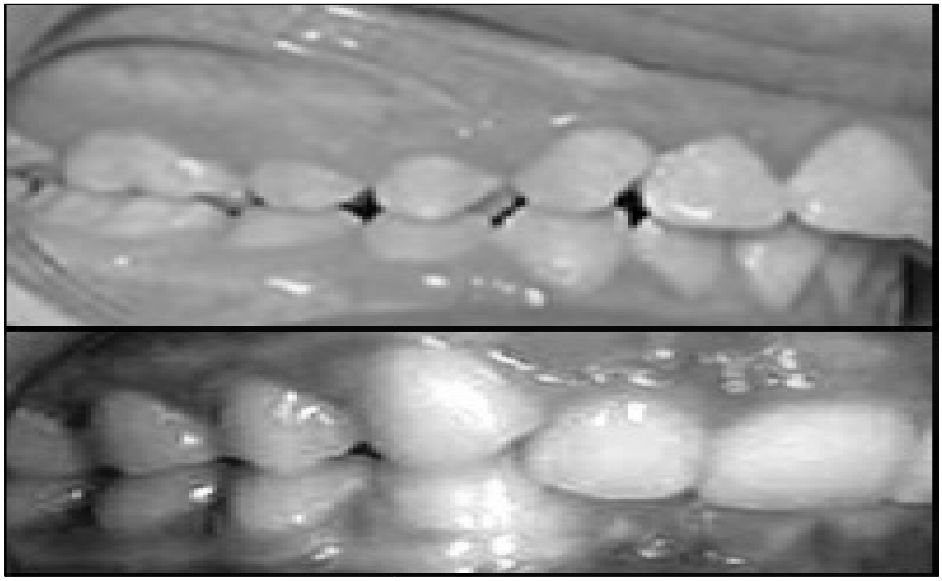


Class II occlusion

Class II occlusion is further subdivided into two (2) divisions:

- Class II, division 1 occurs when the permanent first molars are in class II and the permanent maxillary central incisors are either normal or slightly protruded out toward the lips.

- Class II, division 2 occurs when the permanent first molars are in class II and the permanent maxillary central incisors are retruded (pulled backward toward the oral cavity) and tilting inwards towards the tongue.

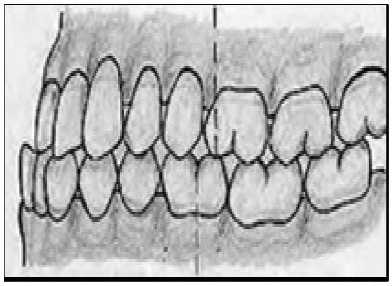


Class II Division 1
Class II Division 2

3.3 Identification of Class III Occlusion/ Jaw Relationship (Mesiocclusion)

In this classification, the maxillary first molar is more to the back of the mandibular first molar than normal; the buccal groove of the mandibular first molar is mesial to the mesiobuccal cusp of the maxillary first molar. The facial profile is termed prognathic.

In edentulous case, the mandible is anteriorly positioned to the maxilla, either as a result of the mandible being abnormally positioned anteriorly to a normal maxilla or a normal mandible positioned to a receding maxilla.



4.0 CONCLUSION

In this unit, you have learnt how to identify different classes of occlusion/ jaw relationships by the patients' facial profile, teeth arrangement and relationship of the maxilla to the mandible in edentulous patient/models.

5.0 SUMMARY

This unit has focused on the identification of class 1, class 11 and class 111 occlusions using the first permanent molar relationship of the upper and lower arch, facial profiles of each class as well as the maxilla-mandibular relationship in edentulous patients/models. The next unit will be focusing on how to differentiate these jaw relationships in complete dentures.

6.0 TUTOR-MARKED ASSIGNMENT

1. Write briefly on class 1 and class 111 occlusion/jaw relationships.
2. Differentiate between class 11 divisions 1 and class 11 divisions 2 jaw relationship.

7.0 REFERENCES/FURTHER READING

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UNIT 2 DIFFERENTIATION BETWEEN CLASS I, II AND III OCCLUSIONS/JAW RELATIONSHIPS

CONTENTS

1.0 INTRODUCTION

Differentiation between class I, II and III occlusion/jaw relationships is a follow up on unit 1 of module 4 which focused on identification of the three classes of occlusion/jaw relationship. The occlusal scheme described in unit 2 of module 4 (construction procedure of complete denture) has been that of a fully balanced articulation using cusped teeth, with the assumption that there is a normal horizontal relationship between the mandible and the maxillae (class I). Consideration now needs to be given to those situations where a considerable discrepancy in the horizontal jaw relationship exists.

This unit will deal with the retrognathic situation (class II), and also the prognathic situation (class III), taking into account the problems likely to be encountered prosthodontically.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- differentiate between setting up for a class i and class ii complete dentures
- describe how to set up for a class III complete denture.

3.0 MAIN CONTENT

3.1 Class I Complete Denture

The upper model is often wider than the lower model, when occluded to the lower it overlaps it. Setting up in this class often follows the principles as stated in unit 2 of module 4, after setting up the upper anterior teeth overlaps the lowers by about 2mm and also overlaps posteriorly.

3.2 Class II Complete Denture

When constructing complete dentures for class II patients, a variety of problem arises, because of both the static and functional relationships between upper and lower jaws.

Anteriorly, it is still necessary to replace teeth in the same position as they once occupied, but there can be some allowance for a reduction in overbite, usually by setting the upper teeth a little higher, but in the same anteroposterior relationship. Posteriorly, the different sizes of the arches means that the lower arch appears much shorter than the upper, and there is a narrowing of the arch in the premolar region, because a narrow segment of the lower arch must articulate with a wider part of the upper, the ridges will never be parallel to each other. It is important to be aware of this, because after recording the jaw relationship, it may well appear erroneous when the articulated models are viewed.

-Setting Up: After mounting the models, the anterior teeth are first set, usually the space for the lower anteriors are reduced, thus, it may be better to place five instead of six anterior teeth to match the upper teeth than to select too small set of lower teeth. The lower anterior teeth may be proclined slightly to enable an edge to edge contact of the incisor during function.
Alternatively, it is sometimes better aesthetically to leave out the lower first premolars and replace them with lower canines, which can be placed to articulate better with the upper first premolar.

The over jet and overbite are inevitably bigger than the usual 2mm recommended, however, it is important that the teeth remain in the neutral zone for stability, even if it involves a posterior cross bite (the lower teeth placed buccal to the upper). It would also seem sensible to use an articulator that better reproduces the patient's condylar guidance angle, and teeth with steep cuspal angle. All these are done to give preference to function over aesthetics.

3.3 Class III Complete Denture

Characteristically the incisor relations in the natural teeth are either in edge-to-edge relationship or display a reverse over jet (where the lower anteriors are in advance of the upper anteriors).

Once again there are both static and functional problems when constructing complete dentures for these patients, as there is likely to be a discrepancy in arch size and position between the upper and the lower arches. Anteriorly, the requirement, as always, remains to place the artificial teeth in the positions occupied by the natural teeth; but if this means reproducing a reverse over jet, this is often unacceptable to the patient. Posteriorly, the main problem is the discrepancy in arch size, whereby the lower arch is wider than the upper. Although, the general principles of setting up may be followed, there is need for modifications in order to produce a functional complete denture.

Setting Up

After mounting the models, the anterior teeth are set up, in this case the space available for lower anterior teeth is large, therefore, large lower anterior teeth may be used or an extra incisor tooth added or better still slight diastema may be incorporated.

Most patients find the re-creation of a reverse over jet unacceptable; hence, the only compromise that could be considered is to place the upper anteriors closer towards the residual ridge into an edge-to-edge relationship with the lowers. At no time should a normal Class I arrangement be considered, even if the teeth were originally edge-to-edge: this relationship should be reproduced. In all cases, though, the angle of the incisal edges should be in harmony with the anteroposterior compensating curve.

Because the lower arch usually overlaps the upper arch, placing the teeth in a normal relationship will mean either extending the upper posteriors far buccally or the lowers far lingually, or both. Clearly this is impractical, and will create more problems than solution. So maintaining the artificial teeth within the neutral zone in this case, means that it is necessary to set the teeth in a cross-bite arrangement.

The lower first molar is positioned slightly anterior to the normal occlusion position in rare cases, the mesiobuccal cusp of the lower first molar being mesial to the second upper premolar. Alternatively, the lower first molar may occupy its normal position and extra lower premolar set on each side of the arch.

4.0 CONCLUSION

In this unit, you have learnt the different modifications employed in teeth arrangement to produce an aesthetically pleasing and functional complete denture both in class II and III occlusion/jaw relationships.

5.0 SUMMARY

This unit has considered the necessary modifications to be made when setting up for class II to compensate as much as possible the excessive over jet and overbite present as well as adjusting the posterior teeth in a manner to attain the best functional occlusion as well as setting the anterior teeth, edge to edge in a class III complete denture also modifying the posterior teeth to achieve balanced occlusion.

6.0 TUTOR-MARKED ASSIGNMENT

1. Describe setting up for a class II complete denture.
2. Explain how to set up a class III complete denture.

7.0 REFERENCES/FURTHER READING

Adeoye, S. (1997). “Lecture Notes on “DTE 212 Dental Prosthetic Technology Theory for ND 2 Students of Federal School of Dental Technology& Therapy”. Trans-Ekulu Enugu, Enugu State (Unpublished).

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