SELECTION AND ARRANGEMENT OF ARTIFICIAL TEETH FOR DENTURE PROSTHESIS

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INTRODUCTION

• THE ANTERIOR TEETH ARE PRIMARILY SELECTED TO SATISFY THE ESTHETIC REQUIREMENT.

• WHERE AS THE POSTERIOR TEETH ARE PRIMARILY SELECTED TO SATISFY THE FUNCTIONAL REQUIREMENTS.
OBJECTIVES FOR TOOTH SELECTION

TO CONSTRUCT THE COMPLETE DENTURE THAT

1. FUNCTION WELL EFFICIENT FOR MASTICATION.
2. ALLOW PATIENT TO SPEAK NORMALLY.
3. ESTHETICALLY PLEASING.
4. WILL NOT ABUSE TISSUE OVER RESIDUAL RIDGE
5. SHOULD MAINTAIN THE VERTICAL DIMENSION
ANTERIOR TOOTH SELECTION

1. SIZE OF THE TEETH
2. FORM OF THE TEETH
3. COLOR / SHADE OF THE TEETH
4. COMPOSITION OF MATERIAL OF TEETH
SIZE OF THE TEETH

- The size of the teeth should be in proportion to the size of the face and head
- Women’s teeth are often smaller than men’s
- A distinct difference between CI & LI is desirable in women
- Following factors are used as a guide to select the size of the teeth:
  
A. Methods using pre-extraction guides
B. Methods using anthropological measurements of the patient
C. Methods using theoretical concepts
D. Methods using anatomical landmarks
ANTERIOR TOOTH SELECTION/ SIZE

METHODS USING ANTHROPOLOGICAL MEASUREMENTS OF THE PATIENT

Berry’s biometric index

bi-zygomatic width

Width of the upper Cl = 16

length of the face

Width of the upper Cl = 20
SIZE OF THE TEETH

1. SIZE OF THE FACE
2. SIZE OF THE MAXILLARY ARCH
3. INCISAL PAPILLA AND CUSPID EMINENCES
4. MAXILLO MANDIBULAR RELATIONS
5. THE CONTOUR OF THE RESIDUAL RIDGE
6. VERTICAL DISTANCE BETWEEN THE RIDGES
7. THE LIPS

ANTERIOR TOOTH SELECTION/ SIZE
SIZE OF THE MAXILLARY ARCH

BOUCHER (1975)
The size of six anterior teeth:
Length: Smile line, ⅔ part of anterior teeth will appear
Width: Canine line
Tips: C ---- C
Distal: C ---- C
Lee (1962): The distance between canine tips is similar with the width of nose.
The form and outline of the anterior teeth can be determined using the following factors:

- Shape of the patient’s face or facial form
- Patient’s profile
- Dentogenic concept and dynesthetics
• The form of the teeth should be conformed to contour of the face as considered from the labial, mesial, distal and incisal aspect.

• The general outline of the tooth should conform to the general outline of the face when viewed from frontal aspect.

• Three factors are used as guides in the selection of anterior teeth for form:

  A. The form and contour of the face
  B. SEX
  C. AGE
ANTERIOR TOOTH SELECTION/ FORM

THE FORM AND CONTOUR OF THE FACE

According to Leon Williams classification face
Three types:
- Square
- Tapering
- Ovoid
TRIBYTE INDICATOR

to determine the facial form and outline
SQUARE

Facial form
- the width of the forehead, zygomatic arch and mandibular angle is equal.

Profil
- straight and flat ala area

Incisal form
- mesial and distal lines are almost parallel till the length of 2/3rd from incisal edge.
OVOID

Facial form
- width of zygomatic arch is wider than the distance of forehead.

Profile
- ovoid ala area

Incisal form
- mesial and distal lines are curved.
TAPERING

Facial form
- the width becomes narrow from forehead towards to zygomatic arch and mandibular angle.

Profil
- curved or flat

Incisal form
- mesial and distal lines become narrow from incisal edge to cervical end.
SQUARE, OVOID, TAPERING FORMS
ANTERIOR TOOTH SELECTION/ FORM
ANTERIOR TOOTH SELECTION/FORM
TOOTH FORM IN RELATION TO ARCH FORM

V shaped arch - incisors with narrow neck (tapering)
Square arch – parallel sided incisor (square)
Round arch – ovoid teeth
COLOR / SHADE OF THE TEETH

- A knowledge of the physics, physiology, and psychology of color is of value in the selection of the color.
- The color of most concern to dentist is the yellow color, because the colors of teeth and faces are primarily yellow.
- Colors have four qualities—
  1. Hue
  2. Saturation (chroma)
  3. Brilliance (value)
  4. Translucency
- All these are involved in selection of teeth.
Basic Color
The name of the Color: red, yellow, blue........
CHROMA

The degree of color saturation
VALUE

The degree of color brightness
COLOR / SHADE OF THE TEETH

• The factors of shade selection are:-
  1. Age.
  2. Sex.
  3. Complexion.
  4. Patient -preference
1. Age:
   - The younger the patient, the lighter the color is preferred.
   - The color of natural teeth darken with age because of deposition of secondary dentin, wearing away of enamel and external staining from oral fluids, foods or tobacco.

2. Sex: -
   - The sex may effect color, it seems that females given brighter teeth than males.
3. Race:-

The color of the face should harmonize the color of teeth. Lighter teeth are suitable for lighter skin, while darker teeth are suitable for darker skin, although darker people with dark skin seemed to have very light teeth. This is because of contrast in the skin and tooth color.

4. Patient preference (Method of pair comparison ):-

Show the patient a complete shade guide and select the two tabs that are lightest and darkest, hold them against the patient lip and ask them to point to the one that they prefer. More than two or three shades should be selected and comparison between them would help in final right selection.
MATERIALS OF ANTERIOR TEETH:
There are two main types:
1. Porcelain,
2. Acrylic
Porcelain teeth:
We have vacuum fired and air fired. The vacuum is better because they are harder and have luster. Generally porcelain teeth are preferred particularly for young person because they look more vital, very smooth and difficult to abrade.

Acrylic teeth:
They are made from acrylic resin, indicated when there is insufficient inter-occlusal distance, and grinding becomes necessary, also in situation where there are opposing natural teeth, partial denture and gold bridge. They are inferior when they are compared with porcelain because they can not maintain luster for long time and abraded easily.
PORCELAIN TEETH:
1- Brittle, more resistance to abrasion
2- Excellent (does not stain).
3- Mechanical bonding by pins or undercuts holes.
4- Difficult to grind and polish.
5- More forces to the mucosa.
6- Clicking on contact.
7- Much lower than acrylic causes stresses in acrylic denture base.
ACRYLIC TEETH:
1- Not brittle, but poor abrasion resistance.
2- Esthetic very good.
3- Chemical bonding with denture base.
4- Easily ground and polish.
5- Transmit fewer forces to the mucosa.
6- No clicking on contact.
7- Thermal expansion same as acrylic denture base.
Posterior teeth are selected for:

- Color
- Buccolingual width
- Mesiodistal length,
- Vertical height (occluso-gingival length)
- Occlusal form.
1- Shade (color):
Shade of posterior teeth should be harmonized to the shade of anterior teeth, maxillary first premolars are sometimes used for esthetic more than function, so it's advisable to select premolar teeth with lighter color than the other posterior teeth, but not lighter than anterior teeth. Generally the shades of posterior teeth are slightly darker than anterior teeth (post. Contain dentin more than ant.).
2- Bucco-lingual width:-
The bucco-lingual width of posterior teeth should be slightly narrower than natural teeth to decrease occlusal surfaces which direct less stress during function to supporting tissue, and also enhance the development of the correct form of polished surfaces of the denture.

3- Mesio-distal width:
The mesio-distal width of posterior teeth should be equal to the distance between canine line and anterior border of maxillary tuberosity for upper teeth. For lower teeth should be equal to distance between canine line and anterior border of retro molar pad area.(the width with in design limit)
4- The occluso-gingival height
The occluso-gingival height or length is controlled by the available inter-arch distance. The length of the maxillary first premolar should be comparable to that of maxillary canine to have the proper esthetic effect. The height of posterior teeth usually divided into long, short, medium. Long posterior teeth are generally more esthetic in appearance than are shorter teeth.

5- Occlusal form:
- Selecting the tooth to be used is based on the concept of occlusion to be developed, the philosophy of occlusion to be fulfilled, and the accomplishment approached. It is given in the table below.
It is important that the artificial anterior teeth are placed in the same antero-posterior position and at the same length as the original natural esthetics and phonetics.

Guides for arrangement of anterior teeth:

- Residual alveolar ridge
- Incisive papilla
- Reflections of soft tissues under the lip
POSITION OF UPPER TOOTH

ARRANGEMENT OF ANTERIOR TEETH
• Position of the maxillary central incisor:
▪ Long axis inclines slightly towards the vertical axis when viewed from front
ARRANGEMENT OF ANTERIOR TEETH

• Slopes labially 15 degree when viewed from side
• **Position of the maxillary central incisor:**

**Mesio-distal inclination:**
The maxillary central incisor is placed, so that the long axis shows a slight distal inclination, when viewed from front.

**Labio-lingual inclination:**
The neck of the tooth should be slightly depressed when viewed from this side, the tooth slopes (incisal edge) towards the labial side.

**The incisal edge:**
Is in contact with the occlusal plane.
• Position of the maxillary lateral incisor:

- Long axis slopes more toward midline when viewed from front
- Incisal edge is 1mm short of occlusal plane
ARRANGEMENT OF ANTERIOR TEETH

• Slopes labially 20 degree when viewed from side
ARRANGEMENT OF ANTERIOR TEETH

• Position of the maxillary lateral incisor:

  Mesio-distal inclination:
  The maxillary lateral incisor is placed with its long axis inclined noticeably distally when viewed from the front.

  Labio-lingual inclination:
  The neck of the maxillary lateral incisor is depressed (of the neck) more than the central incisor, although the labial surface will be nearly in line with the central incisor.

  The incisal edge:
  is $\frac{1}{2}$ to 1 mm above the level of the occlusal plane.
• Position of maxillary canine:
  - Long axis is parallel to vertical axis
  - Cusp is in contact with the horizontal plane
Mesio-distal inclination:

• The maxillary canine is placed so that the long axis has slight distal inclination from the front view.

Labio-lingual inclination:

The neck of the maxillary canine is prominent. The tooth axis is vertical (straight) when viewed from the side.
POSITION OF LOWER TOOTH
• Position of the mandibular central incisor:

- Its long axis inclines slightly towards the vertical axis when viewed from the front
- Slopes labially when viewed from the side
- Incisal edge is about 2mm above the occlusal plane
• Position of the mandibular central incisor:

• Mesio-distal inclination:
  • The long axis is perpendicular to the occlusal plane (vertically upright).

Labio-lingual inclination:
  The central incisor is placed with its neck depressed and the tooth will show that it’s labially inclined when viewed from one side.

The incisal edge:
  Are 1-2 mm above the occlusal plane.
• Position of the mandibular lateral incisor:

- Its long axis also inclines towards the vertical axis when viewed from the front.
- Slopes labially when viewed from the side.
- Incisal edge is about 2mm above the occlusal plane.
• Position of the mandibular lateral incisor:

Mesio-distal inclination:
  • The mandibular lateral incisor is placed with its long axis showing a slight distal inclination.

Labio-lingual inclination:
  The labial surface is perpendicular to the occlusal plane.

The incisal edge:
  Are 1-2 mm above the occlusal plane.
• Position of the mandibular canine:

- Long axis leans very slightly towards the midline when viewed from the front
- Very slightly lingually when viewed from the side
- Cusp is slightly more than 2mm above the occlusal plane
• Position of the mandibular canine:

  • Mesio-distal inclination:
    • The mandibular canines are placed with a more distal inclination (neck distally placed) than the mandibular lateral incisors.

Labio-lingual inclination:
The neck of the tooth is placed prominently. The tooth shows a slight lingual inclination (at the incisal edge) when viewed from the side.

The incisal tip:
  Lies 1-2 mm above the occlusal plane.
**Horizontal overlap (over jet):**
This the horizontal distance between the incisal edge of the maxillary central incisor and the labial surface of the mandibular central incisor.

**Vertical overlap (over bite):**
The maxillary anterior teeth overlap the mandibular anterior teeth and this overlap on the vertical axis is called the vertical overlap.
ARRANGEMENT OF POSTERIOR TEETH

- Posterior teeth are set up in tight centric occlusion.
- The mandibular teeth are set in the wax occlusion rim over the residual ridge in their ideal bucco-lingual position and the maxillary teeth are set in tight centric occlusion with them regardless of their bucco-lingual position.
- The objective here is to have the intercuspatation of the posterior teeth so precise that any deviation of this occlusion in the mouth will be easily detected.
ARRANGEMENT OF POSTERIOR TEETH

Standardized parameters

1. Curve of Wilson' as transversal compensating curve.
2. Curve of Spee' as sagittal compensating curve.
3. Optimum intercuspsation of the antagonists.
**Curve of Wilson**

Transversal compensating curve. It runs frontally (transversally), touching the cusp tips of the posterior teeth. In the lower arch, it is produced by an even inclination of the right and left molars towards the lingual, corresponding to an inclination towards the buccal in the maxilla. When setting-up complete dentures, the teeth should be positioned along this curve.
**Curve of Spee**

Sagittal compensating curve. Its bow-shaped line of occlusion in dentition. Spee described it as the "shifting path" of the mandible. The segment of the circle drawn has its center in the orbital cavity.
1st Upper Premolar

- Long axis is parallel to vertical axis when viewed from the front or the side
- Palatal cusp is 1 mm shorter
- Buccal cusp is in contact with the occlusal plane
2\textsuperscript{nd} Upper Premolar

- Long axis is parallel with the vertical axis when viewed from the front or the side
- Both buccal and palatal cusps are in contact with the occlusal plane
1st Upper Molar

- Long axis slopes buccally more
- Mesiopalatal cusp is in contact with the occlusal plane
2nd Upper Molar

- Long axis slopes buccally from the front
- Slopes Distally from the side
1st Lower Molar

- Long axis leans lingually
- All the cusps are at a higher level above the occlusal plane
- Mesio buccal cups of upper lies in mesio buccal groove of lower molar
2\textsuperscript{nd} Lower Premolar

- Long axis also parallel to the vertical plane
- Both cusps are about 2 mm above the occlusal plane
1st Lower Premolar

- Long axis is parallel to the vertical plane
- Lingual cusp is below the horizontal plane and its buccal cusp about 2mm above it as it contacts the mesial marginal ridge of the upper first premolar.
2nd Lower Molar

- Lingual and mesial inclination of the long axis of this tooth
- Cusps are at a higher level above the occlusal plane

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• Charles M. Heartwell, Jr; Arthur O. Rahn: Syllabus of Complete Dentures, Fourth edition, pg 293-346; published by Lea & Febiger Philadelphia