APPLIED DENTAL NOMENCLATURE

I. Objectives:
   1. Identify all tooth contours.
   2. Relate the teeth to the surrounding tissues.

   3. Assignment
      ii. Self-Assessment in Course Electronic Manual accessible through Black Board

II. INTRODUCTION

   1. Definition of Dental Anatomy- that branch of gross anatomy dealing with the position, relation, structure, form and function of the teeth and surrounding tissues.

   2. Rationale for studying Dental Nomenclature
      i. To establish common language for communicating with colleagues.
      ii. As a building block to studying dentistry's many disciplines, it is necessary to have a common language that is precise and descriptive.

   3. Functions of Teeth
      i. Prehension - seizing or grasping
      ii. Protection
      iii. Esthetic and facial shaping --psychological
      iv. Speech and communication
      v. Mastication

   4. Location and Arrangement of Teeth
      i. Teeth are located in the jaws of the head.
         1. Each tooth is surrounded and supported by bone.
            a. This bony process is called the alveolar process.
            b. The bony socket into which the teeth are set is called the alveolus.
         2. There are two dental arches.
            a. The teeth anchored in the upper jaw (maxilla) are termed maxillary teeth.
            b. The teeth anchored in the lower jaw (mandible) are termed mandibular teeth.
3. All the teeth collectively form the dentition.

4. The mandible is the moving jaw while the maxilla is stationary.
   
   a. As the mandible is raised, the teeth of the mandibular arch come in contact with those of the fixed maxillary arch and are said to be in occlusion.

5. The teeth are divided into left and right halves by the midline or median line of the face. This midline or mid-sagittal plane is an imaginary vertical line dividing the arch into equal halves.

6. The mid-sagittal plane and a mid horizontal plane divides the dentition into four quadrants
   
   a. Maxillary right quadrant
   b. Maxillary left quadrant
   c. Mandibular right quadrant
   d. Mandibular left quadrant

5. Classification of Dentitions

   i. Heterodont - teeth that demonstrate different shapes and functions; example: human dentition
   
   ii. Homodont - teeth exhibit the same shape and function; example: reptiles
   iii. Monophyodont - only one dentition in a lifetime
   iv. Polyphyodont - possessing three or more sets of teeth; examples: fish, amphibians, and reptiles
   v. Diphyodont - possessing two sets of teeth during a lifetime; example: human dentition

6. Human Dentitions:

   i. Deciduous Teeth (Primary, baby, milk)
   
   1. These teeth are shed or exfoliated
   2. There are 20 teeth which normally erupt between 0-2 yrs old.
   3. There are 5 teeth per quadrant ten teeth per arch.

   ii. Permanent Teeth (Succedaneous & nonsuccedaneous)
   
   1. These teeth are 32 in number, normally erupting between 6-21 years of age.
   2. There are eight teeth per quadrant; 16 per arch.
III. CLASSIFICATION AND FUNCTION OF TEETH

1. Types of Teeth
   
   i. Incisors - designed to incise or cut
   ii. Canines - designed to grasp or hold food
   iii. Premolars - designed to hold and crush food
   iv. Molars - designed to grind and mix food

2. Permanent teeth:
   
   i. Each quadrant from the midline contains:
      
      1. Incisors (2)
         a. Central Incisor (1)
         b. Lateral Incisor (1)
      2. Canine (1)
      3. Premolars (2)
         a. First Premolar (1)
         b. Second Premolar (1)
      4. Molars (3)
         a. First Molar (1)
         b. Second Molar (1)
         c. Third Molar (1)

   **Therefore, there are 4 incisors, 2 canines, 4 premolars and 6 molars per arch.

   ii. The incisors and canines collectively form the **anterior** (front) teeth; the premolars and molars collectively form the posterior teeth.

   iii. The **premolars** are often called bicuspids. This is a misnomer. Not all premolars have two (bi) cusps. The mandibular second premolars often have three cusps. Therefore the term premolar is more descriptive.

   iv. The permanent teeth that replace the primary teeth (20) are described as **succedaneous teeth**.

   v. The permanent teeth that do not replace primary teeth are described as **non-succedaneous teeth** (12 molars).

3. The **Primary** (Deciduous) **Dentition**
   
   i. Each quadrant contains the following teeth: (their function being similar to their permanent complements).
1. Incisors (2)
2. Canine (1)
3. Molars (2)

IV. TOOTH IDENTIFICATION, FORMULAE AND CODING (NUMBERING SYSTEMS)

1. Identification: When identifying a specific tooth, we list in sequence

<table>
<thead>
<tr>
<th>EXAMPLE 1</th>
<th>EXAMPLE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENTITION</td>
<td>Permanent</td>
</tr>
<tr>
<td>ARCH</td>
<td>Maxillary</td>
</tr>
<tr>
<td>SIDE</td>
<td>Right</td>
</tr>
<tr>
<td>TOOTH NAME</td>
<td>1st Premolar</td>
</tr>
</tbody>
</table>

2. Numbering (Coding): Serve as abbreviations for writing out entire name

i. Universal Numbering System - Used by University of Maryland

1. Permanent Teeth-the teeth are numbered beginning on the right side with the permanent maxillary right third molar as #1 around the entire maxillary arch to the permanent maxillary left third molar #16. From here, we continue with the permanent mandibular left third molar (#17) and continue around the mandibular arch ending at tooth #32, the permanent mandibular right third molar.

2. Primary Teeth—are numbered in the same manner except they are assigned capital letters, “A-T” instead of numbers.

   a. Example: primary right central incisor is #E.

ii. International Numbering System

1. Approved by the International Federation of Dentistry

2. Based on a two number system - the first number identifies the quadrant and the second number identifies the tooth in that quadrant.
3. The teeth are numbered from the midline to the 3rd molar, 1-8 in each quadrant.

4. The quadrants are numbered 1,2,3,4 for the permanent dentition. The upper right quadrant is 1; the upper left quadrant is 2; the lower left quadrant is 3 and the lower right quadrant is 4. The primary dentition is numbered the same way using 5,6,7,8. Example: maxillary right central incisor = 5-I

iii. Palmer Notation

1. Uses quadrant symbols
2. Tooth numbering is the same as for the International System
3. The symbols are:
   a. Maxillary right: ┼
      i. For example: the maxillary right second premolar is: 5-│
   b. Maxillary left: │
   c. Mandibular left: ┼
   d. Mandibular right: ┼

4. Note: The primary dentition is often noted by the use of upper case letter of the alphabet where A=central; B=Lateral incisor; C=canine; D=first molar; E=second molar.

V. GENERAL MORPHOLOGY OF TEETH

1. Tooth Tissues
   i. **Enamel**: The hard acellular substance that normally covers the crown of the teeth; hardest substance in the body.
   
   ii. **Cementum**: A bone-like substance that covers the roots of teeth.
   
   iii. **Dentin**: The hard substance that forms most of the root and a major portion of the crown; it is harder than cementum but not as hard as enamel.
   
   iv. **Pulp**: The soft tissue within the dentin providing blood supply, innervation and connective tissue. The primary function of the pulp is to produce dentin.
2. Tooth Parts
   i. Each tooth is divided into two parts, the crown and the root.

1. Crown- suprastructure
   a. Anatomic crown: that portion of the tooth covered with enamel
   b. Clinical crown: that portion of the tooth that is normally visible in the oral cavity and exposed to the fluids of the mouth

2. Root- substructure: normally embedded in the alveolar process and may be single branch or root (anterior teeth) or divided into two or three branches (posterior teeth)
   a. Anatomic Root: that portion of the root covered by cementum
   b. Clinical Root: that portion of the tooth that is embedded in the periodontal (surrounding the tooth) tissues
      1. Bifurcation: a forking or division of the root trunk into two branches
      2. Trifurcation: a division of the root trunk into three branches
         i. Root Trunk: the base of the root of a multi-rooted tooth
         ii. Terminal Roots- the roots branching from a root trunk
         iii. Apex- terminal end or tip of the root.
            1. Apical Foramen: opening at or near the apex of the tooth through which vessels and nerves pass.

3. Describing Relationships Between the Crown and Root
   a. Cemento-enamel Junction (CEJ) -the junction of the anatomical root and anatomical crown.
   b. Cervix -the neck of the tooth formed by a line called the cervical line
ii. TOOTH SURFACES

1. All teeth have five surfaces named because of their function or relationship to the midline or an anatomical structure.

   a. **Facial** - the labial and buccal surfaces collectively toward the face

   b. **Labial**: facial surface of anterior teeth; face the lips

   c. **Buccal**: facial surface of posterior teeth; face the buccinator muscle of the cheek

   d. **Lingual**: surfaces of the teeth toward the tongue

   e. **Occlusal**: surfaces of posterior teeth toward the chewing surface, opposite the root

   f. **Incisal**: surfaces of the anterior teeth towards the biting surface, opposite the root

   g. **Proximal**: surfaces of the teeth which face an adjacent tooth in the same arch
      
      i. **Mesial**: closest to the midline; proximal surface facing the midline
      
      ii. **Distal**: more distant from the midline; proximal surface facing away from the midline
      
      iii. **Contact area**: portion of the proximal surface that touches the adjacent tooth

   1. **diastema**: space between teeth if the adjacent surfaces do not touch

iii. DIVISION INTO THIRDS - crown and root surfaces are divided both horizontally and vertically into imaginary thirds to differentiate general areas on the teeth

   1. From a facial or lingual view, a crown may be divided into: three vertical and equal divisions

      a. mesial third
      b. middle third
      c. distal third
2. Three horizontal and equal divisions
   a. incisal (occlusal) third
   b. middle third
   c. cervical (gingival) third

3. From a proximal view, the three divisions are:
   a. facial (labial or buccal) third
   b. middle third
   c. lingual third

4. Root divisions of a horizontal nature are:
   a. apical third
   b. middle third
   c. cervical third

iv. LINE ANGLES-A line formed by the junction of two surfaces (planes) and derives its name from those surfaces that join. Illustrations reprinted from: Wheeler’s Dental Anatomy, Physiology and Occlusion, Ash, Eighth Edition, Saunders, 2003. with permission from Elsevier pg.15.

Line Angles of Anterior Teeth

   a. Mesiolabial
   b. Distolabial
   c. Mesiolingual
   d. Distolingual
   e. Labio-incisal
   f. Linguo-incisal
   g. Mesio-incisal
   h. Disto-incisal

Line Angles of Posterior teeth

   a. Mesiobuccal
   b. Distobuccal
   c. Mesiolingual
   d. Distolingual
   e. Bucco-occlusal
   f. Linguo-occlusal
   g. Mesio-occlusal
   h. Disto-occlusal

**Procedure for combining terms for naming line angles and point angles:**

1. Mesial and distal precede all other terms.
   
   e.g. Mesiobuccal line angle; distolinguoincisal point angle

2. Facial (labial, buccal) and lingual follow mesial and distal AND precede incisal or occlusal in any combination.
   
   e.g. Distolabial line angle; labioincisal line angle; mesiobucco-occlusal point angle
3. **Incisal and occlusal occur last in any combination.**
   e.g. Linguoincisal line angle; disto-occlusal line angle; mesiolinguo-
   occlusal point angle

4. In a two-term combination, the final letters -AL are dropped
   from the first term and replaced by 0. The second term remains
   unchanged.

   e.g. Mesial-lingual angle becomes mesiolingual line angle

5. **In a three-term combination, the final letters -AL are**
   **dropped from each of the first two terms and replaced by**
   **0’s. The third or last term remains unchanged.**
   i. e.g. labial-incisal point angle becomes distolabioincisal
   point angle

vi. **CORONAL MORPHOLOGY**

1. **Cusp**- an elevation or mound on the crown portion of a tooth
   making up a divisional part of the occlusal surface

2. **Tubercle**- a small elevation on some portion of the crown
   produced by an extra formation of enamel. These are deviations
   from the typical from and are rare.

3. **Lobe**- a primary section of formation in the development of the
   crown.

4. **Cingulum** - a lingual lobe of an anterior tooth making up the bulk
   of the cervical 1/3 of the lingual surface. It resembles a “girdle.”
   Cingulum is Latin for girdle.

5. **Mamelon** - any one of three rounded protuberances found on
   the incisal ridges of newly erupted incisor teeth. It is the result
   of lobe development.

6. **Ridge** - any linear elevation on the surface of a tooth and is
   named according to its location.

7. **Triangular Ridge:** those ridges which extend from the tips of
   the cusps of molars and premolars toward the central part of the
   occlusal surface.

   a. They are named for the cusp from which they originate.

8. **Marginal Ridge:** ridges which form the mesial and distal margins
   (edges or borders) of the occlusal surfaces of premolars and
   molars, and the mesial and distal margins of the lingual surfaces of
   the incisors and canines. Therefore, all teeth have a mesial and a
   distal marginal ridge.
9. **Transverse Ridge**: the union of two triangular ridges transversely cross the occlusal surface of a mandibular first premolar.

10. **Oblique Ridge**: the union of two triangular ridges that obliquely cross the occlusal surface of maxillary molars from mesiolingual to distobuccal.

11. **Cusp Ridge**: elevations which extend in a mesial or distal direction from cusp tips. Cusp ridges form the buccal and lingual margins of the occlusal surface of posterior teeth.

12. **Fissure**: a cleft or crevice in a tooth surface thought to result from the imperfect fusing of the enamel of adjoining cusps or lobes.

13. **Fossa**: an irregular depression or concavity on the surface of a tooth.

14. **Lingual Fossa**: a fossa on the lingual surfaces of anterior teeth.

15. **Triangular Fossa**: a fossa located on the occlusal surfaces and formed by three ridge slopes. (i.e., mesial and distal triangular fossae).

16. **Central Fossa**: a fossa located on the middle of the occlusal surfaces of molars only.

17. **Groove**: a shallow linear depression on the surface of the tooth

18. **Developmental Groove**: a shallow groove or line between the lobes of the crown

19. **Supplemental Groove**: a less distinct shallow linear depression on the surface of a tooth. It does not mark the junction of lobes, but is
   a. supplemental or secondary to the developmental grooves.

20. **Buccal & Lingual Grooves**: a developmental groove on the buccal or lingual surface of posterior teeth.

21. **Sulcus**: a long depression or valley in the surface of a tooth between ridges and cusps. A sulcus has a developmental groove at the junction of its inclines.

22. **Pits**: a small pinpoint depression located at the junction of developmental grooves or at terminals of these grooves (e.g., central pit is located in the central fossa).
vii. PULPAL ANATOMY

1. **Pulp Cavity** - entire cavity within the tooth which resembles the external shape of the tooth and houses the nerve and vascular supply of the tooth.

2. **Pulp Chamber** - the pulp cavity within the anatomical crown; may exhibit conical-shaped peaks called pulp horns.

3. **Root Canal** - the portion of the pulp cavity within the anatomical root.

4. **Canal Orifice** - an opening leading from the pulp chamber into the root canal.

viii. SUPPORTING STRUCTURES OF THE TEETH- THE PERIODONTIUM

1. **Cementum** - bone-like substance that covers the root of the tooth.

2. **Periodontal Ligament** - fibrous attachment, which attaches the cementum to the alveolar bone.

3. **Alveolar Bone** - that part of the facial skeleton, which forms around teeth, and crypts of developing teeth.

4. **Gingiva** - outermost soft tissue which covers the alveolar bone and from which the clinical crown erupts.

VI. DENTITION- ERUPTION PATTERNS, PERIODS, DEVELOPMENT

1. **Eruption Sequence Patterns** - may vary from one text to another, just as they vary from one individual to another. Below is listed one suggested sequence of eruption.

2. i. **Primary Dentition**: (Data from Wheeler’s Dental Anatomy and occlusion)

<table>
<thead>
<tr>
<th>Teeth</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>6 months</td>
</tr>
<tr>
<td>A</td>
<td>9 months</td>
</tr>
<tr>
<td>B</td>
<td>12 months</td>
</tr>
</tbody>
</table>
### ii. Permanent Dentition:

<table>
<thead>
<tr>
<th>Tooth</th>
<th>1st Evidence Calcification</th>
<th>Completion of Crown</th>
<th>Eruption (Emergence)</th>
<th>Completion of Root</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Years</td>
<td>Years</td>
<td>Years</td>
</tr>
<tr>
<td>Maxillary</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#8 &amp; #9 (Central Incisors)</td>
<td>3 - 4 months</td>
<td>4 - 5</td>
<td>7-8 years</td>
<td>10</td>
</tr>
<tr>
<td>#7 &amp; #10 (Lateral Incisors)</td>
<td>10 - 12 months</td>
<td>4 - 5</td>
<td>8-9 years</td>
<td>11</td>
</tr>
<tr>
<td>#6 &amp; #11 (Canines)</td>
<td>4 - 5 months</td>
<td>6 - 7</td>
<td>11 - 12 years</td>
<td>13 - 15</td>
</tr>
<tr>
<td>#5 &amp; #12 (1st premolars)</td>
<td>1 ½ - 1 ¾ years</td>
<td>5 - 6</td>
<td>10 - 11</td>
<td>12 - 13</td>
</tr>
<tr>
<td>#4 &amp; #13 (2nd premolars)</td>
<td>2 - 2 ¼ years</td>
<td>6 - 7</td>
<td>10 - 12</td>
<td>12 - 14</td>
</tr>
<tr>
<td>#3 &amp; #14 (1st molars)</td>
<td>At birth</td>
<td>2 ½ - 3</td>
<td>6 - 7</td>
<td>9 - 10</td>
</tr>
<tr>
<td>#2 &amp; #15 (2nd molars)</td>
<td>2 ½ - 3 years</td>
<td>7 - 8</td>
<td>12 - 13</td>
<td>14 - 16</td>
</tr>
<tr>
<td>#1 &amp; #16 (3rd molars)</td>
<td>7 - 9 years</td>
<td>12 - 16</td>
<td>17 - 21</td>
<td>18 - 25</td>
</tr>
<tr>
<td>Mandibular</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#23 &amp; #26 (Lateral Incisors)</td>
<td>3 - 4 months</td>
<td>4 - 5</td>
<td>7-8 years</td>
<td>10</td>
</tr>
<tr>
<td>#22 &amp; #27 (Canines)</td>
<td>4 - 5 months</td>
<td>6 - 7</td>
<td>9 - 10</td>
<td>12 - 14</td>
</tr>
<tr>
<td>#21 &amp; #28 (1st premolars)</td>
<td>1 ¼ - 2 years</td>
<td>5 - 6</td>
<td>10-12 years</td>
<td>12 - 13</td>
</tr>
<tr>
<td>#20 &amp; #29 (2nd premolars)</td>
<td>2 ¼ - 2 ½ years</td>
<td>6 - 7</td>
<td>11-12 years</td>
<td>13 - 14</td>
</tr>
<tr>
<td>#19 &amp; #30 (1st molars)</td>
<td>At birth</td>
<td>2 ½ - 3</td>
<td>6-7 years</td>
<td>9 - 10</td>
</tr>
<tr>
<td>#18 &amp; #31 (2nd molars)</td>
<td>2 ½ - 3 years</td>
<td>7 - 8</td>
<td>11-13 years</td>
<td>14 - 15</td>
</tr>
<tr>
<td>#17 &amp; #32 (3rd molars)</td>
<td>8 – 10 years</td>
<td>12 - 16</td>
<td>17-21 years</td>
<td>18 - 25</td>
</tr>
</tbody>
</table>
3. General Dentition Periods

i. The Primary Dentition Period
   1. Only primary teeth are present
   2. Ends with the eruption or the first permanent molar (usually 1st mandibular molar)
   3. Range - six months to six years of age

ii. The Mixed Dentition Period
   1. both primary and permanent teeth are present
   2. range - six to twelve years of age
   3. ends with exfoliation of the last primary tooth (usually maxillary canine)

iii. The Permanent Dentition
   1. Only permanent teeth are present
   2. Range- twelve years of age through the remainder of life

4. Development- The development of a tooth usually begins with the formation of the crown and continues apically until the apex of the root is formed.

   i. Tooth development initiates in four or more “centers of growth” called lobes.

   ii. As they grow, the lobes unite with one another forming a coalescence of all lobes into the crown. The development of the root follows.

   iii. As these lobes fuse together, they form developmental grooves at their junctions with each other.

   iv. The form and contour of each lobe as well as the arrangement of the lobes determine the individual tooth form.

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