DEVELOPMENT OF OCCLUSION

Occlusion

Occlusion is the way in which the maxillary and mandibular occluding surfaces articulate, in static and in function. To simplify the description of changes, which occur in the dental occlusion during the various stages of the teeth eruption, four stages are assumed:

I. Gum pads stage: 0-6 months.
II. Primary dentition stage: 6 months-6 yrs.
III. Mixed dentition stage: 6 yrs-12 yrs.
IV. Permanent dentition stage: 12 yrs & beyond.

Gum pads stage

This stage extends from birth until the eruption of the first primary tooth, around 6-7 months of age. The newly born baby mouth is usually devoid of teeth. The arches show certain elevations (10 in upper arch and 10 in lower arch) and grooves that outline the portions of developing deciduous teeth. The upper arch is a horseshoe shape, while the lower is a U shape. The upper arch usually overlaps the lower arch in the anteroposterior and transverse direction; in other words, the upper arch is wider than the lower, and at the same time, the lower arch is in a retrognathic position relative to the upper, so it will give an appearance of CL. II pattern.

The anterior segment of upper and lower gum pads do not approximate each other with a space created between them, while the posterior segment occlude with each other at the molar region. An infantile anterior open bite is seen at this time. The tongue is positioned in this space during suckling.
In this manner, the opposing surfaces of the pads provide for a more efficient way of squeezing milk during breastfeeding. This infantile open bite is transient and get self-corrected with eruption of primary incisors. Occasionally few infants are born with one/two erupted teeth, usually at mandibular incisor region; such teeth are called as *Natal teeth*. These teeth look like the deciduous teeth but usually with very short or without root. Natal tooth may be a supernumerary one and it’s extraction is not necessary unless it causes a painful situation for a breastfeeding-mother.

**Primary dentition stage**

The primary dentition stage extends from the time of eruption of the primary teeth until the eruption of the first permanent tooth around 6 years of age, table (1). By 3 years of age, the eruption of deciduous teeth is usually completed; at that time the occlusion is established and dental arches remain relatively constant with no significant changes up to 6 years of age. The usual eruption sequence of deciduous teeth is A-B-D-C-E.

<table>
<thead>
<tr>
<th>Primary tooth</th>
<th>Calcification begins (IU weeks)</th>
<th>Eruption (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central incisors</td>
<td>12-16</td>
<td>6-7</td>
</tr>
<tr>
<td>Lateral incisors</td>
<td>13-16</td>
<td>7-8</td>
</tr>
<tr>
<td>Canines</td>
<td>15-18</td>
<td>18-20</td>
</tr>
<tr>
<td>1st molars</td>
<td>14-17</td>
<td>12-15</td>
</tr>
<tr>
<td>2nd molars</td>
<td>16-23</td>
<td>24-36</td>
</tr>
</tbody>
</table>

There are some characteristics can be seen in the primary dentition stage:

- **Incisors relationship:** When these teeth erupt in the mouth, they will erupt in a more vertical position than the permanent incisors. i.e. the upper long axes of the central incisors coincide with the long axes of the lower incisors, and usually there is slightly increase in the overbite (deepbite). The lower incisors in this condition will contact the cingulum area of the upper incisors in centric occlusion. Excessive overjet is often
observed in deciduous dentition, which usually overcome later by forward growth of mandible.

- **Interdental spaces**: The deciduous dentition usually erupt in spaced condition. The interdental spaces present between deciduous teeth are often referred to as *physiological or developmental* spaces, which include: *Generalized spacings* that occur in almost 75% of the individuals in the primary dentition stage, in both dental arches. It thought that help in accommodation of larger successors teeth.

In addition to the generalized spacings, localized spacings are often present and are referred to as *primate/anthropoid spaces* (Most subhuman primates have these spaces throughout life, thus the name).

The primate spaces are located, mesial to the upper canine and distal to the lower canine, into which the opposing canine interdigitates. These spaces are normally present from the time the teeth erupt and used for early mesial shift. Physiological or developmental spaces between the incisors are often present from the beginning, but become somewhat larger as the child grows and the alveolar processes expand.

The arrangement of the primary incisor teeth with gaps between them may not be very pretty, but it is normal. Adult appearing smile in a primary dentition child is an abnormal, not a normal finding—the spaces are necessary for proper alignment of the permanent incisors.

- **Molar relationship**: the Anteroposterior molar relationship in the primary dentition stage is described in terms of the relationship between terminal planes. The terminal planes are the distal surfaces of the maxillary and mandibular second primary molars (E). Essentially the two terminal
planes can be related to each other in one of three ways:

A. *Flush terminal plane* relationship, both terminal planes of maxillary and mandibular 2nd molars are at the same level anteroposteriorly. It is of significance to note that the lower E has a greater mesiodistal width than that of the upper E. this difference makes the distal surface of both upper and lower Es to be at same vertical plane. Flush terminal plane is considered the ideal molar relationship in primary dentition.

B. *Distal step* relationship, the mandibular molar terminal plane is relatively distal to the maxillary molar terminal plane. Lastly,

C. *Mesial step* relationship, the mandibular molar terminal plane is relatively mesial to the maxillary molar terminal plane.

Determining the terminal plane relationships, in the primary and mixed dentition stages, is of great importance to the clinician because the erupting first permanent molars are guided by the distal surfaces of the second primary molars as they erupt into occlusion.

When the deciduous second molars are in a flush terminal plane, the permanent first molar erupts initially into a cusp-to-cusp relationship. In distal step occlusion, the permanent first molar will erupt in a Class II relation when they erupt. While in mesial step relationship, the permanent first molar will erupt in Class I relation in early mixed dentition.
Changes can occur in deciduous dentition:

- By the effect of eruptive force of the permanent teeth, the resorption occurs in the root of the deciduous teeth. Concurrently, at age of 5-6 years the occlusal force will be more, so these occlusal forces together with root resorption will increase the mobility of the deciduous, which facilitate the process of normal shedding.

- Spaces try to increase with age due to growth of the jaw and attrition. Since the shape of deciduous teeth is triangular, and these teeth will be subjected to a great amount of wear at incisal edges and at interproximal surfaces by mastication, a more spaces are produced between them.