**Fixed-Detachable or Overdentures**

**Concept 1**

The Minimum Distance between the centers of implants

\[ R1 + R2 + 2 \text{mm} \]

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**Crown and Bridge Style Restorations**

**Concept 2**

The Ideal Distance between the centers of implants

\[ \frac{\text{Width of tooth 1}}{2} + \frac{\text{Width of tooth 2}}{2} \]

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**Concept 3**

Implant placement next to a natural tooth Ideal Distance

\[ \frac{\text{Width of replaced tooth}}{2} \text{ from proximal of natural tooth} \]

---

**Concept 4**

Implant placement next to a natural tooth Safe Distance

\[ \text{distance from proximal of natural tooth} = 2 \text{ mm} + \text{Radius of implant} \]

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Drs. Ken Hebel and Reena Gajjar
INSTRUCTIONS FOR USE

The recommendations in this handout are meant as a guide to implant selection and placement. Every dentist must decide if individual variation from the average exists in the size of the patient's teeth and make appropriate allowances. Also, these recommendations are not meant to replace a diagnostic wax-up if indicated.

SIZE SELECTION:
Recommendations are made to relate various sized implants to the size of the roots of the teeth that they replace as indicated in Tables 1 and 2. The size of the implants in the tables represent their diameter at the prosthetic interface.

FIXED DETACHABLE OR OVERDENTURES (Concept 1):
Formula 1: \( R1 + R2 + 2\text{mm} \) represents the minimal spacing required between the centers of implants for fixed detachable or overdenture prostheses. If the practitioner wishes a greater allowance for bone or tissue health, 3mm can be substituted in the formula. The minimum spacing allows for tissue health and impressions of implants that are slightly misaligned. If attachments are to be placed between implants, then more than 2mm is required. If you feel 3mm is ideal, place 3mm in the formula. For fixed-detachables or overdenture prostheses, the implants do not need to be placed in positions relating to the roots of missing teeth. Their primary role is to provide support and they are covered by the patient's lips or the flange of a prosthesis.

IMPLANT PLACEMENT FOR CROWN AND BRIDGE TYPE RESTORATIONS:

Vertical Placement:
3-4mm below the gingiva if an aesthetic emergence profile is desired.

Buccal Lingual:
For single tooth implants, the buccal aspect of the implant should not extend past a line drawn between the buccal aspect of the adjacent teeth.

MULTIPLE IMPLANTS SPACED AS SUPPORT FOR CROWN AND BRIDGE STYLE RESTORATION (Concept 2):
Using the sizes of natural teeth as a guide, the spacing from the centre of the one implant to the next can be determined from the formula:

\[
\frac{\text{width tooth 1}}{2} + \frac{\text{width tooth 2}}{2}
\]

This will space the implants similar to the roots they are replacing providing correct spacing for aesthetics when viewed from the buccal. If contralateral teeth exist in the patient's mouth, they should be measured and placed in the formulas. Otherwise, the anatomic averages from the tables should be used. All of the calculations for anatomic spacing based on the average size of teeth and using the formula are presented in Table 3.

IMPLANT POSITIONING NEXT TO A TOOTH (Concept 3, Ideal Distance):
The width of the tooth to be replaced divided by 2 gives the distance away from the existing natural tooth to the center of the implant. The tooth size to be used in the formula can be taken from the tables provided in this handout or as a first choice by measuring the complementary tooth on the contralateral side of the patient's mouth if the tooth is present. This provides for individual variation as found from patient to patient. The roots of some teeth are tipped or dilacerated and some teeth have narrow crowns. The use of the formula, the width of the tooth divided by 2, may place the edge of the implant less than 2mm from the adjacent tooth in some situations.

IMPLANT POSITIONING NEXT TO A TOOTH (Concept 4, Safe Distance):
If the practitioner wishes a larger zone of safety for small teeth in some situations, they can use the formula \( R + 2\text{mm} \), \( R \) equaling for the radius of the implant. The centre of the implant will not be anatomically correct, however, there will be a constant 2mm zone of safety.

IMPLANTS PLACED BETWEEN TWO NATURAL TEETH
The implant recommendations in the tables for specific teeth are valid for most single tooth replacement situations. Some teeth however are small mesio-distal and as such the implant will not fit with sufficient bone between the implants and adjacent teeth.

The maxillary lateral incisor is one such example. A smaller implant, 3.25mm or 3.5mm, may be more appropriate even though a 4.1mm prosthetic Table more approximates the actual root size.
Implant Selection and Positioning Based Upon Anatomic Averages of Teeth

**Table 1 - Maxillary Arch**
Mesial-Distal Crown and Root Diameter of Maxillary Teeth and Implant Recommendations

<table>
<thead>
<tr>
<th></th>
<th>Mesial-Distal Crown</th>
<th>Mesial-Distal CEJ</th>
<th>Mesial-Distal CEJ - 2mm</th>
<th>Recommended Implant*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>8.6</td>
<td>6.4</td>
<td>5.5</td>
<td>3.75, 4.0, <strong>4.3</strong>, 5.0</td>
</tr>
<tr>
<td>Lateral</td>
<td>6.6</td>
<td>4.7</td>
<td>4.3</td>
<td>3.0, 3.3, <strong>3.5</strong>, 3.75, 4.0</td>
</tr>
<tr>
<td>Cuspid</td>
<td>7.6</td>
<td>5.6</td>
<td>4.6</td>
<td>3.75, 4.0, <strong>4.3</strong></td>
</tr>
<tr>
<td>1st Bicuspid</td>
<td>7.1</td>
<td>4.8</td>
<td>4.2</td>
<td>3.75, 4.0, <strong>4.3</strong></td>
</tr>
<tr>
<td>2nd Bicuspid</td>
<td>6.6</td>
<td>4.7</td>
<td>4.1</td>
<td>3.75, 4.0, <strong>4.3</strong></td>
</tr>
<tr>
<td>1st Molar</td>
<td>10.4</td>
<td>7.9</td>
<td>7.0</td>
<td>3.75, 4.0, 4.3, <strong>5.0</strong></td>
</tr>
<tr>
<td>2nd Molar</td>
<td>9.8</td>
<td>7.6</td>
<td>7.0</td>
<td>3.75, 4.0, 4.3, <strong>5.0</strong></td>
</tr>
</tbody>
</table>

* Denotes diameter of prosthetic table
* Numbers marked in red are the recommended Nobel Replace Implants

**Table 2 - Mandibular Arch**
Mesial-Distal Crown and Root Diameter of Mandibular Teeth and Implant Recommendations

<table>
<thead>
<tr>
<th></th>
<th>Mesial-Distal Crown</th>
<th>Mesial-Distal CEJ</th>
<th>Mesial-Distal CEJ - 2mm</th>
<th>Recommended Implant*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>5.3</td>
<td>3.5</td>
<td>3.5</td>
<td>3.0, 3.3, <strong>3.5</strong></td>
</tr>
<tr>
<td>Lateral</td>
<td>5.7</td>
<td>3.8</td>
<td>3.5</td>
<td>3.0, 3.3, <strong>3.5</strong></td>
</tr>
<tr>
<td>Cuspid</td>
<td>6.8</td>
<td>5.2</td>
<td>4.1</td>
<td>3.75, 4.0, <strong>4.3</strong></td>
</tr>
<tr>
<td>1st Bicuspid</td>
<td>7.0</td>
<td>4.8</td>
<td>4.5</td>
<td>3.75, 4.0, <strong>4.3</strong></td>
</tr>
<tr>
<td>2nd Bicuspid</td>
<td>7.1</td>
<td>5.0</td>
<td>4.7</td>
<td>3.75, 4.0, <strong>4.3</strong></td>
</tr>
<tr>
<td>1st Molar</td>
<td>11.4</td>
<td>9.2</td>
<td>9.0</td>
<td>3.75, 4.0, 4.3, <strong>5.0</strong></td>
</tr>
<tr>
<td>2nd Molar</td>
<td>10.8</td>
<td>9.1</td>
<td>8.5</td>
<td>3.75, 4.0, 4.3, <strong>5.0</strong></td>
</tr>
</tbody>
</table>

**Table 3**
Standard Average Distances Between The Centers of Implants as a Guide for Implant Placement

<table>
<thead>
<tr>
<th></th>
<th>Maxillary</th>
<th>Mandibular</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central - Central</td>
<td>8.6</td>
<td>5.3</td>
</tr>
<tr>
<td>Central - Lateral</td>
<td>7.6</td>
<td>5.5</td>
</tr>
<tr>
<td>Lateral - Cuspid</td>
<td>7.1</td>
<td>6.2</td>
</tr>
<tr>
<td>Cuspid - 1st Bicuspid</td>
<td>7.4</td>
<td>6.9</td>
</tr>
<tr>
<td>1st Bicuspid - 2nd Bicuspid</td>
<td>6.9</td>
<td>7.1</td>
</tr>
<tr>
<td>2nd Bicuspid - 1st Molar</td>
<td>8.5</td>
<td>9.3</td>
</tr>
<tr>
<td>1st Molar - 2nd Molar</td>
<td>10.1</td>
<td>11.1</td>
</tr>
</tbody>
</table>

Mandibular Arch
Implant Selection and Positioning for Crown and Bridge

Maxillary Arch
Implant Selection and Positioning for Crown and Bridge, Milled Bars, and Fixed Detachable

Implants placed in the following positions:
Central, Canine, 2nd Bicuspid and 1st Molar

Implants placed in the following positions:
Canine, 1st Premolar, 2nd Premolar and 1st Molar
Esthetic Guidelines

Natural + Natural

- Free gingival margin of the centrals at same height
- The papilla fills almost 100% of the time


Implant + Natural

- Free gingival margin for the lateral at or below a line from the central to the canine
- The papilla fills almost 100% of the time


Implant + Implant

- W/L = 75% to 80%
- The papilla was present


The distal of central and lateral are more curved to create larger distal embrasures and a more youthful appearance


The distal of central and lateral are more curved to create larger distal embrasures and a more youthful appearance