Mandibular Major Connectors

Special Structural Requirements

- Unlike maxillary major connectors, the mandibular major connectors often need relief between the rigid metal surfaces and the underlying soft tissues. The Distal extension removable partial denture tends to rotate during function so a moderate amount of relief may be needed. Relief prevents the margins of the major connector from lacerating the sensitive lingual mucosa as a result of this movement.
- Bead lines are not used in combination with mandibular major connectors. Contact with the mucosa of the mandibular arch may cause irritation, ulceration, and patient discomfort.

Types of Mandibular major connectors

The following is a list of the different types of mandibular major connectors:

1. Lingual bar
2. Lingual plate (Linguoplate)
3. Double lingual bar (Lingual bar with cingulum bar)
4. Labial bar

1. Lingual Bar

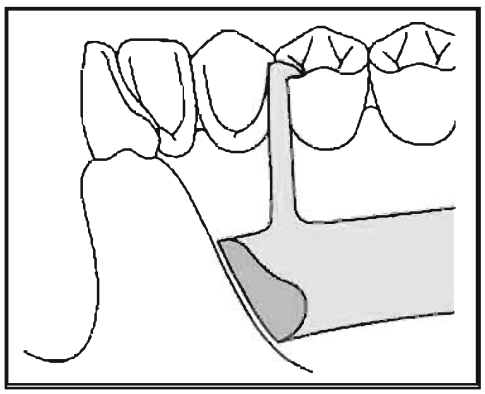
The lingual bar is perhaps the most frequently used mandibular major connector (Fig. 1). Because of its simplicity in design and construction, a lingual bar should be used unless one of the other connectors offers a definite advantage. A lingual bar is indicated for all tooth-supported removable partial dentures unless there is insufficient space between the marginal gingivae and the floor of the mouth.

Figure 1: lingual bar major connector.

The basic form of a mandibular major connector is a half-pear shape, located above moving tissue but as far below the gingival tissue as possible (Fig. 2). The bar should not have sharp margins that irritate the tongue. The superior border should be tapered toward the gingival tissue and the greatest bulk should be at the inferior border which should be slightly rounded, resulting in a contour that has a half-pear shape. A rounded border will not impinge on the lingual tissue when the denture bases rotate inferiorly under occlusal loads.

The inferior border of a lingual mandibular major connector must be located free from the floor of the mouth.

Figure 2: Sagittal section showing half-pear shape of lingual bar.



Indication for use:

The lingual bar should be used for mandibular RPD where sufficient space exists, more than 8mm between the slightly elevated alveolar lingual sulcus and the lingual gingival tissue.

Methods that may be used to determine the relative height of the floor of the mouth:

At least two clinically acceptable methods may be used to determine the relative height of the floor of the mouth and locate the inferior border of a lingual mandibular major connector. 1) Measure the height of the floor of the mouth in relation to the lingual gingival margins of adjacent teeth with a periodontal probe, as in figure 3. When these measurements are taken, the tip of the patient's tongue should just lightly touch the vermilion border of the upper lip. Recording of these measurements permits their transfer to both diagnostic and master casts. 2) Use an individualized impression tray for which lingual borders are 3 mm short of the elevated floor of the mouth, and then use an impression material that will permit the impression to be accurately molded as the patient licks the lips.

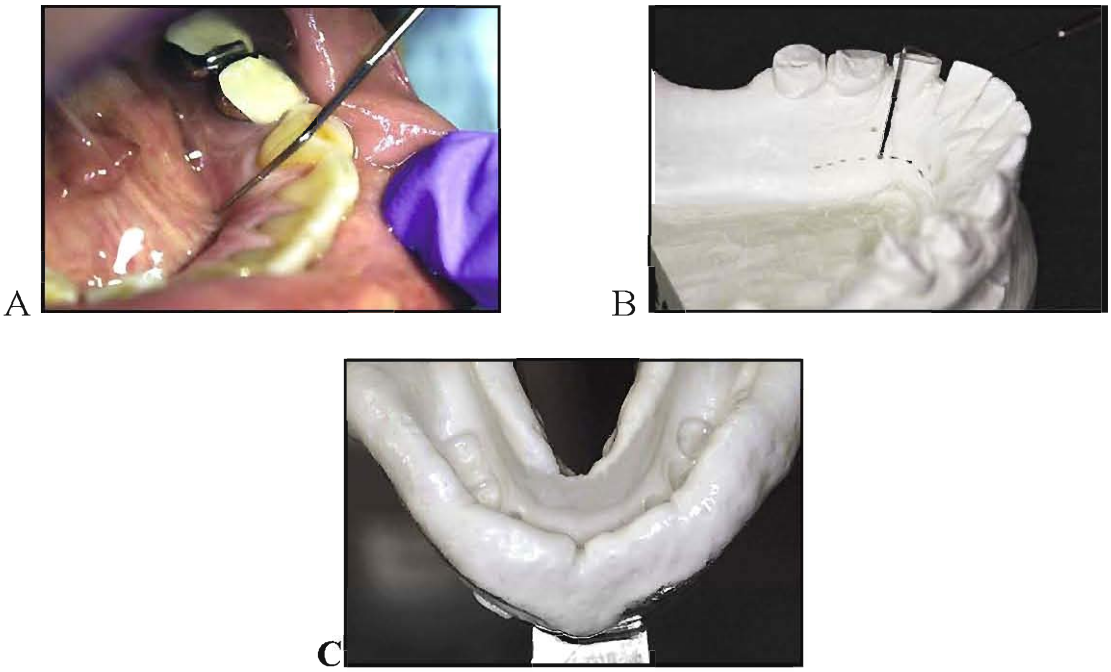


Figure 3: A, Height of floor of the mouth (tongue elevated) in relation to lingual gingival sulci measured with a periodontal probe. **B** Recorded measurements are transferred to a diagnostic cast and then to a master cast after mouth preparations are completed. **C** Impression made with functional movement of the tongue to demonstrate maximum shortening of the floor of the mouth.

2. Linguoplate (lingual plate)

The structure of a lingual plate is basically that of a half pear shaped lingual bar with a thin, solid piece of metal extending from its superior border (Fig.4). This thin projection of metal is carried onto the lingual surfaces of the teeth and presents a scalloped appearance.

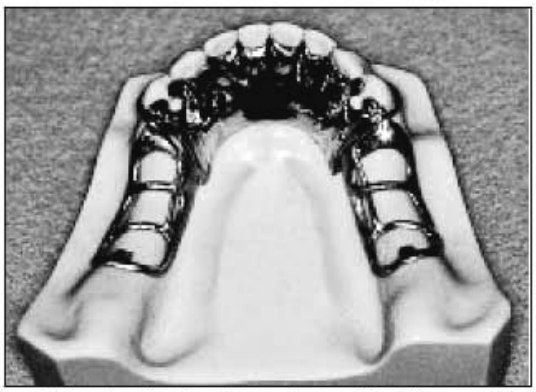


Figure 4: Lingual plate major connector.

The inferior border of a lingual plate should be positioned as low in the floor of the mouth as possible, but should not interfere with the functional movements of the tongue and soft tissues. The superior border of a lingual plate must be contoured to intimately contact the lingual surfaces of the teeth above the cingula (Fig. 5).

Figure 5: Sagittal section through the linguoplate demonstrating a basic half-pear–shaped inferior border with the metallic apron extending superiorly.

In addition, the lingual plate must completely close the interproximal spaces to the level of the contact points. Sealing these spaces from the lingual aspect prevents food from being packed into these areas. As a result of this contouring, the lingual plate should display a scalloped appearance (Fig.6).

Figure 6: The superior border of a lingual plate major connector should display a scalloped appearance.

The indications for the use of a linguoplate may be listed as follows:

1. When the lingual frenum is high or the space available for a lingual bar is limited (less than 8 mm).
2. In Class I situations in which the residual ridges have undergone excessive vertical resorption.
3. For stabilizing periodontally weakened teeth, splinting with a linguoplate can be of some value when used with definite rests on sound adjacent teeth.
4. When the future replacement of one or more incisor teeth will be facilitated by the addition of retention loops to an existing linguoplate.
5. In the presence of mandibular tori.

The lingual plate has a main disadvantage, because of its extensive coverage, which may contribute to decalcification of enamel surfaces and irritation of the gingival tissues in patients with poor oral hygiene.

The linguoplate does not in itself serve as an indirect retainer. When indirect retention is required, definite rests must be provided for this purpose. Both the linguoplate and the cingulum bar ideally should have a terminal rest at each end, regardless of the need for indirect retention. However, when indirect retainers are necessary, these rests may also serve as terminal rests for the linguoplate.

Sometimes a linguoplate is indicated as the major connector of choice even though the anterior teeth are quite spaced and the patient strenuously objects to metal showing through the spaces. The linguoplate can then be constructed so that the metal will not show through the spaced anterior teeth. This is a modification of the linguoplate and is named "***interrupted linguoplate***" *or* **"step backs"**. To accomplish this, the superior border of a lingual plate should cover the cingulum of the individual tooth. The border should extend toward the contact area of the tooth and then turn apically, following the line angle to the level of the gingiva. The rigidity of the major connector is not greatly altered. However, such a design may be as much of a food trap as the continuous bar type of major connector (Fig.7).

Figure 7: Interrupted linguoplate or "step backs".

3. Double lingual bar (Lingual bar with cingulum bar or Kennedy bar).

The connector consists of a lingual bar plus a secondary bar resting above the cingula of the anterior teeth. The upper and lower components of a double lingual bar are not joined by a continuous sheet of metal. As a result, the lingual surfaces of the teeth and the interproximal soft tissues are largely exposed (Fig. 8).

The lower component of this major connector should display the same structural characteristics as does a lingual bar. The upper bar should be half oval in cross section. This bar should be 2 to 3 mm in height and 1 mm thick. The upper bar should not run straight across the lingual surfaces of the teeth but should present a scalloped appearance. The two bars should be joined by rigid minor connectors at each end. Rests should be placed at each end of the upper bar and should be located no farther posterior than the mesial fossae of the first premolars. Placement of these rests is intended to prevent the bar from moving inferiorly and causing orthodontic movement of the remaining anterior teeth.

The secondary bar supposedly acts as an indirect retainer and performs a role in the horizontal stabilization of periodontally involved teeth. The performance of these functions is questionable. Additionally, this major connector can create a food trap between the two bars. **The use of this type of connector is not encouraged.**

Indications for Use:

1. When a linguoplate is indicated but the axial alignment of anterior teeth is such that excessive blockout of interproximal undercuts would be required.

2. When wide diastemata exist between mandibular anterior teeth and a linguoplate would objectionably display metal in a frontal view.

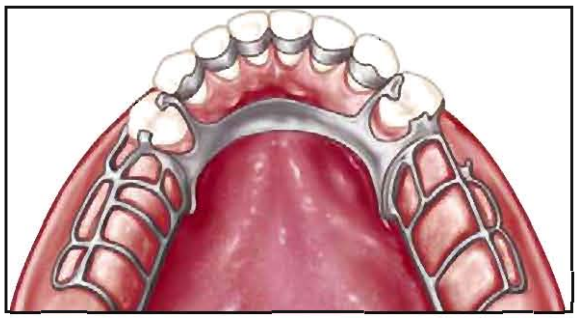


Figure 8: Lingual bar & cingulum bar major connector

The disadvantage of this type of major connector is the tendency of the upper bar to trap debris especially with crowding of the mandibular anterior teeth. This can be minimized by accurate impressions and good adaptation of the upper bar to the anterior teeth. Also, the double lingual bar may irritate the tongue and annoy the patient due to the multiple borders and the thickness of the upper bar. Thus, a modified lingual plate major connector may be preferred.

4. Labial Bar

As its name suggests, a labial bar runs across the mucosa on the facial surface of the mandibular arch (Fig. 9). Like other mandibular major connectors, a labial bar displays a half-pear shape when viewed in cross section. But, because of its placement on the external curvature of the mandible, a labial bar is longer than a corresponding lingual bar, double lingual bar or lingual plate. To ensure rigidity, the height and thickness of a labial bar must be greater than those described for a lingual bar.

In only few situations when the extreme lingual inclination of the remaining lower premolar and incisor teeth prevent the use of a lingual bar major connector. With the use of conservative mouth preparations in the form of recontouring and block out, a lingual major connector can almost always be used. Lingually inclined teeth sometimes may have to be reshaped by means of crowns. Although the use of a labial major connector may be necessary in rare instances, this should be avoided by resorting to necessary mouth preparations rather than by accepting a condition that is otherwise correctable.

Figure 9: Labial Bar

The same applies to the use of a labial bar when a mandibular torus interferes with placement of a lingual bar. Unless surgery is definitely contraindicated, interfering mandibular tori should be removed so that the use of a labial bar connector may be avoided.

Indications for Use:

1. When lingual inclinations of remaining mandibular premolar and incisor teeth cannot be corrected, preventing placement of a conventional lingual bar connector.
2. When severe lingual tori cannot be removed and prevent the use of a lingual bar or lingual plate major connector.
3. When severe and abrupt lingual tissue undercuts make it impractical to use a lingual bar or a lingual plate major connector.

Characteristics and Location:

1. Half-pear shaped with bulkiest portion inferiorly located on the labial and buccal aspects of the mandible.
2. Superior border tapered to soft tissue.
3. Superior border located at least 4 mm inferior to labial and buccal gingival margins and farther if possible.
4. Inferior border located in the labial-buccal vestibule at the junction of attached (immobile) and unattached (mobile) mucosa.

A labial bar can be used in association with the linguoplate as a modification for the linguoplate. This concept is incorporated in the Swing-Lock design, which consists of a labial or buccal bar that is

connected to the linguoplate major connector by a hinge at one end and a latch at the other end, as shown in figure 10.

Support is provided by multiple rests on the remaining natural teeth. Stabilization and reciprocation are provided by a linguoplate that contacts the remaining teeth and are supplemented by the labial bar with its retentive struts. Retention is provided by a bar type of retentive clasp with arms projecting from the labial or buccal bar and contacting the infra-bulge areas on the labial surfaces of the teeth.

Figure 10: The Swing-Lock removable partial

Use of the Swing-Lock concept would seem primarily indicated when the following conditions are present: 1) Missing key abutments, 2) Unfavorable tooth contours, 3) Unfavorable soft tissue contours, & 4) Teeth with questionable prognoses.

Contraindications to the use of this hinged labial bar concept are poor oral hygiene or lack of motivation for plaque control by the patient, the presence of a shallow buccal or labial vestibule, & a high frenal attachment.

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