

PROSTHODONTICS

Lec: 4

المرحلة الرابعة

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Factors affecting support in Free end extension RPD:-

In a tooth- supported removable partial denture, a metal base or the framework that supports an acrylic resin base is connected to and is part of a rigid framework that permits the direct transfer of occlusal forces to the abutment teeth through the occlusal rests. Even though the denture base of a tooth-supported (Kennedy Class III) Partial denture supports the supplied teeth; the residual ridge beneath the base is not called on to aid in the support of the removable partial denture. Regardless of the length of the edentulous spans, if the framework is rigid, the abutment teeth are sound enough to carry the additional load, and the occlusal rests are properly formed, support comes entirely from the abutment teeth at either end of that span.

Distal Extension Removable Partial Denture:-

The distal extension removable Partial denture does not have the advantage of total tooth support, because one or more bases are extension covering the residual ridge distal to the last abutment. It therefore is dependent on the residual ridge for a portion of its support.

Factors influencing the support of a distal extension base:

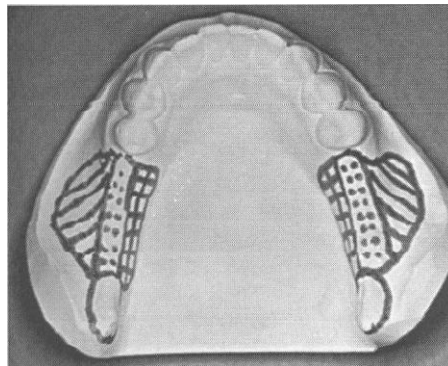
Support from the residual ridge becomes more important as the distance from the last abutment increase and will depend on the following several factors:-

- 1) Contour and quality of the residual ridge.**
- 2) Extent of residual ridge coverage by the denture base.**
- 3) Type and accuracy of the impression registration.**
- 4) Accuracy of the fit of the denture base.**
- 5) Design of the Partial denture framework.**
- 6) Total occlusal load applied.**

1) Contour and quality of the residual ridge:-

The ideal residual ridge to support a denture base would consist of cortical bone that covers relatively dense cancellous bone, a broad flat crest with high vertical slopes, and covered by firm, dense, fibrous connective tissue. Such a residual ridge would optimally support vertical and horizontal stress placed on it by denture bases. Unfortunately this idea is seldom encountered. Easily displaceable tissue will not adequately support a denture base, and tissues that are interposed between a sharp bony residual ridge and a denture base will not remain in a healthy state. Not only must the nature the bone of the residual ridge be considered in developing optima support for the denture base, but also its positional relation to the direction of forces that will be placed on it.

The crest of the bony mandibular residual ridge is most often cancellous in nature. Because lining mucosa restricts both the buccal and lingual mucosa adjacent to teeth in mandible, loss of firm mucosa overlying the residual ridge is common following tooth extraction in the posterior mandible. Pressures placed on tissue overlying the crest of the mandibular residual ridge usually results in irritation of these tissues. Therefore the crest of the mandibular residual ridge cannot be a primary stress-bearing region. The buccal shelf region (bounded by the external oblique line and crest of the alveolar ridge) seen to be better suited for a primary stress-bearing role because it is covered by relatively firm, dense, fibrous connective tissue supported by cortical bone. In most instances this region bears more of a horizontal relationship to vertical forces than do other regions of the residual ridge. The slopes of the residual ridge then would become the primary stress-bearing regions to resist horizontal and off-vertical forces. (Figure-A-)

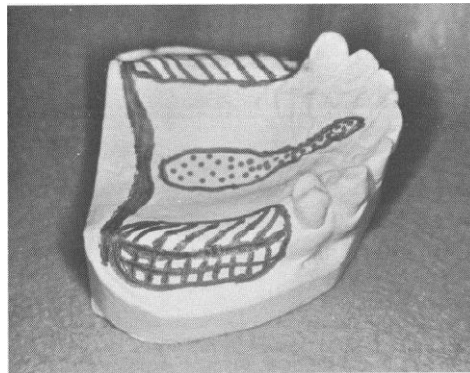


(Figure -A-)

Dotted portion outlines crest of residual ridge, which should be recorded in its anatomic form in impression procedures. Similarly retro molar pads should not be displaced by impression. Buccal shelf regions (diagonal lines) serve as primary support and therefore selected additional pressures may be placed on these regions for vertical support of

denture base. Lingual slopes of residual ridge (cross hatched) may furnish some vertical support to restoration; however, these regions principally resist horizontal rotational tendencies of denture base and should be recorded by impression in undisplaced form.

The immediate crest of the bone of the maxillary residual ridge may consist primarily of cancellous bone. Oral tissues that overlie the maxillary residual alveolar bone are usually of firm dense nature. The crestal area of the residual ridge will become the primary stress-bearing area to vertically directed forces. Some resistance to these forces may be obtained by the immediate buccal and lingual slopes of the ridge. Palatal tissues between the medial palatal raphe and the lingual slope of the edentulous ridge posteriorly are ready displaceable and cannot be considered as primary stress-bearing sites. (Figure -B-)



(Figure -B-)

Crest of maxillary residual ridge (diagonal lines) is primary supporting region for maxillary distal extension denture base. Buccal and palatal slopes may furnish limited vertical support to denture base. It seems logical that their primary role is to counteract horizontal rotational tendencies of denture base. Dotted portion outlines incisive papilla and median palatal raphe. Relief must be provided for these regions, especially if tissues covering palatal raphe are less displaceable than those covering crest of residual ridge.

2) Extent of residual ridge coverage by the denture base:-

The broader the coverage, the greater the distribution of the load which result in less load per unit area. The denture base should cover as much of the residual ridge as possible and be extended the maximum amount within the physiologic tolerance of the limiting border structures or tissues. In a series of experiments, kaiores has shown that ‘’ maximum coverage of denture-bearing areas with large, wide denture bases is of the utmost importance in with standing both vertical and horizontal stresses’’.

3) Type and accuracy of the impression registration:-

The residual ridge may be said to have tow forms: the anatomic and the functional form. The anatomic form is the surface contour of the ridge when it is not supporting an occlusal load. It is this resting form that is recorded by soft impression material such as plaster of Paris or a metallic oxide impression paste if the entire impression tray is uniformly relieved. Mclean and other recognized the need to record the tissues that support a distal extension partial denture base in their functional form or supporting state, this was called a functional impression because it recorded the ridge relation under simulated function. On the other hand, those who use the static ridge form or ridge relationship for the partial denture should seriously consider the need for some mechanical stress breaker to avoid the possible cantilever action of the distal extension base against the abutment teeth. The use of a properly prepared, individual impression tray can be a means to record the primary stress-bearing areas in a functional form and the non-stress-bearing as in an anatomic form.

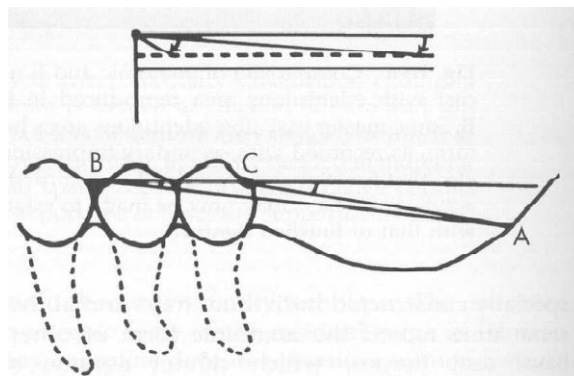
4) Accuracy of the fit of the denture base:-

Support of the distal extension base is enhanced by intimacy of contact of the tissue surface of the base and the tissues that cover the residual ridge. The tissue surface of the denture base must optimally represent a true negative of the basal/ seat regions of the master cast.

5) Design of the Partial denture framework:-

Some rotation movement of a distal extension base around posteriorly placed direct retainers is inevitable under function loading, the greatest movement takes place at the most posterior extent of the denture base, the retromolar pad region of the mandibular residual ridge and the tuberosity region of the maxillary residual ridge therefore are subjected to the greatest movement of the denture base. As the rotational axis (fulcrum line) of the denture is moved anteriorly, more of the residual ridge is used to support the denture base, thereby distributing stresses over a proportionally greater area.

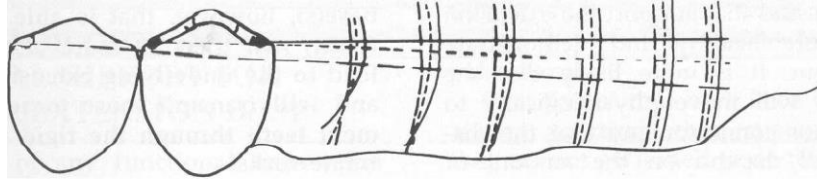
(Figure-C-)



(Figure -C-)

Acute dip of short denture base is compared with that of long one in upper figure. In lower figure, when point rotation is changed from C to B by losing more teeth. It can be seen that proportionally greater area of residual ridge is used to support denture base than

occurs when fulcrum line passes through C. Amount of movement is directly related to quality of tissue support. Lines AC represent length of denture base.



(Figure –D-)

(Figure –D-) If rotation of distal extension base occurs around nearest rest, as rest moved anteriorly, more of residual ridge will be used to resist rotation. Compare vertical arcs of long-dash broken line with arcs of solid line

6) Total occlusal load applied:-

The total occlusal load applied is influenced by the number of supplied teeth, the width of their occlusal surfaces, and their occlusal efficiency. It was conducted that “the reduction of the size of the occlusal table reduces the vertical and the horizontal forces that act on the partial dentures and lessens the stress on the abutment teeth and supporting tissues”.