

Equipoise removable partial dentures

IN THE SECOND OF
HIS ARTICLES ON THE
EQUIPOISE SYSTEM
FOR PARTIAL
DENTURE DESIGN,
JEROME GOODMAN
DISCUSSES WHY THIS
TREATMENT IS
SUITABLE FOR A WIDE
RANGE OF PATIENTS

When designing a removable partial denture, there are absolutely no contraindications for using the Equipoise system. If only a single tooth is missing (Figure 1a) or if there is only one tooth present (Figure 1b), then a properly designed Equipoise removable prosthesis can be fabricated (Goodman, 1989).

A correctly designed removable partial denture will always direct the forces of mastication along the long axis of the abutment teeth. During this function, no lever action should exist. All retentive units must disengage the undercuts so only the prepared rest is in contact with the abutment teeth. Retention is only necessary when dislodging forces are present (Goodman & Heil, 1948) (Figure 2).

PLANNING AND DESIGNING WITH EQUIPOISE

To begin, it is essential that study casts are made and articulated, and from these we learn the following (Figure 3):
Occlusion - before the removable partial denture is designed and fabricated, the occlusion must be corrected and balanced. Extruded teeth should

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Figure 1a: A single missing tooth removable partial denture



Figure 1b: Removable partial denture retained with only one tooth present

be adjusted as much as possible. Study casts should be shown to the patient and it should be explained to them, with the aid of the cast, why one must adjust the opposing teeth (Figure 4). Once informed, it is unlikely that the patient will raise any objections.

Retromolar pad area and tuberosity - all free end removable partial dentures must include these areas. If the bite has collapsed or the tuberosity

is elongated, the dentist must use the removable partial denture to restore the patient's vertical dimension, so that these areas can be included in the prosthesis (Goodman, 1975) (Figure 5).

Tori - bony growths on the mandible lingual area and the maxilla palatal area can change the design of the major connectors (Goodman, 1975b) (Figures 6a and 6b). The patient must be informed since the

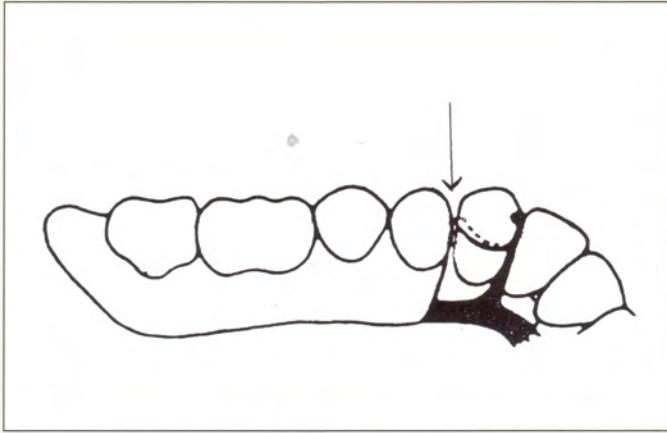


Figure 2: Retentive unit disengages the undercut during function

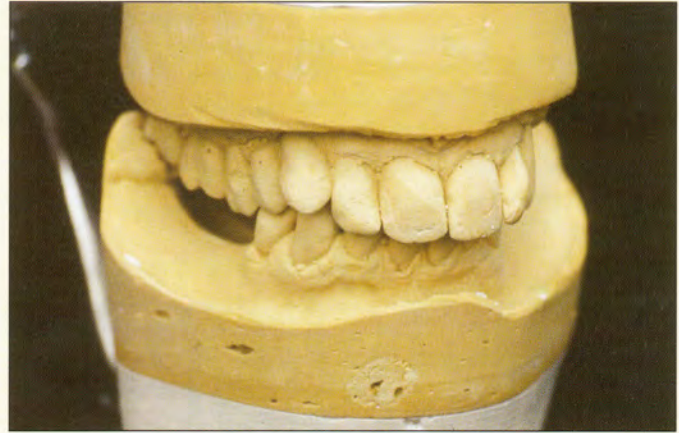


Figure 3: Articulated study models

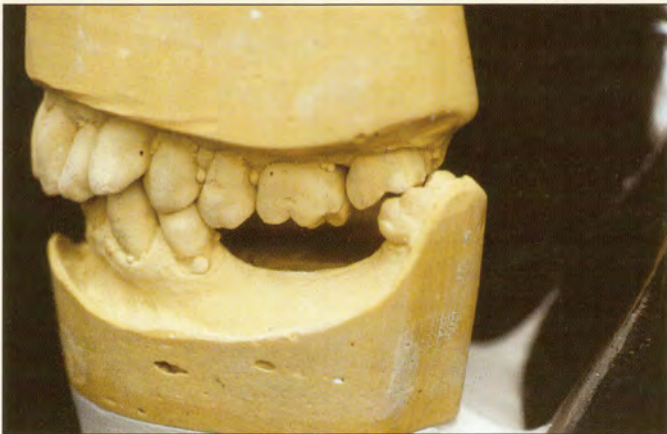


Figure 4: Study model showing extruded teeth



Figure 5: Articulated models showing collapsed vertical dimensions

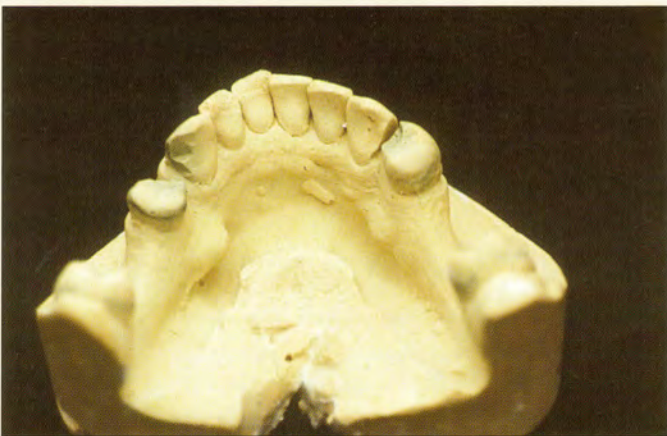


Figure 6a: Lingual tori interfering with major connector



Figure 6b: Maxillary tori

major connector bypassing or covering these tori will be larger and more bulky than conventional major connectors. **Abutment teeth** - tilted or malaligned teeth can change the normal design profile. Molar teeth tilted lingually will necessitate a labial bar major connector, thereby eliminating food traps which would result if

the major connector was placed lingually (Figure 7a). Molar teeth tilted mesially will prevent the use of the standard Equipoise clasp, which usually would have the prepared rest on the distal of the tooth. Mesially tilted molars will have mesial rests and mesial plates with buccal and lingual arms for retention (Goodman, 1977)

(Figure 7b).

Patient education - design all prostheses on the study cast. Prepare this cast in the same way as for abutment teeth and show these casts to the patient, explaining why tooth preparation is necessary for a successfully designed removable partial denture (Figure 12). When the patient

sees the study cast and listens to the dentist's explanation, there is usually little or no resistance from the patient to tooth preparation. The prepared and designed study casts then are sent with the final impression to the dental laboratory for fabrication of the removable partial denture.

Many abutment teeth have

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little or no undercuts. These can be observed easily from the study casts (Figure 8).

PERFECTING A PROPER DESIGN

When little or no undercuts are present, there are three options to perfect a proper design.

The first is to make an Equipoise crown on the abutment tooth. This crown will have a rest 1mm deep on the side of the crown away from the edentulous area, a flattened area and a 1mm space between the abutment crown and the adjacent tooth. If necessary, a small amount of the adjacent tooth will have to be prepared, so that a 1mm interproximal

plate is created on the side of the abutment crown next to the edentulous area an undercut is created a third of the way below the occlusal table of the crown (Figure 9).

If for reasons of cost a crown cannot be constructed, then an undercut can be made on the tooth by recontouring the abutment tooth (Goodman, 1989) (Figure 10).

If neither of these can be done, a regular Equipoise clasp can be constructed with an I bar added to the design. It is placed on the buccal surface of the tooth for extra retention (Figure 11).

FOUR BASIC DESIGNS

Dentists using Equipoise should familiarise themselves with the four basic designs and every removable partial denture will utilise one of these basic systems (Goodman, 1997). These include free-end saddles; free-end saddle on one side, toothborne on the other side; one or two edentulous areas - all toothborne; three or more



Figure 7a: Lingual tilted molars



Figure 7b: Mesial tilted molars



Figure 8: Abutment tooth with no undercut

edentulous areas, all toothborne.

Free-end saddles - anterior or posterior free-end saddles: this design will always have the prepared rests and interproximal reciprocating plates away from the edentulous area. The retentive units will always be placed on the tooth next to the edentulous area. When anterior and posterior edentulous areas are present, the major retentive units are placed next to the edentulous area that gets the greatest

amount of function. Stabilising rests are used to prevent anterior/posterior tooth movement (Figure 13a).

Free-end saddle on one side, toothborne on the other: the free-end side is treated like the above. The toothborne side is retained with two Equipoise clasps, the free-end tips of each clasp facing the edentulous area. If the molars are tilted mesially, mesial rests should be prepared and buccal and lingual arms are used for retention (Figure 13b). To improve the

“ Many abutment teeth have little or no undercuts ”



Figure 9: Equipoise crown

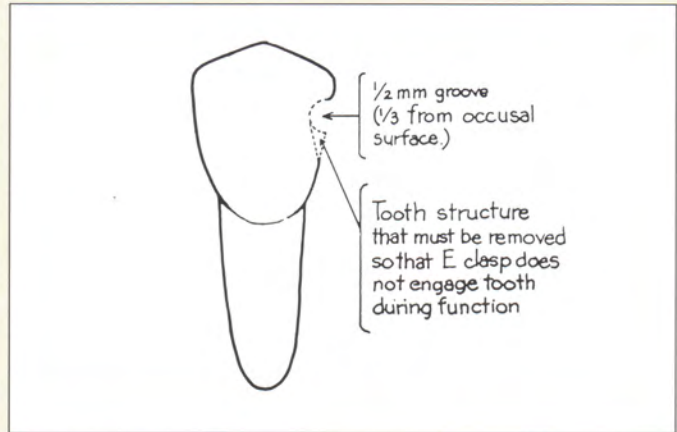


Figure 10: Recontouring abutment tooth to make undercut



Figure 11: I bar with Equipoise clasp



Figure 12: Designed case on study model

aesthetics of the toothborne areas, it is not necessary to plate all the way through to the buccal. A three quarter plate, at least 1mm thick must therefore be created (Figure 14).

One or two edentulous areas, all toothborne: the design for the toothborne configuration is the same as the design of the toothborne area, as described above (Figure 13c).

Three or more edentulous areas, all toothborne: this design is used to create the best aesthetics where multi-edentulous areas, all toothborne

are present. The interproximal areas are placed as far distally as possible and all the free end tips are placed on the mesial of the abutment teeth (Figure 13d).

HELPFUL DESIGN HINTS

When designing a removable partial denture and if it looks likely the patient will lose some of the remaining teeth in the near future, then work as if these teeth are already extracted and design the case accordingly, using one of the four basic designs. When contiguous

contact points are present and the terminal abutment tooth is in doubt, it is not necessary to put the interproximal plate rest and retentive clasp on the same tooth. The terminal tooth will still be utilised for retention (Figure 15).

When carrying out tooth preparation, all rests used with retentive units are always placed on the mesial or distal side of the abutment teeth. They need to be at least 1mm deep and prepared either with diamond burs or carbide burs. The rest walls must be flared

out so that no undercuts are present, since rests with undercuts will cause decay.

The use of interproximal plates is the most important difference between an Equipoise design restoration and all other removable partial denture design systems. The interproximal plate between the abutment tooth and the adjacent tooth places the prosthesis within the arch, not on top of the arch. This affords the prosthesis greater stability, eliminates torque forces, aids retention and reciprocates the

“ **Tooth movement is something which the dentist should take into consideration** ”



Figure 13a: Design no. 1



Figure 13b: Design no. 2



Figure 13c: Design no. 3



Figure 13d: Design no. 4

forces from the retentive arm. All free-end saddle removable partial dentures must have the plates prepared completely from buccal to lingual and be at least 1mm thick. Three quarter interproximal plates can be used only in conjunction with all toothborne designs (Goodman, 1989).

Tooth movement is something which the dentist should take into consideration. When the interproximal plates are prepared and contact is broken between the adjacent

tooth and the abutment tooth, it is most important to keep this space open. In as little as seven days, the space will start to close up, making it difficult or impossible to insert a prosthesis. To keep this space open, use a light cured composite, though it is vital that no acid etching or bonding takes place. Wedge the composite in the interproximal space and place some composite in the rest seat. Harden the composite, check the bite and tell the patient to come back to the

surgery if the composite falls out.

REFERENCES

Goodman JJ (1989). Equipoise, the proven partial denture system. Equipoise Dental Prosthetics

Goodman H & Heil LM (1948). The design of partial dentures. *Prosthet Develop Corp*

Goodman JJ (1975a). Protection, restoration and strengthening of abutment teeth, part I. *J of Bergen County Dental Soc*, 42: 7-10

Goodman JJ (1975b). Protection, preservation and strengthening of abutment teeth, part II. *J of Bergen County Dent Soc*, 42: 7-13

Goodman JJ (1977). Sixteen basic designs for removable prosthesis. *New Jersey State Dent J. October*

Goodman JJ & Goodman H (1968). The C & L attachment - a functional retentive device. *Annals of Dentistry*, 27: June

Goodman JJ (1997). Equipoise: An aesthetic solution for dentures. *Indep Dent 2(3)*: 63-66



Figure 14: Design on study model showing 3/4 plate



Figure 15: Maxillary partial denture plate and rest on tooth with E clasp on adjacent tooth

ADDITIONAL READING

App, George R (1973). Periodontal treatment for the removable partial prosthesis patient. *Dental Clinics of N America*, **7** (4)

Axinn, Sherman (1975). Preparation of retentive areas for clasps in enamel. *J Prosthet Dentistry*, **34**: 405-407

Campbell, Larry D (1977). Subjective reactions to major connector designs for removable partial dentures. *J of*

Prosthet Dentistry, **37**: 507-516

Cecconi BT et al (1971). The effect of partial denture clasp design on abutment tooth movement. *J of Prosthet Dentistry* **25**: 44-56

Demer Walter J (1976). An analysis of mesial rest - I bar clasp designs. *J of Prosthet Dentistry* **36**: 243-253

Frantz Wayne R (1973). Variability in dentist designs of a removable maxillary partial denture. *J of*

Prosthet Dentistry **29**: 172-182

Goodman JJ & Goodman H (1963). Balance of force in precision free-end restorations. *J of Prosthet Dentistry* **13**: 302-308

Goodman JJ & Goodman H (1968). The C & L attachment - a functional retentive device. *Annals of Dentistry* **27**: 2

Krajicek DD (1972). Why partial dentures fail. *Dental Clinics of N America* **16**: 1

Krol AJ (1973). RPI clasp retainer and its modifications. *Dental Clinics of N America* **7**: 631-646

Krol AJ (1973). Clasp design for extension base removable partial dentures. *J of Prosthet Dentistry* **29**: 267-282

Kratochvil F (1963). Influences of occlusal rest position and clasp designs on movement of abutment teeth. *J of Prosthet Dentistry* **13**: 114-124

McCracken WL (1964). Partial denture construction (2nd edn). The CV Mosby Co

Robinson C (1970). Clasp design and rest placement for the distal extension removable partial denture. *Dental Clinics of N America* **14**: 583-594

Shohet H (1969). Relative magnitude of stress of abutment teeth with different retainers. *J of Prosthet Dentistry* **21**: 267-282

Weintraub G & Goyal BK (1976). Tertiary prevention: a goal of removable prosthodontics: the distal extension removable partial denture. *J of Prevent Dent* **3**: 35050 