

A systematic method for designing removable partial denture framework

Ramin Mosharraf

Department of Prosthodontics, Isfahan University of Medical Sciences, Isfahan, Iran

For correspondence

Dr. Ramin Mosharraf, Department of Prosthodontics, Member of Torabi-Nejad Research Center, Isfahan University of Medical Sciences, Hezar-Jarib Ave. Isfahan, Iran. E-mail: mosharraf@dent.mui.ac.ir

Designing a removable partial denture framework can be complicated for students and dentists. This article suggests a simple and systematic method for the process. In this method, the designing sequence outlines (1) rests, (2) minor connectors and proximal plates, (3) retentive meshwork, (4) major connector, (5) direct retainers, and (6) indirect retainers, respectively.

Key words: Design, framework, removable partial denture

DOI: 10.4103/0972-4052.49181

INTRODUCTION

When planning treatment for partially edentulous patients, the dentist is confronted with myriad combinations of edentulous spaces and remaining teeth,^[1] so designing a removable partial denture (RPD) framework might be complicated for students and dentists.^[2] This problem seems to arise not so much from a lack of understanding of basic concepts, but from the lack of a start point and a systematic sequence of designing.^[2,3]

This article suggests a simple and systematic method for designing an RPD framework.

Technique

1. Survey the diagnostic cast in a classical manner.^[4]
2. Outline the supporting rests based on these rules:
 - a. The position of rest seats is most often dictated by the classification. For Class III and IV arches, the quadrilateral configuration is indicated. The tripod clasping is used for Class II arches. For a Class I arch, a bilateral configuration is required.^[5]
 - b. In the tooth supported edentulous spaces, the rests should be placed next to the edentulous spaces^[5] [Figure 1].
 - c. In the distal extension areas, the rest seats must be located far from the edentulous ridge (e.g. RPI design)^[5] [Figure 1].
3. Outline the proximal plates and minor connectors based on these rules:
 - a. All the rests next to the tooth-supported areas must be connected to proximal plates^[3] [Figure 2].
 - b. In the distal extension areas, the proximal plates are not connected to the rests. Mesial rest must

be connected to a minor connector.

4. Outline the retention mesh for the denture base resin considering these rules:
 - a. In the tooth-supported areas, metal bases should be used [Figure 3]. However, in long span areas, unhealing extraction sites and severe resorption of residual ridge, using acrylic resin bases is necessary.
 - b. In the maxillary distal extension base, the retentive meshwork must be extended to hamular notch [Figure 3]; but in the mandible, these elements should cover only two-thirds of ridge length.^[4]
 5. Outline the major connector on the cast. The type of major connector is selected based on the support and rigidity needed for preservation of tissues, and anatomic limitations^[6] [Figure 4].
 6. Outline the direct retainers considering these rules:
 - a. In tooth supported edentulous spaces, the type of clasp selected is not critical. Tooth and tissue contours and esthetics should be considered, then the simplest possible clasp selected.
- NOTE: In the case of mesial abutment of the modification area of a Class II mod 1 situation, wrought wire should be used in a mesiobuccal undercut and half-T or I-bar clasp must be used in a distobuccal undercut^[4,5] [Figure 5].
- b. In the abutment tooth next to the distal extension area:
 1. If a distobuccal undercut is present, the vertical projection retentive clasp is preferred.^[5]
 2. If a mesiobuccal undercut is present, a wrought wire clasp should be indicated^[5] [Figure 5].
 - c. Each retentive element must be opposed by a reciprocal or bracing element. Lingual plating may be substituted.^[5]

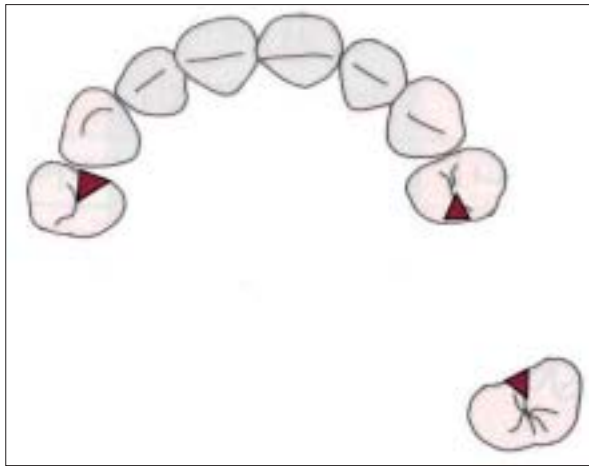


Figure 1: Outlining supporting rests (e.g. tripod configuration in this case)

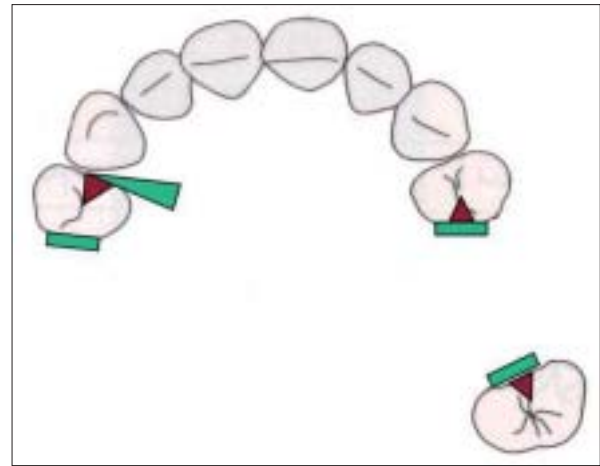


Figure 2: Outlining proximal plates and minor connectors that are connected to rests

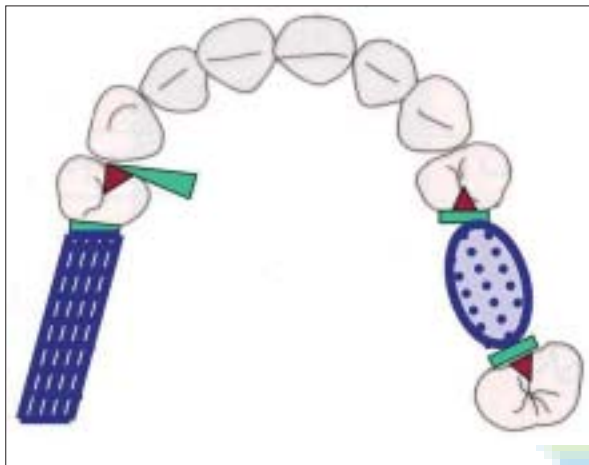


Figure 3: Drawing retentive meshwork in the edentulous spaces

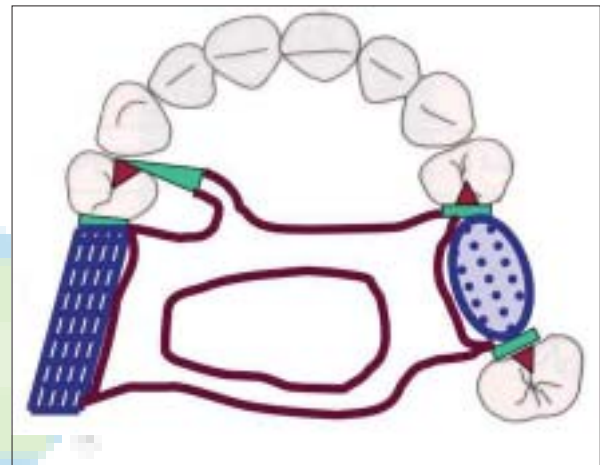


Figure 4: Drawing major connector selected

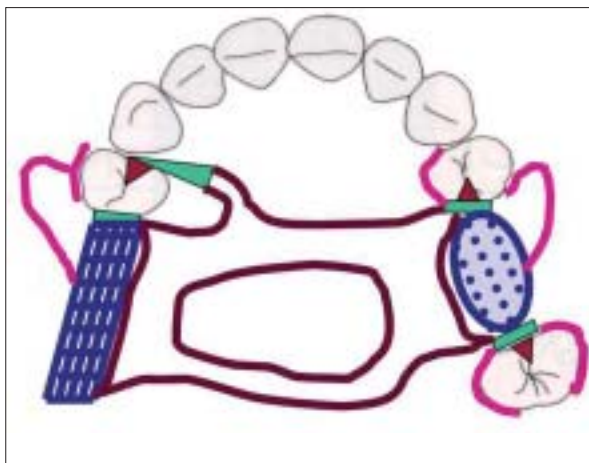


Figure 5: Drawing direct retainers

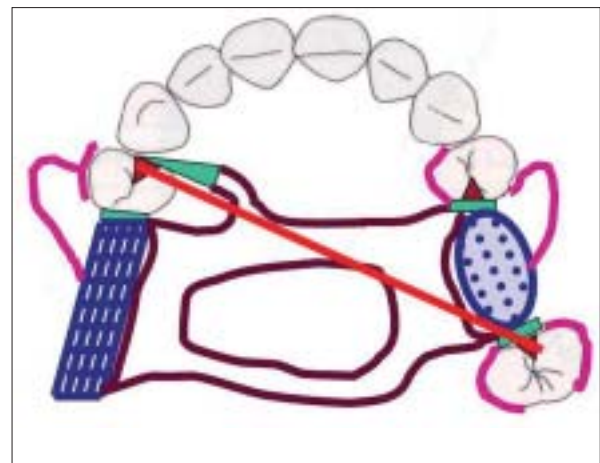


Figure 6: Outlining indirect retainers (distal rest on the maxillary first premolar can act as indirect retainer)

6. Outline the indirect retainers as far anterior to the fulcrum line as possible.^[5]

In some instances, the primary rest (draw in step 2) might act as an indirect retainer, too [Figure 6].

DISCUSSION

The procedure described for designing a diagnostic cast is applicable to each dental arch. It is presented

in a sequential and systematic manner and is not complex.

CONCLUSION

This simple and systematic designing procedure consists of six major steps, that must be remembered and followed in this manner: (1) rests, (2) minor connectors and proximal plates, (3) retentive meshwork, (4) major connector, (5) direct retainers, and (6) indirect retainers.

In each step, there are 2-3 rules that must be considered.

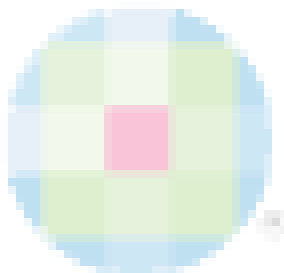
REFERENCES

1. Budtz-Jorgensen E, Bochet G. Alternative framework

designs for removable partial dentures. *J Prosthet Dent* 1998;80:58-66.

2. Cowles KR. Partial denture design: A simple teaching aid. *J Prosthet Dent* 1982;47:219.
3. Davenport JC, Basker RM, Health JR, Ralph JP, Glantz PO. A system of design. *Br Dent J* 2000;189:586-90.
4. McGivney GP, Carr AB. McCracken's removable partial Prosthodontics. 10th ed. St. Louis: Mosby; 2000. p. 173-96.
5. Phoenix RD, Cagna DR, Defreest CF, Kenneth L. Stewart's clinical removable partial prosthodontics. 3rd ed. Chicago: Quintessence; 2003. p. 215-60.
6. La Verere AM, Freda AL. A simplified procedure for survey and design of diagnostic casts. *J Prosthet Dent* 1977;37:680-3.

Source of Support: Nil, Conflict of Interest: None declared.



Author Help: Online submission of the manuscripts

Articles can be submitted online from <http://www.journalonweb.com>. For online submission, the articles should be prepared in two files (first page file and article file). Images should be submitted separately.

1) **First Page File:**

Prepare the title page, covering letter, acknowledgement etc. using a word processor program. All information related to your identity should be included here. Use text/rtf/doc/pdf files. Do not zip the files.

2) **Article File:**

The main text of the article, beginning with the Abstract to References (including tables) should be in this file. Do not include any information (such as acknowledgement, your names in page headers etc.) in this file. Use text/rtf/doc/pdf files. Do not zip the files. Limit the file size to 400 kb. Do not incorporate images in the file. If file size is large, graphs can be submitted separately as images, without their being incorporated in the article file. This will reduce the size of the file.

3) **Images:**

Submit good quality color images. Each image should be less than **1024 kb (1 MB)** in size. The size of the image can be reduced by decreasing the actual height and width of the images (keep up to about 6 inches and up to about 1200 pixels) or by reducing the quality of image. JPEG is the most suitable file format. The image quality should be good enough to judge the scientific value of the image. For the purpose of printing, always retain a good quality, high resolution image. This high resolution image should be sent to the editorial office at the time of sending a revised article.

4) **Legends:**

Legends for the figures/images should be included at the end of the article file.