

REMOVABLE PARTIAL DENTURES

Antonín Zicha

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Removable Partial Dentures

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1. INTRODUCTION TO REMOVABLE PARTIAL DENTURES

Removable partial dentures (RPDs) are a universal alternative applicable for the replacement of lost or missing teeth. RPDs are useful in large partially edentulous span cases.

They can be used in almost all types of dental arch defects, from cases where only one tooth is missing to situations where only one tooth remains in the jaw. However, a removable partial denture is not always the best final treatment for every given situation, and not every missing tooth has to be replaced immediately. This applies to situations where functional impairment is not expected and where no other disorders of the stomatognathic system are likely to develop.

On the other hand, it is always necessary to consider whether the application of a partial denture could increase the risk of adverse effects, particularly the development of:

- dental caries,
- marginal periodontitis,
- allergic reactions.

Thus, the expected benefit of the therapeutic effect must be weighed against the possible risks associated with the application of a removable partial denture.

1.1 DEFINITION OF REMOVABLE PARTIAL DENTURES

A removable partial denture (RPD) restores a partially defective dental arch. The remaining teeth are used to provide stability and retention of the denture and, in certain cases, also to transfer masticatory load.

The denture is freely detachable from the mouth. The patient can remove and insert it on their own as required.

1.2 INDICATIONS AND CONTRAINDICATIONS FOR REMOVABLE PARTIAL DENTURES

There is a very wide range of dental arch defects. Between fully dentulous jaws with 28 teeth and jaws with only one remaining tooth, there are thousands of possible combinations of defects. Because of this, there is a broad spectrum of technical possibilities in the design of partial dentures.

The following factors must be considered when deciding whether a partial denture is suitable:

- the patient's general health status,
- the current condition of the stomatognathic system,
- the number of missing teeth,
- the arrangement of teeth in the dental arch,
- the size of the dental arch defects,
- the curvature of the dental arches,
- the biological condition of the remaining teeth,
- the quality of the basal seat in the edentulous regions of the dental arch,
- the type of transfer of masticatory load and forces,
- aesthetic expectations,
- the level of oral hygiene,
- possible time limits.

Because removable partial dentures offer many construction options, they are well suited to meet these individual and often complex requirements. Even patients with seemingly similar types of dental arch defects may require different denture designs due to differences in tooth distribution or supporting conditions.

Removable partial dentures are indicated for all classes of dental arch defects. They are most commonly indicated for Class II and III defects (according to Voldrich). In Class I defects, a removable partial denture is used when a fixed denture cannot be provided or when it is contraindicated (refer to contraindications of fixed dentures and scheme 1). In some situations, the treatment plan may involve more than one type of partial denture (for instance, initially an immediate denture with mucosal transfer of masticatory load, followed later by a definitive denture with dento-mucosal support). In certain situations, the combination of a removable partial denture with a fixed prosthodontic restoration is beneficial, purposeful, or even necessary.

Contraindications for removable partial dentures are generally rare, but they include:

- remaining teeth that are unable to provide sufficient retention to the prosthesis (due to weak teeth, poor periodontal/gum health),
- situations where difficulties with incorporation of the denture are expected, such as psychological barriers or advanced age,
- mental disorders associated with poor patient cooperation,
- somatic conditions (e.g. paresis, tremor) that make manipulation and handling of the denture very difficult or even impossible,
- allergies to materials used in the denture.

Tab. 1: In Class I defects, RPDs are an alternative to fixed dentures

Denture preference		
Criteria	Fixed prosthesis	Removable prosthesis (RPD)
caries	frequent	rare
alveolus	preserved	atrophic
size of defect	small	large
localization of defect	frontal	distal
course of alveolus	straight	curved
number of defects	less	more
age	younger	older

1.3 CLASSIFICATION OF REMOVABLE PARTIAL DENTURES

There are a variety of different removable partial dentures to suit particular situations.

Removable partial dentures can be classified according to different criteria, for instance based on the:

- a) base material used (base made of acrylic or cast chromium-cobalt framework),
- b) duration of use (temporary, definitive),
- c) mechanism of retention.

However, the main classification is based on the transfer type of masticatory load from the base of the denture to the jaw skeleton. This classification has the greatest influence on the design of the denture and is of fundamental importance for clinical practice.

Masticatory load can be transferred from the denture to the jaw skeleton in the following ways:

- a) Dental transfer: i.e. through the periodontium of the remaining teeth,
- b) Mucosal transfer: i.e. through the mucoperiosteum of the alveolar processes and the hard palate,
- c) Dento-mucosal transfer: i.e. combination of both mechanisms.

Ad a) Dental transfer of masticatory load (= tooth-borne denture)

These removable partial dentures are constructed with a metal framework (usually chromium-cobalt alloy) combined with artificial teeth (cast metal partial dentures).

Dental transfer of masticatory load utilizes a physiological mechanism in which chewing forces are transmitted to the jaw skeleton through the remaining teeth and their periodontium.

In situations when the base of the denture has to replace larger defects and the number of abutments is smaller than the number of teeth being replaced, the remaining abutments are subjected to considerably increased load. Such an instance becomes even worse when the abutments show signs of periodontal disease, which limits their ability to carry additional masticatory loads. In such cases, denture constructions that distribute the load over the maximal possible number of abutments are indicated, leading to a splinting effect.

Dental transfer of masticatory load is only possible under specific conditions: the defect must be a so called “limited gap” (i.e. Class I defect according to Voldrich), and the denture must contain retainers that allow dental transfer. These include:

- 1) cast alloy clasps,
- 2) retentive bars,

- 3) rigid attachments,
- 4) telescopic crowns,
- 5) conus crowns.

Ad b) Mucosal transfer of masticatory load (= mucosa borne denture)

In mucosal transfer, masticatory load is transmitted to the jaw skeleton through the tissues of the basal seat. The load is transferred directly from the denture base (saddle or plate) to the basal seat. The mucosa of alveolus and the hard palate tolerates pressure relatively well, provided that certain conditions are met:

- 1) the load must be intermittent, i.e. intermittent pressure changes enhance microcirculatory blood supply to the tissues of the basal seat. Continuous pressure disturbs microcirculation and causes damage of the trophic of tissues or even necrosis ("decubitus" is the common clinical term used in this association).
- 2) the load must be evenly distributed,
- 3) the load intensity must be appropriate.

In order to meet these requirements, it is necessary to extend the base of the denture as much as possible, in order to achieve the lowest possible load per unit area of the basal seat. A purely mucosal transfer of masticatory load is the least favorable method in definitive partial dentures, especially when healthy abutments are still present. Partial removable dentures with mucosal transfer of masticatory load utilize the remaining teeth only for retention and stabilization, not for transmission of masticatory load. Suitable retainers in such cases are:

- 1) wrought wire clasps,
- 2) free attachments.

Most commonly, simple retentive one arm wire clasps are used as retainers for dentures with mucosal transfer of masticatory load. These clasps are not designed to transfer any masticatory load to the abutments and therefore lack an occlusal rest. However, the occlusal rest not only enables transfer of masticatory load to the abutment, but also ensures vertical stability of the clasp (and denture) relative to the abutment and, to a certain extent, also to the basal seat. In the absence of an occlusal rest, this function of the applied retainer (in this case, wrought wire clasp) is not ensured.

A denture without ensured vertical stability may, when sinking into the basal seat, harm the periodontium of the abutments. This injury can be due to:

- 1) the lever mechanism of the clasp upon the abutment,
- 2) direct mechanical irritation in the region of marginal gingiva.

For these reasons, such dentures are only indicated for temporary, short term use (e.g. immediate dentures) or for occasional interim use (e.g. spare dentures worn only during periods of repair of definitive prostheses). They require continuous clinical monitoring.

These dentures are made from lightweight acrylic material (polymethyl methacrylate) and lack the strength to transfer chewing forces to the remaining natural teeth.

Acrylic partial dentures provide an affordable, lightweight, and versatile solution for restoring oral functionality. A significant advantage of acrylic partial dentures is their adaptability. If a patient requires multiple extractions over time, this can be made later to accommodate additional teeth. However, this type of denture can break or wear down over time.

Ad c) Dento-mucosal transfer of masticatory load (= tooth-mucosa borne denture)

These partial dentures (cast metal removable partial dentures) are made from a metal framework combined with acrylic resin base carrying artificial teeth within.

By their design, they allow the masticatory forces to be transferred to the remaining teeth.

The masticatory load is transferred partially through the remaining abutments and partially through the mucosa of the edentulous alveolar regions and the hard palate (in the upper jaw). This combined transfer is typically used in defects of the so-called "shortened dental arch" (i.e. Class II defects according to Voldrich), where purely dental transfer of masticatory load cannot be applied. Through appropriate constructional design, the proportion between both types of transfer can be modified to a certain extent. Here, the mucosal component of transfer is regarded as supplementary, as it differs from the ideal (physiological, dental) transfer. However, it is clinically proven that when a denture is applied with the correct ratio between dental and mucosal transfer there will be no injury to the remaining teeth or the basal seat tissues.

The distribution of masticatory load within the tissues of the basal seat differs between purely mucosa borne dentures and dento-mucosa borne dentures. In mucosa-borne-dentures the basal seat is loaded equally, whereas in dento-mucosa-borne-dentures this distribution is uneven. The regions adjacent to the abutments are subjected to the lowest load, as the abutments absorb a substantial amount of the masticatory forces, while regions located further away are progressively

more heavily loaded in proportion to their distance from the abutments. This distribution depends primarily on the type of connection between the base of the denture and the retainers (refer to chapter: Connectors), which dictates the ratio between dental and mucosal load transfer.

In areas of dental transfer, retainers must be selected for their ability to transmit masticatory load while ensuring vertical stability relative to the remaining teeth.

Furthermore, the distribution of the abutments must minimize the risk of overloading and leverage, to which the marginal abutments are particularly susceptible (refer to statics of partial dentures).

1.4 SUMMARY

A removable partial denture restores a partially defective dental arch. The remaining teeth are used either solely to ensure retention and stability of the denture, or they also function in the transfer of masticatory load (either completely or only partially). According to this, the following types can be distinguished:

- 1) RPDs with dental transfer of masticatory load,
- 2) RPDs with dento-mucosal transfer of masticatory load,
- 3) RPDs with mucosal transfer of masticatory load.

Whenever a patient's own natural and healthy dentition is present, it has to be utilized for the transfer of masticatory load. The denture has to be constructed in such a way that the abutments are loaded with appropriate intensity and in the correct direction. In particular, the extra-axial components of masticatory load have to be eliminated. The design should not limit the so-called border-tissue-movements (= the action of the muscles and other tissues adjacent to the borders of the denture). It should not irritate any soft tissues, especially not the marginal periodontium. Under these conditions, the prognosis of the remaining teeth will be favorable. For definitive denture construction, denture designs with dental and dento-mucosal transfer of masticatory load are preferred over dentures with purely mucosal transfer.

Vážení čtenáři, právě jste dočetli ukázkou z knihy ***Removable Partial Dentures***.
Pokud se Vám ukázka líbila, na našem webu si můžete zakoupit celou knihu.