Construction of Removable Partial Denture

Peter Hermann
Department of Prosthodontics
Semmelweis University
Treatment options for edentulous spaces

- Fixed prosthodontics (crowns/bridges)
- Removable prosthodontics (dentures)
  - Complete dentures
  - Transitional denture (Dentures designed in such a way as to facilitate addition of prosthetic teeth as and when remaining teeth need to be extracted)
  - RPD
- Implant retained/supported prosthodontics
- No prosthetic treatment
Large diversity of treatment complexity

- Number of teeth to be replaced
- Health of residual dentition
- Health of patient
- Patient requirements
- Patient expectations
- Dentist competence
- Laboratory competence & liaison
- TIME!
- MONEY!
Need and demand

‘How many teeth must be lost before a patient seeks prosthetic replacement?’

In a UK survey people were asked, 'If you had several missing teeth at the back would you prefer to have an RPD or manage without?’
Shortened Dental Arch

No prosthetic treatment may be an appropriate option

- THIS DOES NOT MEAN NO RESTORATIVE or PREVENTATIVE TREATMENT

- The provision of a distal extension RPD may not contribute any significant functional benefits
- A minimum of 8-10 occluding pairs of anterior teeth
- Must be periodontally sound
- Strictly speaking upper and lower second premolar to second premolar
- Replacement of missing posterior teeth should be driven by demand and function, not by habit
Removable partial denture

- an appliance which restores a partial loss of natural teeth and associated tissues
- it can be removed from the mouth and replaced by the patient
THE COMPONENT PARTS OF REMOVABLE PARTIAL DENTURE (IN PIECES)

1. artificial teeth
2. artificial gingiva
3. base plate
   a. saddle
   b. connector
   c. occlusal rest
4. retainer (clasp)
Saddle

- “That part of the denture that rests on the oral mucosa”
  or alternatively
  “The space(s) to be filled by the denture”
- Replaces the lost of the alveolar tissues and carries artificial teeth (obligatory function)
- Can take part in support and retention (optional function)
- Types: 1. bounded
  2. free end
Support classification of partial dentures

**Support**: resistance to vertical components of masticatory force in a direction toward the basal seat

- Dental
- Dento- mucosa
- Muco- dental
- Mucosal
Retention

- **Retention**: the resistance to movement of a removable partial denture from its supporting tissue
- Clasp
- Precision attachment
- Telescopic retainers
Connectors: minor or major

- The minor connectors (coloured red) join the small components, such as rests and clasps, to the saddles or to the major connector.

- The major connector (coloured black) links the saddles and thus unifies the structure of the denture.
• Connects the two sides of the denture (the saddles) together, provides the rigid unit of the dental appliance (obligatory function)

• Can take part in the support and retention (optional function)

• Upper arch:
  - butterfly (lateral edentulous areas)
  - horseshoe (anterior edentulous area)
  - fenestrated (decreasing the size of the baseplate)
  - skeletonized (fully tooth-supported)
Lower arch:

• **Lingual bar: most widely used**
  The lingual bar, like the sublingual bar, should be placed as low as the functional depth of the lingual sulcus will allow.

• **Sublingual bar**
  The sublingual bar differs from the lingual bar in that its dimensions are determined by a specialized master impression technique that accurately records the functional depth and width of the lingual sulcus.

• **dental bar:** where the clinical crowns are long enough

• **'Kennedy Bar' or continuous clasp:** consists of a dental bar, combined with a lingual bar
Guidelines for designing the connector part

- The protection of the tissues of the marginal periodontium must be carried out.
- **Reduction**
  - The connector part must be rigid, the possibility of reduction depends on the type of the support.
  - With straight contour we provide the proper cleaning of the removable partial denture, and it is more comfortable for the patient (speech).
- The material of the baseplate is **metal**, except in the cases of mucosal and dental, and mucosal support.
Support

- Provides the tooth support (obligatory function)
- Can take part in avoiding tilting (optional function)
Procedures in the office and in the laboratory

- Medical and dental history
- extra-and intraoral examination
- Xray analysis
- classify the dental condition (Fábián and Fejérdy)
- Primary impresion taking
- Treatment planning
The removable partial denture equation

- Initial step in determining if prosthetic treatment is indicated must always be the assessment of:
  - The patient’s wishes and concerns
  - The relevant dental and medical history
  - The results of the extra-oral and intra-oral examinations
  - Oral hygiene habits and status
  - The essential oral functions of appearance, mastication and speech.

Benefits
- Appearance
- Speech
- Mastication
- Maintaining the health of the masticatory system:
  — preventing undesirable tooth movement
  — improving distribution of occlusal load

Satisfactory outcome depends upon the clinician, the dental technician and the patient.
Study casts
Impression 1.

- Stock try
- Elastic impression (silicone) material
- One stage/ two stage impression technique
Impression 2.

- Materials used for primary impression taking:
  - alginate
  - silicones
  
  Taken by a stock tray!

- After pouring out the primary impression in the laboratory, we get the primary cast

- On the primary cast we outline the borders of the special tray

- secondary impression with special tray (silicones)
• On the secondary cast at the dental office we design the removable partial denture, outline the saddle areas, occlusal rests and the retainers

• The secondary cast is the **mastercast** (made of stone or precise die stone)
• With the duplication of the mastercast we get the working cast for making the wax pattern and investing
• Materials used for duplicating the mastercast:
  • duplicating gels
  • silicones
On the surface of the working cast, the dental technician makes the wax pattern from prefabricated wax elements.
After sprueing the working cast is ready for investing
• Investing with flask
• Investment materials used for cobalt-chromium alloys:
  • Phosphate bonded
  • Silica bonded
  • Gypsum bonded
  • Investing is carried out by vibration.
• Deflasking
• Finishing of the ready metal frame
  • (sandblasting, trimming, polishing)
• At the dental office we check the ready frameworks and determine the jaw relationship with wax occlusal rim and determine the shade
• At the laboratory they set up the teeth
• After setting up the teeth we try in the trial denture at the office
• Check up the occlusion, articulation,
• Check shade
Processing
Insertion

- Check the occlusion!
- Correction
- Recall
Combined fixed-removable prosthetic restoration

- Single crowns on 34 and 2 unit splint on 44,45 and RPD:
  - precision attachment /friction screw/ on tooth 34
  - Ball attachment attached to the teeth 44 & 45
  - E-clasp placed on tooth 37
  - chrome cobalt lingual bar together with all stress distributors and E-clasps will be cast in one piece.
Attachment prosthesis claspless restorations

- Intra coronal connections
- Extra coronal connections
- Inter coronal connections

Industrial manufactured attachments: primary and secondary part (male and female) guarantees the anchoring of the prosthesis to the remaining dentition.
Circumferential shoulder and interlock

the stress distribution arms of the cobalt framework lock to it

- chamfered parallel milling with a cervical and/or occlusal shoulder
- allows a proportionate force distribution onto the parodontium
- serves as a tool for the path of the insertion
- offers stabilization against horizontal and vertical forces
- supports the rigid connection to the attachment.
Complete wax up of the crowns
• always done in an articulator
• anatomical form of the crown and the stress distributor of the chrome cobalt frame, guarantee a biodynamic balance

Set up of the artificial teeth
• always done in an articulator
• availability of space and how to attach the construction elements onto the chrome cobalt frame.
• modelling of the tissue and the later acrylic saddle areas allows an judgement of the overall aesthetic appearance of the prothesis.
Investing
Casting
Deflasking
Blasting
Finishing
• Ceramic material is **veneered** (sintered) onto a metal frame of FPD in several firing processes
• Fixed restoration **tried in**
• Taking **impression** of fixed restoration

Dr Csilla Erdei: case report
• **duplicating part** been placed onto the ball anchor to produce the investment or refractory models
• **undercuts blocked** out with special wax so the model can be easily removed from the duplicating material.
• **preparation wax** is used on the enclosed and free end saddles, to create space for the acrylic
• **duplicating gels** are reversible thermoplastic materials
• After the cooling process has finished the master model will be removed from the gel and the **investment material** will be poured into the gel form
• investment or refractory model is produced for the wax up of the framework

• sprues serve as a feed line for the melt into the actual cast object
• Investing the modellation
• Casting
• Deflasking
• Sandblasting
• Polishing
• duplicating part for casting/ female retentive part is fixed and locked in
• Try in procedure of finished CrCo-framework (with fixed prosthodontics together)
• Bite registration
• Set up artificial teeth
• Trial Denture
• Acrylic finishing
• Cementation of fixed-removable prosthodontic restoration together
• Recall!
Thank you for your attention!