



Top tips for removable partial dentures: Part 2 – acrylic removable partial dentures

By L. Blakely,¹ W. A. V. Beare² and E. McColl³

Introduction

Part one of the series discussed the necessary fundamentals for removable partial denture success. Many of these fundamentals cannot be optimised with acrylic dentures, but such dentures are commonly used in a range of situations across primary care.

To provide a suitably strong denture, acrylic removable partial dentures (ARPDs) are inherently bulkier and have greater tissue coverage, resulting in a more plaque retentive denture which may contribute to increased caries incidence and periodontal breakdown, with subsequent tooth loss.¹ The majority of ARPDs provided are mucosal borne, with potential for occlusal load to be transmitted directly to the underlying tissues, damaging the supporting structures.

The risk of prosthesis failure through biologic damage is higher with ARPDs, as adhering to hygienic principles is more challenging. Whilst not ideal, we will discuss ways of mitigating risk to the patient's oral health when providing ARPDs.

Traditionally ARPDs have been used as interim prostheses to maintain appearance and function immediately after extractions, or as part of a stabilisation phase whilst other restorative and periodontal treatment is carried out, before providing a definitive prosthesis. Additionally, with a failing dentition, ARPDs can be used as a transitional trainer denture, allowing ease of additions to the denture, and a period of adaption prior to the final complete denture.

In clinical practice, far more acrylic dentures are made than chrome framework dentures, and a significant proportion of these dentures are intended as definitive dentures.¹ Additionally, for many patients an ARPD may be chosen as a cost-effective treatment option.

Upper acrylic dentures

Good design of an ARPD should aim to minimise the disadvantages of this type of denture. This, combined with good oral hygiene, can allow an upper ARPD to function well over a prolonged period of time.²

The classic 'Every' denture³ was proposed when clinical observation noted that provision of partial dentures resulted in aggravating existing decay and periodontal infection, and the belief that lateral loads on the remaining teeth caused damage to the supporting structures. Although this was based on an earlier understanding of the pathogenesis of dental disease, the design features advocated were the foundation for considering an approach to denture design that minimised the potential damage from wearing a denture.

The Every denture is a clasless design for upper bounded saddle dentures. The saddles have wide embrasures and the baseplate is kept a minimum 3 mm clear of the remaining teeth.⁴ This concept is a hygienic design. The drawback is that this denture design has no tooth support and does not include distal extension saddles.

The best approach is to use some of the design principles of the Every denture, combined with additional features to improve retention and support, so limiting iatrogenic damage.⁵

When providing an ARPD, specific design decisions need to be made to ensure the denture is as hygienic a design as possible (Fig. 1). As there is less potential for tooth support, the denture base requires broad extension to distribute load, improve rigidity and strength.



Fig 1. Modern ARPD, made to hygienic principles with good support (image courtesy of Charlotte Stilwell)

The design should not be delegated to the laboratory but requires clear instruction and communication with the technician.⁶

The design sequence and principles for planning components is the same as metal framework dentures.

Design for support and stability

- Optimise mucosal support by using a major connector that covers the centre of the palate. An area of 5 cm² in the midline of the palate remains stable, with no resorption recorded after many years post-extraction.⁷ This will provide longer term stability
- For distal extension saddle dentures the amount of mucosal support should be increased
- With distal extension saddle dentures it is essential for both support and bracing, that the saddle base extends to the hamular notch and full sulcus depth⁸



¹General Dental Practitioner, Spring Hill Specialist Dental Centre, 33 West St, Tavistock, Devon PL19 8JZ and Clinical Supervisor, Derriford Dental Education Facility, Plymouth Science Park, Research Way, Plymouth, PL6 8BT (University of Plymouth), UK; ²Clinical Lead/Honorary Consultant, Derriford Dental Education Facility, Plymouth Science Park, Research Way, Plymouth, PL6 8BT (University of Plymouth), UK; ³Director of Clinical Dentistry, Derriford Dental Education Facility, Plymouth Science Park, Research Way, Plymouth, PL6 8BT (University of Plymouth), UK

- With bilateral distal extension saddle dentures the posterior border should extend to the post-dam⁸
- Tooth support can be provided on anterior abutment teeth (canines, incisors) by extending the acrylic of the denture base onto the cingulum area. On posterior teeth, where the design indicates contact with the major connector, the acrylic should finish above the survey line⁹
- Support on posterior teeth can be from a rest made of half round stainless steel
- Direct retention in the main comes from good adaption of the fit surface to the mucosa and the cohesive retention from saliva. Contacts between abutments and denture need to be tight but passive. The polished surfaces should be shaped to assist the patient to gain muscular control
- Direct retention can be enhanced by preformed wrought wire clasps positioned to engage undercuts, either occlusal or gingival approaching, or a ring clasp (for lone-standing teeth). The clasps are embedded into the acrylic
- Ball ended clasps, C-clasps and Adams clasps that originate from the major connector can also be used, and additionally provide some vertical support where they cross the teeth
- Reciprocation for clasps is most effectively provided by the acrylic base plate which should finish on and above the survey line, except for ring clasps (self-reciprocating)
- Retention and stability can be enhanced by the use of guide planes (see part 1) and close contact between saddle and natural abutment teeth
- Where the denture base contacts the natural teeth ensure that acrylic collets finish above the survey line and have an accurate fit to help resist denture movement during loading, and minimise the risk of 'gum stripping'⁸
- Indirect retention will improve denture stability. With bounded saddles this can be achieved with baseplate extension on abutments taken onto the cingulum or finishing above the survey line. With bilateral distal extension dentures, extend the baseplate to use the remaining teeth (this also improves tooth support). The compromise is additional tissue coverage
- The denture occlusion should not interfere with the patient's intercuspal position (ICP). The occlusion should be carefully planned and adjusted, aiming for light contacts in ICP, as heavy contacts will drive the denture down into the mucosa, causing discomfort and tissue damage
- Maintain the natural tooth guidance and adjust the denture to avoid lateral interference which will create lateral stress and reduce stability.⁴

Design for hygiene

- Plan the design to leave as much gingival tissue uncovered, compatible with providing support and indirect retention
- The denture base should be kept at least 3 mm clear of the gingival margins,⁸ except in areas where the major connector is providing cingulum rest support or reciprocation
- With single standing teeth between saddles, it may not be practical to have 3 mm clearance
- Where the major connector joins a saddle, the acrylic should cross at 90 degrees⁸

- Where the denture base contacts natural teeth ensure that acrylic collets finish above the survey line and have an accurate fit to prevent food packing and periodontal damage⁸
- The denture base should have a pin-dam to minimise food ingress.⁸

The traditional 'Spoon' denture, used to replace single or few anterior teeth, is not advised. Whilst this is a hygienic design, there is a risk of inhalation or ingestion. The size of the denture is an important risk factor for this serious adverse event.¹⁰ A safer design is one modified to extend the major connector bilaterally to the palatal aspect of a molar and add wrought clasps.

An ARPD with a 'horse-shoe' shape design should be avoided. This design combines extensive gingival coverage with support mostly provided by the alveolar ridges which will resorb over time. The risk is that as the denture sinks the hard and soft tissues will be damaged, this can cause 'gum stripping'.

Lower ARPD

Due to the poor strength of acrylic, the major connector has to cover all the abutment surfaces and no clearance of the gingiva is possible. The lingual plate design results in significantly higher plaque deposition than other major connectors¹¹ with the potential for caries and periodontal inflammation (Fig. 2). There is less available tissue support to start with, and with alveolar ridge resorption the saddle will 'sink' into the tissues and a higher risk the denture will strip the gum away from the abutment teeth.

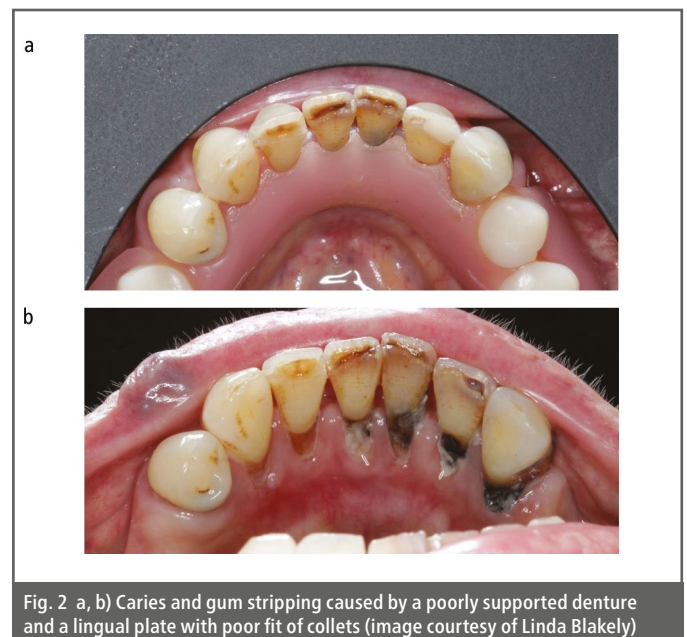


Fig. 2 a, b Caries and gum stripping caused by a poorly supported denture and a lingual plate with poor fit of collets (image courtesy of Linda Blakely)

Consequently, lower ARPD are only appropriate for interim or transitional dentures.

To minimise the potential damage during the interim phase, the following design features should be incorporated:

- Optimum tissue support for distal extension saddle dentures to include support from the buccal shelves, extension onto the retromolar pad
- Wrought wire clasps for retention
- Wrought wire rests for support. Modified ball clasps can also be used.² Tooth support is more effective with bounded saddles ▶▶

- Ball ended clasps can be helpful providing vertical support for Class IV immediate replacement temporary dentures, where tissue support is extremely poor
- Collets with a good fit around the remaining teeth and finishing above the survey line.

An often-omitted stage of denture construction is blocking out unnecessary undercuts and duplicating the cast prior to processing the denture.

Whilst this can increase fabrication costs, there will be considerable saving on the time of chairside adjustments. Multiple saddle dentures, with each saddle having a conflicting path of insertion, can be quite time consuming to fit. Inaccurate adjustments of the collets and denture base results in gaps between the denture and teeth resulting in food packing, reduced retention and stability, with increased potential for tissue damage.¹ This negates the benefits of the considered design. Blocking out the cast does give gingival relief, but this is not associated with a greater risk of deterioration in gingival health.¹²

On fitting the denture, should adjustment be required to enable the denture to be seated, from the fit surface look for undercuts that conflict with the path of insertions, and carefully adjust. Do not adjust the occlusal aspect of any collets, as this will open up a space between denture and tooth.

ARPDs may be more prone to causing sore areas. Use light bodied silicone to check the fitting surface and flange borders, and carefully adjust where indicated.

Reiterate the value of continued hygiene support and review of the denture fit.²

Conclusions

Whilst a poorly designed and constructed ARPD can compromise a patient's oral health, the ARPD remains an important modality for replacing missing teeth. Finance may preclude more complex replacement options, and for many patients an acrylic denture may be the only option available, so incorporating our tips will hopefully increase the chance of a long-term successful outcome in such patients. ■

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