



# Top tips for complete denture prosthetics in primary care

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**E**dentulism can have a significant impact on a patient's ability to eat, speak and socialise effectively.<sup>1</sup> Complete denture prosthetics (CDP) refers to the body of knowledge and skills pertaining to the restoration of a patient's edentulous arches with complete dentures.<sup>2</sup> It is a complex discipline where the art and science of dentistry combine, and often presents many challenges to clinicians.

Whilst the majority of edentulous patients can expect an enhanced quality of life after the completion of conventional complete denture construction,<sup>3</sup> 10–20% of patients report dissatisfaction.<sup>4</sup> Common complete denture referrals to secondary care often concern loose dentures related to resorbed mandibular ridges, complicated by high expectations and low coping ability.<sup>5</sup> Examination of such patients often reveals further compounding factors of incorrect base extension, poor adaptation of denture bases to tissues, and inaccuracy of the retruded jaw registration.

This short article will hopefully provide primary care practitioners with helpful tips to avoid these common errors in complete denture prosthetics cognisant of the complexities involved.

## 1. Initial consultation

The authors consider this the most important stage of CDP:

- Listen to the patient to gain understanding of their concerns, expectations, motivation and attitude to dentures. As always being empathetic with insight into the patient's perspective is of

benefit. Good clinical skills allied with effective communication skills have been associated with improved prognoses of complete denture treatment<sup>6</sup>

- A comprehensive history, thorough examination of the denture bearing tissues and assessment of the denture design should follow. The clinician should ask: is this a previously satisfactory denture that requires replacement? Or have there been a number of unsatisfactory dentures with this perceived fault? Identifying the fault and determining a treatment strategy to overcome this is crucial to success
- Similarly, the clinician should establish: is this a denture design fault that can be remedied with a different approach? Or a patient with reduced adaptive capacity (eg the 'frail elder'); a patient with unreasonable expectations, or one who will never be happy with conventional dentures?

## 2. Therapeutic diagnostics

This is a process of testing remedial changes prior to denture construction.<sup>7</sup> It aids the clinician in assessing the likely success of proposed alterations, improving patient understanding and aiding consent. The addition of baseplate wax to the patient's existing denture, moulded to the tissues at the proposed new extension, extending the upper denture to the vibrating line or the lower denture to the retro-molar pads can demonstrate the precise extent of change and is helpful for the patient to

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« perceive the improvement in retention and stability. This can be supplemented with a thin wash in light-bodied silicone to address any deficiency in fit surface.

Such diagnostic modification of dentures may be reversible or irreversible.

Other examples of reversible diagnostic changes are:

- Relining using a tissue conditioner to improve tissue adaptation and extension
- Using occlusal pivots to obtain even occlusal contact
- Improving lip support, incisal position and increasing the occlusal vertical dimension (OVD) by adding baseplate or carding wax over the six upper anterior denture teeth and occlusal aspect of lower denture. A preliminary record of the proposed incisal position can be recorded with an Alma Gauge for future rim prescription.

Whilst the authors would not recommend carrying out irreversible alterations unless you are confident of the result, irreversible changes include:

- A chairside relin of the existing denture to improve extension
- Removing lingual cusps of lower posterior teeth to improve tongue space and polished surface contour
- Creating a mentalis groove.

Such changes will aid in formulating a diagnosis and developing a treatment plan. This in turn should lead to a discussion with the patient as to the likely success of the treatment. Document your findings and conversation with the patient and obtain consent for treatment.

### 3. Impression taking

- Avoid making a denture on a primary cast; this is likely to combine errors of both under and overextension, reducing retention, and cause instability. A primary impression should be overextended to record all the potential area of support for the denture and show the landmarks for customised tray fabrication. A muco-displacive impression material such as a condensation cured silicone putty works well. It is sufficiently viscous to displace the tongue and record mylohyoid anatomy, as well as the full depth of the buccal sulci. The frena will require firm manipulation to give accurate reproduction
- Developing a good primary impression may be seen as a valuable investment of time and is crucial in determining the quality of all subsequent stages
- Whether designing a close fitting or spaced tray, draw the desired outline on the cast. This should ideally be 2–3 mm short of the sulcus to allow border moulding
- To help resist distal displacement the lower denture should cover the lower two thirds of the retromolar pad. On the model, draw a line from this point at 45° to an imaginary line along the lower ridge crest extended buccally to the external oblique ridge. The special tray should not extend beyond this line to avoid displacement by the masseter. More recent work suggests providing a notch in the custom tray at the buccal base of the retromolar pad to relieve around the Someya Sinew String, which can be observed in 10%

of patients.<sup>8</sup> Design stub (vertical) handles to avoid displacing the lips, especially with the lower tray

- Always check the tray in the mouth and adjust to ensure there is no over-extension; this is most likely to occur around the frenal attachments and in the post mylohyoid fossa
- Ask the lab to space the tray with one layer of modelling wax (1.25 mm thick) and to leave the wax in the tray. Trim away 4 mm of wax from the tray margin and border mould the tray. Remove the remaining wax before using light body Vinyl polysiloxane (VPS) impression material to record the impression
- The authors prefer a spaced tray for silicone impressions. Close fitting impression trays work well with ZnO Eugenol impression,

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but VPS impressions benefit from having more space for the material to flow.

The vast majority of retention for an upper denture is provided by the peripheral seal from the full depth and width of the posterior buccal sulcus around the tuberosity and from compression of the tissues in the post dam area:

- Use separate stage border moulding with either VPS or green stick compound to capture this. Failure to capture the width of the sulcus results in a denture with a thin flange, missing the opportunity to use the cheek tissue to maximise the peripheral seal. Additionally, tissue compression by the post dam prevents the wash impression slumping away from the tissues during the setting. Having taken the trouble to capture the detail, after disinfection, use an indelible pen to mark the extent of the height and width of sulcus to be retained on the cast; this will guide the technician to retain the correct extension.

### 4. Jaw relations

Obtaining the best quality impression is the foundation for denture success, providing stable bases on which to record the jaw relationship. The purpose of occlusal registration is not just to record the vertical dimension, but to shape the rims to communicate to the technician the position of the teeth for aesthetics and function:

- Ensure the rims are constructed on the more accurate master and not the primary cast
- Reference the existing dentures to decide on aspects to keep or change, including information obtained via therapeutic diagnostics. Further information can be obtained from dentate photographs and biometric guides<sup>9</sup>
- Shape the upper rim first for aesthetics and good lip support. Be aware that placing upper teeth too far palatally will have an effect on lower tooth position and compromise denture stability
- Align the upper rim to the naso-tragal line and inter-pupillary line. Check when the patient smiles the rim is harmonious with the lower lip

- Lower teeth should be set over the ridge and in the neutral zone for stability. A common error is setting lower posterior teeth with lingual inclination and lower anterior teeth too far forward of the ridge
- Respect the skeletal base relationship, as setting a Class II patient in a Class I setup will cause instability of the dentures. Class II patients often have an active mentalis muscle, and care is required in positioning the lower incisors. This may require either a horizontal space to allow the mentalis to contract without displacing the denture or retroclined teeth. The labial flange should not be bulky
- If using conventional rims, at the start trim the 'heels' from the distal aspect of upper and lower rims. This will greatly reduce inadvertent tipping of the rims and minimise occlusal errors
- All patients require bilateral simultaneous contact on closure. Carefully trim the rims to achieve this at the chosen OVD. Ensure adequate freeway space has been provided, taking several measurements to confirm. Rehearse closure into centric relation (CR) with the patient. A line can be marked on the rim to assess reproducibility. Reproducibility shows you have found centric relation
- When difficulty recording the retruded record is anticipated, remove the lower denture on arrival or place a cotton wool roll

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between the dentures. This allows some deprogramming to occur. Use the 'Fish' exercise and ask the patient to open and close without the lower denture in place as fast as they can; encourage maximum opening each time. When the patient's muscles have been exhausted, manipulate them into their retruded contact position (RCP) and record your jaw relationship. An alternate means of deprogramming is to use 'Occlusal pivots' as a therapeutic diagnostic on the old dentures. Roughen up the occlusal surfaces of the lower first and second premolars on each side of the denture. Add some composite bond to the rough surface and a mound of composite on it. Have the patient close up gently in RCP so they indent the composite with no other tooth contact. Cure the composite with the patient in this occlusal position. Smooth and polish the mound, removing excess composite but ensuring there is even contact on both left and right sides. Allow the patient to wear the denture for a few days. Most patients will benefit from increased stability of the lower denture as the even contact on closure will reseat the denture correctly on its supporting tissues

- Care should be taken to avoid increasing the vertical dimension. Cut four v-shaped notches in each rim. Wax is notoriously unreliable as a registration material so use a bite registration paste. Place some silicone adhesive on the lower rim and Vaseline on the upper rim. This allows you to check the reproducibility of your recording. Once completed, replace the rims on the casts

and check that they seat correctly, removing any spare plaster that gets in the way but taking care not to trim the denture extensions.

### 5. Managing resorbed lower ridges

The reduced area of support, proximity of muscle attachments to the ridge crest and thinning of mucosa may contribute to a patient complaint of loose and uncomfortable dentures:

- Manage the patient's expectations at the outset by explaining about the difficulties of making a stable and comfortable denture. Advise fixative will in all likelihood be needed. Fixative is helpful in the days after fit to minimise small unfamiliar movement that can be irritating
- Consider a neutral zone impression to improve the denture stability. This technique combined with meticulous border moulding will greatly improve denture stability
- Consider reducing the OVD to reduce load on the ridge. Reduce the size of the occlusal table, using narrow teeth, reducing length by leaving off last molar and avoiding loading the distal ridge incline
- At the 'fit' appointment, explain comprehensively about what to expect during acclimatisation to the new dentures. Include the likelihood of sore areas, transitory altered speech, increased saliva production, and learning a new chewing pattern
- A useful tip is to use a light-bodied silicone wash to identify potential areas of pressure that will cause soreness under the denture. This can eliminate many sore areas before they occur
  - Always check the occlusion for even, bilateral contact and no slide between retruded contact and denture ICP, before adjusting any of the fit surface. A good proportion of soreness can come from occlusal errors causing denture movement.

Once treatment has been completed, encourage the patient to return for regular reviews to have a soft tissue examination. Additionally, timely relines can help maintain functional dentures before replacement dentures are required.

We hope these tips will help in managing these often challenging cases. ■

### References

1. Fiske J, Davis D M, Frances C, Gelbier S. The emotional effects of tooth loss in edentulous people. *Br Dent J* 1998; **184**: 90–93.
2. The Glossary of Prosthodontic Terms: Ninth Edition. *J Prosthet Dent* 2017; doi: 10.1016/j.prosdent.2016.12.001.
3. Ellis J S, Pelekis N D, Thomason J M. Conventional rehabilitation of edentulous patients: the impact on oral health-related quality of life and patient satisfaction. *J Prosthodont* 2007; **16**: 37–42.
4. Berg E. Acceptance of full dentures. *Int Dent J* 1993; **43**: 299–306.
5. Leyssen W, Jayachandran S, Walmsley A D. Complete denture series part 1: referrals for complete dentures – identifying the reasons. *Dent Update* 2019; doi: 10.12968/denu.2019.46.5.466.
6. Shigli K, Awinashe V. Patient-dentist communication: an adjunct to successful complete denture treatment. *J Prosthodont* 2010; **19**: 491–493.
7. Bell D H. Provocative diagnosis: A rational approach to the management of problem denture patients. In Lefkowitz W (ed) *Proceedings of the Second International Prosthodontics Congress*. pp 31–32. St Louis: C. V. Mosby, 1979.
8. Someya S. The anatomical study of the sinew string observed on the buccal mucosa of mandibular second molar and posterior of retromolar pad. *J Acad Clin Dent* 2008; **28**: 14–20.
9. Watt D M, MacGregor A R. Chapter 2. *Designing complete dentures*. WB Saunders, 1976.