



Top tips for occlusion in primary care

By Andrew Harris,¹ Christopher Tredwin² and Ewen McColl³

On a daily basis, primary care clinicians may impact on occlusion whether placing a single restoration or more complex multiples in fixed prosthodontics. Whilst crucial to consider the dynamic nature of occlusion, this area is often overlooked. Neglecting to analyse the occlusion and the effect our interventions may have on it can significantly affect successful outcomes and accelerate failure if not managed carefully.

In this short paper, we discuss top tips for occlusion, highlighting that occlusion should be at the forefront of our thinking, in order to improve patient outcomes.

Simple occlusal analysis

Terminology alone can be confusing in occlusion with a plethora of different terminologies for the same positional/occlusal concepts.

You need to think separately to those with teeth and without teeth. For the dentate, there are three key occlusal positions that are relevant to the clinician:

- a. The intercuspal position (ICP) – also known as maximal intercuspal position (MIP): this is the complete intercuspal position of the opposing teeth independent of condylar position, sometimes referred to as the best fit of the teeth regardless of the condylar position.¹ This is the most closed the mandible can be
- b. Retruded axis position (RAP) – also known as centric relation (CR): this is a non-tooth determined position and dictated by anatomical structures (hard and soft tissues/muscles/ligaments). It is when the condyles articulate in the anterior-superior position against the posterior slopes of the articular eminences¹
- c. Retruded contact position (RCP) – this is the first tooth contact on closure of the mandible when in RAP, and may or may not be coincident with ICP. The presence of an RCP–ICP discrepancy has to be considered the norm for the majority of the population, with between 56–100% of patients in multiple studies reporting a discrepancy between the two.^{2,3,4,5}

There is a great capacity for adaptation and compensation, and as long as you remain in aesthetic parameters, freeway space is not a pivotal consideration in the dentate.

Most of the time in general practice, you will accept the current occlusal scheme and conform to it (conformative approach). If this is not possible (eg a severe tooth surface loss case where there is lack of occlusal space), then you will need to reorganise the occlusion at an increased vertical dimension (OVD) (reorganised approach). When reorganising, there is only one reference point that can be used to restore from and that is RAP.

Occlusion and restorations

If conforming, a simple tip is to check the occlusal contacts (ICP) on other teeth are the same before and after the restoration is placed.

It is important that any restoration has contact in the intercuspal position, as teeth may move if not in contact.^{6,7} Shearing forces are damaging for posterior restorations and in order to prevent fracture, dynamic tooth guided movement should not involve posterior restorations where possible ie the occlusion discludes off the restoration in any excursions.

It is important to identify where the slide from RCP to ICP is located prior to restoration. If the tooth to be restored is involved in producing that slide, you may unknowingly alter the slide between RCP and ICP. This unplanned occlusal adjustment may result in the created space for the restoration being lost.

If the slide from RCP to ICP involves your planned restoration, then articulated study casts should be made before tooth preparation, and mounted in RAP. A planned occlusal adjustment can then be made on the casts prior to being duplicated in the mouth, and the slide removed from the tooth.

Facebows (earbows)

The most commonly used facebows are average value ones and if occlusal analysis/changes are planned a facebow needs to be utilised in order to accurately set the models up on a semi-adjustable articulator. These approximate the position of the hinge axis (axis of opening of the mandible) of the condyle to the maxilla.

Additional patient information is obtained through a horizontal reference plane and allows an aesthetic perspective (often by paralleling to the inter-pupillary line) to be transferred to the articulator, and then to the laboratory. Due to the aesthetic utility offered by a facebow it is wise to make use of one if performing multiple anterior restorations.

Articulators

If conforming to ICP, an articulator may not be required (as in most cases in primary care) and often hand holding the casts or a simple plain line articulator will suffice. As cases get more complex and multiple units are involved then using an articulator may be more helpful.

If changes are required in the occlusal scheme then a semi-adjustable articulator should be used and the casts mounted on the articulator in RAP. An example of this is the management of a patient with severe tooth surface loss whereby you intend on increasing their vertical dimension.

The main parameter that determines how much to increase the OVD by will be aesthetics of the upper anterior teeth. As a rule of thumb, the upper incisors and canines should follow the contour of the lower lip line during smiling.

A diagnostic wax up can then be transferred from the models to the mouth utilising putty or a suck down splint, containing an acrylic based temporary crown material. The proposed occlusal scheme and aesthetics can be then assessed prior to definitive restoration preparation. ▶▶

¹Clinic Lead Devonport Dental Education Facility, Peninsula Dental School (University of Plymouth), Damerel Close, Madden Rd, Devonport, Devon PL1 4JZ, UK; ²Professor of Restorative Dentistry/Head of School, Peninsula Dental School (University of Plymouth), John Bull Building, 16 Research Way, Plymouth Science Park, Plymouth, Devon, PL6 8BU, UK; ³Director of Clinical Dentistry, Peninsula Dental School (University of Plymouth), Derriford Dental Education Facility, Plymouth Science Park, Research Way, Plymouth, PL6 8BT, UK

« Occlusion and dentures

For partially dentate patients, if there are sufficient tooth-to-tooth contacts to ensure a stable ICP, adequate inter-arch space for the denture, and few aesthetic concerns, generally conform.

For partial dentures, the occlusal plane and prosthetic tooth forms are usually dictated by the patient's established occlusal pattern in order to function harmoniously. Whilst the abutment teeth either side of a saddle can impart a degree of denture stability, partial denture teeth should not interfere with natural tooth contact in ICP or be involved in lateral excursions. Where possible denture tooth contact should be limited to bilateral and simultaneous contact of prosthetic teeth in ICP (Fig. 1).

Historically, the adopted occlusal scheme for complete dentures has been based around the concept of providing a balanced bilateral occlusion (BBO)/articulation; denture stability provided by simultaneous posterior occlusal contact of prosthetic teeth in ICP and eccentric positions. The conceptual importance of BBO has been challenged recently, BBO is difficult to technically achieve and a systematic review indicated little difference in masticatory performance or quality of life/satisfaction between BBO and other occlusal schemes.⁸

More importantly setting the occlusion in RAP is pivotal to the success of complete dentures. With the loss of periodontal mechanoreceptors and subsequent depletion of tactile sensory input to the central nervous system,⁹ RAP is the only reproducible reference position that patients possess. Freeway space also becomes important as the ability for adaptation and compensation as with teeth is lost. When a patient closes in RAP the mandible should rotate into ICP, and patients can simply reseat prostheses loosened by function by closing gently together. If not coincident patients have to guess where their ICP is located, upper and lower teeth clash and move, border seals break and dentures loosen. If you are having difficulties obtaining an accurate RAP record remove the patient's existing lower denture or place a cotton wool roll between the dentures to allow some deprogramming to occur.¹⁰

Even for those complete dentures set up correctly in RAP, instability can result from prosthetic tooth position. Avoid setting molar teeth posteriorly on the upward sweep of the mandible because

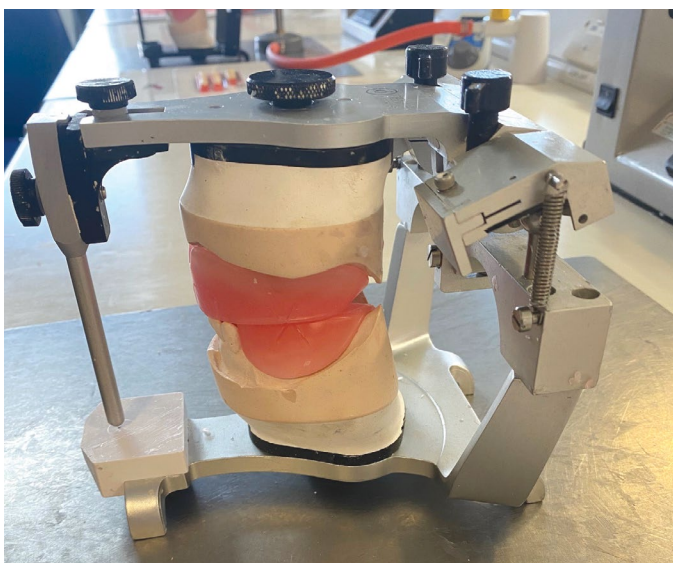


Fig. 1 Occlusal considerations in denture construction

dislodging forces can be created in function. It is quite acceptable for the occlusal scheme to finish at the first molars. For those with poor neuromuscular control there should be some freedom of movement in ICP to avoid occlusal locking and subsequent movement – consider occlusal adjustment or utilising cusplless teeth.¹¹

Occlusion and periodontology

Studies by Ericson and Lindhe¹² suggested that, in the presence of uncontrolled periodontitis, greater attachment loss could occur in the presence of occlusal trauma. This suggested that occlusal trauma may exacerbate periodontitis. However, this effect has only been shown in some animal studies, and the evidence for this so-called co-destructive effect is weak. Such effects have not been shown in human studies, and there is a lack of evidence from such human studies to implicate occlusal trauma in the progression of attachment loss in periodontitis.

Whereas some clinicians advocate occlusal intervention to reduce occlusal trauma in periodontitis patients, a relatively recent Cochrane systematic review showed that there was insufficient evidence to justify such treatment in periodontitis cases.¹³ The World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions (2018)¹⁴ has stated that there is no evidence that traumatic occlusal forces cause periodontal attachment loss in humans.

Conclusions

Understanding of occlusion and the effect our clinical interventions have on occlusion is an essential element of daily clinical practice affecting all disciplines in dentistry. In this short paper, we have presented tips and observations that we have found to help in managing occlusion to avoid occlusal disharmony and the complications this may bring. We hope these tips will be useful in allowing clinicians to think about occlusion and dispel some of the confusion that often exists around discussions in this area. ■

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