How To Avoid Occlusal Adjustments
When Placing Final Restorations

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To ensure long-term success, a greater understanding of occlusal concepts needs to be incorporated into the restorations we provide our patients. We must ensure that the beautiful smiles we create today will hold up to the rigors of mastication and occlusal forces well into the future.

Fixed restorations have come a long way since the early days of cast gold restorations with pyrophylact (acrylic) facings. New materials are being developed and techniques are simplified to make these materials advances more economical and viable to the dental community. Beautiful, lifelike reproductions of teeth (Fig. 1) can be created with a variety of different materials, such as:

- porcelain fused to metal
- porcelain layered onto zirconia
- full contour zirconia
- lithium disilicate glass-ceramic
- polymer glass

As well, restorations can be fabricated in many forms, i.e. being cemented onto natural teeth or implant abutments. They can also be designed as one-piece, screw-retained implant restorations with occlusal access holes. But what about function?

Improper occlusal relationships can be a major cause of failure, not just to the teeth, but to the entire oral maxillofacial complex. When teeth do not function in harmony with each other, more is at stake than just the teeth or the restorations that are fabricated to replace them. Yes, teeth and crowns can break or chip to avoid the interferences created, however, greater problems can manifest over time. Many of today’s restorations are being fabricated out of harder and stronger materials that resist fracture. Occlusal forces are being directed away from the teeth to other areas of the system. The muscles of mastication can be put under stress, leading to clenching and grinding, which can further exacerbate the situation. Temporal mandibular joints can be diverted from their optimal movements causing pain and discomfort. As well, with prolonged muscle strain, skeletal changes can occur, which puts further strain on the entire neuromuscular system.

Teeth need to work and function in harmony with each other.1 They must provide for maximum interdigitation in function and working contacts.2 At the same time, they must allow for the free range of motion provided by the reduction of interferences in excursive movements.3,4 This means providing restorations that require minimal occlusal adjustments.

Through discussions with dentists for almost thirty years, we found the number one complaint with fixed restorations, regardless of the material selected, is the excessive time lost associated with adjusting the occlusion or even having to grind in the bites. But why does this occur? Can we not capture a proper occlusal relationship?

To overcome the need to make excessive occlusal adjustments, some clinicians have requested that their restorations be fabricated with varying thicknesses of metal foil placed on the opposing teeth to the restoration being fabricated (Fig. 2).5 This will create a space, and depending on the cause of the interference, may provide enough relief to keep the restoration out of occlusion and prevent the need to adjust the restoration.

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References
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However, it does not address the root cause of the issue and results will vary. This can leave the restoration either in hypo-occlusion or too far out of occlusion, and allow the undesirable consequence of tooth over eruption. The vast majority of inaccuracies are still being fabricated on casts mounted on some type of articulator to allow the simulation of movement of the mandible. These casts have generally been made of low expansion, resin-reinforced, dental gypsum products. Today's dentists progress into the digital age, these models can now be printed out of resins (Fig. 3).

To capture the relationship between the maxillary and mandibular arches, an intraoral bite registration is taken. Once impressions or digital scans of the arches, a physical or digital articulating instrument that relates these models to each other, measurements provided. These simple articulators do nothing to relate the dentition to the patient's condyles or to the base of the skull, and thus provide none of the information needed to create free function. They are simple and inexpensive, and they lack the necessary information that is needed to ensure interferences are not inadvertently built into our restorations. Be it adjustable or simple articulators, neither address the concern of pre-maturities in occlusion, which hold the casts apart once they are mounted.

With all mounted models, regardless of the method with which the arches are captured and regardless of the articulating instrument that relates these models to each other, interferences in the occlusion will most likely occur. These interferences can take the form intrusurally, or natural high spots in occlusion, where a tooth or several teeth contact prematurely in occlusion. Usually due to the periodontal ligaments, these teeth with premature contacts can depress into their sockets or move laterally out of the way.

Sometimes these interferences are the result of inaccuracies with the impressions provided (Fig. 7) and can take the form of positive bubbles on the occlusal surfaces of the casts or outright distortions to the natural shape and contours of the teeth (Fig. 8). Regardless of what causes these interferences, they all produce the same result; they do not allow the teeth of the casts to occlude into maximum interdigitation. They, in fact, hold the models apart and create an open bite. If these interferences are not noticed and eliminated, the final restoration, regardless of material or design, will be high in occlusion when placed intraorally.

We have taken these concepts and related them to the stone and/or resin articulated casts. The technique consists of first eliminating all bubbles and noticeable irregularities from the occluding surfaces of the casts (Fig. 9). Secondly, with fine articulating paper (Bausch Arti-File, 8 micron, black, double-sided) we look for high spots in occlusion (Fig. 10). These could be naturally occurring high spots, distortions in the impression technique, or errors in the model fabrication technique. Thirdly, we then eliminate these high spots, with a #3 round bur (HPB Jet Carbide) at low speed, until more stable contact markings appear (Fig. 11). These stable contact areas are similar to the Clayton Centric Stops (Fig. 12) developed by Dr. JA Clayton. It may take several attempts of marking and eliminating interferences, until the mounted models show more stable occlusal markings and more accurately represent the patient’s true occlusal contacts. Since implementing this technique over 17 years ago, we’ve surmised that we have been able to successfully eliminate approximately 95 per cent of all chair-side occlusal adjustments to our restorations.

Today’s dentists and dental technologists are constantly striving to enhance the patient experience. At the same time, as we are working to develop better materials, creating advanced designs, and engineering newer techniques, we can be applying clinical techniques in the laboratory setting to create restorations that reduce the need for adjustments and provide longevity. By ensuring that we do not inadvertently create pre-maturities in occlusion, we can be confident that we are helping to build a more sustainable system that can function with ease for the patient’s lifetime.

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