The Basics Of Occlusion With ClinCheck® Software
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As General Practitioners, we are often uncertain as to what we want the outcome of our Invisalign treatment to be. When I first started treating with Invisalign aligners, I was happy when a patient’s teeth were straight at the end of treatment. With Invisalign treatment, within certain parameters, we can start with a clean slate and work from there. In a way, it is similar to when I was in dental school setting denture teeth. I could place the teeth wherever, but the final result was always better if I took note of certain anatomic landmarks, facial measurements, smile line, etc., and had an idea of how I wanted the smile to look. With the Invisalign ClinCheck treatment plan we are able to design, with a high degree of certainty, the smile we want the patient to have before we even begin treatment.

So what are the basics of smile design and a functional occlusion that will allow us to provide our patients with the very best function, esthetics, and health?

**FINAL OCCLUSION GOALS**

I always prefer to have the final occlusion in centric relation rather than centric occlusion. If during initial examination, there is no joint pathology or muscle or joint symptoms, I will treat the patient in centric occlusion and then equilibrate the patient in centric relation at the end of treatment. If there are any joint or muscle symptoms, I will pre-treat the patient with appliance therapy to relieve symptoms and then treat the patient in centric relation.

**ARCH FORM GOALS**

Arch form is one of the first things I think about when treatment planning. The more ideal form we are able to attain, the better the result we can achieve. The best arch form is U-shaped and this form begins in the anterior segment. When treatment planning for Invisalign aligners, I want the maxillary incisors to be in golden proportion.

That is, when viewing the maxillary anterior six teeth from the anterior view, the central incisors should appear 1.6 times the size of the lateral incisors in their width and the mesial third of the canines should appear 0.6 times the size of the laterals. If the laterals are too small, the arch form will tend to be V-shaped. If the laterals are too large in relation to the centrals, the arch will be too squared. Also, I like the width of the centrals to be 80% of the length, which means a central that is 8mm wide should be 10mm in length.

In addition, for ideal arch form, I would like the posterior teeth to stepwise; that is, from the anterior view, the premolars and molars would step back in equal proportion. This is better known as the buccal corridor, and it can be controlled using Invisalign aligners. The smile appears more youthful the more the posterior teeth show.
COSMETIC GOALS

Having the anterior teeth in golden proportion is not enough to ensure a good cosmetic and functional result. The incisal edge position is equally important. I always have the patient say “fifty-five” to determine where the maxillary incisor edge hits on the lower lip. Ideally, the incisal edge will hit at the inner vermillion border of the lower lip during the “f” sound. If the centrals bury into the lower lip and we build our case on that extruded position, then the result will be a gummy smile even if the golden proportion is correct. Conversely, if the centrals are naturally intruded, we may end up with centrals that do not show when smiling. Additionally, I have the patient say “sixty six” to evaluate the relationship of the upper to lower incisors. I like to have the upper and lower edges within a millimeter of each other both vertically and horizontally with the “s” sound. I also look at the nasolabial line angle. For men, this angle should be 90-95 degrees and for women 95-105 degrees.

FUNCTIONAL GOALS

In optimum function, the lower arch should have a proper curve of Spee and curve of Wilson, together known as the plane of occlusion. This curvature of the mandibular arch is crucial to allow for the posterior teeth to disclude during excursive movements and avoid lateral forces on the posterior teeth. From centric relation position of the mandible where the muscles are able to function in the way they were intended, there can be no working or balancing interferences when the mandible moves in a lateral excursion or when the mandible moves forward. In other words, there needs to be a definite cuspid rise ideally or at least good group function.

Anterior guidance within the envelope of function also is needed as it is one of the determinants of a healthy occlusion. I tell patients that this combination of cuspid rise and anterior guidance is like a curbing on a street. The curbing is not there for you to drive against but to drive within. As long as you stay within the curbing, you will be okay. If you were not paying attention while driving and you hit the curbing, it would wake you and remind you to drive within the curbing. And if the curbing were not there and you were not paying attention, you could drive off the road and injure yourself or someone else. Of course, we would look silly walking around moving our jaw in a cuspid rise or anterior guidance type movement for no reason. The point is that these determinants are our curbing. They are there for a reason, which is to protect our back teeth and allow us to function without giving a thought to the safety of our teeth. So anterior teeth protect the posterior teeth as long as the posterior teeth disclude the moment either condyle starts to move from its fixed centric relation condylar position. This allows the muscles to fire when they are meant to fire and relax when they are meant to relax. Otherwise, there will be muscle activity that is counterproductive to maintaining a healthy, functional, and sustainable dentition.
Another key ingredient is that the posterior teeth in maximum intercuspation in centric relation should only contact on cusp tips and fossas/marginal ridges and there should be contact on all teeth. As soon as the mandible is moved into any other position, the posterior teeth should immediately disclude. In this way, forces are only applied in a vertical direction and there is no lateral torque on any posterior tooth.

It seems like a lot to think about but in reality it is what we do every day in our restorative and cosmetic practices. Now, with Invisalign® aligners, we are able to combine all these elements into a comprehensive treatment plan.

ABOUT DR. GARDNER

Dr. Edward Gardner has been treating patients with Invisalign aligners at his practice in Richmond, Virginia since 2002. Along with practicing dentistry for 40 years he has lectured, conducted seminars and consulted with dental professionals throughout the United States. Dr. Gardner holds a Business Administration Degree from The College of William and Mary and a DDS from the Medical College of Virginia, Virginia Commonwealth University.