Egyptian Prosthodontic Association (EPA Newsletter)

Clinical Guidelines for Occlusal adjustment & equilibration

Electronic Newsletter

Volume 3. Issue 4

April 2024

One of the major problems that most dentists encounter in their daily practice is the reported masticatory discomfort by the patient secondary to newly formed dental restorations. The "high spots" complaint is always familiar to the operators whether in simple single composite restorations or full mouth rehabilitation cases. Though it might appear as a simple procedure at first that can be resolved in a recall visit quickly, it can turn into an everlasting nightmare for the fellow dentist that may jeopardize the success of the dental work.[1]

If we take a relaxed but thorough look at the problem, we can conclude that it can be attributed to two main reasons; the first one is that most of our restorations are designed in a static fashion, that is identifying the accuracy of occlusal contacts according to the patient's closure in centric occlusion or maximum intercuspation, neglecting the dynamic nature of the patient's chewing function and mandibular movements. This means that the dentist should be aware of the different eccentric movements (lateral & protrusive excursions), and how to adapt the teeth and restorative contacts accordingly.[2]

The other reason would be the presence of interferences on the occlusal surfaces that may be due to either the wrong position of the anatomical contacts or the unequally balanced magnitude of the contacts' pressure, and hence the need for occlusal adjustments and equilibration. And despite both terms are always concomitant, there's a big difference between both procedures.[3]

Occlusal adjustments denote the procedure of correction or re-establishment of the correct position of the occlusal anatomy (e.g., the accurate location of the cusps, grooves, fossae ...etc.), while occlusal equilibration dictates the equalization of the strength and magnitude of the contact points to be in harmony with other occluding surfaces in the oral cavity. [2]

Before we proceed with the description of the interferences and how to deal with each of them in all mandibular movements, we must identify some guidelines at first that can help us going through out the procedure including:

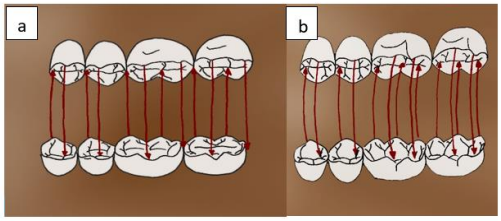

FIGURE (1): a) cusp to marginal ridge. b) cusp to fossa

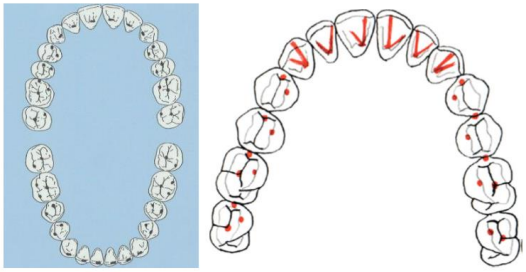

FIGURE (2): visualization of the correct occlusal scheme

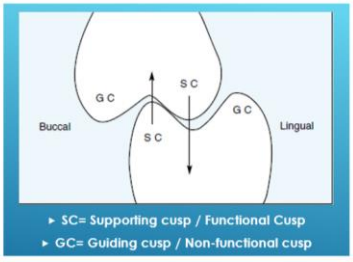

FIGURE (3): Functional and Non-functional cusps

FIGURE (4) : initial point of contact or centric slide

1- visualization of the correct static occlusal scheme that we are aiming to reach. There are two theories regarding static occlusion which are “cusp to marginal ridge” and “cusp to fossae”. The former concept describes that the cusps of one tooth should occlude with marginal ridges of the opposing tooth (a tooth to two teeth concept), while the latter one dictates that the cusps should articulate with central and triangular fossae of the opposite tooth (a tooth-to-tooth concept) Figure 1. The cusp to fossa concept is better as it directs more axial loads on the teeth that are well perceived and tolerated by the periodontium. So, it should always be our final goal as shown in Figure 2.[4]

2- the occlusal equilibration should be selective, non-harmful to the patient, non-restrictive to mandibular movements and provide stability for muscles and TMJs.[2]

3- occlusal equilibration must not be performed with unstable TMJs (no pain or discomfort)[2]

4- you should always pay attention to the location of functioning cusps (buccal in mandible and palatal in maxilla) and non-functioning cusps (vice versa)[1] as shown in Figure 3.

Now we can safely identify and eliminate occlusal interferences, whether in centric (static) position or in excursive (dynamic) movements.

A- CENTRIC INTERFERENCES:

The first tooth contact (FTC) on the arc of rotation of mandibular movement when the MIP does not coincide with the centric reaction (initial point of contact or centric slide)[1] figure 4.

This slide can result in anterior displacement of the mandible leading to occlusal trauma to the incisors, which can be manifest as fractured restorations, drifting of teeth[1]. Elimination of this interference depends on its position according to arc of closure (antero-posterior) and line of closure (medio-lateral)[2]

1- Interfere with arc of closure

Grinding rule: **MUDL** (mesial slop of upper cusp & distal slop of lower cusp) figure 5

2-Interfere with centric relation / line of closure

Grinding rules:

1. If the interfering incline causes the mandible to deviate off the line of closure toward the cheek, grind the buccal incline of the upper or the lingual incline of the lower, or both inclines. **BULL**

2. If the interfering incline causes the mandible to deviate off the line of closure toward the tongue, grind the lingual incline of the upper or the buccal incline of the lower, or both inclines. **LUBL** FIGURE 6

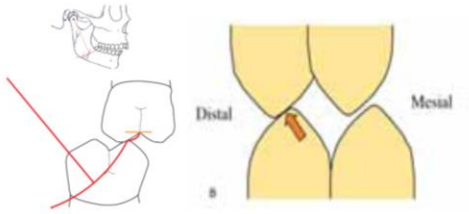

Figure (5): MUDL Rule

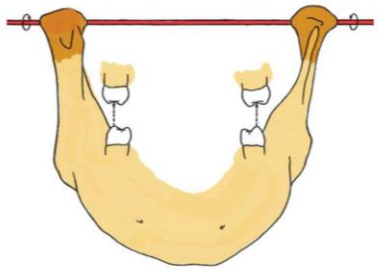
Figure (6): centric interference with the line of closure

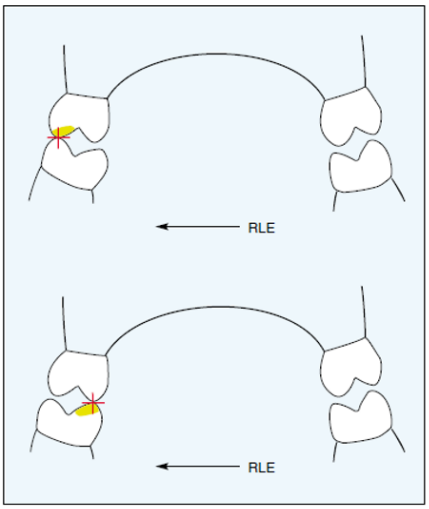

Figure (7): BULL Rule

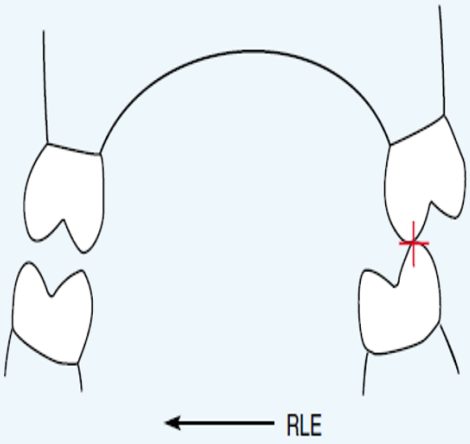

Figure (8): Non-Working interferences

B- LATERAL EXCURSIVE INTERFERENCES:

I- Working-side interference: Separates the other teeth of the working side and occurs between the outer inclines of the maxillary supporting cusps and the inner inclines of the mandibular guiding cusps and vice versa. Here we follow the BULL rule explained before[3]. Figure 7

II- Non-Working side interference: The involved tooth/teeth acts as a pivot and shifts the fulcrum from the (TMJ), lifting the working-side teeth out of contact. It has a negative effect on the stability of the TMJs.[3]

The relevant teeth are overloaded, as occlusal forces are imposed on these teeth and outside their long axes. The interference occurs between the inner incline of both opposing functional cusps. (Figure 8) To maintain cusp height, try grinding inclines so making the cusp narrower.[1]

The grinding rules for lateral excursion in general are very simple. Grind all marks on cusp inclines (red marks) and never touch the cusp tips or central fossa (black marks). Complete elimination of all posterior excursive contact the moment the mandible leaves centric allows the canine guidance to separate the posterior teeth and shut off most of the elevator muscles[2]. Figure 9

The grinding rules for lateral excursion in general are very simple. Grind all marks on cusp inclines (red marks) and never touch the cusp tips or central fossa (black marks). Complete elimination of all posterior excursive contact the moment the mandible leaves centric allows the canine guidance to separate the posterior teeth and shut off most of the elevator muscles[2]. Figure 9

C- Protrusive Interference:

Protrusive interference occurs between the mesial inclines of the mandibular posterior teeth and the distal inclines of the maxillary posterior teeth during mandibular protrusion[3]

It causes disocclusion of the anterior teeth during this movement. It may also cause locking of the mandible. [3] Figure 10

The rule for eliminating protrusive interferences is **DUML**:

Grind the Distal inclines of the Upper or, in some instances, the Mesial incline of the Lower teeth (Figure 11) [2]

D- Adjusting the Anterior Guidance:

Treatment objective

1. Stable holding contacts on all anterior teeth.

2. Continuous contact from centric to incisal edges on as many anterior teeth as possible in all excursions.

3. Anterior guidance in harmony with the patient's normal envelope of function.

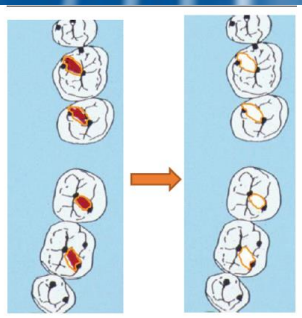

Figure (9): lateral excursive interferences

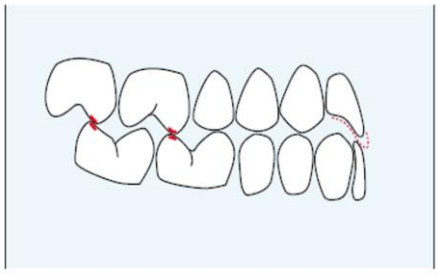

Figure (10): protrusive interferences cause anterior disocclusion

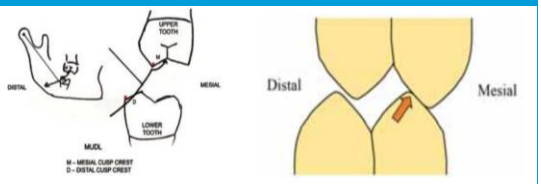

Figure (11): DUML Rule

Figure (12): canine guidance vs anterior group function

Figure (13): occlusal contacts detection

4. Immediate disocclusion of all posterior teeth as soon as the mandible leaves centric relation in any excursion.

The scheme of Anterior Guidance in lateral excursion can be either canine guidance[4] or anterior group function[2]. Figure 12

The more vertical the envelope of function, the more likely you will have canine-only contact in lateral excursions. The flatter the envelope of function (more horizontal pattern), the more likely you will have group function.

E- Detection of occlusal contacts:

Most of the fellow dentists use the available articulating paper without paying attention to their film thicknesses. The available ordinary articulating papers range between 70, 110, or even 200 microns. Which are considered less sensitive to accurately detect the presence of true high spots. In fact, it's recommended to use the 40 µm at first, followed by using the 20 µm. Any smudges, halo, bull's eye, or slide marks that are heavily painted and not evenly and correctly distributed on the teeth are considered interferences and should be eliminated as discussed before.[1]

Finally, shim stock (8-12µm) is used to verify the presence of occlusal contact on the right, left and anterior segments of the oral cavity.[1] Figure 13

F- DYNAMIC-STATIC vs STATIC-DYNAMIC:

The order of adjustment has been debatable in the literature all over the years. Some authors recommended starting with the centric interferences at first, as they represent the starting and end points of the movements.[2,3] Others suggested the adjustment of eccentric movements at first, as this will produce a clear representation of the occlusion. They believed that it is much more reliable than the 'static-dynamic' examination order, which tends to rub off the static occlusion marks during the excursive movements. [1]

Recently many clinicians have adopted the concept of "CENTRIC-LATERAL-CENTRIC".

POSTITION/ MOVEMENT	INTERFERENCES	ABBREVIATION
CENTRIC	Mesial inclines of upper/Distal inclines of lower	**MUDL**
Working side	Inner inclines of non-functional cusps (buccal upper/lingual lower)	**BULL**
NON-working	Inner inclines of functional cusps (DONT' SHORTEN CUSP TIPS)	**PUBL**
PROTRUSIVE	Distal inclines of upper/Mesial inclines of lower	**DUML**

References

1-Warreth, A. et al. (2015). Fundamentals of occlusion and restorative dentistry. Part II: occlusal contacts, interferences and occlusal considerations in implant patients. Journal Of the Irish Dental Association, 61(5), 252–259.

2- Dawson, P.E. (2007) Functional Occlusion: From TMJ to Smile Design. CV Mosby, St. Louis, 48-50, 76-96, 108, 264-275, 281, 297, 352-354, 408.

3- Okeson Jeffrey P. 1989. Management of Temporomandibular Disorders and Occlusion. 2nd ed. St. Louis: Mosby.

4- Adel M. El-Tannir. (2019) A Simple Approach To Occlusion. Fixed prosthodontics department, Faculty of dentistry, Cairo University

Egyptian Prosthodontic Association (EPA)

Address: 15 Ahmed Abo El-Ela St. – 8th district Nasr City, Cairo Egypt.

Mobile : 010 28203484 (Calls & Whatsapp) Phone: 02 26705035