

In The Operatory

The Missing Factor in Cosmetic Dentistry: Occlusion

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Imagine your best day ever in the office. Picture finishing work on your favorite patient. What did the work look like? Was it easy, almost predictable how perfect it would be? Were there good feelings all around; proud at the completion of a job well done? How about payment, was everyone satisfied with a fair fee for excellent service? Wouldn't it be great if not only our favorite patients could be like this, but every patient, every single day? All these positives rarely happen by accident, in general they all require advance planning of a specified goal and the underlying knowledge to accomplish it. Most dentists graduate dental school: a) traumatized, and b) with the ability to churn out amalgams. Some dentists aspire to more; to minimize or eliminate amalgams, to do fixed prosthodontics, tooth colored restorations, cosmetic dentistry, but are turned back by insufficient time, inability to get paid superior fees for superior service, and/or fear of breakage.

Things break because they are overloaded by stress. In the mouth, form follows function or, in other words, stress is caused by factors of occlusion. Conversely, in our practices mental overload and stress can be caused by things breaking. If our goal is to minimize stress in both our practices and our dentistry, then a thorough understanding of what causes those stresses and a plan to eliminate them is in order. Thus, by understanding fundamental factors of occlusion, we can increase the life span of our restorations, expand the range of services we offer, improve our financial

conditions, as well as our personal and professional satisfaction.

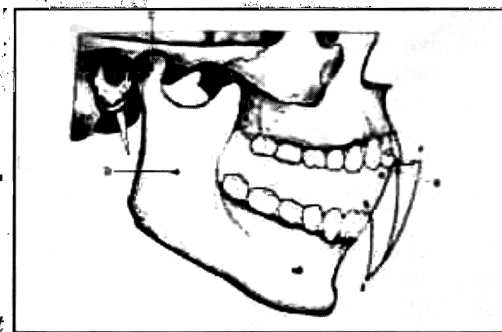
Occlusal Considerations

There are four major factors in occlusion:

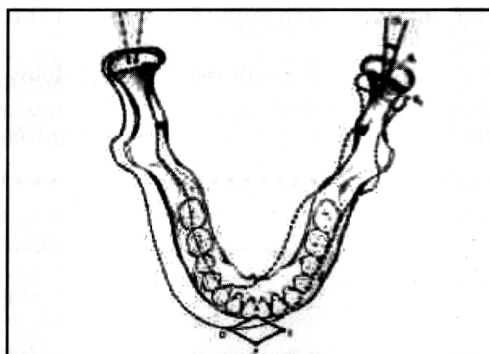
- 1) Simultaneous, pinpoint, contact in centric
- 2) Immediate anterior disclusion in all excursions
- 3) Progressive anterior guidance
- 4) Narrow Buccal-Lingual occlusal width

These basic generalizations on the surface may not appear to cover every situation, yet when considered closely are quite powerful.

- 1) Simultaneous, pinpoint, contact in centric



contact



are

Centric

figure 3

centric, the immediate lift off - guided by the anterior teeth - prevents the posterior teeth from touching anywhere other than centric.

Progressive anterior guidance. The most commonly known form of anterior guidance is canine guidance.

This is an excellent starting point, but why should all excursive forces be concentrated on one poor canine? Instead, by designing a progressive anterior guidance, it is possible to spread out excursive forces

equally, so they are distributed among all of the anterior teeth. Therefore, although we begin with canine guidance, the guidance should quickly and gently transfer to the lateral incisors, and then to the central incisors upon which to ride the rest of the lateral excursion, all on a pinpoint sized contact.

Narrow Buccal-Lingual occlusal width. This concept was taught widely by the late, great Dr. Elliot Feinberg,

our starting point of centric into excursions. *Immediately,* all posterior teeth are disoccluded by the anterior teeth. In other words, although all teeth are touching in cen-

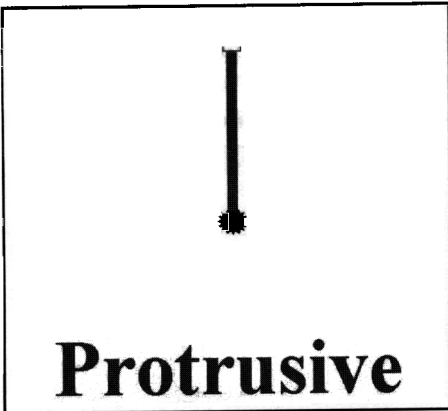


figure 4

Lateral Excursions

figure 5

cians. As craftsmen, lab techs enjoy fabricating porcelain, lots of porcelain, so much so, in fact, that many times they will fabricate a crown and actually make it

Occlusal Anatomy

Indeed, to impress dentists with their skill, lab technicians will routinely decorate the occlusal surface of restorations with a myriad of unnecessary stains

and grooves, also known as "cat scratches." Actually, these embellishments, although admired by dentists ignorant of their pointlessness, are many times offensive to patients. The posterior occlusal anatomy truly necessary from a Gnathologic standpoint is quite simple, and consists of the "Escape grooves" needed to allow opposing cusps to travel through fossae in excursions without hitting, throughout the envelope of motion. The envelope of motion is most popularly thought of in the sagittal plane, as in *figure one*, however it can also be viewed from the occlusal plane as seen in *figure two*.

Another way to think of it is to reconsider our four major occlusal considerations. We know from #1 that all that is needed in centric is a pinpoint contact with an opposing cusp in a central fossa, as in *figure three*. We then can imagine this opposing cusp traveling into protrusive and the path it would trace, as in *figure four*.

Returning to centric, we can further picture our opposing cusp traveling into right and left lateral excursions, as in *figure five*. Even in classic centric relation one must always allow for a small amount of potential retrusive movement, as seen in *figure six*. Finally, the mandible can make minor border movements as seen in *figure seven*. It's no coincidence, then, that if we superimpose these movements onto the occlusal of a mandibular first molar they perfectly match the basic necessary dental anatomy (*figure eight*).

larger than the tooth it was replacing. This over building can result in unsupported porcelain - which is more prone to fracture - and extra wide buccal and lingual cusps with porcelain sticking out, presenting the possibility of the jaw finding eccentric balancing contacts - which can lead to bruxism.

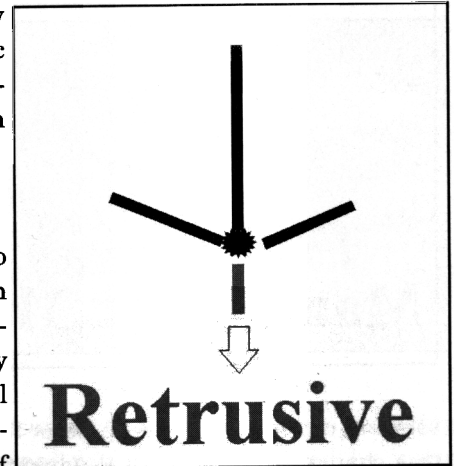


figure 6

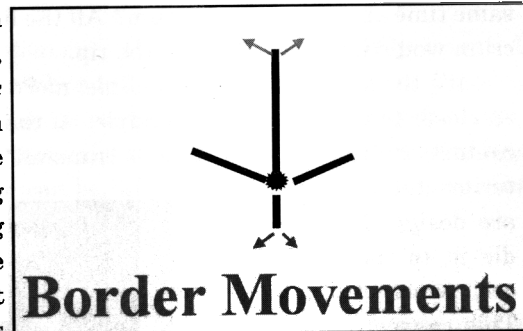


figure 7

Mechanical Considerations

The importance of these escape grooves is to eliminate the possibility of posterior eccentric interferences, and minimize the occlusal forces on anterior teeth. Imagine trying

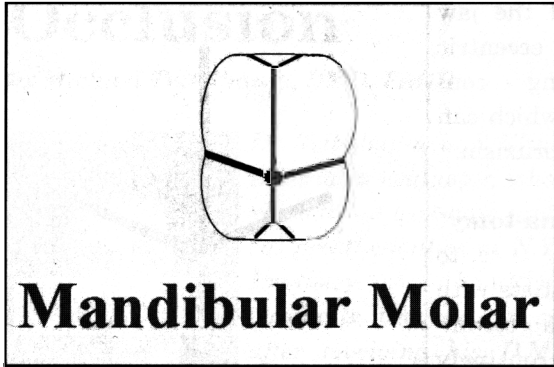


figure 8

to cut something hard or thick with a pair of scissors. Empirically, you know to gain more force you would not use the tip of the scissors, but cut closer to the handle, or fulcrum. In point of fact, this changes the mechanical advantage from a class three lever system to a Class two lever system (see *figure nine*), and generates a tremendously greater amount of force. But what if you could have something contact the outer tip at the

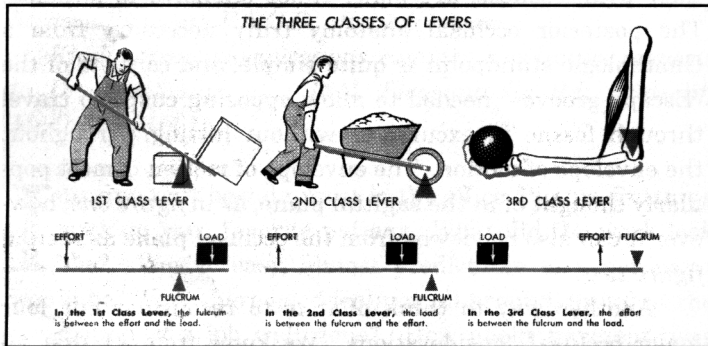


figure 9

same time as close to the fulcrum? All the force from the fulcrum would be transmitted to the tip.

It's the same with the mandible: more force is generated closer to the fulcrum, or condyle. If there are balancing contacts or interferences, force is transmitted from the posterior teeth, which are designed to handle it, to the anterior teeth, which are not. This causes many of the fractures and chips we see in anterior teeth, and is a critical factor in restoring them.

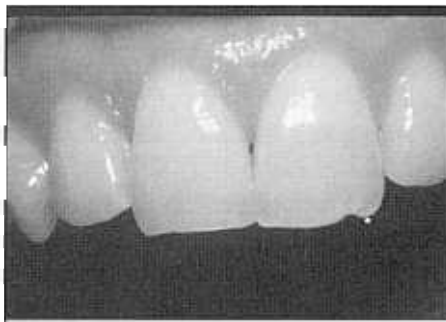


figure 10

Clinical Considerations

Figure ten shows just such a fracture of an anterior tooth. In this simple example we can see that there currently are no posterior balancing contacts and that the damage was probably done from a long-term anterior balancing

contact in crossover position between teeth #9 and #25 (see *figure 11*). This balancing position most likely began when there actually were posterior teeth balancing against these two teeth. These

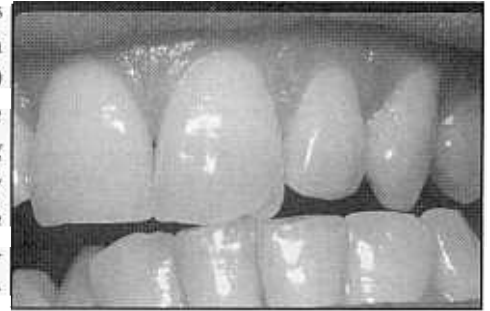


figure 11

posterior balancing teeth have most likely been long since either extracted or exfoliated. Since this patient had long since felt that his maxillary central incisors were too long anyway, it was a relatively simple procedure to shorten them to eliminate the fractured area (see *figure 12*) then round and polish the incisal edges of both maxillary and mandibular incisors to eliminate any future potential balancing areas. *Figure 13* shows the patient having slid all the way to a maximum lateral excursion finding no area to balance on.

Our next case shows a young woman who presented having just fractured teeth #9 and #8 (see *Figure 14*). Sliding her mandible into extreme excursions finds her jaw naturally stops

when tooth #20 "clicks" into the fractured area, as in *figure 15*. Upon further examination it can also be seen that she has posterior balancing contacts at the same lateral



figure 12

crossover position on both right and left (see *figures 16 and 17*). This balancing tripod effect most likely contributed to excessive force long-term on the anterior teeth which, unable to take the load, eventually fractured. There is no composite material stronger than enamel - the hardest substance in the human body. Her balancing contacts enabled the patient to develop enough force to fracture enamel, so it is only reasonable to assume that she would be able to fracture any composite replacement in a much shorter period of time.



figure 13

Initial attempts, therefore, were to eliminate the posterior contacts in the locking crossover position.



figure 14

Unfortunately, this only shortened her vertical dimension in this position, deepening the anterior overlap into the fracture. The only way, then, to eliminate excessive forces caused

by the posterior contacts was to build up the fractured incisal edges, creating an anterior guidance with a class three lever system.

After first selecting a shade, first tooth #9 then tooth #8 (separately) were first bevelled, then sandblasted, etched then bonded with a hydrophilic bonding system. They were then incrementally built up and cured with matching shaded composites until the posterior cusps were no longer contacting in the crossover position. The patient's ability to

smoothly translate throughout all excursions without locking was verified and then double checked with 10 micron thick articulating paper. Both anterior and posterior teeth were then highly



figure 15

polished (see figure 18). Upon examination the patient remarked that her newly restored teeth looked just as they had when she had been younger, before she'd begun to wear them down.

Financial Considerations

Therefore, it is important to understand how mechanical forces effect occlusion throughout the envelope of function, and in all



figure 16

the teeth in question been repaired without regard to the occlusal forces on them that had caused the fractures, there is no question that the repairs would have been short lasting, indeed. Unfortunately, this kind of diagnosis and meticulous treat-

ment requires substantially more time throughout all phases of treatment. Spending more time per patient obviously translates into not being able to physically treat as many patients. While it certainly should be our mission to help all in need, unless we

are fairly compensated for this increased time and subsequent drop in patient flow, it can lead to financial difficulties, and an inability to help anyone. It is unlikely that a dentist doing this kind of thorough



figure 17

occlusal/ restorative treatment could long survive accepting merely a few dollars per restoration as offered by many managed care plans, especially when just overhead would likely come to a high multiple of this number. Is it fair to ask our patients to pay a higher fee for a higher quality of service? As providers of dental care services should we model ourselves after either Nordstrom's or Wal-Mart, the

Four Seasons or Holiday Inn? This is a question that each dentist must answer for him or herself. Just as there must be room in the marketplace



figure 18

for the comprehensive, Pankey-style, occlusally oriented, amalgam free, all bonded, insurance-independent practice, so must there also be room for the opposite. In a free marketplace one cannot exist without the other. Our choice is to decide which we can be, which we want to be, and if we can live with that decision.

References

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