LCIAD Information sheet: 10

Occlusal analysis, treatment of temporomandibular joint dysfunction (TMD), deprogramming and equilibration -

A digital copy of this document is also available on our website https://www.lciad.co.uk/patient-dental-information-sheets/

This information sheet contains generic information and must be read in conjunction with your personalised treatment plan, which gives specific advice.

1. General information

Your natural teeth as part of your general masticatory (chewing) system are expected to give a lifetime of function. They are subject to substantial repetitive forces of very high magnitude throughout life. Most machines that would be expected to function like the human masticatory system over many decades would wear out, break and certainly require spare parts. Our natural teeth can last a lifetime and withstand this punishment, but only if they work harmoniously with your jaw joints, musculature, central neurological control and physical harmony of movement during your chewing cycle. If a tooth or piece of dental work breaks, there is a reason. The usual reason (other than direct damage through trauma such as biting on an olive stone) is what we refer to as occlusal disease or occlusal dysfunction.

Diagnosing problems in the masticatory system involves looking carefully at the jaw joints (temporomandibular joints) and the way the teeth meet together not just statically, but also across the whole envelope of lower jaw movement during function. It is our experience at LCIAD that most dental surgeons in the UK do not look closely at this aspect of function. We have therefore been running courses on teaching our colleagues how to systematically address occlusal disease since 2003.

2. How do I know I have occlusal dysfunction?

Most people are not aware of their bite as they develop through childhood and early adulthood. Many will undertake orthodontic treatment to straighten crooked or misaligned teeth. However orthodontic straightening on its own, whilst looking aesthetically better, often does not create a stable final bite and may indeed make your bite worse unless it is planned and carried out very carefully.

Occlusal disease can manifest in many ways:

- repeated breakage of teeth or dental restorations
- the feeling of not having a stable bite or having multiple bite positions
- a history of dental restorations requiring repeated adjustment to establish a comfortable bite (and often still not being satisfactory)
- rapidly advancing tooth wear for a patient's age
- mobile teeth that may eventually become uncomfortable to bite on
- teeth that move out of their normal positions

- breaking orthodontic retainers
- chipping of the enamel at the neck of the teeth (abfraction)
- muscle discomfort or pain during chewing
- clicking, locking or pain from the jaw joints that gets progressively worse over time
- vertical splitting of teeth where they cannot be saved and need to be removed

3. How should my bite work?

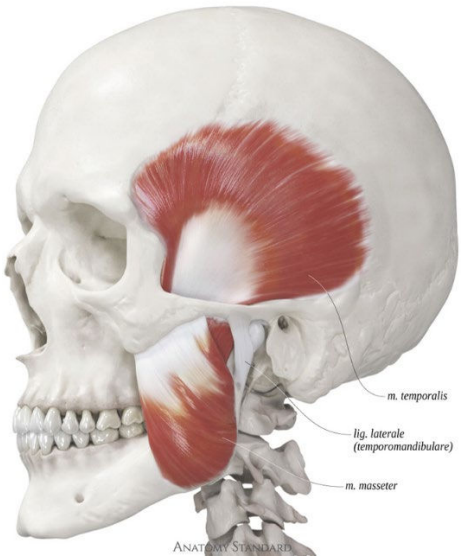
Your upper jaw is fixed against the base of your skull and is immovable. Only the lower jaw moves. It functions against the upper jaw via a complex system of two temporomandibular joints (TMJ's) which function together through your dental bite relationship and partly subconscious neuromuscular control of what are known as the "muscles of mastication".

The muscles of mastication are four muscle pairs that are used largely for chewing:

Temporalis - large fan-shaped muscle that covers a large aspect of the side of your skull and temple and inserts via a single strong tendon into your lower jaw behind the wisdom tooth passing behind your cheekbone. It is a very powerful closing muscle.

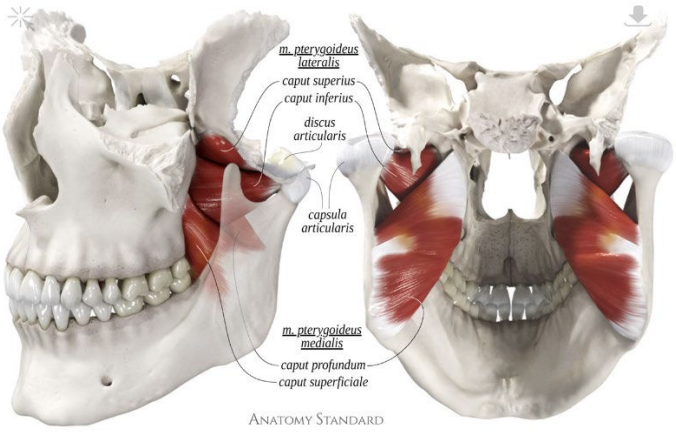
Masseter - thick strap like muscle that extends from your cheekbone to the back corner of your lower jaw. It is also a very powerful closing muscle.

Both of these muscles can be felt contracting if you clench your teeth together whilst touching your temples and cheeks.



Lateral pterygoid - the main opening muscle of the lower jaw. It attaches to the base of the skull and controls forward movements of each jaw joint and the protective disc that sits on it.

Medial pterygoid - the muscle that controls waggling sideways movements of your jaw. It attaches from the base of the skull to the inside corner at the back of your lower jaw. The right medial pterygoid pulls your lower jaw to the left and vice versa.



For these muscles to function properly and for your teeth to meet evenly, your jaw joints must seat evenly and comfortably in their sockets on their protective discs at the end of each chewing cycle.

There should be no individual tooth contacts that deflect the pathway of your lower jaw during the chewing cycle controlled by your joints and neuromusculature.

Many people experience dysfunction in the system at some point during their lives.

Some patients adapt without any discomfort or adverse effect or any deterioration occurs so slowly that they are not aware of it. However, many others experience problems with joint dysfunction (including displacement of the protective discs which causes clicking or locking of the joints and also eventual irreversible disc and bony joint head damage), muscular pain or deteriorating dentition due to accelerated wear or tooth breakage which can even lead to tooth loss. Some experience all three.

So how do we diagnose the problem and how do we treat it?

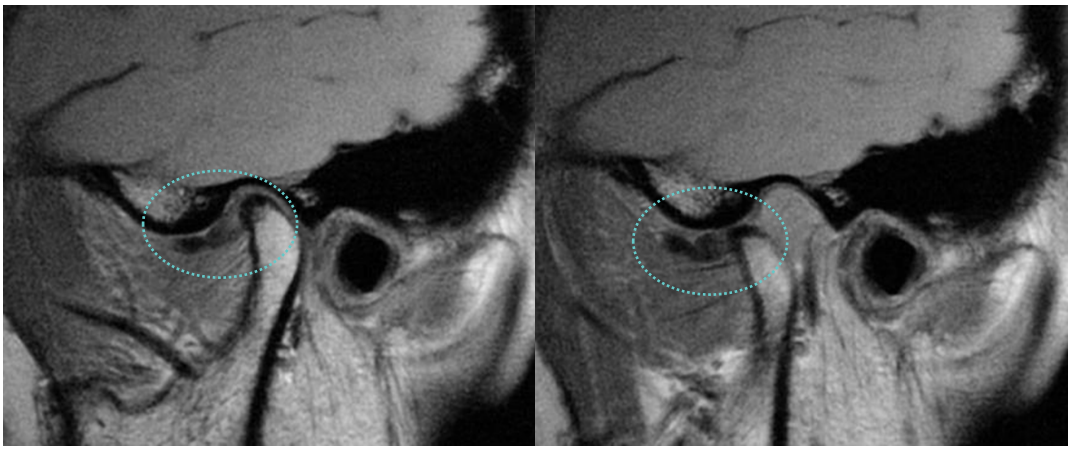
4. Diagnostic steps

The main steps in diagnosing occlusal dysfunction are as follows:

A. **Clinical examination.** We routinely carry out a detailed analysis of your jaw joint function and photographically record how your teeth meet together and slide over each other as part of your New Patient Consultation. This normally provides many clues as to what the problem is. For example, the case below shows a deflecting premature contact on one tooth that thrusts the lower jaw forward during function. It may not look significant but this may well lead to future where, breakage of the teeth and temporomandibular joint dysfunction.




B. MRI imaging of the temporomandibular joints. If there appears to be any joint dysfunction such as clicking, locking or lack of joint movement, we will normally prescribe an MRI of your joints to be taken. This is normally carried out at Oryon Imaging in Wimpole Street and the MRI reported on by Dr Kevin Lotzof who is the most experienced TMJ radiologist in the UK. For example, the MRI below shows a displaced disc that bunches in front of the joint and limits opening of the jaw joint and causes pain from internal joint damage:



C. Occlusal (bite) analysis: We would normally take detailed records of your teeth and bite with your jaw joints fully seated (articulated study models) to analyse the true relationship between your upper and lower jaws before the teeth meet. This allows us to see whether an individual tooth is significantly deflecting your bite. These teeth are often the ones that break, wear, cause muscle and joint dysfunction, become tender to bite on or drift out of position.

D. **Equilibration:** We would then carry out what we refer to as "equilibration" on models of your teeth. Equilibration is a process where we look at whether simple adjustment and repolishing of the tooth shapes will allow a more harmonious bite or whether orthodontics or more extensive restorative work is required to re-establish correct bite. It is carried out systematically and photographed step-by step on models of your teeth first.

Equilibration is always carried out on models of your teeth first to see the extent of adjustment that would be required to restore your ideal bite. This analysis is almost mandatory before and after any restorative work or orthodontic treatment. Occlusal analysis and equilibration are hugely important processes in all aspects of dentistry to be able to properly diagnose which teeth are out of position and require correction and which teeth need their shapes adjusted after orthodontics once the teeth have been moved into their correct positions.

The images below show the true relationship between the upper and lower jaws when the joints are fully seated whilst this deflective tooth contact is present on the top left. Equilibration reveals that the bite can be stabilised and made to meet correctly on the top right image. The white islands in the red on the two lower photographs show the extent of tooth adjustment and equilibration that would be required to achieve this. A decision would then be made as to whether this is an acceptable level of adjustment or whether orthodontics or adding to the tooth surfaces to re-establish a proper bite would be preferable.

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E. **Deprogramming/disc recapture:** If it is not possible to establish a stable joint position due to muscle spasm or your discs have been displaced to the extent that your joints do not function properly, we would normally carry out what we refer to as "deprogramming". This involves making a specifically designed removable hard acrylic appliance for you to wear over your teeth every night and for as much of each day as functionally possible to help stabilise your jaw position and disc positions before an occlusal analysis can be carried out accurately. Depending on your situation, this appliance may need to be worn for a few weeks or in the cases of disc displacement up to 6 months, and possibly even longer as a preventive measure against future damage. Therefore, deprogramming may be required before accurate occlusal analysis and equilibration can be carried out.

5. What happens if a proper diagnosis and treatment are not carried out?

Patients often present to us with an acute problem such as a tooth fracture or acute temporomandibular joint dysfunction that is causing them pain.

However, when we look closely, we invariably see the tell-tale signs that occlusal disease has been present for some time. The fracture or acute pain occurs once the adaptive capacity of the patient has been exceeded and something has finally broken or a muscle has gone into spasm.

We often point out occlusal disease and occlusal dysfunction in patients that are not aware that they have any problems. This is because they have adapted and the dysfunction is not yet causing them a problem.

Prevention is always better than cure and often eliminating occlusal dysfunction early before it causes problems can be something as simple as carrying out a non-invasive bite analysis and making minor adjustments to tooth shapes either by reshaping potentially damaging deflecting contacts on the bite or by adding to teeth that are worn to restore their function in protecting the teeth around them.

If occlusal dysfunction is allowed to continue, then any combination of the issues described above can occur over time.

Failure to diagnose occlusal disease properly is the same as failing to diagnose decay or gum disease early. None of these conditions cause any symptoms at the start but can go on to cause pain and loss of teeth if allowed to advance which are invariably much more expensive both biologically and financially to address once damage is beyond a certain point. Therefore, for us at LCIAD, diagnosis and proper therapeutic treatment and prevention of occlusal disease carries the same importance as proper diagnosis and therapeutic treatment of prevention of decay and gum disease.
