Occlusion for Everyday Clinical Dentistry

Occlusion for all Aspects of Dentistry
Treatment of Headaches
Temporomandibular Joint Problems
and
Appliance Therapy

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Introduction

It is my intention in this manual to make myself clearly understood. I consider it my duty to help people understand what I am teaching not their duty to understand me. I also appreciate that many of the people I am teaching do not use English as their first language. I therefore have tried to avoid complicated words. Those people in the academic world may find this disconcerting. I am however aiming at presenting knowledge and skills that can be directly applied in clinical practice for the benefit of patients in a way that is easily understood.

This manual is designed for dental students and qualified dentists. Some of the descriptions and explanations are deliberately simple so that everyone can understand everything in this manual.

Use this manual in conjunction with the presentations on my website.

http://stuartortonjones.com/ Links will be provided at suitable stages.

Many dentists leave dental school confused about Occlusion and remain so for the rest of their careers. This seems to be universal throughout the world as the following comments show. I asked a number of dentists what their teaching on occlusion was like at dental school. These were some of their responses.

Malaysia
“I honestly can’t remember much of that topic as I totally did not understand what my lecturer was talking about. It was all Greek

Iran
Hated it. They made us do wax up in 10 different colours. I thought it was completely irrelevant to the practice of dentistry in real life. My dislike of occlusion was probably the reason for choosing Oral Surgery for postgraduate studies

UK
I wish that I had a deeper understanding of occlusion at dental school. The topic should have been taught more thoroughly, emphasizing on the importance of occlusion being the basis of what we do practice in dentistry

Turkey
Dental occlusion is generally not emphasized accordingly. Even most of our teacher cannot properly help the patient

India
Zero Just Theory. Teachers did not know about Occlusion or how to do correction
Pakistan
Poor     Basic Concepts not given

Egypt
Given some definitions Very shallow  No clinical application

Part of the cause of this is what one of the dentists said “Teachers did not know about Occlusion or how to do correction”. Other reasons are the use of complicated language that has to be defined and another reason is the use of acronyms such as “CO”, “CR”, “CRO” and “ROM”.
I am an advocate of plain understandable language that everyone can understand. The use of complicated words and acronyms are obstructive to understanding, learning and communication. Both complicated words and acronyms are often used in an attempt to inflate the ego of the teacher and confuse those who are being taught.
My teaching is designed to be understandable and logical rather than hiding behind a whole lot of research paper quoting.

In this manual the lower jaw may be referred to as the “lower jaw” and the upper jaw as the “upper jaw”. The Temporomandibular Joint may be referred to as the “jaw joint”.

Let us look at the whole aspect of the terminology of occlusion. If I talk about the “Hinge Position” of the upper jaw it is easily understood. It is the position when the jaw opens and closes so that the upper jaw hinges before the head of the condyle starts to move down the Articular Eminence of the Glenoid Fossa. When the head of the condyle starts to move down the Articular Eminence the head of the condyle is said to be translating .We can easily define the “Hinge position” as the position that the head of the condyle rotates before moving down the Articular Eminence.

The “Hinge Position” may be describes as a “Physiological Hinge Position” or a “Pathological Hinge Position”
“Physiological Hinge Position” is position of the jaw when the head of the condyle rotates in a healthy joint before translating down the Eminence of the Glenoid Fossa.
“Pathological Hinge Position” is position of the jaw when the head of the condyle rotates in an unhealthy joint before translation down the Eminence of the Glenoid Fossa. Due to swelling (oedema) of the joint (inflammatory fluid being present) the head of the condyle is lowered a little out of the True Hinge Position. Any major occlusal alteration should not be attempted until the inflammation is treated. Big interferences preventing the upper jaw from closing in the True Hinge Position may be adjusted even if the joint is swollen. The reason for this is that the big interferences will still be present even after the swelling subsides.
Now let us clear up the confusion that is caused by terminology such terms as Centric Relation, Centric Occlusion and Centric relation Occlusion.
I have replaced Centric Relation with term the “True Hinge Position” as this term hardly needs defining and because it describes the situation more clearly. I have replaced the term “Centric Occlusion” with the “Maximum Tooth Contact Position” for the same reason. This describes the situation clearly, not requiring any further description. The term “Centric Occlusion” is more confusing.
It is defined, in the Western world, as the position of maximum Intercuspidation. The word Intercuspidation has then to be defined as the position when the teeth are in maximum contact. Why not, therefore call the position the “Maximum Tooth Contact Position” which describes the position precisely. The word “Intercuspidation” is rarely if ever used in any other situation so why use it in the context of occlusion.

What adds to the confusion by the use of term “Centric Occlusion” in India where it refers to the position that the jaw is in the hinge position and the teeth are in maximum tooth contact. The Western concept of occlusion only refers to maximum tooth contact irrespective of the position of the head of the condyle.

When discussing the guidance of the lower jaw we will look at the guidance due to the anatomy of the jaw joint and the guidance due to the contacts of the teeth. The terms Posterior Guidance and Anterior Guidance will be shown to cause confusion and will not be used. Also the use of Group Function and Canine Guidance as the only terms to describe the guidance of the lower jaw will be shown to be unsatisfactory.

**My Experiences Treatment of Headaches and Temporomandibular Joint Problems**

At dental school my first experience of occlusion was when the professor of prosthetics drew a diagram on the chalk board of an articulator with lines attempting to explain what I could not understand.
I was taught to achieve the hinge position by having the patient put their tongue at the back of the palate. Since then I have realized that this is unreliable as patients seem to be unable to controls their tongues consistently.
I was also introduced to the term “Most Retruded Position” which I have also realized to be incorrect for the following reason. When the jaw is in the Hinge Position the jaw may be retracted by the patient. The head of the lower jaw then has moved out of the hinge position into an extreme limit of the joint.

At the end of my time at dental school planned to visit some dental schools in at Scandinavia. I mentioned this to the professor of orthodontics who explained to me that the Scandinavian Dental Schools had Occlusal Equilibration Departments as if this was weird insinuating that the study of occlusion was
weird.

A few years after qualifying I went to the USA to study at Northwestern Dental School in Chicago. During this time I treated a lady who had toothache in her upper left third molar. The tooth was unopposed, overerupted and unsavable and had to be removed. On seeing her ten days later she reported that the headaches she used to have two to three times a week had disappeared. The tooth, being overerupted was interference when the patient closed in the hinge position. This was the first time I am aware of that I had helped clear up a patient’s headaches.

At Northwestern Dental School I read a number of papers on occlusion and learnt how to talk about occlusion. However I did not have the practical skills to put the knowledge into practice.

On leaving Northwestern I practiced in Niagara Falls Ontario for a few years. Soon after arriving in Niagara Fall I went to lectures by Bob Barkley an enormously influential lecturer and probably the best lecturer on preventive dentistry that there has ever been. He introduced me to an examination system of patients that was far more thorough than I had come across before. This included a section on occlusion. After examining my patients more thoroughly I realized that I should find a place to learn practical clinical occlusion.

I then received a telephone call from Bob Berkley who explained that he was conducting a course on personal growth with a psychologist at the Pankey Institute in Miami in two weeks’ time. I cancelled out my patient for that week and went down to the course.

During my time there I met Dr. Pankey who said to me “Stu, you had better come down here and the boys here teach you some dentistry”. I thought at that time that I knew a lot about dentistry but I respected Dr. Pankey and did what he said.

I spent two weeks down there learning about practical clinical occlusion and many other things about quality dentistry.

During the next week in practice I examined a patient who had occlusal problems. I recommended an occlusal adjustment which she accepted. After the adjustment I charged her forty five dollars which back then I thought was a lot of money. The patient also looked as if she thought it was a lot of money however she paid and left.

On returning a few weeks later she reported that the clicking joint, that was so loud that it upset her whole family when she ate, had stopped clicking. This was the first time I had succeeded in successfully treating a jaw joint problem.

Since then I have been rewarded by eliminating or reducing headaches and jaw joint problems.
The following are some other examples

**Headaches**

**Example 1**  I created a headache in a patient to whom I had fitted a temporary crown. I met her ten days later and she mentioned that she had had a headache ever since. I checked her occlusion and found that the temporary crown was slightly high. I adjusted the crown and her headache stopped. Two years later the exact thing occurred again.

**Example 2**  This forty year old patient gave a history of headaches since the age of ten. He had two types of headaches, a frequent dull headache that lasted all day and a more acute headache if he were doing very intense work. On examination he had interferences in the hinge position and a long slide forwards from the hinge position to maximum tooth contact. He had all his teeth except his upper third molars. When he moved his lower jaw to the left he had large interferences third molars on his right side and when he moved to his right he had large interferences on his third molars on the left side. After removing his lower third molars and then an occlusal adjustment he was relieved of his symptoms except for one small headache three months later. Three years later he had had no further headaches.

**Example 3**

The patient’s symptoms were sharp shooting pain on the left side of the head around the Temple region three to four times a month, a pain in the neck sometimes most of the day. He said that the symptoms were “pretty unpleasant, quite strong pain”. All teeth were present except the lower third molars. Interferences were present on the overerupted upper third molars when the patient closed in the hinge position. On further closure the patient slid forwards into maximum tooth contact. The upper right third molar was removed. The headaches were reduced and the neck pain stopped immediately. The upper left third molar was removed. Following this the patient reported that he had absolutely no pain, no jaw ache and that it had changed the way I hold my face and that it had changed his life.

**Jaw Joint Problems**

**Example 1**  The patient had an upper very small left third molar with a missing filling. I replace the filling. A week later the patient reported that his left jaw joint was still. On examination a shiny mark was present on the filling. The filling was adjusted and the stiffness stopped in about an hour.
Earache

Example
A dental assistant of mine was off work for a week with acute earache which was diagnosed by her medical doctor as acute inflammation of the inner ear. She came back to work for a day and then stayed off work for the rest of the week. On the Friday afternoon she telephoned me in desperation to ask if there was anything on her x-rays that might indicate what the cause of her problem was.

I suddenly realized what might be the cause. I asked her to come in straight away. I asked my other dental assistant to sit the suffering assistant in a dental chair and place a cotton roll between her back teeth on both sides.

When I saw her fifteen minutes later she said that this was the first relief she had had in two weeks.

I made her an occlusal appliance which solved her problem. It turned out to be a problem in her jaw joint. She was pregnant and gave a history of grinding her teeth so loudly that her husband had to wake her up at night as it disturbed his sleep.

How to perform an Initial Occlusal Check

Check the patient in the hinge position several times using bimanual manipulation (The Dawson Hold). Ideally, if there is an interference, the patient will repeatedly indicate on which side the interference is and roughly where it is.

Take two sets of impressions and pour two sets of models.

Mark one set of models with “I” on each model.

Mark the other set with “II” on each model.

Take two hinge records and a facebow record.

After the upper model has been mounted using a facebow, lower the pin 4-5 mm so that the upper member is raised. This roughly compensates for the thickness of the hinge record. (This is done so that, after the models are mounted and the record removed the Occlusal Plane will be in the correct position on the articulator).

The hinge record is placed between the upper and lower models. Plaster is then placed on the base of the lower model and on the lower mounting plate. The articulator is then closed.

Mount the each set of models using one of the hinge records to mount one set of models and the other hinge record to mount the other set of models.

When the plaster is set the record is removed and the pin raised or removed.
To check for early contacts the articulator is then closed till the first tooth contacts

It may be necessary to tap the articulator together on some articulating paper several times to check for the first contact if it is not obvious just by looking at the models when closed together

**Checking to see if the models are mounted correctly**

Now check for the presence of interferences on the two sets of mounted models. If the two interferences are found to be the same on both sets of models then it is extremely likely that the models are mounted correctly. It is extremely unlikely that two incorrect records would be the same. Now compare the findings on the mounted models with the information that the patient gave. At this stage it may be helpful to check the patient more closely and compare the mounted model findings.

**Signs and Symptoms of Occlusal Problems**

**Symptoms due to Occlusal Problems**

- Headaches
- Pain on Jaw Movements
- Temporomandibular Joint Problems
- Muscle Fatigue
- Pain in Muscles of Mastication
- Dizziness & Loss of Balance (Vertigo)
- Burning Sensation in Tongue and Ears
- Mild Catarrhal Deafness
- Tinnitus
- Pain in and around the Ears
- Dryness of the Mouth
- Hypersensitivity
- Occlusal Awareness

**Signs due to Occlusal Problems**

- Occlusal Wear Facets
- Cervical Crevicing (Notching) due to bending of Teeth
- Fracture of Teeth
- Bone Loss
- Loosening of Teeth
- Muscle Spasm
Temporomandibular Joint Problems
Decreased Mobility
Severe Limitation in Opening    Trismus
Hypermobility
Bruxing
Clenching
Periodontal Breakdown
Stress on Teeth

Common Causes of Headaches

- Raised Temperature
- Sinus Problems
- Toothache
- Excess Alcohol
- Trauma
- Referred Pain from Muscle Spasm
The Mechanism of Myofascial Pain

- Occlusal Interferences
- Bruxism Clenching
- Lowered Pain Threshold
- Neural Hyperactivity
- Muscle Hypertrophy
- Muscle Inflammation
- Muscle Irritability
- Muscle Ischaemia
- Parotid Duct Blockage

Threshold
When the Threshold is high There may be no Signs and Symptoms

Ideal
If the Threshold is Lowered due to increased Stress

Signs and Symptoms may develop
**Solution**  Either raise the Threshold to relieve the Signs and Symptoms

In times of stress the threshold of tolerance is lowered so that the interference is not tolerated and symptoms appear.

Solution  Raise the threshold by reducing the life stresses or use of medication

And /or reduce or eliminate the interference
LOCAL SYMPTOMS
1. Clicking & Crepitus
2. Pain on Movement
3. Decreased Mobility
4. Fatigue
5. Tenderness to Palpation
6. Trismus
7. Hypermobility

PERIPHERAL SYMPTOMS
1. Headache
2. Vertigo
3. Burning Sensation in the Tongue & Ears
4. Mild Catarrhal Deafness
5. Tinnitus
6. Pain In and Around the Ears
7. Dryness of the Mouth
8. Painful Muscles of Neck & Back
9. Tenderness to Palpation

ORAL SYMPTOMS
1. Bruxism
2. Clenching
3. Periodontal Breakdown
4. Tooth Facets
5. Tooth Fracture
6. Tooth Mobility
7. Hypersensitivity
8. Awareness of Occlusion

How the Jaws Work
The Upper and Lower Jaws
The Jaw Joint
The Teeth
The Muscle Activity controlled by the Nerve Supply
(The Neuromusculature)
The Influence of Bruxing and Clenching

The Anatomy of the Jaw

The jaws are made up of a lower jaw, an upper jaw, and two joints each separated by an articular disc, the ligaments and muscles associated with the jaws and, when present, teeth attached to the jaws.

See http://stuartortonjones.com/lower jaw/

The lower jaw is made up of a front part known as the Symphysis, and each side a body of the lower jaw and at the back an Ascending Ramus with a Condyle and Coronoid Process each side.
The upper jaw is made up of a front part known as the Premaxilla, at the back the posterior upper jaw, and in the centre the palate.
See http://stuartortonjones.com/upper Jaw/

The bony components of the jaw joints are made up of the heads of the condyles, the fossae and the articular eminences. The soft tissues of the joints are made up of the cartilaginous covering of the head of the condyle, the cartilaginous covering of the fossae and the eminences. In healthy joints, cartilaginous articulator discs are present between the heads of the condyle and the fossae and eminences. At the back the disc is attached to the neck of the condyle below and the edges of the fossae above. Attached to the Lower jaw and base of the skull are various ligaments.
Anatomy of the Mandible

- Internal Oblique Ridge
- Mylohyoid Line
- Mylohyoid Fossa
- External Oblique Ridge
- Lingula

The Anatomy of the Maxilla and Surrounding Bones

- Zygomatic Arch
- Zygomatic Process
- Alveolar Process of the Maxilla
- Medial Pterygoid Plate
- Lateral Pterygoid Plate
- Maxillary Tuberosity
The Purpose of Ligaments is to allow two or more bones to move in relation to each other within a certain range.

The jaw muscles are attached to the lower jaw, to the articular discs and to the upper jaw and bones of the skull. They move the lower jaw and disc.


Teeth may be present in the upper and lower jaws. The presence and position of the teeth and the relationships of the upper and lower arches affects the guidance of the lower jaw.

**The Movements of the Lower Jaw**

The lower jaw is moved by the jaw muscles. The movements of the lower jaw are limited by the anatomy of the jaw joint, the ligaments and the teeth if present.

When the lower jaw opens the Head of the Condyle first hinges. Then after a short while the Head of the Condyle starts to move down the Articular Eminence. At this stage the Head of the Condyle is said to be “translating”.

The shape of the fossae and eminences of the jaw joints affects the direction that the jaw moves. The direction that the head of the condyle moves is known as the condylar path. This affects whether the back teeth separate and if so the amount of separation of the back teeth.
The flatter the slope of the Articular Eminence the flatter the condyle moves from the Fossa down the eminence. The degree of separation of the back teeth will be very little if any. The steeper the slope that the Head of the Condyle Path moves down the eminence the steeper the condylar path will be and the greater the degree of separation of the back teeth will be.

The presence of teeth restricts the movement of the lower jaw in vertical, lateral and forward directions.

**The True Hinge Position**

The True Hinge Position is when the head of the condyle hinges in the Glenoid Fossa, in a healthy jaw joint, without translating. If the jaw joint is in a pathological state due to swelling in the joint, damage to the articular disc or damage to the bones around the joint the head of the condyle may not be in the true hinge position.

The hinge position is an unstrained position. When the head of the condyle is in true hinge position the head of the condyle may be retruded posteriorly by the patient. It is then in the most retruded position but no longer in the true hinge position. The term commonly used “The Most Retruded Position” is therefore an incorrect term. In the Most Retruded position the joint is strained. When the lower jaw is in the Hinge position, it is considered to be in Centric Relation which then requires defining.

**Hinge Position Interferences (Centric Interferences).**

When the jaw is closed in the true hinge position and one or more teeth touch before the rest the contacts are known as Hinge Position Interferences (Centric Interferences).

**The Anatomical Definition of the True Hinge Position.**

The relationship of the lower jaw to the upper jaw, when both condyles are in their most superior position in the fossa, irrespective of tooth contacts.

Clinically the True Hinge Position is achieved by what is known as “bimanual manipulation” or the Dawson Hold. The thumbs are placed just above the chin and the fingers placed on the lower border of the lower jaw. By pressing down with the thumbs and lifting with the fingers the head of the condyle is raised into the joint socket. This would be an easy procedure if it were not for the interference of the musculature. The skill required to establish the Hinge Position takes several months to
develop.
When a patient is hinging the operator is aware that the head of the condyle is in
the hinge position. As soon as the head of the condyle moves out of the Hinge
Position the operator should become aware through their fingers.

See http://stuartortonjones.com/introduction-to-occlusion-3/

The False Hinge Position

The false hinge position is a pathological state in which the head of the condyle
is not in the true hinge position due to pathological conditions such as
inflammation of the joint. Swelling in the joint causes the head of the condyle to
move downwards out of the fossa. This may result in back teeth coming out of
contact.
The lower jaw may hinge but will not be hinging in the true hinge position.

In Summary

The Hinge Position
I prefer the Term “Hinge Position” as it describes the position of the condyle before it moves
out of the fossa so long as here is no inflammation in the fossa. In this case the head of the
condyle would be a little out of the fossa. It is easy to imagine the “Hinge Position” as it is a
clinical position. It is not easy to imaging Centric Relation which has to be defined
anatomically. That is fine for anatomists but not much help to dentists.

When an appliance is fitted covering the back teeth allowing the back teeth to separate in
movement away from the hinge position the wearer tends to tap together in to the hinge
position when asked to tap together. This shows that when interferences are covered up the
wears of such an appliance tend to reflexly tap together in the Hinge Position.

Maximum Tooth Contact
When the teeth are in maximum tooth contact it would seem sensible to call the position the
“Maximum Tooth Contact “position. This is otherwise known as “Centric Occlusion” Which
is defined as “The position when the teeth are in maximum intercuspidation.” Maximum
Intercuspidation is then defined as “The position when the teeth are in maximum tooth
contact.” The position might as well be called “The Maximum Tooth Contact Position”

The Guidance of the Lower Jaw

Jaw Joint Guidance.
When the lower jaw moves out of the Hinge Position, the direction in which the head of the
condyle moves is determined by the shape of the fossa and eminence. This might be called
the Guidance by the Jaw Joints or Jaw Joint Guidance.

Tooth Guidance
At the same time as the jaw movements are affected by the anatomy of the joints the teeth are
also guiding the lower jaw so long as the teeth are touching.
The relationship of the upper and lower arches influences which teeth guide the mandible
In a Class I dentition the guiding teeth are likely to be the front teeth.
In a Class II Division 2 dentition the guiding teeth are likely to be the front teeth.
In a Class II Division 1 dentition the guiding teeth are likely to be the premolars and molars.
In a Class III dentition the guiding teeth are likely to be the molars.

Because the guidance can be on any teeth given the factors just discussed the term “Tooth Guidance” is a better term that Anterior Guidance as this may be mistakenly thought of a guidance by anterior teeth.

Guidance is very varied and is influence by other factors such as tooth position within the arches and which teeth are present.
The lower jaw movements are therefore determined by the jaw joint anatomy at the back and the teeth at the front.

**Anteriorly Displaced Discs**

If damage to the posterior attachment of the disc has occurred, the disc may be positioned in front of the head of the condyle when the jaw is at rest. The disc is not in its correct position on top of the head of the condyle. The jaw will be able to hinge but would not be hinging in the true hinge position.

On opening the disc is pushed forwards in front of the head of the condyle as the head of the condyle translate down the Articular Eminence. When the jaw is almost fully open the disc slips onto the head of the condyle into its correct position. At this moment a click occurs.

On closure, the disc is carried on the head of the condyle for a while. At the stage when the condyle is almost closed the disc flips forwards off the front of the head of the condyle. Again there is a clip. There is therefore a click late click on opening and a click late on closing.

**Diagnosing an Anteriorly Displaced Discs**

A late click on opening and a late click on closing is diagnostic of an Anteriorly Placed Disc.

**Uses of the True Hinge Position**

(1) It is reliable and repeatable reference position depending on the health of the jaw joint.
(2) It is a starting point for restorative procedures. Observing tooth contacts when the lower jaw is in the true hinge position enables a decision as to whether any alterations are required to the tooth contacts before restorative dentistry is performed.

**Front Teeth Relationships**

Irrespective of the classification based on the first molar relationship the relationship of the upper and lower teeth of front teeth varies considerably. This is partly due to the relationship of the upper and lower arches and partly due to the inclination of the front teeth, whether the teeth are angled forwards or backwards.
Tooth Position within the Arch

Teeth may be well aligned in the arch or may not. They may also be rotated, over erupted or under erupted. This affects the guidance of the lower jaw by the teeth.

Maximum Tooth Contact

Maximum Tooth Contact is the relationship of the upper and lower arches when the teeth are in maximum tooth contact irrespective of the jaw relationship. When the jaws are clenched together moderately firmly the lower teeth will close so that there is the maximum number of tooth contact. The lower jaw may or may not be in the true hinge position depending on whether any interferences are present causing the lower jaw to move out of the true hinge position as the teeth slide into Maximum Tooth Contact. This position is popularly known as Centric Occlusion in Europe and the USA. In India Centric Occlusion means when the jaw is in the true hinge position and the teeth are in maximum tooth contact.

Hinge and Maximum Tooth Contact Position

When the teeth are in Maximum Tooth Contact and the jaws are in the True Hinge Position simultaneously this is known at Hinge and Maximum Contact Position. This is popularly known as Centric Relation Occlusion.

Movements of the Lower Jaw away from the True Hinge Position

For discussion purposes there are terminologies that need to be understood. The description of the relevant terminology is as follows.

Movements away from the Hinge Position Movements (Eccentric)

All movements of the lower jaw, when it moves away from the true hinge position.

Non Hinge Position Contacts (Eccentric Contacts.)

Any contacts of the teeth when the lower jaw moves away from the true hinge position.
The Functional Side or Working Side

When the lower jaw moves to one side the side to which the jaw moves is considered to be the Functional Side or Working Side, If the lower jaw moves to the left, the left side of the arches is considered to be the functional side or working side. If the lower jaw moves to the right, the right side of the dental arches is considered to be the functional side or working side.

The Non-Functional, Balancing Side, or Non-Working Side

When the jaw moves to one side, the Non-functional Side, Balancing Side or Non-Working Side, is the side of the dental arches away from which the lower jaw has moved. If the lower jaw moves to the left, the right side of the dental arches is the Non-functional Side, Balancing Side or Non-Working Side. If the lower jaw moves to the right, the left side of the dental arches is the Non-functional Side, Balancing Side or Non-Working Side.

Tooth Guidance The Guidance of the Lower Jaw due to Tooth Contacts (Anterior Guidance)

The understanding of the guidance of the movements of the lower jaw due to teeth has been confused by a misunderstanding of the terms used. The term “Incisal Guidance” used to be used to describe tooth contacts when the lower jaw moves from the true hinge position. This is a limiting term as more teeth than incisors frequently guide movements of the lower jaw. Depending on the arch relationship of an individual patient, front teeth may or may not be involved in guiding the lower jaw. The relationship of the upper and lower arches determines which teeth guide the movements of the lower jaw.

Arch Relationships and their relevants to Tooth Guidance

How the lower arch is positioned in relationship to the upper arch has an influence on which teeth guide the movement of the lower jaw.
For reasons of discussion a classification of arch relationships is used. This is helpful as far as an overall discussion is concerned. It is not always helpful when considering individual cases. For example a patient may be half way between being a Class I and a Class II or half way between being a Class I and a Class III. Arch classification is useful only as an overall picture.


Class 1 molar relationship is considered to be when the mesio-buccal cusp of the upper first molar is in line with the buccal groove of the lower first molar.

Class 11 molar relationship is when the buccal groove of the lower first molar is positioned more posteriorly to the mesio-buccal cusp of the upper first molars.

Class 11 Division 1 is present when the buccal groove of the lower first molar is positioned further back than the mesio-buccal cusp of the upper first molar and the upper front teeth are in front of the buccal groove of the lower front teeth and are not touching.
Class 11 Division 2 Relationship is present when the buccal groove of the lower first molar is positioned further back than the mesio-buccal cusp of the upper first molar and the upper front teeth are tilted backwards and there is no space between the upper and lower front teeth.
A Class 111 molar relationship is considered to be when the buccal groove of the lower first molar are further forward than the mesio-buccal cusp of the upper first molar.

There is a considerable range of possibilities of jaw relationships from an extreme Class 11 to an extreme Class 111. In the middle is the Class 1 relationship. An individual may be anywhere within these extremes. The concept of a range is a range.

**Classification of Arch relationships has its uses and also its hazards.**

A patient whose lower jaw is slightly further back than a classical Class 1 relationship would still be considered to be Class 1. At what point as the lower arch is further and further back is the patient considered Class 11. Alternatively a patient whose lower jaw is slightly in front of a classical Class 1 relationship would be considered to be Class 1. At what point as the lower arch is further and further forward is the patient considered Class 111.

The risk is to put people in boxes rather than considering them as individuals. Patient must be looks at as individuals with their own individual arch relationships.

If the lower jaw is further back relative to the upper jaw and the upper front teeth are not tilted backwards, the back teeth will initially guide the movements of the lower jaw when it moves away from the hinge position.

**Tooth Guidance in Different Jaw Classification**
**Cases**

**Class I Tooth Guidance.** The guidance is likely to be on the front teeth. If the guidance is on the back teeth the contacts are considered to be interferences. Some consideration should be given to removing these interferences.

**Class II Division 1 Tooth Guidance.** In this situation the upper front teeth are positioned sufficiently further forward to the lower front teeth that, at least initially, they are not in contact until the jaw moves away from the hinge position. In more extreme cases where the upper front teeth are a long way in front of the lower front teeth the front teeth may never come into contact and therefore may not have any influence on tooth guidance. The jaw movements away from the Hinge Position will be guided by the premolars and molars.

**Class II Division 2 Tooth Guidance.** Because the upper front teeth are tilted backwards, the front teeth take over the guidance immediately as the jaw moves away from the Hinge Position. The back teeth are separated immediately.

**Class III Tooth Guidance.** In this case the lower front teeth are in front of the upper front teeth and when the jaw moves away from the Hinge Position the lower front teeth move even further away from the upper front teeth. The front teeth play no part in the guidance of the lower jaw.

It must be remembered that there is a range from extreme Class II to extreme Class III and a patient may be anywhere between these extremes. The terms “Canine Guidance” and “Group Function” are totally inadequate to describe the multitude of variations of tooth guidance.

45% of people are either Class II (40%) or Class III (5%). This means that 45% of people cannot be canine guided as their canines do not touch. This means that some of the 55% of people close to a pure Class I may have canine guidance. Of the other Class I patients that are more towards being Class II or Class III cannot have canine guidance. They may for example be guided by their upper first premolars and lower canine teeth.

**Posterior Guidance**

If the term “Anterior Guidance” is to be used then an understanding of Posterior Guidance must firstly be understood. Posterior Guidance is the guidance of the lower jaw due to the anatomy of the jaw joints. The shallower the angulation of the condylar path the less the back teeth will separate. The steeper the angulation of the condylar path the greater the separation will be.

**Tooth Guidance  Anterior Guidance**
Tooth Guidance (Anterior Guidance) is the guidance of the lower jaw due to the guidance of the teeth.

Which teeth guide the lower jaw will be determined by the relation of the upper and lower arches, the teeth that are present and the positions of the teeth within the arch. As a result of this the guiding teeth may be anywhere in the arches. The guidance may be on the back teeth first and then some teeth further forward may take over the guidance. In some circumstances the guidance may be immediately on the front teeth and in others the guidance may only be on the back teeth.

The guidance may be one upper tooth and one lower tooth. The teeth involved in the guidance of the lower jaw may be upper and lower canines, upper and lower lateral incisors, upper and lower central incisors, upper canines and lower first premolars, first and second premolars or the molar teeth. Many combinations occur.

As the lower jaw moves from the true hinge position the guidance may be on one upper tooth and one lower tooth. Then more teeth may take over the guidance. Then other teeth may take over the guidance. Alternatively the guidance may start on several teeth then progress onto only a few teeth.

If the lower arch is positioned far back or far forward relative to the upper arch the guidance may only be on back teeth as is the case in Class 11 and Class 111 Cases.

The combinations of possible guidances are so numerous each case must be looked at as being very individual.

There can be a problem with the use of the term “Anterior Guidance”. It may be confused by meaning guidance by anterior teeth. In a significant many cases there is no guidance on anterior teeth. The term “Tooth Guidance” is therefore a more comprehensive term and can be used in all combinations of possible guidances.

To say that anterior guidance can be achieved by two different types of anterior guidance, “Anterior Group Function” or “Canine Guidance” is very simplistic.

If we look at an analogy of people conversing together, two people may be talking to each other. Three people may be talking to each other. Four people may be talking to each other. A small group of people may be talking to each other or a large group of people may be talking to each other. Only to consider two people talking to each other or a group of people talking to each other would be too simplistic.

To start with how many teeth have to contact to constitute “Group Function”,
four teeth, six teeth, eight teeth or how many. When the lower arch is far forwards compared with the upper jaw, several molar teeth will guide the lower jaw. Would this be termed “Posterior Group Function”? If the guidance is on one upper molar tooth and one lower molar tooth is this “Molar Guidance”. The truth is that the guidance is wherever the guidance is for a particular patient.

Guidance by several teeth is suitable when it is already present and there are no adverse effects present. Guidance by several teeth is advantageous when distribution of excursive stresses is advisable.

In situations where there is loss of bone around some teeth or where there are extensively restored teeth, guidance on several teeth is advantageous.

**The Principles of Occlusion for Natural and Restored Dentitions**

The following principles should be considered when studying each individual case.

1. The occlusal forces should be directed down the long axis of each posterior tooth.

2. As many back teeth as possible should contact in the true hinge position (centric relation), no lateral slide being present when the teeth are clenched together, (a very slight slide forwards is acceptable).

3. The front teeth should separate the back teeth wherever possible.

4. If the arch relationships and the angulation of the front teeth allow, when the jaw moves away from the true hinge position, tooth contacts of the back teeth should decrease as the front teeth take over guidance.

5. There should be no non-functional, balancing side, contacts.

6. In severe Class III guidance on the non-functional sides is unavoidable.
Edge to Edge Contacts

Protrusive

Lateral-Protrusive

Radial Lateral

Crossover
Exceptions to the Principles of Occlusion

1. In moderate and severe periodontal cases where the normal guiding teeth have reduced bony support, non-functional (balancing side) contacts may be required to reduce the stresses on usual guiding teeth on the functional side.

2. In Anterior Open Bite Cases and Severe "Class III" Cases, guidance will be on back teeth often on the non-functional side.

Mounted Study Model Procedure

Two sets of models should be set up on two articulators using two centric records. The accuracy of the mounting can be checked by marking the first contacts on each set of models after they are mounted and comparing the two set-ups. If they are the same or very nearly the same then the two sets are mounted accurately. The possibility of setting up two sets of models incorrectly and exactly the same is highly unlikely.

Items Required

- Two sets of Impressions
- A Facebow Registration
- A Hinge Position (Centric Record) Registration

Set-up

1) Metal Tray
   (Plastic trays are damaged by the Zinc oxide and Eugenol Paste)

2) Upper and Lower Perforated Alginate Impression Trays
   (Ensure that all the trays in the practice are clean and ready to use)
   (Anatomical Coe Trays are the best trays to use)
   If there are any previous models use them to help select the correct size tray for the patient. Ensure that the tray extends beyond the back teeth and is not too tight

3) 2 Wax Rectangles (7 cm long)
   (Use a fairly soft type of wax There will be a certain amount of distortion of the Hinge Position (Centric) Record when it is taken out of the patient's mouth and during the time before it is used to mount the lower model When the models are put together with the Hinge Position (Centric) Record and gripped together the softer type wax will "distort"
back to its original shape
Hard waxes are unsuitable as they crack when this is done

4) **Zinc Oxide and Eugenol Paste measured 1 and 1/2 inches from each tube**
(A type of Zinc Oxide and Eugenol paste which is suitable for making Hinge Position (Centric) Records being not too sticky and not too brittle)

5) **Vaseline**
(Used to help prevent the paste from sticking to the patient's teeth)

6) **4 Bowls of Alginate measured out**
(3 measures for each medium or small tray  3 measures for each large tray Use three scoops if partial dentures are to be made on the models)

7) **4 Water Measurers plus water**

8) **2 Alginate Spatulas**

9) **Facebow with Wax added to the Fork**

10) **Tip-a-dilly Aspirator tip**

11) **Piece of paper with the patient's name on To identify the case**

**Study Model Impressions**

**The Procedure**

1) Assistant chooses the trays by using any previous models of the patient Otherwise the Dentist chooses correct size of trays

2) Dental assistant mixes and loads tray ( Dentist may prepare wax sheets for the Hinge Position (Centric) Records while waiting for the alginate to be mixed )

3) The Dental assistant places a small amount of alginate onto the pad of the Dentists first finger and holds the Alginate Tray the correct way up and in the right direction to go straight into the patient's mouth

4) The Dental assistant holds the tray somewhere other than by the handle which should be kept clear for the Dentist to hold

5) The Dentist smears Alginate on the biting surfaces of the teeth ( this helps avoid trapping air bubbles )
6) The dental assistant orientates the tray in the correct direction to go into the patient's mouth

7) The Dentist inserts the tray into the patient's mouth

8) The Dental assistant mixes for the next impression

9) While the dental assistant is mixing the Dentist removes the tray when the Alginate is set and aspirates any Alginate left in the Patient's mouth (at the end of all the impression taking the patient is given a thorough rinse)

10) Upper followed by 2 lower impressions are taken one after the other

**Care of the Impressions**

a) The impressions should be washed in cold water to remove saliva which would affect the hardness of surface of the model

b) Vigorously shake the water of the impressions (If left on the impressions the plaster/stone mixture would be diluted on the surface of the model and would be soft when set)

c) Cover the impression with a tissue and drop several drops of water on it. This helps prevent the Alginate drying out

d) Pour the impression within 15 minutes (after this time the Alginate begins to distort)

e) Separate the impression from the model after 1 hour

**SEPARATE AT LEAST WITHIN 3 HOURS**
Facebow Registration for the Artex Semi-adjustable Articulator

Purpose

To enable the mounting of the patient's upper model on the articulator in the same relationship to the condyle as the patient's upper arch to their Temporomandibular joint (jaw joint)

The Artex Face Bow Components

The bow
The bite fork which carries the wax
Universal locking joint

Artex transfer items

Transfer table
Transfer jig

Set-up Facebow Fork Preparation

1. The prongs of the bite fork are covered with wax by the chairside assistant.
2. The bite fork is attached to the face bow
3. The wax is warmed in a bowl of hot water by the assistant ready for the dentist to use.

The Procedure

1. The prepared face bow is held over the patients mouth by the assistant (using their left hand)
2. The assistant retracts the patients left cheek using a mirror with their right hand
3. The dentist inserts the bite fork into the patients mouth
4. The patient is told to bite onto the bite fork
5. The dentist holds onto the ends of the sliding parts of the bite fork (the assistant can now let go of the bite fork)
6. The sliding arms are gently pushed together in line with the ear holes and the patient is asked to push them in and to hold in place
7. The nasal rest is slid onto the Nasion and held in place
8. The universal joint is tighten, making sure it is on the patients left
To remove the face bow
9. Slide nasal rest away and tighten
10. Slide arms out
11. Ask patient to open mouth and remove face bow and hand it over to the assistant

**Hinge Record Registration** (Hinge Position (Centric) Record Registrations)

**SET-UP**

- 1) 2 Pink Wax rectangles (7 cm wide)
- 2) Zinc oxide and Eugenol Paste measured out 4 cm (1 and 1/2 inches) from each tube
- 3) Water in an eyedropper bottle
- 4) Cement Mixing Spatula (clean)
- 5) Vaseline
- 6) Pointed 5" Curved Scissors

**THE PROCEDURE**

**Initial Planning**

a) Check to see if there are enough teeth opposing each other far enough apart from each other to provide 4 good “stops”.

b) Having put the models together with the Hinge Position (Centric) Record between them it must be possible to grip the models together without their relationship to one another changing.

It may be necessary to add a bite block to part of the wax sheet to be used for the Hinge Position (Centric) Record where teeth are missing)

c) Manipulate the patient into Hinge Position (Centric Relation) using the Dawson Hold and check for:

 - a) The first contact in Centric Relation
 - b) The amount that the patient's lower jaw moves from this first contact to Maximum Tooth Contact

(The centric relation record should be taken with the patient's teeth sufficiently far apart so that the teeth do not touch. If this should occur the lower jaw may move out of centric relation. It may be necessary to make an Anterior Jig to keep the teeth apart so as to prevent the centric interferences contacting.)
d) Decide whether or not to make an Anterior Jig
The wax handle at the front of the Hinge Position (Centric) Record may be rolled up so that the patient's front teeth are kept apart by the wax when the patient is closed up onto the centric record. The rolled up part is made thick enough to prevent the first contact of back teeth to occur.

2. The Dental assistant mixes the Zinc Oxide and Eugenol paste as soon as possible, as it takes a long time to set.
   (ADD 1 DROP of WATER to speed the setting. Adding more water will lengthen the setting time)

**Making the Wax Template**

a) The dentist warms the wax between his hands and inserts it into the patient's mouth

b) The wax is placed on the upper arch and pressed up onto the upper central incisor teeth.
   (This helps the relocation of the record in the patient's mouth)

c) The patient is then asked to bite hard on the wax.

d) The wax sheet is then removed from the mouth and excess wax cut off using a pair of curved scissors leaving a handle at the front

e) 4 holes are punched in the wax using the tip of the curved scissors
   (The position of each hole is selected where a cusp tip of a tooth closes into an opposing tooth somewhere along a line from one marginal ridge to another. The holes are best positioned in the first premolar and second or third molar regions whenever possible)

**Making the Anterior Jig**

a) Tap the patient in Centric Relation onto their early contact, and decide how much opening is required to prevent these teeth from touching.

b) Roll the Wax Template Handle up to make a jig that will contact the front teeth, and is thick enough to prevent the early contacts from touching.

c) Place the Wax Template into the patient's mouth, on the upper teeth.

d) Tap the patient into Centric Relation into the Anterior Jig.

e) Check that there is no contact between the early contacts.
Taking the Centric Record

a) Add a small amount of Zinc oxide and Eugenol Paste to each side of each hole and: -
   WAIT TILL THE PASTE BEGINS TO BECOME MODERATELY FIRM
   (Like putty or plasticene) BEFORE PLACING THE RECORD INTO THE PATIENT'S MOUTH

(Prepare the next wax record while the paste is setting)

b) Vaseline the biting surfaces of the patient's teeth

The dental assistant may mix the Zinc oxide and Eugenol paste for the second record at this stage so that it will be ready to be applied to the second record as soon as the first record has been placed into the patient's mouth

c) Place the record into the patient's mouth using the indentations of the upper incisor teeth to relocate the record.

d) Press the record gently onto the upper back teeth

Occasionally it may be helpful for the dental assistant to hold the record in place by placing her thumb on the record at the front to hold it against the upper teeth

e) Close the patient's lower jaw into centric relation using the Dawson Hold.

Gently tapping the lower teeth into the zinc oxide and Eugenol paste produces indentations in the paste.

DO NOT CLOSE THE LOWER JAW SO THAT THE UPPER AND LOWER BACK TEETH COME INTO CONTACT

f) Have the patient open their mouth a little while the paste is setting to prevent the patient biting on the record and distorting it

g) Wait till the paste is set and then remove the record

h) Repeat the procedure for the second centric record

Checking the Hinge Record (Centric Record)

While the paste is setting check the first record for: -

a) Good cusp tip to tooth “stops”
b) No holes in the zinc oxide and Eugenol paste indicating that the patient's teeth have come into contact

Remove the second record and check it

**Hinge Records for Difficult Patients**

Some patients may be relatively easy to manipulate in the Hinge Position until a hinge record is taken. At this stage their muscles may stiffen up and they become difficult to manipulate

**Stage 1  Jig Construction**  Used to guide the patient into the Hinge Position while taking Hinge Records

1. Firstly check whether it is possible to manipulate the patient into the Hinge Position. If so proceed with the record
2. Take a piece of impression compound and place it in a bowl of $\frac{1}{2}$ boiling water and $\frac{1}{2}$ cold water
3. When it is soft, roll it into a ball about 3mm across
4. Then press the compound against the Incisal edges of the upper front teeth so that it locates accurately over the upper front teeth
5. While the compound is still soft manipulate the patient into the Hinge Position and close the patient into the compound so that the lower teeth indent the compound
6. Allow the compound to cool
7. Remove the compound
8. Place some Vaseline into the indentation where the upper front teeth were
9. Replace the Compound
10. Check that it stays in place
11. Check in the Hinge Position to see if the lower front teeth fit accurately into the indentations in the compound. If not re-do the compound jig
12. Have the patient practice closing their lower teeth into the indentations in the jig
13. Reapply Vaseline to the Upper Incisor indentations in the jig

**Stage 2**

1. Make a wax occlusal template with a wide handle at the front
2. Cut away the template so that the jig can fit through it
Stage 3

1. Mix the Zinc Oxide and Eugenol paste and add it to the wax template
2. Vaseline the patient’s upper and lower occlusal surfaces
3. Place the template against the upper teeth
4. Insert the Compound Jig
5. Have the patient close into the indentations in the jig
6. Allow the Zinc Oxide and Eugenol to set
7. Remove the Hinge Record and the jig carefully

Ensure that the jig does not fall to the back of the patient’s teeth

Mounting Lower Models

On Hanau, Denar, Fagmatic, Artex and Dentatus Articulators

IF MOUNTING STUDY MODELS CHECK THAT THE MODELS ARE MARKED “1” AND “2” (indicating that the models are mounted on articulators "1" and "2")

Do not put the Hinge Position (Centric) Record on the models till both have been adjusted as described later

Setting Up
Put a small amount of water into a plaster bowl

Place next to the bowl

a) A clean spatula
b) A scalpel
c) The Centric Records
d) The Lower Models

Remove Face-bow or mounting jig from the articulator

Remove the Upper Model from the articulator

Attach a mounting plate to the lower member of the articulator

Articulator Preparation
ARTEX

a) Check that the Condylar Balls are as far forward as possible

b) **Check that the Centric Locking Screws are locked**

c) Stand the articulator upside down on its upper member

(IDEALLY THE DENTIST TAKES THE RESPONSIBILITY FOR MOUNTING THE LOWER MODEL)

d) **Set the Incisal pin on 0, then open pin by 4 mm** to compensate for the thickness of the centric record

**Hinge Position (Centric) Record and Model Preparation**

a) Check the occlusal surface of the upper and lower models for defects such as bubbles

b) **Score the base of the lower model**

c) **Check and adjust the Hinge Position (Centric) Record for sharp projections** which would prevent the models from seating into the record

d) Place the Hinge Position (Centric) Record onto the upper model and check for distortion

(It may be necessary to warm the record in warm water to help seating the record if there has been some distortion)

e) Seat the lower model into the Hinge Position (Centric) Record and grip the two models tightly together. On releasing the grip, watch for "spring back"

If there is, remove the record, warm it, replace it and grip the models together. If there is still spring back it may be necessary to hold the models together after mounting the lower while the plaster sets

f) With the two models seated into the Hinge Position (Centric) Record attach the Upper model to the upper member of the articulator.
Mounting the Lower Model

a) Place a very wet tissue on the base of the lower model

b) Close the articulator and check the space between the base of the lower model and the mounting plate to determine how much plaster will be needed

c) Add Plaster to the Mounting Plate and the base of the model

d) Close the articulator and remove any excess plaster

FINALLY

e) Grip the Upper and Lower models together to ensure that the models are seated correctly in the centric record

DO NOT PLAY WITH PLASTER WHILE IT IS SETTING

Occlusal Examination of Study Models

Name ______________________________________________________

Dynamic Analysis

Set the Condylar Angles to 20 degrees and Bennett Shift to 15 degrees unless otherwise indicated

1) EARLY CONTACTS in Centric Relation

a) Lock the articulator in the Hinge Position (Centric Relation)

b) Raise the Incisal Pin

c) Close the articulator and look for any obvious interferences

d) Open the articulator and place a square of GREEN silk over the lower teeth

e) Close the articulator and tap the models together

f) Check for early contacts
2) **PRESENCE of a SLIDE** from the Hinge Position (Centric Relation) to Maximum Tooth Contact

a) Unlock the centric locking device check that the Articulator arm moves freely

b) Hold the upper Member of the Articulator in the one hand and the Lower Member in the other hand

c) Holding the Articulator in Hinge Position (Centric Relation) close the Articulator

d) After the first contact is reached close the articulator carefully into Maximum Tooth Contact

e) Observe the direction of any slide from centric relation to Maximum Tooth Contact

f) Record the findings e.g. short or long slide to the left or right

3) **INTERFERENCES**

**IN LEFT LATERAL MOVEMENT**

a) With the centric locking device unlocked close the articulator into centric relation

b) Move the lower model to the patients left

c) Observe whether the front teeth separate indicating a contact posteriorly

d) Place a square of RED silk between the models and repeat the movement

e) Describe the Interferences e.g. short or long slight or gross

**Non-functional** (contacts on the right side)
**Cross-over** (after the left canines have crossed over each other)

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**Functional** (on the left side)

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**IN RIGHT LATERAL**

**Non-functional** (on the left side)

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**Cross-over** (after the canines on the right side have crossed over each other)

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**Functional** (on the right side)

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4) **Tooth Guidance**

a) **Edge to Edge Contacts**

**Protrusive**

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**Left Lateral**

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**Right Lateral**

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**Left Lateral Protrusive**

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Right Lateral Protrusive

b) **LEFT LATERAL EXCURSION**

Smoothness of Guidance

Steepness of Tooth Guidance

Posterior Clearance or presence of Posterior Interferences

Right __________________________ Left ______________________

c) **RIGHT LATERAL**

Smoothness of Guidance

Steepness of Tooth Guidance

Posterior Clearance or presence of Posterior Interferences

Left ___________________________ Right ______________________

d) **PROTRUSIVE**

Smoothness of Guidance

Steepness of Tooth Guidance

Posterior Clearance or presence of Posterior Interferences

Right ___________________________ Left ______________________

e) **LEFT LATERAL PROTRUSIVE** (half way between left lateral and protrusive)

Smoothness of Guidance

Steepness of Tooth Guidance
Posterior Clearance or presence of Posterior Interferences

Right ___________________________ Left ______________________

f) RIGHT LATERAL PROTRUSION (half way between left lateral and protrusive)

Smoothness of Guidance ____________________________________________

Steepness of Tooth Guidance ________________________________________

Posterior Clearance or presence of Posterior Interferences

Left ___________________________ Right ___________________________

**OCCLUSAL PLANNING**

Orthodontic Treatment ___________________________________________

________________________________________________________________

Removal of Teeth ________________________________________________

________________________________________________________________

Appliance Therapy _______________________________________________

________________________________________________________________

Posterior Cusp Tip Shortening and Reshaping / Additions to Fossae

________________________________________________________________

________________________________________________________________

Other Occlusal Equilibration Planning _______________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________
Occlusal Correction by Restorative Treatment
Occlusal Management

ANALYSING an OCCLUSION
1) EARLY CONTACTS in the Hinge Position Centric Relation

2) PRESENCE of a SLIDE from Centric Relation to Maximum Tooth Contact

Slides in Centric Relation
Describing a slide:
   Long or short, to the left or right, protrusive, horizontal or vertical
Close gently into centric relation, ask the patient to close into Maximum Tooth Contact

3) INTERFERENCES

LEFT LATERAL:
Non-functional (contacts on the right side)
Cross-over (after the left canines have crossed over each other)
Functional (on the left side)

   RIGHT LATERAL:
Non-functional (on the left side)
Cross-over (after the right canines have crossed over each other)
Functional (on the right side)

4) **Tooth Guidance**

a) **Edge to Edge Contacts:** Protrusive, Left Lateral, Right Lateral,
   Left Lateral Protrusive, Right Lateral Protrusive

b) **Left Lateral Excursion:** Smoothness of Guidance, Steepness of Tooth Guidance, Posterior Clearance

c) **Right Lateral:** Interferences, Smoothness of Guidance, Steepness of Tooth Guidance, Posterior Clearance

d) **Protrusive:** Smoothness of Guidance, Steepness of Tooth Guidance,
   Posterior Clearance

e) **Left Lateral Protrusive:**
   (Half way between left lateral and protrusive) Smoothness of Guidance,
   Steepness of Tooth Guidance, Posterior Clearance

   f) **Right Lateral Protrusive:**
   (Half way between left lateral and Protrusive) Smoothness of Guidance,
   Steepness of Tooth Guidance, Posterior Clearance
**The Principles of Occlusion**

1) The Occlusal Forces should be directed down the long axes of each posterior tooth

2) As many posterior teeth as possible should contact in the Hinge Position (Centric Relation)

3) There should be no lateral slide from Hinge Position (Centric Relation) to Maximum Tooth Contact

4) As the patient moves away from Hinge Position (Centric Relation) tooth contacts on back teeth should decrease as the front teeth take over the guidance.

5) The front teeth should protect the back teeth

6) There should be no non-functional (balancing) contacts

**Occlusal Adjusting**

Objective:

* To produce as many stable centric stops on posterior teeth as possible

* To reduce or remove posterior centric interferences

* To produce harmonious tooth guidance that reduces the stress on the back teeth as much as is possible in the circumstances and allows smooth gliding guidance in excursive movements

**Methods of Altering Occlusions**

Remove teeth

Restore teeth

Reposition teeth

Reshape teeth

Occlusal Appliance Therapy
Deciding where to start

- The possibilities are:-

a) Remove early contacts to establish Hinge and Maximum Contact Position

b) Then remove Non-functional Contacts

c) Then Improve the Tooth Guidance

d) Or All three at once

When learning the art of equilibration it is easier to adjust in centric relation first and to then adjust the Non-functional contacts and finally to adjust the Tooth guidance. At first tackling all three at once is difficult. As soon as possible, however, begin to look at all three aspects of occlusal adjusting.

a) Establishing Hinge and Maximum Contact Position

The Temporomandibular Joint (Jaw Joint) is made up of the following structures:-

1. The Head of the Condyle (the highest point of lower jaw)

2. The Articular Disc

3. The Glenoid Fossa (the depression in the base of the skull into which the Head of the Condyle fits)

An objective of occlusal equilibration is to establish stable centric stops, with properly seated Head of the Condyles in the Glenoid Fossa and relaxed muscles.

Mark the Early Contacts using Green Silk on models, Green Silk or Blue articulating paper in the mouth.

Analyze each marking:

1) Markings on Anterior Teeth:

Contacts on anterior teeth in centric relation are not advisable unless the teeth are in such an alignment that the forces can be directed down the long axis of the teeth involved.
Lightly remove contacts on anterior teeth in centric relation

As a rule remove markings from front teeth when adjusting in centric relation, unless there are insufficient centric stops on healthy posterior teeth.

Contacts in Hinge and Maximum Contact Position on front teeth are undesirable unless there are few back teeth present i.e. poor posterior support in this case some help may be required from the front teeth to take the forces of occlusion in centric relation

Occasionally front teeth may be in edge to edge occlusion in which case the forces of occlusion will be directed down the long axes of the teeth However contacts on front teeth will most often be on slopes which although not ideal is a better situation than having too much force exerted on the few remaining back teeth.

The principles of occlusion are principles not rules and must be adapted to the situation being dealt with
If the front teeth are in an edge to edge relationship, the forces will be directed down the long axis of the teeth, and are acceptable.

2) Markings on Posterior Teeth:

a) Markings on slopes

These are unstable and may result in a slide from Centric Relation to Maximum Tooth Contact

Decide the ideal place to move a contact i.e. mesially, distally, lingually, or buccally

Is it going to be possible to produce a stable centric stop in this particular situation?
If not, remove the contact straight away and continue adjusting elsewhere

Stage 1   Adjust Contacts on Slopes

“The Occlusal Forces should be directed down the long axes of the teeth”

Remove markings from slopes

When adjusting study models, use the spoon end of the Le Cron carver for adjusting fossae and slopes, and use the blade for adjusting and recontouring
cusp tips. In the mouth, use a round diamond bur for adjusting fossae and the short flame diamond bur for cusp tips.

If a tooth becomes sensitive, remove tooth structure from a non-sensitive part of the tooth or remove tooth structure from the opposing tooth.

Take care when working near cusp tips so that cusp tip is not reduced inadvertently.

When removing a contact from a slope, be careful not to remove anything from the fossa below the slope. If this is done the fossa will become deeper and the centric stop on this tooth may be lost. This may result in difficulty in obtaining a centric stop on that tooth.

Stage2 Adjust Centric Stops to bring other potential Centric Stops into contact.

The objective is to create as many Centric Stops into contact as possible

“As many posterior teeth as possible should contact in the Hinge Position (Centric Relation)”

When a few stable centric stops have been created, they will need to be reduced in order to produce additional stops on other teeth.

Choosing whether to adjust a fossa or a cusp tip

Reducing a fossa just requires producing a flat area for an opposing cusp to occlude
Adjusting cusp tips is more difficult to perform. Once shortened the tip has to be recontoured to produce a point contact. During this process the highest point of the tip may be moved mesially, distally, buccally and lingually. This requires a greater degree of thought and skill than reducing a fossa or marginal ridge. It is more difficult to reshape cusp tips.

In cases of steep anterior guidance where there is no possibility of creating Non-functional contacts it is easier to adjust the fossa rather than the cusp tip. Where there are non-functional contacts or there is a likelihood of creating non-functional contacts deepening fossae is likely to worsen the situation. It is better to reduce cusp tips in this situation.

Deepening a fossa will allow the opposing cusp tip to occlude deeper into the fossa. This may result in producing or worsening a non-functional contact. If this is a likely to occur, adjust the cusp tip.
Keep cusp tips reasonably pointed. This enables point contacts rather than contacts over a larger area. If this were to occur there is likely to be greater wear of the teeth.

How much tooth structure to remove?

This depends on the clinical judgment of the operator taking into account the following factors:-

How gross is the interference? The greater the interference the greater the amount of tooth structure should be removed. When there is only a small interference taking too much tooth structure will result in the loss of a centric stop.

How close is the progress towards an end result? (The closer to the end result, the less should be removed)

How sensitive are the teeth? If teeth become sensitive during an occlusal adjustment consider stopping and continue the adjustment a few months later.

The effect of removing tooth structure posteriorly

Removing 1 mm at the back of the mouth results in a closure of 3 mm at the front.

From which tooth should the tooth structure be removed?

If the cusp tip is also a non-functional contact, remove from the cusp tip not the fossa

Removing from the fossa allows the cusp tip to be positioned deeper into the opposing tooth and increases the severity of the non-functional contact.

Removing from the cusp tip lessens the severity of the non-functional contact.

When a non-functional contact on a cusp tip is also a centric stop, it may be necessary to reduce the cusp tip to eliminate the non-functional contact and to thus sacrifice a centric stop. Hopefully there will be another centric stop on the tooth.

Adjusting Anterior Teeth

The objectives are to produce a harmonious Tooth Guidance that reduces the stress on the back teeth as much as is possible if the arch relationships allow. Smooth gliding guidance in excursive movements reduces stress on the teeth and reduces grinding of the teeth. If the guidance is not smooth a tooth or several teeth may be traumatized during bruise and may be damaged and/or
loosened. If by reducing the contact on a loose front tooth, a non-functional contact is created this may be necessary to improve the prognosis of this tooth.

Transferring guidance onto teeth further forwards is preferable in order to reduce the stresses on back teeth.

If there is a contact in Maximum Tooth Contact between the tip of a lower front tooth and the palatal surface of an upper front tooth, and the tip of the lower front is shortened, the edge-to-edge contacts can be altered. This effectively may allow the back teeth to come into contact. This may not be desirable as it will have created a posterior interference.
A decision has to be made as to which contact to reduce the tip of the lower front tooth or the back of the upper front tooth

As posterior interferences are removed the lower jaw contacts on the upper teeth move forwards. Due to this centric stops may move forwards and be lost off the front of the mesial marginal ridges of the upper teeth, To avoid this it is necessary to reduce the mesial aspect of the tip of the lower tooth. This results in the highest point of the tip being further back

Before beginning an occlusal adjustment, look for deep fossae in fillings. By shortening the opposing cusp tip and adding to the deep fossa of the filling there will be less likelihood of interference being present.

A cavity is cut in the deep fossa and light cured composite added to the cavity .The patient is asked to close their teeth together and the composite cured from the buccal aspect. The patient then opens and the composite material cured from on top. The composite filling will to too high and will require reducing.

Teeth with large amalgam fillings may have thin and fragile cusps. In this case, ensure that all centric stops are on the amalgam filling, not on the cusp tips as they thin cusps. This may prevent the weak cusp tips fracturing off.

Halos
When nearing the completion of an equilibration it may be possible to hear one tooth is touching before the rest.

At this stage there may be several markings, produced when the teeth are tapped together on articulating paper or the mounted study models are tapped together.

Have the patient then tap together with no articulating paper present.
Check the markings again. Where there is a true contact the ink markings will have been cleared in the centre of a marking. If this is the case, this is the true first contact. This type of marking is known as a "halo".
**Splaying of Front Teeth**

Splaying of front teeth in moderate to advanced periodontal cases is often due to the lower teeth hitting in centric relation and sliding forwards into the front teeth the upper front teeth protrude and gaps may appear between them.

When these cases are equilibrated in Hinge and Maximum Contact Position and the slide eliminated, the front teeth may move back of their own accord, into their original positions. They may require retracting with an orthodontic appliance.

**Historic Markings**

When a decision has been made to remove tooth structure from only one of two teeth that are contacting the marking on the other tooth still remains. This is known as a “Historic Marking " and is no longer relevant. The marking ink must be removed from this tooth at the same time as the tooth structure is removed from the opposing tooth. Unless this marking is removed, irrelevant markings will be present causing confusion. Historic markings will be present as well as the true markings of the real contacts.

**Smudge**

Occasionally marks maybe a smudge and not a true marking. Markings may even be found on unopposed teeth.

When a lot of smudges or markings are present, clean them off with a toothbrush and start again. Alternatively ask the patient to grind on a tissue or piece of gauze held in a pair of articulating paper holders

**Protecting Cusp Tips**

When adjusting non-functional contacts, preserve centric stops where possible. If two cusp tips touch in excursions often non-functional contacts, it may be necessary to lose one or other cusp tip contacts. In these situations it is necessary to sacrifice the stop from a tooth with most stops.

**Tooth Guidance**

Immediate separation by two teeth is easier to deal with than when more teeth are involved in the guidance.

Guidance by several teeth has the advantage of distributing the forces of occlusion over several teeth

If upper or lower front teeth are to be shortened for aesthetic and functional
reasons,, check first to ensure that interferences at the back are not going to be produced. If interferences are produced, decide whether it is still wise to go ahead, or make provision to adjust them later.

**Steepness of Tooth Guidance –**

General principle - Flattening Tooth guidance seems to decreases TMJ problems
Steep Tooth Guidance in Class 2 division 2 cases produces immediate discussion of the back teeth.
Steepening Tooth guidance, however, can cause Temporomandibular joint problems.

Flattening the Tooth guidance can help Temporomandibular joint problems.

Changing the Angulation of the Tooth Guidance:

1. If the tooth guidance is flattened, interferences may be produced on the back teeth.

2. Flattening the tooth guidance can help in Temporomandibular Joint problems.

3. Steepening the Tooth guidance may help reduce posterior interferences but produce joint problems.
When checking Tooth Guidance:

1. Edge-to-edge position
   a. protrusive
   b. left lateral
   c. right lateral
   d. left lateral protrusive
   e. right lateral protrusive

2. Check left lateral; note guiding teeth & look for non-functional contacts on the right

3. Check right lateral; note guiding teeth & check non-functional contacts the left

4. Protrusion; check guiding teeth & protrusive interferences

5. Left Lateral Protrusive

6. Right Lateral Protrusive

When checking edge-to-edge positions:-
Check for interferences on posterior teeth

Adjusting Edge-to-edge Contacts - Whether to adjust upper or lower front teeth depends on which gives best aesthetics

Adjusting Front Teeth

When adjusting the length of front teeth, always consider the appearance. The appearance of front teeth is personal to that person. Alterations of the appearance need to be done with the consent of that person. Alterations to the aesthetics need to be done gradually, with the patient watching in a hand mirror. They need to look at the results as the procedure progresses.

STOP adjusting the front teeth when the patient is happy with the appearance.

How to Progress when starting to perform Occlusal Adjustments.

1) Start with isolated adjustments that are obviously necessary: -
   a) Reshaping and shortening opposing cusp tips before restoring a tooth when the cusp tip occludes deep into the occlusal surface of the opposing tooth

   b) Remove obvious interferences in centric relation
c) Remove gross non-functional contacts

d) Recontour anterior teeth that are over-erupted where there is no chance of creating non-functional contacts by doing so

2) a) Take two sets of study models of patients who you consider would benefit from alterations in their occlusion
b) Adjust one set and record any particularly significant changes you think should be made to the patient
   c) Equilibrate the patient

3) Equilibrate the study models at the same time as you equilibrate i.e. adjust the models a little and then adjust the patient and repeat the process

The advantages are:
   a) The patient sees the work you are doing on their behalf (charging the patient for the adjustment of their models when they are not present is fully justified. Seeing the adjustment being performed may help them rationalize the fee)

   b) The adjustment made on the model is fresh in your mind when you are adjusting in the mouth

4) **When in doubt fit an appliance before equilibrating**

5) Stop if the patient experiences pain

6) At first
   a) Do not treat patients who are particularly neurotic

   b) Do not overly persuade patients to have an occlusal adjustment. Choose patients who are enthusiastic and good patients

**Appointing Patients for an Occlusal Adjustment.**

It is not possible to predict exactly how long an equilibration will take

Book patients for an initial appointment with the understanding that further appointments may be necessary

Relate the length of an appointment to the patient's ability to pay i.e. Arrange shorter appointments for patients who need to spread out the payments.

Be flexible
General Screening

NAME: _____________________________________ DATE: ____ / ____ / ____

☐ Initial Requests

☐ General Health  ☐ Recent Visit to Doctor  ☐ Allergies
☐ Serious Illnesses  ☐ Bleeding Problems  ☐ Medication
☐ Rheumatic Fever  ☐ Blood Pressure  ☐ Diabetes
☐ Heart Problems  ☐ Arthritis
☐ Headaches  ☐ Migraine

☐ Any Dental Problems?

☐ Comfortable Bite

☐ Sensitive Teeth

☐ Grinding

☐ Jaw Joint  ☐ Pain  ☐ Noises (Clicking, Popping, Grating)

☐ Difficulty in Moving Jaw  ☐ Pain on Moving Jaw

☐ Sinuses

☐ Ears

CLINICAL EXAMINATION

☐ Soft Tissues  ☐ Preauricular Palpitation

☐ Lat. Ext. Aud. Meatus  ☐ Tap, Tap, Tap Test

☐ Early Contacts (EC) Test  ☐ Presence of Slide (CR-CO)

☐ Non Functional Contacts (NFC)

☐ Tooth Charting  ☐ Vitality

☐ Looseness  ☐ Gum Check
Clinical Occlusal Evaluation Form for Patients

Name__________________________________________________________

1) EARLY CONTACTS in Centric Relation
(Using the Dawson Hold close the patient until you feel the first tooth contact
Then ask the patient if they notice any tooth touching before any other
Record their reply e.g. left or right side near the front or back)
_________________________________________________________________

2) PRESENCE of a SLIDE from the Hinge Position (Centric Relation) to Maximum Tooth Contact
(Close the patient into centric relation using the bimanual manipulation (the Dawson Hold)
After first contact is reached ask the patient to close tight
Observe the direction of any slide from centric relation to Maximum Tooth Contact
Record the findings e.g. short or long slide to the left or right)
_________________________________________________________________

3) INTERFERENCES
(Put finger on left canine, ask patient to slide towards it
Observe whether the front teeth separate indicating a contact posteriorly If there is no apparent separation place some articulating silk between the posterior teeth on the right side and repeat the exercise pulling on the articulating paper holders
Describe the Interference e.g. short or long slight or gross
Non-functional (contacts on the right side) ______________________________
Cross-over (after the left canines have crossed over each other)
_________________________________________________________________
Functional (on the left side ) __________________________________________

LEFT LATERAL

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RIGHT LATERAL

Non-functional, on the left side ____________________________________________

Cross-over (after the canines on the right side have crossed over each other)

_______________________________________________________________

Functional (on the right side) __________________________________________

4) Tooth Guidance (Anterior Guidance)

a) EDGE TO EDGE CONTACTS (put a finger on central incisors & ask patient to slide
towards it)
Protrusive ______________________________________________________

Left Lateral ________________________________________________________

Right Lateral ________________________________________________________

Left Lateral Protrusive_______________________________________________

Right Lateral Protrusive______________________________________________

b) LEFT LATERAL EXCURSION
Smoothness of Guidance _____________________________________________

Steepness of Tooth Guidance___________________________________________

Posterior
Right ____________________ Left _____________________________

Clearance  RIGHT LATERAL
Smoothness of Guidance_______________________________________________

Steepness of Tooth Guidance___________________________________________

Posterior
Clearance Left __________ Right _______________________________

d) PROTRUSIVE
Smoothness of
Guidance__________________________________________________________

Steepness of Tooth Guidance___________________________________________

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Posterior Right ___________________________ Left ___________________________
Clearance

e) Left Lateral Protrusive (half way between left lateral and protrusive. Put finger on lateral incisor and ask patient to slide towards it)

Smoothness of Guidance_____________________________________________________

Steepness of Tooth Guidance________________________________________________

Posterior Right ___________________________ Left ___________________________
Clearance

f) RIGHT LATERAL PROTRUSION (half way between left lateral and protrusive)

Smoothness of Guidance_____________________________________________________

Steepness of Tooth Guidance________________________________________________

Posterior Clearance Left_______________________ Right_______________________
Clinical Occlusal Adjustment Procedure

Items required for the Occlusal Adjustment Procedure

STORAGE TRAY

1. 1 Tupperware Container 15 cm x 18 cm containing
   a) Pre-cut Red Silk
   b) 2 x Articulating Paper Holders set up with Red Silk ready to use
2. 4 or more Articulating Paper Holders set up with BLACK foil
3. 1 Suture box containing pre-cut Black Foil
4. 1 Box Shimstock pre-cut to 1/2 inches, 4 cm or the width of a small post-it
5. Horseshoe Articulating Paper (for denture adjustments)

The Black foil and the Red silk should be cut neatly to the length of a large post-it with a pair of straight scissors
The Red Silk dries out if left out and does not mark the occlusal contacts

Burs
   Short Flame Diamond (Intensive 255 from Metrodent)
   Round Diamond  Horico 001025  Glover Dental
   Long Flame Diamond F.G.563 (for aesthetic adjustment)
      or Intensive 311 from Metrodent

Other items
   Plastic Salivary Ejectors, CUT IN HALF
This item is extremely useful in salivary control when held by the chairside assistant and used as the dentist dries the teeth with the 3-in 1 syringe

SET-UP
   Plastic Tray,
   Storage tray,
   Mouth mirror,
   4 or more pairs of Articulating paper holders plus black foil,
(Ensure that all the other free Articulating paper Holders are set up with black foil)
  2 pairs of articulating holders plus red silk,
  Large round in No 1 handpiece,
  Short flame diamond in No 2 handpiece,
  Tweezers plus a Cotton Pellet, (for removal of individual unwanted markings)
A Toothbrush, (for brushing of old markings)
Tip-a-dilly plus a shortened plastic salivary ejector,

THE PROCEDURE

In order for the dentist to manipulate the jaw into Hinge Position (Centric Relation) both his hands are required. It is therefore necessary to have effective chairside support from a dental assistant.

The dental assistant should aspirate and place the Articulating Foil or Silk into the patients mouth while the Dentist dries the teeth and manipulates the jaw. The dental assistant should dry the foil or silk thoroughly after each time they are used using a tissue otherwise they will not mark the teeth. The assisting needs to be fast and accurate as the procedure is repetitive and requires good coordination between the dentist and the assistant. It is important that the assistant keeps ahead or at least up with the dentist. As soon as the dentist moves his hand towards the 3-in-1 syringe the assistant should place the aspirator into the mouth. The dentist dries the teeth with the 3-in-1 Syringe as the dental assistant aspirates with her left hand at the back of the patient's mouth on the side that the dentist is drying. The dental assistant holds the Articulating paper holders in her right hand ready to place in the patient's mouth as the dentist removes the 3-in-1 Syringe from the patients mouth. The dental assistant clearly knows which side to place the articulating paper holders having observed which teeth the dentist has dried.

The articulating paper holders must be placed in the mouth at the same time as the aspirator is removed in order to prevent saliva wetting the foil or silk unnecessarily. The articulating paper holders should be held against the upper teeth as this jaw does not move while the lower does move. There is not enough time to change hands during the procedure so it is necessary for the assistant to develop the use of her right hand to place the articulating paper into the left and right hand sides of the patient's mouth. When the procedure is actively in progress the Articulating Paper Holders should be held up near the mouth ready to place in the mouth. The Articulating Paper Holders need to be placed in the mouth as the Dentist removes the 3-in-1 syringe, otherwise there is a risk of the teeth becoming wet with saliva. Constantly dry the Red silk during the procedure otherwise it will not mark the teeth. The dentist will indicate when the black foil or the red silk is to be used.

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Preserving markings

If the teeth have been marked and for some reason the dentist is not ready to make the necessary adjustments the patient must be prevented from closing. This may well cause the markings to be rubbed off. To prevent this happening the assistant should rest the aspirator tip or the tip of a finger on the tips of the lower front teeth to discourage the patient from closing.

Placing the Articulating paper holders into the patient's mouth

1) Which side to place it
   (This will be indicated by the dentist as it will be the side that he dries with the 3-in-1 syringe)

2) Hold the Holders ready in the direction that they will be placed into the patient's mouth

3) Aim the holders up towards the patient's palate almost touching it. Then move it using a finger movement between the teeth ensuring that it is in the line of the arch and in the region which the dentist dried the teeth. Placing the articulating paper holders accurately this way will help prevent the foil or silk being folded over by the patient's tongue.

4) Move the Foil around a little while the patient's teeth are being tapped together in order to ensure better markings. By doing this a fresh area of foil is ready to mark the teeth

Tips

1) To help detect first contacts tap the patient into Centric Relation using the Dawson Hold and ask the patient to put their finger on the tooth that touches first.

2) If a patient experiences difficulty in moving their jaw in the correct direction sometimes the cause can be that only one pair of articulating forceps have been put into the patient's mouth. By placing two in the patient's one each side may overcome this problem.

3) The Quick Method of Occlusal Adjusting
   a) Have the patient grind around on some red silk.
   b) Look at the markings and decide on the markings where contact is definitely not needed or wanted.
   c) Remove these markings.

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4) Decide on the amount of tooth structure that needs to be removed

Early in the procedure more may be removed whereas later only a minute amount may need to be removed
The bur being used should be applied to the tooth using a light brush stroke Post Treatment Presentation

**Explain the following things to the patient**

1. They may find that their teeth feel rough for several days

2. Their symptoms get worse for a few days This is not a bad sign It is due to the patient being more aware of their bite having had it altered Their symptoms will settle down after a few days

They may feel hot and cold pain for a few days

**Mounting Models on an Articulator**

The reason for mounting models on an articulator is to enable a patient's upper and lower models to be related to one another in the same way as the patient’s upper and lower dental arches

The different types of articulators may be divided into three groups

1) The simple hinge types
2) The semi-adjustable types
3) The fully adjustable types

The Temporomandibular joint is represented in the simple hinge articulator by a simple hinge This type of articulator will only reproduce opening and closing movements in a vertical plane

Fully adjustable articulators have condylar assemblies programmable to simulate the patient's Temporomandibular joint movements and will reproduce the movements of the lower jaw

Between these two extremes there is a whole range of articulators which will reproduce...
the movements to a greater or lesser degree. These are known as semi-adjustable articulators. The condylar pathways are usually represented by a movement in a straight line on the articulator whereas the human Temporomandibular joint does not. Some articulators have curved pathways that can to a degree simulate human paths of condylar movement.

The accuracy to which the movements are simulated will depend on the accuracy of the mounting procedures and the complexity of the articulator used. Total accuracy can never be achieved.

Ultimately the patient is the most accurate “articulator”

**THE CHOICE OF WHICH TYPE OF ARTICULATOR TO USE**

The choice of which articulator to use will be dictated by the needs of each particular case being treated and depends on what movements are required to be simulated.

**For example:**

In severe class 11 Division 2 cases the posterior teeth are immediately separated in excursive movements due to the lower front teeth gliding down the palatal surfaces of the upper front teeth. The guidance at the front is so steep that there is little possibility of building interferences into crown and bridge cases.

In this case only a simple hinge movement is required for posterior tooth restorations. This however assumes a basic understanding of the fundamentals of occlusion on behalf of the dentist and technician.

In a severe class 11 division 1 case the separation of the back teeth by the front teeth is minimal if at all. The guidance, being almost flat, considerably increases the possibility of building interferences into a crown and bridgework. The movements of the lower jaw must be reproduced accurately. A semi-adjustable or fully adjustable articulator is required in these cases, even then minor adjustments may need to be performed in the mouth.

Semi-adjustable articulators are required for anterior crown and bridgework in order to establish or copy predetermined tooth guidance. It may be necessary to use a custom anterior guide table when the tooth guidance has already been established.

**The Choice of which Articulator to buy**

The first essential is an understanding of the fundamentals of occlusion resulting in the ability to make a decision on the best way to approach case. A decision on the mechanical equipment to be used in the execution of the diagnosis and restorative work necessary can then be made.
Semi-adjustable Articulators

All the articulators in this group produce similar movements and each has minor advantages and disadvantages.

They can be used for simply reproducing a hinge movement as well as being able to be moved in excursive movements due to the relatively crude condylar assemblies the simulation is not highly accurate. They can however be used very successfully even when average values are used.

The following are desired characteristics of a good semi-adjustable articulator:

1) It should be possible to lock the condylar assembly so that only a simple hinge movement can be made. In situations when it is desirable to mount models accurately in centric relation this is a very important characteristic. A positive centric latch or locking screw is required.

2) When the condylar assembly is locked, it should not become unlocked unintentionally.

3) It should sufficiently robust and durable.

4) It is helpful if the upper member of the articulator can be separated from the lower. This is a characteristic particularly helpful to technicians. It should not be possible for separation of the upper and lower members to occur unintentionally.

5) It should not be unduly expensive.

6) It should be easy to use.

7) It should have sufficient room between the upper and lower members of the articulator to allow the mounting of pinned working models.

METHODS OF MOUNTING MODELS

1) Using a Facebow

   The advantages of using a Facebow registration are:
   a) It provides a convenient place to locate the upper model when mounting it on an articulator.
   b) The upper model can be mounted at approximately the same distance from the hinge of the articulator as the patient's upper arch is to the Temporomandibular joint.

This means that the model will move in the same arc when being closed up after a Hinge Position (Centric) Record has been removed when the models are moved in lateral excursions they will also move in a similar arc to the patient's dental arches when the lower jaw is moved laterally.

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2) Hand mounting without a Facebow
For single crowns on posterior teeth when there is steep guidance by the anterior teeth in excursive movements it may be acceptable to hand mount models without using a Hinge Position (Centric) Record

METHODS OF MOUNTING LOWER MODELS

1) Using some type of interocclusal record
The taking of accurate Hinge Position (Centric) Records and the subsequent mounting of models in centric relation on an articulator requires a high degree of skill and should only be performed when the situation merits it. Use a Hinge Position (Centric) Record for mounting study models and full dentures.

When a Hinge Position (Centric) Record is used,
a) It may be inaccurate
b) The articulator must be closed after the record is removed in order to achieve tooth contact. The arc of closure of the articulator may not be the same as that of the patient even if a Facebow is used.

2) Hand mounting with plaster to plaster contact without a full interocclusal record.
Hand mounting of accurate models with plaster to plaster contact is the most accurate way of mounting models. There is also the advantage that the models are mounted at the same vertical dimension that restorative work will be constructed.

Use for mounting all crown and bridge cases
Where an occlusal adjustment has been performed to eliminate interferences in centric relation and in excursive movements Maximum Tooth Contact will be in centric relation. Hand mounting models will result in the models being mounted in centric relation and in Maximum Tooth Contact.

If Maximum Tooth Contact and centric relation do not coincide and an occlusal adjustment is not to be performed then there is no point in mounting models in centric relation.

When hand mounting it may be necessary to take a sectional record of the area where teeth have been prepared, with the teeth in Maximum Tooth Contact, in order to relate the models together in a stable way. It is better not to involve the teeth either side of the prepared teeth in the record as the resistance of the material can lead to the patient sliding into an incorrect occlusal relationship.
WHEN TO MOUNT MODELS IN CENTRIC RELATION

1) Study models to be used for the analysis of a patient's occlusion
   (A Hinge Position (Centric) Record must be used)
2) Full upper and full lower denture cases (unless the condition of the
   Temporomandibular joint indicates otherwise)
3) All crown and bridge cases when the patient is in centric relation and Maximum
   Tooth Contact simultaneously (unless the condition of the Temporomandibular joint
   indicates otherwise)
   These cases are best hand mounted.
If it is considered necessary to perform an occlusal equilibration this should be carried
out before any crown and bridgework is performed

WHEN NOT TO MOUNT MODELS IN CENTRIC RELATION
If centric relation and Maximum Tooth Contact are not coincident and an equilibration is
not to be performed then there is no point in mounting models in centric relation
They are best hand mounted in Maximum Tooth Contact i.e. maximum Tooth Contact

SETTING THE CONDYLAR ASSEMBLIES
The Simple Hinge Articulator solves the problem by having no possibility of any
adjustments due to the fact that only a simple hinge movement is possible
Semi-adjustable articulators may be adjusted in several ways Owing to the relative
simplicity of these types of the articulator the movements of the human
Temporomandibular joint are not reproduced with great accuracy
Their advantages lie in their relatively lower cost compared to the fully adjustable
articulator and the relative ease with which they can be used

METHODS OF SETTING CONDYLAR ANGLES
On semi-adjustable articulators:-

1) After mounting the models on the articulator have the patient move in a lateral
direction
Observe the degree of separation of the back teeth, if any, and alter the condylar angle to
reproduce the same separation on the articulator
Repeat the same exercise in protrusive  Choose the shallower of the angles for
restorative cases
There is less likelihood of building non-functional Interferences by doing this
This method of setting condylar angles of semi-adjustable articulators is probably the
most accurate

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2) Have the patient close into some soft wax with the jaw in a protrusive position. Place this record between the mounted models of the patient. Having unlocked the centric locking mechanism, adjust the condylar articulator so that the models seat into the wax record. Fully adjustable articulators are programmed after complex records have been taken of the patient using an elaborate Facebow type structure known as a pantograph. Generally speaking, semi-adjustable articulators will reproduce most of the movements necessary for diagnostic analysis, crown and bridgework and prosthetic procedures.
**General Screening**

NAME:_________________________________________ DATE:_____/____/____

Initial Requests_______________________________________________________________

<table>
<thead>
<tr>
<th>General Health</th>
<th>Recent Visit to Doctor</th>
<th>Allergies</th>
<th>Serious Illnesses</th>
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<tbody>
<tr>
<td>Bleeding Problems</td>
<td>Rheumatic Fever</td>
<td>Blood Pressure</td>
<td>Diabetes</td>
</tr>
<tr>
<td>Medication Problems</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heart Problems Arthritis Headaches Migraine

Any Dental Problems?__________________________________________________________

Comfortable Bite____________________________________________________________

Sensitive Teeth______________________________________________________________

Grinding__________________________________________________________

Jaw Joint Pain Noises (Clicking, Popping, Grating)

Difficulty in Moving Jaw Pain on Moving Jaw

__________________________________________________________________________

Sinues____________________________________________________________

Ears____________________________________________________________
CLINICAL EXAMINATION

Soft Tissues ______________________ Preauricular Palpitation _______________

Lat. Ext. Aud. Meatus ______________ Tap, Tap, Tap Test _______________

Early Contacts (EC) Test __________ Presence of Slide (CR-CO) ____________

Non Functional Contacts (NFC) __________________________________________

Tooth Charting ____________________ Vitality ______________________________

Looseness _________________________ Gum Check __________________________
Temporomandibular Joint and Occlusal Examination Sheet

Name______________________________________________

Preauricular Palpation at Rest______________________________________________

Opening______________________________________________________________

Closing______________________________________________________________

To the Left ___________________________________________________________

From the Left__________________________________________________________

To the Right___________________________________________________________

From the Right________________________________________________________

Forwards_______________________________________________________________

Back_________________________________________________________________

Lateral External Auditory Meatus Palpation

At Rest_______________________________________________________________

Opening______________________________________________________________

Closing______________________________________________________________

To the Left ___________________________________________________________

From the Left__________________________________________________________

To the Right___________________________________________________________

From the Right________________________________________________________

Forwards_______________________________________________________________

Back_________________________________________________________________
Occlusal Evaluation  Early Contacts___________________________
Slide from Centric Relation to Maximum Tooth Contact________________________
Non-functional Contacts on Left___________________________________________
Non-functional Contacts on Right_________________________________________
Protrusive Edge to Edge___________________________________________________
Left Lateral Edge to Edge__________________________________________________
Right Lateral Edge to Edge________________________________________________
Left Lateral Protrusive Edge to Edge_______________________________________
Right Lateral Protrusive Edge to Edge______________________________________

Analysing an Occlusion

1) **EARLY CONTACTS** in the Hinge Position (Centric Relation)

2) **PRESENCE of a SLIDE** from the Hinge Position (Centric Relation) to Maximum Tooth Contact

Slides in Centric Relation
Describing a slide:
  Long or short, to the left or right, protrusive, horizontal or vertical
Close gently into centric relation, ask the patient to close into Maximum Tooth Contact

3) **INTERFERENCES**

**LEFT LATERAL:**
Non-functional (contacts on the right side)
Cross-over (after the left canines have crossed over each other)
Functional (on the left side)

**RIGHT LATERAL:**
Non-functional (on the left side)
Cross-over (after the right canines have crossed over each other)
Functional (on the right side)
4) Tooth Guidance

a) **Edge To Edge Contacts**: Protrusive, Left Lateral, Right Lateral, Left Lateral Protrusive, Right Lateral Protrusive

b) **Left Lateral Excursion**: Smoothness of Guidance, Steepness of Tooth Guidance, Posterior Clearance

c) **Right Lateral**: Interferences, Smoothness of Guidance, Steepness of Tooth Guidance, Posterior Clearance

d) **Protrusive**: Smoothness of Guidance, Steepness of Tooth Guidance, Posterior Clearance

e) **Left Lateral Protrusive**: (Half way between left lateral and protrusive) Smoothness of Guidance, Steepness of Tooth Guidance, Posterior Clearance

f) **Right Lateral Protrusive**: (Half Way Between Left Lateral and Protrusive) Smoothness of Guidance, Steepness of Tooth Guidance, Posterior Clearance

**The Principles of Occlusion**

1) The Occlusal Forces should be directed down the long axes of each posterior tooth

2) As many posterior teeth as possible should contact in the Hinge Position (Centric Relation)

3) There should be no lateral slide from the Hinge Position (Centric Relation) to Maximum Tooth Contact

4) As the patient moves away from the Hinge Position (Centric Relation) tooth contacts on back teeth should decrease as the front teeth take over the guidance

5) The front teeth should protect the back teeth

6) There should be no non-functional (balancing) contacts
Occlusal Adjusting

Objective:

* To produce as many stable centric stops on posterior teeth as possible
* To reduce or remove posterior interferences
* To produce a harmonious Tooth Guidance that reduces the stress on the back teeth as much as is possible in the circumstances and allows smooth gliding guidance in excursive movements

Methods of Altering Occlusions
The relevance and order varies with each patient

Remove

Restore

Reposition

Reshape

Appliance Therapy

DECIDE WHERE TO START

- The possibilities are :-

a) Remove early contacts to establish Hinge and Maximum Contact Position

b) Remove Non-functional Contacts

c) Improve the Tooth Guidance

d) All three at once

At first tackling all three at once is difficult. When learning the art of equilibration it is easier to adjust in centric relation first and to then adjust the Non-functional contacts and finally to adjust the tooth guidance.

As soon as possible, however, begin to look at all three aspects of occlusal adjusting.

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a) Establishing Hinge and Maximum Contact Position

The Temporomandibular Joint (Jaw Joint) is made up of the following structures: -

1. The Head of the Condyle (the highest point of lower jaw )

2. The Articular Disc

3. The Glenoid Fossa (the depression in the base of the skull into which the Head of the Condyle fits)

One of the objectives of occlusal equilibration is to establish stable centric stops, with properly seated Head of the Condyles in the Glenoid Fossa and relaxed muscles.

Mark the Early Contacts using Green Silk on models, Red Silk in the mouth.

Analyze each marking:

1) Markings on Anterior Teeth:

Contacts on anterior teeth in centric relation are not wanted unless the teeth are in such an alignment that the forces can be directed down the long axis of the teeth involved. Lightly remove contacts on anterior teeth in centric relation. As a rule remove markings from front teeth when adjusting in centric relation, unless there are insufficient centric stops on healthy posterior teeth. Contacts in Hinge and Maximum Contact Position on front teeth are undesirable unless there are few back teeth present i.e. poor posterior support. In this case some help may be required from the front teeth to take the forces of occlusion in centric relation. Occasionally front teeth may be in edge to edge occlusion in which case the forces of occlusion will be directed down the long axes of the teeth. However contacts on front teeth will most often be on slopes which although not ideal is a better situation than having too much force exerted on the few remaining back teeth. The principles of occlusion are principles not rules and must be adapted to the situation being dealt with. If the front teeth are in an edge to edge relationship, the forces will be directed down the long axis of the teeth, and are acceptable.
2) **Markings on Posterior Teeth:**

a) Markings on slopes
These are unstable and may result in a slide from Centric Relation to Maximum Tooth Contact

Decide the ideal place to move a contact i.e. mesially, distally, lingually, or buccally

Is it going to be possible to produce a stable centric stop in this particular situation? If not, remove the contact straight away and continue adjusting elsewhere

**Stage 1** Adjust **Contacts on Slopes**
“The Occlusal Forces should be directed down the long axes of the teeth”

Remove markings from slopes

When adjusting study models, use the spoon end of the Le Cron carver for adjusting fossae and slopes, and use the blade for adjusting and recontouring cusp tips. In the mouth, use a round diamond for the fossae and the short flame diamond for cusp tips.

If cusp tip or fossa becomes sensitive, remove tooth structure from the non-sensitive part. Take care when working near cusp tips so that cusp tip is not reduced inadvertently.

When removing a contact from a slope, be careful not to remove anything from the fossa below the slope, as the fossa will become deeper. This may result in it being difficult to obtain a centric stop on that tooth.

**Stage 2** Adjust **Centric Stops** to bring other potential Centric Stops into contact.
The objective is to bring as many Centric Stops into contact as possible

“As many posterior teeth as possible should contact in Centric Relation”

When a few stable centric stops have been created, they will need to be reduced in order to produce additional stops on other teeth.

Deepening a fossa will allow the opposing cusp tip to occlude deeper into the fossa. This may result in producing or worsening a nonfunctional contact. If this is a danger, adjust the cusp tip. Keep cusp tips reasonably pointed

**How much to remove?**
How gross is the interference?

The relationship between the importance of the problem to be solved, the importance of the result to be achieved and the amount of tooth structure to be removed In some
situations the amount of tooth reduction may not be merited as the problem being solved is very minor whereas in other situations it may be necessary to make gross reductions in tooth structure or even the extraction of a tooth in order to solve a gross problem

How close is the progress towards an end result? (The closer to the end result, the less should be removed)

How sensitive are the teeth?

Removing 1 mm at the back of the mouth results in a closure of 3 mm at the front.

From which tooth should the removal be made?

* If the cusp tip is also a non-functional contact, remove from the cusp tip not the fossa
* Removing from the fossa allows the cusp tip to be positioned deeper into the opposing tooth and increases the severity of the non-functional contact
* Removing from the cusp tip lessens the severity of the non-functional contact
Anterior Repositioning Appliances

1. Construct Tanner Appliance shell
2. Reline Tanner shell in the mouth
3. Ask the patient to: - a) open until the first click  
   b) Protrude the jaw, closing forwards  
   c) Retrude to just before the second click.
4. Practice the above.
5. Place a small amount of warm compound on the appliance in the 2nd premolar / 1st molar region  
on both sides. Insert the appliance and have the patient to:-  
a) Open until the first click  
b) Protrude the jaw  
c) Then close into the compound just before the second click.
   Allow the compound to cool.
6. Check that the click has disappeared when the patient
7. Opens and closes.
   If the click on closing is still present, replace the compound and have the patient close a little further forward.
7. Reline the occlusal surface of the appliance with acrylic anterior and posterior to the compound.
8. Insert the appliance and guide the patient into the compound registration. Allow to set.
9. Remove compound and add more acrylic.
10. Shade the guiding planes with pencil.
11. Trim off the buccal flash and any excess but leaving the guiding surfaces of acrylic.
12. Fit the appliance and check that the click has disappeared.

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Occlusion Headache and TMJ Evaluation

HEADACHE & MIGRAINE HISTORY

Present Conditions
- Headache/Migraine (Record description of the different types of headaches experienced separately eg headache 1, 2, 3 etc)
- Time of Onset & Duration
- Character & Intensity (V.A.S.)
- Location, Direction & Extension
- Progress - Changes in Character
- Frequency
- Precipitating Factors - Stress, Alcohol, Work, Food
- Alleviating Factors - Drugs, Analgesics, Sleep, Vascular Drugs, Dark Room

Associated Signs & Symptoms
- Nausea □ Dizziness □ Aura
- Loss of Balance (Vertigo)
- Visual Changes □ Clenching
- Grinding (Time, Intensity, Duration)
- Sinus □ Eyes □ Ears
- Ringing in the Ears (Tinnitus)
- Jaw Joint □ Teeth □ Neck
- Shoulder □ Back □ Chest □ Arms

Previous History
- First Noticed
- Changes in Character & Pattern
- Remissions & Exacerbations
- Trauma (Direct Blow, Whiplash)

Previous Treatment - Drugs Taken
- Analgesics □ Tranquilizers
- Anti-Depressants □ Muscle Relaxants
- Narcotics □ Ergotamines
- Migraine Drugs

STRESS HISTORY

- Home □ Work □ Leisure
- Sleep Pattern □ Early Waking
- Ease of Going to Sleep □ Fatigue
- Disturbed Sleep □ Sound Sleeper
- Irritability □ Depression
- Anxiety □ Frustration
- Eating Pattern
- General Observations

TEMPOROMANDIBULAR JOINT HISTORY

Present Conditions
- Patients Description
- Noises:- □ Clicking □ Popping
- Grating □ Crunching
- Noises During Eating
- Limitations in Movement
- Locking Open/Closed
- Stiffness
- Pain:- □ at rest □ on clenching □ on chewing

Frequency
- Character (severity & intensity)

Precipitating Factors
- Eating □ Grinding □ Clenching
- Direct Blow □ Whiplash
- Excessive Opening □ Yawning
- General Anaesthetic
- Dental Procedure
- Alteration in Dentition
- Single Restoration □ Multiple
- Occlusal Alteration □ Extractions
- Orthodontics □ Prosthetics

Alleviating Factors

Associated Signs & Symptoms
- Headache/Migraine □ Tinnitus
- Vertigo □ Dizziness
- Sinus □ Eyes □ Neck
- Teeth □ Back
- Shoulder □ Arms
- Other Joints □ Arthritis
- Loose Joints

Previous History
- First Noticed
- Changes in Character & Pattern
- Remissions & Exacerbations

Previous Treatments
- Occlusal Adjustments □ Splints
- Crown & Bridgework □ Drugs
- Physical □ Orthodontic
- Surgery □ Counselling
- Chiropractic □ Osteopathic

OCCLUSAL ANALYSIS

- Missing Teeth
- Overerupted Teeth
- Wear Facets
- Cervical Abrasion
- Loose Teeth
- Loss of Posterior Support
- Loss of Vertical Dimension

XRay Findings
- Bone Loss - Vertical
- Widened Periodontal Spaces

O C l o s e r O t e r f i n e r e n c e s
- Anterior Guidance (AG)
- Guiding Teeth
- Character □ Smoothness
- Mobility of Teeth
- Left Lateral
- Right Lateral
- Protrusive
- Lateral Protrusive

Study Model Evaluation SM

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<table>
<thead>
<tr>
<th>TEMPOROMANDIBULAR JOINT</th>
<th>MUSCLE PALPATION</th>
<th>RESISTANCE TESTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Preauricular Palpation</td>
<td>Temporalis</td>
<td>Patient attempts the following movements against resistance</td>
</tr>
<tr>
<td>B Lateral External</td>
<td>Masseters</td>
<td>Closing</td>
</tr>
<tr>
<td>Auditory Meatus Palpation</td>
<td>Sternoc-Mastoids</td>
<td>Opening</td>
</tr>
<tr>
<td>C Preauricular Auscultation</td>
<td>Trapezius</td>
<td>Left Lateral</td>
</tr>
<tr>
<td></td>
<td>Digastrics</td>
<td>Right Lateral</td>
</tr>
<tr>
<td></td>
<td>Mylohyoide</td>
<td>Protrusive</td>
</tr>
<tr>
<td></td>
<td>Medial Pterygoids</td>
<td>Retrusive</td>
</tr>
<tr>
<td></td>
<td>Lateral Pterygoids</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Vertical Movement A B C</th>
<th>Horizontal Movement (Together)</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Rest</td>
<td>To Left</td>
</tr>
<tr>
<td>Opening</td>
<td>Back to Centre</td>
</tr>
<tr>
<td>Closing</td>
<td>To Right</td>
</tr>
<tr>
<td></td>
<td>Back to Centre</td>
</tr>
<tr>
<td></td>
<td>Protrusive</td>
</tr>
<tr>
<td></td>
<td>Retrusive</td>
</tr>
<tr>
<td></td>
<td>(Teeth Apart)</td>
</tr>
<tr>
<td></td>
<td>To Left</td>
</tr>
<tr>
<td></td>
<td>Back to Centre</td>
</tr>
<tr>
<td></td>
<td>To Right</td>
</tr>
<tr>
<td></td>
<td>Back to Centre</td>
</tr>
<tr>
<td></td>
<td>Protrusive</td>
</tr>
<tr>
<td></td>
<td>Retrusive</td>
</tr>
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<table>
<thead>
<tr>
<th>CHEWING TEST (soft wax)</th>
<th>RANGE OF MOVEMENTS (ROM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vertical Opening (N=40-65mm)</td>
</tr>
<tr>
<td></td>
<td>Maximum Active Opening (MAO)</td>
</tr>
<tr>
<td></td>
<td>Record Pain and/or Discomfort</td>
</tr>
<tr>
<td></td>
<td>Limitation Slight 30-40 Moderate 20-30</td>
</tr>
<tr>
<td></td>
<td>Moderate/Severe 10-20 Severe 0-10</td>
</tr>
<tr>
<td></td>
<td>Maximum Passive Stretch Opening (MPSO)</td>
</tr>
<tr>
<td></td>
<td>Pain and/or Rock Hard End Feel</td>
</tr>
<tr>
<td></td>
<td>Opening Pattern (Draw Diagram)</td>
</tr>
<tr>
<td></td>
<td>(Mark Pain &amp; Noises*)</td>
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<tr>
<td></td>
<td>HORIZONTAL MOVEMENTS (Horiz ROM)</td>
</tr>
<tr>
<td></td>
<td>Maximum Left (N=9mm)</td>
</tr>
<tr>
<td></td>
<td>Maximum Right (N=9mm)</td>
</tr>
<tr>
<td></td>
<td>Maximum Protrusive (N=9mm)</td>
</tr>
<tr>
<td></td>
<td>(Draw Pattern &amp; Mark Noises)</td>
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<table>
<thead>
<tr>
<th>PASSIVE RANGE OF MOVEMENT TEST</th>
<th>VAPOSPRAY &amp; STRETCH TEST</th>
</tr>
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<tbody>
<tr>
<td>with patient as relaxed as possible and with minimal patient assistance</td>
<td>Record Maximum Active Opening</td>
</tr>
<tr>
<td>Opening</td>
<td>Cover Eyes</td>
</tr>
<tr>
<td>Right</td>
<td>Spray 3 Times with Vapospay</td>
</tr>
<tr>
<td>Protrusive</td>
<td>Record Maximum Stretch Opening</td>
</tr>
<tr>
<td>Retrusive</td>
<td>Record Maximum Active Opening</td>
</tr>
<tr>
<td></td>
<td>Record Maximum Stretch Opening</td>
</tr>
</tbody>
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<thead>
<tr>
<th>NECK ACTIVE RANGE OF MOVEMENT</th>
<th>MUSCLE PALPATION</th>
<th>RESISTANCE TESTING</th>
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<tr>
<td>Forwards</td>
<td>Temporalis</td>
<td>Patient attempts the following movements against resistance</td>
</tr>
<tr>
<td>Backwards</td>
<td>Masseters</td>
<td>Closing</td>
</tr>
<tr>
<td>Left</td>
<td>Sternoc-Mastoids</td>
<td>Opening</td>
</tr>
<tr>
<td>Right</td>
<td>Trapezius</td>
<td>Left Lateral</td>
</tr>
<tr>
<td></td>
<td>Digastrics</td>
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<td>Retrusive</td>
</tr>
<tr>
<td></td>
<td>Lateral Pterygoids</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BITING TEST (using a tongue depressor between)</th>
<th>LOCAL ANAESTHETIC MUSCLE INJECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior Teeth</td>
<td>Record Maximum Active Opening</td>
</tr>
<tr>
<td>Left Posterior</td>
<td>Record Maximum Stretch Opening</td>
</tr>
<tr>
<td>Right Posterior</td>
<td>Inject Muscle (Lignocaine Without Adrenaline)</td>
</tr>
<tr>
<td>Bilaterally</td>
<td>Record Maximum Active Opening</td>
</tr>
<tr>
<td></td>
<td>Record Maximum Stretch Opening</td>
</tr>
<tr>
<td></td>
<td>Record Presence of Pain</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>DIAGNOSING OF ANTERIOR DISPLACED DISC</th>
<th>COTTON ROLL TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of Opening &amp; Closing Click</td>
<td>Patient Opens Until Click</td>
</tr>
<tr>
<td>Auscultation - Loud Opening &amp; Soft Closing and/or Palpation</td>
<td>Cotton Roll Placed Between Molars</td>
</tr>
<tr>
<td>Click</td>
<td>Patient Closes, Bites &amp; Relaxes</td>
</tr>
<tr>
<td>Cotton Roll Test</td>
<td>(Palpate for Click - Less Painful?)</td>
</tr>
<tr>
<td>Protrusive/Retrusive Test</td>
<td>Repeat</td>
</tr>
<tr>
<td>Romancing Test</td>
<td>After Clicking, Patient Opens &amp; Closes</td>
</tr>
<tr>
<td></td>
<td>with Cotton Rolls In</td>
</tr>
<tr>
<td></td>
<td>(Palpate For Clicking)</td>
</tr>
<tr>
<td></td>
<td>If Oasses Test - Good Candidate For A</td>
</tr>
<tr>
<td></td>
<td>Repositioning Appliance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROTRUSIVE/RETUSIVE TEST</th>
<th>ROMANING TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open &amp; Close (Ensure Click)</td>
<td>Open Wide, Ensure Joint Clicks</td>
</tr>
<tr>
<td>Close Teeth Together &amp; Slide Forwards (Preauric. Lat Ext Aud Meatus Palpation)</td>
<td>With Bimanual Manipulation Arc Up, With</td>
</tr>
<tr>
<td>Retrude</td>
<td>Pressure Upward on Angle of Mandible</td>
</tr>
<tr>
<td>* NOTE - Click Further Forward On Protrusive than Retrusive</td>
<td>Romance Condyle Up Into Fossa</td>
</tr>
<tr>
<td></td>
<td>Tap Teeth Together &amp; Check Which Teeth</td>
</tr>
<tr>
<td></td>
<td>Touch (eg if Left Disc Out of Place, the</td>
</tr>
<tr>
<td></td>
<td>Lower Left Molars Will Now Be Lower, The</td>
</tr>
<tr>
<td></td>
<td>Right Side Teeth Will Be In Premature Contact)</td>
</tr>
<tr>
<td></td>
<td>Have Patient Open Until Clicks</td>
</tr>
<tr>
<td></td>
<td>Close (Click) - Teeth Will Fit</td>
</tr>
</tbody>
</table>

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RECOMMENDED READING

Communication and Psychology
Games People Play by Eric Berne published by:- Penguin
Happiness and Fulfilment in Dentistry Quintessence Publishing Co Ltd

I'm O K  You're O K  by Harris
Staying O.K. by Harris

Oclusion
Diagnosis and Treatment Planning of Occlusal Problems by Peter Dawson published by Mosby from:- The L.D.Pankey Institute (Bookstore)
(Order using VISA or MASTERCARD. If you order by Fax, Give complete card number & expiry date.) FAX 010-1-305-361-6534 or Phone 010-1-305-361-5433

Restorative Dentistry
Fundamentals of Fixed Prosthodontics
by Shillingburg Hobo and Whitsell from:- Quintessence

Restoration of Endodontically Treated Teeth
by Shillingburg and Kessler from:- Quintessence