Chapter

Trauma from Occlusion: Practical Management Guidelines

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Abstract

Occlusal trauma is trauma to the periodontium from functional or parafunctional force's causing damage to the teeth and its attachment apparatus by exceeding its adaptive and reparative capacities. Occlusal instability is a common cause for trauma from occlusion, resulting in numerous complications. It often leads to interference which reflexively shifts or slides the jaw forward on one or both the side to find a spot where most teeth come together. This action protects the teeth from injury caused by chewing on just one tooth. Overtime, this shift can cause a whole host of problems from TMJ pain, post restorative complications, headache, tooth sensitivity, recession, broken and loss of teeth and orofacial pain. These occlusal interferences and bite discrepancies are treatable with minimally invasive dentistry. Occlusal equilibration is a therapy that is used when the cause of trauma is due to occlusal instability. This involves the reshaping of the teeth where the improper biting surfaces are located. The key lies in decoding the cause, but often treatment is only directed towards the effects. Only a thorough evaluation and occlusal analysis will lead to a definitive diagnosis that will help in better anticipation of the damages.

Keywords: occlusal trauma, occlusal instability, occlusal interferences, occlusal analysis, biometric analysis, occlusal equilibration

1. Introduction

Ideal occlusion is characterized by simultaneous contacting of all teeth at maximum intercuspation, with an equal intensity force on right and left side of the arch. This helps to preserve all the physiological components of the stomatognathic system namely the occlusion, the attachment apparatus, TMJ and the neuromusculature in harmony as they are closely interrelated. When the functional or parafunctional occlusal forces exceeds the capacity for adaptation and repair of one tooth or group of teeth and its attachment, limited or progressive injury

occurs. This is called occlusal trauma. In the presence of interference, the jaw will reflexively shift and slide forward on one or both the side to find a spot where most teeth come together. An unstable occlusion is a common cause for numerous post restoration complications. Overtime, this may cause a whole host of problems from TMJ pain, headache to sensitivity, recession, broken and lost teeth and Orofacial Pain.

Establishing a stable and harmonious occlusion goes a long way in preventing the deterioration of the dentition and its associated structures [1]. Trauma from occlusion is a clinical finding often ignored by the dentist as it is not a part of the chief complaint. The key lies in decoding the cause, but most often treatment is only directed towards the effects. Only a thorough evaluation and occlusal analysis will lead to a definite diagnosis. A good diagnosis helps in better anticipation of the direction the damages will take.

Digital occlusal analysis is a powerful tool which provides the dentists with an objective reproducible data. These occlusal technologies along with a biometric approach will allow for an accurate diagnosis treatment and reevaluation of the inter relationship between teeth, muscles & joints [2].

2. Terminologies used with trauma from occlusion

2.1 Trauma from occlusion

Occlusal trauma was defined as "An injury to the attachment apparatus as a result of excessive occlusal force" "Glossary of Periodontics terms" (American Academy of Periodontology 1986), [3].

2.2 Occlusal interferences

Any contact that inhibits the remaining occluding surfaces from achieving stable and harmonious contacts.

2.3 Occlusal adjustment

Reshaping of the occlusal surfaces of teeth by grinding to create harmonious contact relationships between the upper and lower teeth, or orthodontic movement of the teeth to create more harmonious contact relationship.

2.4 Fremitus

A palpable or visible movement of a tooth when subjected to occlusal forces (also known as functional mobility).

2.5 Premature occlusal contact

A condition of tooth contact that diverts the mandible from a normal path of closure.

3. Classification

3.1 Glickman's classification (1953)

3.1.1 According to duration of cause

I. Acute trauma from occlusion:

This type of trauma is caused because of abrupt occlusal impact, like due to biting on a tough object or high restorations or prosthetic appliances. The clinical signs and symptoms of the condition include tooth pain and sensitivity to percussion, fremitus, tooth mobility and once the cause is removed, symptoms subside and complete healing takes place [4–7].

II. Chronic trauma from occlusion:

When abnormal occlusal forces are exerted on the tooth-supporting structures for a longer duration of time, chronic trauma from occlusion occur. It is more significant than the acute condition because it results in progressive changes in occlusion clinically seen as tooth migration, tooth wear and extrusion of teeth [4–7].

3.1.2 According to nature of cause

I. Primary trauma from occlusion:

It refers to the injury resulting from excessive occlusal forces applied to a tooth or teeth with adequate support

II. Secondary trauma from occlusion:

It refers to the injury resulting from normal occlusal forces applied to a tooth or teeth with inadequate support.

3.2 Box's classification

3.2.1 Physiologic occlusion

Box defined it as a condition, in which the systems of forces acting upon the tooth during the occlusion are in a state of equilibrium, and they do not and cannot change the normal relationship existing between the tooth and its supporting structures [8].

3.2.2 Traumatic occlusion

The damage produced in the periodontium is due to the overstress produced by the occlusion (**Table 1**).

Precipitating factor	Magnitude of force Director of the principle PDL fibers Duration of the force application Frequency of the force application	
Predisposing factor	**Intrinsic**	**Extrinsic**
	Orientation of the long axis of the teeth Morphological characterization of the tooth Morphology of the alveolar process (quality & quantity of the bone)	Local factors like plaque Long span fixed partial denture supported on few teeth Inappropriate bone resection Parafunctional habits Other factors, including overhanging filling, poorly contoured restoration Food impaction etc.

Table 1.
Etiology of trauma from occlusion.

4. Pathophysiology of trauma from occlusion

Excessive occlusal force
↓
Soft tissue change
Traumatic v shaped gingival crescent
Stillman's cleft (indentations in the gingival margin generally on one side of tooth)
McCall's festoons (Buccal Bone dehiscence)
Absence of stippling – Edema secondary to trauma
↓
Alteration in occlusal forces
↓
Hard tissue change
Occlusal wearing pattern of tooth not attributed to any abnormality in patient diet
↓
Tooth mobility, migration, shifting & tilting of tooth
↓
Discomfort on eating
↓
Sensitivity of teeth
↓
Hypertonicity of muscle
↓
Mandibular deviation

5. Stages of tissue response to excessive occlusal forces

Excessive force of occlusion causes the tissue to respond in three stages Injury, repair and adaptive remodeling of periodontium.

5.1 Stage 1: injury

Soft tissue injury is the immediate result of excessive occlusal forces. The magnitude of forces varies from slightly excessive, greater then excessive or severely high.

The centre of rotation of a single rooted tooth lies at the junction of middle and apical third of the tooth and is located near the furcation area of the multirooted teeth.

When excessive occlusal forces are subjected to teeth they rotate around the fulcrum of rotation. This rotation in the tooth socket creates areas of presser and tension on the opposite side of the fulcrum. When the force is unidirectional, these are created on the opposite surface, whereas in the case of jiggling forces these areas may co – exist on the same surface.

Effect of excessive occlusal forces on the periodontium.

Slightly excessive forces- simulates bone resorption in area of presser, causing the widening of periodontal ligament space. Elongation of PDL fibers takes place in the areas of tension.

Greater than slightly excessive forces- caused marked changes in the tooth supporting structures producing areas of hyalinization and necrose when excessive compressive forces are produced from trauma from occlusion.

Severely high occlusal force- results in thrombosis, hemorrhage, tearing & widening of pdl space and undermined bone resorption. If the forces are removed, or tooth moves away the periodontium is completely repaired.

5.2 Stage 2: repair

Takes place when the damage tissue is replaced by new connective tissue and cells. This is a well-regulated mechanism and the healing process is directly or indirectly facilitated by the extracellular matrix and certain inflammatory mediators. The activity is increased during TFO & the body tries to reinforce the trabeculae within the new bone by a process known as buttressing bone formation. When it occurs in the buccal and lingual surface of the alveolar bone it is known as peripheral buttressing and central buttressing when this process occurs within the bone this helps to bear increased occlusal load. There is a shelf-life thickening of the bone on the labial or lingual surface of the alveolar bone is referred to as lipping.

5.3 Stage 3: adaptive remodeling of the periodontium

Establishes a structural relationship in such a way that the forces of occlusion are no longer harmful to the periodontium, and the repair process can keep pace with the destructive occlusal forces.

Tooth mobility is an important clinical sign when TFO is increase it occurs in two phases the initial phase there is an increase in the width of the PDL and reduction of the number of the periodontal fibers leading to alveolar bone resorption.

The second phase results in the permanent widening of the PDL space which occurs after the repair of the traumatic lesion as an adaptation to the increased forces.

6. Is traumatic occlusion reversible?

If excessive occlusal forces are neutralized, healing takes place. The presence of plaque may however impair healing so resolution of inflammation should be first initiated. Injury caused by TFO is reversible but there may or may not be complete restoration of the supporting structures of the tooth.

7. Examination, evaluation, diagnosis and prognosis of trauma from occlusion

Clinical history of the patient and clinical examination are the cornerstones of correct diagnosis of TFO.

7.1 Clinical features of occlusal trauma

1. No periodontitis
2. Tooth wear (mild faceting or marked attrition)
3. Fractures of the enamel or restorations
4. Occlusal interferences (either from the retruded contact position to intercuspal position (ICP) or in lateral excursions/protrusive movements)
5. Ridging of buccal mucosa
6. Indentations in lateral border of the tongue
7. Reddening of the tip of the tongue.

7.2 Tooth mobility

Miller's Index (1938) is most often used to classify tooth mobility. Normal physiological movement vary between 10 μm and 150 μm and is not detectable on examination.

Class 0 – Within physiologic range when force is applied.

Class I – Mobility more the physiologic range.

Class II – Tooth moves upto 1 mm or more laterally (mesiodistal/buccolingual). Inability to vertically depress the tooth (apicocoronally).

Class III – Tooth can be moved 1 mm or more laterally (labiolingually or mesiodistally). Tooth can be depressed in a vertical direction.

7.3 Fremitus test

TFO can clinically detected using this test. The movement or vibratory pattern is measured when the teeth are placed in contacting positions and during lateral and protrusive movements.

In this test the vibratory movement of the tooth/teeth is identified and graded by placing dampened index finger along the labial surfaces of maxillary teeth.

The patient is asked to tap the teeth together in MIP and then grind systematically in lateral and protrusive movements.

Classification system used:

Class I fremitus: Mild movements/vibration detected.

Class II fremitus: No visible movements/easily palpable vibration.

Class III fremitus: Movements are visible to the naked eye.

7.4 Radiographic signs

I. Widening of the PDL space, often with thickening of the lamina dura along the lateral aspect of the root in the apical region and in bifurcation areas

II. Irregular widening of the periodontal ligament space.

III. Vertical rather than horizontal destruction of the interdental septum, with the formation of infrabony defects

IV. Bone sclerosis in the periapical area or in the interdental bone crest.

V. Radiolucency and condensation of the alveolar bone

VI. In advanced stages of TFO inflammatory root resorption is seen.

VII. Increase in periapical bone density around a vital tooth on a radiograph indicative of a type of Sclerosing Osteitis and a positive clinical sign of TFO helps guide us to a correct diagnosis and treatment plan.

Radiographical Features

1. Hypercementosis.

2. Secondary dentin laid down in the pulp chamber.

8. Occlusal trauma and implants

Osseointegration of implants is a direct structural and functional connection between ordered living bone and the surface of a load carrying implant.

Functional load enhances the integration when the load is adequately distributed. Occlusal overload however adversely affects implant stability. Strain is the key factor in controlling bone remodeling. Strain is created when any object is subjected to external stress. Stress in the oral environment is the occlusal overload. Mechanoreceptors present in the bone play a major role in initiating bone remodeling. When implant restorations are subject to TFO, stress of a higher level are imposed at the interface. This initiates resorption of bone and may lead to failure of implants.

Crestal bone loss observed around implants occurs mainly because of the difference in modulus of elasticity of the implant and bone. As the modulus of elasticity of titanium is 5–10 times greater than that of the cortical bone. In osseointegrated implants stresses are concentrated at the crestal bone level. Thus, any sustained overload on the implant restoration may lead to implant instability.

9. Our present understanding of trauma from occlusion

Periodontal health depends on the normal occlusal forces. Any increase in the functional demand the periodontium accommodates by thickening of the lamina dura and reinforcement of bony trabeculae.

When the functional demand of the tooth cannot be met, tissue injury results. If the stimulus is chronic and noxious widening of the PDL space is seen at the expense of bone resorption. This has a cushioning effect which enables the tooth to bear the excess forces.

Many concepts still needs to be clarified about trauma from occlusion. However, the following conclusions can be drawn from the present data.

Presently there is no evidence that suggests that gingivitis or periodontitis is caused by trauma from occlusion or can accelerate the progression of gingivitis to periodontitis.

PDL is a dynamic tissue and has the ability to adapt to increased forces of occlusion by widening of the periodontal ligament & crestal bone resorption. But when the excessive forces are removed, the periodontium & the tooth comeback to their normal state of function.

Trauma from occlusion may be considered a co factor which can increase the rate of progression of an existing periodontal disease.

As a rule the first line of treatment should be to resolve inflammation by elimination of local factors by scaling & root planning.

An important component to ensure smooth function & comfort of the patient is occlusal therapy.

10. Treatment of trauma from occlusion

10.1 Treatment plan: systematic approach

I. Make the patient aware, accept and own the problem and make them partners on the road to co-discovery and co-treatment in order to achieve functional, esthetic and biological goals.

II. Identify bacterial risk, periodontal charting, habits evaluation, fremitus test, pathological wear, mobility and migration.

III. Evaluation of functional disharmony in the Masticatory apparatus (R.O.M, Load test, JVA, EMG, occlusal scan, TMJ Doppler Auscultation, Muscle palpation. Evaluate the 5 requirements of occlusal stability by Dawson's Academy. Evaluate TMJ- for Piper's classification.

IV. Assess the complete records- clinical, radiographic, photographic, diagnostic models,

Mount cast with facebow transfer at the first point of contact, protrusive and centric records are taken to program the articulator.

Treatment Planning can be done with the help of

a. Two-dimensional wax up or

b. 3-dimensional digital wax up

10.2 Treatment options

Different treatment options can be planned for the same diagnosis. The option taken will be determined by several patient related factors and occlusal analysis. The

treatment of TFO involves removal of the excessive occlusal forces and bringing the tooth/teeth in a comfortable position. Many treatment modalities have been advised to treat TFO. These include,

I. Occlusal adjustments and occlusal equilibration

II. Management of parafunctional habits.

III. Biometric management of trauma from occlusion.

IV. Orthodontic tooth movement.

V. Occlusal reconstruction.

VI. Extraction of selected teeth.

10.3 Occlusal adjustments and occlusal equilibration

10.3.1 Occlusal equilibration

"It is a controlled destruction of tooth surface aimed at reducing the biological price the dentition will eventually pay if not done. Establishing a stable and harmonious occlusion goes a long way in preventing the deterioration of the dentition and its associated structures. This can be achieved by occlusal equilibration, which is a minimally invasive therapy involving reshaping of the teeth when improper biting forces are located.

10.3.2 Steps in occlusal equilibration

1. Mock Equilibration in the Articulator.

   The centric and eccentric interference are marked and eliminated in a sequence. Establishing of a harmonious and optimum anterior guidance to the new envelop of function. Developing the guidance with a wax up after customizing the anterior guidance table. This establishes a tentative blue print of the procedures and amount of reduction to be carried out on the identified teeth.

2. Occlusal adjustment is done directly in the mouth with a Kois Deprogrammer (**Figure 1**) with an anterior ramp at pre-establishing vertical dimension and centric relation.

10.3.3 Occlusal equilibration can be done in 4 steps

1. Find the first point of contact with a 200 μm horse shoe paper.

2. Remove the clinical contact, continue with the equilibration (40 μm paper).

3. Obtain equal intensity contact from canine backward (8 μm paper).

4. Chewing pathway adjustment is done with 200 μm paper.

Figure 1.
Kois deprogrammer. SOURCE- https://www.koiscenter.com/kois-center-a-new-standard/kois-center-research/kois-deprogrammer/.

10.3.4 Grinding rules to be followed

1. Narrow the stamp cusps before reshaping the fossa.

2. Do not shorten the stamp cusp.

3. Always adjust centric interferences first.

4. Eliminate all posterior incline contacts & preserve only the cusp tip.

10.3.5 Occlusal reduction

i. Centric relation interferences (interference to the arc of closure)

   a. Retrusive interference

   b. Centric slide – MUDL

ii. Selective Reduction of tooth structure that interferes with the lateral excursions, deflective interferences (Line of closure) lateral interferences Patient is guided to left and right eccentric positions.

   a. BULL- Balancing interference

   b. LUBL- Working interference

iii. Elimination of all posterior tooth structure that interferes with the protrusive excursions (Protrusive interferences) –

   DUML- The patient is guided to centric and asked to slide forward and back

iv. PATHWAY ADJUSTMENT

Harmonization of anterior guidance to the envelop of function at an erect posture and asked to chew on 200-micron paper.

a. Stable holding contacts on Central incisor (anterior teeth at the cervical ⅕th of the tooth)- Anterior retained stops (MIP)

b. All contact anterior to this is removed.

c. Equalize the contact to get as many teeth into contact as possible without striking the inclines. Optimum guidance is when anterior teeth does not interfere with the Chewing pathway.

- Finally, the patient is asked to chop-Chop in centric and grind in all direction with an 8-micron paper in the mouth.

- End result should be one good heavy contact on all the teeth from canine backwards on the functional cusp and opposing fossa. With light contact on 2nd molar and no contact on the incisors, verify dots in the back and lines in the front.

- End with a clench test- Patient is asked to close the mouth and squeeze firmly and checked for comfort. In teeth/muscle/TMJ if there is a bilateral smooth simultaneous, uniform harmonious jaw function with no instability in the joint.

- Completed with a Shim Stock contact test.

- Finished and polished to a smooth finish with a polishing paste.

- A maintenance protocol also needs to be followed every 2 weeks, for a month requiring constant checkup (**Figure 2**).

10.4 Management of parafunctional habits

Parafunctional habit is a repetitive behavior that targets oral structures occlusal wear, fractured cusps, clenching/bruxism, obstructive sleep apnea are common signs of parafunctional activity. They can occur consciously when awake or at night and have been linked to stress & anxiety.

Management begins with creating a cognitive and behavioral awareness. Use of hard acrylic splints which are correctly adjusted for occlusion, helps protect the teeth and relax the muscles.

Localized occlusal interference splint and orthotic devices help in management of dental arch malrelationship.

10.5 Biometric management of trauma from occlusion

A biometric approach includes the jaw vibrational analysis (JVA) (**Figure 3**) of the TMJ, EMG (**Figure 4**) of the muscles and digital occlusal scan (**Figure 5**) of the teeth.

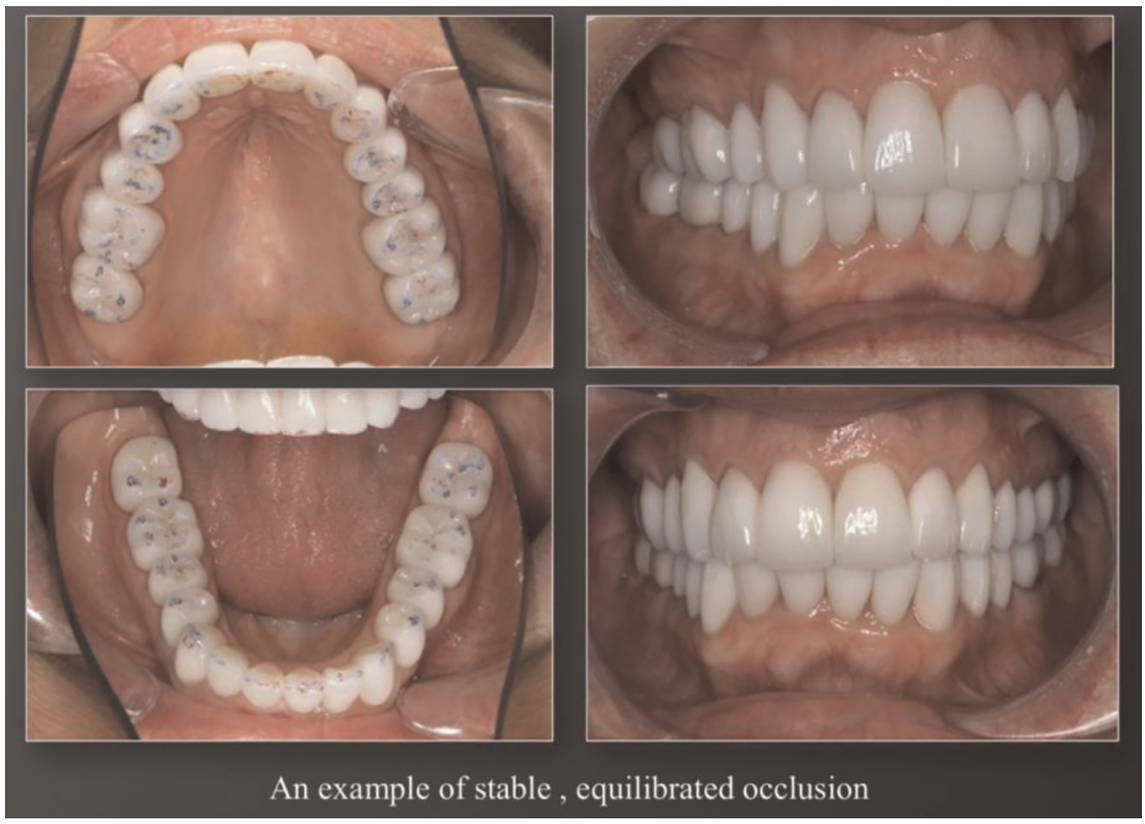

Figure 2.
Equilibrated occlusion.

Figure 3.
Jaw vibrational analysis [JVA]. SOURCE- https://www.bioresearchinc.com/joint-vibration-analysis/.

Harmony in the muscle, joint, teeth & restorations are closely interrelated, the biometric approach gives the critical information needed to create this harmony,

Advanced computerized systems are now able to give objective, reproducible data allowing for accurate diagnosis, treatment and re-evaluation of occlusal condition.

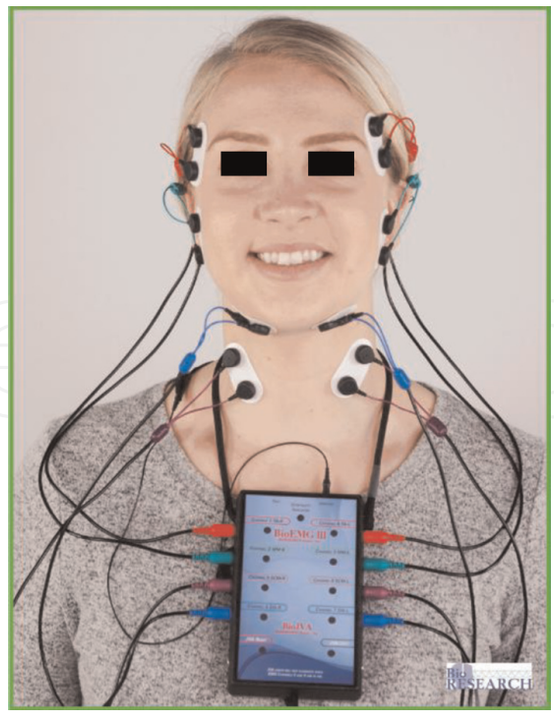

Figure 4.
Electromyograph [EMG]. SOURCE- https://www.bioresearchinc.com/emg-bioresearch/.

Occlusion analysis is elevated to a true science as compared to subjective analytical methods followed when using articulating papers.

When used pro-actively clinicians can detect potential problem early thus preventing the progression of debilitating conditions.

Step 1. – Joint vibration analysis is an instrument which produces virtual image of the recordings by measuring the wavelength of different types of vibration and patterns of friction. It is shown to be 98% specific in diagnosis of joint pathology. It can be paired with other devices to synchronize the vibration analysis with jaw tracking and EMG recording.

Step 2- The Craniofacial muscle activity in both rest and function is recorded using the EMG to determine the specific activity of the muscles of mastication, timed exactly with the occlusal contact forces.

EMG studies help improve muscle coordination, and reduce incoordination and hyperactivity. Electric activity in the muscle quiets down almost immediately after a clench is released, whereas with occlusal disharmony muscle activity is prolonged even after the teeth are separated. Electromyography helps measure specific muscle activity, allowing treatment to be biologically based instead of just spatially driven.

Step 3- Digital Occlusal Scans- gives a functional picture of the mouth which helps establish the dynamic occlusion that balances both force and time. The role of occlusion is often overlooked, minimized or ignored in dental practice due to difficulty in understanding the concepts. Occlusal scans can be used along with tenets of both popular school of thoughts regarding occlusion by coordinating the timing and activity of individual muscle as well as canine protected occlusion.

When used simultaneously with a link software between EMG and occlusal scan it will help improve the patient's overall occlusion. This is because the scan software shows the exact timing and specific tooth contact and loads in conjunction with muscle activity. The use of disocclusal time reduction (DTR) therapy can reduce the

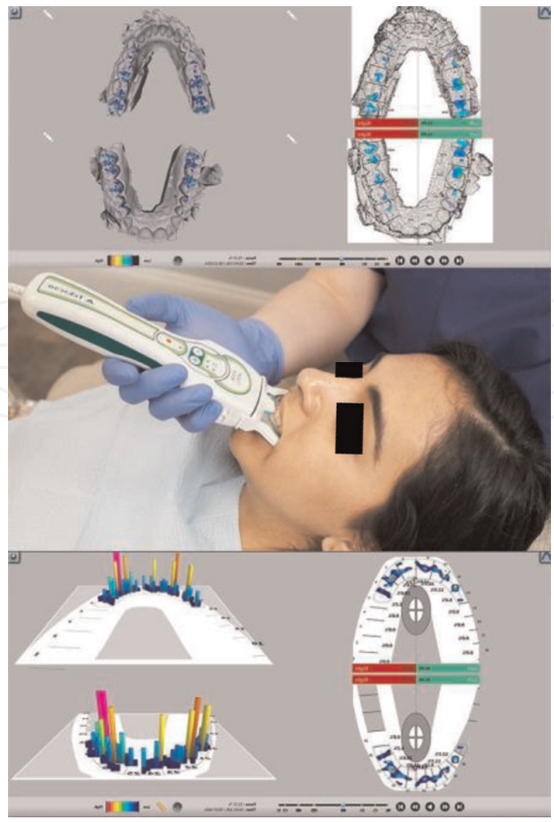

Figure 5.
T-scan (digital occlusal analysis). SOURCE- https://www.tekscan.com/dental-scan-t-scan.

time taken for disocclusion from MIP to Canine rise, and also help reduce interference that disrupt the harmony of tooth muscle joint complex.

Digital scans also help analyze and address the causes of occlusal discrepancy instead of just treating the effects. Thus, removing potential triggers from any muscle based clinical pathologies creating harmony synergy and symmetry in the stomatognathic system [2].

10.6 Orthodontic tooth movement

Tooth malposition are prime cause for Trauma from Occlusion. Orthodontic therapy (**Figure 6**) has a big role to play in prevention and treatment of malposition. The teeth should be moved to a position which will improve its stability and long-term prognosis by eliminating abnormal occlusal forces. Early detection of occlusal trauma and correction can help mitigate the harmful occlusal forces and help prevent damage to the teeth and the periodontium. Investigations that help aid this include visual inspection of occlusion with articulating paper, mobility assessment, full mouth radiographs and use of computer aided occlusal evaluation system. The assessment should be made both in static and functional excursions.

Orthodontic treatment may itself create occlusal interferences, these are temporary and do not last long. The reasons are usually related to inappropriate tooth position, occlusal morphology and overload in excursive movements. These interferences if present should be allowed to settle down over a duration of time by natural accommodation and assessed over a period of time. A through occlusal analysis should always be performed before and after completion of orthodontic treatment.

Figure 6.
Orthotic appliances. SOURCE- https://drandrewwilloughby.com/smile-gallery/neuromuscular-orthotics-for-treatment-of-tmj-dysfunction/.

10.7 Occlusal reconstruction

Redesigning of the complete occlusal scheme is done when no other means of occlusal equilibration can be achieved. This is done by fabrication, crowns, fixed partial and implant supported prosthesis and requires a thorough understanding of occlusion and then extensively on an appropriate articulated cast and is then replicated in the patient's mouth.

The chewing and biting surfaces of teeth are in balance and proper alignment. Thus, the pressure on individual teeth is lessen there by making them less susceptible to trauma. Thereby improving the normal functioning of the mouth.

A thorough examination and a differential diagnosis procedure is essential to restore the health of the articulating system restore individual tooth to its best anatomic position. This requires an integrated approach including (using) all disciplines of dentistry, to support, manage, limit and lessen the wear and destruction of the element of the masticatory apparatus and restore a healthy physical support.

10.8 Surgical management

Extraction of tooth that interferes with occlusion is a rarely used option. In certain situations, extraction of the selective teeth with poor prognosis with extensive periodontal involvement is done to improve the prognosis of the remaining teeth. This helps achieve a proper true position and alignment of the remaining teeth and immediate structures and the total articulating system.

11. Discussion

Trauma from occlusion is a term often used but least understood. It refers to tooth/tissue injury due to distorted occlusion and/or occlusal forces. The damaging forces may affect the tooth, its supporting structures and immediate structures that may extend to involve the articulating system. A lack of awareness often leads to the cascading consequences in the masticatory system.

This is mostly to do with difficulty in decoding the cause as a result management is only directed at the effects. Treatment approach needs to include through evaluation of occlusion, understanding of occlusal instability and early diagnosis of changes in the supporting structures.

11.1 Periodontal management

Any occlusal force which goes beyond the adaptive capacity of the underlying tissues leads to damage to the periodontal structures. The current understanding of the role of TFO is it can amplify not cause localized loss of attachment.

Trauma from occlusion is reversible but attachment loss may not be. The development of pockets and recession are not a direct consequence of TFO. The development of pockets and recession are not a direct consequence of TFO but due to other etiological factors & plaque and calculus. When diagnosing the periodontal condition, his/her unique susceptibility, history and site specificity, specific to the direction of the force to a particular tooth [6, 9].

Management is directed towards intercepting any pathological process or to eliminate conditions conducive to disease or injury by looking for risk factors early help manage with minimal treatment. This is done by containing inflammation and instituting proper plaque control measures including supra/sub gingival debridement. If mobility persists teeth should be stabilized with fixed splints only after the traumatic occlusal forces are eliminated. If TFO is left untreated the chances of periodontal disease increases greatly [10].

Occlusal instability is a trigger to a host of adverse consequences leading to occlusal disharmony. Failure to replace missing teeth, malocclusion and improperly aligned teeth to each other produces irregular and less repeatable chewing strokes. The chewing is shorter and slower and may also have an irregular pathway. Mandibular deviation may result in order to avoid deflective contacts. This manifests as pain in the jaw muscles, and a host of adverse consequences in the masticatory apparatus. Occlusal equilibration is the widely used option of treatment, in which the chewing and biting surfaces of the teeth is either selectively reduced or restored to achieve the ideal occlusion [11].

Analysis of the direction of the stress in the centric closure versus that of eccentric closure discloses on the important causes of pathologic wear of teeth and the resultant effect on the supporting structures. Objective treatment plan should restore a harmonious cuspal relationship within physiologic limit and harmonize the jaw in centric at peace with the neuromusculature. This allows the jaw to function where it is comfortable and not restricted [12].

The goal is to confine all excursive contacts on to the anterior teeth, removing any posterior interferences if any that trigger and activates the muscle hyperactivity that prevents the turning off of the elevator muscle activity. The role of occlusion is often overlooked minimized or ignored in general dental practice. As many dentists find it difficult to understand concepts and when, where and how to incorporate occlusal technologies in to the practice [1].

Biometric approach gives clinician a powerful objective tool for incorporating occlusal analysis leading to improved clinical results and fewer failures in prosthetic restorations and orthodontic tooth repositioning. It connects the biological markers with the patient's occlusion and gives critical information that is required to create harmony between teeth, muscles and jaw [2].

Prevention, Interception and correction are terms synonymous with orthodontic, should also be integrated into management of TFO. Malposition of teeth are prime

reasons for development of damaging forces, orthodontics is the ideal means of correcting these teeth irregularities. Early diagnosis and repositioning of teeth to an ideal occlusion in static and dynamic function allows for proper anatomical alignment of opposing teeth and the arches. Adapting a comprehensive individualized treatment approach after assessing the effects on each element of the masticatory apparatus will lead to a better outcome.

If parafunctional habits are involved, habit counseling, cognitive and behavioral awareness therapy needs to be instituted. The habits can lead gradually weaved off, if needed the help of permissive or stabilizing splints can be used. This may be followed by a restorative management.

12. Conclusion

The key to understand trauma from occlusion is to understand how the brain finds the teeth, it finds the teeth by the best of fit. The jaw should be allowed to close into maximum intercuspal position without any interference and not force itself in, So better the fit into MIP the healthier the occlusion. The chewing pathway is as important as the anterior guidance which does not interferes with the pathway. Occlusion is unique to each individual so is the pathway. A systemic approach in the sequence of treatment selected and planned will help in improving the long-term prognosis and rehabilitation of patients by establishing the occlusion which is in harmony with the envelope of function. An inter disciplinary treatment approach with digital occlusal analysis will go a long way in developing neuro-occluso-muscular harmony.

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Nomenclature

TFO	Trauma from occlusion
TMJ	Temporomandibular joint
MIP	Maximum intercuspal position
EMG	Electromyography
JVA	Joint Vibrational Analysis
PDL	Periodontal Ligament
ICP	Intercuspal position
ROM	range of movement
μm	micron (measurement unit)

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