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RESEARCH ARTICLE

CORONOPLASTY: AN UNEXPLORED TREATMENT MODALITY IN PERIODONTAL THERAPY

***Dr. Malvika Singh MDS**

Department of Periodontics, Himachal Institute of Dental Sciences, Paonta Sahib, H.P, India

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ABSTRACT

The study of dental occlusion has been a subject of major interest since the time of emergence of modern dentistry and can be attributed to the fact that it is often less understood and and perhaps ignored by alot of clinicians. Inhibition of occlusal surfaces causes occlusal trauma to the individual and thus require its treatment. Cornoplasty is the procedure of selectively reducing the supracontacts thus relieving the patient of the same.

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INTRODUCTION

"Occlusion" takes on an almost mystic importance and attracts a cult like devotion and has been rightly described as "*The heart of dentistry*". According to Ash and Ramfjord, "occlusion is defined as a manner in which the upper and lower teeth intercuspate between each other in all mandibular positions and movements. It is a result of neuromuscular control of the components of the masticatory systems namely: teeth, periodontal structures, maxilla and mandibular, temporomandibular joints (TMJ's) and their associated muscles and ligaments" (Ash, 1982). Any tooth contact that inhibits the remaining occluding surfaces from achieving stable and harmonious contacts is known as occlusal interference (Francová, 2014), and it poses a potential of changing the occlusion. Selective grinding or *coronoplasty* is the mechanical elimination of occlusal supracontacts that may be present during functional movements. It also deals with selectively reducing occlusal areas with the primary purpose influencing the mechanical contact, conditions and the neural patterns of sensory output in addition to establishing an ideal occlusion, premature contacts and neural patterns of sensory input. This article aims at highlighting the need and importance of coronoplasty and also attempts to throw light on the procedures and importance of same in the field of dentistry with emphasis in the field of periodontics.

***Corresponding author*: Dr.Malvika Singh MDS**
Department of Periodontics, Himachal Institute of Dental Sciences, Paonta Sahib, H.P, India.

Occlusion: According to *Ash &Ramfjord*, "occlusion is defined as the manner in which the upper and lower teeth intercuspate between each other in all mandibular positions and movements. It is a result of neuromuscular control of the components of the masticatory systems namely: teeth, periodontal structures, maxilla and mandibular, temporomandibular joints (TMJ's) and their associated muscles and ligaments"(Ash, 1982). Generally, the term occlusion in itself includes following two subtypes:

Centric occlusion: Also known as intercuspal position (ICP), it is the tooth-tooth relationship with maxillary contact, irrespective of the condylar position and it is the position composed on the neuromuscular system to avoid cuspal interference. Generally, individuals in this position tend to close their teeth in "*a position of the best"* (Wise, 1984).

Centric Relation (CR)*:* It is the only position which is both reproducible and stable, with or without teeth present (Andrews, 1972). The significance of centric relation is that this position is reproducible irrespective of the guidance that the occlusal surfaces of the teeth may provide.

Occlusal interferences: In clinical terms, an occlusal contact relationship must interfere with something to be considered as an occlusal interference. Bernhard el al. investigated the potential associations between dynamic occlusal interferences and signs of periodontal disease in posterior teeth based on a cross- sectional epidemiologic study titled, "Study of Health in

non-working side contacts and increased probing depth and attachment loss (Bernhardt, 2006). Conditions predisposing occlusal interferences are lack of harmony, unilateral mastication, loss of teeth and centric relation traumatising interferences.

Coronoplasty: It is defined as the selective reduction of occlusal areas with the primary purpose of influencing the mechanical contact conditions and the neural pattern of sensory output". It is the direct and irreversible change of occlusal scheme (Krogh-Poulsen, 1968). It can also be defined as the mechanical elimination of the supracontacts that may be present during functional movements and the selective reduction of occlusal areas to establish functional relationship favourable to the periodontium by reshaping, restoring, application of intraocclusal appliance therapy and orthodontic movement &orthognathic surgery of teeth (Malathi, 2014). The objective of coronoplasty is to mechanically eliminate the occlusal supracontacts that are involved in function and parafunction (Bernhardt, 2006). The principle behind performing coronoplasty is to eliminate the undesirable occlusal forces that cause the tissue damage and tooth mobility and it should be done by mechanically eliminating all occlusal supracontacts which are in function and parafunction.

Treatment planning: While planning the treatment for a patient, following points should be kept in mind:

Sequencing coronoplasty in treatment planning: Prior to adjusting occlusion, gingival inflammation and pockets are eliminated due to following reasons:

- Inflammation is eliminated first as evidence related to the pathogenesis and healing aspects of trauma from occlusion (Polson, 1976 and Polson, 1976), suggests that the benefits of coronoplasty are not complete if same is not eliminated first.
- Teeth are periodontally treated first as the ones having same tend to migrate. This sequence is however modified under the conditions such as infrabony pockets, mucogingival surgery, excessive tooth mobility and cracked tooth (Agar, 1988).

Occlusal analysis: Prior to extensive coronoplasty, casts from dental impressions are made so that a well rehearsed planned adjustment is carried out with the greater confidence and efficiency (Carranza, 1998).

Armamentarium: These are the materials that are used to identify and mark tooth contacts for specific application in coronoplasty. These include contra-angled handpiece, inked marking ribbons, mylar strips, abrasive disks, ribbon holder, blotting paper, abrasive disk and wheel, cutting and abrasive burs (tapered fissure bur, tapered fissure diamond bur, straight bur, round bur, football diamond bur, round diamond bur), arkansas stone, rubber polishing cones, occlusal registration strips, occlusal indicator wax, marking and articulating paper (Carranza, 1998).

Informed consent: Patients are often concerned about whether coronoplasty will change their appearance, causing tooth decay, or increase tooth sensitivity. Hence it is the duty of the clinician to explain to them the fact that teeth are not going to be ground down, but reshaped so that they will function better.

Steps for coronoplasty: Coronoplasty can be accomplished using a variety of different sequences, particularly if the area to be corrected involves only a few teeth. However, when a comprehensive coronoplasty is to be accomplished, a step-by-step approach is required, although experienced clinicians tend to blend the steps (Carranza, 1975). The series of steps are normally accomplished over two or more appointments, with each visit lasting no more than 30 minutes. The sequence in which coronoplasty is performed can be enumerated in following steps:

Gross adjustment and elimination of occlusal disharmonies:
According to Clyde Schuyler, occlusal adjustment can be divided into *two* main headings: gross adjustment and fine adjustment. Gross adjustment can be performed prior to soft tissue therapy, but fine adjustment usually follows the elimination of inflammation and infection. Where teeth are very loose (as a result of secondary occlusal trauma) or have gross interferences, occlusal adjustment is carried out as soon as possible.It is a simple and uncomplicated procedure where striking changes, both in appearance and function, are achieved in one or two 15 minute grinding sessions.

It is generally used to correct:

- Extruded teeth
- Plunger cusps
- Uneven adjacent marginal ridges
- Rotated, malposed and tilted Teeth
- Facets and flat occlusal wear
- Flat occlusal wear

Removal of retrusive prematurities and elimination of deflective shift from retruded contact position (RCP) to intercuspal position (ICP):

The purpose of this step is to reduce supracontacts that interfere with posterior border closure of the mandible to a stable retruded contact position (RCP). This step results in the elimination of retruded contact position (RCP) to intracuspal position (ICP) shift and it neutralises or removes the shifts from retruded contact position (RCP) to intracuspal position (ICP).

Adjustment of intercuspal position to achieve stable, simultaneous, multipointed widely distributed contacts: The aim behind performing this step is to achieve a stable intercuspal position (ICP) and to refine occlusal anatomic relationships. The main feature of this step is the identification of supracontacts without the guidance by the operative adjustment of same during one or more visits. The posterior teeth are adjusted first, followed by conservative adjustment of the anterior teeth, if necessary. Among the alterations that are commonly made in conjunction with this step are:

- Reduction of cuspal size.
- Alteration of occlusal table width.
- Lessening of plunger cusp height.

Test for excessive contact (fremitus) on the incisor teeth: The basic purpose of the step is to slightly take or move incisor teeth out of contact or in light contact over the maximum teeth so that the firmness of contact can be detected by using mylar

occlusal strips that are usually held in hemostat. Also closing contacts should be tested for fremitus,hence a vibration or displacement perceptible on the palpation the facial tooth surface is felt with a moistened forefinger during repeated firm closure to interproximal contacts (ICP).

Removal of posterior protrusive supracontacts and establishing contacts that are bilaterally distributed on the anterior teeth: The objective of this step is to attain bilateral, well-distributed contact on the incisal edges of the maxillary and mandibular incisor teeth.

Removal or lessening the mediotrusive (balancing) interferences: The objective of this step is to remove mediotrusive (balancing) supracontacts that complicate correction of the laterotrusive (working) guidance in order to facilitate dominant disclusion on the laterotrusive side.

Reduction of excessive cusp steepness on the laterotrusive (working) contacts: In this step, the canines causing disclusion are removed as they lead to a single tooth molar supracontact and eventually result in trauma from functional and parafunctional movement (Reynolds, 1975 and Scaife, 1961).

Rechecking the tooth contact relationships: Under this procedure, tooth contact relationships in all positions and movements are rechecked to verify the guidelines that to help determine the feasibility of achieving a satisfactory result by means of occlusal adjustment.

Finishing technique and patient instructions: In this step, the occlusal surfaces are smoothed and polished so that they feel *"comfortable"* to the patient. Many situations in periodontal therapy require coronoplasty of only one or two teeth and comprehensive occlusal adjustment is not warranted. In these cases, localised coronoplasty is often limited to intraborder reduction of supracontacts on the involved teeth (i.e. steps 2, 4 and 5 are only performed). The decision to include retruded contact position adjustments (RCP) is usually based on the use of retruded contact position (RCP) as a reference position rather than as the occlusal end point position. Following steps are used for coronoplasty:

Bruxism and appliance therapy: The term '*la bruxomanie*' was first introduced by Marie Pietkiewicz in 1907. It was later adopted as 'bruxism' to describe gnashing and grinding of the teeth occurring without a functional purpose.Bruxism is defined as a diurnal or nocturnal parafunctional activity that includes clenching, bracing, gnashing and grinding of teeth. *Glossary of Prosthodontic Terms* (GPT-8) defines bruxism as "parafunctional grinding of teeth or an oral habit consisting of involuntary rhythmic or spasmodic non-functional gnashing, grinding or clenching of teeth in other than chewing movements of the mandible which may lead to occlusal trauma". It can be caused due to psychic stress, irritation from periodontal pockets, bruxing habit and prolonged periods of occlusal trauma eventually leading to formation of facets, loose teeth and open contact.

Management of Bruxism (Jadidi, 2007)

Methods of relaxing muscle spasm: It is ironical that those patients who most need help to alleviate bruxing, are the most difficult to treat because of their hypertonic musculature. In some people, it is quite impossible to guide the mandible in any direction and the muscles are in complete state of spasm. Some also complain of discomfort in the temporomandibular joints (TMJ's).

- Cotton roll technique
- Occlusal Interventions

This category aims at achieving harmonious relationship between occluding surfaces but there exist controversies among dental clinicians and researchers. Butler described an occlusal adjustment procedure for the treatment of bruxism without a proper theoretical basis. Greene et al. stated that occlusal rehabilitation further mutilates the dentition beyond what bruxism has created.

Occlusal Appliances

These are the most commomly and widely used orthodontic appliances for the treatment of bruxism. They include acrylic bite plane and Hawleys retainer:

Conclusion

Occlusion acts as a central pillar in our working lives and to be of such a systemic import to the well-being of the patients that it takes almost mystic importance and attracts cult like devotion. This can lead some dentists to advocate occlusion as being the key to resolving or preventing a range of disorders far removed from the masticatory system. Occlusion cannot be fully evaluated or treated in isolation. Instead, each component of the masticatory system must be fully understood according to its potential for adaptation and pathophysiology as well as interactions with the other components therefore its relationship to the function of the stomatognathic system has been widely studied in dentistry since many decades. The relation between periodontal disease and occlusion has been long debated. Occlusal trauma can alter the periodontium (gingiva, cementum, periodontal ligament and alveolar bone). Due to this effect, it is ideal to manage occlusal trauma prior to any definitive periodontal therapy. Occlusal therapy can be used to decrease loading of the teeth that have lost bone due to periodontal disease with the main to maintain or achieve occlusal stability. Thus, coronoplasy is used to provide better stability and occlusion in a permanent dentition non-invasively. Coronoplasty has remained as an ignored and perhaps overlooked procedure by clinicians. The opportunities for oral health care in the twenty first century are enormous. The convergence of the biological and digital revolution with clinical dentistry and medicine is changing and transforming diagnostics, treatment planning, procedures, techniques, therapeutics, biomaterials and predictable outcome of therapy. The clinicians should be made aware about the importance of coronoplasy in dentistry specially in periodontics so that it can be exploited for the betterment of the patients.

Conflict of interests: None to declare.

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