



ISSN: 0975-833X

RESEARCH ARTICLE

TEMPOROMANDIBULAR JOINT DISORDERS: A COMPREHENSIVE REVIEW

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ARTICLE INFO

Article History:

Received 06th June, 2015
Received in revised form
25th July, 2015
Accepted 20th August, 2015
Published online 30th September, 2015

Key words:

Temporomandibular Joint,
Temporomandibular Joint Disorder,
Soft Occlusal Splint.

ABSTRACT

The temporomandibular joint (TMJ) is one of the most complex joint in the body, the area where the mandible articulates with cranium. It is formed by the mandibular condyle fitting into mandibular fossa of the temporal bone. Separating these bones from direct articulation is the articulating disc which is composed of dens fibrous connective tissue. Functionally, the articulating disc serves as non ossified bone that permits the complex movements of the joint. Because the articulating disc functions as a third bone, the craniomandibular articulation is considered as compound joint. Disorders of this joint are called as temporomandibular joint disorder having typical signs and symptoms. Although there is various treatment modalities for treating this joint disorder which include conservative treatment modality and surgical treatment modality. This review article highlights the temporomandibular joint disorder and its various classification and treatment modality.

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Citation: Dr. Cheena Singh and Dr. Parvathi Devi, M., 2015. "Temporomandibular Joint Disorders: A Comprehensive Review", *International Journal of Current Research*, 7, (9), 20618-20620.

INTRODUCTION

The stomatognathic system is a functional unit that performs masticatory tasks such as swallowing food, speaking and esthetics. This system consists of three main components i.e. TMJ, masticatory muscles and dentition. These components are interrelated and coordinated by the central nervous system (Rajendra G. Deshpande and Swapnil Mhfare, 2010). The TMJ functions uniquely, in that the condyle both rotates within the fossa and translates anteriorly along the articular eminence. It provides hinging movement in one plane and therefore can be considered as ginglymoid joint. However, at the same time it also provides for gliding movements, which classifies it as arthroidial joint. Thus it has been referred as "ginglymodiarthroidial joint", a combination of the terms ginglymoid (rotation) and arthroidial (translation) (Jaffery P. Okeson, 6th Edition). Temporomandibular disorders and their relevance to dentistry, has been a highly debated topic in recent years. Temporomandibular disorders are collective term embracing a number of clinical problems that involves the masticatory muscles and tempromandibular joint.

The conventional soft occlusal splint therapy is much safer and effective mode of conservative line of therapy in comparison to surgical therapy for TMD. Treatment goals are to achieve even and simultaneous contact with the opposing teeth (Rajendra G. Deshpande and Swapnil Mhfare, 2010). Soft Occlusal splints can allow repositioning of condyles and jaws into centric relation (Paulo Cesar Rodrigues conti *et al.*, 2006).

History

The TMJ syndrome was first described by Dr. James Costen, an otolaryngologist in 1934 (Rajendra G. Deshpande and Swapnil Mhfare, 2010; Jaffery P. Okeson, 6th Edition; Durham, 2008). In late 1930s and through the 1940s, only a few dentists became interested in managing these pain problems. The most common therapies provided at that time were bite – raising appliances which was first suggested and described by Dr. James Costen himself. However scientific investigation of temporomandibular disorders began in the 1950s. Then in 1970s an explosion of interest in temporomandibular disorders took place. It was not until the 1980s that the professional began to recognize fully and appreciate the complexity of temporomandibular disorders (Textbook of oral medicine and radiology, 10th and 11th Edition). In 1984, Zarrinnia used a

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latex material in his splint treatment, as he liked the cushioning effect it had to occlusal trauma. In 1984, Clark offered an evaluation of all of the orthopedic interocclusal appliances being used to date. He cited the use of soft splints for patients with a bruxing habit as well as for patients with a click in the TMJ (DuPont and Brown, 2006).

Prevalence and Etiology

It has been observed that TMD is more prevalent between the age of 20 years to 40 years and approximately 33% of population has at least one TMD symptom and 3.6% – 7% of population has TMD with sufficient severity to cause them to seek treatment (Jaffery P. Okeson, 6th Edition). The etiology of TMJ disorders remains unclear, but it is likely multifactorial. Capsule inflammation or damage and muscle pain or spasm may be caused by abnormal occlusion, parafunctional habits (e.g., bruxism), stress, anxiety or abnormalities of the intra-articular disk. Occlusal and emotional stresses were accepted as major etiological factors for functional disorders of masticatory muscles².

Anatomy of Temporomandibular joint

The primary components of TMJ are mandibular condyle, the articular surfaces of temporal bone, the articular disc and joint capsule. The mandibular condyle forms the lower part of the bony joint and is generally elliptical, although variations in shape are common. The articulation is formed by the mandibular condyle occupying a hollow in the temporal bone (the mandibular or glenoid fossa) (Figures 1. A and B).

Clinical features of Temporomandibular joint disorders

Temporomandibular joint disorders are associated with signs and symptoms of the masticatory muscles and the joint or both. The common signs and symptoms of TMD include pain, joint sounds, limited or asymmetrical jaw movement and spasm of masticatory muscles (Rahul Srivastava *et al.*, 2013).

Disk Disorders

Intracapsular disorders affecting the TMJ are divided into two broad categories: arthritis and articular disk disorders. Either of these disorders may be present with or without symptoms. It is important for the clinician treating patients with TMD to distinguish between clinically significant intracapsular disorders that require therapy from those that are an incidental finding in a patient with facial pain from other causes. Articular disk displacement (ADD) is an abnormal relationship between the disk, the mandibular condyle, and the articular eminence, resulting from the stretching or tearing of the attachment of the disk to the condyle and glenoid fossa. ADD may result in abnormal joint sounds, limitation in mandibular range of motion, and pain during mandibular movement. ADD of the TMJ does not appear to effect children below the age of 5 years. Loosened disks become displaced pterygoid muscle attaches to the disk. This attachment would pull a loosened disk anterior and medial to the condyle. Posterior disk displacement (when a portion of the disk is found posterior to the top of the condyle) does occur occasionally.

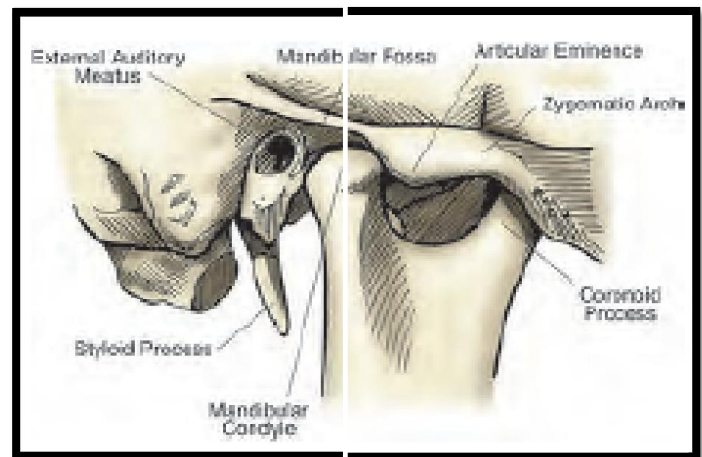
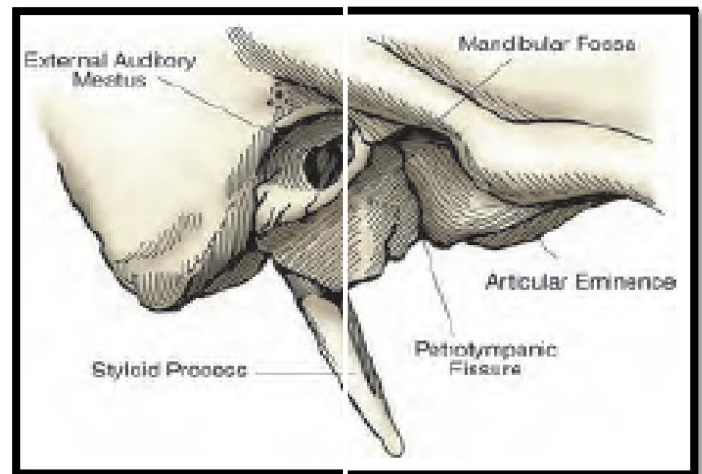


Fig. 1. A, B. To show anatomy of joint and its adjacent structures

Clinical Manifestations

Disk displacement is divided into stages based on signs and symptoms combined with the results of imaging studies. A simple classification system divides ADD into:

- (1) Anterior disk displacement with reduction (clicking joint)
- (2) Anterior disk displacement with intermittent locking, and
- (3) Anterior disk displacement without reduction (closed lock).

Treatment

Temporomandibular joint disorders are not “cured” but are managed instead, treatment of TMJ disorders starts with conservative therapies which are simple and do not invade the tissues of face, jaw and joints. Since most TMJ disorders are temporary and do not get worst, simple conservative treatment is all that is usually needed to relieve discomfort (Rahul Srivastava *et al.*, 2013). Therefore dental professional began to use bite raising appliance as therapy of choice for mandibular dysfunction. Use of Occlusal splints is one of the most widely accepted conservative therapy for signs and symptoms of temporomandibular joint disorders (Tarun Bablani *et al.*, 2009). An occlusal appliance/ a splint is a removable device, usually made of hard acrylic, that fits over the occlusal and incisal surfaces of teeth in one arch, creating precise occlusal

contact with the teeth of opposing arch. It is commonly referred to as a bite guard, night guard, inter occlusal appliances, intra-oral orthotic, or even orthopaedic device. They show considerable control in myofascial pain, however no clear hypothesis about the mechanism of action has been proved¹. Occlusal splint therapy may be defined as “the art and science of establishing neuromuscular harmony in the masticatory system by creating a mechanical disadvantage for parafunctional forces with removable appliances.” Occlusal splint is a diagnostic, relaxing, repositioning, and reversible device (Jaffery P. Okeson, 6th edition). It may be used for Occlusal stabilization, redistribution of occlusal forces preventing wear and mobility of teeth, reducing bruxism and other parafunctional habits, repositioning of condyle and treating masticatory muscle pain. Various types of occlusal splints are: stabilization appliance, anterior repositioning appliance, anterior and posterior bite plane, pivoting appliance, soft/resilient appliance (KOH and Robinson, 2004) and hydrostatic oral splint that is Aqualizer.

The soft occlusal appliance is a device fabricated from resilient material that is usually adapted to the maxillary teeth. It is quick to fabricate and can be provided as ‘emergency treatment’ for a patient who presents with an acute TMD. These appliances are made from 2- 4mm thick polyvinyl sheet generally worn only at night and will produce symptomatic relief within 6 weeks (Paulo Cesar Rodrigues conti *et al.*, 2006). They should be replaced after 4-6 months as they lose their resilience with the passage of time. Heat cure acrylic splints have constantly been shown to be effective, the use of vacuum formed splints rather than heat cured acrylic splints in the construction of an occlusal splints provide advantages to the dentist, to the patient and laboratory technician.

Vacuum formed splints are more rapidly constructed, more easily fitted and delivered. It can be constructed on the original model and therefore does not require duplication of the cast. This step reduces the fabrication time and eliminates the possibility of distortion. The vacuum formed splints are also less expensive and easier to fabricate than heat cured splints. Therefore, the vacuum formed splint could be prescribed for immediate and emergency use. A major benefit is that if splint therapy is unsuccessful then the splint can be discarded, leaving the practitioner safe in the knowledge that no irreversible changes to the patient’s natural dentition, which could subsequently compromise or exacerbate their symptoms, have been made. If splint therapy is successful, the patient can retain the splint to use on an ‘as needed’ basis (Aysen Nekora *et al.*, 2009).

For a successful occlusal appliance therapy, through examination of the patient and exact diagnosis is quite mandatory and also, the complete knowledge of the appliances is essential (Shfer, and Hine and Levy, 7th edition). The conventional soft occlusal splint therapy is much safer and effective mode of conservative line of therapy in comparison to surgical therapy for TMD. It has better patient compliance, fewer side effects, more cost effective than surgical treatment and temporarily provides occlusal condition that allows TMJ to assume the most orthopedically stable joint position.

Treatment goals are to achieve even and simultaneous contact with the opposing teeth (Rajendra G. Deshpande, 2010). Soft Occlusal splints can allow repositioning of condyles and jaws into centric relation (Paulo Cesar Rodrigues conti *et al.*, 2006). It can be effective, inexpensive and reversible treatment.

Conclusion

Temporomandibular disorders (TMDs) affect the temporomandibular joint (TMJ) or the muscles involved with mastication or both. Occlusal and emotional stresses were accepted as major etiological factors for temporomandibular joint disorders. Use of soft occlusal splints is one of the most widely accepted conservative therapy for signs and symptoms of temporomandibular joint disorders. The soft occlusal appliance is a device fabricated from resilient material that is usually adapted to the maxillary teeth. The vacuum formed splints are also less expensive and easier to fabricate than heat cured splints.

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