

A Clinical Approach to Management of Temporomandibular Joint Disorder with Direct Bonding Composites - A Case Report.

Abdullah Abdul Salam Al Yagoob^{1*}, Lovely M², Jovita D'souza³ and Padma Gandhi⁴

¹Ras Al Khaimah College of Dental Sciences, Ras Al Khaimah, UAE

²Department of Prosthodontics, Ras Al Khaimah College of Dental Sciences, Ras Al Khaimah, UAE

³Department of Periodontics, Ras Al Khaimah College of Dental Sciences, Ras Al Khaimah, UAE

⁴Department of Endodontics, Ras Al Khaimah College of Dental Sciences, Ras Al Khaimah, UAE

*Corresponding Author: Abdullah Abdul Salam Al Yagoob, Ras Al Khaimah College of Dental Sciences, Ras Al Khaimah, UAE.

Received: July 06, 2017; Published: July 27, 2017

Abstract

This paper reports the case of a temporomandibular joint (TMJ) disorder with symptoms such as hearing loss, pain, deviation of jaw which was treated by recontouring the posterior tooth cuspal morphology by direct bonding of composites, to obtain proper occlusal contacts. Apart from the TMJ disorder the patient also had open apexes in upper incisors with periapical inflammation. Management of upper incisors included apexes closure using MTA and restorations by crowns. This article highlights the most effective and simplest method of developing occlusal contacts thereby eliminating the symptoms associated with TMJ disorder due to malocclusion.

Keywords: Occlusal Correction; TMD with Ear Pain; Direct Bonding Composites

Abbreviations

IOPA: Intra Oral Peri Apical Radiograph; GP: Gutta-percha; TMJ: Temporomandibular Joint; TMD: Temporomandibular Joint Disorders; PFM: Porcelain Fused to Metal; MTA: Mineral Trioxide Aggregate

Introduction

Temporomandibular disorders (TMD) is a musculoskeletal disorder that influences masticatory muscles, temporomandibular joint (TMJ), teeth, and periodontal associated structures [1]. Patients usually report masticatory myalgia and arthralgia, and the primary goal of the treatment is to relieve pain [2]. In severe cases, TMD is associated with tinnitus, ear fullness, and sometimes hearing loss [3]. Etiology of TMD is related to trauma and stress and is commonly reported with occlusal factors [4]. Distortion in maximum intercuspal position (ICP) results in transient local tooth pain, tooth migration and hence, alterations in chewing patterns, causing slight changes in postural muscle tension. ICP interference might lead to transient disruption of smooth jaw functioning, leading to jaw muscle pain and clicking occasionally [5].

Management of the TMD includes physiotherapy, splint therapy, pharmacological therapy, surgical therapy and combined treatment [4]. Non-invasive treatment options have revealed good outcomes in majority of TMD cases, with noticeable relief of symptoms. Therefore, more conservative treatment options have to be considered before any aggressive irreversible therapy is opted for [3]. The modalities aimed at treating TMD are based on the alteration of the vertical dimension of occlusion, reduction in the muscular activity, repositioning and unloading of the TMJ [6].

This is a case report of a patient who was diagnosed with a TMJ disorder and partial loss of hearing. A simple occlusal corrective therapy eliminated his symptoms and also regained his hearing ability. A thorough history, clinical examination and investigation enables practitioners to render the best possible treatment options.

Case Report

A 32-year-old male patient reported to RAKCODS complaining of pain in the maxillary anterior region. His previous dental history indicated orthodontic correction by removable appliance for two years. Due to a fall injury, he had fractured both upper central incisor and lateral incisors which was restored by porcelain fused to metal crowns. After a few years of crown replacement, he started experiencing pus discharge and pain in the upper anterior region (Figure 1).

Fig1: Pre-treatment intraoral image



Figure 1: Pre-Treatment Intraoral Image.

Medical history indicated multiple ENT visits and partial loss of hearing of the right ear apart from this he was medically fit. He was on analgesics continuously for six months due to pain on chewing and soreness near the auricular region. On extra oral examination, there was an observed deviation of jaw to the left side on mouth opening, clicking and pain on the right TMJ and Masseter muscle region. Intraoral examination revealed multiple wear facets and malocclusion. Group function occlusion was present on both sides on laterotrusion.

On evaluating the upper anterior region, it was found that the gingiva was inflamed and there was presence of sinus tract openings originated from 11 and 21 on the attached gingiva in the maxillary anterior region. Percussion test were negative in all four anterior teeth. Vitality test was positive for 12.

Radiographic finding revealed open apices in teeth 11, 21 and 22, and significant periapical lesions accompanied by bone resorption (Figure 2).

Fig2: pre-treatment anterior IOPA



Figure 2: Pre-Treatment Anterior IOPA.

Diagnostic radiographs were taken to evaluate the TMJ. Radiographic finding indicated posterior unilateral condylar displacement on the right side (Figure 3). The cephalometric radiograph revealed an abnormal space between the C1 and C2 cervical spine (Figure 4).

Fig 3: Pre-treatment Panoramic X-ray



Figure 3: Pre-Treatment Panoramic X-ray.

Fig 4: Pre-treatment Cephalometric X-ray



Figure 4: Pre-Treatment Cephalometric X-ray.

Management

Management of the case started with disease control via oral hygiene procedures. The PFM crowns were removed and the underlying tooth structures were evaluated. Root canal treatment was indicated for anterior teeth after the fabrication of splint.

Fabrication of Stabilization Splint

Two sets of diagnostic Impressions were made with Alginate (Tulip Cavex) of the upper and lower arch. On evaluation of articulated study cast mounted in the returned axis it was observed that there was a significant cant on the maxillary arch.

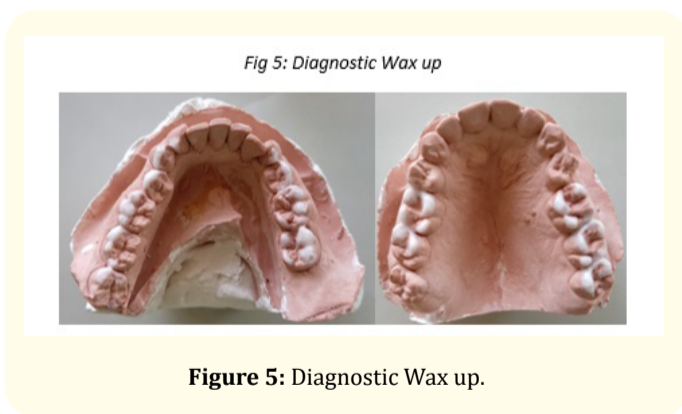
For further treatment planning, a face bow transfer (using Hanau spring bow) was done and the cast was mounted on a semi-adjustable articulator in the returned axis. A temporary acrylic stabilization splint was made to observe if the patient is able to tolerate the increase in vertical dimension.

The temporary stabilization splint was corrected and modified until the patient was comfortable and there was a reduction in his clinical symptoms related to TMJ disorder. After three weeks, the patient said he was free of pain and regained his hearing as before. Four months later, after confirmation that no clinical signs of temporomandibular disorder remained, further restorative treatment was planned and at each stage the patient consent was obtained.

Endodontic Treatment for Anterior Teeth

Endodontic treatment was initiated in 11, 21 and 22 after providing the temporary occlusal splint. The root canals were prepared up to 80 k file. For 21, GP size 80 was used to condense the MTA against the apex. After 2 weeks, the apical calcified plug was successfully formed in 21 and obturation using GP was done. This technique was slightly modified for 11 and 22 since they had wider open apices. Custom-made master cones for these root canals were prepared by Rolled cone technique with 80 (0.02%) taper gutta-percha points. MTA - Angelus was used for the apical seal and material was manipulated and placed according to the manufacturer’s instructions. The lateral walls of the canals were coated with regular resin based sealer with the help of 70 size (0.02% taper) butt end of paper points. The master cones were coated with MTA sealer at their apical ends and placed into the respective root canals. After confirming the apical and lateral seal of the canals with an IOPA, the GP points were sheared at the level of root canal orifices and access cavities were sealed with temporary filling material. The patient was recalled after 4 weeks and IOPA radiographs revealed considerable reduction in the size of the periapical radiolucency.

Prefabricated fiber reinforced posts were luted in place and light cured. The coronal ends of the cemented posts were adjusted and core was prepared with core material. After a 4-month follow up, the periodontium re-established gradually, revealing success of the treatment (Figure 5).

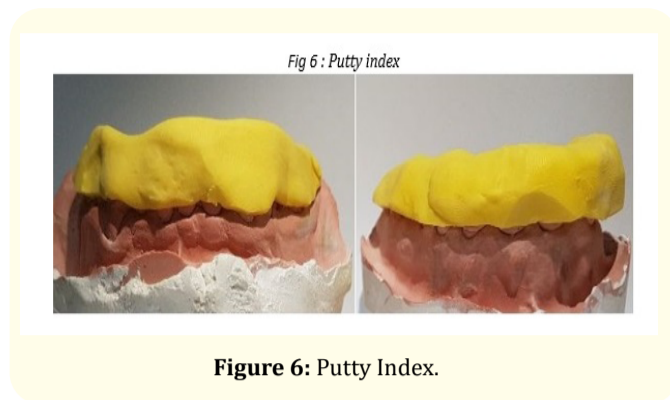


After the completion of the root canal treatment, permanent occlusal stabilization was done by direct bonding composite technique.

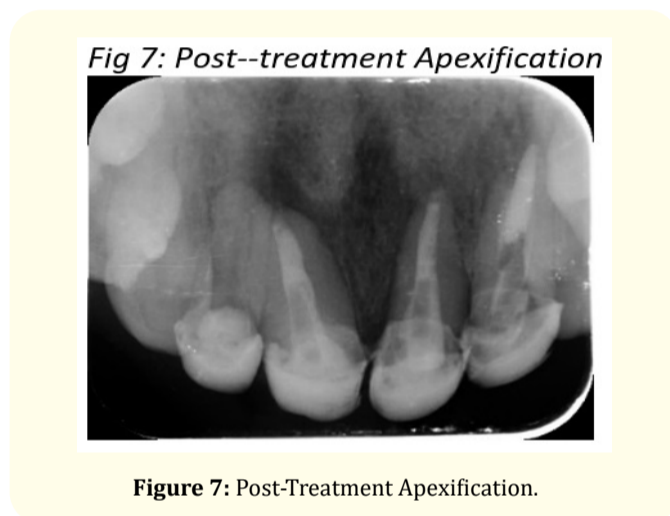
Direct Bonding Composite Technique

A diagnostic wax up was done on the articulated cast on the posterior tooth of upper and lower using (RENFERT - GEO, SNOW-WHITE L WAX) to obtain a balance in occlusion on both sides and

to correct the cant (Figure 6). The increase in the occlusal vertical dimension (OVD) was measured from the acrylic stabilization.



The new altered occlusal surface after waxing up was indexed by lab putty material. This index was used to precisely replicate the waxed-up morphology in the patient’s mouth (Figure 7).



The putty index was insulated and the restorative composite filled in the index. After isolation, etching and bonding as per manufacturer’s recommendation, the composite was repositioned on the tooth arch and light cured for three-to-four seconds. The index was carefully removed, along with any excess material and further curing was done for 60 seconds per tooth. Each of the composite restoration was finished and polished, using white rubber polishing cup and pumice. The occlusion was checked and modified to create even occlusal contact on the left and right side using an articulating paper at the new vertical dimension. Patient was recalled every week to evaluate symptoms and to observe any failure of direct composite resins.

For the final anterior restorations, new crowns were decided but due to the minimal crown height a crown lengthening procedure was indicated in the upper anterior region on all incisors.

A trans crevicular circumferential probing (bone sounding) was performed under local anaesthesia to establish the biological width. After evaluation, it was certain that some amount of alveolar bone had to be removed. Adequate amount of keratinized tissue was present in this area. An internal bevel incision was done on the buccal and lingual aspects and a full thickness flap was raised from 13 to 23. Osseous reduction was done in the necessary areas (Figure 8). After degranulation, the flaps were sutured. A periodontal dressing was placed. The suture removal was done 1-week post operatively (Figure 9).

Fig 8: Internal Bevel Incision



Figure 8: Internal Bevel Incision.

Fig 9: 1 week Post--treatment



Figure 9: 1Week Post--Treatment.

Provisional anterior restorations were fabricated after another set of diagnostic wax up and evaluation of anterior guidance. Temporary restorations are given currently for a period of 3 months to allow gingival marginal level to stabilize after gingival contouring (Figure 10).

Fig 10: Post--treatment Temporary Restorations



Figure 10: Post-Treatment Temporary Restorations.

A post treatment radiograph was taken which showed a change in the condylar position (Figure11).

Fig 11: Post--treatment Panoramic Radiograph



Figure 11: Post--Treatment Panoramic Radiograph.

Discussion

The etiology of TMD is multifactorial, and it involves an alteration in the functional balance between the fundamental elements of the stomatognathic system: dental occlusion, jaw muscles and TMJ. Costen was one of the first to established with certainty the involvement of occlusion in the development of TMD. Rammelsberg offered a review of the etiopathogenic model of TMD development wherein high abrasion and insufficient restorative procedure on posterior teeth are risk factors causing occlusal instability [7].

Teeth clenching and bruxism have been extensively studied as possible risk factors for TMD as well.

The Occlusal Vertical Dimension (OVD) for dentate individual is mainly determined by the remaining dentition, hence loss of tooth substance might influence the OVD. A loss of OVD can significantly affect patient function, comfort and aesthetics and to some extent have an effect on the TMJ [8]. Various treatment options are currently available to treat patients with TMD, ranging from conservative methods to more invasive procedures. There is considerable evidence to support conservative management therapies of TMD such as occlusal appliances, behavioural therapy, physiotherapy and jaw exercises [9,10]. An increase in OVD can be carried out conservatively with occlusal appliances [9,11,12]. Occlusal appliances have a dual purpose, they stabilize the TMJ as well as increase the OVD. On the basis of patient adaptation to the occlusal appliance, permanent restorations at the increased vertical dimension can then be fabricated [13,14].

The most commonly used appliances are stabilization appliances and anterior positioning appliances. Stabilization appliances redistribute forces at the tooth TMJ level, and relax the elevator muscles leading to stabilization of the TMJ. Anterior positioning appliances indicated in cases of acute TMJ pain, acts through altering the structural relationships to reduce the stress in the TMJ. But with long term use, complications such as permanent alteration in interarch relationships have been reported [3].

Posterior composite restoration technology is constantly improving, and nowadays, these posterior composites can be used effectively in stress bearing areas and have better wear resistance [15,16]. Many studies have shown that by mere occlusal adjustments and removing occlusal interferences, patients can be relieved of TMD signs and symptoms [12]. In another report, occlusal adjustment using composite resin restoration was used to restore the normal occlusion and structural relationship, resulted in a significant reduction in the signs and symptoms of the TMD. The patient's hearing was restored and there was a significant reduction in pain. Inner ear impairment has a correlation with TMD, which is associated with swelling and inflammation, which has a direct influence on the ear, and can lead to blockage of Eustachian tubes [17]. Direct bonding composite works similar to the stabilization splint, which enables redistribution of the occlusal forces at the tooth and alter the location of stress in the joint [3].

In our case report, the stabilization splint improved the patient's hearing ability and alleviated the pain within a week. After three weeks, the patient was free of pain and regained his hearing as before. After the direct bonding composite, the patient was followed up for three months. There was no signs and symptoms of TMD and the restoration was intact. Composite restoration plays important role in alteration of the vertical dimension of occlusion, reduction in the muscular activity, repositioning and unloading of TMJ [6]. This simple approach had a big impact on the patient's wellbeing.

The patient primarily came to us for gingival inflammation and pus discharge in the upper anterior region. He also mentioned a history of trauma when he was a little boy. Due to inappropriate treatment measures taken at the time, the patient had open

apexes in the anterior teeth with periapical infection, causing the constant pus discharge from sinus tracts. Mineral trioxide aggregate (MTA) was used in this case due to its superior properties and ability to form an apical plug [18]. Favourable results were achieved with MTA in this case.

Trauma has also been stated as a predisposing and initiating factor for TMD. Sale suggested that one in three people exposed to whiplash trauma is at risk of developing delayed TMJ symptoms. [19] A study including 400 patients with TMD revealed that in 24.5% of them, the presence of TMJ pain was directly correlated with a history of trauma [20]. The radiographic findings of the patient reveal a gap between C1 and C2. Several authors state that cervical spine posture is related to the TMJ and it is influenced by its position [21]. In addition, cervical spine injury has correlation with maxillofacial trauma due to force transmission from the facial skeleton to the cervical soft and hard tissue structures. Majority of the cases occurred at C1/C2 or C6/C7 levels [22,23]. Although the patient is relieved of his symptoms, these findings should not be ignored and continuous monitoring and follow up is mandatory.

Conclusion

Simple occlusal adjustments can be done by using direct bonding composites which can stabilize the occlusion, remove the cant due to malocclusion and eliminate TMJ disorder symptoms due to occlusal discrepancies.

Compared to invasive procedures as orthodontic correction or permanent crown restorations to permanently correct the occlusal discrepancy direct bonding composites can be used instead.

Bibliography

1. Wright, *et al.* "Management and Treatment of Temporomandibular Disorders: A Clinical Perspective". *Journal of Manual and Manipulative Therapy* 17.4 (2009): 247-254.
2. Ferreira, *et al.* "Ear Acupuncture Therapy for Masticatory Myofascial and Temporomandibular Pain: A Controlled Clinical Trial". *Evidence-Based Complementary and Alternative Medicine* (2015): 1-9.
3. Kaur, *et al.* "Prosthodontic Management of Temporomandibular Disorders". *The Journal of Indian Prosthodontic Society* 13.4 (2012): 400-405.
4. Koh, *et al.* "Occlusal adjustment for treating and preventing temporomandibular joint disorders". *Cochrane Database of Systematic Reviews* (2016).
5. Tsukiyama, *et al.* "An Evidence-based Assessment of Occlusal Adjustment as a Treatment for Temporomandibular Disorders". *The Journal of Prosthetic Dentistry* 86.1 (2001): 57-66.
6. Lim, *et al.* "The Effectiveness of Occlusal Splint for the Treatment of Temporomandibular Joint Dislocation". *Journal of Oral Medicine and Pain* 39.4 (2014): 152-155.
7. Rammelsberg P. "Untersuchungen über Ätiologie, diagnose und Therapie von Diskopathien des Kiefergelenkes". Berlin: Quintessenz; 1998.
8. Turner KA and Missirlian DM. "Restoration of the extremely worn dentition". *Journal of Prosthetic Dentistry* 52.4 (1984): 467-474.
9. List T, *et al.* "Pharmacologic interventions in the treatment of temporomandibular disorders, atypical facial pain, and burning mouth syndrome. A qualitative systematic review". *Journal of Orofacial Pain* 17.4 (2003): 301-310.
10. Carlsson GE. "Critical review of some dogmas in prosthodontics". *Journal of Prosthodontic Research* 53.1 (2009): 3-10.
11. De Boever JA, *et al.* "Need for occlusal therapy and prosthodontic treatment in the management of temporomandibular disorders. Part I. Occlusal interferences and occlusal adjustment". *Journal of Oral Rehabilitation* 27.5 (2000): 367-379.
12. Dao TT and Lavigne GJ. "Oral splints: the crutches for temporomandibular disorders and bruxism?". *Critical Reviews in Oral Biology and Medicine* 9.3 (1998): 345-361.
13. De Boever JA, *et al.* "Need for occlusal therapy and prosthodontic treatment in the management of temporomandibular disorders. Part II: Tooth loss and prosthodontic treatment". *Journal of Oral Rehabilitation* 27.8 (2000): 647-659.
14. Davies SJ, *et al.* "Good occlusal practice in advanced restorative dentistry". *British Dental Journal* 191.8 (2001): 421-424, 427-430, 433-424.
15. Yip KH, *et al.* "Differential wear of teeth and restorative materials: Clinical implications". *The International Journal of Prosthodontics* 17.3 (2004): 350-356.
16. "ADA Council on Scientific Affairs; ADA Council on Dental Benefit Programs. Statement on posterior resin-based composites". *Journal of the American Dental Association* 129.11 (1998): 1627-1628.
17. Kempf HG, *et al.* "Correlation between inner ear disorders and temporomandibular joint diseases". *HNO* 41.1 (1993): 7-10.
18. Shabahang S and Torabinejad M. "Treatment of teeth with open apices using mineral trioxide aggregate". *Practical Periodontics and Aesthetic Dentistry* 12.3 (2000): 315-320.
19. Packard RC. "The relationship of neck injury and post-traumatic headache". *Current Pain and Headache Reports* 6.4 (2002): 301-307.
20. De Boever JA and Keersmaekers K. "Trauma in patients with temporomandibular disorders: frequency and treatment outcome". *Journal of Oral Rehabilitation* 23.2 (1996): 91-96.
21. An Jung-Sub, *et al.* "Influence of temporomandibular joint disc displacement on craniocervical posture and hyoid bone position". *American Journal of Orthodontics and Dentofacial Orthopedics* 147.1 (2015): 72-79.
22. Mukherjee S, *et al.* "A review of cervical spine injury associated with maxillofacial trauma at a UK tertiary referral centre". *The Annals of The Royal College of Surgeons of England* 97.1 (2015): 66-72.
23. Hackl, *et al.* "Prevalence of cervical spine injuries in patients with facial trauma". *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology* 92.4 (2001): 370-376.

Volume 1 Issue 2 July 2017

© All rights are reserved by Abdullah Abdul Salam Al Yagoob., et al.