The Role of Acrylic Splints in the Orthodontic - Occlusal Treatment for Temporomandibular Disorders

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The etiology of the TMJ disorders is a very controversial topic in the orthodontic literature. The symptoms include pain, muscle spasms, clicking and limitations of the mandibular movements. This pathology is also known as myofacial pain dysfunction and it appears to be more common in young female patients. Muscle hyperactivity, occlusal trauma and parafunctional oral habits are often associated with this syndrome. There are several noninvasive ways to treat this type of pathology (medication, removable appliances, TENS therapy) but the most common refers to acrylic splints. Nonpermissive or repositioning acrylic splints, that often include an acrylic bite plane, representthe most popular treatment alternative nowadays. These appliances can set the condyle in a centric relation in order to reduce muscle spasm, pain and the levels of cellular hypoxia.

Keywords: acrylic splint therapy, occlusal, TMJ

The patient's compliance is a key factor when it comes to splint therapy. The acrylic splint must also take into account several factors, such as stability in centric relation, balanced occlusal contacts, guiding planes for mandibular movements (protrusive movements, lateral movements), posterior desocclusion of the teeth (to induce muscle relaxation), esthetics and comfort. In order to induce a posterior disocclusion, acrylic bite planes must be added in the anterior region [1]. The splint is manufactured by a dental technician, after the establishment of the centric relation. Material thickness and hardness must be taken into account comfort. The thinner the splint, the more comfortable the appliance will be. The acrylic material must be a transparent heat-polymerized resin and it must provide enough stiffness in order to assure good results. Other frequently used materials are hard polymers like PETG or fiber reinforced resins. The appliance must be passive to avoid any dental movements or pain [2].

A very important factor of the acrylic occlusal splints is the proprioception of the periodontal fibers. The periodontal fibers can trigger different patterns of the muscular activity in order to avoid occlusal trauma or pain in the TMJ area. This provides new neuromuscular pathways and a new condyle/disk position. Muscular pain reduces even after a few hours of appliance wear. The splint also prevents tooth wear due to parafunctional activities during sleep by disrupting the heavy loads that appear in patients that have bruxism. [2]

Both soft splints and hard acrylic splints, flat, balanced, repositioning or stabilizing splints, are effective after a period of 3 weeks [3] when it comes to TMJ disorders. They reduce TMD symptoms, correct the condylar position and the vertical dimension and add a certain degree of improvement to muscle restrictions and mandibular movements. In some cases, other treatment modalities can contribute to these effects: acupuncture, external massage, medication and periodic adjustments of the occlusal contacts [4].

Our study objective was to quantify the improvement of the TMJ symptoms in a selected case, with the use of an acrylic splint. For an accurate diagnosis, an analysis of jaw movement and palpation of muscles was performed. The muscles that must be included in any examination are: temporal, pterygoid muscles and masseters. The opening of the mouth was also recorder in order to detect any types of asymmetries or clicking. Some authors claim that joint clicking cannot be treated, while others observed some improvements [3]. Taking into account reviews and other studies from the literature, we recommended full time wear for better results [5].

Experimental part

We selected a clinical case (O. A.)to emphasize the role of acrylic splints for temporomandibular disorders. Orthodontic treatment was performed to improve the occlusion (fig. 1, 2). After obtaining a neutral occlusion, impressions were taken and the dental casts were mounted in an articulator, after a face bow registration and the recording of the centric relation (fig. 4, 5). A hard acrylic splint was manufactured in a dental laboratory (Ortoperformance, Cluj Napoca), taking into account the centric relation of the patient.

Fig. 1.Initial intraoral view of the case

Fig. 2. Occlusal intraoral view of the lower and upper arch

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Fig. 3. The patient's OPG: paraclinical evidence of the asymmetrical position and shape of the condyles

Fig. 4. The dental casts mounted in the articulator

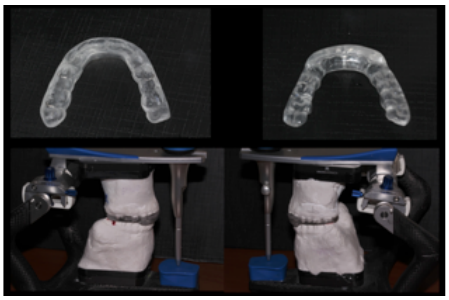

Fig. 5. The manufacturing of the hard acrylic splint

Fig. 6. The acrylic splint in the oral cavity

Paraclinical examination (OPG) was also required in order to evaluate any asymmetries regarding the position of the condyle in the temporal fossa (fig. 3).

The acrylic splint was inserted in the oral cavity. All occlusal contacts were checked. The thin bite plane was added in order to allow muscle relaxation (fig. 6).

The first recall was after 4 weeks (fig. 7, 8). We recommended a full time wear of the appliance for a better outcome. The patient cooperation was not a problem because she had favorable results within a few days. Overall, the pain levels decreased gradually and the masticatory discomfort disappeared. By reducing the intensity of the myofacial pain, the quality of life was improved.

Results and discussions

A major improvement was observed in our case. All occlusal contacts were verified with the use of a blue-colored articulating paper (fig. 9).

Although TMJ disorders are very common among adult patients and the etiology is multifactorial[8-11], symptoms may vary a lot. Anterior disk displacement (with reciprocal clicking), muscle spasms/ soreness, localized TMJ pain, decreased jaw movements, masticatory discomfort or even tinnitus are quite common symptoms. Splint therapy is the most used method for treating such cases, with or without adjuvant techniques. Several studies reported no significant results regarding different types of splints or combined treatment (splint therapy and medication/ acupuncture/TENS, etc.)[4]. In our case, no adjuvant alternatives were used and the results were quite good. For a better evaluation of the case, the Helkimo dysfuntion index can be used [6].

Fig. 7. Recall after 4 weeks of splint therapy

Fig. 8. Recall after 4 weeks (lateral view of the appliance)

Fig. 9. Symmetrical occlusal contacts

Conclusions

Acrylic bite plane splints are effective when treating TMJ disorders because they provide stability and comfort. The esthetic considerations could easily be solved by using a transparent heat- polymerized resin for the manufacturing of the appliance. Short term splint therapy can also reduce the frequency of bruxism episodes during sleep. Regarding joint clicking noises, there is no sustainable evidence of improvement after acrylic splint treatment [7, 12-16]. Longer clinical trials are required in this direction of research.

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