

Orofacial Pain and Temporomandibular Joint Disorder: Chair-Side Routine Diagnostics (Radiography, Ultrasonography) and Mihalyi Ultrasonography Measured Splint Therapy, A Case Report

Szilvia Mihályi^{1*} and Kinga Mészáros²

¹Chief Oral Surgeon, Dentideal Oral Surgery and Dental Clinics, Budapest, Hungary, European Union

²Oral Surgery Resident, Dentideal Oral Surgery and Dental Clinics, Budapest, Hungary, European Union

*Corresponding Author

Szilvia Mihályi, Chief Oral Surgeon, Dentideal Oral Surgery and Dental Clinics, 2A Ipar Street, Budapest, H-1096, Hungary, European Union, Tel: +36703982288

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Abstract

Aim: An increased prevalence of temporomandibular disorders (TMD) has been seen over the last few decades. It is a common issue worldwide considering that a significant part of orofacial pain of non-dental origin is caused by TMD [1]. The present study aims to explain which chair-side examinations can be useful for the diagnostics of the TMD caused pain and thereby an appropriate treatment can be chosen to eliminate the complaints.

Methods: In addition to routine clinical examination, radiography and ultrasound imaging provides short examination time, low cost, non-invasive compared with the magnetic resonance imaging (MRI).

By radiograph diagnostics can anatomical deviations and serious bilateral differences be recognized. Sonography provides dynamic visualization of the soft-tissue structures of the temporomandibular joint (TMJ).

This asymmetric splint therapy is aimed to reduce pain and stress on the joint structure and to protect the associated structures, thereby increasing the quality of life.

Results: We compare the distances of the joint spaces according the ultrasonography and with the difference of these we modify the splint. After 8 weeks of individual ultrasonography measured splint therapy treatment the patient has experienced a relief of her TMD signs and symptoms. After the treatment the patients' symptoms decreased.

Conclusion: Using ultrasonography combined with TMJ x-ray can be a good diagnostic tool. Hence, by using the Mihályi Ultrasonography Measured Splint therapy we provide an individual, non-invasive treatment for patients with temporomandibular disorders.

Keywords: Case report, Chair-side diagnostics, Orofacial pain, Temporomandibular joint disorder, Ultrasonography measured splint therapy

Introduction

TMJ related orofacial pain is a very common phenomenon with a high prevalence worldwide which complicates many dental visits and has a negative effect on quality of life. Consequently, it is a priority issue in the modern dental practice to eliminate or at least reduce the pain associated with temporomandibular disorders. Nowadays, a significant increase in the prevalence of orofacial pain disorders can be observed. Even if about 60-70% of the general population has signs of temporomandibular disorders, only 25% of the affected groups report or are aware of any symp-

toms. As TMJ related orofacial pain occurs on a wide range there are a group of factors that are implicated in its presence as well as orthodontic treatment, occlusal abnormalities, bruxism, stress, tension, anxiety, depression and so on. Identifying and controlling the contributing factors is key for successful management of temporomandibular disorders. According to many factors it is a multifactorial issue which makes it even more difficult to diagnose and essential to treat [2]. Limited mouth opening, deviation of the jaw to one side on opening and closing, clicking, locking, dislocation, and pain in the masticatory muscles during jaw movements can be

signs for the temporomandibular joint disorder [3].

Treatment planning depends on various factors including the main complaint, medical history, presenting symptoms, examination, and diagnosis [4]. The correct diagnosis for treatment of TMD has an important part. The clinical examination is the first step which includes patient history, appearance of pain and joint sounds (clicks, pops, crepitus), palpation of oral masticatory muscles, and the range of the mandibular motion [5]. Furthermore, radiographic imaging is an important element in the diagnosis [6]. Orthopantomography (OPT) is the most widespread radiographic investigation carried out today. This technique is useful as a screening tool, as it allows the initial diagnosis and assessment of TMJ alterations that are not so subtle [7]. Planigraphy or panoramic radiography with programs for TMJ provides a direct comparison of both sides regarding the hypo-, normo-, or hyperexcursion of the condyle, which is useful in confirming a clinical suspicion of hypermobility [8]. The ultrasound examination can be useful in the assessment of disc position in internal TMI disorders [9-10]. Ultrasonography is cost-effective and non-invasive imaging diagnostics tool.

In this article, we will present a case report with the diagnostics tests and applying Mihalyi ultrasonography measured mandibular splint therapy which eliminated the patients orofacial pain and TMD symptoms which had a positive effect on the quality of life [11].

Materials and Methods

The present study aims to explain which chair-side examinations can be useful for the diagnostics of the TMD caused pain and thereby appropriate treatment can be chosen to eliminate the pain.

Case Report

A healthy, 32-year old woman came to our clinic for a routine examination whilst opening difficulties and clicking was discernible on both joints. The patient has no medical history of any kind. In her dental history there are fillings, no missing teeth and no invasive treatment has happened.

After the routine check up she described a few symptoms which indicated the presence of TMD:

Her chief complaint was moderately severe intermittent pain on

her right side including toothache on the same side. The patient experienced painful chewing when eating hard food as it requires longer and more intense chewing. As a result, the pain remarkably increased from hard chewing and yawning.

The patient reported clicking when opening the mouth as well as sometimes an incapacity to open wide. Additionally, she indicated that she often has neck aches and has a 2 year history of headaches along with morning pain.

Extraoral examination revealed palpable clicks with pain over the bilateral TMJs while opening and closing the jaw. As for masticatory muscles, tenderness of masseter and temporalis was discernible. Concerning mouth opening, it was limited for the maximum of 32 mm. No facial asymmetries were detected.

Panoramic Radiography, Panoramic Radiography with Programs for TMJ (Planigraphy)

Orthopantomography can reveal advanced bone alterations in the condyle, such as asymmetries, degenerative and inflammatory processes, erosions, changes in size, shape and certain functional associations between the condyle, articular tubercle and fossa.

In our study we used a digital orthophoto machine (Vatech PaX-i digital panoramic x-ray machine) for the radiography diagnostics. The software of the equipment is able to design for TMJ imaging in close and open jaw position.

Ultrasonography

In addition to routine clinical examination, ultrasound imaging provides short examination time, low cost, non-invasive. Sonography allows dynamic visualization of the soft-tissue structures of the TMJ, the discus of the TMJ, the condyle of the mandibula on the both of sides and measure the width of the articular space [12].

The patient was lying down into the dental chair and turned her head. The joint is palpated while we have the patient open and close her mouth. Ultrasound examination was carried out with a portable instrument (Phillips Lumify Scanner) has a linear probe which operated 8-12 MHz. The transducer was placed longitudinal position to the articular disc. Images were obtained at both closed mouth positions (Figure 1).

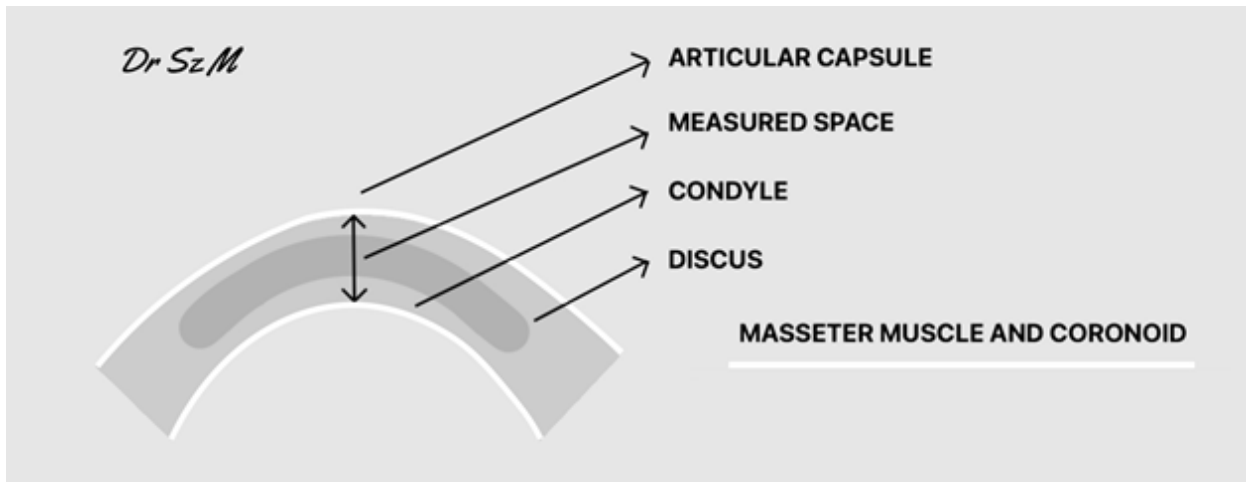


Figure 1

Mihályi Ultrasonography Measured Splint Therapy (MUMS)

The goals of splint therapy are to eliminate TMD and muscle pain [13]. The distraction splint is aimed to reduce pain and stress on the joint structure and to protect associated structures [14]. Ultrasound images are obtained at both closed mouth positions. With the ultrasonography programme the width of the articular spaces are measured in closed position. There are differences between two sides. The difference distance can be the key for the treatment.

We prepared a full-covered mandibular splint with indentation from heat-cured resin based (1,5 mm thick) on a silicone impression. We compare distances of the joint spaces and with the difference of these we modify the splint. The left side is wider therefore on this side we reduce the surface of the splint individually with burs constantly monitored with caliper and checking the model of the opposite side. After fabricating the splint, the first 4

weeks required wearing it 24 hours a day, during the meals as well, except for removal when brushing teeth and splint after a meal. Then wearing while sleeping and eating for the next 2 weeks, and wearing it only while sleeping for another 2 weeks. This therapy is low-cost, easy-to-handle for the patient as well. The patient came for follow up after 2 and 4 weeks and after that once a month. The patient had very good tolerance of the treatment and she has not any complain with the therapy.

Results

The panoramic radiograph of the temporomandibular joint serves asymmetric condyles (widest length right side: 10,27 mm, left side: 7,76 mm) and superior-anterior erosion in the left condyle (Figure 2) . With the radiograph diagnostic we can recognize anatomical deviation and serious bilateral difference.

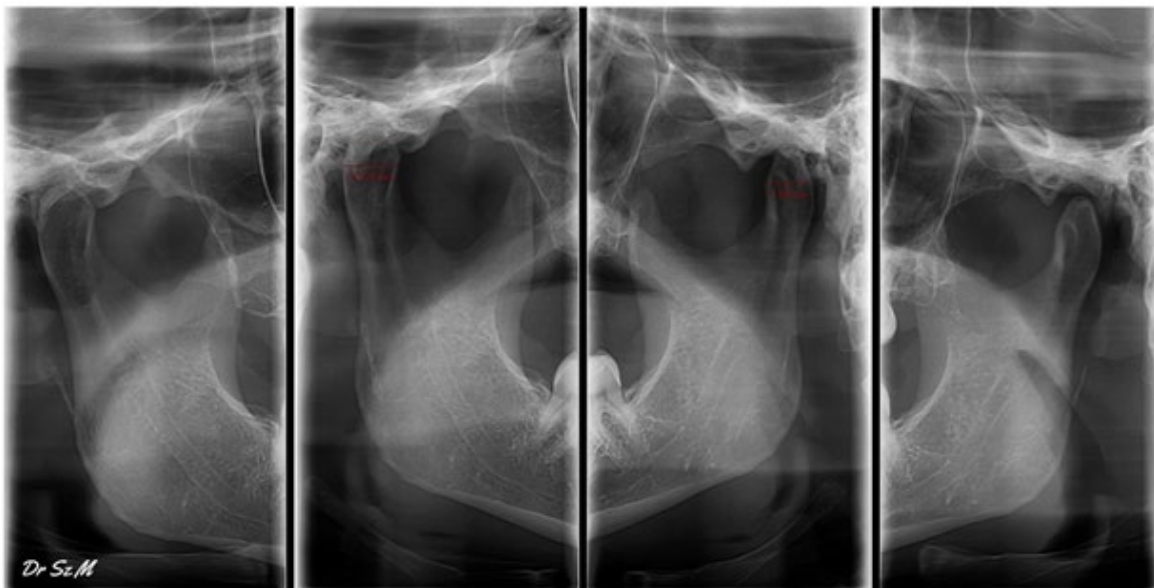


Figure 2

Mouth opened and closed longitudinal imaging of TMJ in the same plane are made which is useful for functional assessment of mouth closing, opening, and joint spaces. In the left TMJ the intra articular space is wider (3 mm) than the right (1,5 mm) in the closing position (Figure 3).

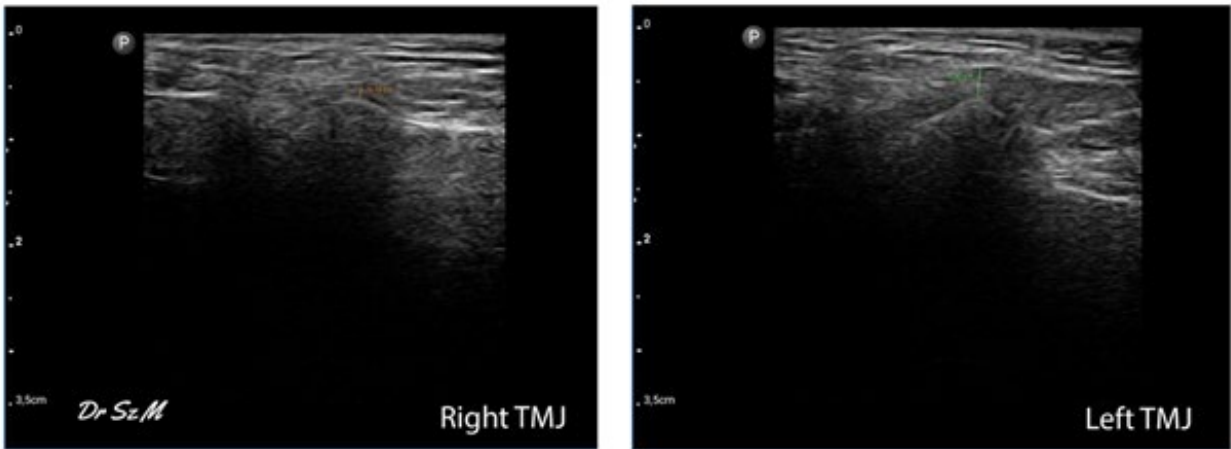


Figure 3

The articular disc appears on the ultrasound image as a hypoechoic disc that lays superior and anterior to the mandibular condyle when the jaw was closed. In her right TMJ the disc was seen during the movements. Our patient's left disc hindered the proper motions of the mandible which caused her pain, therefore the diagnosis is disc displacement with reduction.

We compare the distances of the joint spaces and with the difference of these we modify the splint. The left TMJ has wider capsular space therefore on this side we reduced 1 mm from the surface of the splint individually with burs constantly monitored with caliper (Figure 4). We assumed an average inaccuracy of 0,5 mm.



Figure 4

After treatment with this asymmetric splint therapy she experienced an ease in pain around her temporomandibular joint and reported an overall relief, furthermore her headache and joint sounds disappeared while opening and closing the jaw. With the extraoral examination we established the tenderness of masseter and temporalis has improved. In general the patient was satisfied with the outcome of our treatment.

Discussion

The diagnosis of the TMD can be very difficult. In other publications the ultrasonographic imaging diagnoses were compared with the clinical diagnosis, which showed total agreement, furthermore the ultrasonography presents high sensitivity and specificity in the identification of TMJ articular disc displacement as compared with MRI [5,15]. Radiography and ultrasonography diagnostic examinations can be a routine, chair-side tool which are non-invasive and economical procedures. Despite the fact that this method is easy-to-use and low cost it is necessary to have an accurate understanding about how to measure and evaluate with the help of ultrasonography. These examination tools provide short examination time and can be used for patients with contraindications of MRI (pacemaker, claustrophobia) [16,17]. Traditional panoramic images show only very advanced changes in Temporomandibular Joint, however the use of ultrasound as an early diagnostic method [18]. In a meta-analysis, ultrasound imaging had 72-83% and specificities of 85-90% for diagnosing TMD, which means ultrasonography can aid in confirming the right diagnosis and choosing the proper treatment for the patient [19,20]. In a publication the authors established that the average capsular width of a painful TMJ was significantly greater than that of a painless TMJ what can be an important diagnostic information [21].

When treating TMD a noninvasive treatment is always preferable, such as it is more comfortable for the patient not to mention it saves both money and time [22]. As the outcome of the therapy is highly affected by compliance it is essential to motivate the patient both before and during the treatment for the best result. Treatment of early TMD with splint therapy is an effective way even preventing potential damage to the dentition as well as the periodontium [22]. Treated patient is more likely to improvement of symptoms [23]. As even this case study shows, patients with temporomandibular pain don't necessarily seek help for their TMD at early stages as they somehow learn to live with the pain and normalize it. Several studies show that it is easier to treat TMD early than waiting until invasive methods become unavoidable. Unfortunately, non-treated patients' symptoms don't seem to improve over time, that is why it is important to catch TMD in early phases and have an accurate treatment plan so invasive methods don't have to be considered [23].

As well as there are no differences in the outcome of the treatment between using the splint on the maxilla or on the mandible, a mandibular splint was favored as it is less visible as it is covered by the lower lip and also interferes less during speech [24].

Conclusions

A long-term pain and mandibular dysfunction can affect the quality of life, influencing oral health, chewing and talking. Patients with TMD pain need to have a fast, effective treatment providing short examination time which is available chair-side on reasonable prices.

With the ultrasonography modified splint therapy we provide an individual, not template therapy not to wait until the tolerance for pain is built up because it can cause irreversible consequences.

With this case report we would like to present which chair-side diagnostics are available and easy-to-use for the practitioners. However, these orthopantomography and ultrasonography tools could be impacted in the routine procedure and our new individual, asymmetric splint therapy can be a break-through in the TMD treatments. Our splint therapy is the first in the world which considers the differences between the joints used ultrasonography measurements what can be the key for treating the TMD patients to eliminate pain and increase the quality of life.

Declaration of Patient Consent and Her Perspective of the Treatment

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given her consent for her images and other information to be reported to the journal. The patient understands that her name will not be published and due efforts will be made to conceal her identity.

„ I have suffered from pain for many years, I have visited several dentists to help reducing my complains. Dr. Mihályi offered me first an easy diagnostic procedure and therapy. From the first therapy week I felt relief, my headache started to disappear. When I was chewing, there was an annoying, painful click in my jaw, what was quieter, then disappear after 6 weeks. I am very happy with the team and the whole therapy.”

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