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Review

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DISORDERS OF TEMPOROMANDIBULAR JOINT – A RHEUMATOLOGICAL AND PHYSIATRIC APPROACH

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Summary

Rheumatic disturbances are possibly one of the most common reasons for visiting the doctor and sometimes also the dental office. The most common articular disorders are: degenerative arthritis or osteoarthritis (as a less or noninflammatory degenerative disease), rheumatoid arthritis (with inflammatory synovial joint reactions), metabolic rheumatic diseases, traumatic arthritis, and psoriatic arthritis. Extra-articular rheumatism as a consequence of overstrained tissue surrounding the joint has been diagnosed more frequently – but it amounts to less than 1%. These percentages of the causes of rheumatic disturbances and/or temporomandibular joint diseases can be expected to potentially increase with age, thus multiplying physiatric treatments. Collaboration between dentists and physiatrists regarding physical therapy procedures (pulsating ultrasound heating, magnetic or laser therapy, complementary electroanalgesia, TENS or IFS, and finally, medical gymnastics) is becoming more common. Specially created exercises by Schlute give the best results in TMJ function recovery. In collaboration between dentists and the rheumatologic-physiatric polyclinic, 60 patients diagnosed with temporomandibular disorder by means of magnetic resonance imaging were treated. Health education along with a good collaboration of prosthodontists, physiatrists, rheumatologists and neurologists enables TMD patients to participate in the treatment of the most overloaded joints.

Key words: temporomandibular joint; rheumatology; physiatrics; osteoarthritis; diagnostics; treatment.

INTRODUCTION

Rheumatic disturbances are among the most common reasons for visiting the doctor and sometimes also the dentist. The final years of the current de-

cade (2000-2010), which were dedicated to bone and joint diseases by the World Health Organization, are the right time to pay attention to musculoskeletal diseases of the orofacial system [1-3].

The concept of occlusion and occlusal treatment is an essential part of dental treatment and the specific correlation between occlusion and temporomandibular joints (TMJs) is indisputable. Multifactorial etiology includes a large number of etiological factors which can have different relative significance in each individual case so that risk factors are more often mentioned. Either anatomic or structural factors belong to a group of predisposing factors, such as either compromised occlusal relations or inadequate prosthodontic treatment [4-6]. Every unfamiliar and complicated condition, including temporomandibular pain, was regularly referred to oral surgeons. The contradictory fact is the exceptionally narrow indication for a real surgical procedure in the TMJ, which was noticed in Croatian medicine regarding Costen's syndrome by the maxillofacial surgeon Čupar and later by the oral surgeon Knežević [7-9].

RHEUMATOLOGICAL VIEW ON STOMATOGNATHIC SYSTEM

Osteoarthritis (OA) as a consequence of degenerative diseases of cartilage and the resulting mild inflammatory reactions of the synovial joints contribute to the fact that 25% of women and 20% of men of middle age complain of knee, hand, hip or shoulder diseases as well as of pain in the smaller spinal joints [10-13]. Inflammatory rheumatic diseases – most often rheumatoid arthritis (RA) – are present in 1.5% of women and 0.5% of men of active working population, while metabolic rheumatic diseases have an even lesser prevalence. Extra-articular rheumatism as a consequence of overstrained tissue surrounding the joint and unfavorable effects of the microclimate has been diagnosed more frequently – but it amounts to less than 1% [14-16]. These percentages of the causes of rheumatic disturbances and/or TMJ diseases can be expected to potentially increase with age, thus multiplying physiatric treatments [17].

A limiting factor in the study of temporomandibular disorders (TMDs) was radiologic diagnostics, which is often used in dental treatment of teeth and jaw bones. Traditional x-ray images as well as conventional and computerized tomography cannot show all the functional elements of TMJ. The key component in articular biomechanics is the relationship between the articular plate or disc as a cartilaginous structure and the condylar head as an osseous structure. Another factor is the disc-condyle complex relationship with the posterior plane of the articular eminence, across which the articular complex moves simultane-

ously during mouth opening. Although the imaging of intra-articular structures is possible using a contrast agent (arthrography), only magnetic resonance imaging (MRI) can be used as a noninvasive radiologic examination without ionized radiation, for both symptomatic and asymptomatic subjects [18-21].

Determining the pathological condition of masticatory muscles and/or the TMJs is the main purpose of clinical diagnostics. A standard dental examination focused on dental status and occlusion is insufficient as well as just measuring the mouth opening [22].

Manual diagnostic methods of the stomatognathic system are necessary for [23,24,25]:

- differential diagnostics of muscular, arthrogenic disorder or both;
- determining the status of the articular disc and the articular surfaces;
- measuring the passive capacity of mouth opening;
- making specific diagnoses.

Clinical diagnostics is the basis of musculoskeletal disorder diagnostics which is, in the stomatognathic system, based on the so-called clinical gold standard. In addition to pain, the most important clinical diagnostic signs are limited mouth opening and pathologic noise (clicking, crepitation) [26,27]. However, the most common symptom in general population – pathologic noise – is not a determining clinical symptom of disease. Noise in the joints is not given too much significance in orthopedics either, unless there are other symptoms, primarily pain [28].

Own evaluation of TMD patients was carried out on a group of 60 patients (median age 36.5, ranging from 14-78 years) who sought the services of the Department of Prosthodontics at the School of Dental Medicine, University of Zagreb in Zagreb in the period of 2006 to 2009. The diagnosis of arthrogenic TMD was made based on patient's medical history data as well as on clinical examination using standardized methods contained in the Research Diagnostic Criteria for TMD (RDC/TMD) [29] and supplemented by manual functional analysis [23]. An active need for TMD treatment was determined according to clinical symptoms and signs of disorder: arthrogenic pain or arthrogenic and myogenic pain, restricted irregular and painful mobility of the mandible as well as presence of pathological sounds in the TMJ [30]. Definite TMJ diagnostics was made by MRI at Clinical Department of Diagnostic and Interventional Radiology, University hospital Sestre milosrdnice, Zagreb (Croatia). In collaboration with a rheumatologist-physiatrist at Outpatients Center for Rheumatic Diseases, Physical therapy and Rehabilitation Polyclinic Dr. Drago Čop (Zagreb, Croatia) patients went to

physical therapy. The median of pain upon mandibular movement was 6.25 on visual-analogue scale (AVS 0-10). The difference in pain evaluations on AVS scale after the treatment was shown to be statistically significant (Wilcoxon Pairs Test with $p < 0.001$): pain upon mandibular movement was 2.01.

PHYSICAL THERAPY IN TMD

Mentioning physical therapy might remind the patients of problems faced by the elderly, but it is not always so – a physiatric examination and therapy are indicated for all patients with TMDs, regardless of their age. Physical therapy implies complementary procedures for treatment of pain and the pathologic processes (for example, inflammation) causing it. In addition to numerous physiatric methods used in specialized institutions, at home it is easiest to perform exercises for masticatory muscles and TMJs which achieve similar effects as occlusal splint wear [31,32].

Transcutaneous electrical nerve stimulation (TENS) is a well-known analgesic method of peripheral nerve stimulation through the skin. Iontophoresis and sonophoresis are methods of using direct current or ultrasound to deliver a certain analgesic through the skin in the form of cream, ointment or oil. In this way, pain removal is achieved without systemic consequences or adverse effects. When using iontophoresis, attention should be paid to the existence of metals on the site of application. Neither galvanotherapy nor ultrasound is applied if there is metal in the mouth (for example, dental crowns or an orthodontic appliance). Interference current and magnetic therapy can be used regardless of the existence of metal in the oral cavity [33-35].

KINESIOTHERAPY OF THE MASTICATORY SYSTEM

The integrated method of performing kinesiotherapy of the masticatory system by Schulte is based on massage and exercises (kinesiotherapy) [36-38]. With expert help from a physical therapist, every patient can continue to exercise at home. Thermotherapy should be carried out before starting with the described exercises. Heating can be done by infrared radiation, laser beams as well as by impulse ultrasound or magnetic therapy which penetrate the deeper structures. Schulte's exercises start with self massage. The patient should lean against a table and it is advisable to perform the exercises in front of a mirror. Each massage exercise as well as the others should last 2 to 5 minutes and be performed three times a day with rest periods of 20 seconds between each exercise. Each exercise should be repeated ten times in one cycle. At first, when the pain is

strong, exercises last shorter and then they become longer with time but not more than 5 minutes.

In addition to the described self massage, oral exercises (kinesiotherapy) including isometric and isotonic exercises are performed: discoordination and limitation exercises. The isometric exercise of moving the mandible retrally is performed by placing the tip of the tongue as far as possible on the palate. Moving the tongue across the palate towards the larynx causes the mandible to move retrally as well. This position should be held for about 20 seconds. The teeth are set slightly apart.

After two days this exercise is complemented by self-observing in the mirror and isometric-isotonic mouth opening exercises. The tongue is still placed far back on the palate, only now a movement of maximal mouth opening is performed from this position. Isometric contractions of the mandibular frontally are performed by placing both hands on the edge of a table with the fingers placed on the face. The teeth are set slightly apart. The lower jaw moves forward and the hands give resistance. Limited movement exercise is also observed in the mirror: the chin is held by one hand, but opposite of the painful joint (if the left joint is painful, the hand is on the right side of the face). The hand gives resistance in order to maintain a symmetrical position of the mandible. The middle of the face is observed in the mirror, the mandibular muscles trying to move and the hand giving resistance should create an isometric balance. A tongue exercise is performed for bilateral limitation wherein the mandible is pushed forward: the tongue is placed between the upper lip and the anterior maxillary teeth. The mouth should be opened as much as possible, but at the same time, the initial position of the tongue should be maintained. After performing these exercises, the massage described in the section about Schulte's kinesiology should be repeated.

DISCUSSION

Physiatrists cannot contribute much to the primary prevention in the treatment of dysfunctional symptoms in the TMJs – this is the dentist's task. Secondary prevention is aimed at reducing pain, swelling and numbness of muscles and also at improving oral function. Painful spinal pain syndrome and polyarthritis are the most common diagnosis in the rheumatology polyclinic. OA is usually treated with paracetamol and salicylates, followed by non-steroidal anti-rheumatics orally, combined with their percutaneous application as well. In cases of rheumatoid arthritis, it is first necessary to reduce severe inflammation of the synovial membrane by using small doses of cytostatics as well as of immunostimulants. The recent use of selective immunosuppressants in hospitals

provides an early therapeutic effect, even in very pronounced RA which also affects the TMJs [39-42].

A recent definition describes TMDs as a form of musculoskeletal pain caused by a disorder of masticatory muscles and TMJs. Otological symptoms as well as the tension-type headache are not strong enough diagnostically, that is, they are not pathognomonic and might cause the patient and the doctor to make the wrong diagnosis [43,44].

During a study carried out in Croatia on the ergonomic aspects related to musicians with respect to rheumatologic diseases, a target research about the relation of TMJ disorders in violinists was described. However, probably due to limitations of radiologic diagnostics, only an indirect relation was found [45-47].

Musculoskeletal pain is the most significant symptom to patients and also the main standard for measuring treatment success and therefore it requires not only a dental approach, but also a biomedical perspective in the selection and evaluation of treatment methods applied. Whereas acute pain is seen as a symptom in the general clinical picture of functional decompensation, chronic pain should often be considered a separate disease. In such cases, dental treatment cannot be fully successful [48-50].

A basic concept related to TMDs is the attempt to include musculoskeletal disorders of the stomatognathic system into the functional schematics of disorders appearing elsewhere in the body. On the contrary, for example, the Gnathologic School and their concepts of etiopathogenesis related to *occlusion-TMJ-masticatory muscles* did not accept diagnostic methodology and systems of classification applied to other musculoskeletal systems in the body. Traditional dental diagnostics combined with secondary data gathering about the oral status did not provide useful information. Moreover, adequate radiologic diagnostics was not available [51,52].

Today, some describe TMDs as a form of extra-articular rheumatism, which is only partially true [17]. Pain and TMJ function disorder are intra-articular problems. Manual functional analysis is one of the systematic approaches to clinical diagnostics, which can, in addition to previously described manual and orthopedic tests, contribute significantly to a clinical examination of a patient with TMD. Understanding biomechanics enables the examination of anatomic structures of TMJ using procedures wherein the patient actively (dynamic compressions and translations) and passively (passive compressions) performs mandibular movements. In this way, the use of incomplete diagnoses is avoided, as in, for example, common diagnoses of arthralgia by RDC/TMD, which was mentioned in a recent paper on the subject of modification of that widely used diagnostic system [18,53].

The most important diagnostic system in the treatment of TMDs – RDC/TMD – did not rely sufficiently on the standardized rheumatologic terminology, which was noticed by Palla [54] in the critical edition wherein this diagnostic system was published. Also, the use of the term ‘arthralgia’ should be reduced as much as possible. The etiopathogenesis of arthralgia should be determined by differential diagnostics because many other rheumatologic and similar diseases could be wrongly ascribed to TMDs. Even *angina pectoris* could affect not only the submandibular region and the face but also the preauricular region, which could mean that a serious cardiologic disease might remain undiscovered due to wrong interpretation of symptoms [55].

TMJs and the adjoining masticatory muscles of the stomatognathic system should be viewed with respect to the entire musculoskeletal system although it is not a rule that the patients suffer from rheumatologic disorders as well [56]. Due to changed anatomic relationships such as the prolapsed lumbar intervertebral disc, discopathy can cause serious, widely reflected disturbances, that is, nerve compression in the lumbar segment and painful dysfunction of the legs [57]. TMJ disturbance it presents itself independently of the dental occlusal status [58]. RA can appear separately or as a systemic disease in the TMJs as well as in other regions [59]. Even the multidisciplinary syndromes, such as Sjögren’s syndrome, can be manifested in the TMJs. It is primarily a disease causing dry eyes and mouth (xerostomy) which indicates dental care of such patients. However, the secondary form of this autoimmune disease includes the joints [60,61]. The effects of osteoporosis, the most common rheumatologic-metabolic disease of our times, on the stomatognathic system are mostly related to pathologic changes on the periodontium of preserved teeth and the edentulous residual ridge. Implant prosthodontics requires reliable diagnostics of the mineral contents of the stomatognathic system, especially the jaw. Osteoporosis should always be kept in mind since its relation to the development of OA has not been fully explained, including the TMJs [62-64].

Painful symptomatology of the TMJs can be compared to other syndromes and disorders which are not fully explained while the etiopathogenesis is explained by multifactorial theories. For example, cervical spine disorder could be useful for comparison with TMDs. Radiologic findings of asymptotically displaced spinal discs can be compared to numerous images of asymptomatic TMJ disc displacement [65,66]. Dispersed pain can be the basis of a cervical-facial syndrome, including idiopathic neck pain, whereas in the orofacial region it belongs to the group of TMDs. Even back pain can be good for comparison since the pain is not proportionate with the radiologic findings. However, these types of pain have

much deeper socio-economic, even psychological implications, which often cause patients to retire while still at an active working age [67,68].

Several studies of articular cartilage and biomechanical implications of OA development have pointed to the fact that the TMJ is a small and heavily loaded joint which is at the same time challenging for radiologic diagnostics because its intra-articular parts are tiny and its physiological task is permanent and often unnoticed in everyday life [69,70].

The problems caused by rheumatic diseases as well as by disturbances and/or diseases of the TMJ increase with age, work, traffic and sports injuries [71]. A multidisciplinary approach should be taken to create a set of diagnostic and treatment procedures for the TMJ. Physical therapy combined with drugs and kinesiologic treatment significantly contributes to the prevention of TMDs [72].

CONCLUSION

Interdisciplinary research based on medical evidence should be focused on objectifying the success of TMJ treatment (reduction of pain, improvement of oral function). The secondary and tertiary prevention which includes a collaboration of dentists and rheumatologists can significantly decrease TMJ disorder incidence. Health education with a good collaboration of orthodontists, physiatrists, rheumatologists and neurologists provides TMJ patients with an opportunity to participate actively in the treatment of one of the most overloaded joints.

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Sažetak

Poremećaji temporomandibularnog zgloba – reumatološki i fizijatrijski pristup

Reumatske tegobe zasigurno su najčešći uzrok dolaska u liječničku, a ponekad i u stomatološku ambulantu. Osteoartritis kao posljedica degenerativnih bolesti hrskavica i posljedične blaže upalne reakcije sinovije zgobova pridonose činjenici da se 25% žena te 20% muškaraca srednje životne dobi u Hrvatskoj tuži na bolesti koljena, šaka, kukova ili ramena te na bolove u malim zglobovima kralježnice. Upalne reumatske bolesti, najčešće reumatoidni artritis, prisutne su u radno aktivnoj populaciji u Hrvatskoj u 1,5% žena i 0,5% muškaraca, dok su metaboličke reumatske bolesti još manje prevalencije. Sve češće dijagnosticiramo i tzv. izvanzglobni reumatizam kao posljedicu prenaprezanja okozglobnih struktura – ali u proporciji znatno manjoj od 1%. U takvim proporcijama možemo očekivati i uzroke reumatskih tegoba i/ili bolesti temporomandibularnih zglobova (TMZ) koje se s rastućom životnom dobi potencijalno povećavaju, pa se i fizijatrijski postupci umnažaju. Prikazuju se podaci rada suradnje stomatologa i polikliničke reumatološko-fizijatrijske službe na temelju čije je suradnje uz prethodnu radiološku dijagnostiku (magnetska rezonancija) liječeno 60 pacijenata. Uz to je sve češća suradnja stomatologa i fizijatara glede primjene procedura fizikalne terapije (zagrijavanje pulzirajućim ultrazvukom, magnetoterapijom ili laserom) kao dopune liječenju i elektroanalgeziji (TENS ili IFS) te, nakraju, i medicinskoj gimnastici. Specijalno osmišljene vježbe po Schluteu daju najbolje rezultate povratka funkcije TMZ-ova. Zdravstveni odgoj uz dobru suradnju stomatologa protetičara, fizijatara, reumatologa i neurologa pruža bolesnicima s poremećajima TMZ-ova mogućnost da se kao subjekti uključe u liječenje zasigurno najopterećenijih zglobova.

Ključne riječi: temporomandibularni zglob; reumatologija; fizijatrija; osteoartritis; dijagnostika; terapija.

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