Elaborate Ways for Approaching Autoimmune Rheumatoid Arthritis

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Temporomandibular joint can be a site in course of the autoimmune inflammatory rheumatic diseases. Its involvement causes both specific oral disorders and overall limitation of functioning. The objective of our study was to assess the overall functioning of patients diagnosed with autoimmune inflammatory rheumatic diseases and temporomandibular joint arthritis. Another objective was to point out the importance of rehabilitation treatment in the management of these patients. We followed up 34 patients (18 women and 16 men) suffering fromtemporomandibular joint arthritis developed in the course of an autoimmune inflammatory rheumatic disease. 10 patients had rheumatoid arthritis; 18 patients hadankylosing spondylitis; 4 patients had psoriatic arthritis and 2 patients had systemic lupus erythematosus. The patients were divided into two homogenous groups that underwent a differentiated treatment (medication or medication and rehabilitation). They were assessed and followed during 26 weeks. In the rehabilitation group we noticed a significant decrease of pain in the temporomandibular joint, an important improvement of muscle strength of the affected site, as well as an increase of quality of life. The physical therapy and exercise added to medical treatment play a considerable part in the recovery of overall functioning of patients with autoimmune inflammatory rheumatic diseases and temporomandibular disorders.

Key words: temporomandibular joint (TMJ) arthritis, inflammatory rheumatism, physiotherapy, rehabilitation

Rheumatoid arthritis is an autoimmune inflammatory disease with various localizations. It is known as one of the most disabling conditions of one's well being, with a remarkable impact on a population's health. Temporomandibular joint (TMJ) disorder intermittently raises functional changes and causes an impairment of the quality of life and social activities. The functional evaluation of subjects with autoimmune inflammatory rheumatism, it's impact on TMJ, the importance of a complex medical rehabilitation therapy sustained and established early, can help improve an individualized recovery program by determining which application can influence the quality of life for these patients.

Arthritis remains a major cause of disability along with a lack of independence. In addition, it can be observed in the extended prevalence of the high impact on the cost to the health care system [1]. The goals of an inflammatory arthritis treatment plan are represented by the reduction of pain as well as the progress of the disease itself by preventing further joint damage, increasing functionality, and improving health and the quality of life [2].

Arthritis of TMJ is a common clinical picture seen in dentistry, represented by symptoms such as pain, crepitus and joint disorders. The pain in arthritis has different intensities, depending on the location, such as the area of TMJ, and the cause. It can be triggered by jaw movements or can mimic facial neuralgia without a precise location and different impact. The pain is usually located just in front of the ear, and it may spread to the cheek, the ear itself, and to the temple and/or suborbital area. This type of pain can cover up the real symptoms.

Depending on the cause that enhances TMJ arthritis, it can be nonspecific, determined by the bacterial penetration into the joint cavity, either directly as a result of joint trauma or post surgery, or indirectly as an expansion of infectious process. In most cases, TMJ arthritis is common in autoimmune inflammatory rheumatism.

On clinical examination, the individuals presented throbbing pain in the affected joint area, hypomobility, signs of acute inflammation, crepitus, blocking of the joint, and hypersalivation. The pain is exacerbated with jaw movements, which can affect the process of mastication. Palpation of the external auditory canal can be painful.

Since TMJ arthritis affects all periarticular structures, the anti-rheumatic medication is proven ineffective in most cases of autoimmune diseases, the main treatment plan is based on kinetic physical therapy [3]

An appropriate knowledge of the condition and treatment and, in addition to active assistance in decision-making, therapy management can influence those patients with chronic disability affection to make decisions that will improve their quality of life in terms of need, goals and circumstances [4].

The TMJ impairment as a part of an autoimmune disease often raises not only functional complications but can also affect the quality of life and social activities. It is therefore believed that a comprehensive treatment approach to this type of rheumatism of TMJ can have superior results.

By investigating this condition through other facial aspects, e.g., Ear, Throat, Nose (ETN), and neurological areas, without encouraging results, TMJ will represent basic symptoms of an autoimmune infection in time.

The evaluation of affected TMJ in most important autoimmune rheumatic diseases can be done using specific assessment systems and interpreting the quality of life for these subjects.

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Developing an individualized, comprehensive rehabilitation program, which includes an antalgic electrotherapy (Transcutaneous Electric Nerve Stimulation – TENS), manual massage, thermotherapy, physiotherapy with a role in controlling pain and increasing functional activity for these patients.

It is important to highlight a complex rehabilitation therapy that should be sustained and established early in subjects with autoimmune and inflammatory TMJ rheumatism.

After proper office training, suggesting a physical home therapy program under the guidance of a physical therapist can improve rehabilitation benefits.

Assessing how the implementation of a program of physical therapy positively influences the function of TMJ and periarticular structures in order to prevent muscle imbalances, muscle contractures and future malocclusion.

Experimental part

Material and method

Within three years, during the period between December 2012 and January 2016, thirty-four subjects consisting of eighteen women and sixteen men were followed. Of those, twenty-six cases were from urban areas and eight from rural areas. They were diagnosed with TMJ arthritis as a part of an autoimmune inflammatory condition, with ages ranging between 23-78 years old. From those thirty-four cases, the TMJ was highlighted in four categories of autoimmune inflammatory rheumatism following ten cases with rheumatoid arthritis (RA), eighteen cases with ankylosing spondylitis (AS), four cases of arthropathy PsA (PsA), and two cases with systemic lupus erythematosus (SLE) within articular disorder.

The cases were divided into two homogenous groups, based on adherence to treatment of the subject, as follows: Lot 1 (6 cases PR, 10 cases SA, 1 case APs, 1 case LES) and Lot 2 (4 cases PR, 8 cases SA 3 APs case, 1 case LES). Each lot had undergone different therapy approach.

All thirty-four subjects with TMJ affection received six ratings within a 6.5 month period: at the first visit to medical rehabilitation specialist; two weeks after initial complex therapy; one month after initiation of treatment; after 3 months and 6 and 6.5 month periods from initial visit.

Evaluations of all patients from both groups were convoluted and made by detailed clinical examination, by assessing TMJ functions (chewing, swallowing, phonation, mobility) using a questionnaire for functional mandible assessment, adapted and modified SF-ATM (TOTAL SCORE <= 12 points slightly functional impairment; 13- 24 points = moderate functional impairment;> = 24 points severe functional deficiency) [5].

Analytical balance of muscle strength in the affected TMJ (poor muscle tone 0-1- muscles weak, only slight movement; 2- weak muscles, perform minimal movements involved in chewing, swallowing, phonation; 3- muscle that performed movements involved in chewing, swallowing, phonation, but without resistance; 4- muscles that perform movements involved in chewing, swallowing, phonation, with moderate resistance; 5 - performing muscle movements involved in chewing, swallowing, phonation, maximum strength) [5].

Findings regarding patient pain, using visual analog scales for pain (VAS: 0-painles, 10 unbearable pain) [5].

Applied therapy was convoluted, including comprehensive treatment medication designed individually for each case within rehabilitation specialist indications and twenty treatment sessions of specific medical rehabilitation were applied to subjects from Lot 1, divided into two phases (10 sessions/daily initially and 10 sessions/daily for six months after the first treatment).

The general treatment objectives of the participating subjects in this study were:

- improving the general condition; eliminating pain and/or inflammation;
- correction and recovery of joint biomechanics and aesthetics;
- maintaining/increasing/relaxation of muscle tone;
- maintain and increase range of motion of the TMJ;
- rehabilitation of function such as chewing, swallowing, phonation;
- respiratory physiotherapy/decreasing of anxiety; increased the quality of life;
- performing daily activities and/or professional reintegration;
- effort training.

Complex medication therapy (analgesics, Non-steroidal Anti-inflammatory Agents (NSAID's), muscle relaxants, classical immunomodulatory therapy: Sulfasalazinum, Leflunomidum, Metotrexatum, Ciclofosfamidum, biological therapy: inhibitor of TNF α: Etanercept, Adalimumab, Infliximabum or anti CD 20: Rituximabum) was recommended, appropriate dosage was indicated by rehabilitation specialist, depending on the results from the assessments, diagnosis and subject compliance.

Medication therapy administrated to the subjects was included in a diagram individualized to each case, considering the stage of disease evolution, tolerance, pathology association, additional medication, compliance of the subject, respecting the recommended daily dosages and following strength protocols.

In order to introduce an appropriate treatment protocol, treatment recovery goals were established, taking into account: the period of disease activity, evolutionary stage, the affected area, the clinical and functional subject status, the educational level and it's compliance. Therefore, the objectives were: acute and sub-acute phase: decreasing pain and inflammation; maintaining the joint mobility; maintaining muscular strength and endurance; maintaining optimal trophic function of ligaments and tendons of joint capsule; chronic phase was followed by correct the vicious positions through a strongly, profoundly massage followed by mobilizing multiple techniques regarding functional posture $\rightarrow$ physiotherapy $\rightarrow$ functional posture [5,6].

Medical rehabilitation treatment applied to subjects from Lot 1 consisted of Hydrothermotherapy (HTT) with analgesic purpose, deflation, stimulation of antipyretics mechanisms, fibrinolysis and local circulation. The therapy also included massage with ice on joints with inflammation, humid heat - Priessnitz and heat-fango applications in inactive phases [5,6].

Electrotherapy: TENS was used for the analgesic purpose, known for its immediate analgesics effects. (images 1- 4).

One of the most interesting explanations regarding the immediate effects of analgesic therapy TENS is the *Gate Control Theory* described by Mazak and Wall (1965). This theory is based on the phenomenon of presynaptic inhibition as a process of axonal control taking place in the posterior horn of the spinal cord and is explained though stimulating fibers with large diameter, fast conductors (A-alpha), nonspecific pain, leading tactile information from vibration and pressure to produce at layers 2 and 3 of the posterior horn and bone marrow (gelatinous substance of Rolando inhibitory interneuron), a negative electric field with decreased activation of the T (central neuron from

Images 1,2,3,4 Aspects from the electrotherapy (TENS) session – Clinic BFT Timisoara (Personal collection: with patient approval)

lemniscuses upward pathways) and thus closing the *gate* (barrier control) to transmit information through nerve fibers, slow conducting A-delta and C. Such pain is not perceived in the brain [7].

This therapeutic technique was shown to be an effective tool in the reduction or removal of both current conditions of pain and in arthralgia, skull pain, post-operative, post-herpetic neuralgia pain from focal cancer pathology. The therapy is a noninvasive method for treating various painful conditions (acute), in particular, and chronic, with various etiologies. The method was first used by Shealy (1972) in the US as screening (selection) patients in order to stimulate posterior spinal cord analgesics.

Pain as a symptom represents a warning that is generated by the human body and brain and is interpreted as a sign of sickness. Some pains are so persistent they can seriously disrupt the normal life of an individual.

In most cases, pain may be removed by pharmaceutical means but, in a few cases, this management may be accompanied by unpleasant side effects or toxic intolerance, dangerous to the human body. Soreness is transmitted in various areas of the human body (somatic and autonomic nerves), nerve excitation is converging to the posterior horn of the spinal cord, where they form the so-called substance *P* the mediator of pain. By transcutaneous neurostimulation, the body activates secretion of endogenous opiates (endorphins) that reduces the perception of pain partial or total. The analgesic effect of electric current is not new, knowing that in antiquity the ancient Greeks (Galen, 130-200 C.E.) used electric fish (torpedo marmorata) to treat gout and headaches. It is important to note, however, that transcutaneous neurostimulation removes pain without removing what caused it. However, in some cases, the effect of electric current on the cell activator may result in stimulation of the healing processes of the body by own means.

Bearing in mind that TENS has different effects on different type of patients, some obtain a partial or complete reduction of pain only during treatment; however, the effect may last from a few hours to a few days. TENS antalgic action of high frequency current is explained by the gate control theory [8].

Antalgic action of endogenous opioids release explains the current low-frequency TENS. In humans, analgesia TENS of low-frequency voltage is reversed by the opioid receptor antagonist naloxone, while the high frequency voltage analgesia does not have this effect [9].

In general, treatment efficacy is correlated with the experience gained through the practice and directly from the subjects[10].

Classical manual massage was applied depending on the type of disease, it's evolution and the patient's clinical status, during subacute or chronic, never during

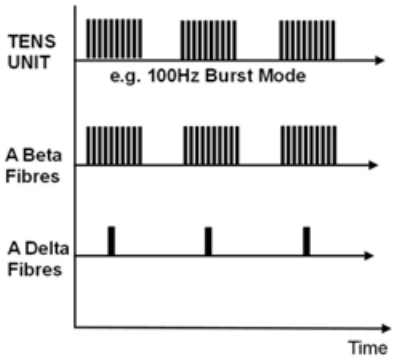


Fig. 1. Pulse waveforms used in TENS

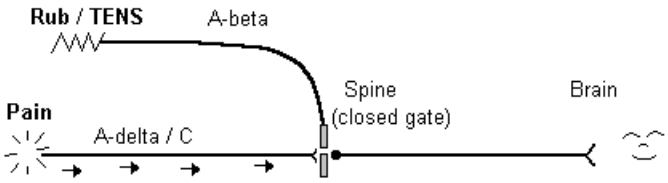


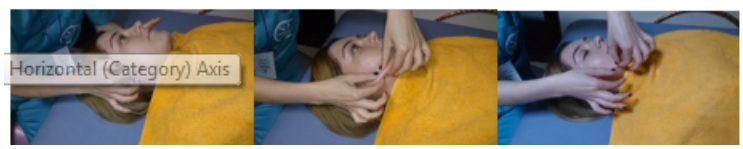
Fig. 2. The *gate* theory of pain

inflammatory stage, applying in these cases only head massage, sedative or muscle relaxant on the contracted areas secondary to vicious positions other than those in full spurt of inflammation. It was applied a muscle relaxing drug or a stimulant, tonic ,on the the muscle hypotrophy / atrophied groups, secondary to periods of restriction of daily activities, due to flares of intense activity of disease, algo-functional decompensation [5,6,11] (images 5-7).

Physical therapy applied to patients of group 1 included a total of 10 meetings in six months, and the subjects were advised to execute the program of physical therapy and daily home bases, after learning the exercises correctly in the presence of physiotherapist.

The exercises were carried slowly, gradually with the continuous tracking of subjects reactions, interspersed with physical prophylaxis and a general program of reconditioning syndrome, given in all cases of associated pathology. Initially were used progressive relaxation techniques (Schultz, Jacobson), under the careful guidance of physiotherapist, which were later learned by the subject, being at hand and easy to perform.

Through the multiplicity and complexity of the exercises, techniques and methods, the subject was taught practically to control pain, to raise the threshold of pain perception increasing the joint mobility of TMJ, with high or low tone on the affected muscle, was re-educated the functions as chewing, swallowing and phonation, it was rehabilitated not only functionally but also aesthetically overall and improved quality of life. It was design a physical therapy program in stages, with biomechanics of TMJ [5,6,12,13] images 8-11).



Iamges 5,6,7 Aspects from the manual massage session (personal collection with patients agreement)

Images 8-11. Physical therapy session (personal collection; with patients agreement)

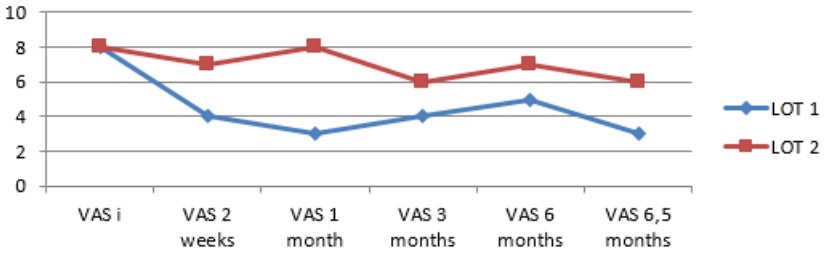


Fig. 3. Evolution of the average VAS score / lot

Results and discussions

Analyzing the results obtained by the subjects from the two groups, through six assessments, there is superior parameters evolution, determined in subjects from lot 1, after each course of 10 sessions of medical rehabilitation, that had variations, but is progressively favorable during the treatment recovery of subjects from lot 2. Results on the subjective pain intensity measured by VAS scale filling by the subject (1-10, where 1-pain minimum to 10 maximum pain) (table 1, fig. 3);

Results regarding the development of muscular strength, after functional jaw disorder secondary to TMJ as part of the autoimmune rheumatic diseases are relevant and highlighted in the following table and graph (table 1, fig. 4);

Results obtained from the subjects of the four groups in terms of functionality and quality of life questionnaire SF-through ATM (12 questions x 1-3 points, where 1-deficient u°or°i 3-deficiency syndrome) (table 1, fig. 5).

Using the program recovery therapy TENS is very important to obtain the quick results of remission, by improving the symptoms of a pain and by regenerating the defect of function, given that long-term pain can induce some changes in reflexes of protection: muscle spasm, inhibition of voluntary movements, vasodilatation, superficial and / or deep hyperesthesia.

Before other physiotherapy procedures, it is important to introduce the physical and mental relaxation techniques, psycho-emotional aspect is very important in the rehabilitation of these subjects.

Unlike other studies (14, 15) the current study highlights the importance of the different muscle rehabilitation and physiotherapy, physiotherapy procedures, functionality and favorable development of TMJ biomechanics.

In the absence of rehabilitation and physiotherapy treatment over time, muscle dysfunction affects joint biomechanics, which, in turn, causes TMJ disorders through micro traumatisms affecting the occlusal-joint imbalance.

Physical therapy has a decisive role in the recovery and safe function of TMJ.

Compared to the Sodhi, et al, study from 2015-16, where the focus is on anti-inflammatory medication, anti-rheumatic and immunosuppressive, the current study

Nr. lot	VAS initial	VAS 2 weeks	VAS 1 month	VAS 3 months	VAS 6 months	VAS 6.5 months
1	8	4	3	4	5	3
2	8	7	8	6	7	6
Nr. lot	Fm Initial	Fm 2 weeks	Fm 1month	Fm 3 months	Fm 6 months	Fm 6,5 months
1	3	4	4	4,5	3,5	4,5
2	3	3,5	3	4	3	3,5
Nr. lot	SF-ATM Initial	SF-ATM 2 weeks	SF-ATM 1month	SF-ATM 3 months	SF-ATM 6 months	SF-ATM 6,5 months
1	28	15	13	12	17	10
2	30	25	22	26	20	22

Table 1
EVOLUTION OF THE PARAMETERS EVALUATED/LOT (AVERAGE VALUES OF THE PARAMETERS/LOT

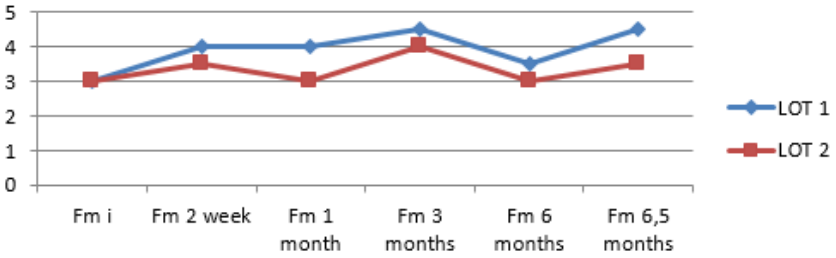


Fig. 4. Evolution of the average score Brawn (Fm) / lot

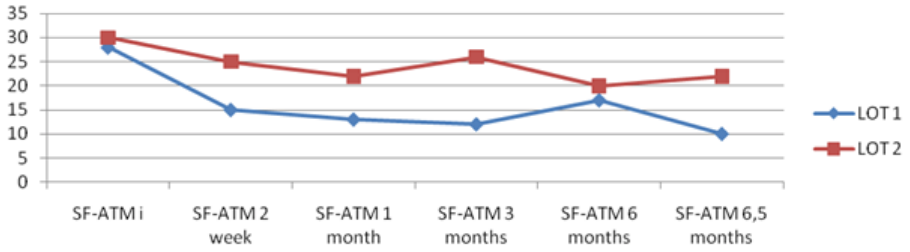


Fig. 5. . Evolution of the average score SF-ATM / lot

highlights the importance of physiotherapy and rehabilitation treatment in refurbishing structures joints, muscles, capsule, synovial fluid and tendon.

The evolution of TMJ arthritis affects all structures involved, the inflammatory process affecting joints and structures in the vicinity also.

Antirheumatic medication, anti-inflammatory and immunosuppressive certainly has a key role in preventing further pathology, but not in reconditioning neuro-musculoskeletal structures.

Physical therapy helps prevent muscle degeneration, the installation of muscle contractures, joint bio-mechanical issues, the malocclusion and orthodontic disorders. Moral support to the patient, both from the medical team and the family, to restore confidence and successful response are crucial to successful rehabilitation of these subjects.

Physical therapy is influencing TMJ structures functionality and aesthetics through rehabilitating caused by muscle imbalance.

Conclusions

A comprehensive approach to TMJ arthritis, establishment of an early drug therapy, along with methods of physiotherapy and rehabilitation applied to all articular and periarticular structures have the leading role in the joint recovery of functionality and biomechanics in subjects with TMJ arthritis as part of autoimmune rheumatic disease.

Complex drug therapy, in addition to physiotherapy and rehabilitation, has proven to be a success in functionality and biomechanics of TMJ, the chewing, swallowing or phonation, which is regained in different forms, depending on the stage of disease but also the associated the pathology and age of the subject.

We considered a necessary long-term interdisciplinary approach based on the idea that early comprehensive and sustained therapy supervised by a team made up of a physiotherapist, doctor for medical recovery, dentist and psychologist, will have a higher efficiency than single therapy.

Recovery of this injury requires a good knowledge of the physiological bases of the disease, professionalism, attention, patience and a close communication with the patient.

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