We are IntechOpen, the world’s leading publisher of Open Access books
Built by scientists, for scientists

6,600
Open access books available

177,000
International authors and editors

195M
Downloads

154
Countries delivered to

TOP 1%
Our authors are among the most cited scientists

12.2%
Contributors from top 500 universities

WEB OF SCIENCE™
Selection of our books indexed in the Book Citation Index in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com
Chapter

Temporomandibular Disorders of Iatrogenic Etiology

Oleg Slesarev

Abstract

Temporomandibular disorder (TMD) is a heterogeneous chronic systemic disease based on genetic, immunological, anatomical, morphological, and functional disorders of the articulatory norm. The task of the diagnostic stage is to identify direct (inherent in only one nosological form) and indirect (occurring in two or more nosological forms) etiological risks that transform into pathogenetic factors and TMDs. The transformation of the pathogenetic horizon of TMDs does characterize by the implementation of a scenario leading to the formation of three nosological forms of the disease: articular and nonarticular lesions of TMJ, and TMDs of iatrogenic etiology. TMDs of iatrogenic etiology constitute the most severe group of patients. Failure to identify biological, technological, and communication iatrogenic risks at the diagnostic stage is the main reason for triggering TMDs of iatrogenic etiology. The transformation of iatrogenic risks into iatrogenic pathogenetic factors leads to the formation of iatrogenic disease. A specialist working with this group of patients must have the necessary competence to make clinical decisions in the diagnosis, treatment, and rehabilitation of patients of this profile, including maxillofacial surgery and psychological counseling. Timely diagnosis of iatrogenic risks is the only preventive measure that prevents the development of iatrogenic TMDs. The therapy of TMDs of iatrogenic etiology does base on an interdisciplinary approach’s principles.

Keywords: temporomandibular disorders, iatrogenic TMDs, pathogenesis of TMDs, diagnosis of TMDs

1. Introduction

Temporomandibular disorders (TMDs) are a group of common non-odontogenic maxillofacial pain syndromes. TMDs are the second most common musculoskeletal disorder resulting in pain, dysfunction, and disability [1]. Epidemiological studies have identified problems associated with TMDs in 25% of the population [2, 3], but only 3–7% of patients seek help [4, 5]. In 70% of cases, the reasons for patients visiting the dentist do associate with pain, impaired movements of the lower jaw, and anatomical and functional changes in the temporomandibular joint [6, 7], which is 3.9% of annual visits from the total number of patients with different profiles [8]. Women, in relation to men, present complaints ranging from 2:1 to 8:1 [9–13]. The multifaceted specific picture of the manifestation of the disease leads to incorrect routing of patients, errors in diagnosis and treatment, and chronicity of the TMJ [3, 14–16].
The frequency of severe disorders accompanied by headache and facial pain and characterized by the urgent need for treatment is 1–2% in children, about 5% in adolescents, and 5–12% in adults [17, 18]. Fifty-eight percent of those who consulted a doctor had a history of 3–5 years, and 16% of them reported no positive response to conservative treatment, resulting in 30–40% of acute cases becoming chronic [19]. The average duration of TMJ was 4.19 years and 5.25 ± 2.91 years, respectively, which characterizes TMJ as a heterogeneous chronic systemic disease. The reasons for the duration of the disease indicate either the lack of treatment due to an undetermined diagnosis or unsuccessful observation by a neurologist for trigeminal neuritis or by an otorhinolaryngologist for otitis media [20–23]. In addition, the disease's symptoms may do associate with centrally mediated and neuroplastic changes in the brain, including dysfunction of the endogenous μ-opioid receptor, one of the central analgesic systems involved in pain perception and analgesia [24].

The prevalence of the analyzed disorders, multifactorial pathogenesis, and therapeutic difficulties in the treatment of TMJ prompted Wieckiewicz et al. [25] to make an effort to describe and systematize current TMJ therapeutic concepts based on DC/TMJ data [26]. Treatment of TMJ is complex and requires special knowledge and skills, and to justify the treatment protocol, it is necessary to formulate a diagnosis that takes into account an interdisciplinary approach [27–29], but most patients seeking help due to TMJ symptoms assess that the treatment has episodic success [23, 30]. A meta-analysis showed that 16% of adults require treatment for TMJ [31]. Moreover, those in need of treatment can divided into those who are indicated for active therapy to eliminate severe symptoms and those who require passive supervision. Manfredini et al. [32] conclude that the specialist treating TMDs must, first of all, be able to differentiate between these two groups of patients. For patients requiring treatment for the symptoms of TMDs, it has been found that noninvasive methods should be preferred. However, the complex structure of TMJ, along with the debilitating nature of the disease at an advanced stage, poses challenges for the development and application of more invasive methods of resolution [19, 33–35].

Murphy [3] analyzed the currently used non-invasive, minimally invasive and fully invasive methods of TMJ treatment, where TMJ disorders are the leading symptom [36]. The ultimate goals of the presented modalities are

- increasing the range of motion of the mandible,
- reducing pain and inflammation in the joints and chewing muscles,
- preventing further degenerative changes in the articular tissues, including direct or indirect damage to the joints.

The successful management of temporomandibular disorders depends on identifying and controlling the contributing factors, including occlusal abnormalities, orthodontic treatment, bruxism and orthopedic instability, macrotrauma and microtrauma, factors like poor health and nutrition, joint laxity, and exogenous estrogen [17, 28].

Global review of research findings by Harper et al. [37] revealed a focus of the flow of clinical diagnostic data in line with the substantiation of two interrelated areas of TMJ therapy: (1) minimization of pain in the maxillofacial region, which is generated and maintained by sensitization mechanisms in the central nervous system; and (2) the need for personalized medicine in providing care to this category of patients.

However, the approach to treating TMDs as a purely dental problem may fail, as a significant proportion of symptoms reflect medical conditions [25, 38], including
iatrogenic TMDs [8, 39–41]. Sharma et al. [17] identified factors that increase the risk of temporomandibular disorders are called “Predisposing factors” and those causing the onset of temporomandibular disorders are called “Initiating factors” and factors that interfere with healing or enhance the progression of the temporomandibular disorder are called “Perpetuating factors.” Iatrogenic injuries can act as both initiating and predisposing factors. This can occur during any dental procedure in which there is early opening like orthodontic treatment, single-sitting root canal treatment, or relapse, which causes a functional imbalance between the temporomandibular joints, muscles, and occlusion. To avoid this damage to the temporomandibular joint, we should always examine the joint [17]. Determining the features of the pathogenesis of TMDs of iatrogenic etiology is a demanded necessity to treat these disorders and for expert evaluation in the event of doctor–patient conflicts. The formation of iatrogenic TMDs proceeds in several stages. The characterization of iatrogenic TMDs as a multistep process made it possible to identify iatrogenic risks triggering the process of iatrogenesis. Timely identification of iatrogenic risks will prevent the development of the disease along the iatrogenic pathway. Disclosure of the stages of iatrogenesis will make it possible to form the principles of diagnosis and treatment of TMDs within the DC/TMD methodology [42–44].

2. Material and research methods

2.1 Study design

A prospective study of 61 clinical cases of TMD with chronic pain (47 women and 14 men) was carried out. We have identified signs of TMJ recurrence in 92% of clinical cases. Of these, 75% complained of TMJ dysfunction and symptoms of chronic pain syndrome, and 25% of TMJ dysfunction. Against the background of the pain syndrome, phenomenological dysfunctions masked by complaints of other problems were revealed. Patients were observed for 2 years (5 points of observation): at the time of treatment; in 6 months; 1 year; 1 year and 6 months; and 2 years.

2.2 Clinical diagnostics

2.2.1 Scales and indices for assessing temporomandibular disorders

Clinical manifestations of TMDs were analyzed using the instruments of axis II DC/TMJ [45] according to the recommendations of Ohrbach et al. [46]. Axis II includes the evaluation of indicators on several scales:


- The GCPS scale (Graded Chronic Pain Scale) [49] integratively assesses the intensity of chronic pain CPI (Characteristic of Pain Intensity) and the degree of disability due to pain syndrome (five degrees of severity, calculated based on the impact of CPI on: daily activities at home, social activities, and labor activity).

- Temporomandibular index was determined by Pehling et al. [50].
2.2.2 Clinical diagnostics of factors of psychological predisposition of TMJ

The method of interviewing, within the framework of a descriptive approach, carried out clinical diagnostics of psychological phenomena, the type of patient’s attitude to the disease and communicative deviations according to Rogers [51].

2.2.3 Clinical diagnosis of myofascial and tendon-muscular trigger points

Identification and qualitative characteristics of trigger points in the muscles and tendon-muscle attachments: m. temporalis; m. masseter; m. pterygoideus lat.; m. geniohyoideus; m. sternocleidomastoides were carried out according to the criteria established by Simons and Travell [52]. Two indicators were considered: the severity of the local convulsive response (biological response) and the reproducibility of pain in response to palpation of the muscle mass and/or tendon-muscle attachment. The response of the trigger point to the action of the stimulus was assessed in points according to Klineberg and Jagger [53].

Visualization of TMJ elements
Cone beam computed tomography and magnetic resonance imaging
Analysis of received images
Cranioometry of tomograms of the temporomandibular joint using an individual anatomical landmark of TMJ structures [54]

Statistical processing of the obtained data was performed using the IBM SPSS 21 package and included comparisons of related groups by the Friedman analysis and the paired Wilcoxon test; independent groups by the Mann–Whitney–Wilcoxon test, qualitative signs—analysis of contingency tables by Pearson’s chi-square test.

3. Temporomandibular disorders of iatrogenic etiology

• According to our study, 30% of patients presenting with TMJ problems have iatrogenic TMDs. We suppose that a large proportion of patients with iatrogenic TMDs come to our maxillofacial surgery clinic and dentistry because patients with complicated forms of TMDs refer to us. Complications are formed as a result of diagnostic errors, which leads to incorrect formulation of the final diagnosis and incorrect treatment planning.

3.1 Theoretical foundations of the system-structural analysis of the etiology and pathogenesis of temporomandibular disorders

Temporomandibular disorders are heterogeneous chronic systemic diseases based on the articulatory norm’s genetic, immunological, anatomical, morphological, and functional disorders. TMD is a symptom complex, the heterogeneity of which is characterized by a fluctuation of clinical symptoms, with periodic dominance of one of them. The pathogenesis of TMDs ends with the formation of specific pathological disorders in the articulation system:
• functional disintegration of the combined functions of the elements of the articulation system and violation of the criteria of the articulation norm;

• pathological occlusion of the dentition in the stage of decompensation;

• combined anatomical and morphological changes in the bone, cartilage, and tendon-muscular structures of the TMJ.

The articulation system is formed by bones of the facial part of the skull, TMJ, chewing muscles, hyoid bone, and dentition in one of the types of physiological occlusion. The anatomical and functional criteria that provide the articulation system’s physiological, cosmetic, and phonetic capabilities do realize within the articulation norm’s phonetically determined boundaries. Therefore, anatomical and functional criteria of the articulatory norm do determine phylogenesis.

Identifying iatrogenic etiological risks (IERs) that form violations of anatomical and functional relationships in the articulation system is the main task of diagnosing TMDs. Iatrogenic etiological risks are preclinical forms of TMDs (predictors). However, undiagnosed preclinical forms transform into iatrogenic pathogenic factors and, further, into clinical forms of TMDs of iatrogenic etiology. As a result of the transformation, a new set of pathomorphological relationships do form, which clinically manifests itself as a newly formed symptom complex—TMDs (Table 1).

### Temporomandibular disorders

<table>
<thead>
<tr>
<th>Congenital</th>
<th>Acquired</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pathology of the development of the bones of the facial part of the skull.</td>
<td>1. Pain syndrome:</td>
</tr>
<tr>
<td>2. Violation of the anatomical ratios of the bones of the facial part of the skull.</td>
<td>2. The impossibility of transferring the lower jaw to the posterior contact position for diagnostic and therapeutic purposes.</td>
</tr>
<tr>
<td>3. Violation of the four conditions of functional occlusion [55].</td>
<td>4. Iatrogenic:</td>
</tr>
<tr>
<td>4. Violation of the vector of muscle forces that determine the movements of the lower jaw, the nonphysiological ratio of the lower and upper jaws.</td>
<td></td>
</tr>
</tbody>
</table>

*Table 1. The structure of clinically detected etiological factors in the pathogenesis of temporomandibular disorders.*
3.2 Etiology and pathogenesis of iatrogenic TMDs

TMDs of iatrogenic etiology have a multicomponent pathogenetic structure. To determine the set of heterogeneous data in the clinical picture of TMDs, we used a system-structural analysis. This will make it possible to identify the paths of pathogenetic transformation of preclinical forms of TMDs into iatrogenic disease (Figure 1). Preclinical forms are predictors of TMDs of iatrogenic etiology, which we have classified as iatrogenic etiological risks.

Unidentified iatrogenic etiological risks (IERs) remain at the risk level until the treatment phase. Implementing incorrectly planned therapy brings the IER out of the “sleep state.” The transition of preclinical forms of TMDs from the level of IER to the level of iatrogenic pathogenetic factors (IPFs) begins. IPF trigger the iatrogenic disease. Thus, TMDs of iatrogenic etiology result from the transformation of iatrogenic etiological risks into iatrogenic pathogenic factors and iatrogenic disease (Table 2).

Failure to identify iatrogenic etiological risks at the diagnostic stage leads to incorrect therapy planning for TMDs. IER predictors are biological, technological, and communicational (psychosocial) forms of risk (Figure 1). IERs do not run in isolation and mutually overlap each other.

Biological risks account for 85% of the total share of risks. They are formed in ontogeny and should be identified at the diagnostic stage. According to the level of violations, we single out iatrogenic biological risks of the macrosystem and intrasystem levels.

Biological iatrogenic risks at the macrosystem level:

1. violations of the constants of the anatomical and functional ratio of the bones of the facial and cerebral skulls determined in phylogenesis;

2. the resulting vector of movements of the lower jaw in three cephalometric planes, which ensures the stability of the position of the center of rotation of the lower jaw (f. mandibulae) in space;

---

**Figure 1.**

*Structure of shares of iatrogenic risks.*
3. phenotypic manifestations of clinical markers of undifferentiated forms of connective tissue dysplasia at the macrosystem level (asthenic body type; deformation of the musculoskeletal system; arachnodactyly; degree of skin extensibility; longitudinal and transverse flat feet; refractive error; and nephroptosis);

4. psychological factors involved in the formation of the structure of the disorder’s pathogenesis.

Biological iatrogenic risks of intrasystem level:

1. anatomical – metric inconsistencies in the size and shape of the jaws; asymmetry in the size of the branch and body of the lower jaw; and the distal position of the mandibular heads.

2. functional – myofascial dyskinesia of masticatory muscles and active and latent trigger points in the masticatory muscles.

3. occlusal – violation of static and dynamic contacts of the dentition of various origins, and violation of the clinical stages of occlusion equilibration.
4. signs of undifferentiated forms of connective tissue dysplasia at the level of the articulation system: dysfunction of the TMJ; the high vault of the palate; dental anomalies; and short frenulum of the tongue.

Technological iatrogenic risks result from a violation of the protocol for examining a patient with TMDs at the diagnostic stage. For example, insufficient volume examination does not correctly collect the necessary diagnostic data, based on which the final diagnosis does formulate and treatment does plan. In such cases, the decision on the method of treating the disease and, in particular, the use of medical technologies to correct the contact of the dentition, the ratio of the jaws, and the function of the masticatory muscles is methodologically incorrect. Therefore, it leads to the development of iatrogenic disease.

Phenomenological dysfunctions constitute a significant component of communication iatrogenic risks. Communication iatrogenic risks are formed at the stage of diagnosis and manifest themselves in the form of a high level of treatment success expected by the patient, formed by the doctor. Unjustified expectations built into previous consultations form a communication gap between doctor and patient. TMD is a multifactorial disease based on reliably identified risk factors – phenomenological dysfunctions, complicated by psychosomatic disorders that prevail over peripheral nociceptive factors.

When formulating a diagnosis and choosing a medical technology, all unknown iatrogenic etiological risks transform into iatrogenic pathogenetic factors and, in association with other already identified clinical symptoms, form a new symptom complex – TMDs of iatrogenic etiology. Thus, at a new stage in the development of the disease, pathogenetic iatrogenic factors formed from iatrogenic pathogenetic risks are revealed. In the structure of the pathogenesis of iatrogenic TMDs, there is a change in the share of influence of pathogenetic iatrogenic factors – biological factors give way to technological factors (Figure 2). This is the result of the hidden influence of unknown iatrogenic risks on the pathogenesis of the disease and the implemented therapeutic and technological solutions. The implemented medical technology aggravates the disease and forms new TMDs of iatrogenic etiology.

4. Conclusions

Thus, in order to avoid such complications as TMDs of iatrogenic etiology in one’s practice, it is necessary at the diagnostic stage to identify preclinical forms of TMDs that can initiate the development of iatrogenic disease. Incorrect use of diagnostic methods and procedures is the leading cause of the occurrence and development of iatrogenic TMDs.

Biological risks not identified at the diagnostic stage at the treatment planning stage become the cause of iatrogenic pathogenetic factors and iatrogenic disease. If iatrogenic etiological risks are not identified and do not define as symptoms, they do not consider when formulating a diagnosis or choosing a medical technology. The diagnostic stage is the stage of missed opportunities, at which it is possible to avoid the occurrence of iatrogenic disease. Therefore, the diagnostic stage tests the professional competencies of the clinic. Thus, undiagnosed iatrogenic risks cause the formation of iatrogenic pathogenetic factors, the failure to identify which leads to an incorrectly formulated or preliminary clinical diagnosis, treatment plan, negative outcome of therapy, and iatrogenic TMDs. Incorrect diagnosis > incorrect diagnosis > incorrect
choice of medical technology > TMDs of iatrogenic etiology. Timely diagnosis of iatrogenic risks is the main preventive measure that prevents the development of iatrogenic TMDs.

5. Clinical example

Patient K does treat in a previous clinic with a diagnosis of TMDs. She received occlusal therapy using a disengaging occlusal splint (Figure 3).

She does admit to our clinic with complaints of limited mouth opening, facial pain, and tooth contact problems. Using DC/TMD tools, we conducted a comprehensive examination of the functional and anatomical state of the articulation system and the psychosocial sphere. Examination of the CBCT of the TMJ with and without an occlusal splint revealed distal position and deformity of the TMJ head surfaces. MRI of the TMJ revealed an unreduced disk dislocation with ligament rupture (Figures 4 and 5).

Using an occlusal uncoupling splint in the mandible resulted in destabilization of the TMJ heads, displacement of the TMJ disk into an anterior-internal position, and a sizeable horizontal-to-vertical dentition ratio. Thus, the insufficient amount of applied methods for visualizing TMJ structures without considering data on soft tissue elements obtained by MRI is the cause of a diagnostic error, an incorrect diagnosis, and unreasonable treatment planning. Occlusal therapy uses an occlusal splint, which does indicate in preparation for the surgical solution of the problem, and not as the leading therapeutic solution (Figure 3).

Final clinical diagnosis: Deforming arthrosis of the TMJ; unreduced anterior dislocation of the TMJ disk on the right and subluxation on the left; the distal position of the heads of the lower jaw; instability of occlusion in the area of 4.4, 4.5, and 4.6 teeth with a decrease in bite height. Moderate anxiety. First-degree disability.
An unreasonable attempt to eliminate anatomical and functional disorders of the jaw ratio by separating the dentition led to the transformation of the IER in the direction of the IPF. For this reason, the phantom bite of iatrogenic etiology and TMDs of iatrogenic etiology have formed. We identified primary etiological factors (iatrogenic biological risks and anatomical pathogenetic factors, i.e. mismatch of the...

Figure 3.
Photo of patient K. Phantom bite formed by an occlusal splint. A – An occlusal disconnecting tire is superimposed on the lower dentition; B – Occlusal slave splint removed from the oral cavity; C – The position of the dentition in the intertubercular position, a phantom bite is formed.

Figure 4.
MRI of the TMJ. A – Anterolateral location of the disk without reduction (↑↑↑) in the left TMJ. B – Anterolateral disk location without reduction with partial rupture of the posterior discotemporal ligament (↑↑↑) of the right TMJ.

An unreasonable attempt to eliminate anatomical and functional disorders of the jaw ratio by separating the dentition led to the transformation of the IER in the direction of the IPF. For this reason, the phantom bite of iatrogenic etiology and TMDs of iatrogenic etiology have formed. We identified primary etiological factors (iatrogenic biological risks and anatomical pathogenetic factors, i.e. mismatch of the
anatomical size, shape, and position of the bones of the facial part of the skull) and secondary etiological factors (crowded position and disruption of dynamic and static contacts of the teeth). The use of an occlusal disconnecting splint led to disk rupture and forced bite formation. In such clinical cases, it is impossible to compensate for anatomical (organ) risks by affecting only occlusal risks, changing the interocclusal height without considering the horizontal-vertical ratio of the dentition. Therefore, it does decide to prepare for reorganizing occlusal therapy with an occlusal stabilizing splint, provisional prosthetics, and pharmacotherapy in combination with CBPC. The use of an occlusal stabilizing splint makes it possible to stabilize the horizontal-vertical ratio of the jaws to model and carry out intraoral verification of occlusal guiding movements of the lower jaw in the protrusion and laterotrusion directions.

Failure to identify iatrogenic biological risks of the macrosystem and intrasystem levels in the patient led to an incorrect diagnosis formulation and incorrect therapy planning. The splint design does make on the lower jaw dentition without considering the vertical-horizontal ratio of the jaws, protrusion, and laterotrusion guides. Overlapping the frontal group of teeth with a splint led to the distalization of the lower jaw. After 2 years of wearing the splint, a phantom bite developed, characterized by lower jaw distalization, occlusion instability, pain syndrome, and TMJ dysfunction.

The use of dissociating occlusal devices, the manufacture of which did not consider the anatomical and functional conditions of occlusal guiding movements of the lower jaw in the protrusion and laterotrusion directions in conjunction with the horizontal-vertical ratio of the jaws, is the cause of the formation of two types of iatrogenies:

1. Iatrogenia are formed by a dissociating occlusal splint and superimposed on the lower jaw with overlapping of the occlusal surface of the teeth of the frontal section. The frontal occlusal platform, when the dentition is closed, slides along

Figure 5. MRI of the TMJ. Rupture of the posterior ligaments of the TMJ disk.
the palatal surface of the incisors of the upper jaw and moves the lower jaw distally to a distance corresponding to the amount of desocclusion, i.e. the thickness of the overlap of the lower jaw incisors by the occlusal platform, which leads to a change in the excursions of the TMJ heads and the transfer of the load vector from vector to tangential. This causes pathological mobility, and frontal dislocation of the upper anterior group of teeth causes gum recession in the lower jaw (Figure 6).

When visualizing the TMJ by CT, the distal position of the heads is revealed with a critical approach to the neurovascular bundle in the petrotympanic fissure. The nature of the movements of the head of the lower jaw changes: it performs only rotational movements, the stage of sliding down and forward is replaced by a horizontal movement toward the slope of the tubercle. When visualizing soft tissue elements by MRI in all functional positions, anterior, at 8 or 10 o’clock, disk displacement is diagnosed, which leads to the formation of disk dislocation without self-reduction. The posterior ligaments of the disk experience pathological stresses, stretch, and lose their ability to regulate disk excursions.

Figure 6.
Photo of the dentition of the patient P. Disconnecting occlusal tire on the lower dentition with overlapping of the frontal group of teeth.

Figure 7.
Photo of patient E’s teeth with an occlusal disconnecting splint made on the lower dentition without considering the occlusal guiding movements of the lower jaw in the frontal and laterotrusive planes. View at the initial visit after treatment for 2 years in another clinic.
The vascular-nervous elements in the bilaminar zone experience compression of the TMJ head, which leads to fluid effusion in this area, the formation of a pain syndrome, a decrease in hearing acuity, and a symptom of a foreign body in the middle ear.

2. Iatrogenia are formed as a result of anatomically unreasonable use of an uncoupling occlusal device in the area of the chewing group of teeth. There is a loss of occlusal guides and the posterior contact position of the mandible (Figure 7). On CT, this is manifested by the displacement of the head of the mandible vertically downward and backward. MRI shows disk rupture, tear, and overstretching of the TMJ ligaments.

Conflict of interest

The authors declare no conflict of interest.

Author details

Oleg Slesarev
Samara State Medical University, Samara, Russia

*Address all correspondence to: o.slesarev@gmail.com

IntechOpen

© 2022 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/3.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.
References


[27] Miernik M, Wieckiewicz M, Paradowska A, Wieckiewicz W. Massage...


[52] Simons DG, Travell JG, Simons LS, Travell JG. Travell & Simons’ Myofascial Pain and Dysfunction: The Trigger Point

