

Juraszek Karolina, Molski Pawel, Ziemniarska Barbara, Kucharczuk-Kopycińska Magda, Kalisz Justyna, Goch Aleksander. Holistic approach to the treatment of cervical spine pain syndromes. Journal of Education, Health and Sport. 2017;7(9):258-269. eISSN 2391-8306. DOI <http://dx.doi.org/10.5281/zenodo.952610>
<http://ojs.ukw.edu.pl/index.php/johs/article/view/4870>
<https://pbn.nauka.gov.pl/sedno-webapp/works/832061>

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 1223 (26.01.2017).

1223 Journal of Education, Health and Sport eISSN 2391-8306 7

© The Authors 2017;

This article is published with open access at Licensee Open Journal Systems of Kazimierz Wielki University in Bydgoszcz, Poland

Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non Commercial License

(<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.

This is an open access article licensed under the terms of the Creative Commons Attribution Non Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 15.08.2017. Revised: 10.09.2017. Accepted: 10.09.2017.

Holistic approach to the treatment of cervical spine pain syndromes

Karolina Juraszek^{1,3}, Paweł Molski^{2,3}, Barbara Ziemniarska³,
Magda Kucharczuk-Kopycińska⁴, Justyna Kalisz⁵, Aleksander Goch¹

¹Department of Physiotherapy, Collegium Medicum in Bydgoszcz, Nicolaus Copernicus

University in Toruń

²University of Economy in Bydgoszcz

³Eskulap Hospital in Osielsko, Rehabilitation Center

⁴10th Military Research Hospital and Polyclinic, Neurosurgery Unit

⁵Jan Biziel University Hospital No.2 in Bydgoszcz, Hematology Clinic

Address to correspondence:

mgr Karolina Juraszek

fizjoterapia.juraszek@gmail.com

Abstract

Spinal pain, including the cervical spine, is currently one of the most common causes of patient visits to physiotherapy clinics. The pursuit for material goods of modern society, stress, lack of time for physical activities and effective rest or staying most of the day in forced sitting position (at work, at home, in the car) are causes for such trends.

Extremely important at the very beginning of the planning of the therapy process is the analysis of the underlying dysfunction that may have different origins. The very visual assessment of the patient's posture pattern during the first visit to the clinic provides valuable

information, such as emotional state or positioning of individual body parts, which is important for the progress of therapy and the sustainability of improvement.

The article presents a new perspective on the pain of the cervical spine as a disorder of the fascia, requiring tissue and emotional integration. Based on Kinesis Myofascial Integration (KMI), the anatomy trains (musculoskeletal chains), attention focuses on the essential components of cervical dysfunction therapy that may appear to be completely unrelated to the dysfunction seen only through the traditional treatment (symptomatic).

Key words: holistic medicine, cervical spine pain syndromes, fascia, upper crossed syndrome

Holistyczne podejście do terapii zespołów bólowych odcinka szyjnego kręgosłupa

**Karolina Juraszek^{1,3}, Paweł Molski^{2,3}, Barbara Ziemniarska³,
Magda Kucharczuk-Kopycińska⁴, Justyna Kalisz⁵, Aleksander Goch¹**

¹Katedra Fizjoterapii, Collegium Medicum w Bydgoszczy, Uniwersytet Mikołaja Kopernika
w Toruniu

²Wyższa Szkoła Gospodarki w Bydgoszczy

³Szpital Eskulap w Osielesku, Centrum Rehabilitacji

⁴10 Wojskowy Szpital kliniczny z Polikliniką w Bydgoszczy, Klinika Neurochirurgii

⁵Szpital Uniwersytecki nr 2 im. J. Bizuela w Bydgoszczy, Klinika Hematologii

Adres do korespondencji:

mgr Karolina Juraszek

fizjoterapia.juraszek@gmail.com

Streszczenie

Dolegliwości bólowe kręgosłupa, w tym również odcinka szyjnego są obecnie jedną z najczęstszych przyczyn wizyt pacjentów w gabinetach fizjoterapii. Stan taki tłumaczony jest pogonią współczesnego społeczeństwa za dobrami materialnymi, stresem, brakiem czasu na aktywność fizyczną i efektywny odpoczynek czy przebywaniem większości dnia w wymuszonej pozycji siedzącej (w pracy, w domu, w samochodzie).

Niezwykle istotna już na samym początku planowania procesu terapii jest analiza podłoża występującej dysfunkcji, która może mieć różne źródło. Już sama ocena wizualna

wzorca postawy pacjenta podczas pierwszej wizyty w gabinecie dostarcza wielu cennych informacji np. o stanie emocjonalnym czy ułożeniu poszczególnych elementów ciała w przestrzeni, co ma istotne znaczenie dla postępów w terapii i trwałości poprawy.

W pracy zaprezentowano nowe spojrzenie na dolegliwości bólowe odcinka szyjnego kręgosłupa, jako zaburzenie układu powięziowego, wymagające integracji na poziomie tkankowym i emocjonalnym. W oparciu o terapię KMI (ang. Kinesis Myofascial Integration), bazującą na koncepcji taśm anatomicznych (łańcuchów mięśniowo-powięziowych) zwrócono uwagę na elementy istotne w terapii zaburzeń w obrębie odcinka szyjnego mogące wydawać się zupełnie niezwiązane z omawianą dysfunkcją, patrząc tylko przez pryzmat tradycyjnego leczenia (objawowego).

Słowa kluczowe: medycyna holistyczna, zespoły bólowe odcinka szyjnego kręgosłupa, powięź, zespół skrzyżowania górnego

Introduction

The pain of the cervical spine is included in one of the most common diseases of the musculoskeletal system. According to some scientific reports 33 - 65% of the population per year is experiencing or have experienced an episode of pain in the upper part of the spine [1]. Despite many therapeutic methods, the spine's pain treatment is sometimes ineffective and short-lived, due to focusing only on treating local symptoms, not on the number of disorders, which should also be avoided during treatment. According to Chaitow it is important to determine the precise cause of the problem, because the place of current discomfort is only the weakest link in the functional chain, where the body's compensating possibilities have broken down [2].

A holistic approach to the therapy

A holistic approach to health, and thus the therapy is the perception of man as a whole and psychosomatic unity based on interpenetrating and consistent levels: physical, mental, social and spiritual [3]. That look is fully consistent with the recognition of health by the WHO (World Health Organization), which defines it as a state of mental, physical and social well-being not only the total absence of disease or disability [4].

Still widely dominant and recognized by the medical community biomedical model requires perceiving the human body as a mechanism in which, a defective individual parts, which are the symptoms of the disease, should be repaired without considering the mental

aspect. Holistic medicine departs from this pattern by expressing opposition to "fraction" human components. Hence, the holistic model advocates are critical of approach to the phenomenon of specialization in medicine, because a narrow look at one area will not see the impact of other elements such as environmental factors, nutrition and emotional factors on health. The goal of holistic treatment is the search for causes of disease and eliminating patterns and circumstances that cause it, taking into account many aspects [5].

In the process of holistic therapy there is a strong emphasis on patient involvement in the fighting against the disease, involving the application and following the principles of preventive health care, techniques, coping with stress, physical activity, proper diet, and alternative methods of treatment such as acupuncture, acupressure, yoga or rolfing [5].

Etiopathogenesis of back pains

Back pain can accompany many diseases being the symptoms of varied and sometimes unknown etiology. According to many authors, pain in the spine is formed by mechanical means, associated with excessive static and dynamic load, which exceeds the adaptable possibilities of the spine and soft tissue [6].

Among the causes of back pain we can extract the structural factors associated with the disorder of the bone structure, joint, muscle, myofascial or non-structural factors associated with of the spine secondary diseases. To disorders of the structural etiology the following changes are included degenerative-productive in the joints and intervertebral discs of the spine, trauma and fractures, spinal canal stenosis, spondylolisthesis, myofascial pain. In turn, the non-structural conditions include infectious diseases, cancer, aortic dissection, rheumatoid arthritis, ankylosing spondylitis or visceral pain from the internal organs [7, 8].

Recently, next to level functional disorders a significant influence, psychological influence and environmental factors are noticed. Negative emotions such as stress, anger, anxiety, experienced by man, leave "footprints" in a myofascial, as a characteristic pattern of body posture, chronic muscular tension or restrictions on soft tissue [9].

Pain in the cervical spine, and muscle imbalance

According to some authors, up to 90% of spinal afflictions are due to the static imbalance within the muscular system and myofascial [10]. As a result of prolonged exposure in the wrong position (eg. working at the computer, in the car) comes to the occurrence of pain within the congested structures. There is imbalance in muscular between the so-called muscle. "mostly tonic" and their antagonists - phase muscles [11, 12]. The first ones are built

from slowly reacting fibers which makes them fatigue resilient, which is necessary to stabilize and maintain the proper posture. On the other hand phase muscles contain more responsive fibers which are designed to carry out vigorous movements. The tone of imbalance of the muscle groups is shown through muscle shortening and by increased muscle tension of tonic (postural), and by weakness, hypotension and stretch of the phase muscles. The occurrence of static imbalance phenomenon, which can be the cause of chronic pain, has been first described in 1979 by the Czech neurologist and therapist - Professor Vladimir Janda [11, 13, 14]. On the basis of this assumption and long-term observation of patients reporting pain in the spine Janda has identified specific patterns of myofascial dysfunction. One of them is the intersection of the upper assembly also known as cervical syndrome - shoulder (Upper Crossed Syndrome - UCS) [15]. Disorders of muscle tone in the posture band, which is UCS gradually lead to restricted mobility and pain not only in affected areas of the body, but also in other segments making up the kinematic chain. The clinical picture of UCS is associated with hypertonic muscle (abbreviated, tight) mex pire sloping suboccipital muscles, sternocleidomastoid muscle, descending part of trapezius muscle, levator scapulae muscle, pectoralis major and minor, clavicular part of deltoid muscle and erector spinae of cervical spine and hypotonic (weakened, stretched): deep neck flexors, ascending and middle part of the trapezius muscle, serratus anterior muscle, spinal part of deltoid muscle and rhomboid muscle [16]. Long term occurrence of described muscle disbalance leads to posture disruption and changes in the components of the joint arrangement of the cervical spine and shoulder girdle. An image of such a disorder is excessively extended in the front head (spinal segments C1 and C2 are hyperextended), protraction and shoulder lifting, rotation and visiting blades acetabular directed shoulder forward [15, 16]. Disorder of the central linear axis of the body in the case of UCS, it will require more effort to keep the body upright. When the head is moved too forward in the sagittal plane, big muscles on the back of the shoulder girdle and neck are in a constant state of tension, in order to support it. The upper part of the trapezius muscle involved in this work loses its function associated with the movements of the head and shoulders for holding the head. In this case, its role is taken over by sternocleidomastoid muscle (MOS), which in normal conditions next to the trapezius muscle is responsible only for turning head from side to side movement and nods. MOS connects the lower jaw fascia, which will hinder habitual clenching previously mentioned movements of the head and increase tension in the area. Incorrect head position in space will change the position of the jaw, which is moved backwards relative to the jaw. Compound dysfunction within this area (temporomandibular joint and face pain) of the body posture noted by Janda [17]. In his view,

the source of this problem is muscular imbalance between the muscles involved in opening and closing the jaws manifested gnashing teeth or jaw tightening in response to stressful situations. From the back of the trapezius muscle and fascia muscle sternocleidomastoid muscle are musculo-fascial continuity with epicranial aponeurosis through a combination of nuchal ligament that characterized at patients with problems of the cervical segment, by a very compact, almost stiff structure. Nuchal ligament acts as a boundary between superficial and deep layers of soft tissues. The result of excessively protruding head in UCS is overload cephalic-cervical junction, and more specifically suboccipital muscles which tense to provide the opportunity to look ahead. Given the enormous amount of muscle spindles per gram on muscle tissue present in the suboccipital muscles, the continuous connection will be maintained at the expense of proprioceptive function in the region of the head and neck will influence the weakening proprioception and postural balance in this region, and may also lead to ischemia and formation of disorders manifested by pain and dizziness, stiff neck, tinnitus [18].

Correction of this postural pattern so or head back to the position at which the central axis of the body will result in loosening of the tight tissues. The effort of improving the settings of several elements disturbed attitude will not solve the problem, if there are tensions in hostnames even further distant areas of the body [9].

The importance of fascia in the musculoskeletal system dysfunctions

Dysfunctions occurring musculoskeletal soft tissue are closely related with the fascia (connective tissue), which is by Ida Rolf "Organ of the body structure," stretching through the whole body, from the toes of the lower limbs after the top of the head. This is the tissue in which are embedded the muscles, bones, blood vessels, lymphatic vessels, nerves, organs, and virtually every cell of the human body [19]. The layered structure of the fascial bonding structure located innermost (periosteum-tendon-ligament) with superficial structures, lying just beneath the skin makes that the body is maintained in its entirety and has a unique shape, but also has some freedom of movement [9]. Such character of the connective tissue allows you to store and transfer information throughout the body.

Any change in voltage, the load associated with the motion or action of gravity is reflected in the extracellular matrix (extracellularmatrix - ECM), which is the main building block of connective tissue. This substance apart from the mechanical function is responsible for proper physical-chemical environment cells immersed in it the having a proper concentration of ions and hydration, providing free transport of nutrients and metabolic

substances [20]. Connective tissue its ability to deforming and adapting to changing external conditions, and thus great flexibility and resilience owes to fibroblasts cells, building up most of the fibrous and interfibrous elements of fascia. Items that make up the three types of protein-fiber composed of elastin, reticulin, or collagen, the most dominant in the structure of the fascial. The last component of the fascia is a basic substance constituting the water gel made of mucopolysaccharides and glycosaminoglycans, provide an adequate barrier to the transport of metabolites and immune response. The aqueous colloid solution under the influence of long-term overload injuries, motor activity associated with a reduction of tissue or excessive stretching, it changes state from sol to a more or less viscous aqueous gel. The piezoelectric effect of the discharge, there is a polarized excessive production of collagen fibers, laying along the line voltage as "compass needle". This creates inflexible, close to the "strip" the density of the base material, resulting in tissue dysfunction, chest pains associated with the formation of trigger points and the accumulation of toxic metabolites. Overloading sustained for a longer time will cause the piezoelectric discharge along meridians myofascial in further regions of the body [18].

Explanation of the above phenomenon at the cellular level is a substrate for examining the human body, as a tensegrity structure consisting of spatial geometries, wherein the rigid elements (bones) are connected by soft-elastic elements (muscles, the abdominal cavity, pleura, pericardium). The hard elements do not touch each other, as are suspended in space by means of a voltage soft element and a change in one part of the system affects the displacement in all its components. This is due to balance of soft tissue tensions is possible to maintain the spine and other elements of the skeleton in a vertical [18, 21].

Tissue (both soft and hard) every day are subjected to physical stress in the form of gravity or other external forces. An amazing fascia structure makes that the human body, despite the seemingly static arrangement of individual elements can adapt to the movement and its lack. This has a positive impact if the activity is increased gradually, which allows to strengthen the structure of the bones or soft tissues. Conversely, in the case of adaptation to the fascia habitual voltage due to abnormal posture or lack of activity, which can result in adhesive bonds, fibrosis and adhesions in the tissue [13].

According to the fact that the connective tissue (fascial tissue) establish a call network at the cellular level, tissue and visceral, disorder within one structure will affect the functioning of the structures for other levels of the musculoskeletal system [21]. Leon Chaitow among the effects of the occurrence of the described upper assembly junction of the mentioned respiratory patterns disorders, arteriovenous movement disorders caused by

compression of the important structures of the nervous system, blood vascular, incorrect setting of internal organs (liver, kidney, small intestine), dysfunctions work stomach, prostate, lane pelvic and limited mobility within the thoracic spine and ribs [22]. Disturbed muscle balance in the case of pain syndromes of the cervical spine affects the function of abnormal postural-stabilizing vertebral spinal column and thus the work of the diaphragm - the main inspiratory muscle man. The centrally located diaphragm separates the chest cavity from the abdominal cavity, maintaining the correct intra-abdominal pressure between them, necessary for the stabilization of the spine and maintain internal organs. There are in it the area of attachment of the proximal part of the rib, loin and bridge and on the attachment end forming the central part of the so-called. tendinous means connected to the internal organs [23]. The diaphragm is not an uniform dome because of holes which they are going through the aorta, the thoracic duct, the lower vena cava, esophagus, azygos vein, vagus nerve, visceral nerves and sympathetic trunks. Besides the main activity associated with the exchange of gases that muscle performs many important functions. Connecting through the ligament arcuate medial and minor portion of the lumbar muscle and trapezius lumbar corresponds with the rest of the deep muscles of the spine for stabilization of the lumbar-pelvic complex (so-called the stability of center). In addition to the role of supporting the diaphragm and respiratory participates in the work abdominal pressure, active during the basic physiological functions, childbirth, cough or vomiting. Moreover it affects internal organs (liver, stomach, kidney, small intestine) with which is directly connected by ligaments and fascial structures. The movements of the diaphragm during inhalation and exhalation, the pressure gradient gives rise to ensure correct drainage venous-lymphatic lower half of the body, to prevent stagnation of venous blood and lymph. Myers also draws attention to the effect of the membrane through internal organs mental health, which is also confirmed in theory chains muscle and joint formed by Godelieve Struyff-Denys [24, 18].

The diaphragm thanks to multidirectional fascial connections is a centrally located point in the interpenetrating chains voltage. Analyzing the arrangement of horizontal and vertical structures, myofascial described by Schultz it can be seen that, when perturbed balance between these structures tends to form a line of tension in the body. The diaphragm perfectly reflects this condition, because it combines with the fascia of the psoas muscle, which through iliacus muscle continuous with the fascia of the obturator internus muscle associated with the fascia pelvic floor. Looking from the rear fascia of the lumbar muscle blends into fascia of the trapezius muscle and erector spinae. Sideways the diaphragm connects to the transverse and oblique muscles of the abdomen, and in front to the rectus abdominis muscle, which has the

trailers end to the pubic bone [9]. By Myers the diaphragm belongs to the deep front line, excluding the share does not take place any motion and within which there may be related, for example offset patterns. Respiratory disorders, excessive flexion or hyperextension of the cervical or depression [18].

The diaphragm dysfunctions presented in terms of fascial will affect the formation of many disorders throughout the body. If the diaphragm does not function the chest does not extend in a downward direction and does not initiate a valid traffic extending lower ribs. The diaphragm restrictions will be compensated by accessory muscles work such as pectoralis major and minor muscles, descending parts of trapezius muscles, levator scapulae muscles, serratus anterior muscles causing them to overload. This type of disturbed breathing pattern is called upper thoracic breathing, which significantly translates to dysfunction of the diaphragm, and thus problems arising, for example: within the respiratory tract, blood, lymphatic system, muscular fasciocutaneous disorders. Such a situation forces the hypermobility of chest, the high setting of the arms, sunken supraclavicular pits during inspiration and a high setting of the sternum, clavicles and the first ribs [23, 25]. Dysfunctional breathing of upper thoracic track accelerated with breathing and reduced ergonomics respiratory tract can lead to hyperventilation, resulting in a low partial pressure of CO₂ in the blood and changes in pH from 7.4 to 7.5, resulting in cerebral ischemia, gastrointestinal motility disorders, pseudocoronary pains or metabolic crisis of muscle over involved in respiration [26].

Emotions stored in the body

Movement patterns of each man and established patterns of tension in the body are closely related to the patterns of personality shaped from birth. Posture and the appearance of a person's give an emotional picture of history, internal states lived, and also talk about the nature and temperament [27]. The described relationship between the mental state, and its reflection in the body noticed Ida and Rolf Wilhelm Reich, related to work fascia [28].

In normal conditions the body in response to physical or mental sensations allows on free emotion's flow and feeling throughout the fascial system. Holding back the dispersal of emotion through the body (eg. to hide the anger) will affect the formation of muscle tension patterns, which locks it in a position different from original physical model. Long-term maintenance of such a state after a certain time causes the occurrence of pain and stiffness associated with changes within the fascia [9, 27].

One of the frequently encountered response to grief is the reaction of blocking voltage of the jaw, chest or throat. Such a lock of feelings can eventually degenerate into unconscious habit [9]. The most common of these is respiratory arrest occurring at an early age, in response to the unwanted feelings or sensations associated with them. It is manifested as storing air only in the lower part of the ribs and disorders of the diaphragm, or may cover the upper peaks of the ribs and lungs. Such pattern or other which is a reaction to emotions maintained for years can become a fixed connection, stiffness and chronic pain, usually located between the main parts of the body in the form of webs connecting the front and back of the body, which are the neck, the upper shoulder girdle, the diaphragm, the lower back [27].

Analyzing the posture of a person with chest pains cervical spine, characterized by advanced forward head, rounded shoulders, sunken chest can be assumed that it is a reflection of a sense of weakness, surrender, or blocking the emotions or shame. The observed chest collapse is associated with an insufficient amount of intake air into the lungs, the source of energy and vitality emotional [27]. The patient seems to be tired, deeply wounded, as if he experienced in the past a strong sadness and disappointment.

The effect of the direct impact of the therapy on myofascial soft tissue by means of respective touch forms is the integration at psychosomatic level. Changing incorrect, settled pattern of tension in the body will increase the awareness of feeling the body and the free flow of emotions, which can manifest itself in the form of tears, muscle tremor, sobbing or screaming.

Summary

An important element of effective back pain treatment is to understand the need for a holistic understanding of health and disease. Treatment only focusing only on muted symptoms, such as stiffness, discomfort or pain in the cervical bring only short-term improvement, as incorrect posture remains unchanged. Patient's therapy with back pain syndrome or other diseases within the locomotor therapy must also take into account the local functioning in other spheres not only in the sphere of somatic. The search for the source of complaints will only be effective if all levels of the life of the patient they are taken into account.

References

1. Hoy DG, Protani M., De R, Buchbinder R.: The epidemiology of neck pain. *Best Practice & Research Clinical Rheumatology* 2010; 24 (6): 783-92.
2. Chaitow L., Fritz S.: *A massage therapist's guide to understanding, locating and treating myofascial trigger points*. Churchill Livingstone, Edinburgh 2006.
3. Ostrzyżek A., Marcinkowski J. T.: Biomedyczny versus holistyczny model zdrowia a teoria i praktyka kliniczna. *Problemy Higieny i Epidemiologii* 2012; 93 (4): 682-686.
4. Domaradzki J.: O skrytości zdrowia. O problemach z konceptualizacją pojęcia zdrowie. *Hygeia Public Health* 2013; 48 (4): 408-419.
5. Starzyńska-Kościuszko E.: Holistyczna (całościowa) koncepcja zdrowia: zdrowie jako wartość. *Humanistyka i Przyrodoznawstwo* 2010; 16: 319-326.
6. Stodolna-Tukendorf J., Stodolny J., Marczyński W.: Zespoły bólowe kręgosłupa a hipermobilność konstytucjonalna. *Chirurgia Narządów Ruchu i Ortopedia Polska* 2011; 76 (3): 138-144.
7. Borenstein D.G., Wiesel S.W., Boden S.D.: *Low Back Pain: Medical Diagnosis and Comprehensive Management*, W.B. Saunders, Philadelphia 1995; 39: 181–589.
8. Marty M.: Définition et évaluation des dimensions physiques et fonctionnelles des lombalgies. *Rev Rhum* 2001: 135–140
9. Schultz L., Feitis R.: *Nieskończona sieć. Anatomia powięzi w działaniu*. Wydawnictwo Irgo, Warszawa 2011: 31-38, 53-57, 91-93
10. Rakowski A.: *Kręgosłup w stresie*. Wydawnictwo GWP, Gdańsk 2008
11. Kruszyna J., Świtoń A.: Postępowanie fizjoterapeutyczne w bólach pochodzenia mięśniowego w odcinku szyjno-piersiowym kręgosłupa. *Rehabilitacja w Praktyce* 2016; 4: 8-12
12. Szwarocki R., Cichowska M.: Terapia tkanek miękkich w zespole skrzyżowania górnego - studium przypadku. *Rehabilitacja w praktyce* 2014; 6, 34-39
13. Chaitow L.: *Techniki E*. Churchill Livingstone, New York 1996
14. Chaitow L., DeLany J. W.: *Clinical application of neuromuscular techniques: the upper body*. Churchill Livingstone, Edinburgh 2000
15. Kaczmarek A.: Trening korekcyjny w zespole skrzyżowania górnego według Jandy. *Praktyczna Fizjoterapia* 2017; 82: 38-45
16. Richter P., Hebgen E.: *Punkty spustowe i łańcuchy mięśniowo-powięziowe w osteopatii i terapii manualnej*. Wydawnictwo Galaktyka, Łódź 2014
17. Janda V.: Some aspects of extracranial causes of facial pain. *Journal of Prosthetic Dentistry* 1986; 56 (4), 484-487

18. Myers T.: Taśmy anatomiczne. DB Publishing, Warszawa 2010: 22–54.
19. Cackowski W.: Nowe rozumienie biomechaniki i kierunku rozwoju myślenia dotyczącego funkcjonowania ludzkiego narządu ruchu. *Praktyczna Fizjoterapia i Rehabilitacja* 2015; 67: 14-18
20. Williams P.: *Gray's anatomy*. 38th ed. Edinburgh: Churchill Livingstone 1995: 80
21. Mikołajczyk A., Kocięcki M., Zaklukiewicz A., Listewnik M., Gębska M.: Zastosowanie koncepcji tensegracji strukturalnej w Manipulacjach Powięziowych według Stecco. *Annales Academiae Medicae Stetinensis. Roczniki Pomorskiej Akademii Medycznej w Szczecinie* 2014, 60, 2: 59–64
22. Chaitow L., Russ D., Shipley D. J.: 6. Rozdział podręcznika [W:] Chaitow L. *Naturopathic Physical Medicine*. Churchill Livingstone, Edinburgh 2008
23. Majchrzycki M.: Rola przepony oddechowej w powstawaniu i utrwalaniu dysfunkcji narządu ruchu. *Praktyczna Fizjoterapia i Rehabilitacja* 2015; 62: 22-24
24. Niemiec B., Rogalski J., Szymański M.: Przepona w praktyce fizjoterapeuty. *Rehabilitacja w praktyce* 2015, 4: 9-12
25. Kochański B., Plaskiewicz A., Ratuszek D., Cichosz M., Wołowicz Ł., Dylewska M., Żukow W.: Postępowanie fizjoterapeutyczne w hipotonii przepony – opis przypadku. *Journal of Education, Health and Sport* 2015; 5 (6): 433-440
26. Godek P.: Przepona. Perspektywa osteopatyczna. *Praktyczna fizjoterapia i rehabilitacja* 2012; 32: 8-14
27. Kurtz R., Prester H.: *Mowa ciała*. Wydawnictwo Centrum Pracy z Ciałem, Koszalin 2014
28. Jacobson E.: *Structural Integration: Origins and Development*. *Journal of alternative and complementary medicine* 2011; 17 (9): 775–780