



Biomechanical Etiology of the So-called Idiopathic Scoliosis (Adolescent Idiopathic Scoliosis [AIS]). New Classification Rules of Therapy and Prophylaxis

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Citation: Karski T. Biomechanical etiology of the so-called idiopathic scoliosis (Adolescent Idiopathic Scoliosis [AIS]). New classification rules of therapy and prophylaxis (2019) Nursing and Health Care 4: 81-85.

Received: Oct 16, 2019

Accepted: Nov 25, 2019

Published: Dec 03, 2019

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Abstract

The biomechanical etiology of the so-called idiopathic scoliosis (Adolescent Idiopathic Scoliosis [AIS]) is described in years 1995-2007. In article are presented the etiological factors, the new classification, and the methods of therapy and principles of causal prophylaxis. The etiology of AIS is strictly biomechanical and it is connected with the asymmetry of the movement of the hips and with function-“standing” and “gait”. The new knowledge about scoliosis is important for doctors and nurses.

Materials: In the years 1984-2018, more than 2500 patients with scoliosis have been observed and treated. This group included children in 80% in age 4 to 18 and in 20% older patients in age of 40-70. In this group of patients there were children endangered or with first or advanced symptoms of “so-called idiopathic scoliosis”. The patients with various syndromes or congenital scoliosis were excluded in the statistic of research.

Keywords: Scoliosis, Biomechanical etiology, Symptoms, New classification, Therapy, Prophylaxis.

Abbreviations: MBD-Minimal Brain Dysfunctions, CNS-Central Nerve System, SofC-Syndrome of Contracture, SofCD-Syndrome of Contracture and Deformities, epg-Etiopathological Group, SOSORT-Society on Scoliosis Orthopedic and Rehabilitation Treatment, IRSSD-The International Research Society of Spinal Deformities.

Introduction

In all these cases was found the limited movement of the right hip. In some children we found an additional causes connected with the bigger or smaller disorders in brain. There were children with Minimal Brain Dysfunctions (MBD) and they had: **a.** primary “extension contracture of the trunk”, **b.** anterior tilt of the pelvis” and **c.** “laxity of the joints”.

Biomechanical etiology

The cause of etiology of scoliosis was secret over many years [1-41]. In years 1984-2007 was found that the primary cause in etiology of scoliosis-is the asymmetry of hip movements-limited movements of right hip. In Karski T. [9] was described a “specific model of hip movements”-three groups of asymmetries-leading to four types of scoliosis. Next important cause in development of scoliosis is function: “gait” and “standing on the right leg” (**Figure 1a, Figure 1b and Figure1c**). In figures 2 and 3 is presented the test of adduction and anatomy of shortened soft tissue (**Figure 2, 3**).

The asymmetry of movements of the hips is one of the symptoms of “Syndrome of Contracture” (SofC) according to Prof. Hans Mau-Tübingen, Germany (in German “Siebenersyndrom”) [18]. Since 2006 we talk in Lublin about the “Syndrome of Contracture and Deformities” (SofCD) because we add the varus deformity of the shanks in newborns and babies as the eighth deformity.

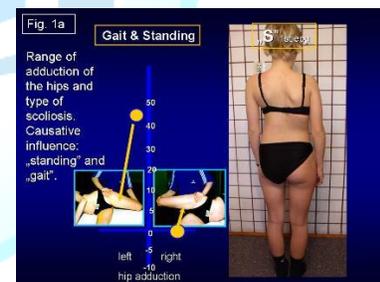


Figure 1a: Range of adduction of the hips and type of scoliosis. Causative influence: “standing” and “gait”. Deformity “S”1st epg.



Figure 1b: Range of adduction of the hips and type of scoliosis. Causative influence: standing”. Deformity “C” 2nd/A epg and “S” 2nd/B epg.

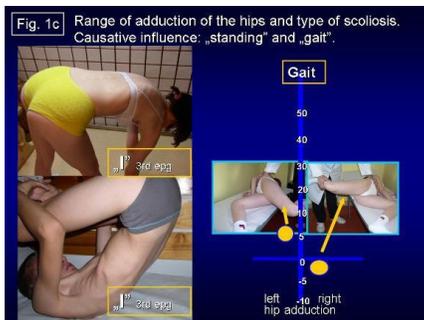


Figure 1c: Range of adduction of the hips and type of scoliosis. Causative influence: "gait". Deformity "I" 3rd epg.

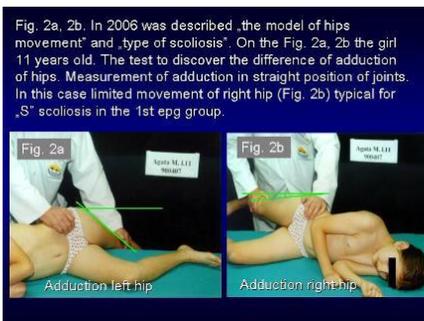


Figure 2: In 2006 was described „the model of hips movement” and type of scoliosis. On the pictures the test to discover the difference of adduction of hips. Measurement of adduction in straight position of joints. In this case limited movement of right hip typical for „S” scoliosis in the 1st epg group.

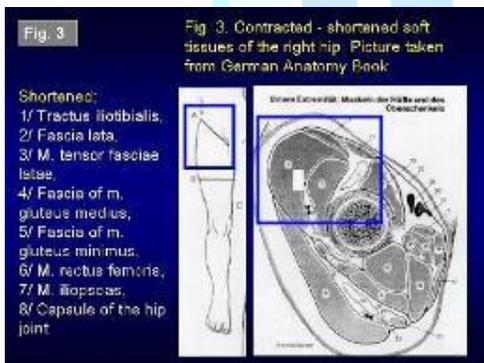


Figure 3: Contracted - shortened soft tissues of the right hip. Picture taken from German Anatomy Book. Shortened: Tractus iliotibialis, Fascia lata, M. tensor fasciae latae, Fascia of m. gluteus medius, Fascia of m. gluteus minimus, M. rectus femoris, M. iliopsoas, Capsule of the hip joint.

This varus deformity, in certain conditions-may lead to Blount disease in older children [18,20-23]. In development of scoliosis the additional secondary influences can come from Central Nerve System (CNS) in children with MBD and examples are presented in (Figure 4a, Figure 4b, and Figure 4c).

Classification

Three groups and four types of scoliosis (Figure 1a, Figure 1b and Figure 1c):

(1) Scoliosis "S" 1st Etiopathological Group (epg)-3D. Double curve. Stiff spine. Rib hump on the right side of the thorax. Specific model of hips movements. Connection with "gait" and permanent "standing 'at ease' on the right leg". Beginning of deformity in 2-3 years of life. Clinical symptoms appears of the age of 5-6 years.

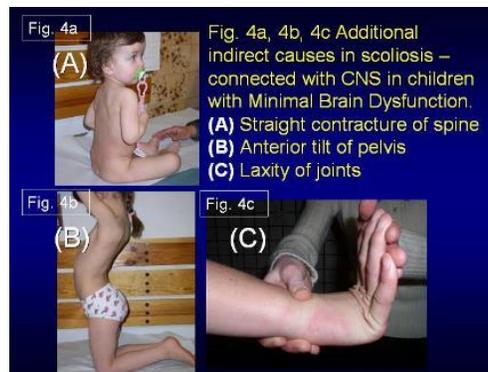


Figure: 4a-c Additional indirect causes-connected with CNS in children with MBD. (A) Straight contracture of spine. (B) Anterior tilt of pelvis. (C) Laxity of joints.

(2a) Scoliosis "C" 2nd/A epg-1D or 2D. One curve-lumbar left convex. Spine flexible. Specific model of hips movements. Connection with permanent standing „at ease” on the right leg. Beginning of deformity at the age of 2-3. Clinical symptoms appear at the age of 8-10.

(2b) Scoliosis "S" 2nd/B epg-2D or 3D. Two curves-lumbar left convex and thoracic right convex. Specific model of hips movements. Connection with permanent standing 'at ease' on right leg and additionally with laxity of joints or/and harmful in previous incorrect therapy/exercises. Beginning of deformity at the age of 2-3. Clinical symptoms appear of the age of 10-12 years. In the 2nd/A and 2nd/B types of scoliosis - the spine is flexible.

(3) Scoliosis "I" 3rd epg-2D or 3D. Specific model of hip movements. Deformity has the form of a stiff spine. No curves or small ones. The cause is gait only. Such "spine deformity" was until 2004 never included and classified as "scoliosis". Beginning of deformity at the age of 2-3. Clinical symptoms are "stiffness of the spine in children" and in adults "permanent pain". Why stiffness? In situations of maximal limited adduction, internal rotation and very often also extension of the right hip-appears compensatory movement in the pelvis and in the spine with every step during gait. This rotation movement in inter-vertebral joints is bigger than normal and has the character of "distortion" and in result causes fibrosis and "stiffness".

Previous therapy

The various extensions exercises to receive "strong muscles" were and are only wrong and improper. They cause "iatrogenic deformity" of the spine-bigger curves, bigger rib hump and more stiff spine. The children after "such therapy" very often need surgery. The bad results after improper therapy were explained as "the natural history of scoliosis" (Figure 5a, Figure 5b, Figure 5c and Figure 6).



Figure 5a-c: Example of wrong and harmful exercises. After such therapy - iatrogenic deformity, big curves, big rib hump and maximal stiff spine.



Figure 6: Patient 20 y. old. In childhood conservative treatment with bad, incorrect exercises. In result enlargement of scoliosis. Next seven (7) operations (!). Now problem with daily activity. Pain.

New, proper therapy

Only stretching exercises giving symmetry of movements and next symmetry of growth and the development of the pelvis and the spine are proper Figures: 7, 8. The best are stretching exercises like karate, taekwondo, aikido, kung fu and others (**Figure 7** and **Figure 8**).



Figure 7: Proper therapy for scoliosis. In program stretching exercise to receive full range of movement of hips, position of pelvis and movement of spine. Important standing 'at ease' only on the left leg in every day situation.

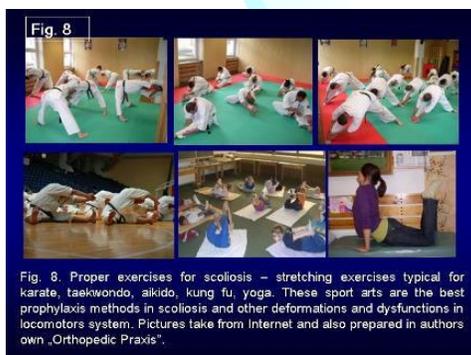


Figure 8: Proper therapy for scoliosis in Sanatorium for Children - under the name-of Dr Janusz Korczak - in Krasnobród. Cooperation with Pediatric Orthopedic and Rehabilitation Department in Lublin from 1977. In program only stretching exercises-to receive full range of movement of hips, position of pelvis and full movement of spine. Important standing 'at ease' only on the left leg in every day situation.

Very important are flexion-rotation exercises for spine. Such treatment gives good results (**Figure 9a**, **Figure 9b**, **Figure 9c**, **Figure 9d**, **Figure 10a**, **Figure 10b**). In this part of the paper it is my ethical obligation to inform-that-flexion exercises for the spine in scoliosis in Poland many years ago (1960-1980) were introduced by Prof. Malawski S [27]. But at this time the biomechanical influence going

from the hips, pelvis and the factors: "standing 'at ease' on the right leg" and "gait" was not discovered.



Figure 9a-c: Stretching exercises to receive full movement of right hip, to receive better range of movement and axis of spine. **Figure 9d:** Result after three years of treatment.

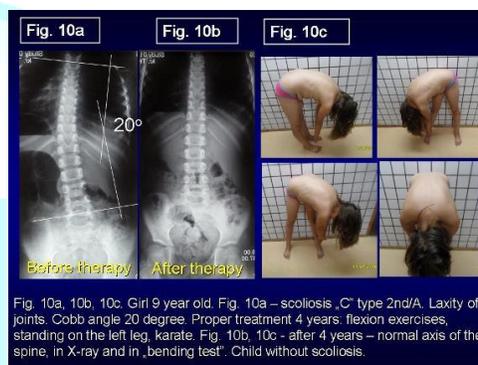


Figure 10a-c: Girl 9 year old. Fig. 10a-scoliosis "C" type 2nd/A. Laxity of joints. Cobb angle 20 degree. Proper treatment 4 years flexion exercises, standing on the left leg, karate. **Figure 10b, 10c:** After 4 years-normal axis of the spine, in X-ray and in "bending test". Child without scoliosis.

The possibility of causal prophylaxis

To find the danger of scoliosis we should use not only old but also the new tests:

- We should define the manner of the standing 'at ease'-left: right leg.
- Use the test of adduction of both hips.
- Adams -Meyer test-other words-bending test for scoliosis.
- Lublin test - side bending test for scoliosis.
- Elly-Duncan test to discover the anterior tilt of pelvis and hiperlordosis of lumbar spine - due to flexion contracture of hips [8].
- Kneeing test-to discover the anterior tilt of pelvis and hiperlordosis of lumbar spine.

Rules of prophylactic recommendations against scoliosis:

- Standing 'at ease' only on the left leg.
- Sitting relax-never straight up.
- Sleeping in embryo position.
- Active participation in sport in school and additionally in clubs - the best are karate, kung fu, taekwondo, aikido, yoga.
- Physiotherapy/Kinesio-therapy to obtain full, symmetrical movement of both hips and movement of the spine-flexion, deviation, rotation. Especially important is to recover the full adduction and internal rotation movement of the right hip.

Discussion and my remarks

Information to these problems is presented on the Website www.ortopedia.karski.lublin.pl from 2006 [41]. In Poland, in 1995-



2009 I have given many lectures about “the problem of scoliosis”-at Polish Orthopedics and Traumatology Congresses in Łódź, Szczecin, Poznan, but till now “the explanation of etiology and the rules of new therapy is not understood nor accepted”. Why-because the conviction that the “scoliosis is idiopathic” is so deeply ingrained in the minds of many doctors, professors-that nobody searches for new knowledge.

My lectures have also been presented abroad in The International Research Society of Spinal Deformities (IRSSD) Meetings in Athens (2002), Genth (Belgium 2006), Liverpool (UK-2008) and in Poznan (Poland 2012) as well in Kolobrzeg (Poland 2009) during Scoliosis Course Meeting of SICOT and in Czech Republic during SICOT Meeting in 2011 and twice at the Society on Scoliosis Orthopedic and Rehabilitation Treatment (SOSORT) Congresses in Athens and in Wiesbaden and remain till now without any response. Only Professor Martha Hawes [32] and Professor Jan Stokes [35,36] from the USA, as well Professor John Sevastik [37,38] and Dr. Helen Normelly [33] from Sweden, Professor Stefan Malawski [27,28] and Professor Kazimierz Rapala [34,40] from Poland, as well Professor Harald Thom [39] from Germany-understood my explanation of the biomechanical etiology of the so-called idiopathic scoliosis.

In the article there is all the information about etiology, classification, new therapy, but-the most important-the rules of causal prophylaxis of scoliosis. The conviction that can be other “etiology of idiopathic scoliosis”-for example presented in articles of Milan Roth (Czech Republic) or divagations of Prof. Mikhail Dudin from St. Petersburg-Russia (my friend, we had many personal discussions) not give the answer to all questions about properties of scoliosis. Only biomechanical etiology answers all questions and because of this we speak “so-called idiopathic scoliosis”. The biomechanical etiology is confirmed over many years by some group of scientist but not known in all countries in the world. Children of the world are waiting for prophylaxis. I hope that from Illinois, USA, the knowledge will spread to other countries, including Poland.

Conclusions

The biomechanical etiologies of the so-called idiopathic scoliosis explain all questions connected with this spine deformity. Development of scoliosis and the types of spine deformity are connected with pathological “model of hips movements”-limited movements of right hip and the function- “standing ‘at ease’ on the right leg” and “gait” [9]. Restricted range of movements in the right hip is one of the symptoms of the “Syndrome of Contractures and Deformities” according Prof. Hans Mau and Lublin observations [18].

Every type of the scoliosis starts to develop at the age of 2-3. If start to be scoliosis-the development is slowly, over years, long time secret for parents and doctors if they do not use the new tests. The infantile scoliosis is not the “So-Called Idiopathic Scoliosis”. The causal prophylaxis of scoliosis is possible and should be introduced in every country. Start for prophylaxis in age of 4-6 years.

The rules of prophylaxis for all children are:

- Standing ‘at ease’ on the left leg.
- Sitting in a relaxed position.
- Sleeping in an embryo position.
- Active participation in sports in school and at home every day.
- Especially beneficial sports are: karate, taekwondo, aikido, kung fu and other similar.

The special “message” to all doctors, to all nurses-“try to understand the new knowledge and proof/check their trust”. Never say-“no” in the first moment. Even “anecdotal” cause-standing ‘at ease’ on the right leg-words of my friends-from Europe’s Country-is in the first place-real and true. Please remember-“standing ‘at ease’ on the right leg” is “true cause in etiology of the so-called idiopathic scoliosis”.

Acknowledgement

I would like to express my many thanks to David Poynton and Honorata Menet for correction of the article.

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