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*Etiology of the so-called "idiopathic scoliosis". Biomechanical  
explanation of two etiopathological groups of spine deformity.  
Effectiveness of new conservative treatment.  
Possibility of causative prophylactics*

In all children with adolescent idiopathic scoliosis (AIS) I find a difference in adduction of both hips examined in straight position of the joint. It is a real abduction contracture of the right hip (sometimes plus flexion and out-rotation contracture) or only "functional contracture", which means only smaller adduction at the right hip than at the left hip. "The real right hip abduction contracture" or only "limited adduction" is connected with "syndrome of contractures" at newborns and babies (Mau, Robinson and McMaster, McMaster, Hensinger, Barlow, Howorth, Green and Griffin, Dangerfield et al., Karski, Karski et al., Tarczyńska et al., Heikkilä). Other factors that also have influence on the development of scoliosis are: character of gait (Gage), standing "at ease" manners (Karski 1997-2003), insufficient sport activity (Walczak, Urbanik), incorrect rehabilitation exercises (Malański), some illnesses like rickets (Gruca), laxity of joints.

MATERIAL

The research was based on the whole material of 1307 patients examined for spine problems over the period of 20 years. The basis for this paper is the material of 434 children with full clinical, radiological and photographic documentation. The parameters studied in these patients were: 1) gender, 2) detailed anamnesis also about other coexisting diseases, 3) time of first symptoms of scoliosis, 4) range of adduction of both hips in straight position of the joint, 5) type of scoliosis ("S" or "C" shaped – described in next chapters), 6) previous treatment, 7) outcome of "old" and "new" conservative treatment, 8) basic laboratory data, 9) social background.

Patients with *dorsum rotundum* or with typical *morbus Scheuermann* were excluded from examination in this paper.

Among 434 children (100%) those evaluated: 173 children (41%) were from etiopathological group I of scoliosis (described in the next chapter), 98 children (23%) were from etiopathological group II of scoliosis (described in the next chapter), 106 children (24%) were endangered with the so-called idiopathic scoliosis (mostly younger children with clinical symptoms of oncoming scoliosis), 6 children (1%) with congenital scoliosis, 50 children (11%) with normal axis of spine (suspected previously for scoliosis in other Units because of asymmetry in shoulders and other signs in the upper part of the trunk – the repeated examination in our Department did not confirm danger of scoliosis or the beginning of scoliosis).

Patients were aged from 3<sup>rd</sup> to 17<sup>th</sup> year of life. The largest group constituted children from 6<sup>th</sup> to 14<sup>th</sup> year of life (Fig. 1).

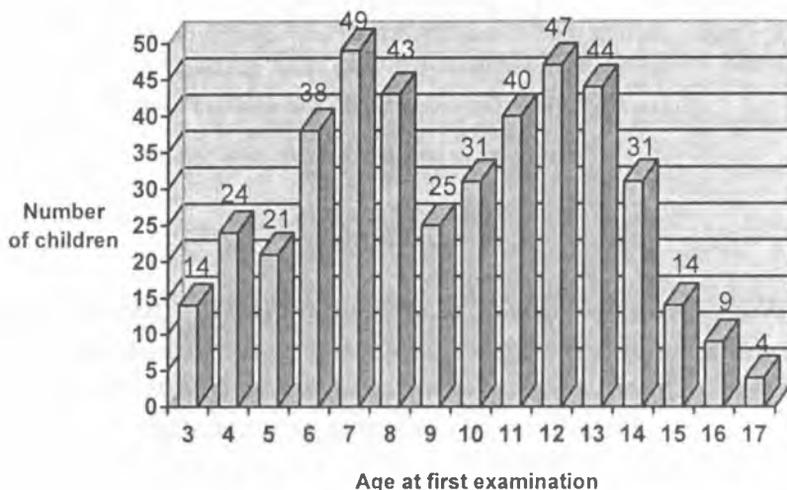


Fig. 1. Age of 434 children at first examination for scoliosis

In about 20% of patients with the so-called idiopathic scoliosis I saw radiological signs of *spina bifida occulta* without any clinical abnormalities and in about 3% – slight symptoms of minimal brain damage (MBD). Mothers of 2% of the examined children were previously treated conservatively or even operated on with scoliosis.

#### INFORMATION ABOUT THE “SYNDROME OF CONTRACTURES” OF NEWBORNS AND BABIES

A lot of early and late disorders and dysfunctions of skeletal system are connected with the “syndrome of contractures” at newborns and babies. At newborns the symptoms of “syndrome of contractures” are only slightly marked and they develop clearly, in the next months, in non-treated babies. The research of Mau (his original description – *siebener Kontrakturen Syndrom*) can explain many deformations of movement apparatus and is also the basis for my explanation of many symptoms of the so-called idiopathic scoliosis. This syndrome can develop in the last four months of gravidity period (Tarczyńska et al.). In 85% of cases we can observe: left-sided position of fetus in uterus and later a left-sided “syndrome of contractures” at some children (about 8% in the Clinic material – Tarczyńska et al.). The clinical symptoms of the “syndrome of contractures” according to Mau are: plagiocephaly, torticollis, infantile scoliosis (different than AIS), deformity of pelvis, deformity of feet, adductor contracture mostly at the left hip, abductor contracture of the right hip what can be clinically equal to *Haltungsschwäche* (English = endangered posture) of Mau (Fig. 2a, 2b). A lot of authors saw clinical and radiological changes in pelvis and hip regions confirming my biomechanical theory described in the next chapter (Tylman, Gardner, Burwell, Stokes, Saji et Leong). Other scientists saw through clinical observations the symptoms of “syndrome of contractures” at head and face-like plagiocephaly, asymmetry of temporal bone and torticollis in children with scoliosis (Dangerfield et al., Willner, Wynne-Davies, Green et Griffin, McMaster, Magoun). In all scoliotic patients on the front-lateral part of the right hip (intra-operative observations) the tissues contracted are: *tractus iliotalibialis*, *fascia lata*, fascias of *m. gluteus medius* and *minimus*, *m. sartorius*, *m. rectus*, capsules of right hip joint.



Fig. 2a, 2b. Oblique position of pelvis. Tilt of the right side. Two examples – children with left-sided “syndrome of contractures” (view from the front)

#### TWO ETIOPATHOLOGICAL GROUPS OF DEVELOPMENT OF SCOLIOSIS (I and II)

The abductor right hip contracture while walking and in the standing position “at ease” only on the right leg (because of the abduction contracture!) is the cause of development of both etiopathological groups of scoliosis (I and II). Depending on the range of adduction of both hips the children with developed idiopathic scoliosis (AIS) were divided into two etiopathological groups of spine deformity (Table 1).

Table 1. Value of adduction movement of both hips measured in straight position of the joint in group I and II of children with scoliosis and in healthy children. Classification of scoliosis depending on range of adduction of both hips. (S – sacral bone, L – lumbar spine, Th – thoracic spine)

Degree and classification of scoliosis	Range of adduction of the right hip in straight position of the joint	Range of adduction of the left hip in straight position of the joint
<b>Etiopathological group I of scoliosis</b>		
Scoliosis – double-“S” shaped. Early beginning – L 0°–10°–15°, Th 5°–10°–15°. Progressive	(-)5°–(-)10° it means real abduction contracture 5°–10°	adduction 30°–45°, even 50°
Scoliosis – double-“S” shaped. Early beginning – L 0°–10°–15°, Th 5°–10°–15°. Progressive	adduction 0°	adduction 30°–45°, even 50°
<b>Etiopathological group II of scoliosis</b>		
Scoliosis – “C” shaped. Visible later – L 10° or S+L 5°–10°, or L+Th 10°–15°. Non-progressive	adduction 10°–15°	adduction 30°–45°, even 50°
Scoliosis – “C” shaped. Visible later – L 10° or S+L 5°–10°, or L+Th 10°–15°. Non-progressive	adduction 15°–25°	adduction 30°–45°, even 50°
<b>Children with no danger of scoliosis</b>		
No scoliosis or minimal changes in posture	adduction 15°–30° or more	adduction 20°–35° or more



Fig. 3a, 3b. Two examples for etiopathological group I of scoliosis. Double -“S” shaped scoliosis. 2a. not treated before. 2b. treated before with wrong exercises (view from the back)

Etiopathological group I of scoliosis – 174 children (64%) aged from 3 to 16. Real abduction contracture of the right hip was 5–10 degree or 0 degree adduction and adduction of the left hip was 35–45, even 50 degree. Clinical findings at this group: the beginning of scoliosis at the age of 3–4 years – invisible in previous clinical examination, first rotation deformity with spine stiffness, even lordotic deformity in thoracic part, gibbus costalis on the right side of thorax. It means also the forming of sagittal deformity and later deformity in frontal plane (3-D). The range of scoliosis according to Cobb was from 5 to 10 degree at young, not treated children to 40–50 degree mostly in older children treated with wrong (old) rehabilitation exercises. The development of scoliosis is connected with asymmetry during gait and is the compensatory deformation as a result of “lack of full movement of the right hip”. The scoliosis is “S” shaped; lumbar (L) left convex and thoracic (Th) right convex appear at the same time (Fig. 3a, 3b).

The deformation mechanism is the compensatory twisting movement of pelvis and spine (Fig. 4). Such mechanism confirms also Prof. Geoffrey Burwell – citation: “causative twisting movement of the pelvis that provokes the rotation deformity of spine”. In our material we saw this mechanism at every patient from the group of development of scoliosis. In this group I the causative factor is the contracture and it must be combined with gait. So, the causative factor depends on the character of gait and range of asymmetry of movement of hips and anatomy of pelvis and spine and sometimes on the presence of coexisting illnesses and previous treatment. Almost every child in group I of development of scoliosis has flexion contractures of both hips but bigger at the right hip. This flexion contracture diminishes the stability in ilio-sacral junction and in sacro-lumbar part of spine and makes easier the development of scoliosis (Karski 2003). This whole “pathomechanical unit”, that means “the range of contracture and the character of gait”, informs about the time of beginning of scoliosis and its history. The children from etiopathological group I of scoliosis always show “the progressive character of deformity”. In these children, at the age of 3–4 years, a prophylactic management should be introduced because the treatment in this group is difficult.

#### Mednica i staw biodrowy

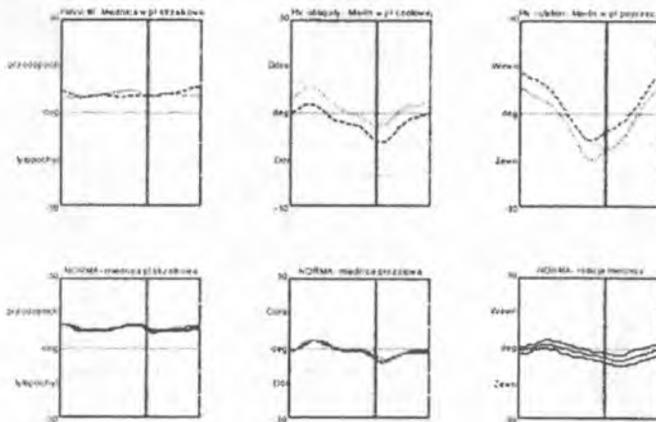


Fig. 4. Computer created gait analysis (VICON460, EMG system, Motion Lab, Kistler platform). Etiopathological group I of scoliosis. Upper row – scoliotic child, lower row – healthy child. Vertically: from the left: A. no difference in movement of pelvis in the sagittal plane between scoliotic and healthy child, B. small difference in movement of pelvis in the horizontal plane between scoliotic and healthy child, C. big difference in movement of pelvis in the frontal plane caused by compensatory rotation movement of pelvis between scoliotic and healthy child

Etiopathological group II of scoliosis – 98 children (36%) aged in majority over 10 years of life. Adduction of the right hip in this group was 10–15 even 25 degrees but at the same time adduction of the left hip was 35–45–50 degrees. Clinical findings: the scoliosis is “C” shaped; lumbar, sacro-lumbar or lumbo-thoracic left convex scoliosis (Fig. 5a, 5b).

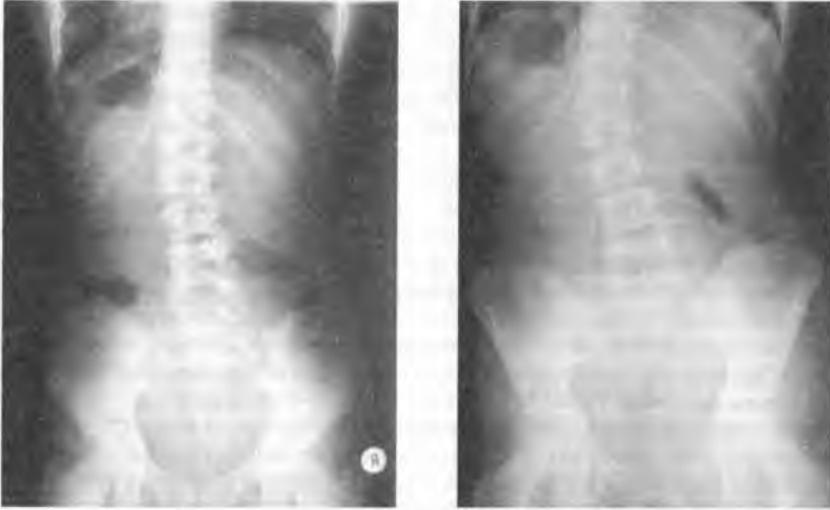


Fig. 5a, 5b. Two examples for etiopathological group II of scoliosis. “C”-shaped scoliosis (view from the back)

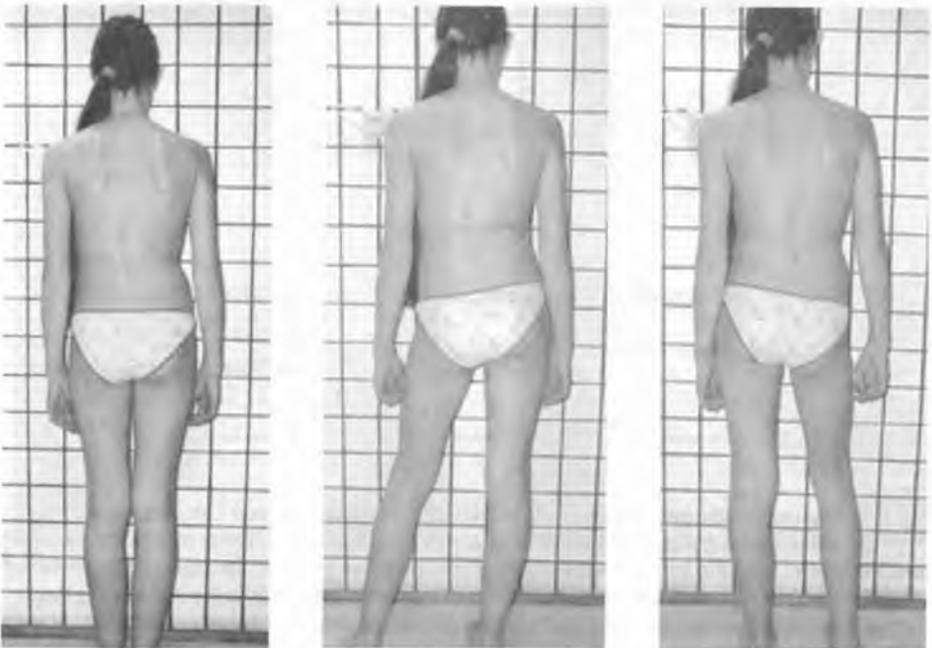


Fig. 6a, 6b, 6c. Ways of standing at ease: on both legs, on the right leg, on the left leg. Permanent stay position on the right leg causes development of scoliosis (photo in the middle)

The development of scoliosis is connected with the habit of standing “at ease” only on the right leg since the first years of life (Fig. 6a, 6b, 6c). The range of scoliosis in this group according to Cobb was from 5–10–15 degree and these were mostly children over 10 years of life. Only children treated before with wrong rehabilitation exercises the range of curves was 20–30 or more degree. Possible occasions for long time spent standing for the children from group II of scoliosis were: visits in museums, standing position in choirs, in churches and in schools, teenage rendez-vous. Sometimes we could see compensatory slight right convex thoracic scoliosis with slight gibbus costalis. We did not observe progression in this group or it was slight and these are cases from the border of group I and II of scoliosis. The treatment in etiopathological group II is easy, these children need only special new rehabilitation exercises and active sport exercises and then scoliosis can be stopped effectively.



Fig. 7. Examination of the range of adduction of the left and right hip in the straight position of the joint. Decisive for etiopathological group I and II of scoliosis

#### NEW EXAMINATION TECHNIQUES IMPORTANT FOR PROPHYLACTICS

The discovery of biomechanical etiology of the so-called idiopathic scoliosis enables us the introduction of effective causative treatment and what is more important gives us possibility of introduction of prophylactics. Prophylactics requires new examination techniques, such as:

A. Checking of range of adduction of the left and right hip in the straight position of the joint. The big difference in adduction range – small adduction of the right hip and big adduction of the left hip – is the threat for development of early scoliosis (Fig. 7). Depending on the value of adduction movements of both hips all children were divided into two etiopathological groups of scoliosis – group I and II (see points above and below–C).

B. The functional test taken during spine extension from flexion. This test is beneficial only at small children – 4–6 years old. At this time any deformity of spine is yet invisible clinically but the extension of spine from flexion is accompanied by the side movement. This is a symptom of the beginning of left-sided functional lumbar scoliosis.

C. The evaluation of the spinosus processes and the shape of the back in flexion. If during flexion the spine takes a full, symmetric and smooth shape “as a bow” it is normal and the child is not endangered with scoliosis. In other cases when the spine begins to be “stiff”, by observing the spine in flexion (*in planum sagittale*), we can distinguish three stages in the development of scoliosis in etiopathological group I: a) disappearing of the spinosus processes informs about the danger of scoliosis or about first stage of deformity (Tomaszewski et Popp, Karski), b) flat back (*hipolordosis lumbalis*, *hipokyphosis thoracalis*) – second stage of spine deformity (Tomaszewski et Popp, Vlach, Roaf, Perdiolle, Karski), c) the

lordotic deformity on smaller (Th9–Th12) or bigger (Th6–Th12) part of thoracic spine – third stage of deformity. (Adams, Meyer, Vlach, Karski, Palacios-Carvajal).

D. The flexion-rotation test. This examination differs from the typical examination conducted by Adams and Meyer (year 1861 – “bending test for scoliosis”). The new test is performed by bending not straight but towards the left and the right foot as a flexion-rotation movement in standing position on legs apart. While bending towards the left and the right foot the levels of the lumbar and thoracic regions should be symmetrical. The asymmetry of levels between left and right lumbar regions informs about primary “functional” scoliosis for example while bending to the right leg the left lumbar region is higher than the right one.

E. The examinations should also check the patient’s habit for standing in relaxed position – standing “at ease” manners. All the children with the scoliosis have the habit to stand “at ease” on their right leg only. The children who stay always on the left leg or with the legs crossed have no scoliosis or the scoliosis is small and without progression.

F. The investigation for the pelvis position. A lowering of the left side of the pelvis, sometimes with changes of its position in frontal plane, co-exists with “functional shortening” of the left leg at many children with scoliosis – “tilt of the left side of pelvis” (Gardner, Malawski, Tyłman, Rapała).

G. Difference in body built. Athletic – small danger or no danger for scoliosis. Picnic (“fat child”) and asthenic (often with laxity of joints) – endangered with scoliosis.

H. The child’s physical activity should also be evaluated as well as his or her willingness to practice sport. Active sport, at schools and especially Karate, Kung-fu, Taekwon do, Judo, Joga protects against scoliosis.

I. The X-ray pictures of spine should include sacro-lumbar and pelvic region and should be taken in stand position with symmetric loading of both legs. On such X-rays picture in a patient with idiopathic scoliosis we can observe apart from typical description of scoliosis: asymmetries of the pelvic shape, small shifting in pubic symphysis, obliquity of os sacrum, wedge deformity of the body of L5, subluxation L4 – L5, shifting of L5 to the left.

#### TYPE OF NEW REHABILITATION EXERCISES. RESULTS OF TREATMENT

Profitable exercises widely introduced in our Department since 1990 are:

- Exercises to remove the contractures of the right hip – stretching exercises, post isometric stretching exercises in prone position or side position – easy to elaborate for every orthopaedic surgeon. Additionally thermotherapy and hand massage.

- Flexion-extension asymmetric exercises for spine – flexion for 5–10 seconds for stretching of muscles, capsules and ligaments and other para-vertebral soft tissues and than extension – that means active exercises for muscles.

- Exercises to remove the contractures of the concave side of scoliosis (lumbar and thoracic) – bending exercises to the left foot for treatment of lumbar scoliosis and bending to the right foot for treatment of thoracic scoliosis.

- Active sport practice in schools and in “sport clubs”– stretching exercises like Karate, Taekwon do, Aikido, Judo, Kung-fu, etc.

- Special kinds of sleep positions. Foetus position on one side – with maximally flexed hips and spine – with knees at the chin – is a protective position against scoliosis.

- Stand “at ease” position only on the left leg. This requires good cooperation with parents – because the stand “at ease” position on the right leg in many children is very difficult to change even over half or one year.

Results of new treatment are presented in the tables (Tab. 2, 3).

Table 2. Outcome of new conservative treatment through new rehabilitation exercises in 174 patients from etiopathological group I. Time of treatment 2–5 years

Diagnosis		Number of patients	Percentage
Etiopathological group I		174	100%
Small curves. Not treated with extension exercises before	Normal axis of spine after new treatment	31	18%
Moderate scoliosis. Not treated before or treated with extension exercises for short time (3–6 months)	Diminishing of scoliosis after new treatment	104	60%
Moderate scoliosis. Treated before with extension exercises (6 or more months)	No progression after new treatment	16	9%
Severe scoliosis. Treated before with extension exercises (1–2–3 years)	Enlargement of scoliosis (no proper result after new treatment)	23	13%

Table 3. Outcome of new conservative treatment through new rehabilitation exercises at 98 patients from etiopathological group II. Time of treatment 2–5 years

Diagnosis		Number of patients	Percentage
Etiopathological group II		98	100%
Small curves. Not treated with extension exercises before	Normal axis of spine after new treatment	38	39%
Moderate scoliosis. Not treated before or treated with extension exercises for short time (3–6 months)	Diminishing of scoliosis after new treatment	31	32%
Moderate scoliosis. Treated before with extension exercises (6 or more months)	No progression after new treatment	26	26%
Severe scoliosis. Treated before with extension exercises (1–2–3 years)	Enlargement of scoliosis (no proper result after new treatment)	3	3%

## DISCUSSION

Over many years idiopathic scoliosis remained a secret deformity of spine. Many scientists in many countries searched for different explanations of etiology of idiopathic scoliosis like congenital, local anatomical disorders, hormonal (prostaglandin, melatonin), calmodulin, level of calcium, phosphorus, dense bodies, actine and myosin in muscles, nervous system, even labyrinths and plenty of other hypothetic influences (described in detail by Tylman, Skogland et al., Lowe et al., Zarzycki et al., Žuk et al.). Observations from the years 1981–2002 show that the cause of development of idiopathic scoliosis is strictly biomechanical. I have presented the concept of biomechanical etiology of scoliosis for the first time in Hungary in 1995, over the years at numerous Congresses and lately during IRSSD Meeting in 2002 and SICOT Congress in 2003. In the year 1997 I discovered that all children with scoliosis have the habit to stand "at ease" only on their right leg (confirmed in orthopaedic Centers in Poland, and also in London, Copenhagen, Bratislava, Vienna, Prague, etc.). In 2001 the author described two etiopathological groups of scoliosis important for treatment and prophylactics. The biomechanical explanation of the development of AIS is also confirmed by excellent observations of Professor Geoffrey Burwell from

Nottingham who described “causative twisting movement of pelvis as the reason for occurrence of the rotation deformity of spine” – in my description it is crucial in group I of the development of scoliosis. The asymmetry in movement between the right and left hip and asymmetry in movement of the right and left side of pelvis during gait disturb spine growth and function since the first moment a child starts walking. AIS in group I develops years before the deformity is clearly visible. This asymmetry of movement of hips should be discovered during the first screening examination for scoliosis. In children with developed AIS, by close examination of the whole patient and not only scoliosis, many researchers saw such distant deformities like: plagiocephaly, torticollis, asymmetry of temporal bone, asymmetry of the whole body described in “syndrome of contractures” (Dangerfield, Sevastik, Green and Griffin, McMaster, Howorth). These precise observations confirm the connection between “syndrome of contractures” and AIS. Biomechanical theory of etiology of the so-called idiopathic scoliosis, account for among others: gender of patients – mostly girls (“syndrome of contractures” is mostly in girls), two etiopathological groups of scoliosis group I – double - “S” shaped, group II – “C” shaped; geography of scoliosis – lumbar left convex, thoracic right convex; gibbus costalis on the right side (connected with left-sided “syndrome of contractures”) and enlargement of scoliosis in the acceleration period of child’s growth. Bones grow up, contracture of the right hip is “fixed”, scoliosis is becoming larger. Big progression of scoliosis was noticed especially in children with big difference of growth between trunk and lower limbs, when lower limbs grew faster than the trunk.

In the material from IRSSD Athens 2002 the author had 35% patients from group I and 65% patients from etiopathological group II of scoliosis. The present analysis of the material shows that group I constitutes 64%, and group II – 36%. The reason is that the children taken for examination for the present material were mostly treated previously with extension “wrong” exercises. So, most of these children had severe, iatrogenic forms of spine deformity – mostly double - “S” shaped scoliosis. Wrong extension exercises lead mostly to the group I of scoliosis even in children who did not show big difference in adduction movement between the right and left hip, which is typical of group I. This proves once more how harmful are wrong extension exercises and how important are proper exercises for treatment of initial forms of the so-called idiopathic scoliosis.

To summarize the discussion and to support the biomechanical etiology of AIS I can say that I have never seen AIS without abduction contracture of the right hip, sometimes plus flexion and plus out rotation. However, I saw children with contracture and with no scoliosis. Why? – because they had the habits of standing at ease on the left leg, to sleep in fetus position, to practice active sport, to walk “toes-in”. These children did not develop scoliosis since there was no biomechanical influence during walking or standing “at ease” on the right leg despite the contracture. In orthopaedic literature a term “compensatory curve” exists. I would like to explain that the compensatory curve develops sometimes only in etiopathological group II – as compensatory only thoracic right convex scoliosis. We also have to remember that there is a group of children from the border between group I and II. All scolioses start from the bottom of pelvis and sacro-lumbar spine and go up.

## CONCLUSIONS

1. The so-called idiopathic scoliosis is connected with the right hip abduction contracture often plus flexion and plus out-rotation contracture or with the big difference in adduction movements of both hips. The real contracture of the right hip causes asymmetry during walking and provokes compensatory changes in pelvis and spine – rotation deformity, stiffness of spine, gibbus costalis and spine curves.

2. There are two etiopathological groups of development of the so-called idiopathic scoliosis. The first group (I) – double - “S” shaped scoliosis – is connected with the asymmetry while walking and the habit of standing “at ease” on the right leg. The lumbar and thoracic scoliosis appear at the same time sometimes even at the age 4–6 years

and they are connected with the rotation deformity which causes "stiffness" of spine (disappearing of *processi spinosi* Th6–Th12 – Tomaszewski et Popp, Kar-ski; flat back (Palacios-Carvajal, Vlach et al., Kar-ski); even lordotic deformity in the thoracic part of spine (Adams, Meyer); and flattening of lumbar spine (Vlach et al.). This type of scoliosis is progressive. The second group (II) – "C"-shaped scoliosis – is connected only with the habit of permanent stand position on the right leg. In this group the first is lumbar or sacro-lumbar or lumbo-thoracic left convex scoliosis. The right convex thoracic scoliosis can occur only sometimes, in children from the border of group I and II. The type II of scoliosis is non-progressive.

3. The abduction contracture of the right hip is connected with the "syndrome of contractures" of newborns and babies described most precisely by Professor Hans Mau from Tübingen and also by many authors (English, German, American, Hungarian, Swedish, Slovak, Czech, Polish, Finnish). The first radiological information about this syndrome can be observed as oblique position of pelvis on x-ray picture made in the baby-period for examination of hip dysplasia.

4. The X-ray picture for scoliotic patients has to be made with special requirements: • spine with whole pelvis, • standing in straight position – knee straight, feet together. If a child for the X-ray picture stands on the right leg – the scoliosis is bigger, if a child stands on the left leg the scoliosis is smaller!

5. Even if there is the abduction contracture of the right hip (real or "functional") the following can prevent scoliosis: permanent stand position "at ease" on the left leg, permanent sleeping in foetus position since first years of life, "toes-in gait" (together with above noticed factors), practising sports very actively (especially stretching exercises – like Karate, Judo, Taekwon do, Aikido, Kung-fu, ballet, dancing, etc.). Sportsmen and sportswomen do not have scoliosis!

6. We change the rehabilitation program for scoliotic patients in our country. We eliminate the commonly applied earlier wrong (!), extension exercises. We have introduced the new stretching-flexion asymmetric exercises and a special sports program for the children endangered with scoliosis or with already beginning scoliosis.

7. In our Department we prepared the check-out tests for prophylactics of scoliosis. We elaborated new clinical test for discovery of danger of scoliosis or oncoming scoliosis. The screening program comprises "the new examination techniques important for prophylactics" (chapter 6).

8. "The new therapy" stops the development of scoliosis. The small curves (lumbar 5–10–15 degrees and thoracic 5–10 degrees) can be stopped and in some children cured. The bigger curves (lumbar 15–20 degrees and thoracic 15–20 degrees) can be stopped or even diminished. The double-"S" shaped scoliosis requires long and difficult treatment, so only early prophylactics could be effective at these children. The therapy of "C"-shaped scoliosis is easy but these children also require prophylactic programs.

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### SUMMARY

The paper gives basic information on biomechanical explanation of etiology of the so-called idiopathic scoliosis. In all children with adolescent idiopathic scoliosis (AIS) I found a real abduction contracture of the right hip often connected with the flexion and the out-rotation contracture or only limited range of adduction of the right hip in comparison with the left hip. I state that the children with the real abduction contracture of the right hip constitute the first (I) etiopathological group of the development of scoliosis. It is double -"S" shaped scoliosis. The patients with only a difference in adduction of both hips constitute the second (II) etiopathological group of the development of scoliosis. It is "C"-shaped lumbar or sacro-lumbar or lumbo-thoracic left convex scoliosis. The right hip abduction contracture, structural or "functional", is connected with the "syndrome of contractures", which can be already noticed in newborns and babies. New screening and new exercises effectively prevent scoliosis enabling neo-prophylaxis.

Etiologia skolioz tzw. idiopatycznych. Biomechaniczne wyjaśnienie dwu grup etiopatogenetycznych deformacji kręgosłupa. Skuteczność nowego leczenia bezoperacyjnego. Możliwość przyczynowej profilaktyki

Praca podaje podstawowe informacje dotyczące biomechanicznej teorii etiologii skolioz tzw. idiopatycznych. U wszystkich dzieci ze skoliozami idiopatycznymi w badaniu klinicznym stwierdza się rzeczywisty przykurcz odwiedzeniowy prawego stawu biodrowego, często połączony z przykurczem w zgięciu i rotacji zewnętrznej, lub też stwierdza się różnicę w zakresie przywiedzenia pomiędzy biodrem prawym i lewym. Dzieci z rzeczywistym przykurczem odwiedzeniowym prawego stawu biodrowego stanowią I grupę etiopatogenetyczną rozwoju skolioz. Jest to skolioza typu „S” – lędźwiowa lewostronna, piersiowa prawostronna z garbem żebrowym po stronie prawej. Pacjenci jedynie z różnicą przywiedzenia obu bioder stanowią II grupę etiopatogenetyczną rozwoju skolioz. Jest to skolioza typu „C” – lewostronna lędźwiowa, krzyżowo-lędźwiowa lub lędźwiowo-piersiowa. Przykurcz odwiedzeniowy prawego biodra rzeczywisty (strukturalny) lub czynnościowy jest związany z „zespołem przykurczów”, który może być już rozpoznany u noworodków i niemowląt. Nowe skringingi i nowe ćwiczenia skutecznie przeciwdziałają skoliozom i umożliwiają neoprofilaktykę.