

The So-Called Idiopathic Scoliosis Etiology - New Classification: Radiological Changes in Pelvis and in Vertebral Spine

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ABSTRACT

Radiologists very frequently see scoliosis cases. It is important to describe the biomechanical etiology of the so-called idiopathic scoliosis [Adolescent Idiopathic Scoliosis (AIS)], early and advanced changes in radiological examination of the spine.

Keywords: So-called idiopathic scoliosis, New classification, Radiological symptoms

SPINE – SCOLIOSIS [1-22]

The etiology of AIS was described in Lublin in years 1995-2007. Discovered causes inform about biomechanical influences in the development of the spine and inform about the stages of deformity.

In X-ray we observe four stages:

1. Rotation changes in spine with its normal axis or beginnings of curves,
2. Development of curves and stages of this deformity,
3. Changes in the shape and the position of pelvis and sacral bone
4. Development of degenerative changes in the inter-vertebral joints.

Classification and comments: Causal influences and properties of scoliosis in points

There are three groups and four types of spine deformity (Figures 1 and 2):

1. “S” scoliosis in 1st group, “C” and “S” scoliosis in 2nd group, “I” scoliosis in 3rd group.
2. Till now in medical literature it has been mostly spoken about the “S” scoliosis in 1st group.
3. All types of scoliosis start to develop at 2-3 years of child’s life.

4. The development of scoliosis in every group and type is connected with biomechanical influences - “walking” and “standing ‘at ease’ on the right leg”.
5. In gait – there is an asymmetry of movements between the left-right side of various parts of child’s body, in pelvis and in the spine. In standing – there is an asymmetry of the time of standing ‘at ease’ – left versus right leg – standing on the right leg longer or only (!).
6. At the beginning of the oncoming of spine deformity we observe clinically and radiologically a rotation deformity of the spine. Explanation: the limited movement of right hip, during gait, as compensatory movement is transmitted to the pelvis and spine and makes “the rotation – distortions in inter-vertebral joints” and as result “the stiffness”.
7. In older children we observe clinically and radiologically curve.

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8. In youth and adults we observe an asymmetry in the position of pelvis and sacrum bone and next degenerative changes.

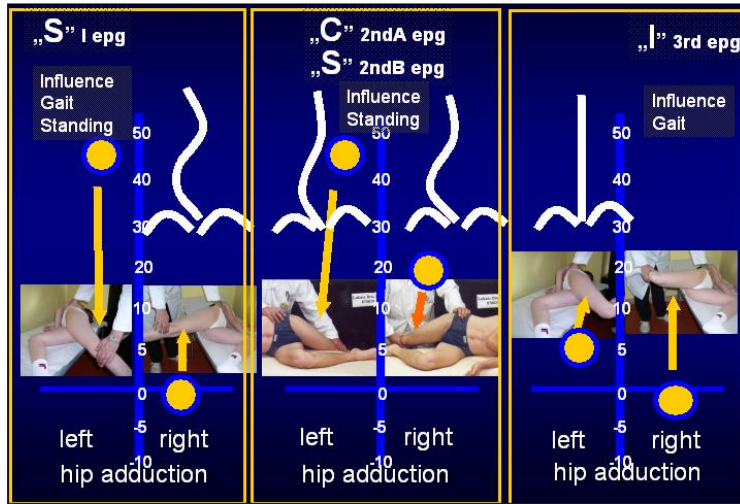


Figure 1. Range of adduction of hips and type of scoliosis.



Figure 2. Three group and four types of scoliosis.

EXPLANATION OF ALL ASYMMETRIES

In all children with scoliosis there is an asymmetry of movement of hips. These asymmetries are a part of the clinical symptoms of the “Syndrome of Contractures and Deformities” according to Prof. Hans Mau (originally in German it is “Siebener syndrome” [1-4,15-22]. All these asymmetries are a primary cause in the etiology of scoliosis. In all children with scoliosis there is a limited movement of the right hip – especially adduction in strait positing of the joint. In some patients with scoliosis there is also limited internal rotation and extension of the right hip. Because of this the right hip is more stable and all children with scoliosis have the habit to stand ‘at ease’ only on the right leg. Next, this “limited movement” has influence as “compensatory movement” to pelvis and spine, what was mentioned above.

Materials

In the years 1985-2018 in observations and in treatment there were - 2500 patients mostly aged 5 to 18. Another group of patients was older (60-80 years), coming with the problem of spine pain. Older people mostly had degenerative spine deformities, and in the new classification there were cases from the 2nd group of scoliosis. According to our observations 80 % of older patients have “painful changes” in the lumbar spine, 20% in lumbar and thoracic spine.

Classification important for radiology specialists. Explanation of the development of scoliosis [5-14]

Clinically, in all scoliosis patients the movement of hips is asymmetrical. In the first place, the adduction in strait position of joints is asymmetrical. The right hip adduction, internal rotation and in some cases also extension are

limited. There are three groups and four types of these hip asymmetries and the three groups and four types of scoliosis are connected with these asymmetries:

1. Scoliosis "S" 1st etiopathological group (epg) (**Figure 3**) - double curve. Right hip adduction is 0 or (-) 5 (-) 10 degrees. Left hip adduction is 30 to 50 degrees. Stiff spine (3D). Rip hump on the right side of thorax. Connection with gait and standing.

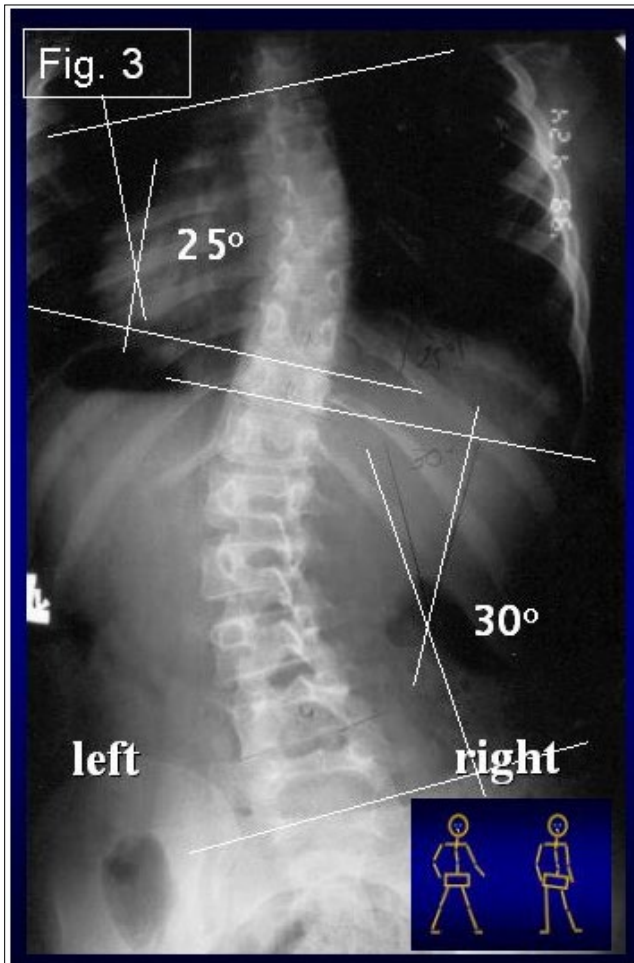


Figure 3. Scoliosis "S" 1st epg. Two curves. Lumbar left convex curve, thoracic right convex curve. Rip hump. Spine stiff. Causative influence: "gait" and permanent "standing 'at ease' on the right leg". Adduction in straight position of joints: right hip maximal limited adduction (contracture), left hip full adduction (**Figures 1 and 2**).

2. "At ease" on the right leg. There is a large asymmetry of movements of hips. The absent/very limited movement of the right hip is transmitted to the pelvis and the spine. Next, a permanent rotation movement in inter-vertebral joints in a form of distortion appears, in every step – the result is stiffness of the spine. Because of the asymmetrical standing, longer on the right leg – the

loading on the right leg lead to the development of curves.

- Scoliosis "C" 2nd/A epg (**Figure 4**) – one curve – lumbar left convex. Right hip adduction is 15 to 30 degrees. Left hip adduction is 30 to 50 degrees. Spine flexible (1D or 2D); Connection only with standing "at ease" on the right leg.

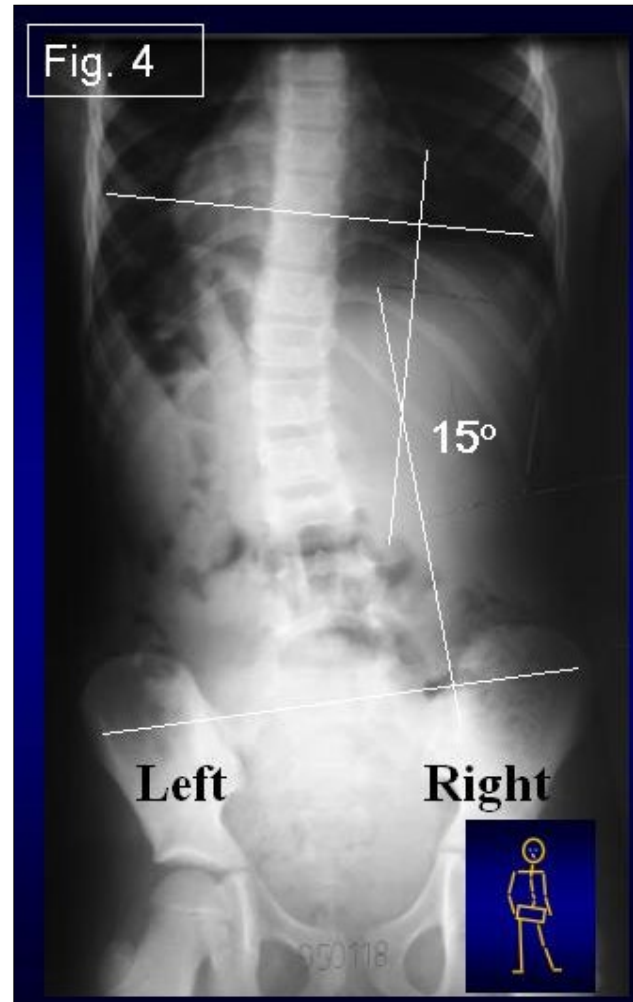


Figure 4. Scoliosis "C" 2nd/A epg. One curve. Left convex curve in lumbar part of spine. Spine flexible. Causative influence: permanent "standing 'at ease' on the right leg". Adduction in straight position of joints: right hip limited adduction, left hip full adduction.

- Scoliosis "S" 2nd/B epg (**Figure 5**) – two curves (2D or 3D); Right hip adduction is 15 to 30 degrees. Left hip adduction is 30 to 50 degrees. Connection with standing 'at ease' on right leg and additionally connected with the laxity of joints and/or harmful previous exercises. In both types of scoliosis the spine is flexible.

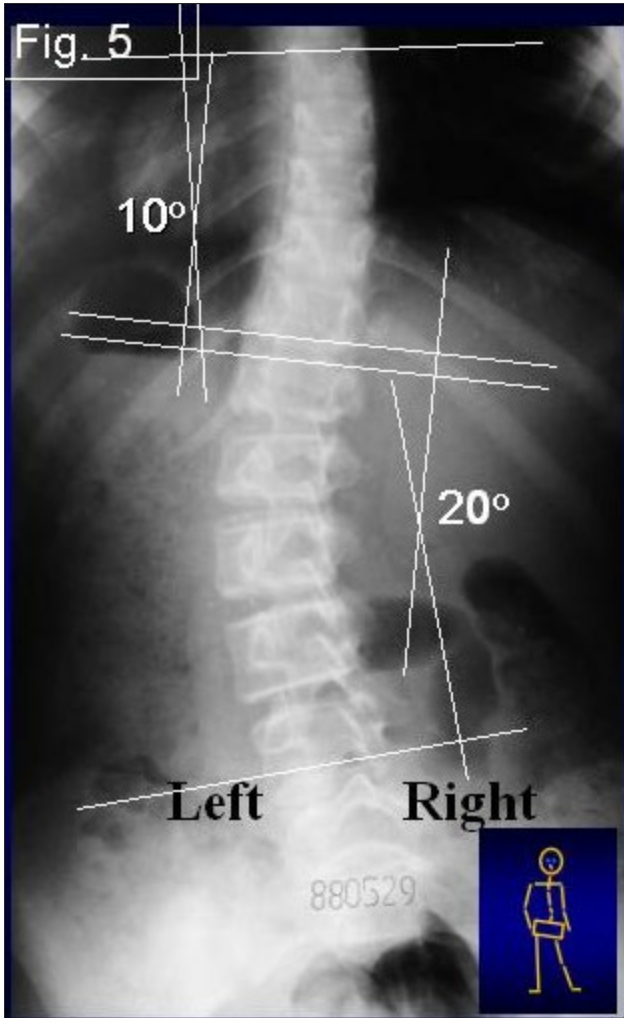


Figure 5. Scoliosis “S” 2nd/B epg. Two curves - left convex in lumbar part, right convex in thoracic part of spine. No or slight gibbous. Spine flexible. Causative influence: permanent “standing ‘at ease’ on the right leg” and laxity of joints. Model of hips movements: right hip limited adduction, left hip full adduction.

In the “asymmetrical standing” the loading on the right leg is permanent, lasts longer, and because of this it leads to the development of curves. In scoliosis 2nd epg group comes to “C” deformity in lumbar spine. The clinical symptom in all cases is the lumbar left convex curve.

In 2nd/B epg additionally it comes to the development of thoracic right convex curve.

3. Scoliosis “I” 3rd epg (**Figure 6**). Deformity is in a form of stiff spine (2D or 3D). No curves or small ones. The cause is gait only. Right hip adduction is 0 or (-) 5 (-) 10 degrees. Left hip adduction is 0 to 15 or to 20 degrees. Such “spine deformity” till 2004 has never been included to the “scoliosis deformity”.



Figure 6. Scoliosis “I” 3rd epg. No curves or small. Spine stiff. No included to scoliosis group till 2004. Causative influence: “gait”. Adduction in straight position of joints: right hip maximal limited adduction (contracture). Left hip limited adduction. Case (C) – lordoscoliosis as a result of five years incorrect exercises.

This type of scoliosis is connected only with gait. The absented movement of the right hips is transmitted to the pelvis and to the spine as a compensatory movement. In every step, rotation movement in inter-vertebral joints appears in the form of distortion – the result is stiffness of the spine. In this group of scoliosis the small adduction of both hips give the symmetrical time of standing. There is no input for the development of curves.

RADIOLOGICAL CHANGES IN VARIOUS TYPES OF SCOLIOSIS AND IN VARIOUS AGES OF PATIENTS

Scoliosis “S” in 1st type (**Figure 3**). In X-ray examination of young people, the rotation deformity of the spine comes first. The processi spinosi are twisted to the side – in lumbar spine to the right side, in thoracic part – to the left side, and this occurs deep under the skin. Clinically the spine is stiff.

Its position, as described above, is deep under the skin especially in segment Th 6 – Th 12.

In older persons – in X-ray examination in the lumbar part there are degenerative changes with osteophytes.

Scoliosis “C” in 2nd/A and “S” in 2nd/B (**Figures 4 and 5**) type of deformity in children, there is only a curve in lumbar part and in thoracic part (in “S” scoliosis) to be observed.

In adults, degenerative changes appear. In this group of people, the progression of deformity is connected only with the permanent standing ‘at ease’ on the right leg (!).

Scoliosis “I” in 3rd type of spine deformity (**Figure 6**). Clinical symptoms in this type of pathology are only stiffness of spine. In X-ray the curves are minimal or absent. Only rotation deformity is present as disappearing of the processi spinosi. In lumbar part they are deep on the right side, in thoracic part there are deep on the left side.

In all types of scoliosis – The X ray examinations should be taken with the pelvis. Technical information: to take X-ray pictures, the patient should be standing symmetrically, on both legs. Remember – standing ‘at ease’ on the right leg shows bigger curves, standing ‘at ease’ on the left leg shows smaller curves (**Figures 7a-7c**). In older patients (the time is important for the development of changes) the radiologist should observe the changes in the position of pelvis – very often it is an oblique position. The “inner light of pelvis” is asymmetrical. We observe an oblique position of the sacral bone very often. With the time develop the degenerative changes in the spine (**Figure 8**). It is connected with the “permanent standing over years on the right leg”.



Figure 7. The child with “S” 2nd epg scoliosis. Importance of manner of standing “at ease” during X-ray examination. Standing on both legs (**Figure 7a**) – neutral, X-ray objective; Standing on the left leg (**Figure 7b**) – beneficial, X-ray smaller curves. Standing on the right leg (**Figure 7c**), X-ray bigger curves.



Figure 8. Degenerative scoliosis. Primary scoliosis “S” 2nd/B type. Permanent standing on the right leg is the cause of enlarged curves and degenerative changes in the spine. On X-ray is to see: left convex sacral – lumbar curve and right convex lumbar – thoracic curve with shifting of vertebral bodies and its deformations. “Line” of “processi spinosi” inform about rotation deformity. Asymmetrical shape of the “inside view” of pelvis.

THERAPY AND PROPHYLAXIS OF SCOLIOSIS

We present the rules of treatment in points:

1. Every doctor should inform patients about the dangerous of the “standing “at ease” on the right leg”. Permanent standing on the right leg over years is the “first cause of the pain of the spine” for many patients in many countries.
2. In problem of back pain – the patients should be informed about the proper sleeping position. The best and relaxing one is the “embryo position”.
3. Patients with “spine problems” should be directed to rehabilitation centers and not undergoing “surgery”. In the therapy, a proper exercises are: kinesiotherapy exercises lying down on the side, or on back - never lying “on stomach” and various kinds of active movement. Important is the “extension/pulling”

treatment for lumbar spine – the patient is lying on their back and hanging “on the legs with the hips and knees flexed to 90 degrees. Other proper therapies are: massage, diadynamic, laser and other physiotherapy methods.

4. “Stretching exercises” are especially profitable for hips, knees and spine. For example exercises typical for yoga or other similar. Here we inform – muscle strengthening exercises are totally wrong, they are the cause of “iatrogenic deformity and illness”.

DISCUSSION

The etiology of the so-called idiopathic scoliosis was described in years 1995-2007. In children with the so-called idiopathic scoliosis the problem is cosmetic and functional. In older people – scoliosis cause pain, especially in the lumbar part of the spine. First of all, “pain syndromes” should be treat by physiotherapy and not by surgery (!). As a reason for diagnosis, many doctors mention the “prolapsed nucleus pulpous” and suggest a surgery. Such a diagnosis is not correct and the proposed therapy is not proper or even totally wrong.

CONCLUSION

1. The etiology of the so-called idiopathic scoliosis is strictly biomechanical. There are three groups and four types of the spine deformity: “S” scoliosis in 1st type, “C” and “S” scoliosis in 2nd A and B type, “I” scoliosis in 3rd type of scoliosis.
2. The development of scoliosis and the type of spine deformity is connected with pathological “model of hip movements” and function – “standing ‘at ease’ on the right leg” and “gait”.
3. The restricted range of movement in the right hip is connected with the “Syndrome of Contractures and Deformities” according to Prof. Hans Mau.
4. The causes of back pain syndromes in adult patients are:
 - Hyperlordosis in the lumbar spine,
 - Degenerative left convex lumbar scoliosis - “C” and “S” scoliosis in II/A/B epg,
 - Stiffness of spine - “I” scoliosis in III epg,
 - Spondylolisthesis,
 - Other anomalies of anatomy of spine.
5. In X-ray we observe – rotation deformity, curves, changes in the anatomy of lumbar and thoracic parts of spine. Advanced changes are connected with age. Degenerated changes occur in older patients mostly over the age of 40.
6. The proper therapy of “scoliosis” in children is only – a/ standing ‘at ease’ on the left leg and b/ “stretching

exercises” and never “strengthening exercises”. Additionally – c/ physiotherapy and especially massage.

7. Surgery is reserved only for cases with “long lasting pain syndromes” and paresis of the foot cases.

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