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Sosort Guidelines for Scoliosis

19th August 2024
10pm KSA Egy - 11pm UAE

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- Certified ISST (schroth method) 2022
- Certified FITS (schroth method) 2023
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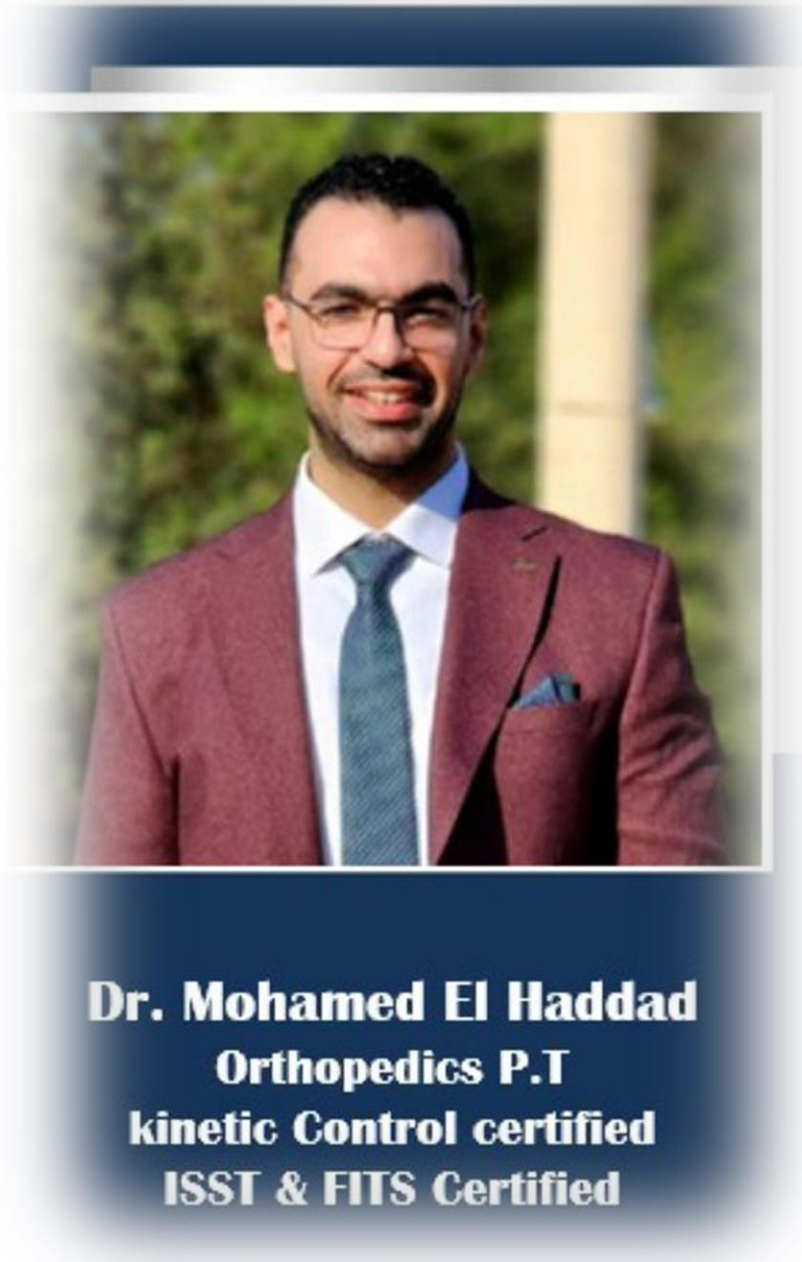


Scoliosis SOSORT Guidelines

Mohamed elhadad

P.T , ISST , FITS , KCMT

Questions

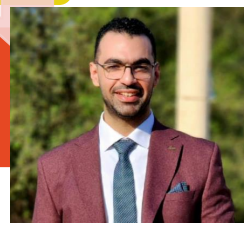
How should a patient be assessed?

Which conservative treatment should be provided, and how?

How and when should bracing be applied?

How and when should exercises be used?

ANSWER : SOSORT Guidelines



SOSORT

- The International Scientific Society on Scoliosis Orthopaedic and Rehabilitation Treatment produce its first guidelines in 2005 and renewed them in 2011

  their role is to produce the guidelines with the new scientific evidence to assure faster knowledge transfer into clinical practice of conservative treatment for idiopathic scoliosis (CTIS)

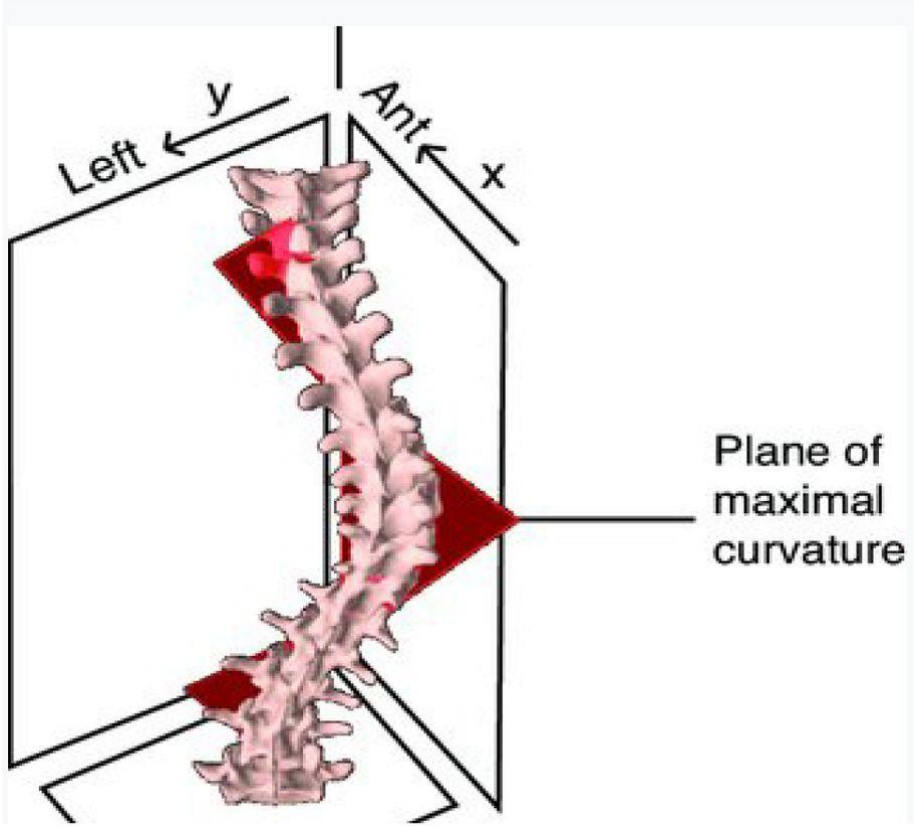
- Multiple literature reviews reviewing the evidence on CTIS (assessment, bracing, physiotherapy, physiotherapeutic scoliosis-specific exercises (PSSE) and other CTIS

Scoliosis

- Scoliosis is a general term comprising a heterogeneous group of conditions consisting in changes in the shape and position of the spine, thorax and trunk
- Galen who defined the first “scoliosis” (sKolios, which means crooked or curved) by meaning an abnormal lateral spinal curvature
- “Structural scoliosis”, or just scoliosis, must be differentiated from “functional scoliosis” that is a spinal curvature secondary to known extra spinal causes
- The term idiopathic scoliosis was introduced by Kleinberg , and it is applied to all patients in which it is not possible to find a specific disease causing the deformity; in fact, it occurs in apparently healthy children and can progress in relation to multiple factors during any rapid period of growth

idiopathic scoliosis

- unknown origin and is probably due to several causes
- Idiopathic Scoliosis has been described as a torsional deformity of the spine, with several torsional regions joined by a junctional zone, every region including a variable number of morphologically lordotic vertebrae translated and rotated to the same side
- the morphological lordotization (flat back), related to a secondary relative anterior spinal overgrowth
- 20% of cases, scoliosis is secondary to another pathological process. The remaining 80% are cases of idiopathic scoliosis



Idiopathic scoliosisis

a deformation of the spine and trunk of unknown etiology.

There is a 3-planes character of these changes:

- In sagittal plane – disorders of physiological curves of the spine: thoracic kyphosis and/or lumbar lordosis
- In frontal plane – lateral flexion of the spine
- In transverse plane – axial rotation of vertebras
- These deformations happens together in 3 planes – so is called torsion of the spine.

Torsion deformity

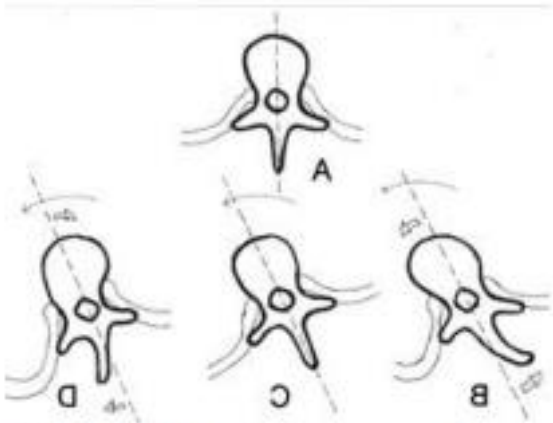
- in sagittal plane – front vertebrae is higher than the back
- in frontal plane – wedge-shaped vertebrae (higher on the convex side)
- in transverse plane – (seen on CT or MR):

a. spinous processes turning towards convex side

b. transverse processes of the convex side is set in sagittal plane

C. transverse processes of the concave side is set in frontal plane

d. pediculus arcus on the concave side is shorter and thinner



k M.: Intravertebral deformation in idiopathic scoliosis: a transverse plane computer tomographic study, J F

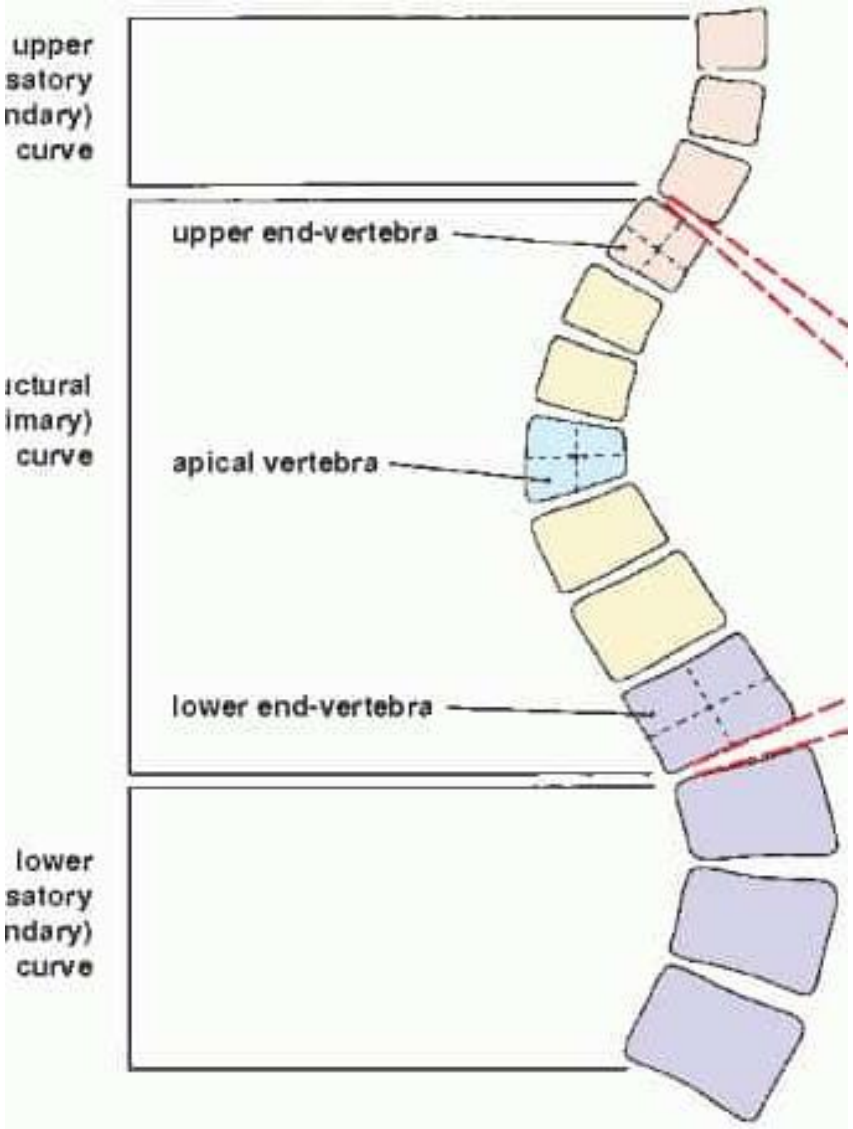
kwise displacement clockwise displacement

kwise deformation counter-clockwise deformat

Cobb angle on x-ray

SRS : Cobb angle

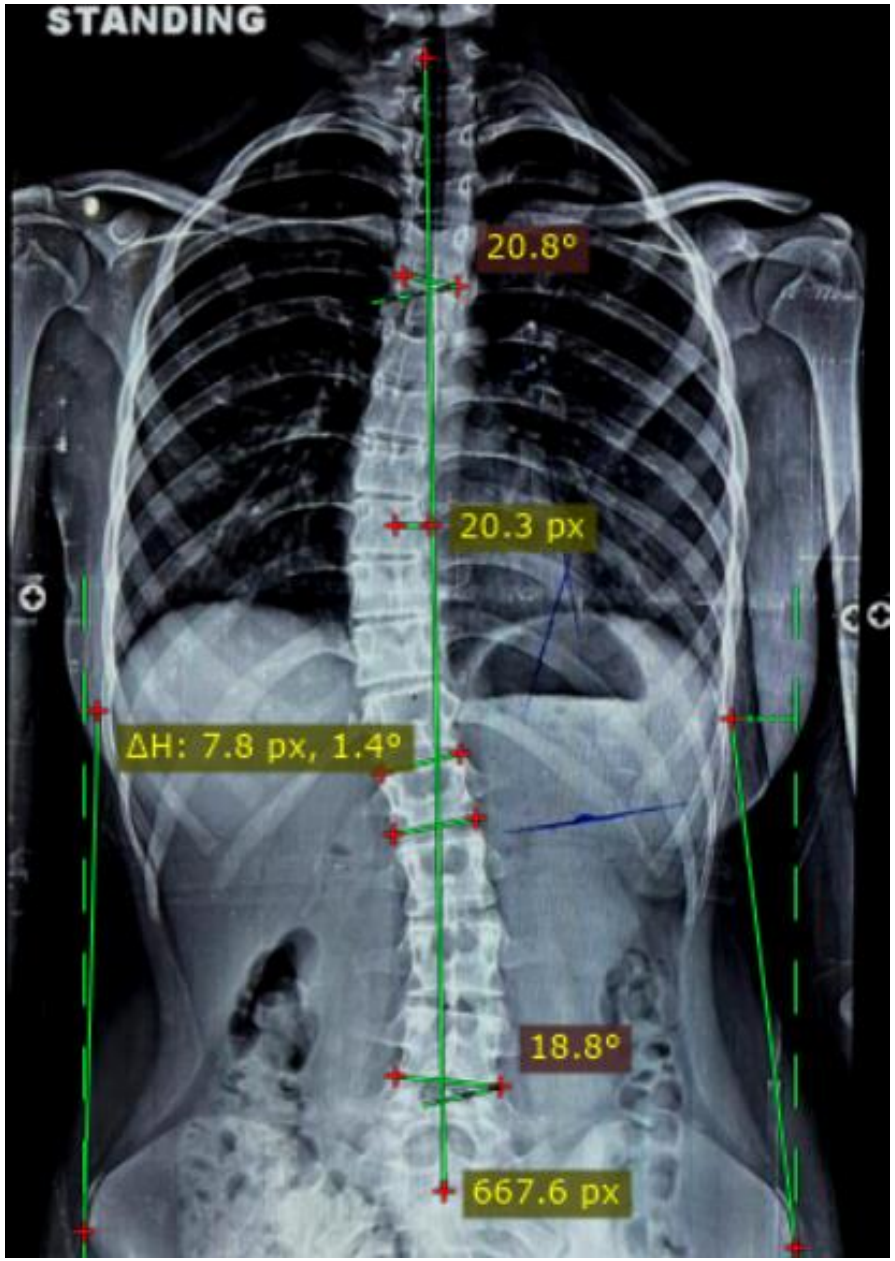
- The curvature in the frontal plane (AP radiograph in upright position) is limited by an “upper end vertebra” and a “lower end vertebra”, taken both as a reference level to measure the Cobb angle.
- The Scoliosis Research Society (SRS) suggests that the diagnosis is confirmed when the Cobb angle is 10° or higher and axial rotation can be recognized. Maximum axial rotation is measured at the apical vertebra.
- However, structural scoliosis can be seen with a Cobb angle under 10°



Cobb angle

- The recognized measurement error in measuring Cobb angles is 5° manually on the radiograph
- new computer-assisted measurement methods have lesser measurement errors, ranging from 1.22° to 3.6

Xray with cobb angle



Females in danger .. !!

- Progression of AIS is much more frequently seen in females.
- When the Cobb angle is 10 to 20°, the ratio of affected girls to boys is similar (1.3:1)
- increasing to 5.4:1 for Cobb angles between 20° and 30°
- and 7:1 for angle values above 30°.
- If the scoliosis angle at completion of growth exceeds a "critical threshold" (most authors assume it to be between 30° and 50° [33], there is a higher risk of health problems in adult life, decreased quality of life, cosmetic deformity and visible disability, pain and progressive functional limitations

Etiology of scoliosis

ETIOLOGICAL THEORIES OF IDIOPATHIC SCOLIOSIS

- There are a lot of theories concerning etiologies of scoliosis, but none of them is absolutely respected by medical field. Each of the theory has their supporters and opponents
- Etiology (factor) which can cause scoliosis: genetic, metabolic, hormonal, neurologic
- Scoliogeny - Pathogenesis (source)

Melatonin – according to research, we observe decreased level of melatonin among girls with fast progressing scoliosis as a secondary factor.

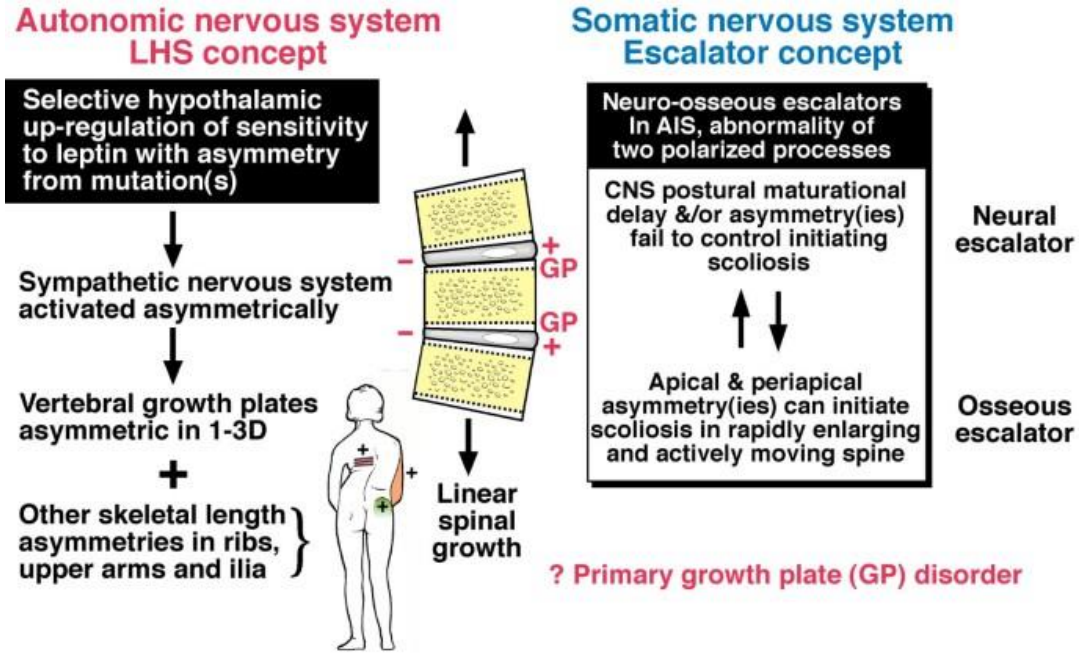
As a primary factor we perceive calmodulin (protein which influences skeletal muscles contractility).

Pathomechanism - (sequence of occurences in patological process)

- Theory of hereditary changes (recessive or dominant inheritance).

o According to H. Mitroszewska idiopathic scoliosis are connected with genetic transmission of metabolic disorders.

Etiology

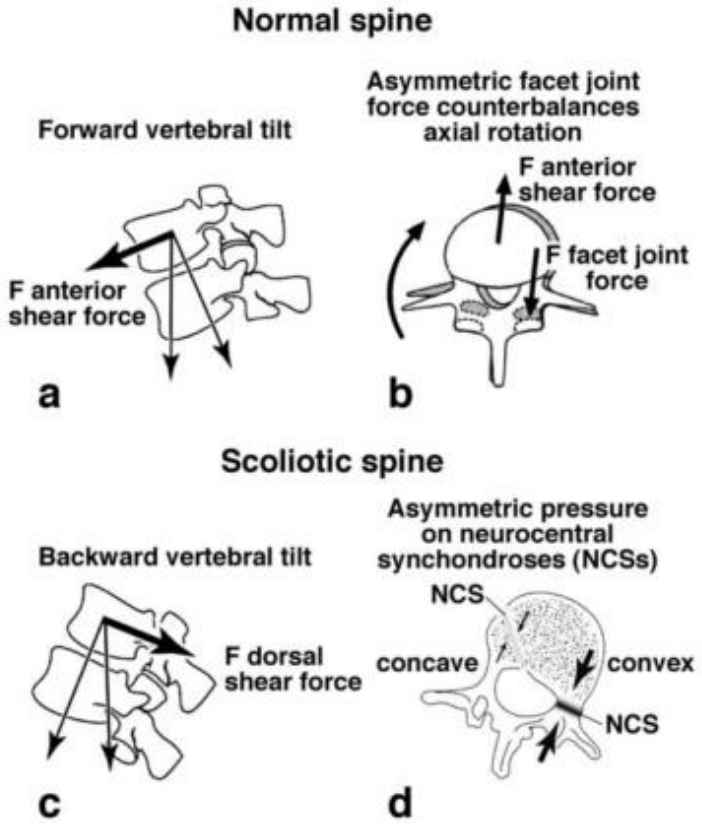


- Based on the variety of opinions on idiopathic scoliosis development, we can assume a multifactorial origin
- Dubousset , Based on hypothesis, melatonin plays a secondary role in the spontaneous induction of scoliosis. It is a consequence of interaction with calmodulin, a protein that has receptors for calcium ions and is thus able to influence .
- The role of genetic factors in the development of spinal axial disorders is also emphasized and is confirmed by the tendency of scoliosis to run in families, with researchers suggesting a hereditary disorder of oestrogen receptor structure and function contractility of skeletal muscles

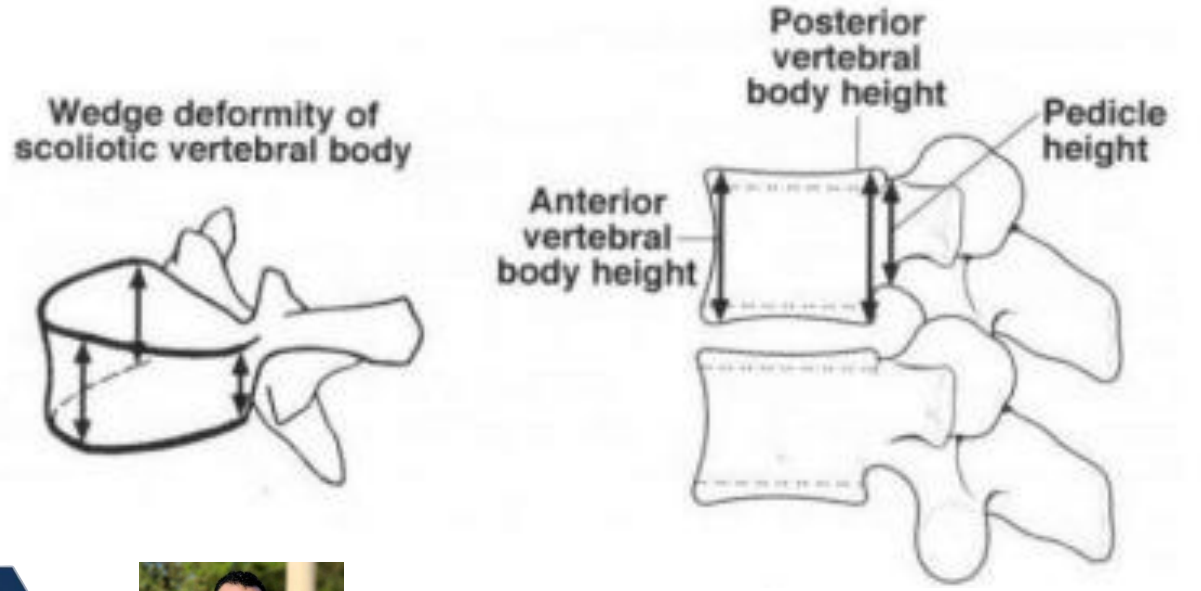
. Uncoupled, or asynchronous, spinal neuro-osseous growth

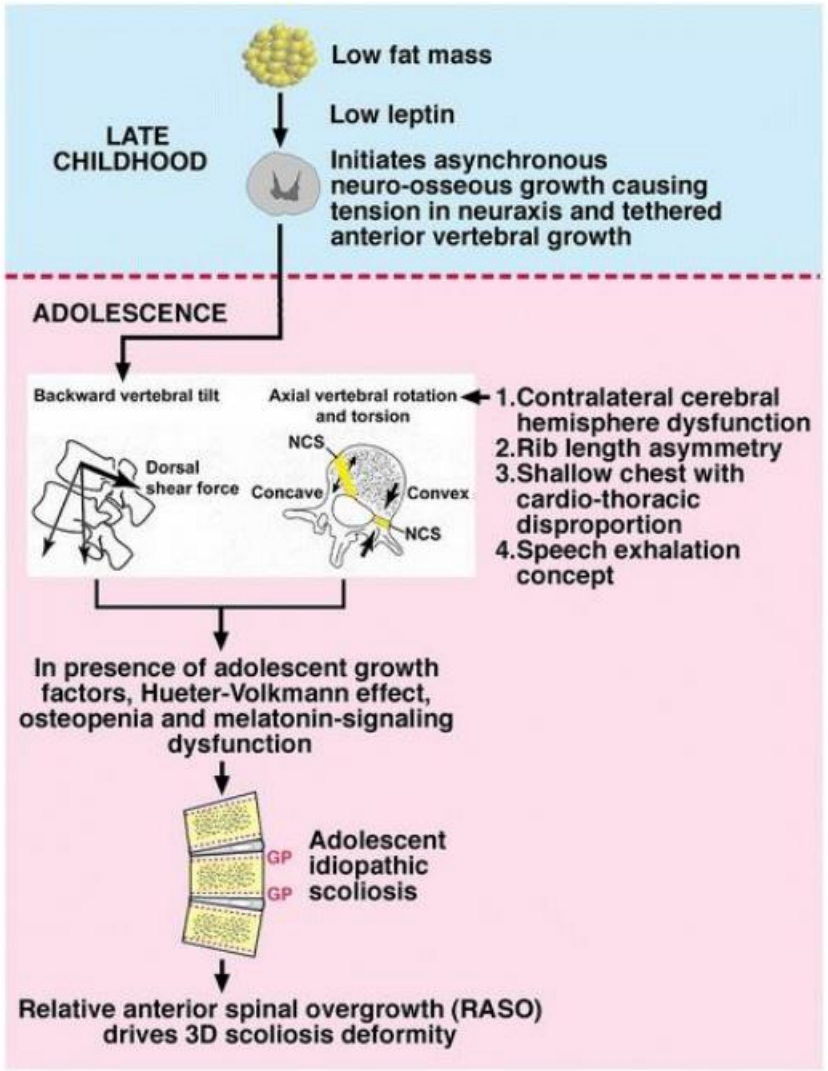
1) pathologic axial lengthening of spinal canal that stretches cord, pia and dura due to angulation of the column which can elicit neurological symptoms,

2) shortening of cord and pia by partial, or total absence of plasticity and elasticity in parts of cord tissue



RASO (Relative Anterior Spinal Overgrowth)



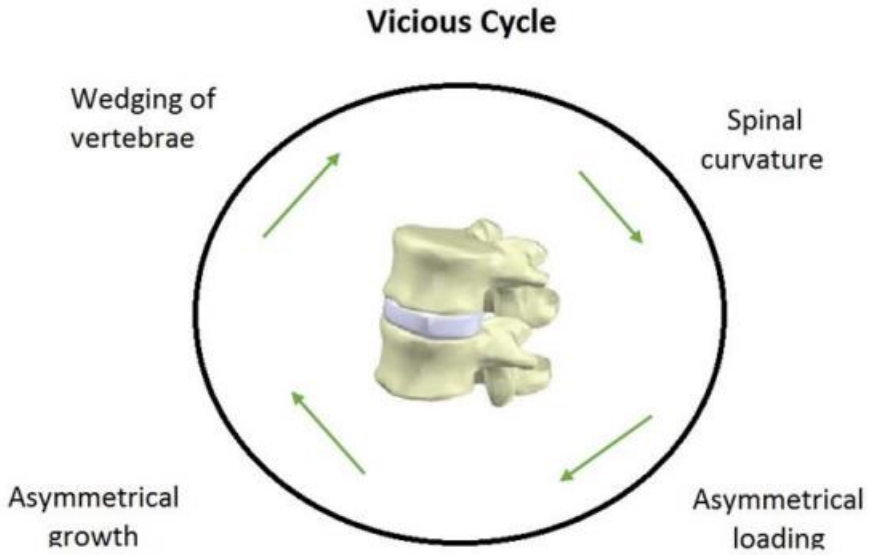


etiology

Among people with scoliosis the following was observed:

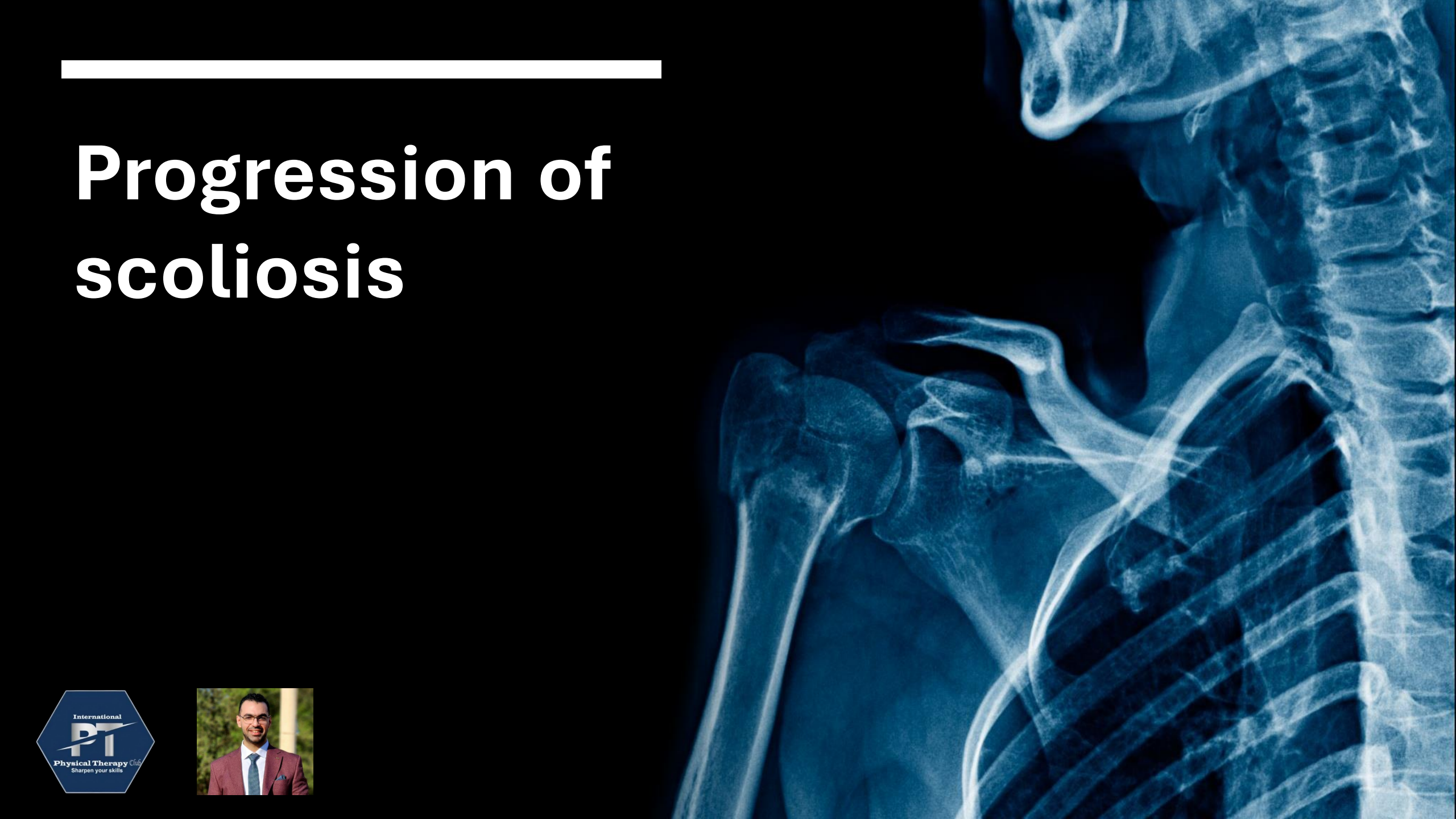
- Low fat mass
- Low fat-free mass
- Low leptin level (protein regulating food intake)
- High adiponectin level (polipeptide hormone – influences glucose and fat acids transformation in liver and muscles)

Pathomechanism of scoliosis progression



Stokes A.F., Burwell R.G., Dangerfield P.H.: Biomechanical spinal growth modulation and progressive adolescent scoliosis – a test of the 'vicious cycle' pathogenetic hypothesis. Scoliosis 2006.

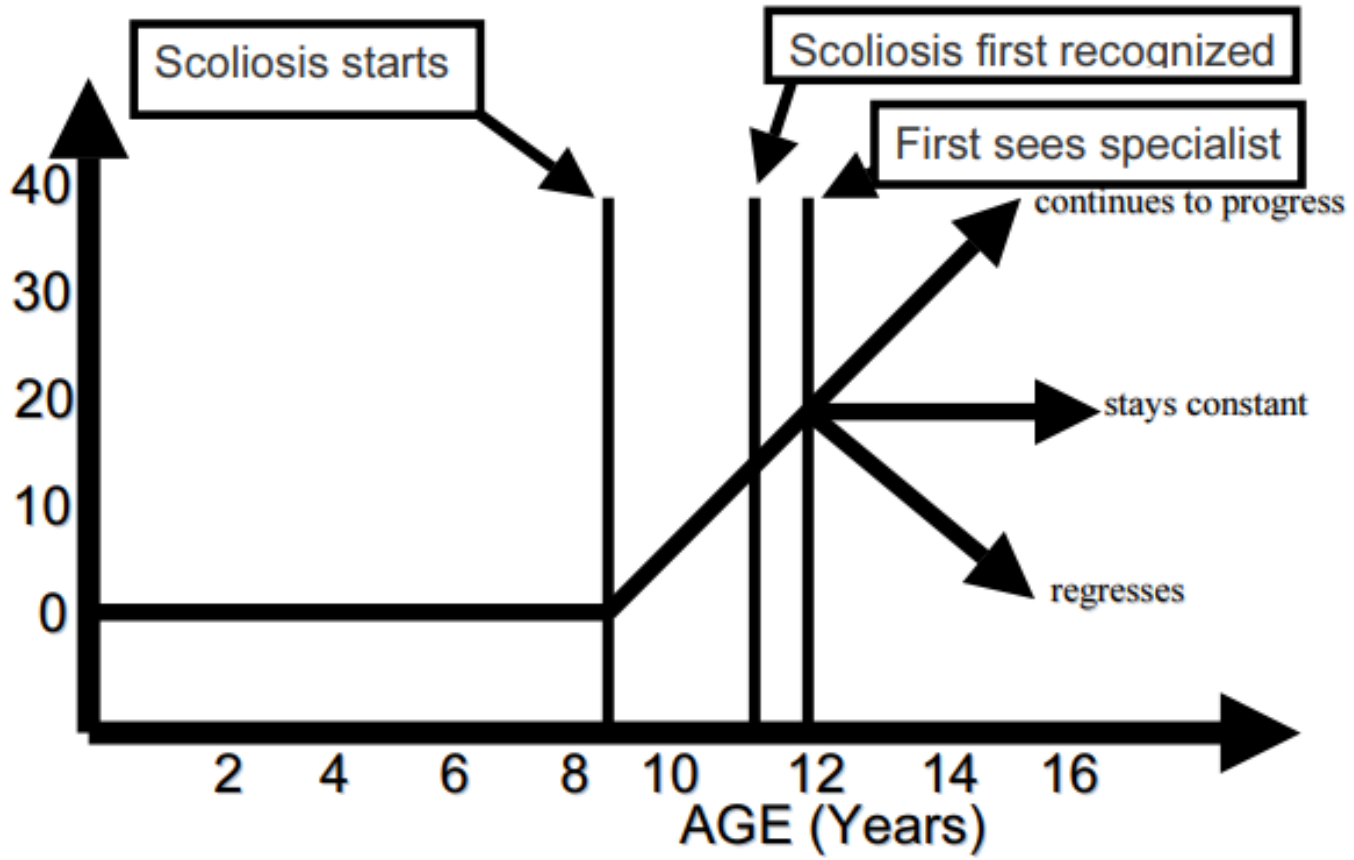
Progression of scoliosis



Progression of scoliosis

- growth spurt-the first is in the first months of life, generally between 6 and 24 month, the between the age of 5 and 8 years, there is a height peak growth and at puberty the most important and rapid growth spurt, generally at age 11 to 14 years of life
- After approximately 2/3 of the period of pubescent growth spurt, girls experience menarche, which indicates that the peak of growth has been passed, with a gradual decrease in the risk of scoliosis progression
- In adulthood, IS may intensify as a result of progressive osseous deformities and collapsing of the spine. This phenomenon is reported especially in scoliosis that is more severe than 50°, while the risk of progression starts to increase as the curve grows above 30°

Hypothetical progress of spinal curve development in a typical patient with AIS



RISK FACTORS OF PROGRESSION

- A period of rapid growth
- Risser test 0-1
- A period before menarche (about 1 year)
- Cobb angle > then 30°
- 2- curves scoliosis
- Female

Risser sign

The Risser sign is an indirect measure of skeletal maturity, whereby the degree of ossification of the iliac apophysis by x-ray evaluation is used to judge overall skeletal development

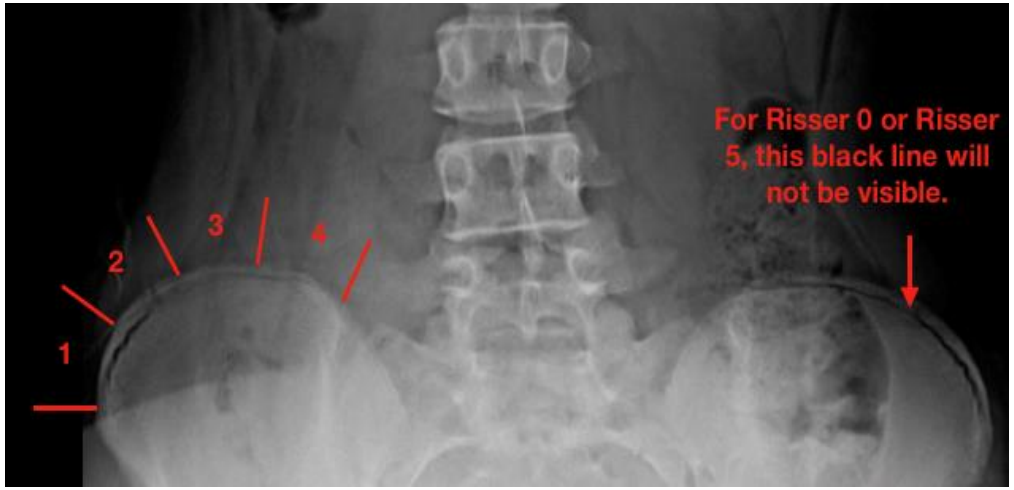
•Grade 1 is given when the ilium (bone) is calcified at a level of 25%; it corresponds to prepuberty or early puberty.

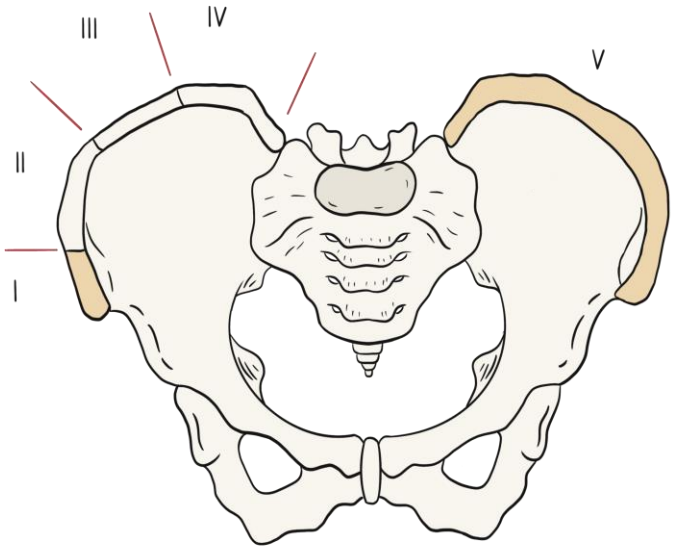
•Grade 2 is given when the ilium (bone) is calcified at a level of 50%; it corresponds to the stage before or during growth spurt.

•Grade 3 is given when the ilium (bone) is calcified at a level of 75%; it corresponds to the slowing of growth.

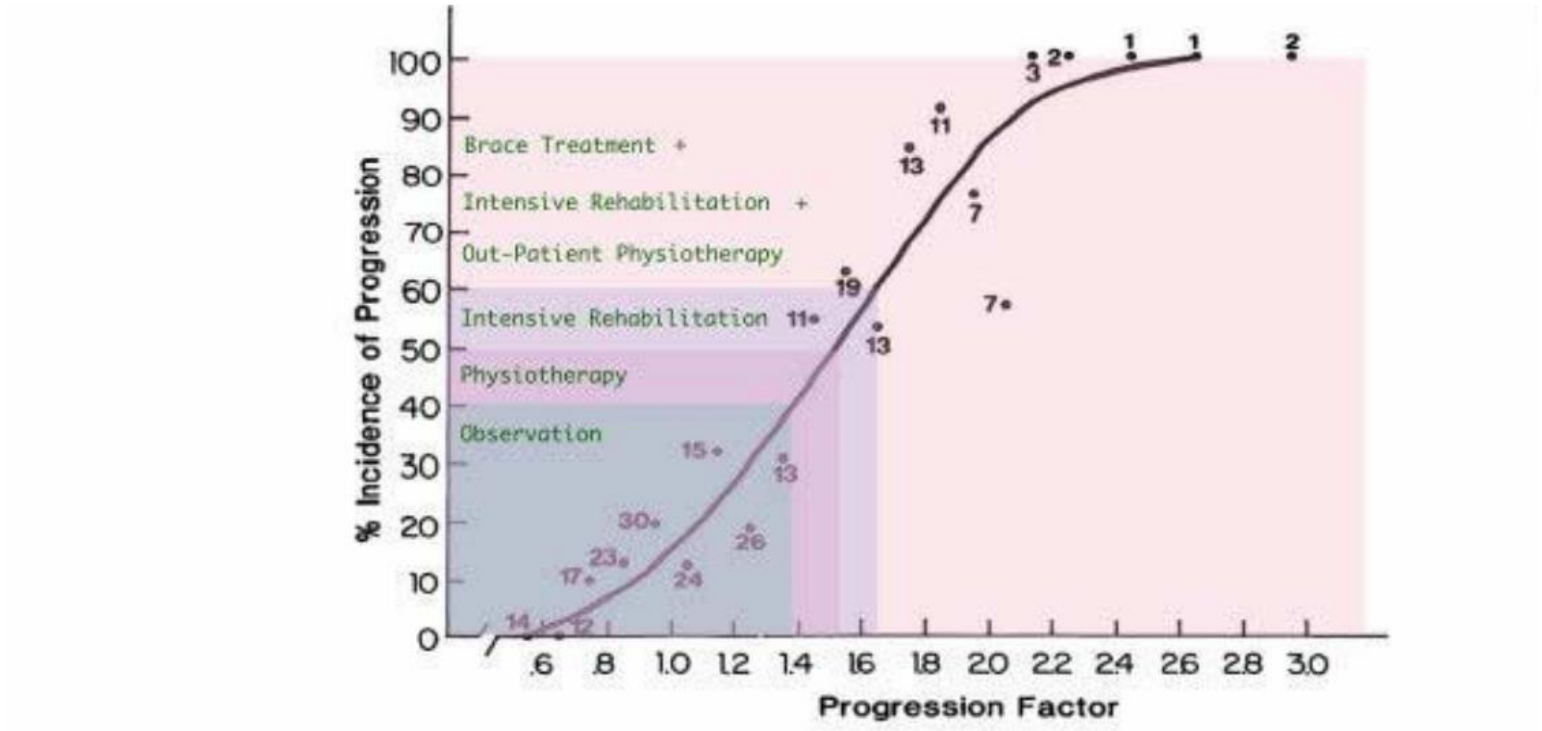
•Grade 4 is given when the ilium (bone) is calcified at a level of 100%; it corresponds to an almost cessation of growth.

•Grade 5 is given when the ilium (bone) is calcified at a level of 100% and the iliac apophysis is fused to iliac crest; it corresponds to the end of growth.





Riskof progression formula



Graph showing the incidence of progression according to the progression factor, which is calculated by the formula:

$$\frac{\text{Cobb Angle} - (3 \times \text{Risser sign})}{\text{Chonological age}}$$

Classifications

Table 3 Classifications of idiopathic scoliosis

Chronological (SoE: V)		Angular (SoE: VI)		Topographic (SoE: V)		
Age at diagnosis (years.months)		Cobb degrees			Apex	
					from	to
Infantile	0–2.	Low	Up to 20	Cervical	–	Disc C6–7
Juvenile	3–9.	Moderate	21–35	Cervico-thoracic	C7	T1
Adolescent	10–17.	Moderate to severe	36–40	Thoracic	Disc T1–2	Disc T11–12
Adult	18+	Severe	41–50	Thoraco-lumbar	T12	L1
		Severe to very severe	51–55	Lumbar		Disc L1–2
		Very severe	56 or more			

Lenke classification

- The most widely used for operative treatment is Lenke classification
- Mild scoliosis with indication for non-operative treatment, specific exercises or bracing, cannot be properly classified according to Lenke objective criteria
- the criterion of “finding a residual coronal curve on side-bending radiographs of at least 25° in the proximal thoracic, main thoracic, thoracolumbar or lumbar regions, as a definition of a structural curve”, is not applicable to scoliosis in the range of 15° to 30°

Why do we treat adolescent idiopathic scoliosis?

To stop curve progression at puberty (or possibly even reduce it)
RCT demonstrated that bracing is effective at preventing progression to the surgical . a long-term RCT found that PSSE improved Cobb angles at skeletal maturity in patients with AIS .

To prevent or treat respiratory dysfunction , Depending on its degree and location, the curvature may affect respiratory function. The most prominent changes within the respiratory system are produced by curvatures of the thoracic spine

To prevent or treat spinal pain syndromes

To improve aesthetics via postural correction

Specific goals of conservative treatment during growth

Table 5 Specific aims of conservative treatment during growth (strength of evidence VI–strength of recommendation C) at least 70% of agreement (SoE VI)

Absolute aim of treatments		Percentage
Avoid surgery		90.70
Improve aesthetics		86.05
Improve quality of life		82.56
Degree of curve	Primary aim	Secondary aim
Low	Remain below 20°	Remain below 45°
Moderate	Remain below 30°	Remain below 45°
Severe	Remain below 45°	Postpone surgery

Practical Approach Scheme (PAS)

Table 7 Strength of treatments scheme (STS) (strength of evidence V–strength of recommendation B): it reports all the possible treatments that can be proposed for idiopathic scoliosis graduated from the less to the most demanding (both in terms of burden on

		Low		Moderate		Severe	
		Min	*Max*	*Min*	*Max*	*Min*	*Max*
Infantile		Obs3	Obs3	Obs3	TTRB	TTRB	Su
Juvenile		Obs3	PSSE	PSSE	FTRB	HTRB	Su
Adolescent	Risser 0	Obs6	SSB	HTRB	FTRB	TTRB	Su
	Risser 1	Obs6	SSB	PSSE	FTRB	FTRB	Su
	Risser 2	Obs6	SSB	PSSE	FTRB	FTRB	Su
	Risser 3	Obs6	SSB	PSSE	FTRB	FTRB	Su
	Risser 4	Obs12	SIR	PSSE	FTRB	FTRB	Su
Adult up to 25 y		Nothing	PSSE	Obs12	SIR	Obs6	Su
	No Pain	Nothing	PSSE	PSSE	SIR	Obs12	HTRB

2016 SOSORT guidelines:

Observation (Ob.) 10-20º

Physiotherapeutic Scoliosis Specific Exercises (PSSE) >20 – 30o

Scoliosis Inpatient Rehabilitation (SIR)

Bracing > 30 – 40o (45)

- Night Time Rigid Bracing (8–12 h per day) (NTRB): wearing a brace mainly in bed.
- Soft Bracing (SB): it includes mainly the SpineCor.
- Part Time Rigid Bracing (12–20 h per day) (PTRB): wearing a rigid brace mainly outside school and in bed.
- Full Time Rigid Bracing (20–24 h per day) or cast (FTRB): wearing a rigid brace all the time (at school, at home, in bed, etc.)

PSSE

- schroth exercises
- BSPTS , Dr rigo
- ISST
- FITS
- SEAS

BRACE

- SOFT BRACE

- *HARD BRACE*

SURGERY

Thank You

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