МЕДИЦИНСКИ УНИВЕРСИТЕТ – ПЛЕВЕН

ФАКУЛТЕТ „МЕДИЦИНА“

ЦЕНТЪР ЗА ДИСТАНЦИОННО ОБУЧЕНИЕ

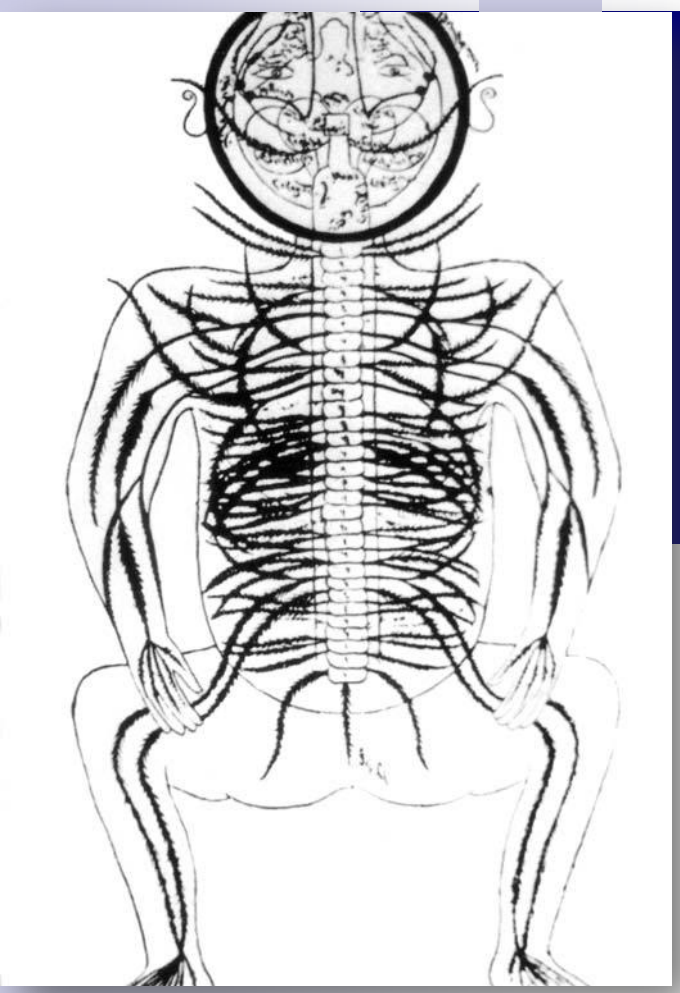
Лекция №10

КАТЕДРА ОРТОПЕДИЯ И ТРАВМАТОЛОГИЯ

Сколиоза

АВТОР: ДОЦ. СВИЛЕН ТОДОРОВ, Д.М.

Медицински университет – Плевен



Адолесцентна сколиотична болест

Доц.д-р Свилен Тодоров,дм

ORTHO PAEDIA

Nicholas Andry
(1658 – 1747)

ORTHOPÆDIA:
Or, the ART of
CORRECTING and PREVENTING
DEFORMITIES
IN
CHILDREN:

By such MEANS, as may easily be put in Practice by PARENTS themselves, and all such as are employed in Educating CHILDREN.

To which is added,
A DEFENCE of the ORTHOPÆDIA, by way of SUPPLEMENT, by the AUTHOR.

Translated from
The *French* of M. *ANDRY*,
Professor of Medicine in the ROYAL COLLEGE, and Senior Dean of the Faculty of PHYSICK at *Paris*.

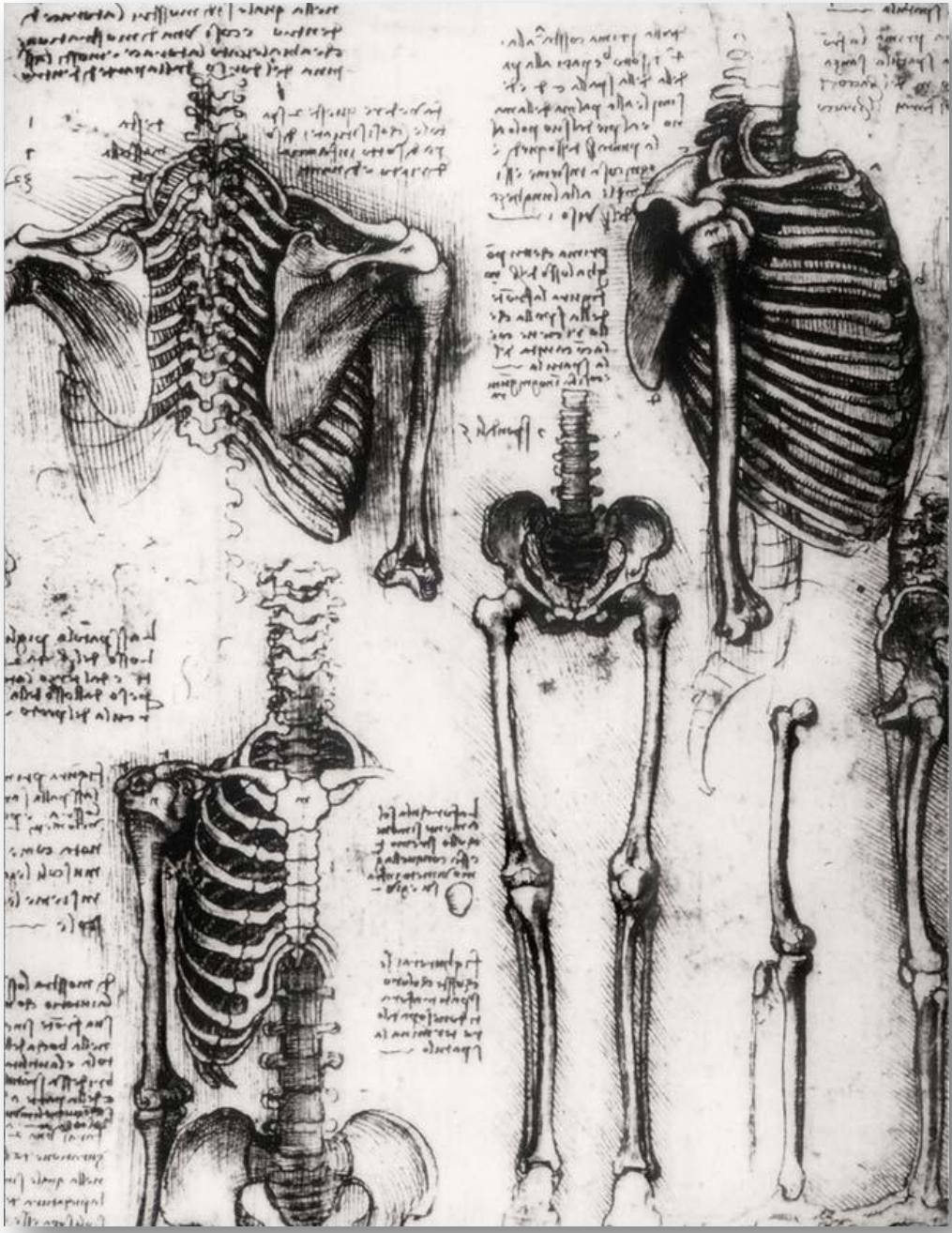
IN TWO VOLUMES.
Illustrated with CUTS.
VOL. I.

LONDON:
Printed for A. MILLAR, at *Buchanan's Head*, opposite to *Catharine-ſtreet*, in the *Strand*.
M. DCC. XLIII.

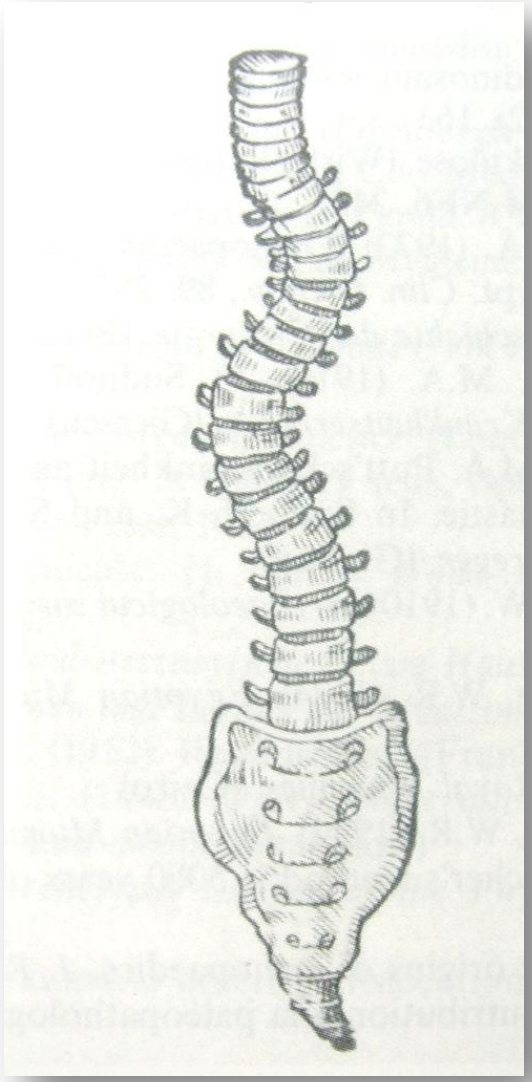
Title page of English translation of Andry's *Orthopaedia*, 1743

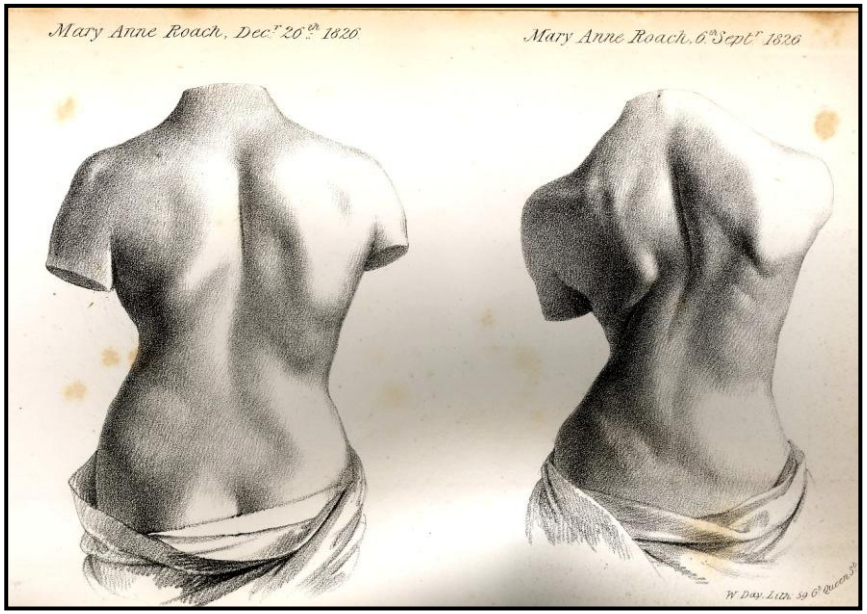
History

Leonardo da Vinci (1452–1519).



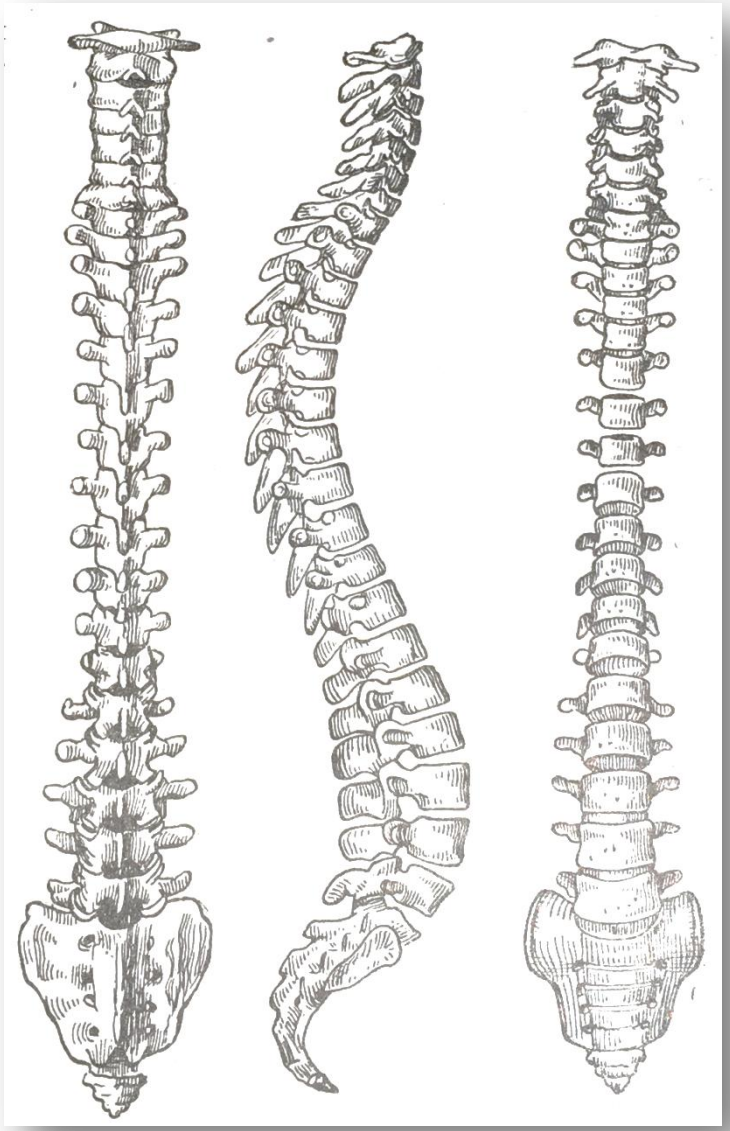
History





Guilhelmus Fabricus Hildanus:
Frankfort, 1652.

Определение



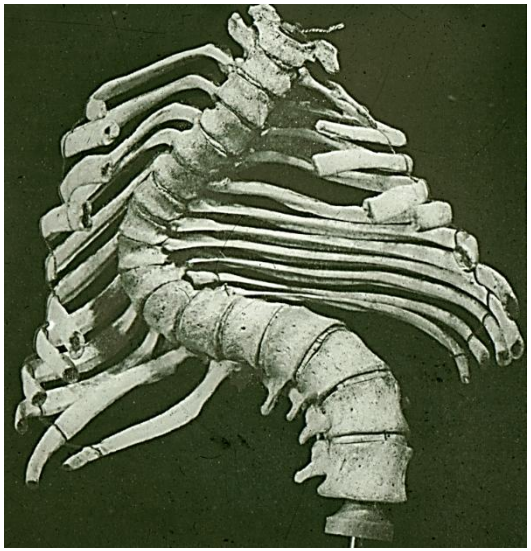
- Латерално изкривяване на гръбначния стълб във фронталната равнина
- През късния ювенилен/ адолесцентен период
- Липса на явна етиология
- Клинично здрав индивид

Положителна Диагноза Критерии:

- > 10° латерална крива
- прешленна ротация/торзия
- рентг. графия

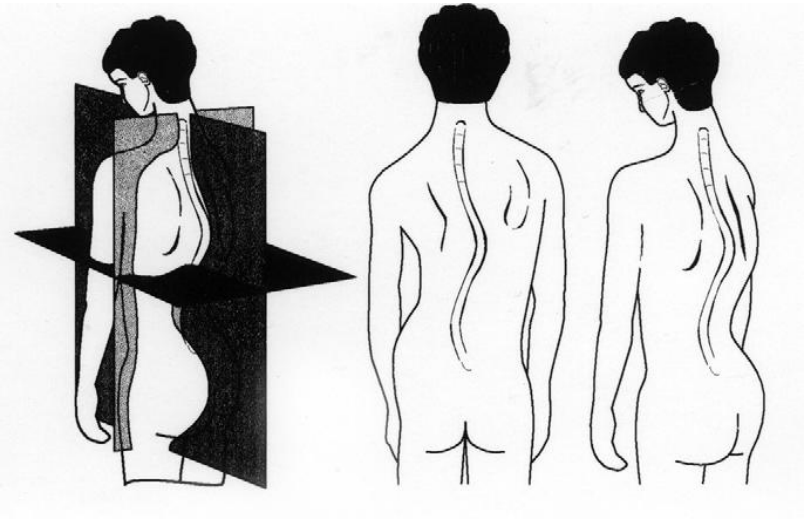
при изправено положение

- клинично здраво дете



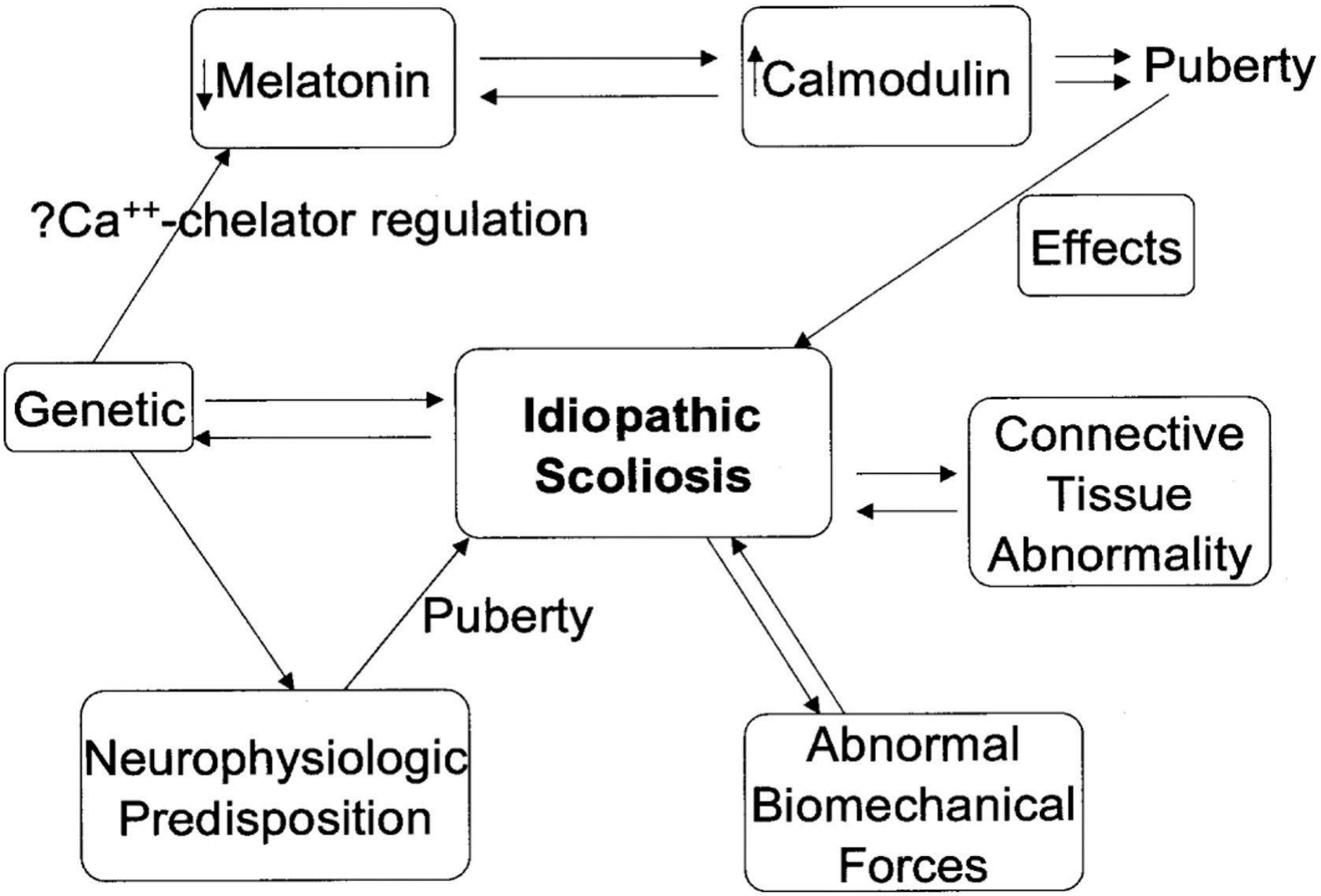
3D Патоанатомия

* Екстензия (лордоза)/Кифоза (флексия) – сагитална равнина
* Латерално изкривяване – фронтална равнина
* Ротация (торзия) – трансверзална (аксиална) равнина



ЕТИОЛОГИЯ

1. Генитчни причини.
2. Синтеза на Calmodulin – мускули/тромбоцити.
3. Неврологични – абн. соматосензорна проводимост.
4. Ендокринно медиирана девиация в растежа.
5. …… и др.


↓Melatonin
↑Calmodulin
Puberty
?Ca++-chelator regulation
Effects
Genetic
Idiopathic Scoliosis
Connective Tissue Abnormality
Puberty
Neurophysiologic Predisposition
Abnormal Biomechanical Forces

ЕПИДЕМИОЛОГИЯ

Най-висока честота във възрастта - 11-14 г.

Криви = 10 гр. - 1.5 %

Криви > 30 гр. – 0.2%

Резпределение по пол:
5 Ж : 1 М

Étude de la courbure scoliotique

Importance de l'extension et de la rotation vertébrale

R. Perdriolle et J. Vidal *

(Montpellier)

FIG. 1. — *La courbure scoliotique doit être étudiée dans les 3 plans de l'espace :* étude tridimentionnelle.

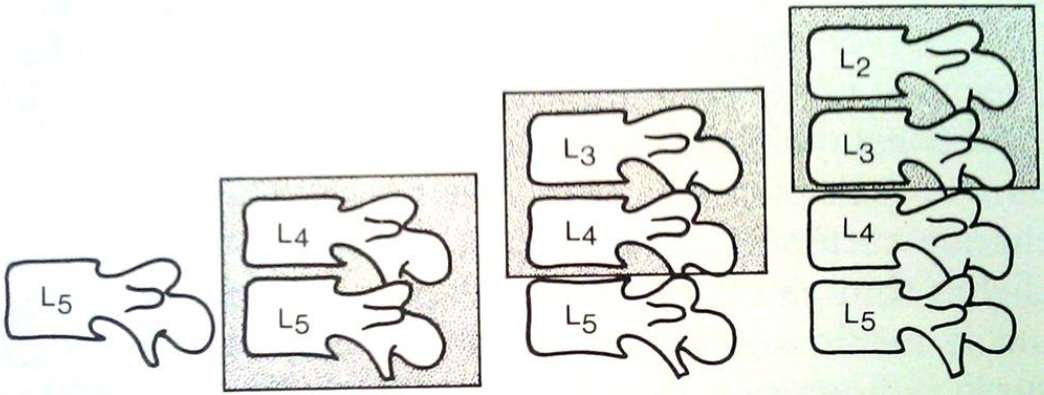


FIG. 4. — *Le calque successif de chaque segment* reporté sur le précédent donne la composante antéro-postérieure.

Étude de la courbure scoliotique

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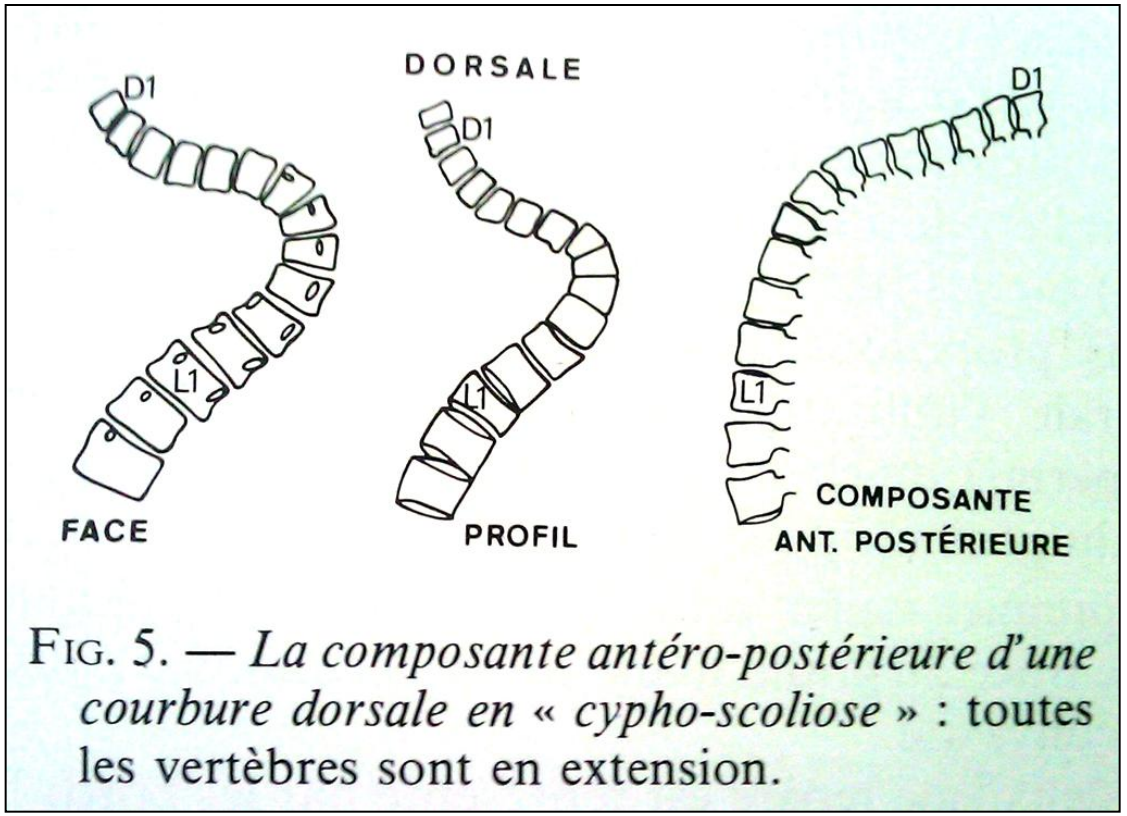

FIG. 5. — *La composante antéro-postérieure d'une courbure dorsale en « cypho-scoliose »* : toutes les vertèbres sont en extension.

Étude de la courbure scoliotique

Importance de l'extension et de la rotation vertébrale

R. Perdriolle et J. Vidal *

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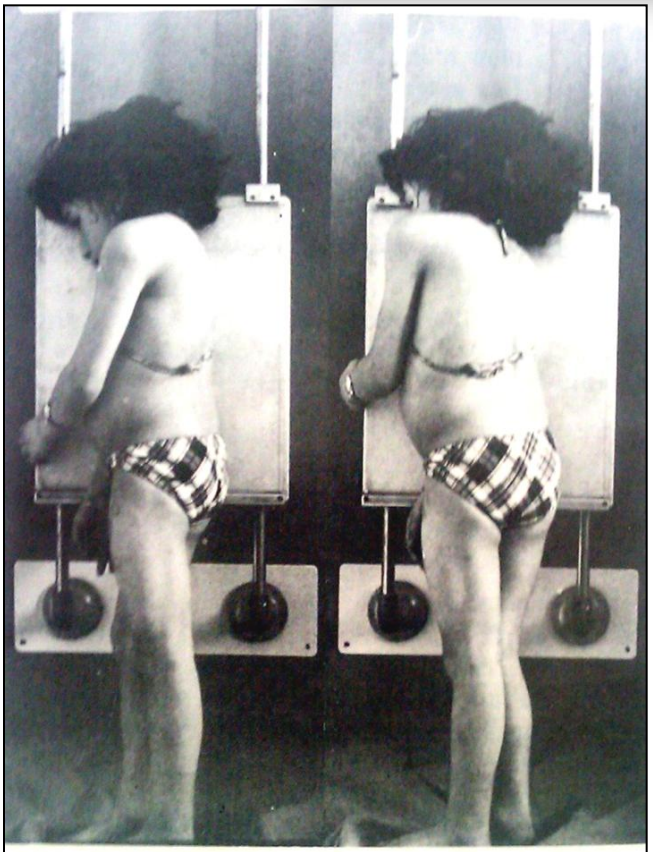


FIG. 2. — *Profil sélectif :* correction de la rotation.

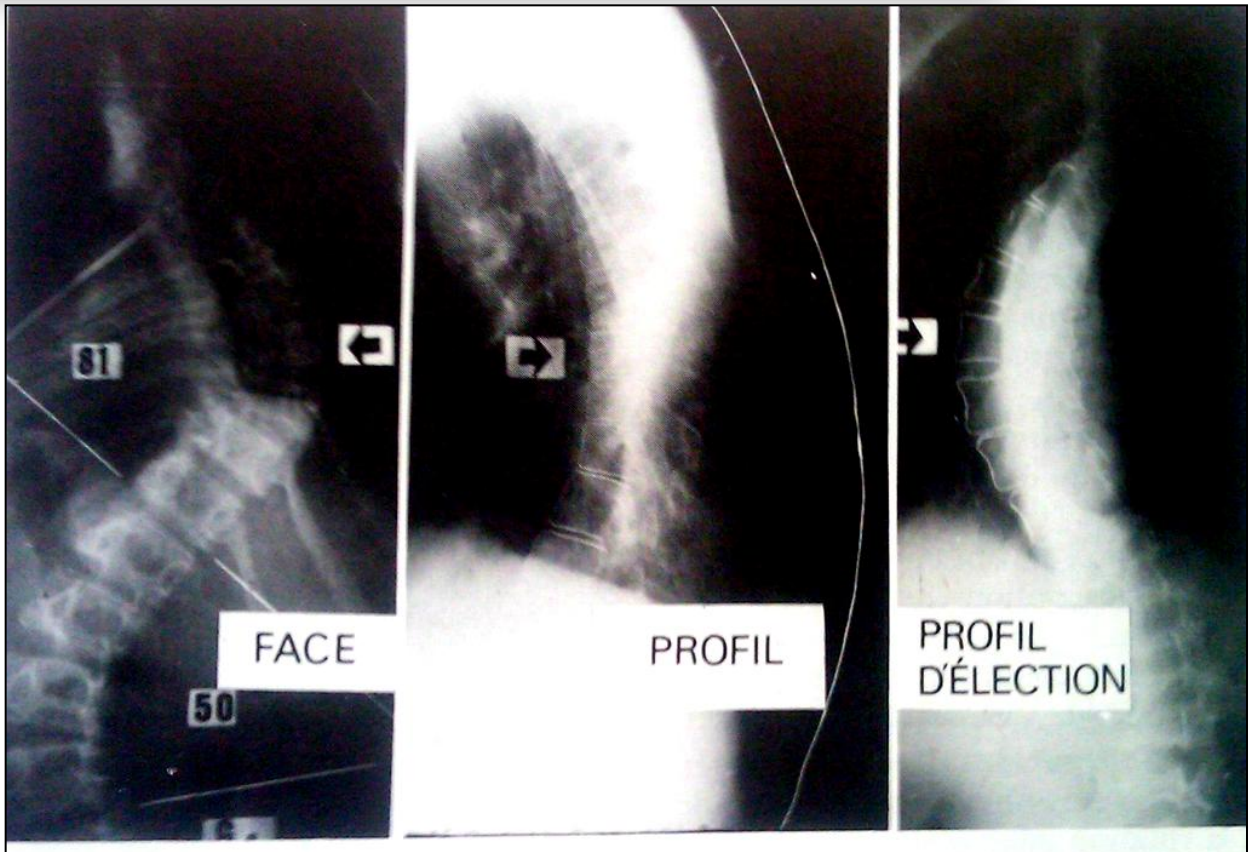


FIG. 3. — *Profil d'élection sur la vertèbre sommet :* montre que les vertèbres sont en extension

КЛАСИФИКАЦИЯ

(Scoliosis Research Society)

- **Идиопатична**
- **Невромускулна**
- Миопатична
- Конгенитална
- Смесена
- Neurofibromatozis
- Мезенхимна
- Травматична
- Osteochondrodystr.
- Тумори
- Ревматоидна
- Метаболитна
- Невропатична
- Торакогенна
- Хистерична
- Функционална

Classification of scoliosis aetiology – taken from BJA CEACCP 2006;6:1;13-16	
Idiopathic (70%)	Early onset (infantile) Late onset (juvenile)
Neuromuscular (15%)	Crebral palsy Myopathies Poliomyelitis Syringomyelia Friedreich's ataxia
Congenital	Vertebral anomalies Rib anomalies Spinal dyraphism
Traumatic	Vertebral fractures Radiation Surgery
Syndromes	Marfan's Rheumatoid arthritis Osteogenesis imperfecta Mucopolysaccharide disorders Neurofibromatosis
Neoplastic	Primary tumours Secondary tumours
Infection	Tuberculosis Osteomyelitis

Функционална vs Структурна

- Фукционалана сколиоза:
  - **Не фиксирана кривина – напълно корегируема чрез тракция или страничен бендинг**
    - Постурална / Хистерична / Анталгична
      - » Мускулен спазъм
      - » Иритация на нервно коренче
      - » Spondylolisthesis
      - » Възпаление (дисцит)
      - » Tu (Osteoid osteoma)
      - » Разлика в дължините на крайниците или ставни контрактури (пр. ТБС)

Функционална сколиоза при дискова протрузия

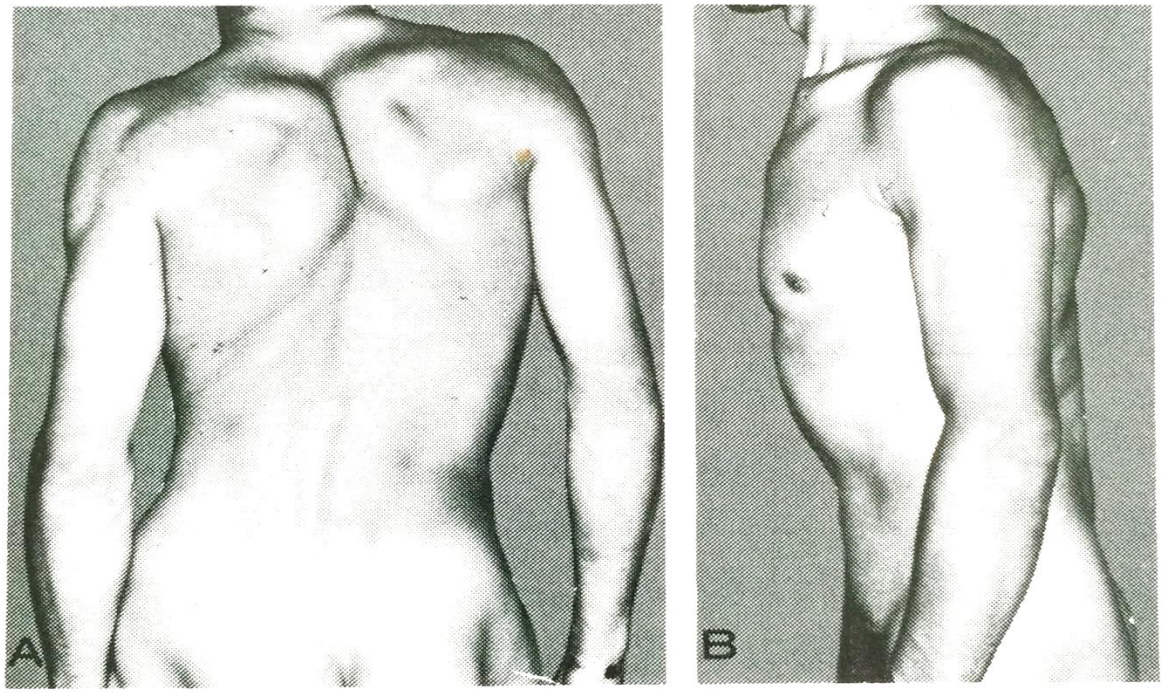
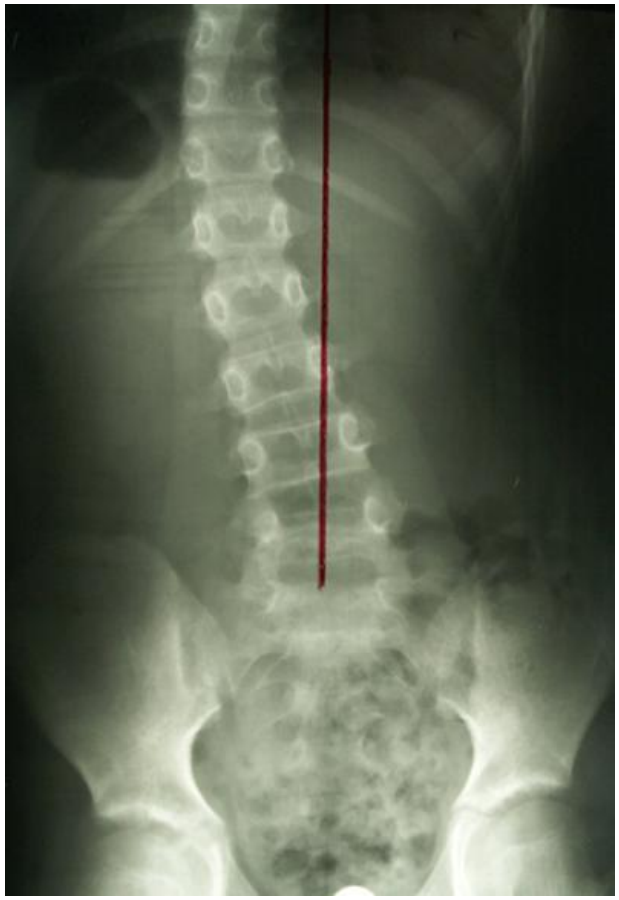
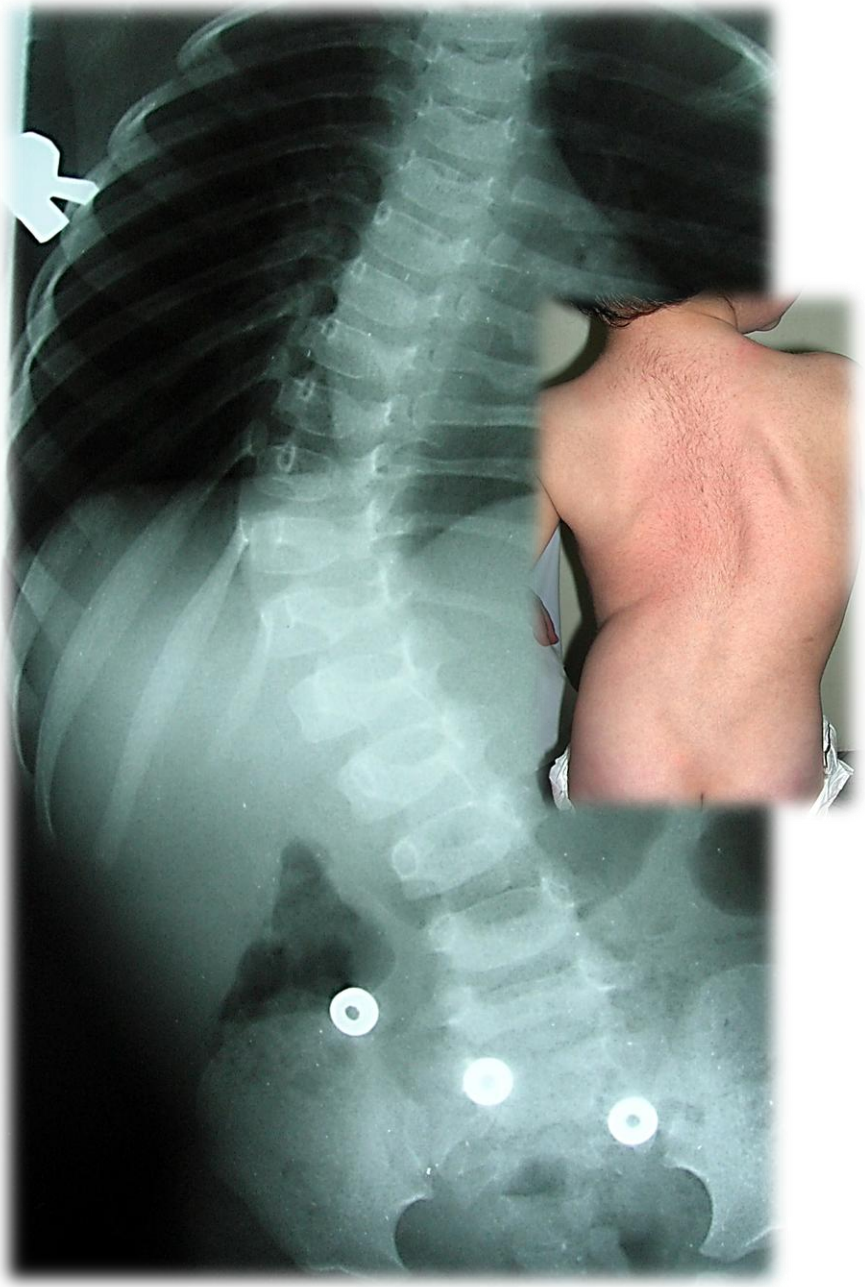


Figure 11.34. Sciatic scoliosis in a 30-year-old man who has an acute intervertebral disc protrusion. The longitudinal muscles are in spasm. In the lateral view there is loss of the normal lumbar lordosis as a result of the muscle spasm.



Класификация според възрастта

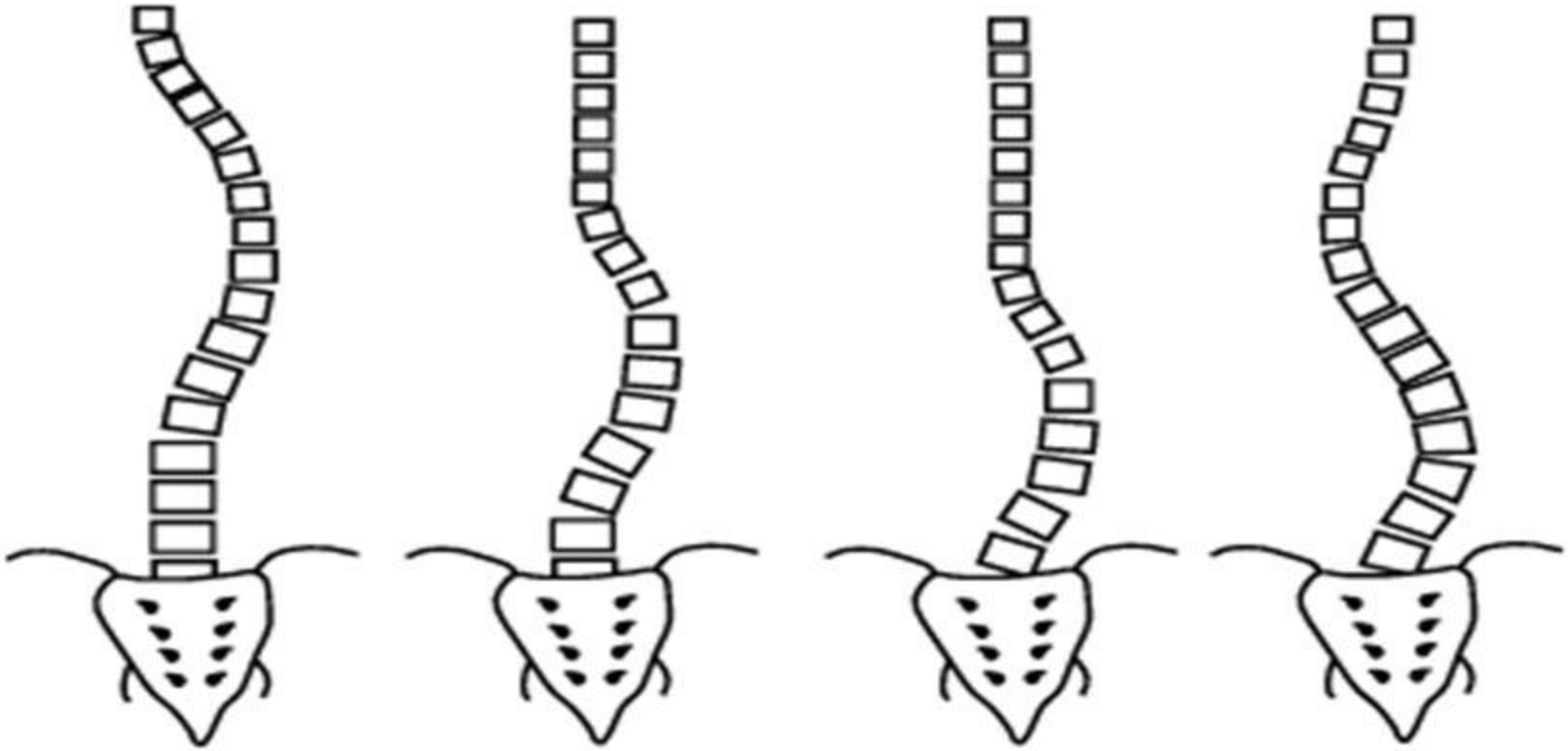
- Инфантилна (0-3у)
- Ювенилна (4-9у)
- **Адолесцентна (10-18у)**
- Зряла (адултна)



The scoliotic curve is named according

1.To side of **the convex side.** (Right or left scoliosis).

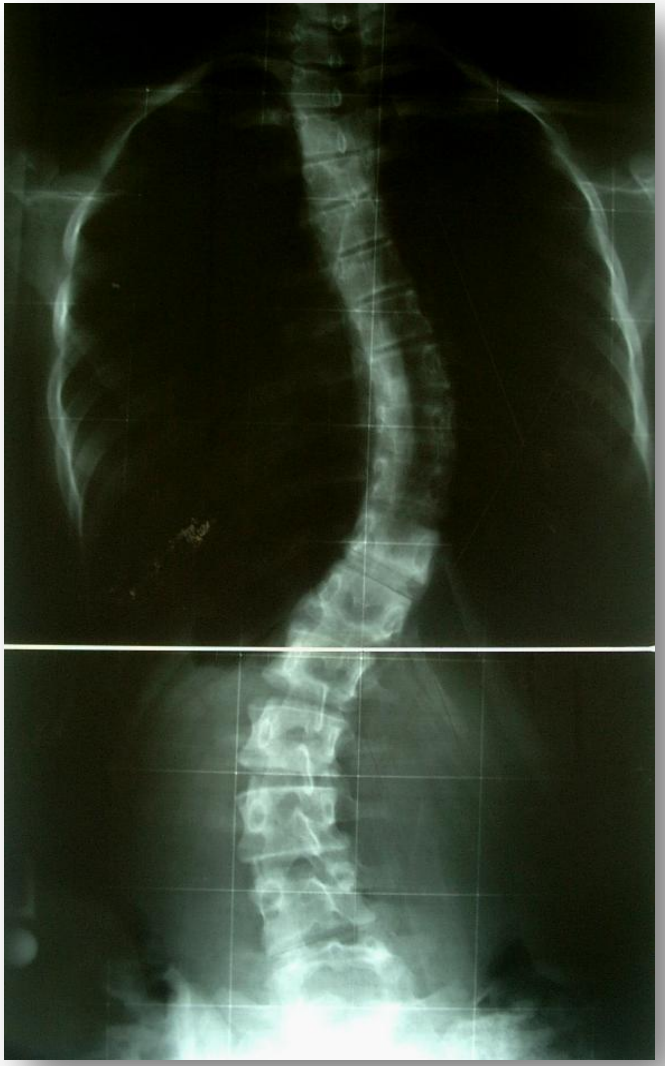
2- **to the location of the apex of the curve, as shown below.**



Видове кривини според структурата при идиопатична сколиоза

*Основна /структурна/ **ригидна** – некорегируема с торзия

*Компенсаторна /неструкторна/ **вторична** – корегируема без торзия



Структурна кривина

Постоянна, некоригираща се!

- Конгенитална – дефект в сегментирането и формогенезата на прешлените
- Синдромна – невромускулна; NF; съединителна тъкан, метаболитни с-я .....
- Посттравматична
- Ятрогенна – кардиоторакална х-я, laminectomy
- Адултна - дегенеративна; De novo
- **Идиопатична** - 80% of structural scoliosis

ДИАГНОЗА @ ОЦЕНКА

Анамнеза:

- Време на проявление
- **Болка – ИАС е обикновено безболкова!**
- Общо състояние и здраве
- Фамилна анамнеза
- **Възраст и физиологична зрялост!!!**

Клинична оценка

- Тангенциално изследване на гърба (Adams test)
- Асиметричност на рамене, лопатки, талия, торако-пелвисно отношение и дължини на долни крайници

Screening *- a simple test to see whether further testing might be needed!*

1. Balance of the thorax over the pelvis is assesed with a plumbline

2. The distance from vertical line to the gluteal cleft is measured in centimeters

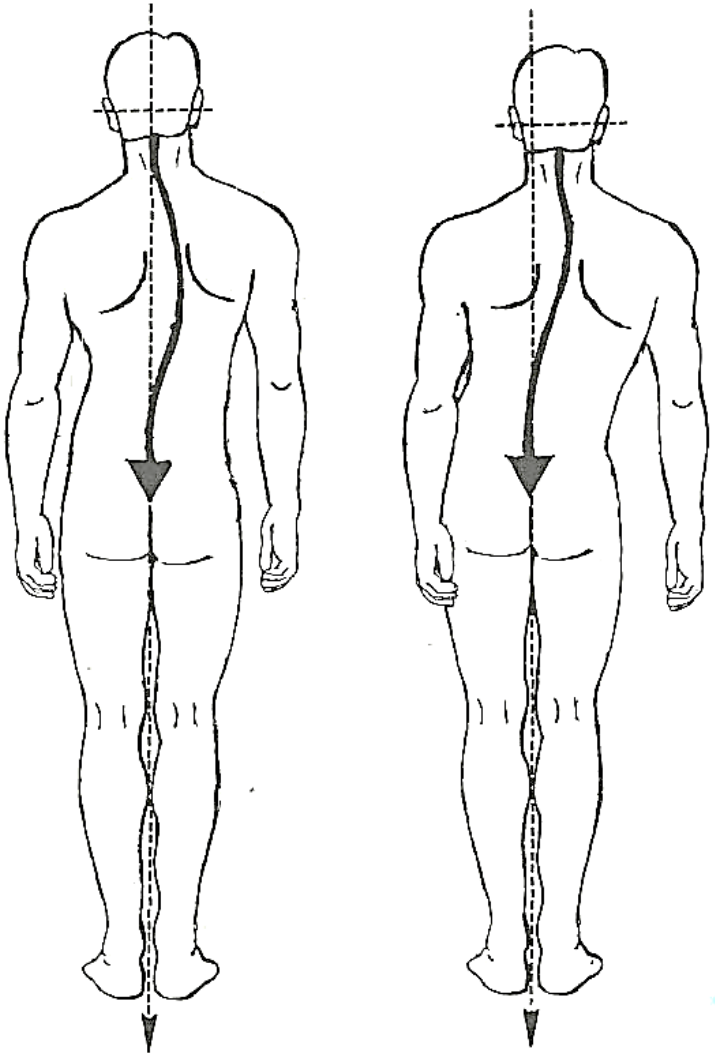
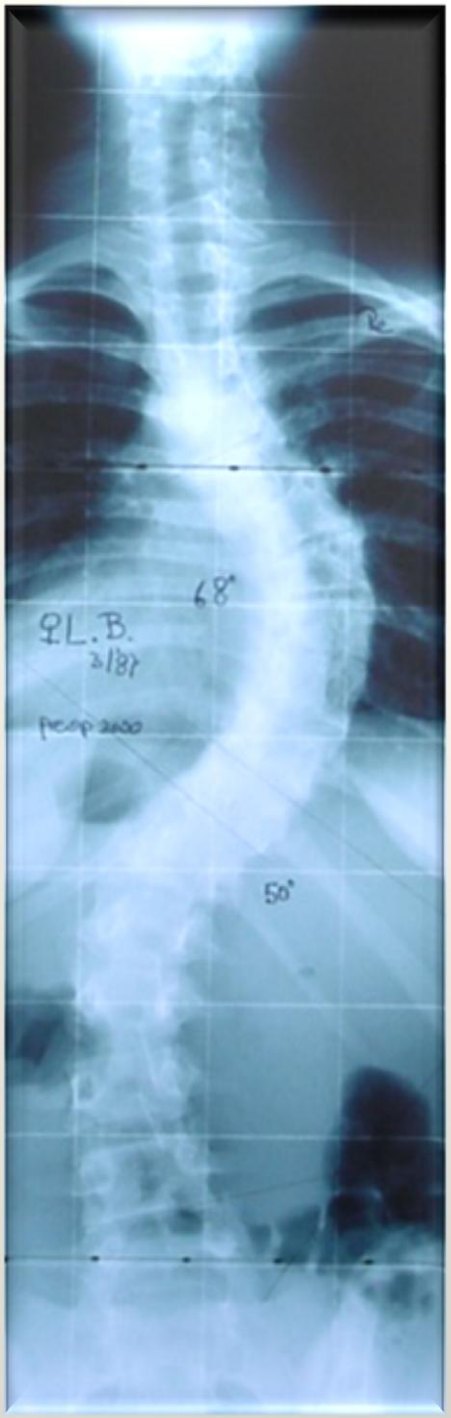
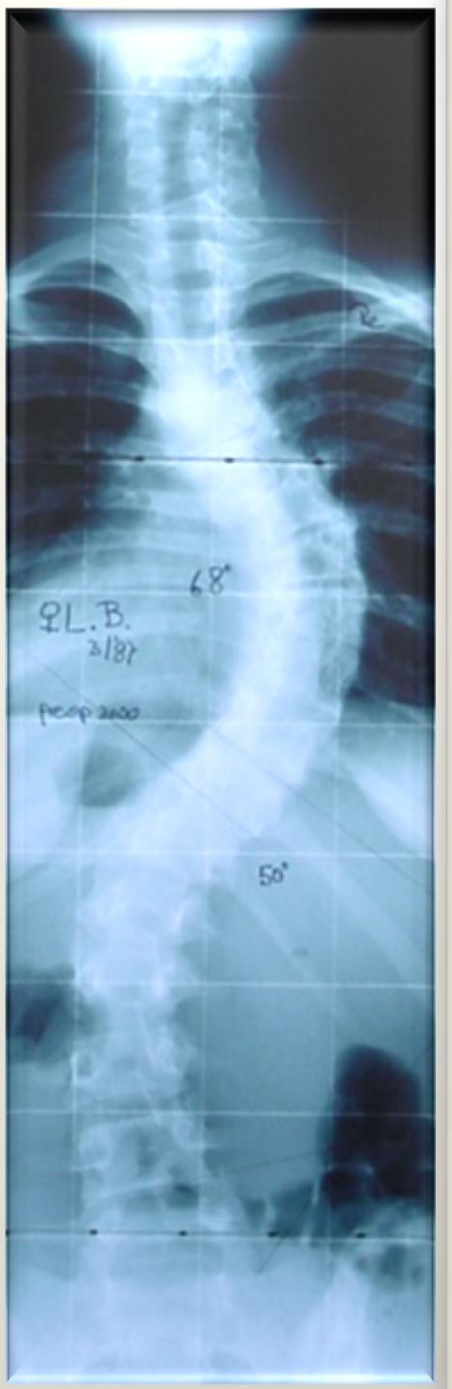


Figure 13.9. Compensated scoliosis shown on *left*, with the occipital protuberance directly above the sacral processes. Decompensated scoliosis shown on *right*, in which poor equilibrium is exhibited by the occipital protuberance located lateral to the midline. A deviation of an inch or more places considerable stress on the contralateral thoracic soft tissues to prevent toppling.


68°
50°


68°
50°

ДИАГНОЗА @ ОЦЕНКА

- The range of motion of the spine is noted in flexion, extension, and side-bending.
- **Side bending** will give an assasement of the flexibility of the scoliosis

НЕВРОЛОГИЧНА ОЦЕНКА

- A brief neurologic examination is performed in ALL patients
- Muscle tone, stregth, and reflexes are evaluated.
- Of importance is the routine evaluation of the superficial **abdominal reflex**, as this has been found to be the only abnormal finding in cases diagnosed as **syringomyelia** and presenting as idiopathic scoliosis

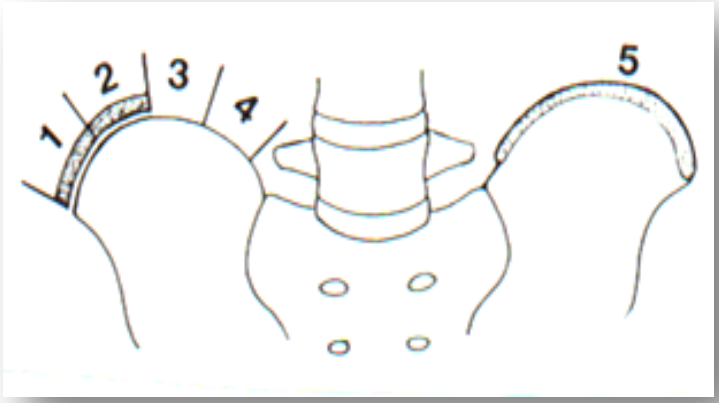
РЕНТГЕНОВО ИЗСЛЕДВАНЕ

X- ray

- Spinal films are viewed as if viewing the patient **from the back**-the right side of the patient is on the right side of the radiograph
- In the initial assessment- an **upright** radiograph.
- When bracing or surgery is indicated **flexibility** views are
- **Main (rigid) / Secondary (compensatory) curves**

Flexibility @ Traction views

Костна зрелост – белег на Risser

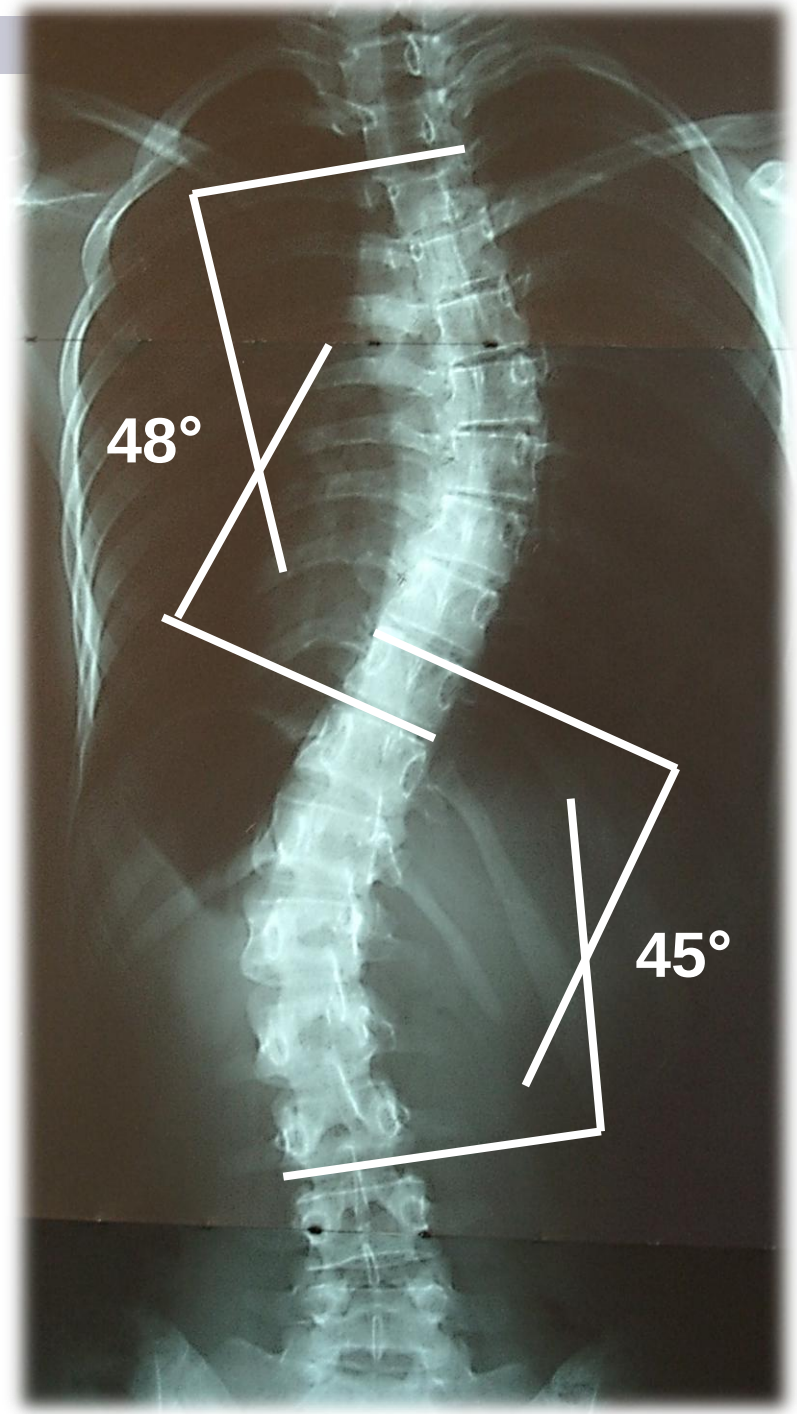


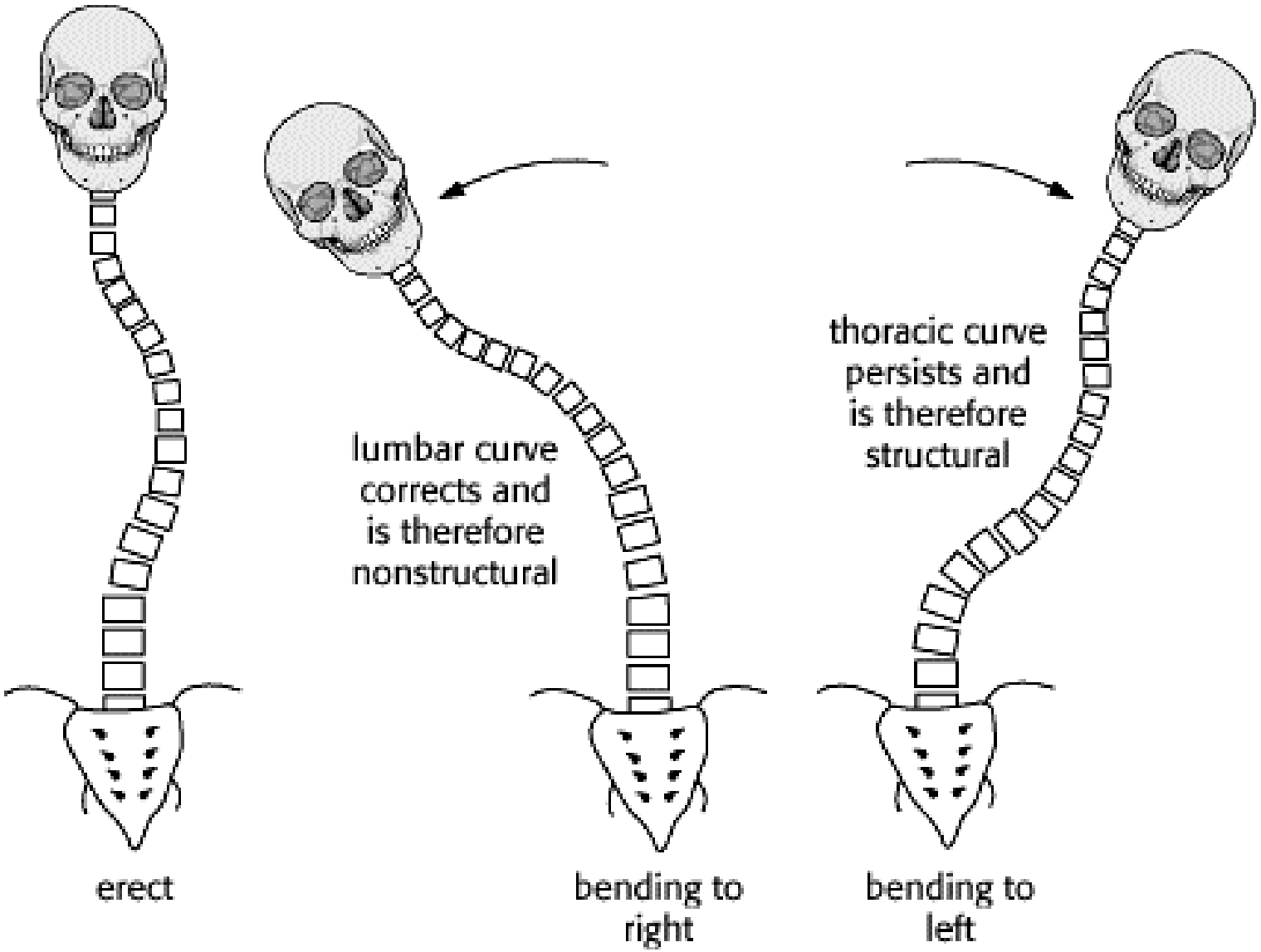
- Risser sign of 4 correlates with the cessation of spinal growth.
- Risser sign of 5 correlates with cessation of height increase

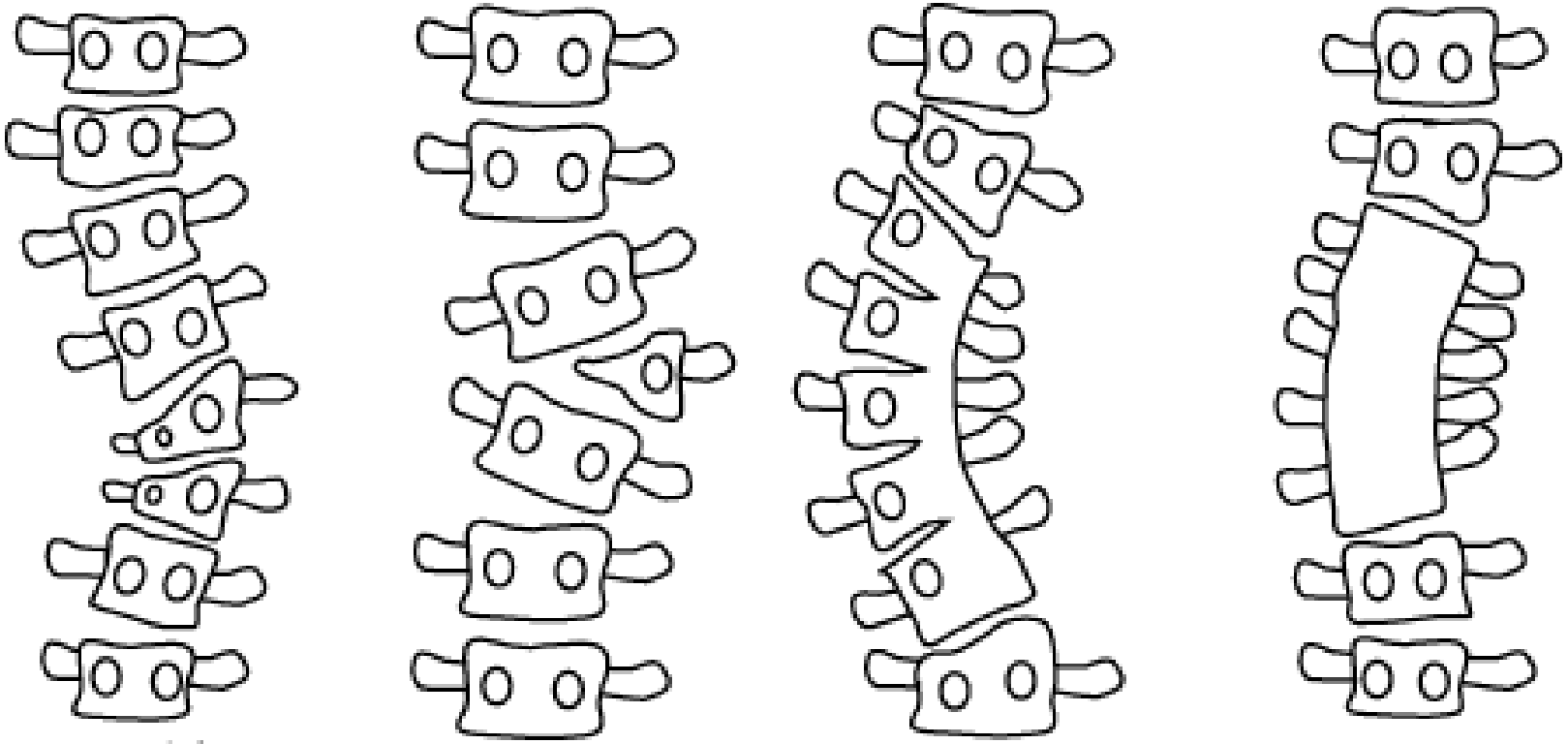
ОЦЕНКА НА КРИВИНАТА

- The radiographs are reviewed to evaluate:
  - the curve pattern,
  - curve magnitude,
  - curve flexibility, and
  - patient's maturity

Измерване на кривината (ъгъл на Cobb)




lumbar curve corrects and is therefore nonstructural
thoracic curve persists and is therefore structural
erect
bending to right
bending to left



partial unilateral failure of formation (wedge vertebrae)

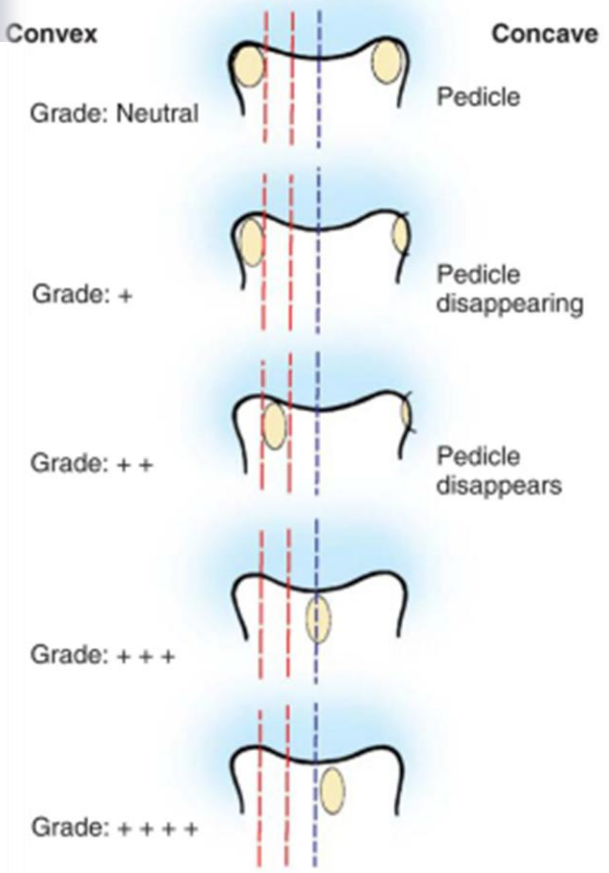
complete unilateral failure of formation (hemivertebra)

unilateral failure of segmentation (congenital bar)

bilateral failure of segmentation (block vertebra)

Оценка на торзията на прешлените според разположението на педикуларната сянка

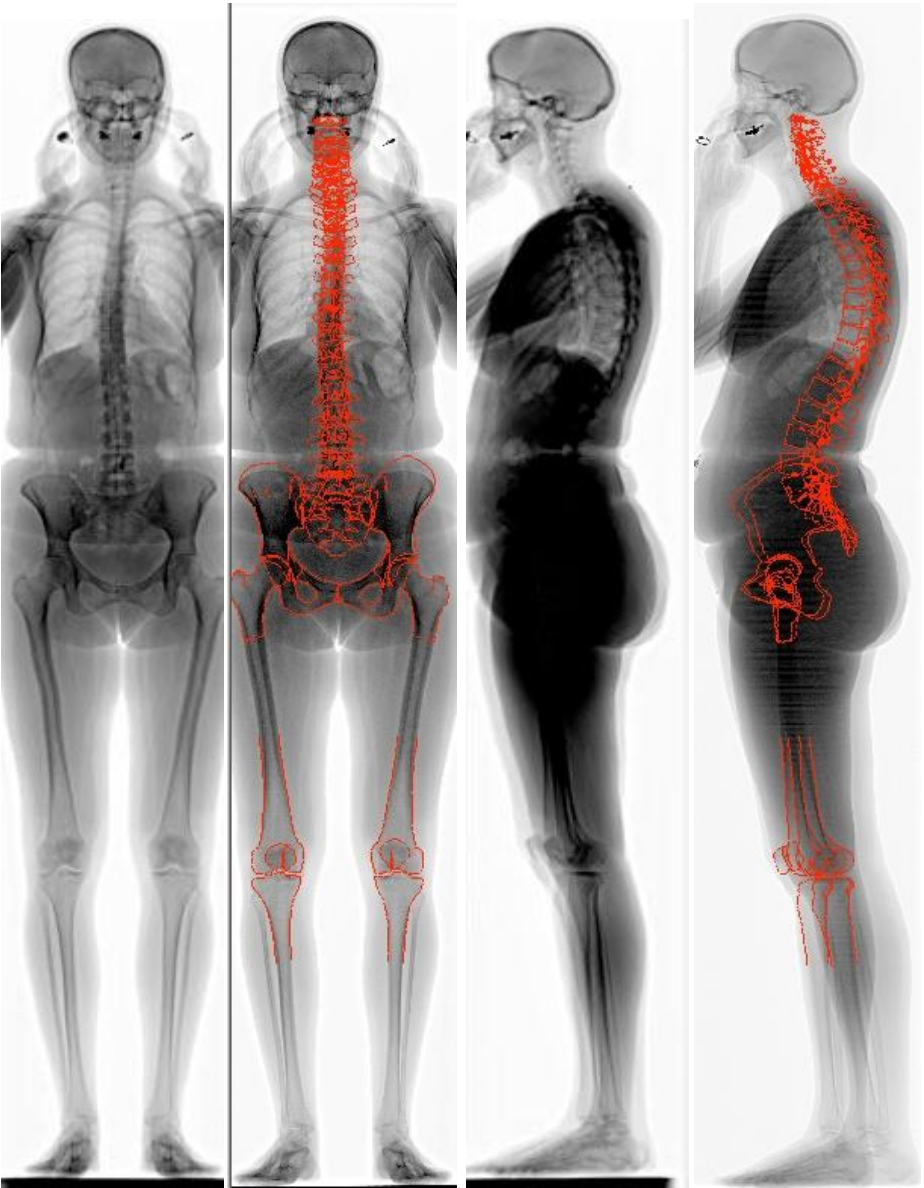
Nash @ Moe, 1969

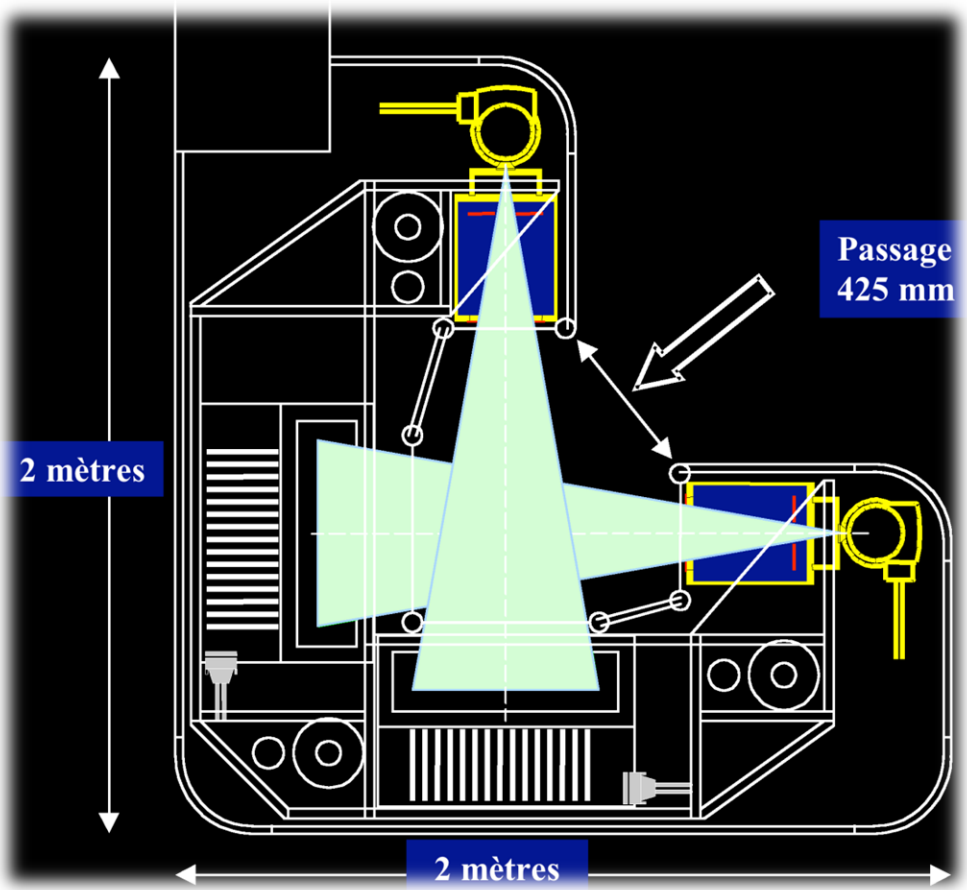


Pedicle	Convex	Concave
Grade: Neutral	No asymmetry	No asymmetry
Grade: +	Migrates within first segment	May start disappearing
	Early distortion	Early distortion
Grade: + +	Migrates to second segment	Gradually disappears
Grade: + + +	Migrates to middle segment	Not visible
Grade: + + + +	Migrates past midline to concave side of vertebral body	Not visible

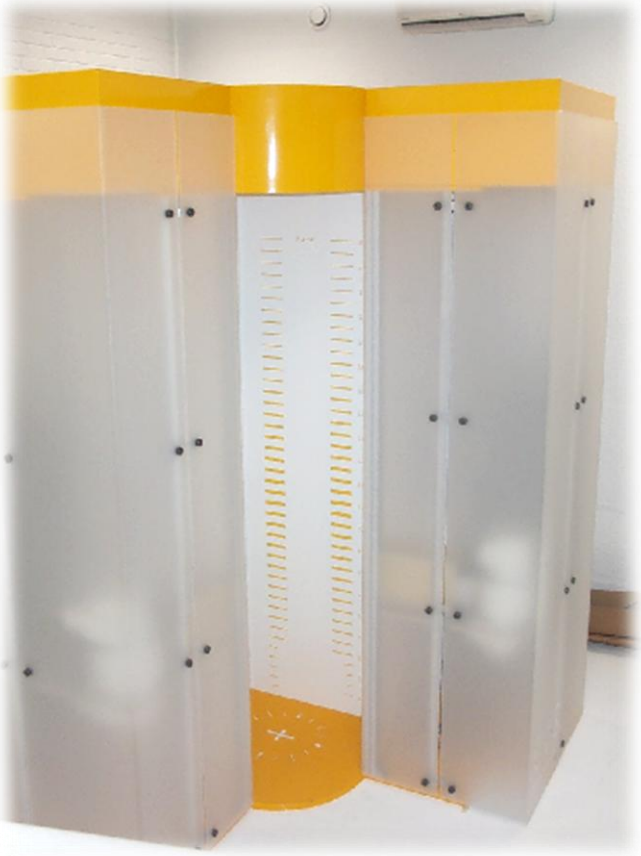
EOS System

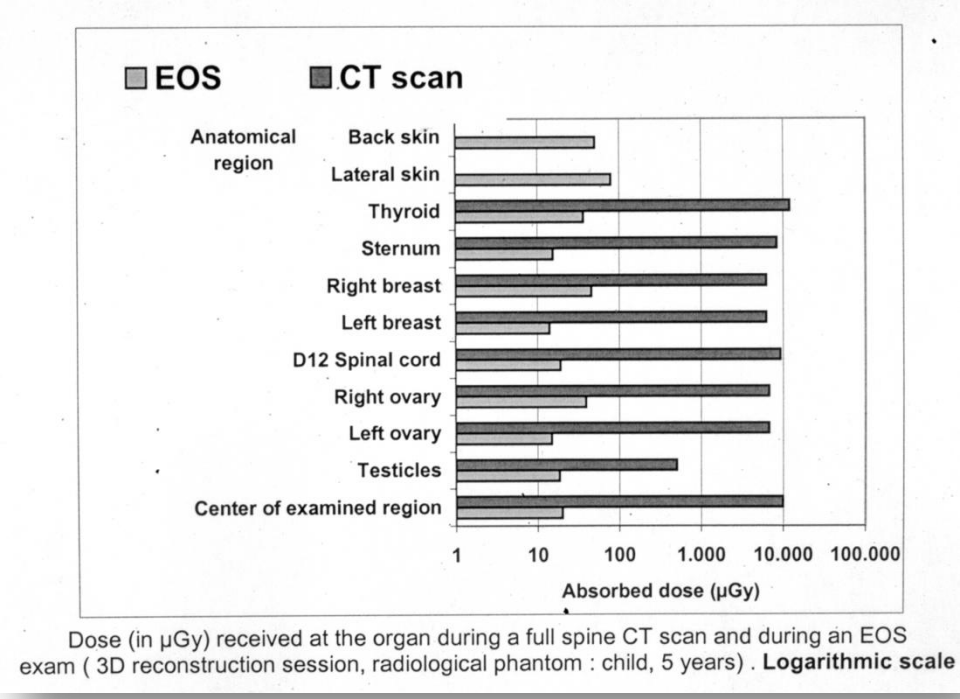
- two perpendicular Xray assemblies (source, detector)
- simultaneous vertical scanning at speeds up to 50 cm (20 inches) per second
- Up to full body : **standing, bent , seated**
- display of front and side 2D radiographs
- software tool for 3D bone reconstruction and display





Radiation dose saved with EOS for 3D reconstructed images





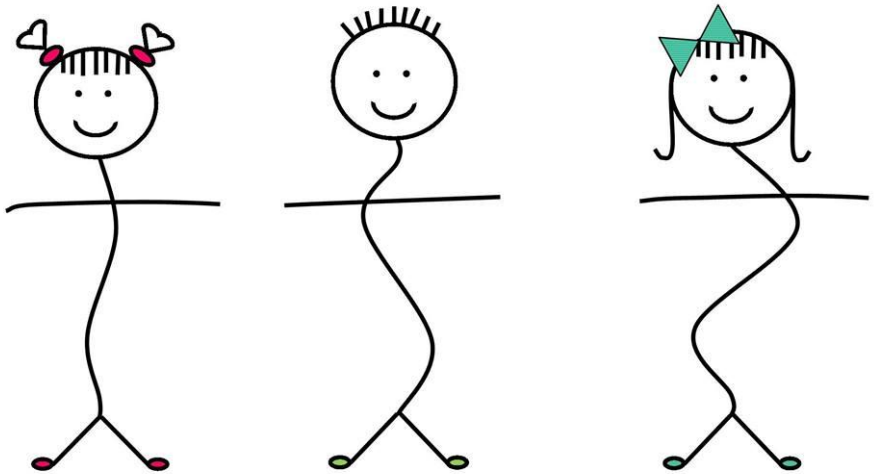
Dose (in µGy) received at the organ during a full spine CT scan and during an EOS exam (3D reconstruction session, radiological phantom : child, 5 years) . **Logarithmic scale**

2D (planar) Imaging : 8 to 10 times less than regular plain X-ray

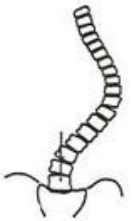
3D Imaging : 100 to 1000 times less than 3D reconstruction with CT Scan

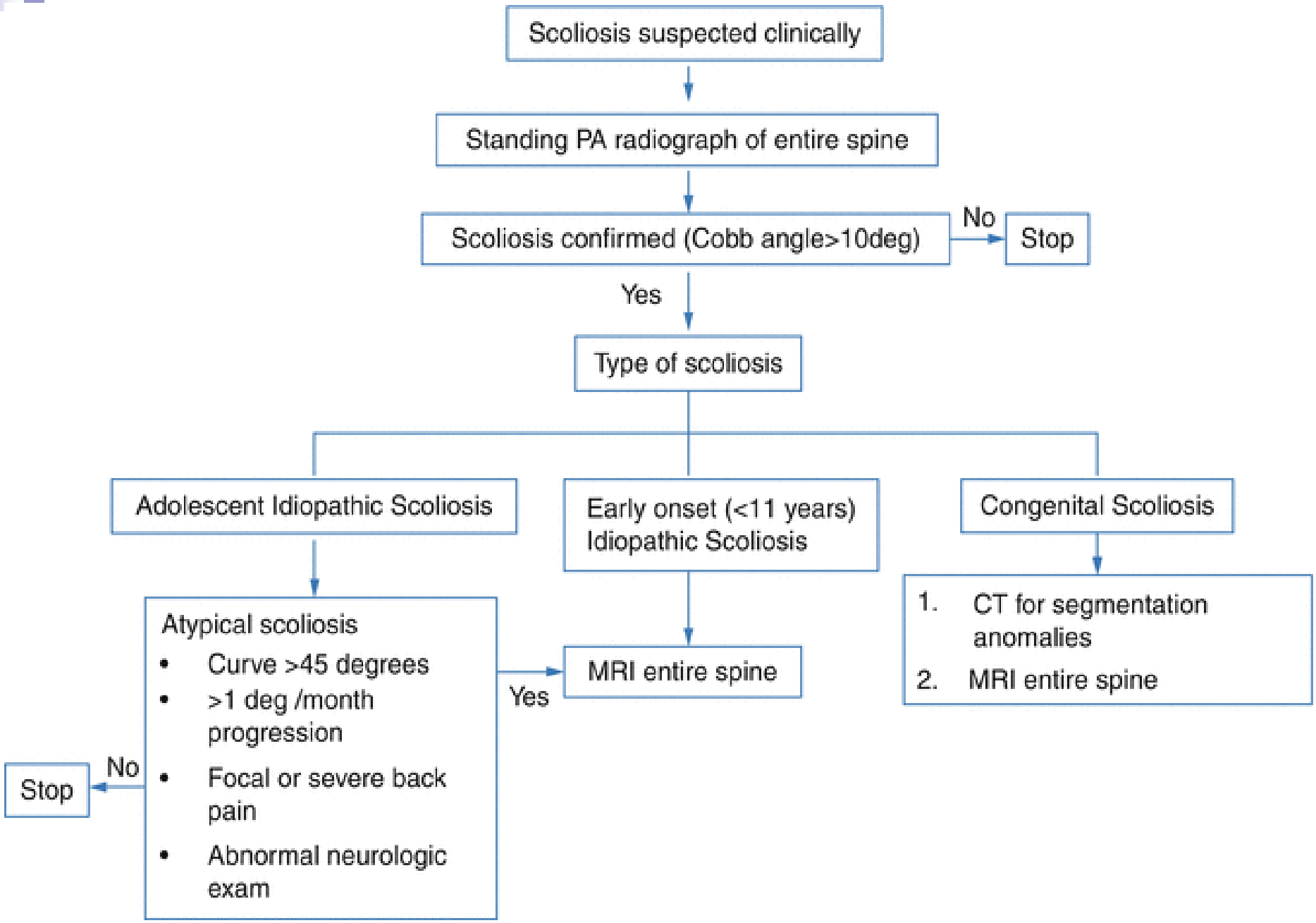
Mild, Moderate and Severe Scoliosis

Facebook: SHIFT Scoliosis



Mild Scoliosis	*Moderate Scoliosis*	*Severe Scoliosis*
10 to 25 degrees	**25-40 degrees**	**40+ degrees**

King type I: A S-shaped curve in which both the thoracic and lumbar curves cross the midline. The magnitude of the Cobb angle of the lumbar curve is larger than that of the thoracic curve on standing roentgenogram. Both curves are structural, with nearly equal flexibility.	
King type II: A S-shaped curve in which both the thoracic and lumbar curves cross the midline. The magnitude of the Cobb angle of the thoracic curve is larger than that of the lumbar curve on standing roentgenogram. The lumbar curve is more flexible.	
King type III: A thoracic curve in which the lumbar curve does not cross the midline (so-called overhang).	
King type IV: A long thoracic curve in which L5 is centered over the sacrum, but L4 tilts into the long thoracic curve.	
King type V: A double thoracic curve with T1 tilted into concavity of upper curve. The upper curve is structural on side bending.	


Scoliosis suspected clinically
Standing PA radiograph of entire spine
Scoliosis confirmed (Cobb angle>10deg)
No
Stop
Yes
Type of scoliosis
Adolescent Idiopathic Scoliosis
Early onset (<11 years) Idiopathic Scoliosis
Congenital Scoliosis
Atypical scoliosis
• Curve >45 degrees
• >1 deg /month progression
• Focal or severe back pain
• Abnormal neurologic exam
Yes
MRI entire spine
No
Stop
1. CT for segmentation anomalies
2. MRI entire spine

ЛЕЧЕНИЕ

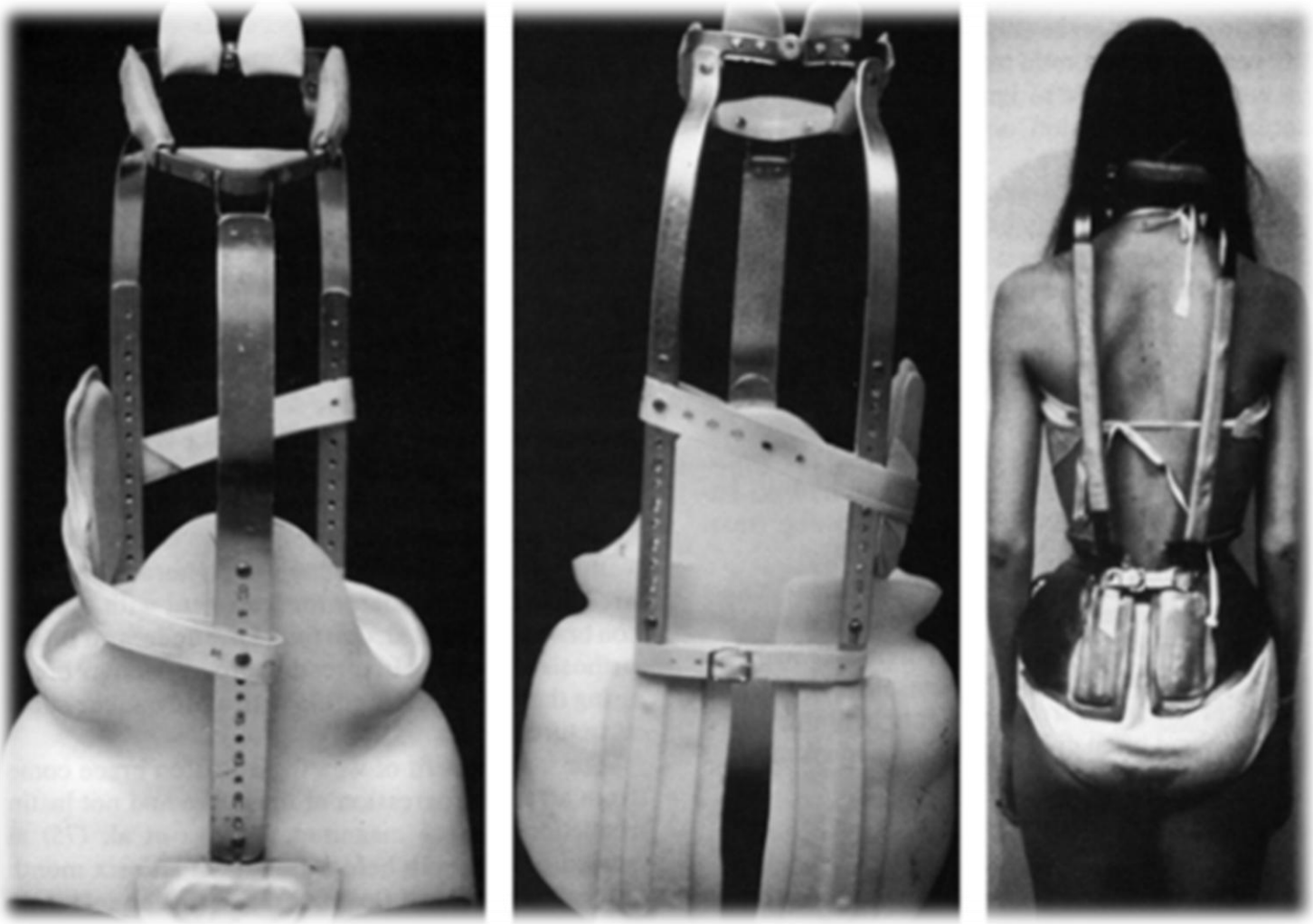
Консервативно:

1. Физиолечение @ гимнастика
   - Йога
   - **Шрот терапия**

1. Коригираща електростимулация.

2. **Корсетолечение**.

Milwaukee brace (CTLSO)
Blount and Schmidt, 1946.



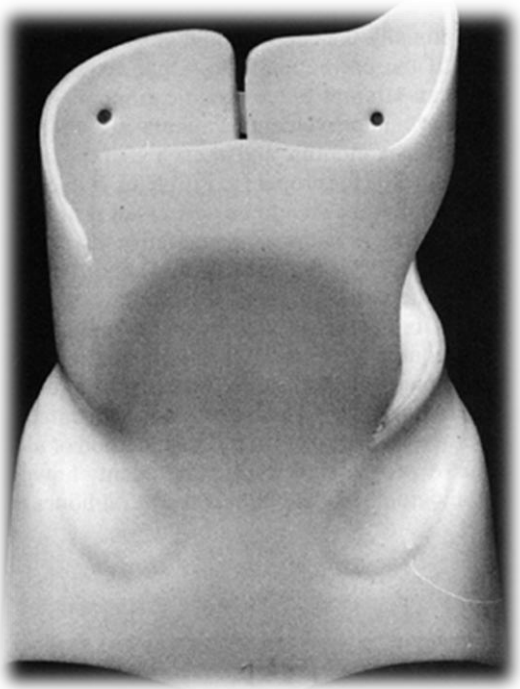
TLSO

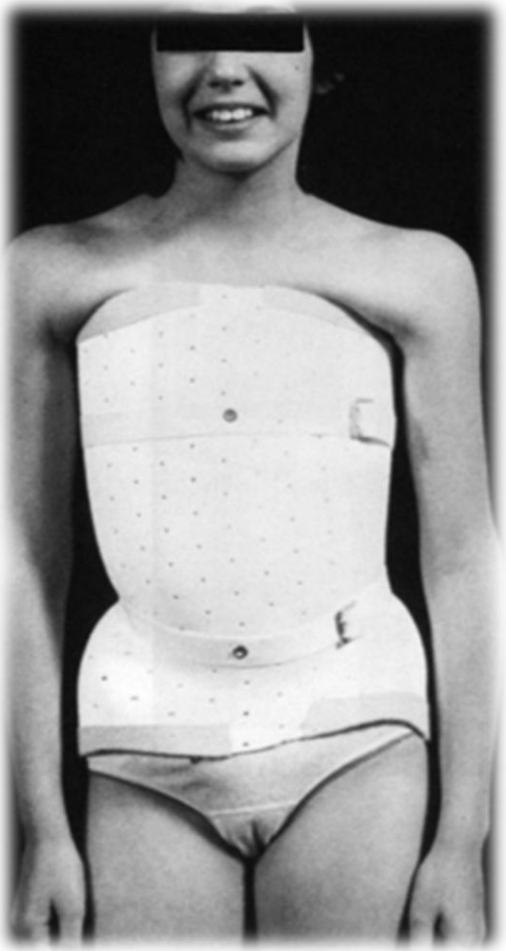
Boston

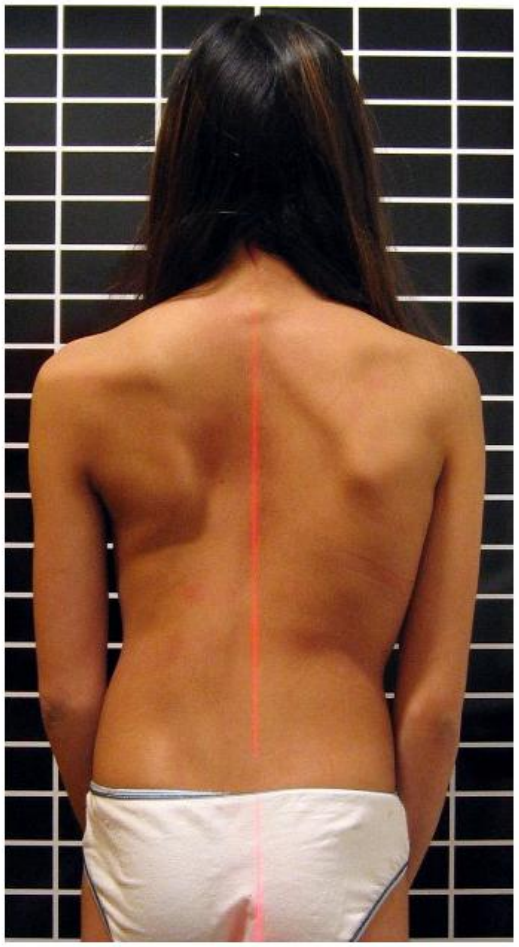
Miami

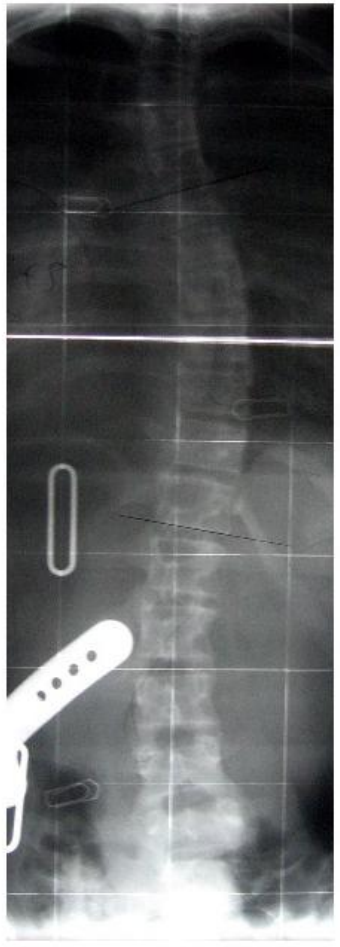
Wilmington

…… etc.







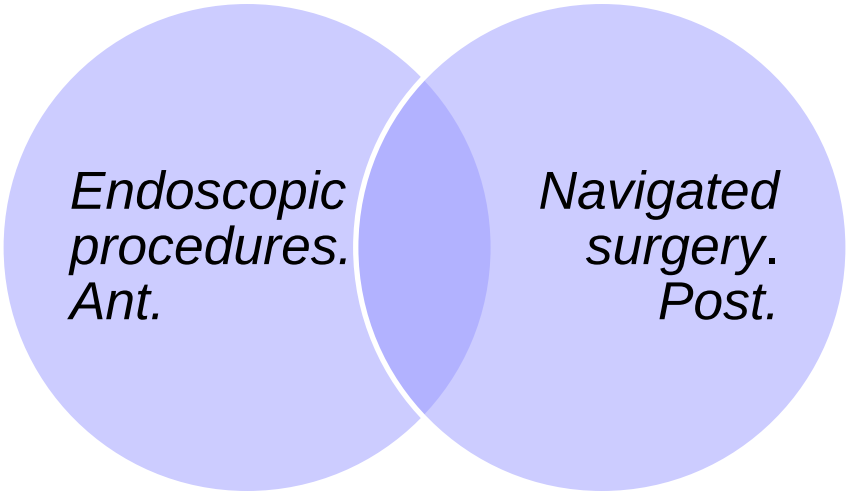



Charlstone bending brace

Оперативно лечение

Конвенционални процедури:

1. Posterior.
2. Anterior.
3. Combined (post + ant).

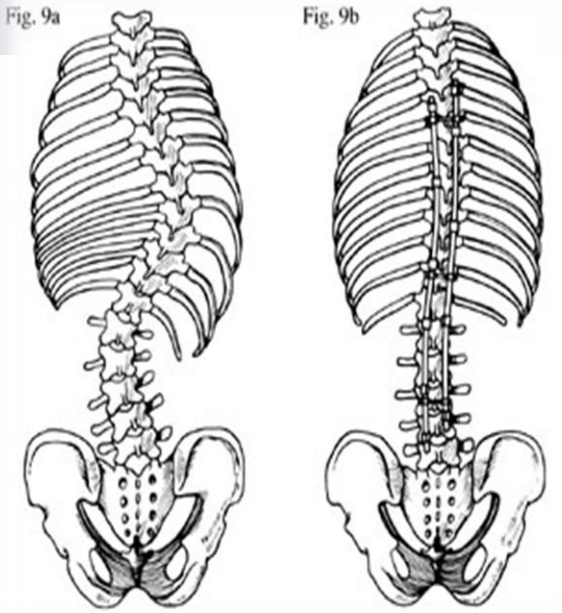


ЦЕЛ на хирургията

STOP the deformity progression.

Obtain @ maintain **balanced vertebral column in 3D** in sitting_standing_walking.

Surgery @ evolution



Hibbs – fusion.
Harrington – hooks and rods.
Luque – segmental system (sublaminar wires).
Cotrel-Dubousset (CD) – rods and multiple hooks.
Pedical screws – Roy-Camille.
Growing rods @ VEPTR.

Before Surgery

After Surgery

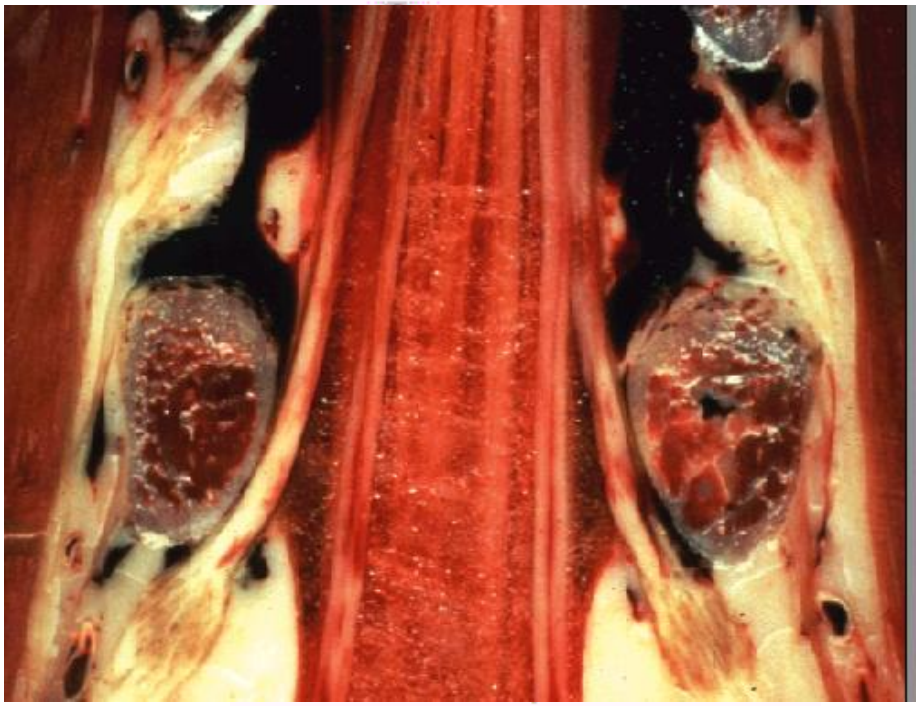
Before Surgery

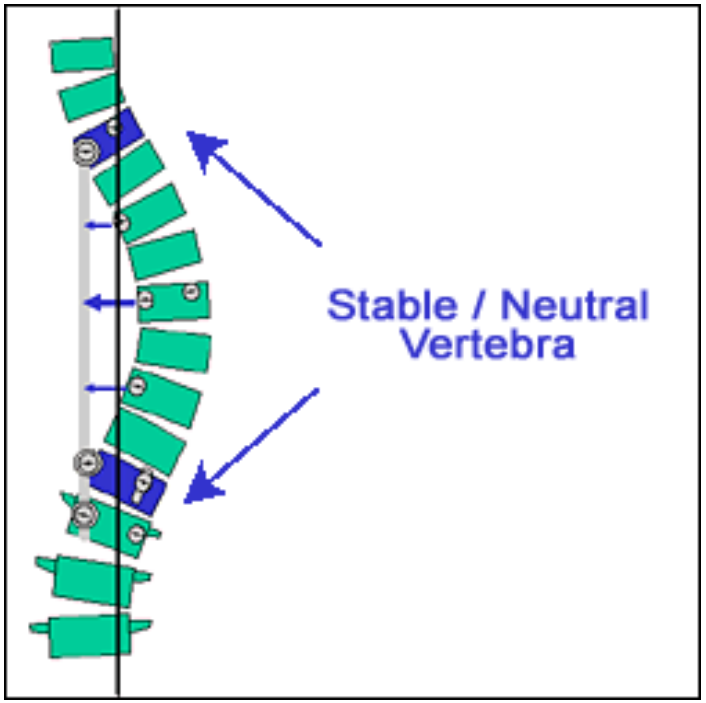
After Surgery

The pedicles

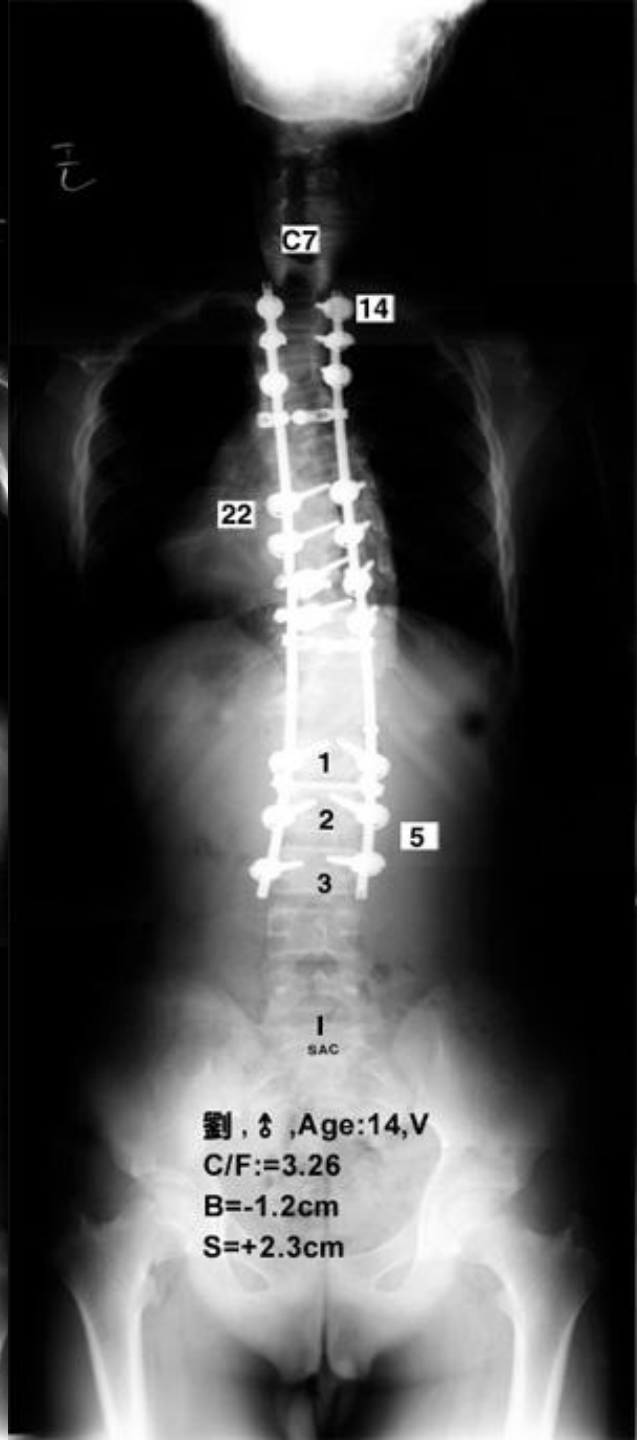
-Junction between the anterior vertebral body and posterior arch.

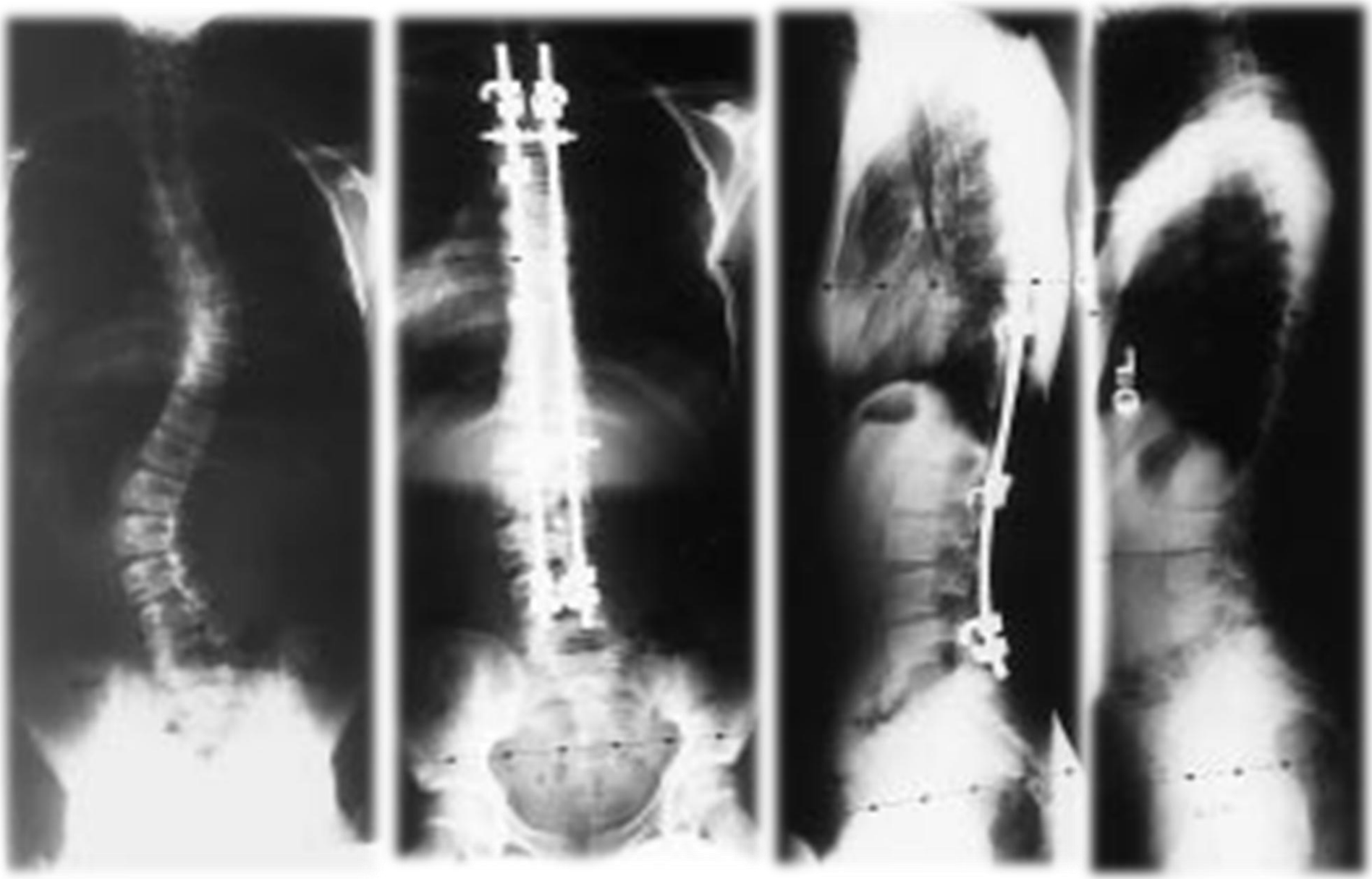
-Strongest part of the vertebrae.

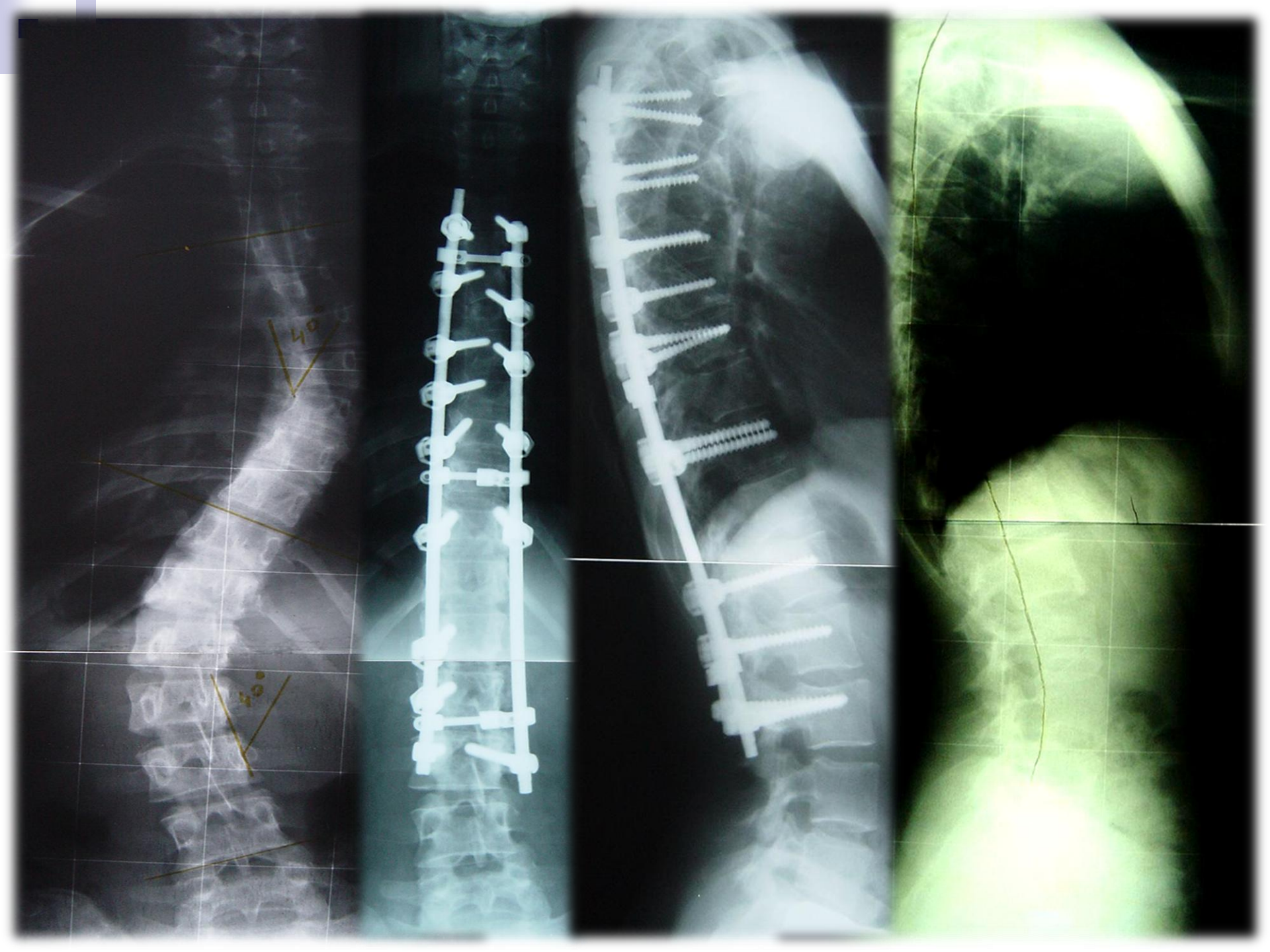



Stable / Neutral
Vertebra

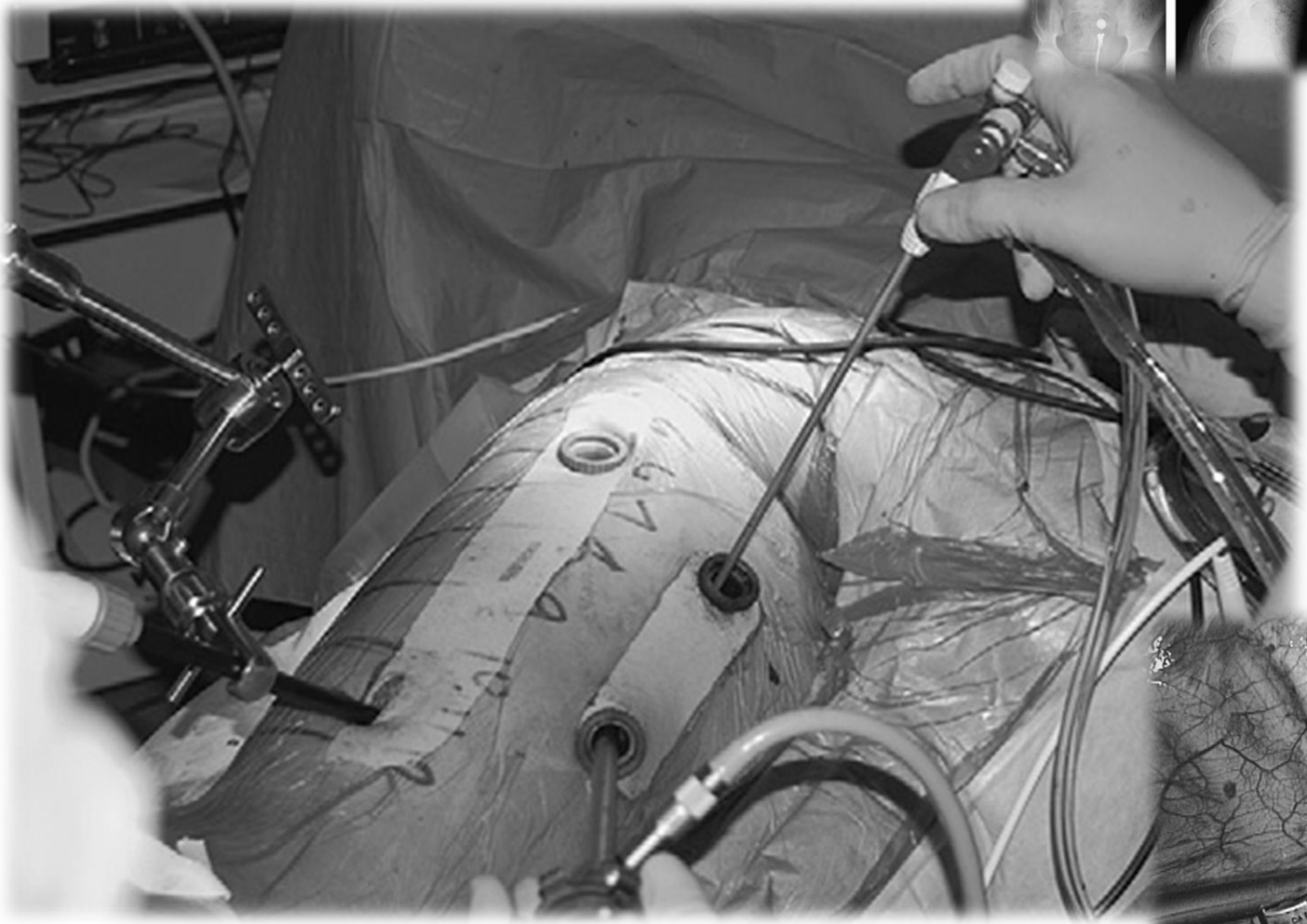

C7
34
84
3
40
SAC
劉 , ♀ ,Age:14,V
F=22.6%
B=0.1cm
S=3.3cm

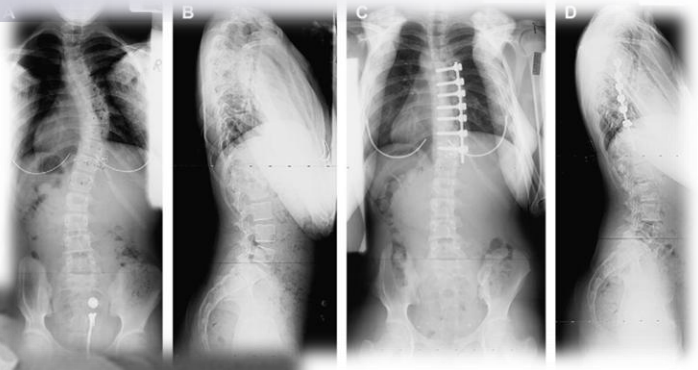

C7
14
22
1
2
5
3
SAC
劉 , ♀ ,Age:14,V
C/F:=3.26
B=-1.2cm
S=+2.3cm



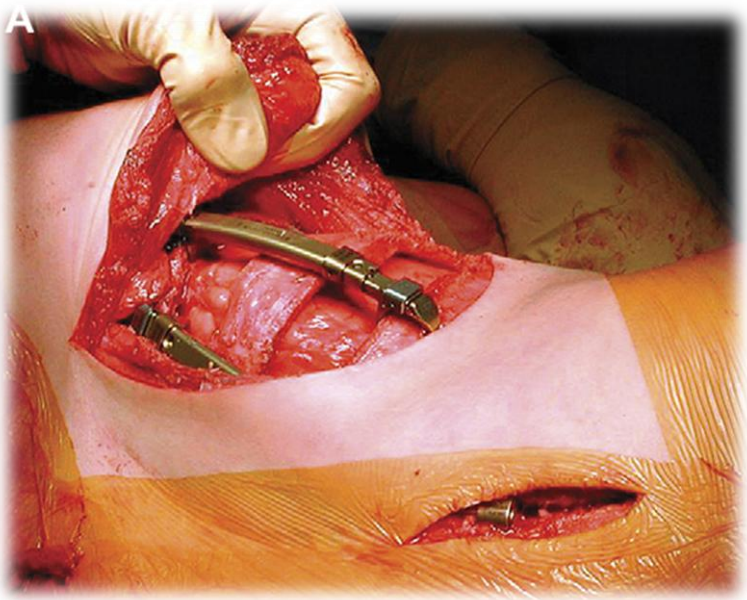

40°
40°

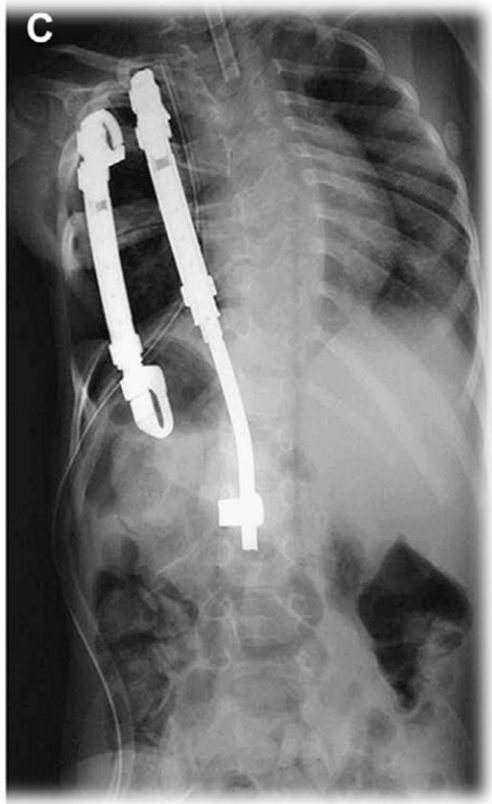
Thoracoscopic surgery





Thoracic insufficiency
VEPTR






Thank You for the attention!