Third Botswana Spine Care Conference

"Creating a country wide program for the prevention of spine disability"

The Gaborone International Convention Center Gaborone, Botswana

May 7 and May 8, 2018

World Spine Care

Adult degenerative scoliosis:

the extent of surgery - does it correspond to the extent of deformity? and how to handle failures.

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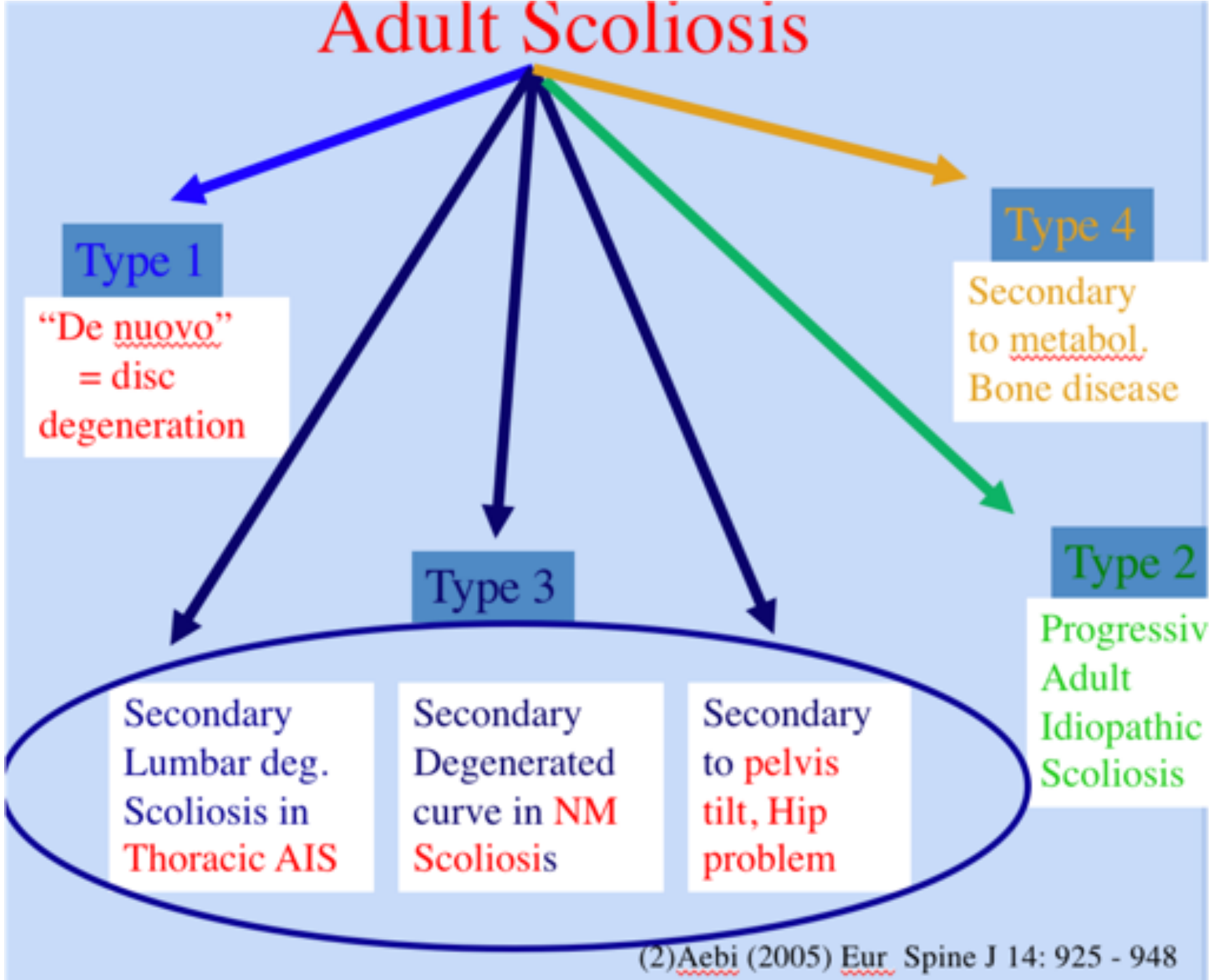
Professor Emeritus Orthopedic Surgery

University of Bern (CH) and McGill University, Montreal (CND)

Member European Academy of Science (EurASc)

4:10 – 4:30 PM.

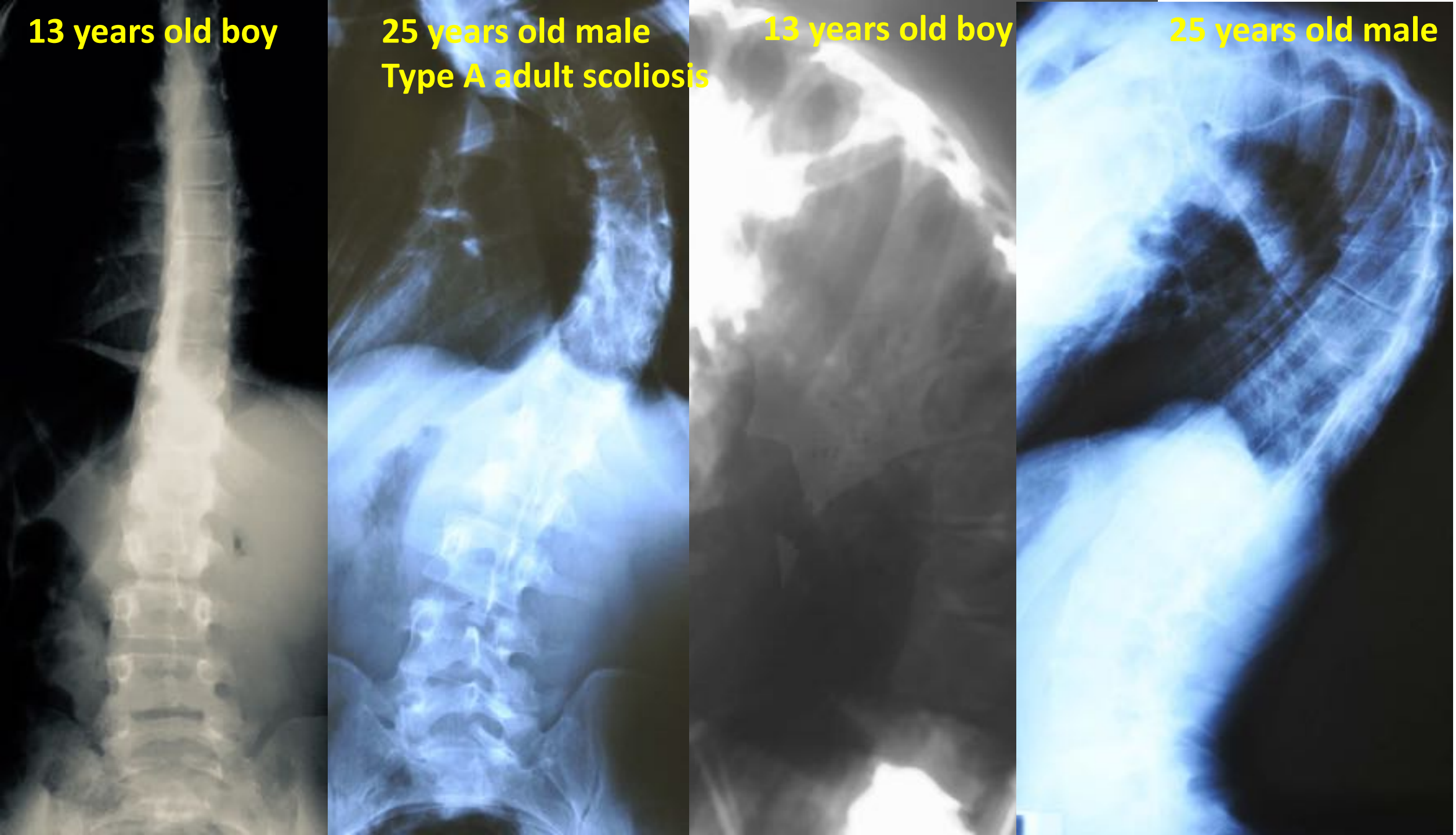

Adult Scoliosis
Type 1
"De nuovo"
= disc
degeneration
Type 4
Secondary
to metabol.
Bone disease
Type 2
Progressiv
Adult
Idiopathic
Scoliosis
Type 3
Secondary
Lumbar deg.
Scoliosis in
Thoracic AIS
Secondary
Degenerated
curve in NM
Scoliosis
Secondary
to pelvis
tilt, Hip
problem
(2)Aebi (2005) Eur Spine J 14: 925 - 948

Natural History of Progressive Adult Scoliosis

Marty-Poumarat, C. et al. Spine (2007): 32(11);1227-1234

Two main types exist:

- adolescent scoliosis, which continues to progress in adult life (type A);
- or late onset scoliosis, *de novo* (type B) - is a multilevel disc disease


13 years old boy
25 years old male
Type A adult scoliosis
13 years old boy
25 years old male

G.V. 25 y/o boy postop. progressive kyphosis. T4-L2 PSF, Ponte OT, sublaminar wiring

Epidemiology

The *prevalence of ASD* is increasing in industrialized countries due to an aging population, demographic shifts, increased life expectancy and, likely, increased recognition of the disorder.(1,2,3)

Botswana Population: 2.3 Mio. (2018)

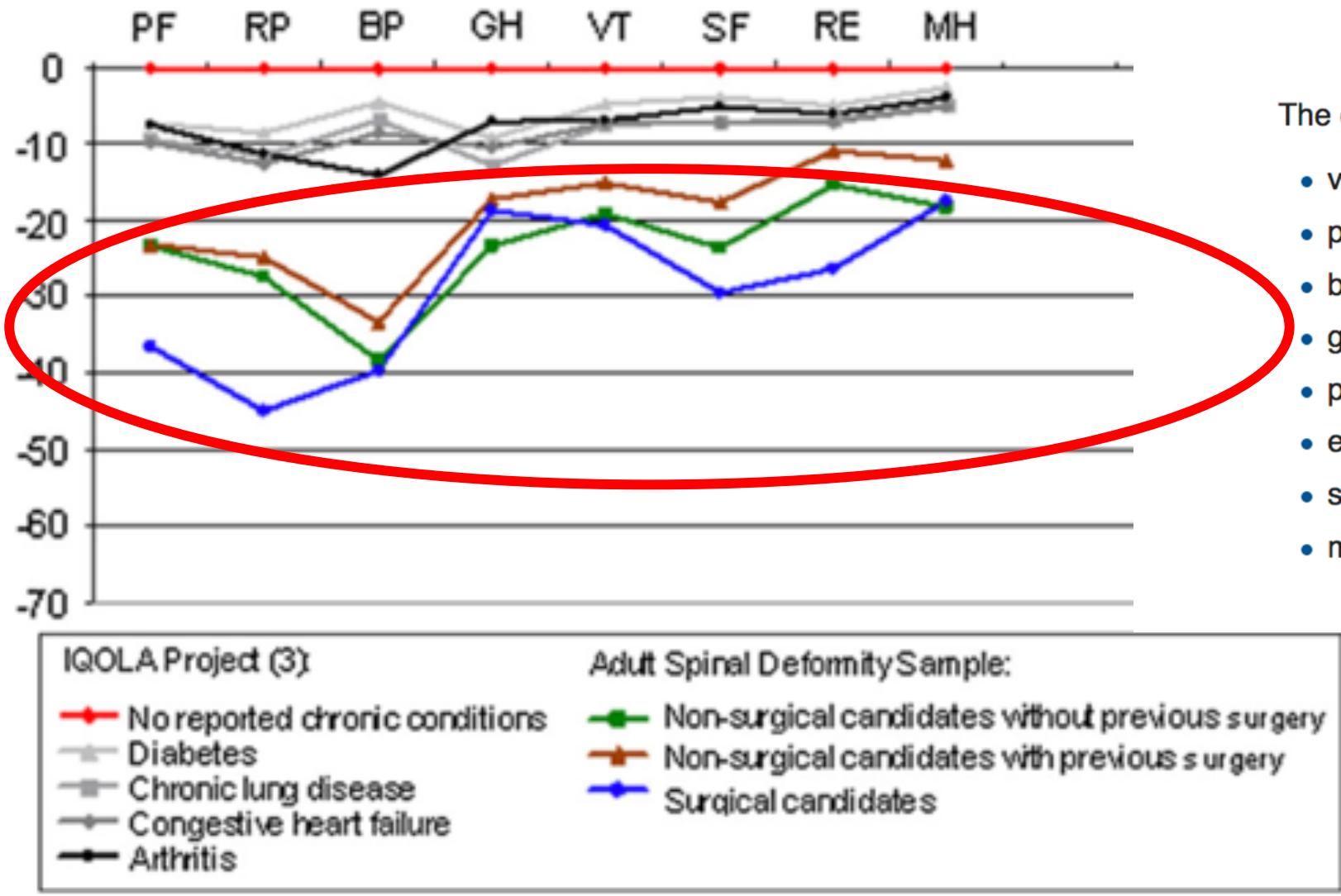
AIS:

33% is younger than 15 years = 750‘000 people
2-3% of adolescent population has **AIS**: ca. 5000 AIS

Adult Degenerative Scoliosis, all forms

6% prevalence of **adult scoliosis** in population > 50 years old
(= ca. 500‘000 of the population) corresponds to ca. 30‘000 people with adult scoliosis.

Number of patients, who need some sort of surgery is unknown, but still a significant number.



The eight sections are:

- vitality VT
- physical functioning PF
- bodily pain BP
- general health perceptions GH
- physical role functioning RP *
- emotional role functioning RE
- social role functioning SF
- mental health MH

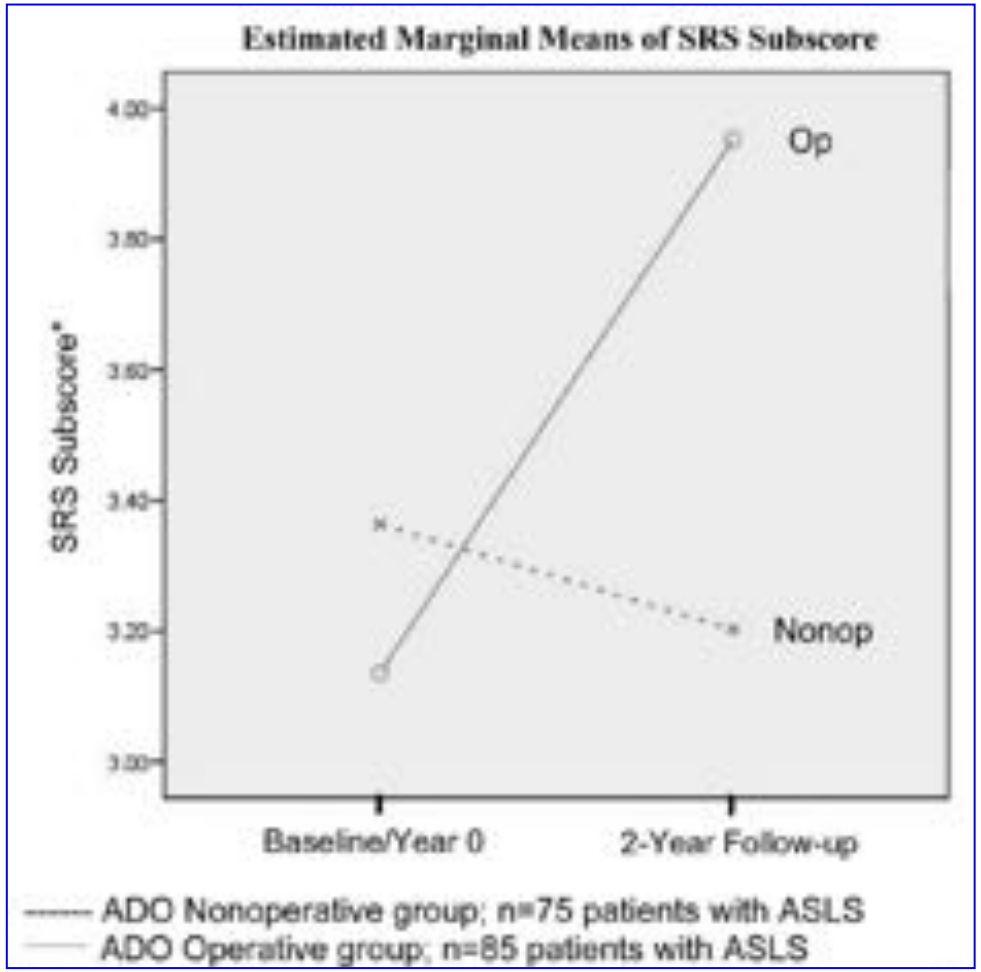
Fig. 1 SF36 scores in ASD patients and in four chronic conditions as assessed in the IQOLA project ADS Study Group ESJ (2015) 24:3-11

* Role limitations due to physical health

- **Patients improvement**: better **after surgical treatment** than medical treatment

- Improvement in SRS scores

- Significant rate of complications: **9-66%**
  - **>50 yo: 55%**
  - <50 yo: 31%



Bridwell, Spine 2009
Smith, Neurosurg. 2009
Smith, Spine 2009
Li, Spine 2009

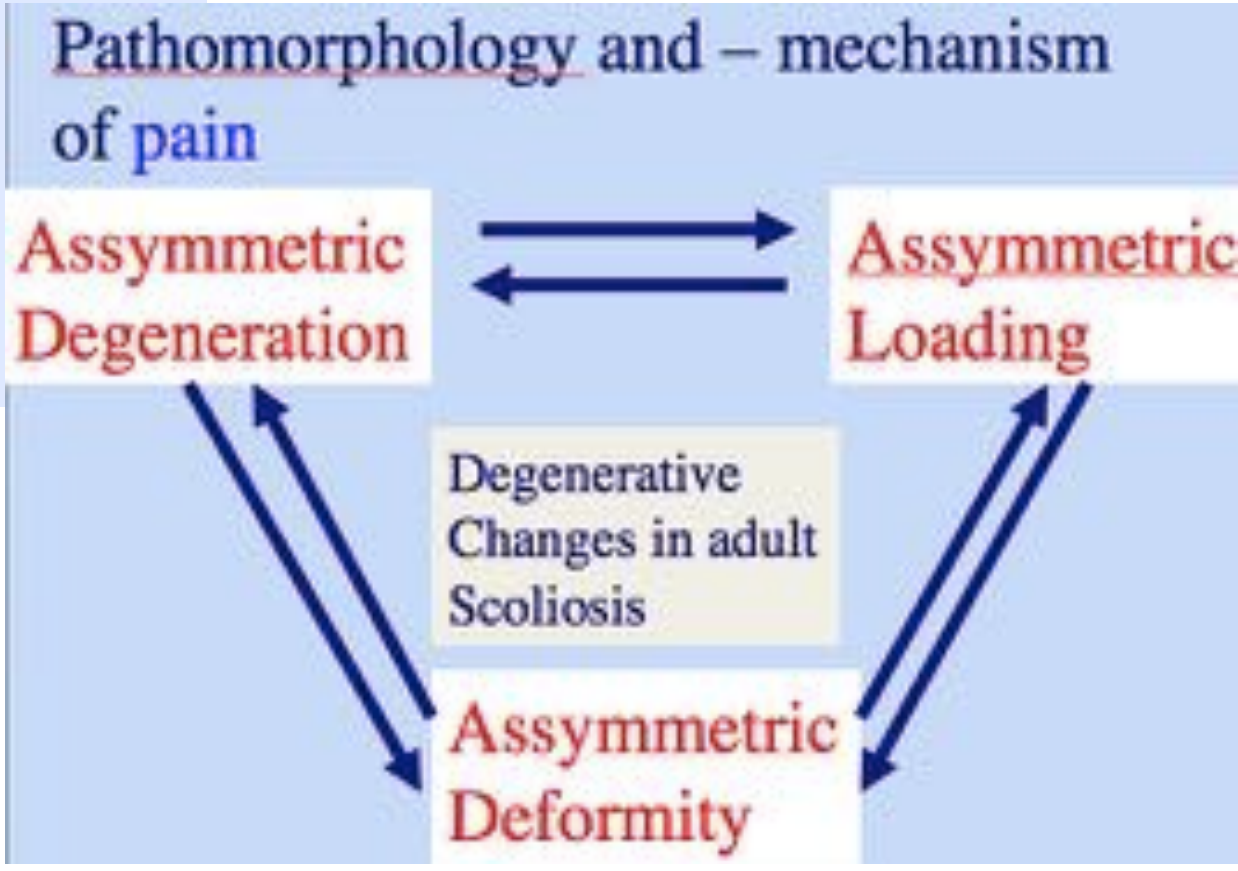
Degenerative Adult Scoliosis

De novo deg. Scoliosis is the most frequent form of
Adult Scoliosis
In the industrialized countries

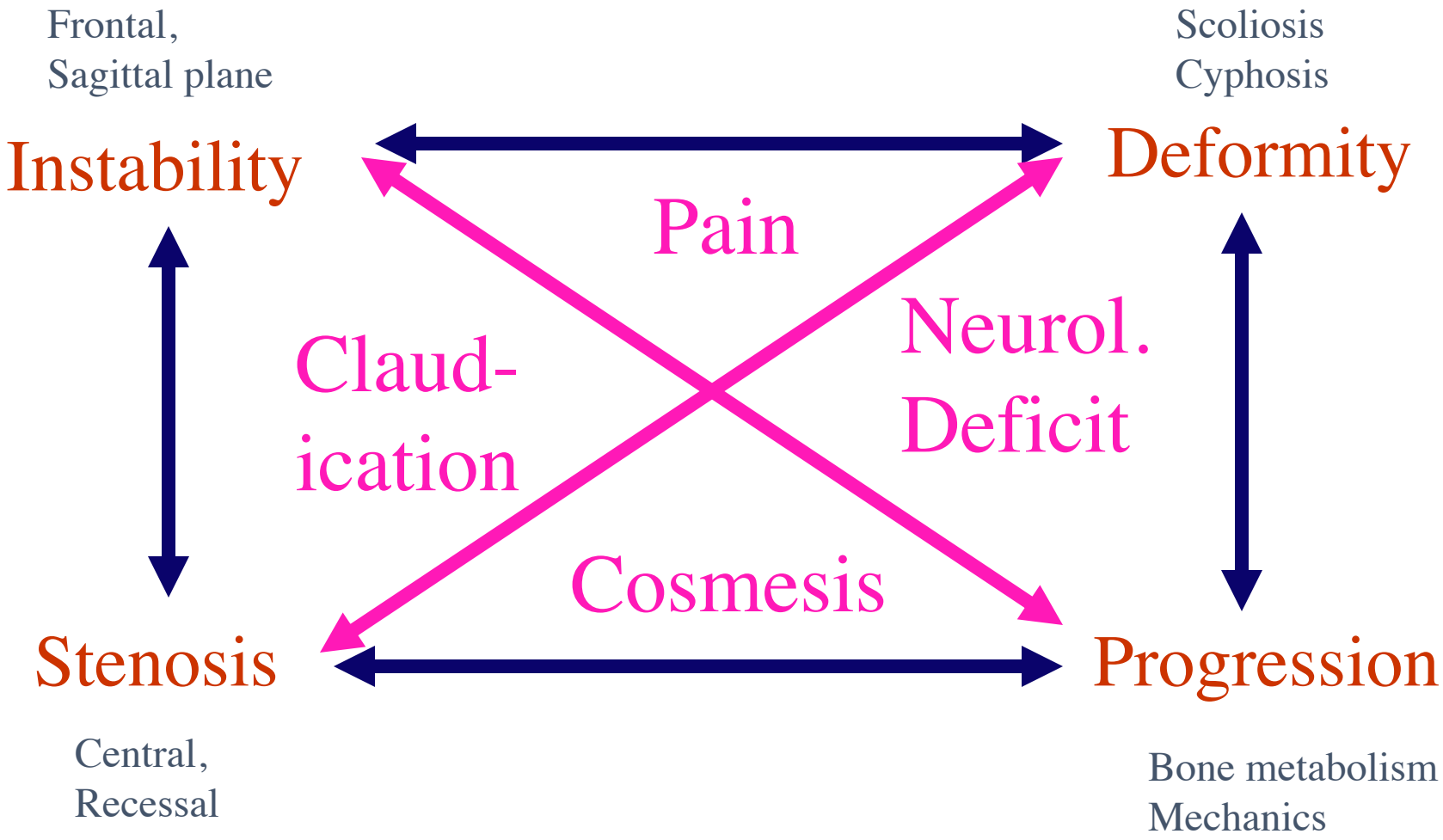
This is a multilevel disc disease!

Cause of symptomatology

- Degenerative disc disease, loss of disc height, osteochondritis, pathological movement
- Facet joint arthritis, asymmetrical facet joints, subluxation
- Osteoporosis, osteoporotic compression fractures
- Spino-pelvic parameters
  - Sagittal orientation of the pelvis
    - Pelvic tilt
    - Sacral slope
  - Intrinsic shape of the pelvis
    - Pelvic incidence



Adult,deg. Scoliosis



Clinical Presentation

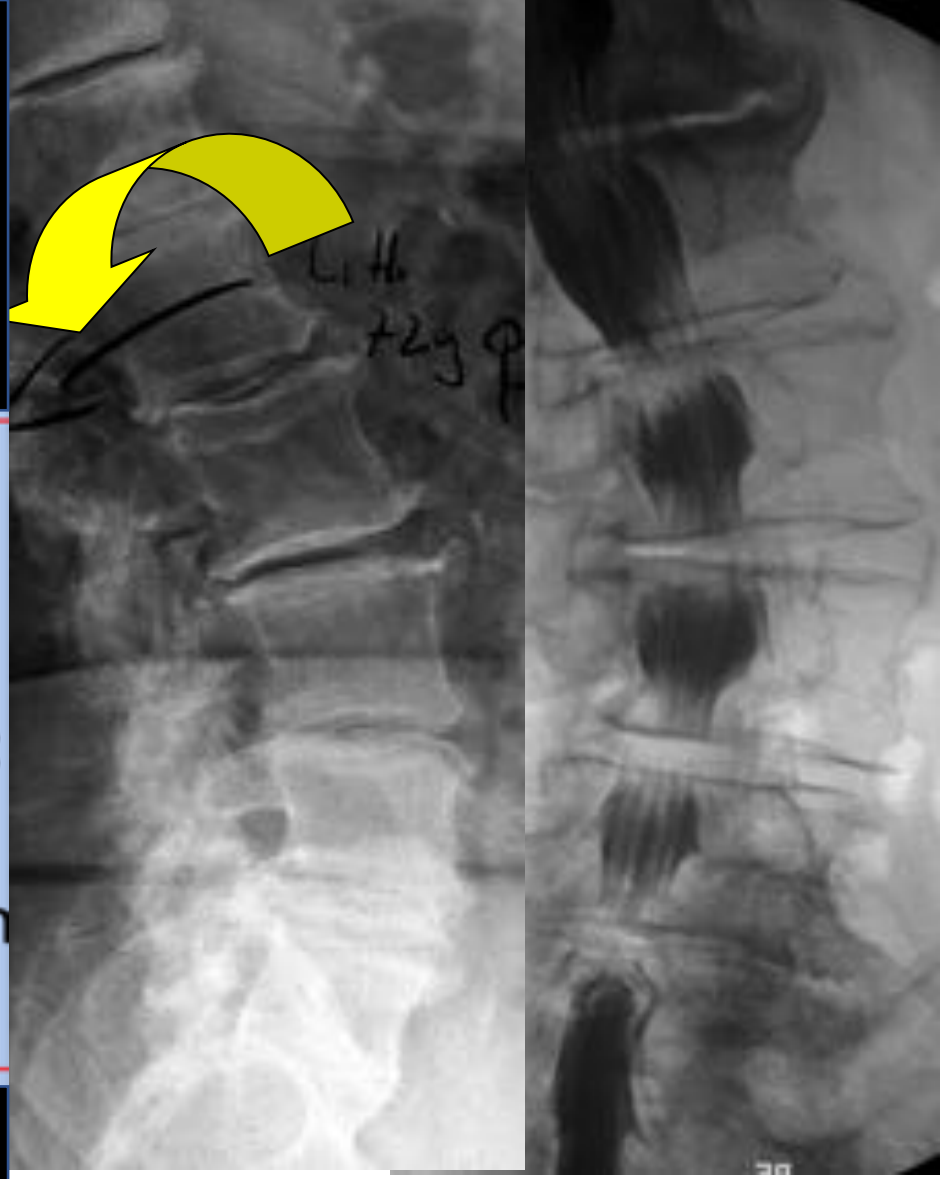
- ***Pain*** Back pain 40% to 90%
  - At the apex
  - Referred pain
  - Radicular pain
    - At concavity
    - At convexity
  - Pain due to stenosis (claudication)
  - Pain associated with sagittal compensation and decompensation
- ***Functional disability: global axial instability and local instability***
- ***Increasing deformity and imbalance***
- ***Neurological Deficit: root irritation, claudication symptoms in central stenosis***

Incidence of back pain similar to general population but greater and more persistant

Psychological impact of chronic pain associated with deformity

Functional x-rays

Traction for a “collapsing” spine: realignment: see the air inclusion in the mobile disc.

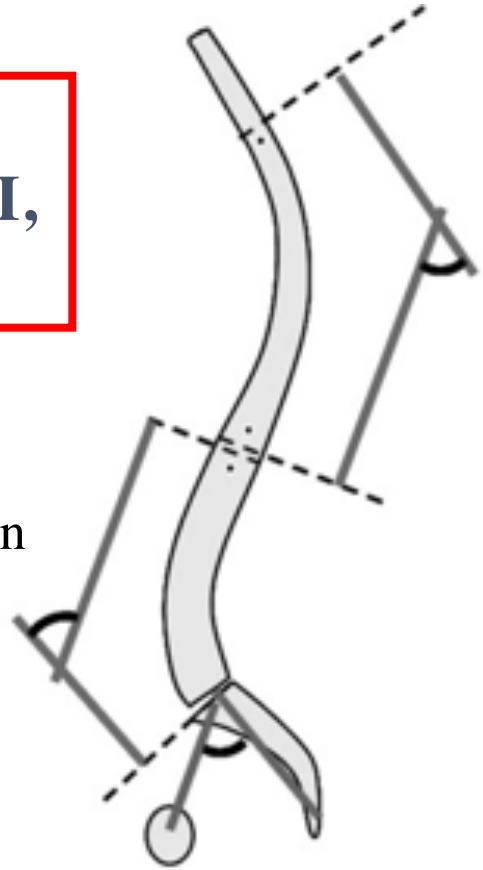


Flexion/extension and side bending view: native and with functional myelogram

Realignment objectives in the sagittal plane. SVA< 60mm PT < 20° , and LL PI +/- 9° sets the stage for achievement of a successful harmonious spinopelvic realignment.

Chain of interconnected parameters: TK – LL – PI, SVA and T1-SPI

LL = Lumbar Lordosis
TK = Thoracal Kyphosis
T1-SPI =Spino pelvic inclination



SPINE (2010): 35(25), 2224ff F. Schwab et al

SVA<50mm

PT<20°

Spino-Pelvic Harmony
LL=PI +/- 9°

Clinical Presentation

Risk factors:

- Osteoporosis
- Osteomalacia
- Age
- Early asymmetric disc degeneration

Strategy and technique selection

- Previous surgery?
- Free levels
- Focal deformity, sagittal balance?
- More correction in lower levels
- Risks
  - Bleeding
  - Surgery duration
  - ICU
  - Neurological risks

Eur Spine J (2014) 23:1815–1824
DOI 10.1007/s00586-014-3219-9

IDEAS AND TECHNICAL INNOVATIONS

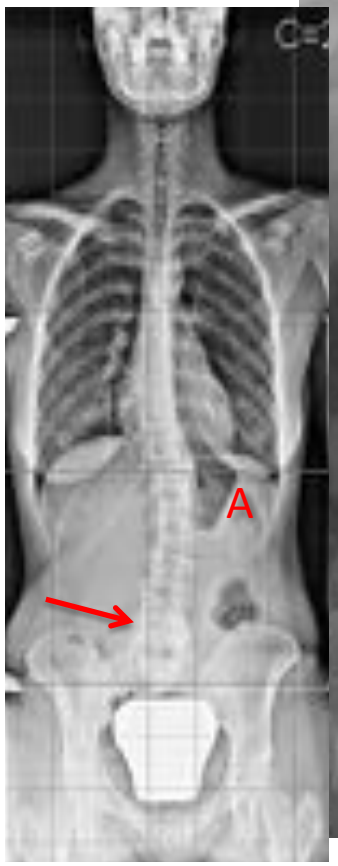
Classification of degenerative segment disease in adults with deformity of the lumbar or thoracolumbar spine

Pedro Berjano · Claudio Lamartina

Position of diseased discs, balanced

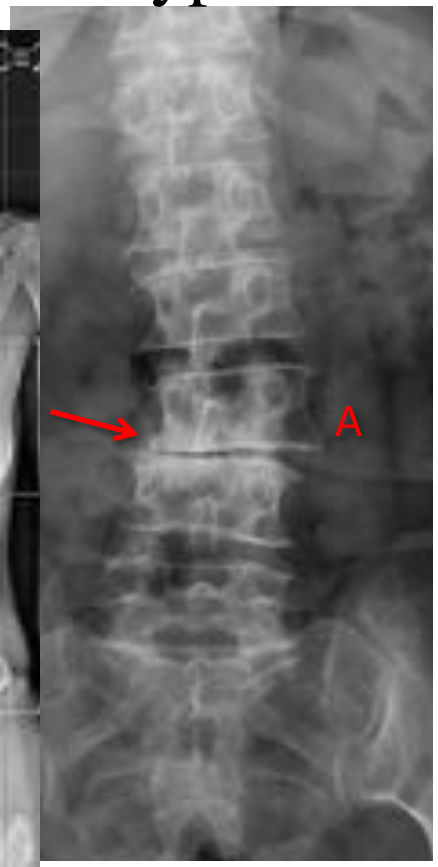
Imbalanced

Type I



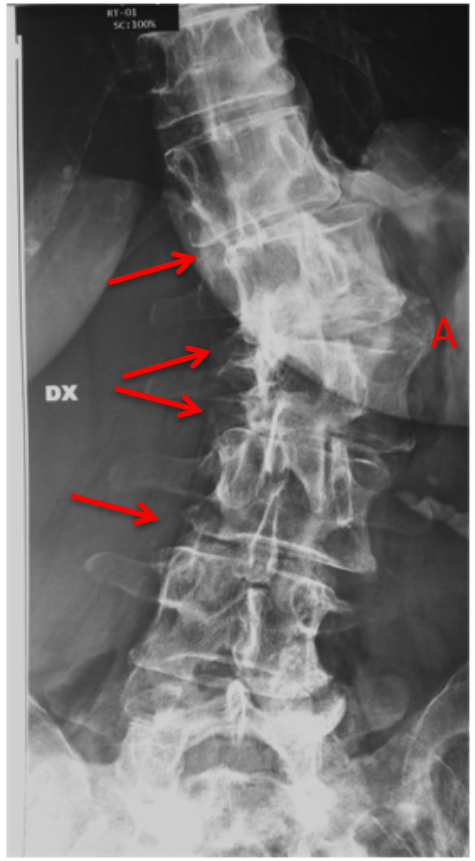
Far from apex: NONAPICAL

Type II



Limited to apex: APICAL

Type III



All the coronal curve: EXTENDED

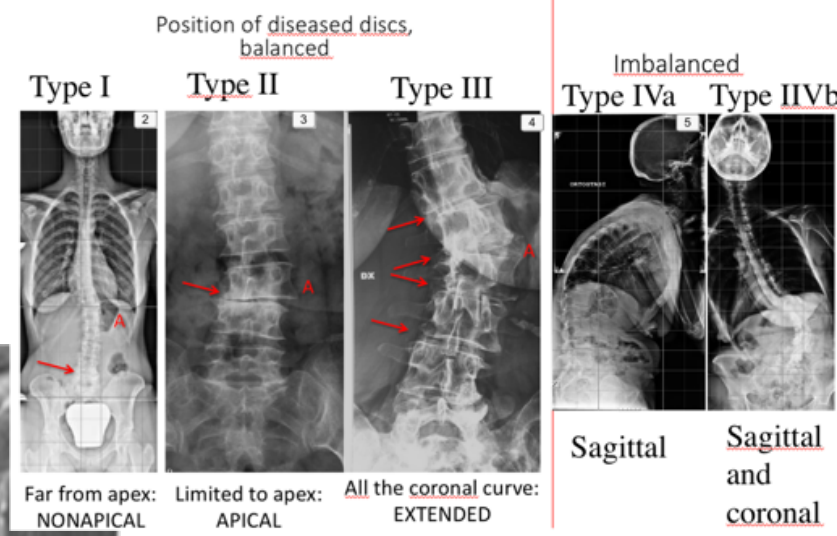
Type IVa

Sagittal

Type IIVb

Sagittal and coronal

Type I: (balanced)
Localized **NONAPICAL**

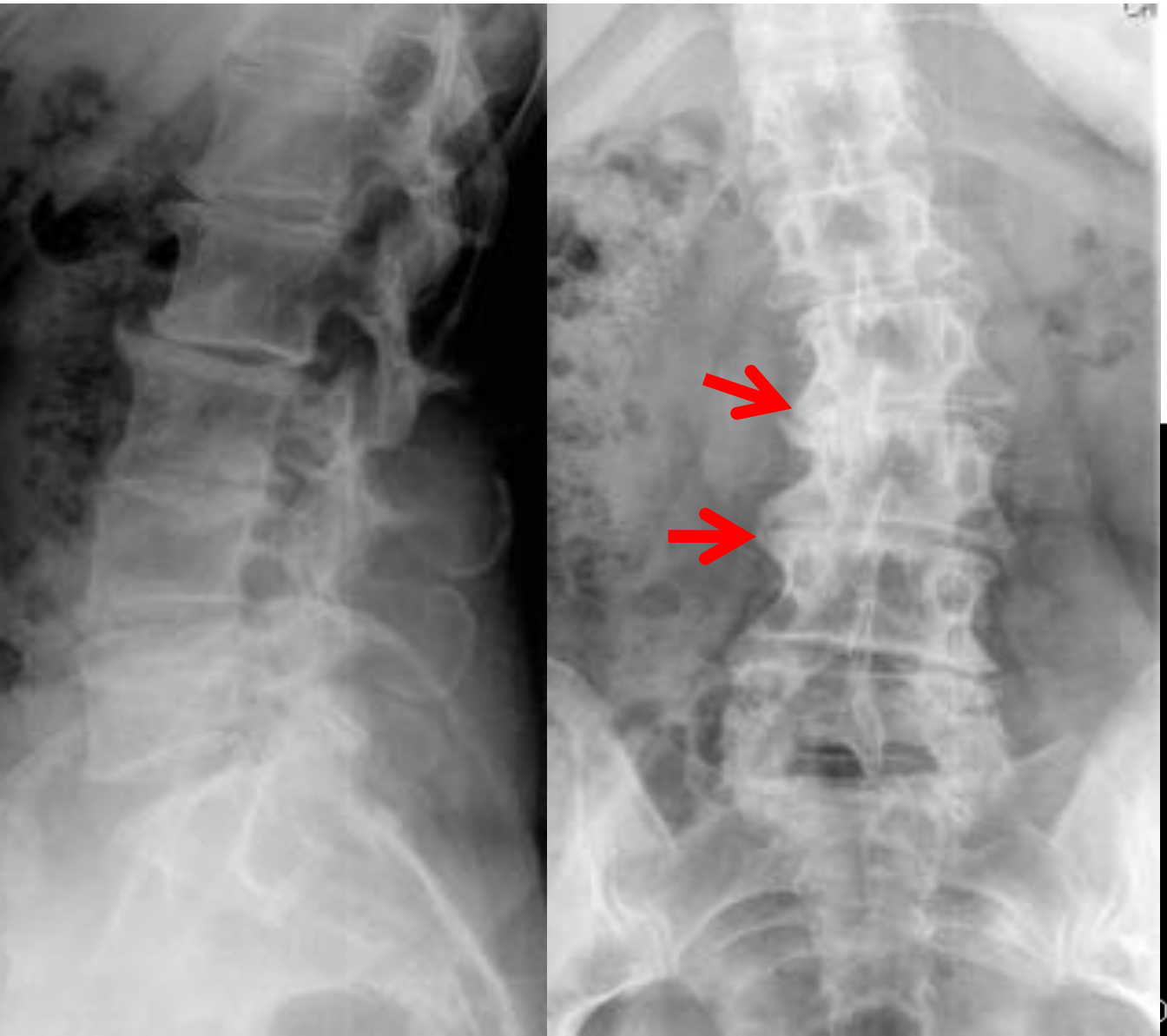


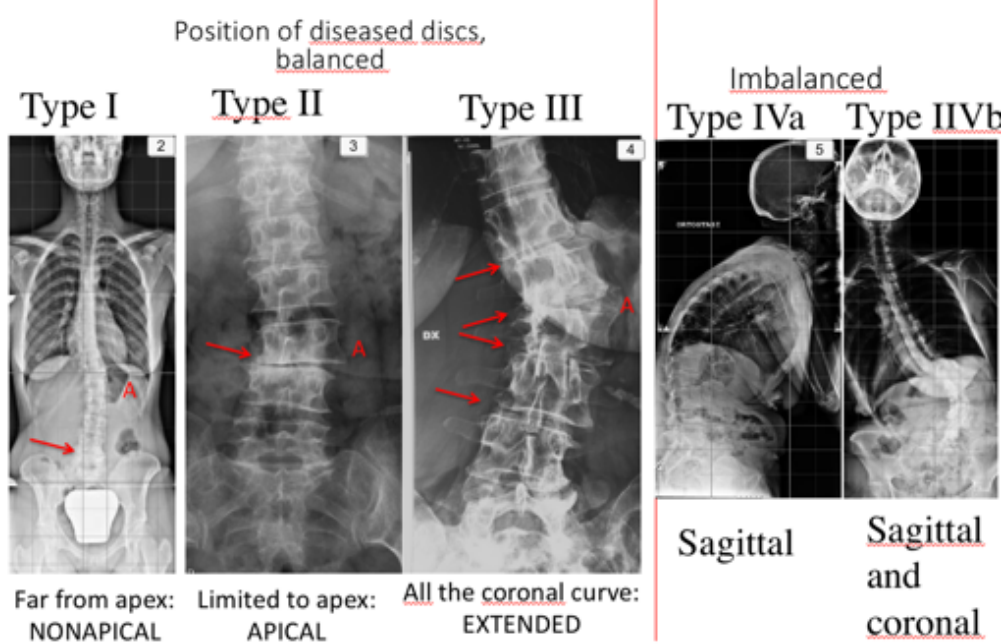
Type I: (balanced)
Localized **NONAPICAL**

Rules

- Correction of the curve not necessary
- Decompression (+/- fusion) in nonapical area

Type II: (balanced) Localized **APICAL**

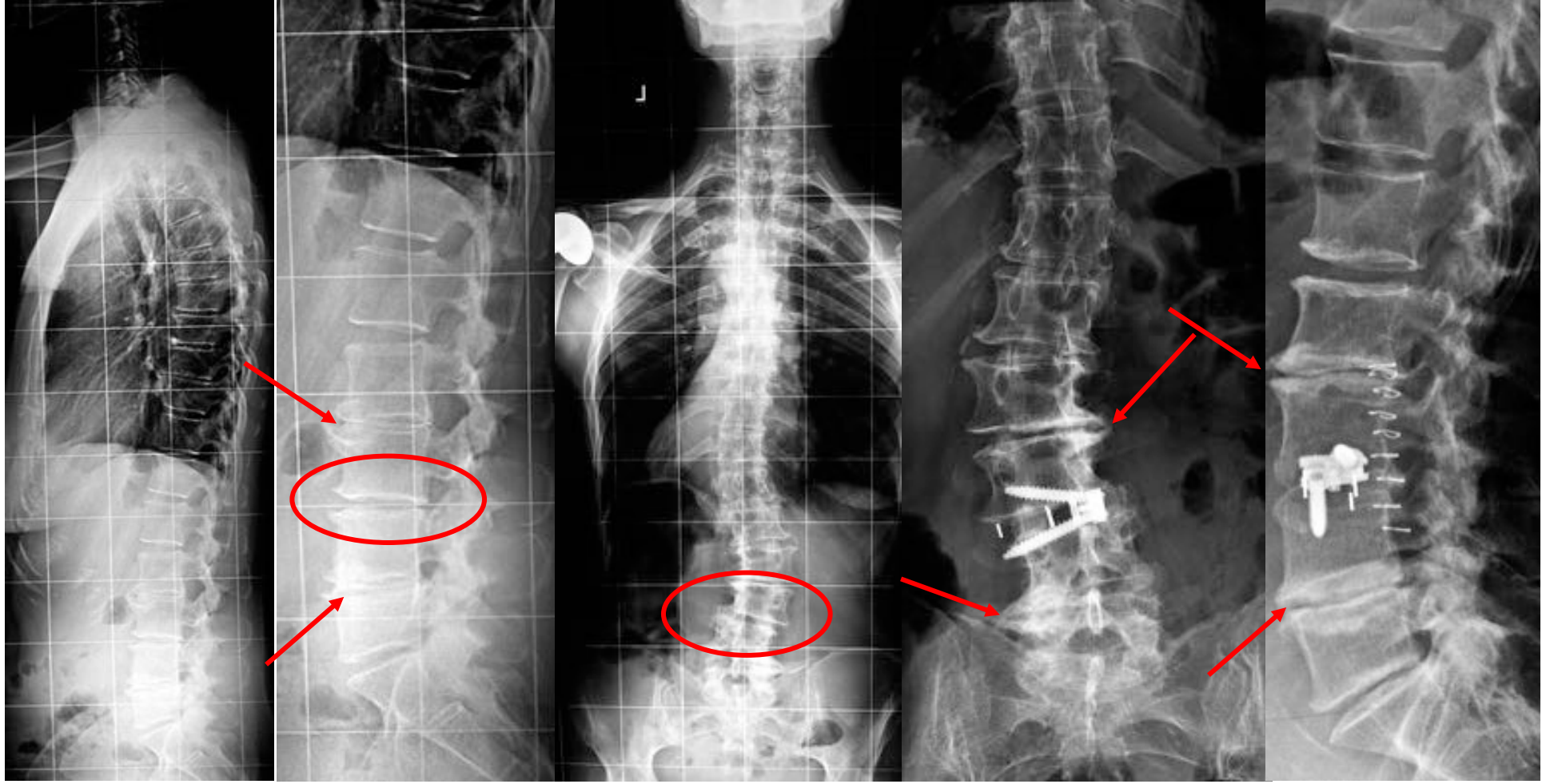




Type II: (balanced) Localized **APICAL** DDD

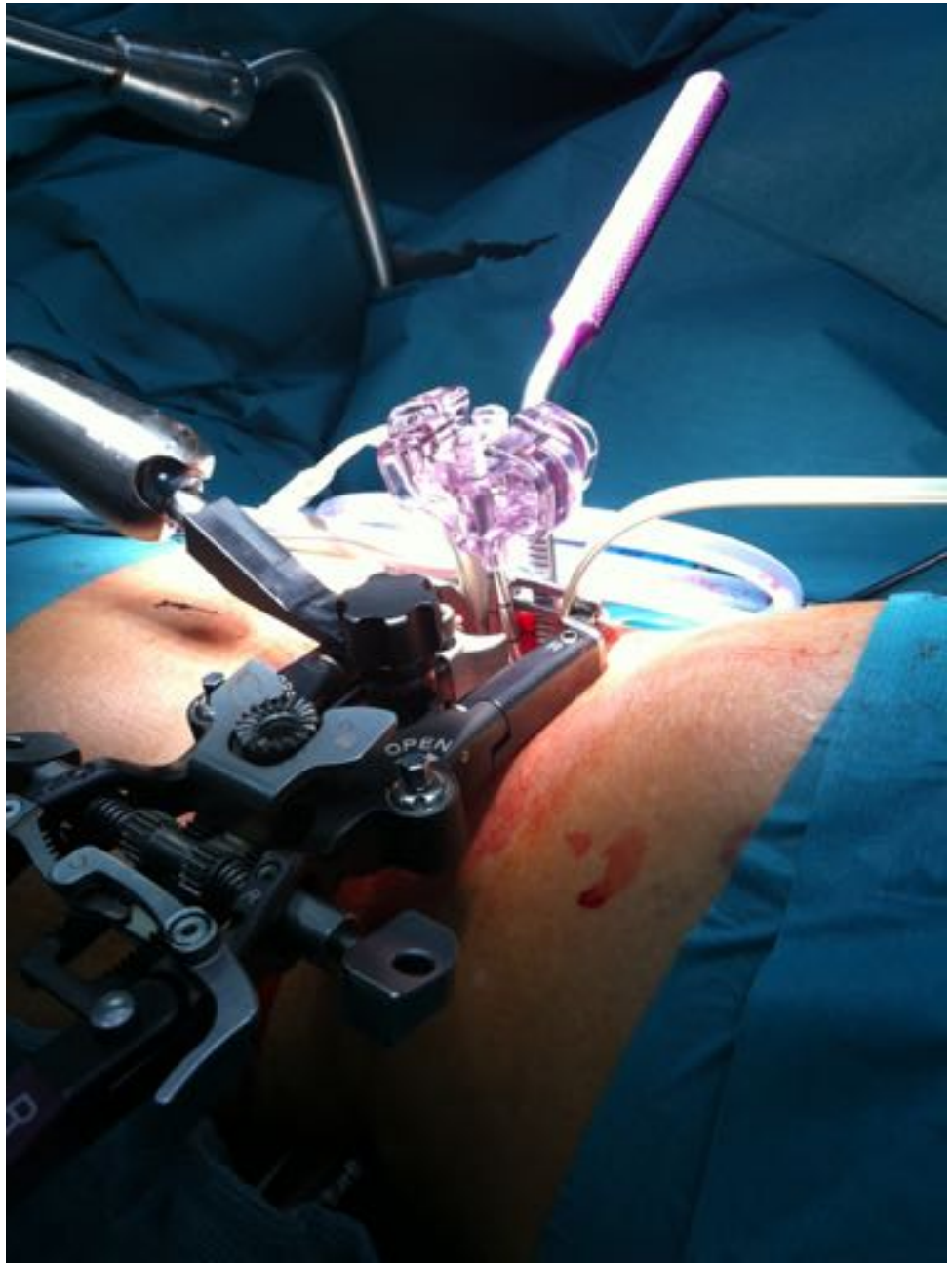
Rules

- Complete correction is desirable
- Fuse the disc above and below the apical vertebra

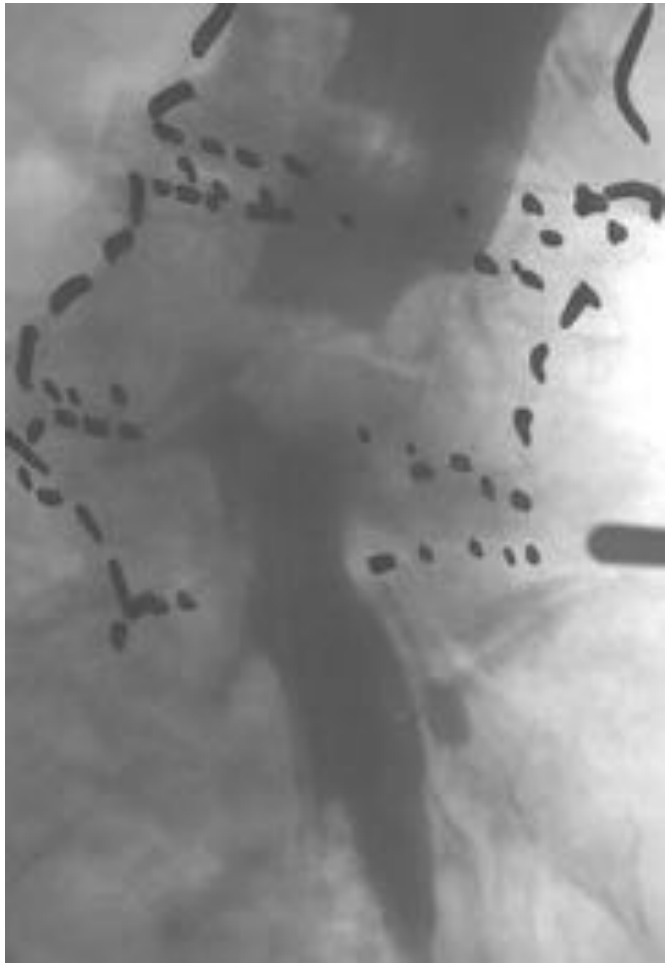


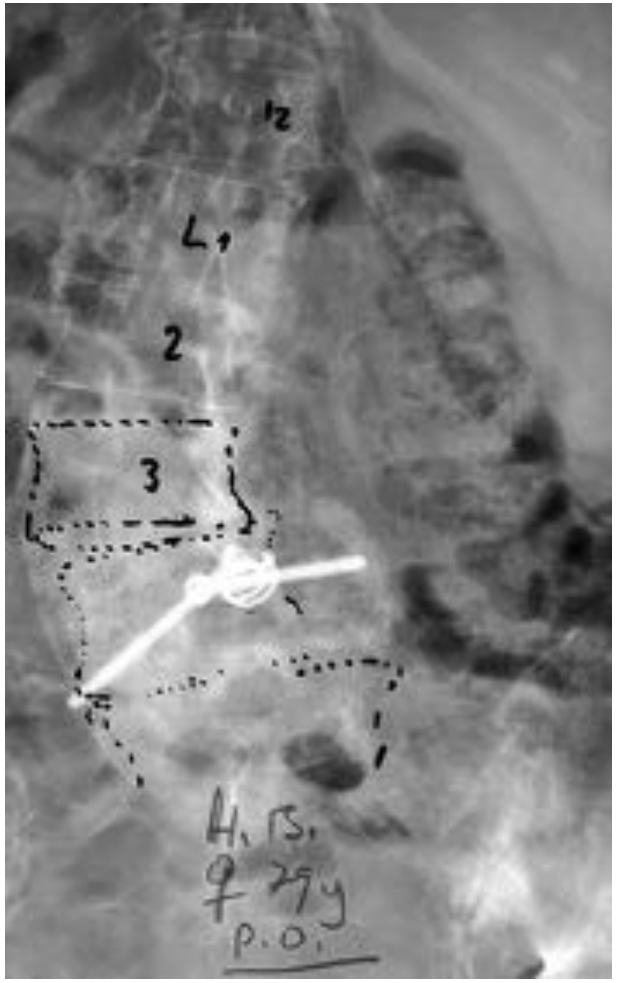
Type I: 68 yrs old female pat with severe motion and activity dependent left leg pain: Surgery L3/4 Anterior surgery alone

XLIF Procedure:far lateral approach



De novo adult scoliosis:
Typ I: non apical disc disease with severe stenosis



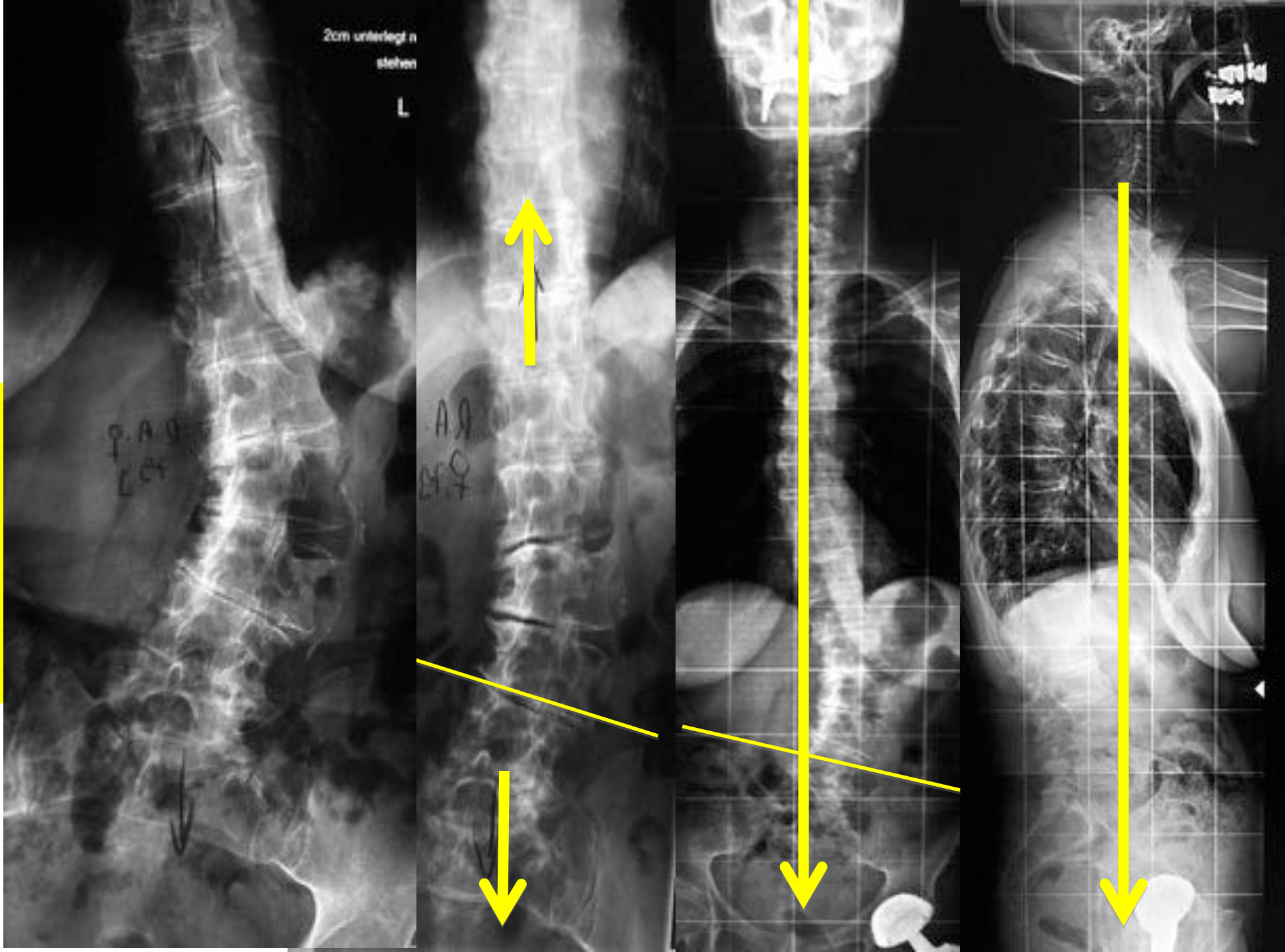


79 yrs old polymorbid female patient

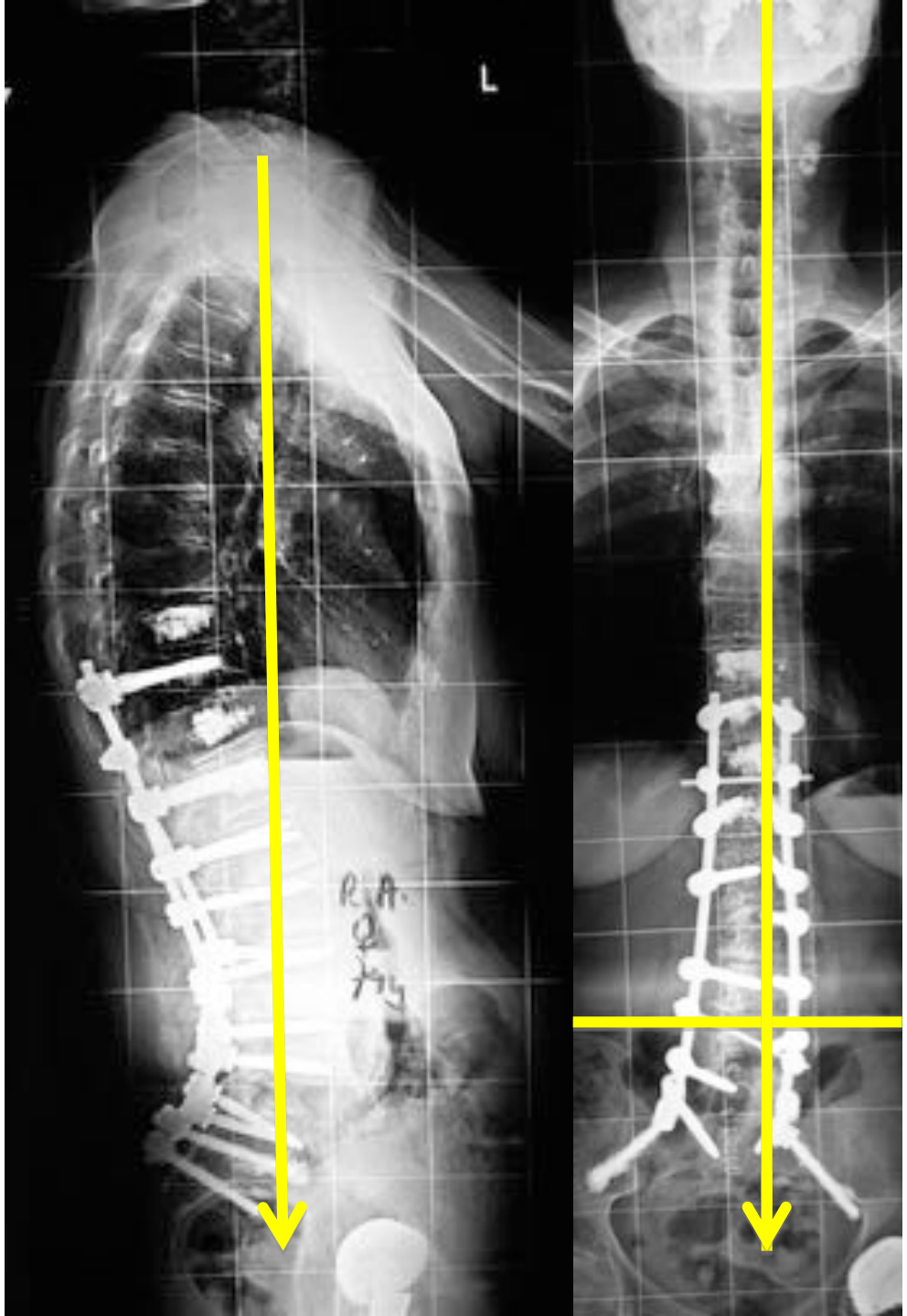
Type III
Balanced
extended

Significant problem:

- **Root Claudication on the concave side**
- **Osteoporosis**
- **Collapsing spine**



Type III
Balanced
extended



Significant preop problem :

- **Root Claudication on the concave side**
- **Osteoporosis**
- **Collapsing spine**

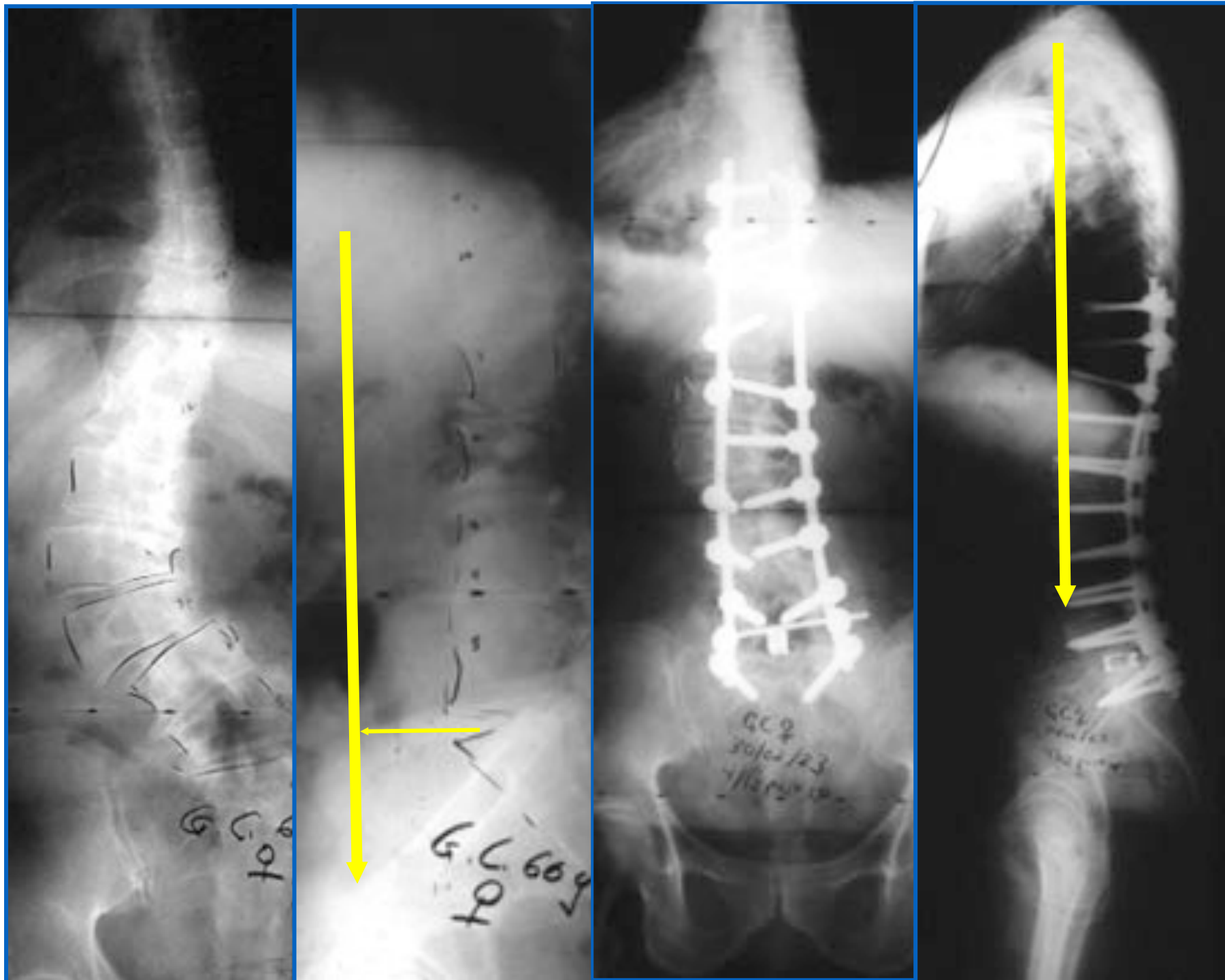
Postop. Good functional outcome
Lumbosacral – pelvic fixation

Adult,deg. Scoliosis

(Secondary deg.Scoliosis
of an originally AIS,
(Type III)

Typical Problem:

- Progressive curve
- Pain
- Loss of lumbar lordosis
- Imbalance
- Spinal Stenosis
- Osteoporosis
- Lumbosacral fixation



Type IVa: Sagittally Imbalanced

	Preop	Target
PI	63°	
SS	16°	
PT	47°	16
LL	-1°	73°
L3-L4	0°	

Type IVa:
Sagittally Imbalanced

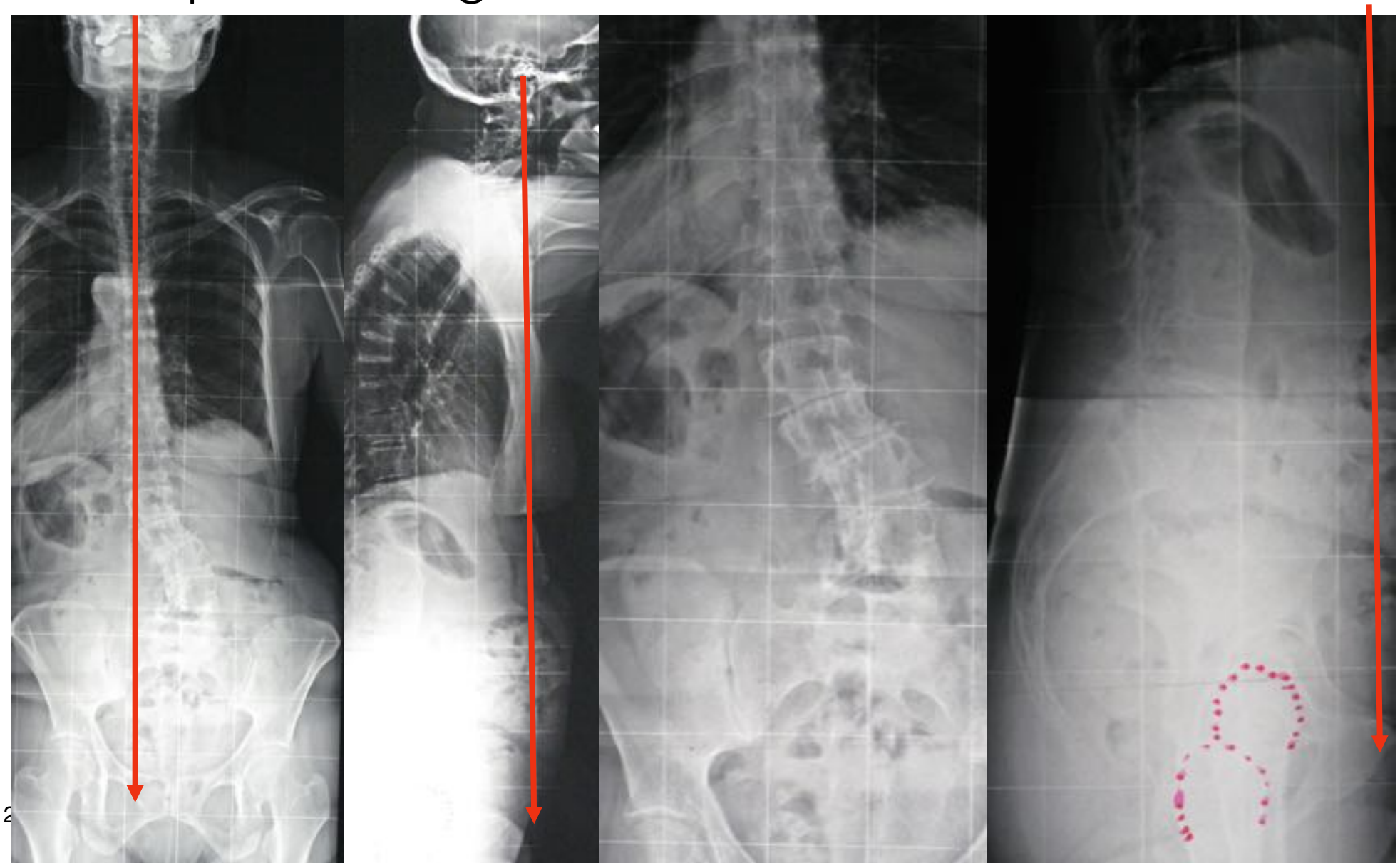
Type IV:

Sagittally Imbalanced

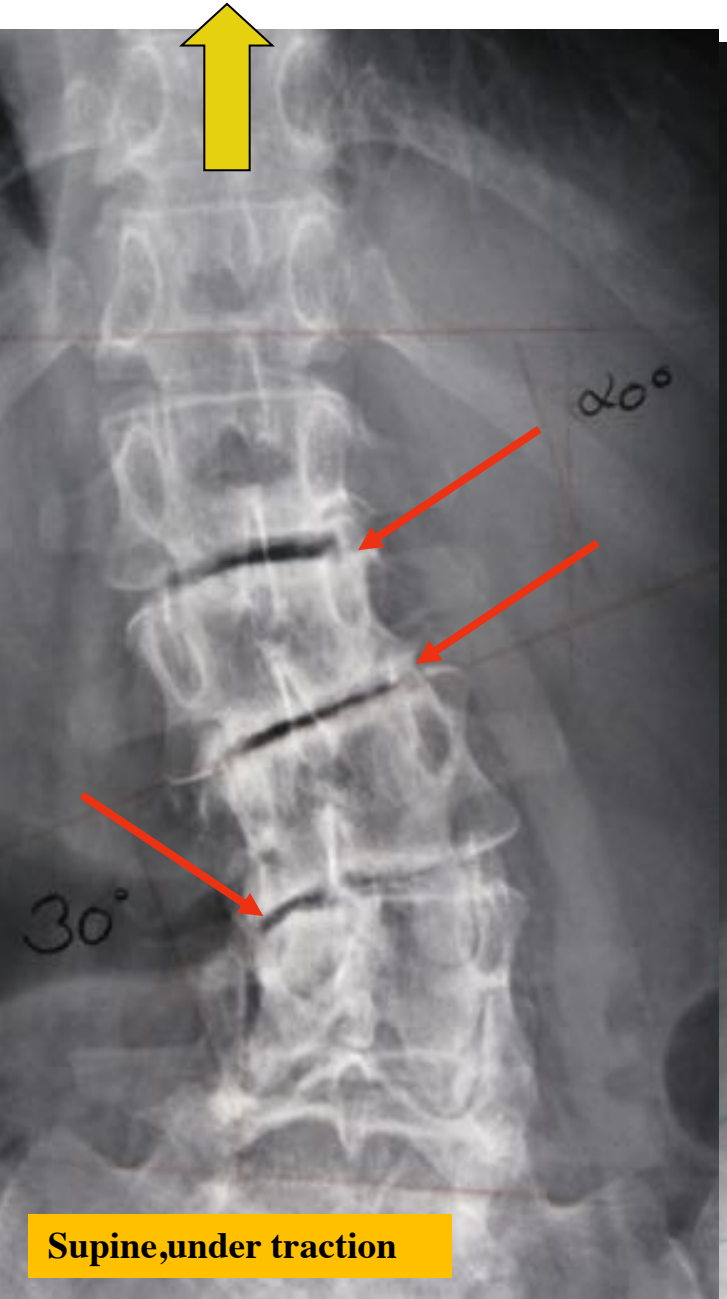
Rules

- Sagittal restoration of PI-LL mismatch is mandatory
- Powerful corrective methods are needed:
  - PSO
  - Anterior release techniques
- Lateral for:
  - Restoration of anterior column in PSO
  - Anterior release and PSO avoidance

C.M. female physician, 72 yrs.preop, severe back pain when up and sitting



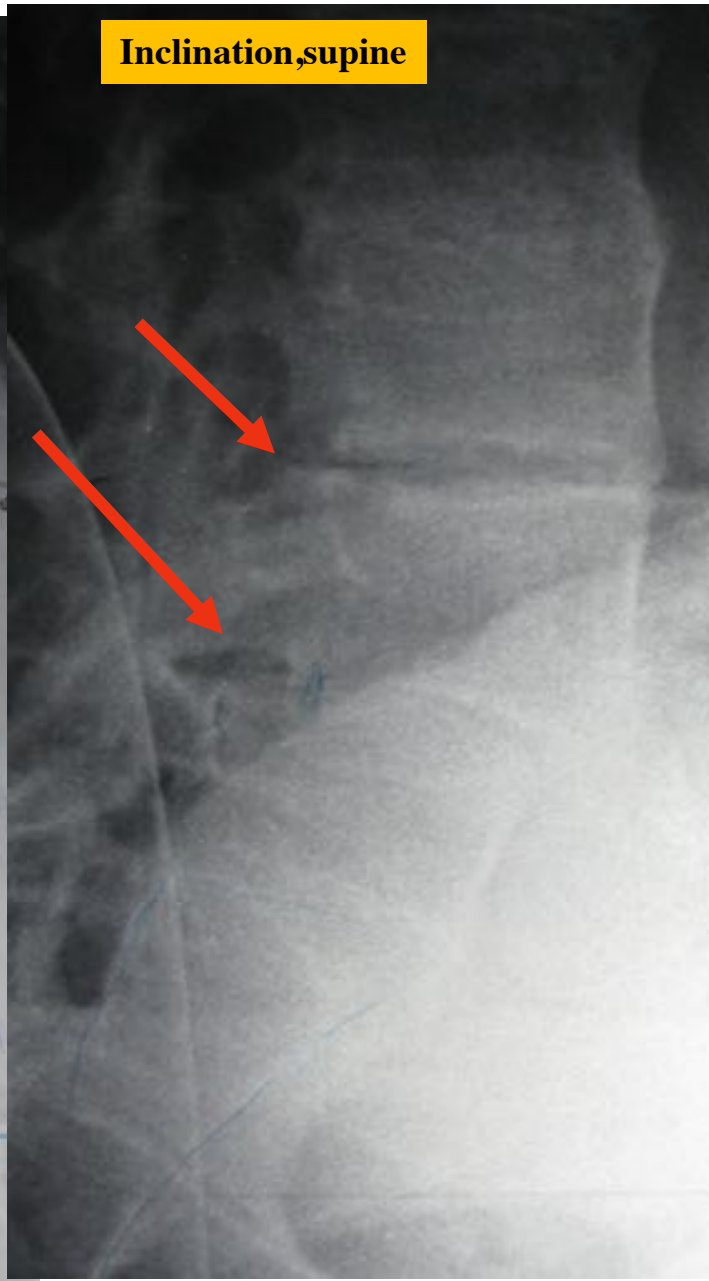
C.M.female 72 yrs.preop, 4 / 2009



Supine,under traction

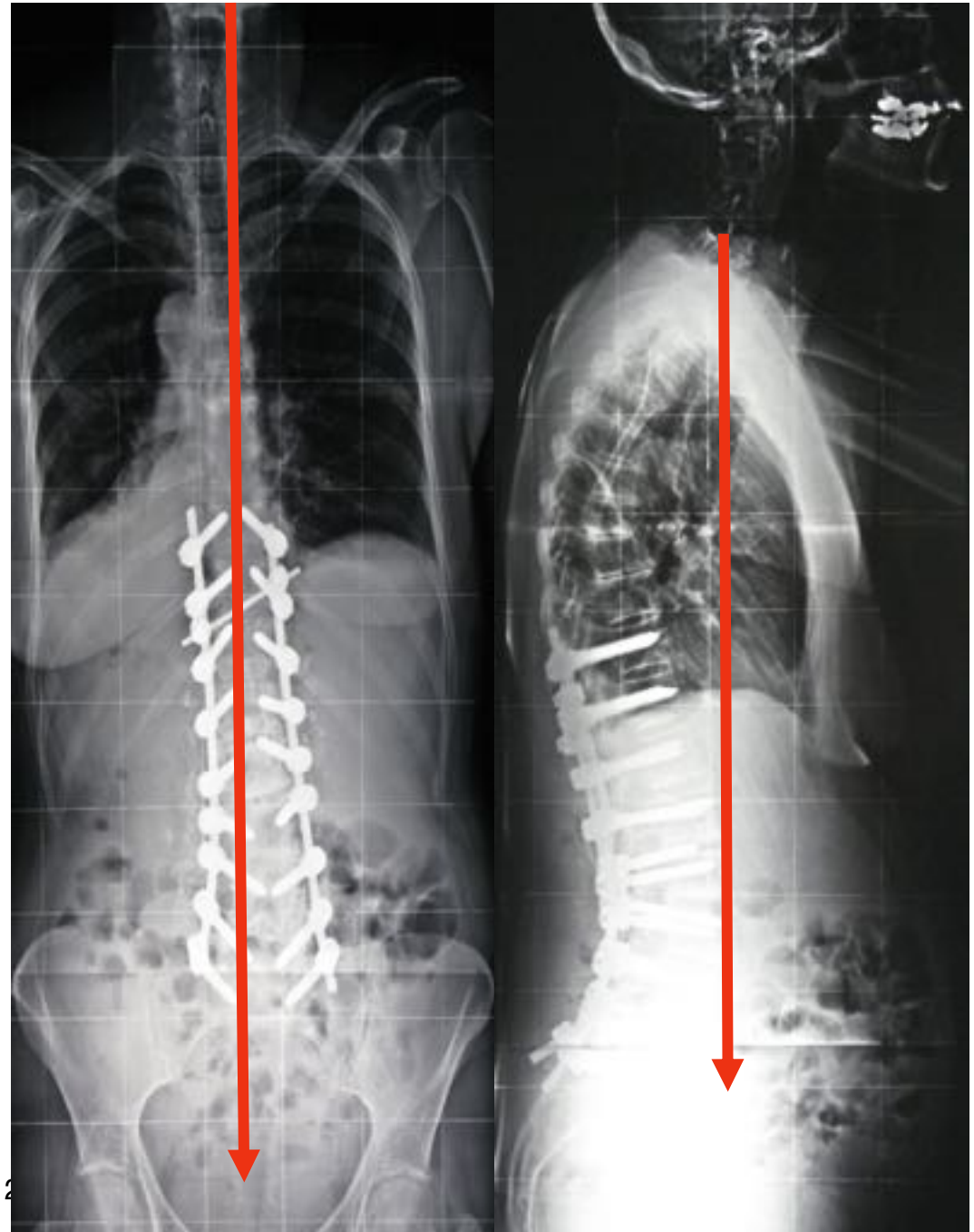
Reclination with roll

Supine, R bending



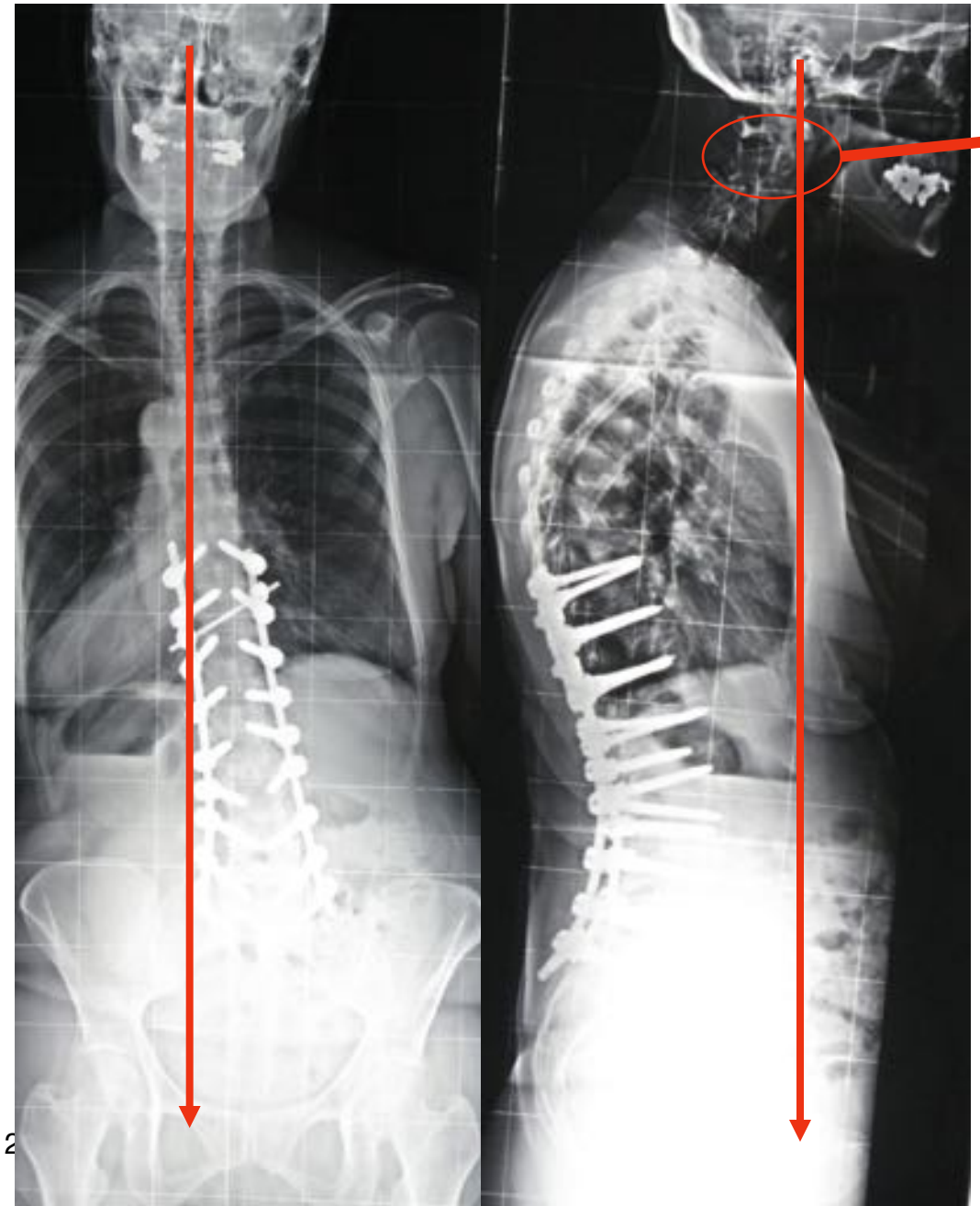
Inclination,supine

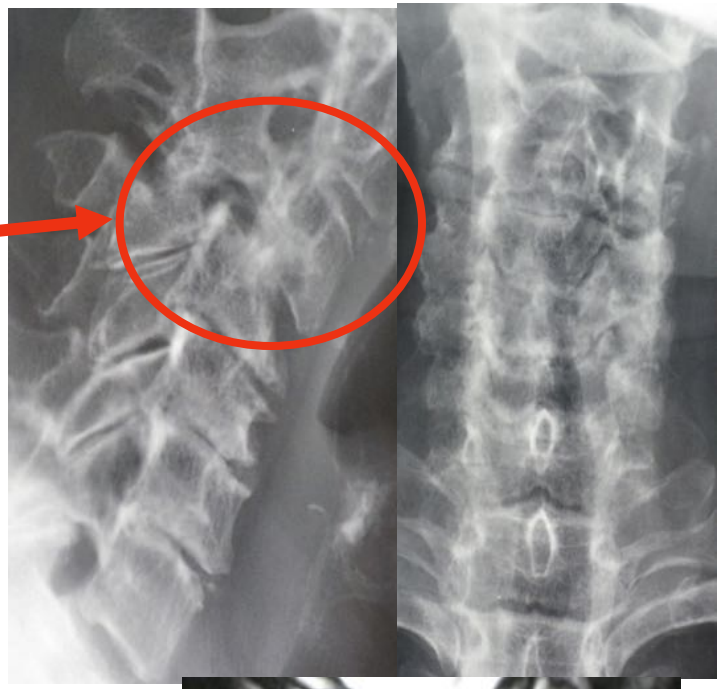
C.M. 6 ms postop



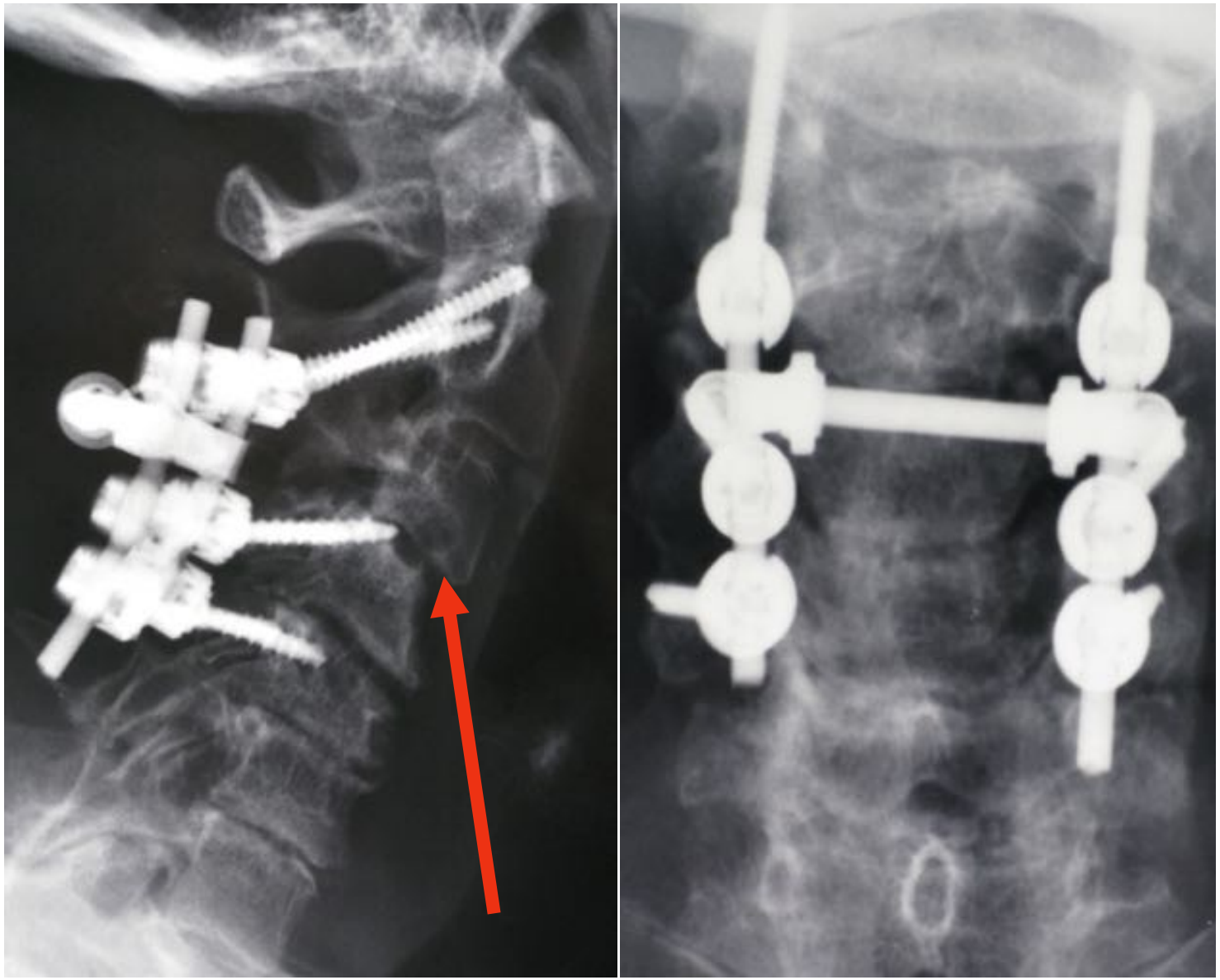
Post. Correction
2 Smith-Peterson
OT, Stabilisation
and Fusion T10 - S1

C.M. Female,73 yrs., 10 ms postop.





C.M. Female,73 yrs., 11 ms postop.1 and 1 m postop.2



24. Mai 2018 44

Complications

Risk-Benefit Assessment of Surgery for Adult Scoliosis: An Analysis Based on Patient Age

Key Points

Spine (2011): 36 (10); 817–824, Smith, J. S. et al.

On average, elderly adults with scoliosis have significantly greater disability, greater severity of back and leg pain, and worse health status at baseline, compared with younger adults with scoliosis.

Elderly adults with scoliosis had significantly more complications with surgical treatment, with the oldest age group (65–85 years) having nearly 4 times the number of minor complications and nearly 5 times the number of major complications compared with the youngest age group (25–44 years).

Adult spinal deformity surgery

Early triage is necessary:

Interdisciplinary spine team approach:

- Imaging,
- neurological and
- clinical diagnostic abilities as well as
- surgical armentarium both, in terms of human resources and technological resources available in the team,
- weighting non surgial-versus surgical treatment
- Anaethesiology,Internal Medicine,Postop. rehabilitation

The best triageur is the specialized spine surgeon:
Indication is key

Definitely a tertiary care procedure:
cases need to be centralized: bigger the case load and routine lesser complications and better outcome and lower the costs!

Thank you for listening