Scoliosis

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MUNI

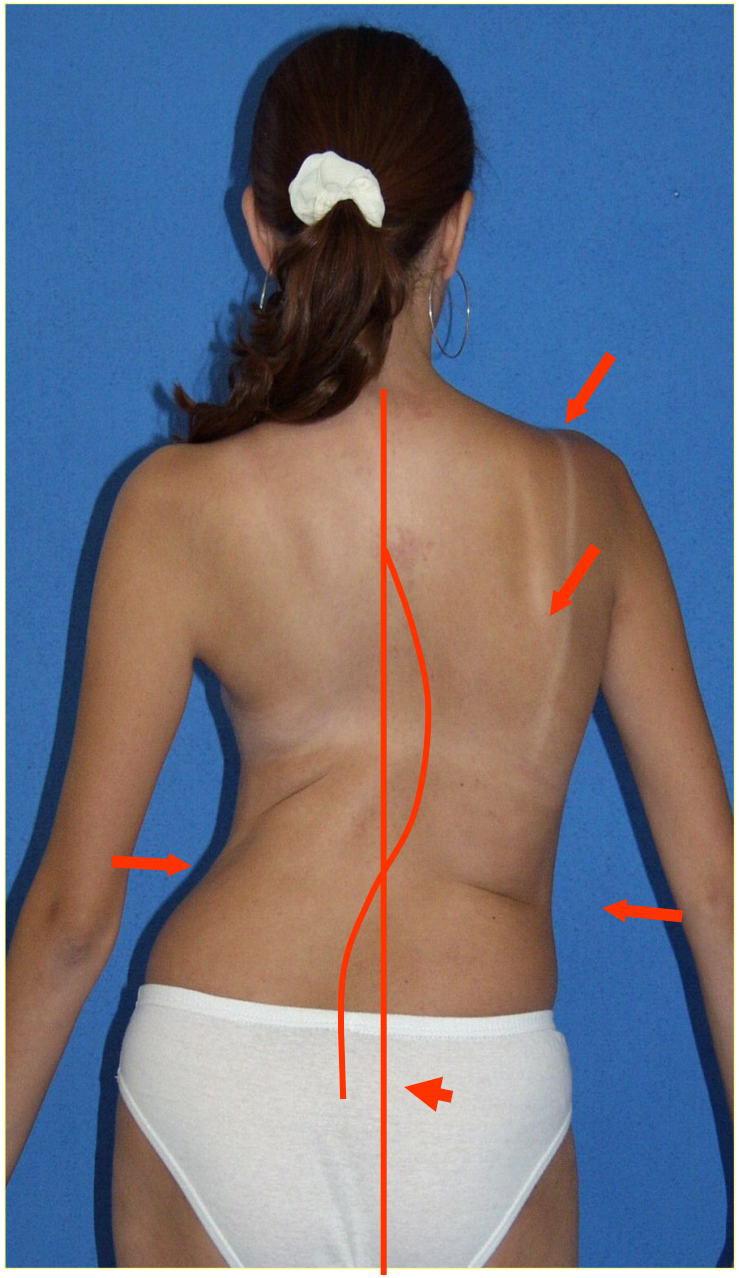
FAKULTNÍ NEMOCNICE BRNO

Scoliosis = 3 D deformity

Frontální rovina

Sagitální rovina

Axiální rovina



Shoulder height disbalance

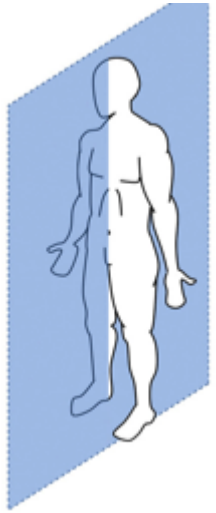
Gibbus – paravertebral prominence

Waist asymetry

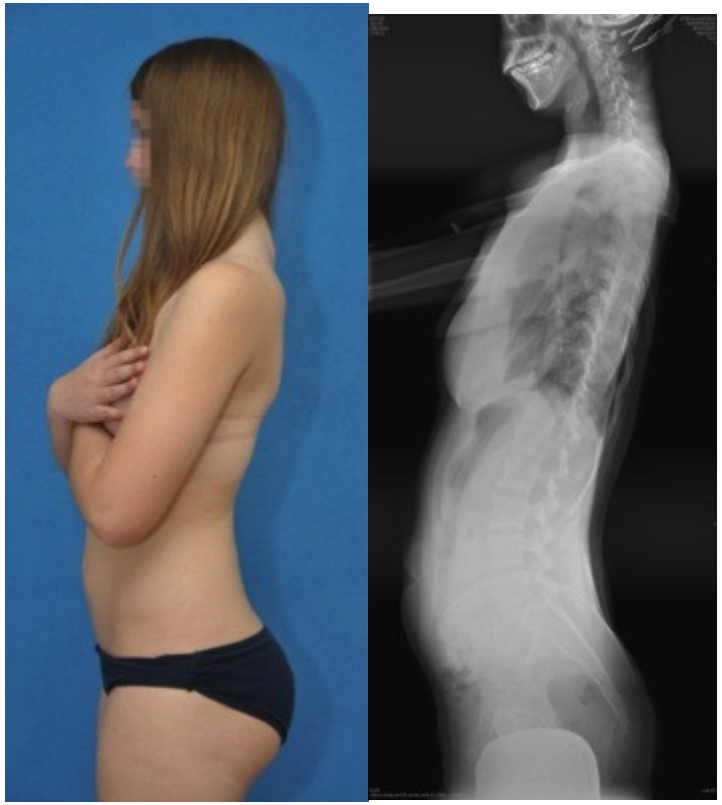
Trunk decompensation - frontal plane , C7 plumb line

Bending forward!
= Adams test

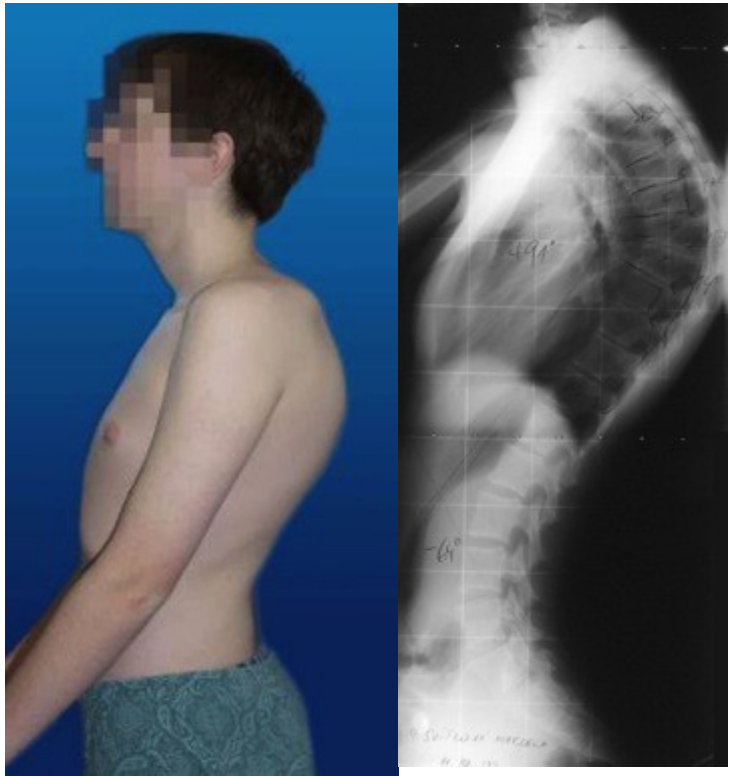
SAGITTAL aspect



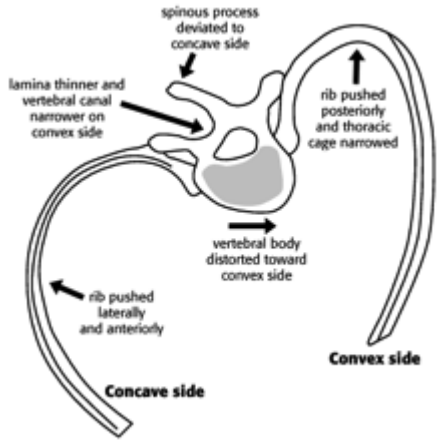
HYPOkyphosis

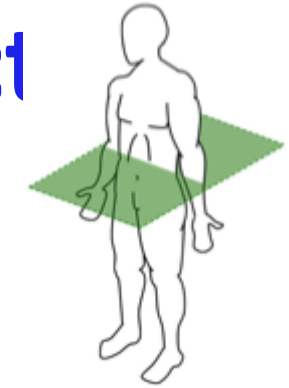


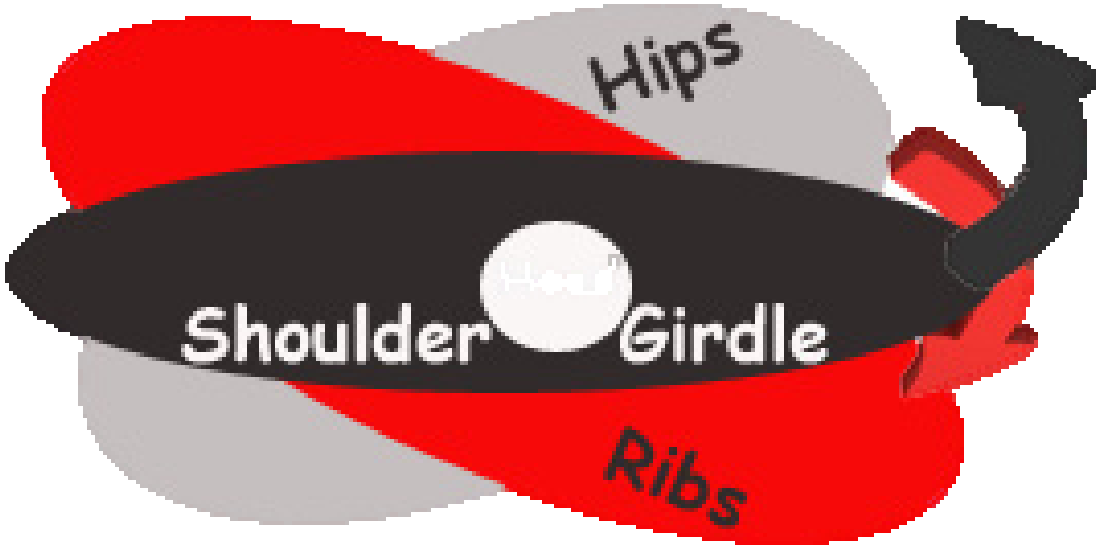
HYPERkyphosis



TRANSVERSE aspect

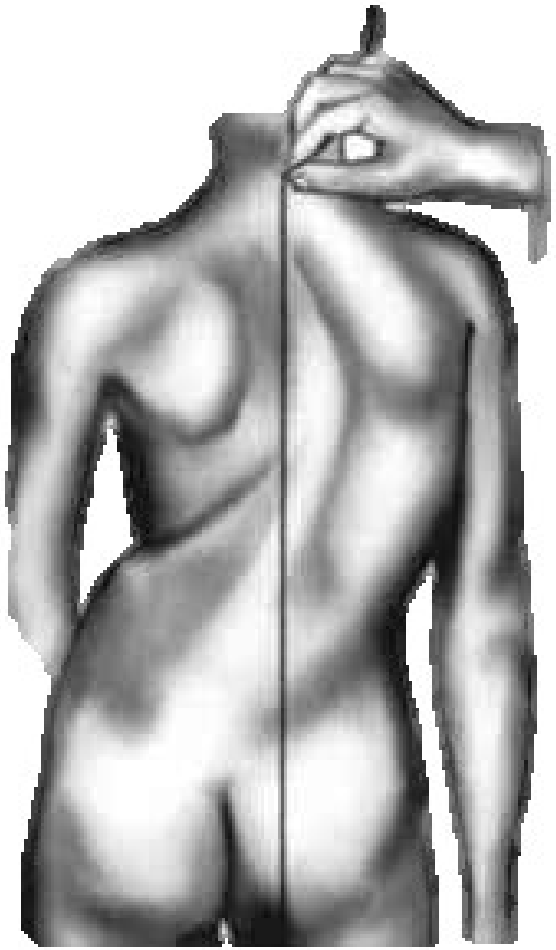




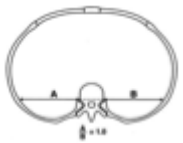


Scoliotic patient EVALUATION

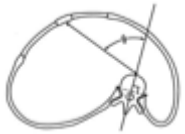
Scoliometer



normal



scoliosis

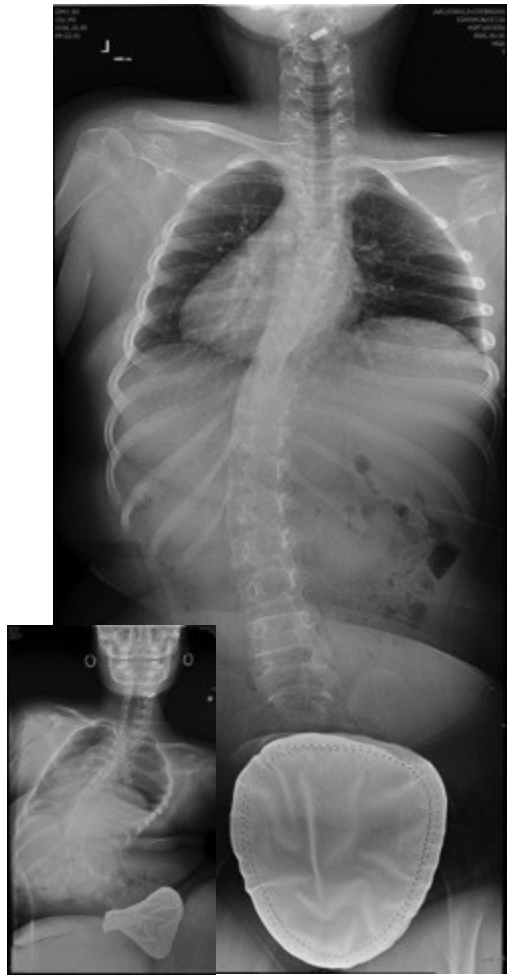


X-RAY

AP

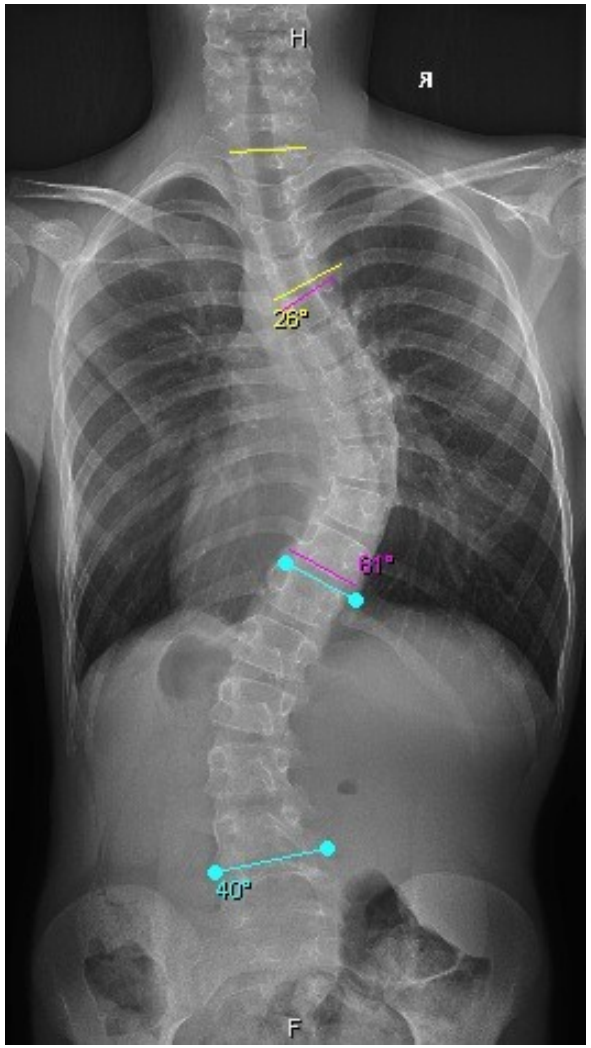
lateral

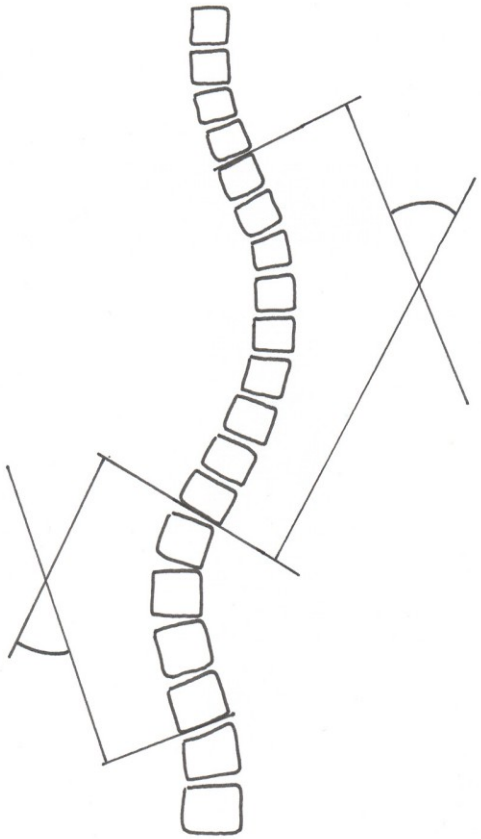
bending

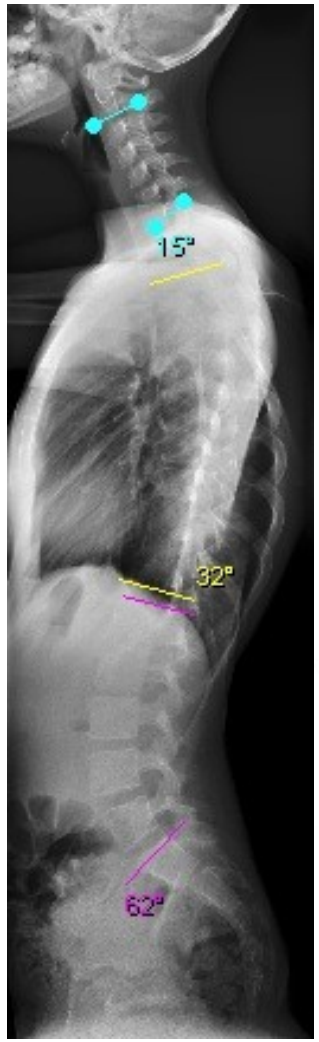


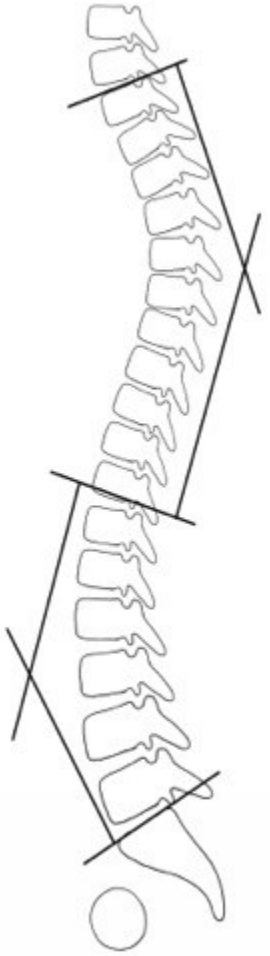
traction

COBB‘s angle









Descriptive terminology

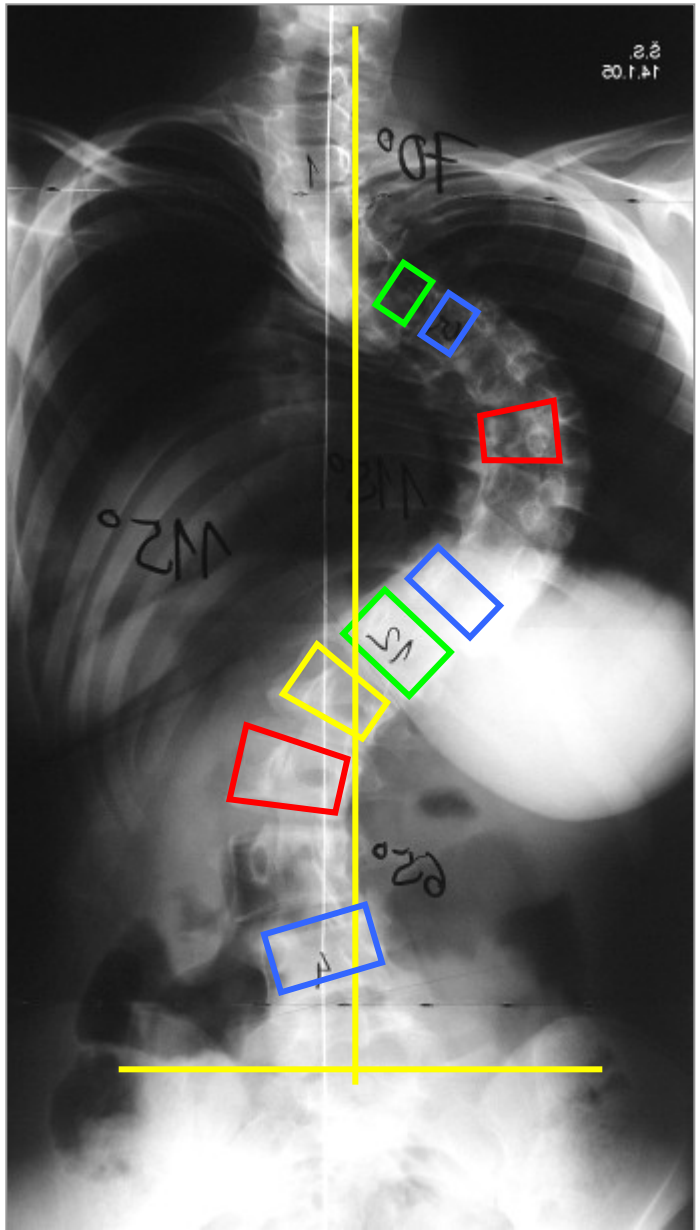
Apical vertebra

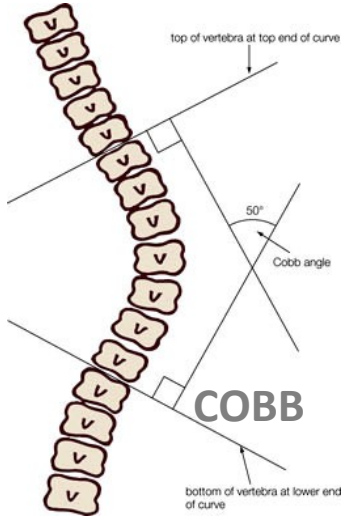
End vertebra

Neutral vertebra

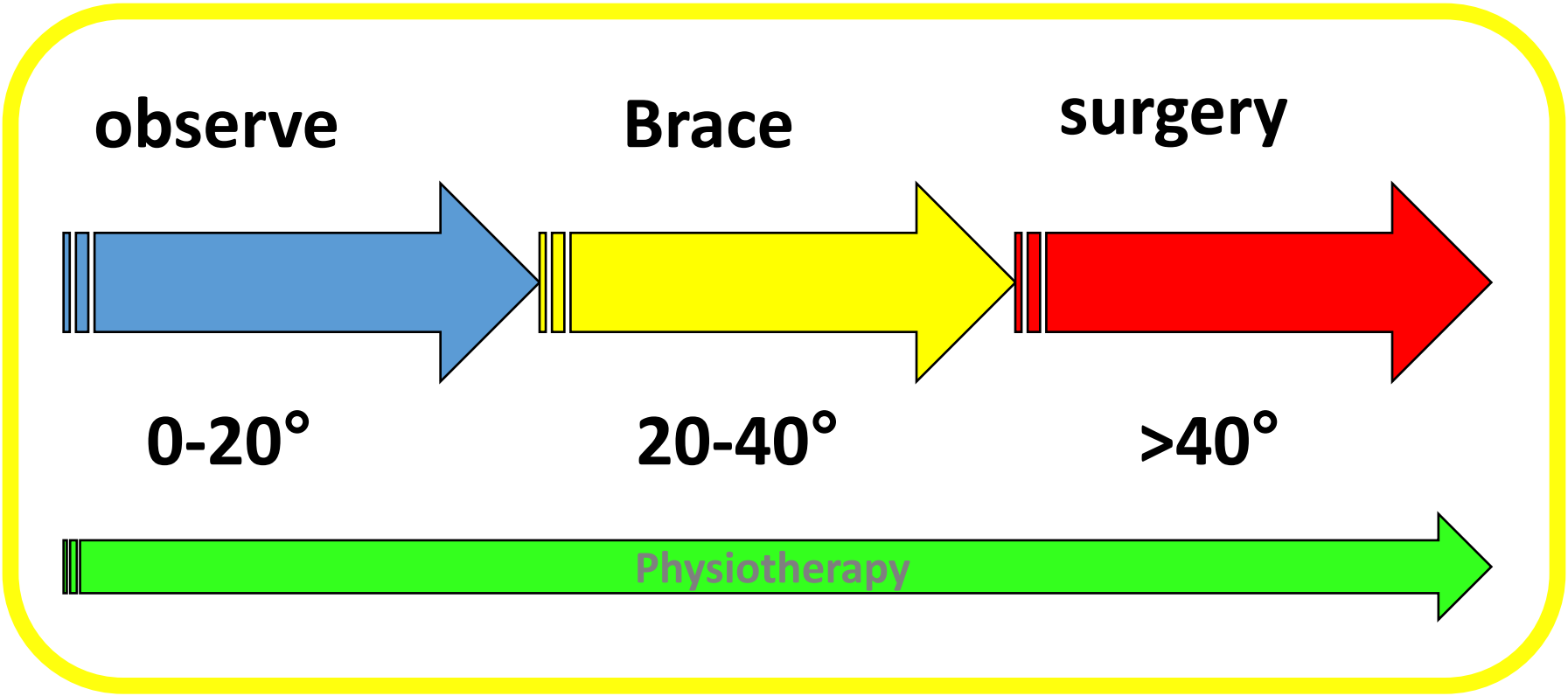
CSVL

Stabile vertebra

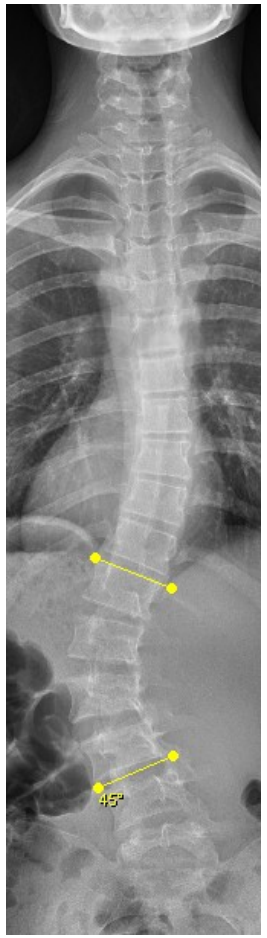
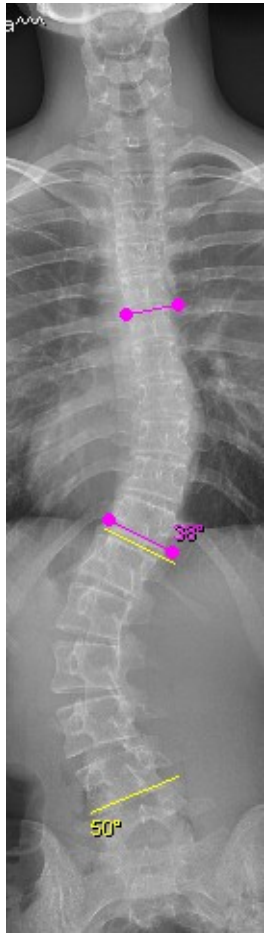
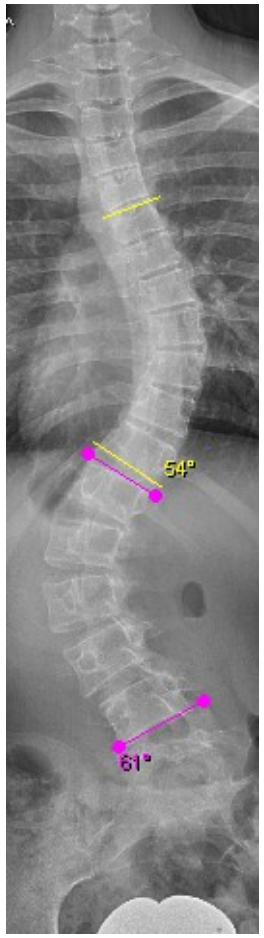
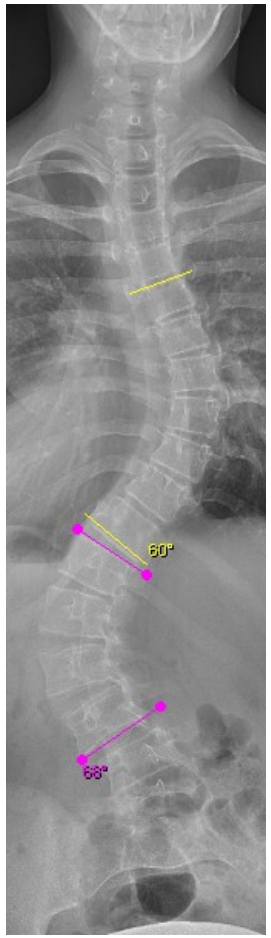
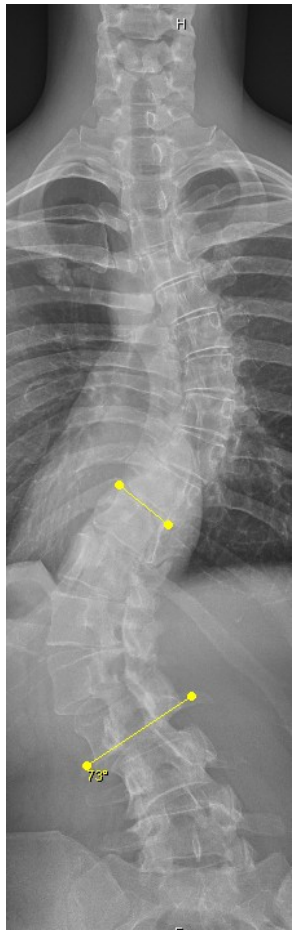




Therapeutic scheme



Natural evolition of untreated juvenile idiopathic scoliosis

10+5	12+7	14+3	16+5	29+4
				
45°	50°	61°	68°	73°

Deformity worsening

68% pts had progresion even in adult age !

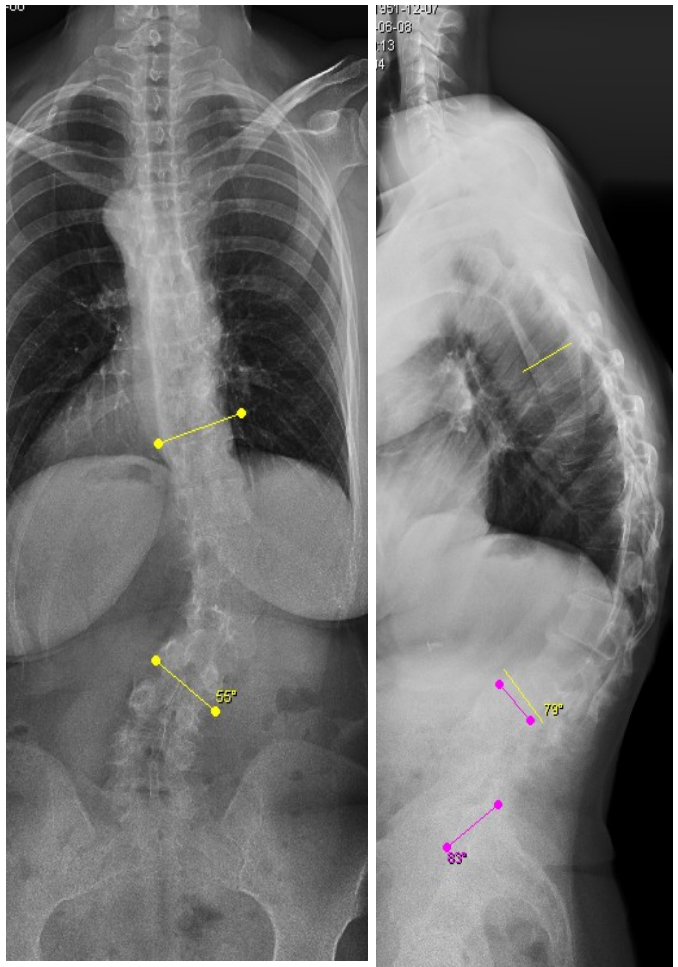
(Weinstein et al)

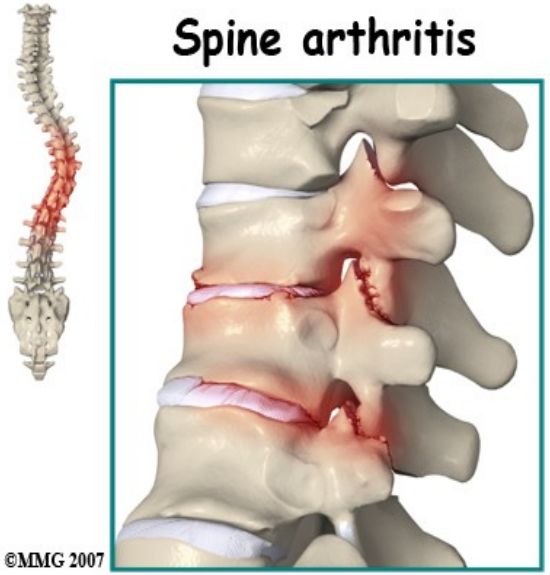
- **Thoracic curves - 1 dg./year**
- **Thoracolumbar curves - 0,5 dg./year**
- **Lumbar curves - 0,24 dg./year**

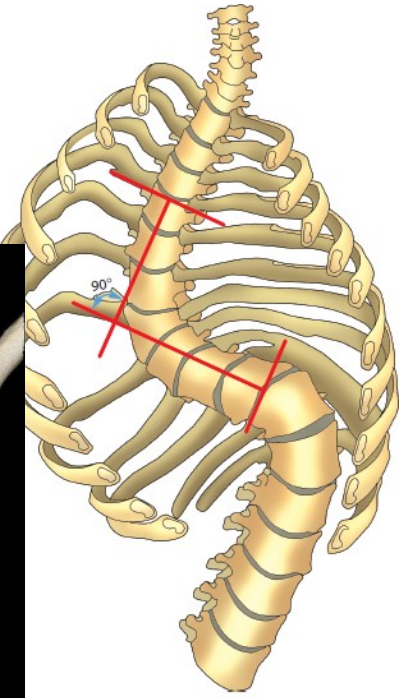
Sever complication of untreated scoliosis in childhood

=

Degenerative changes and cardiopulmonal insuficiency

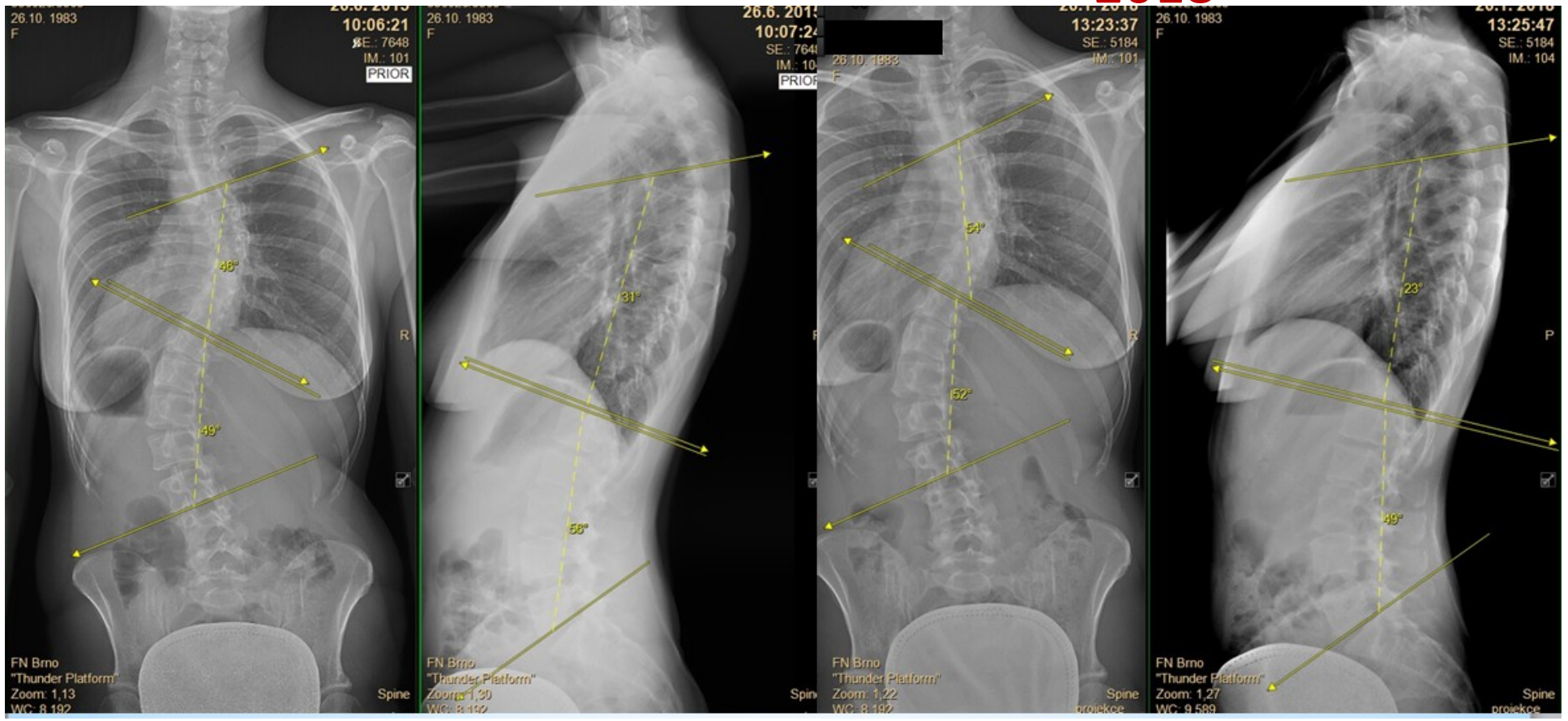






2015

2018



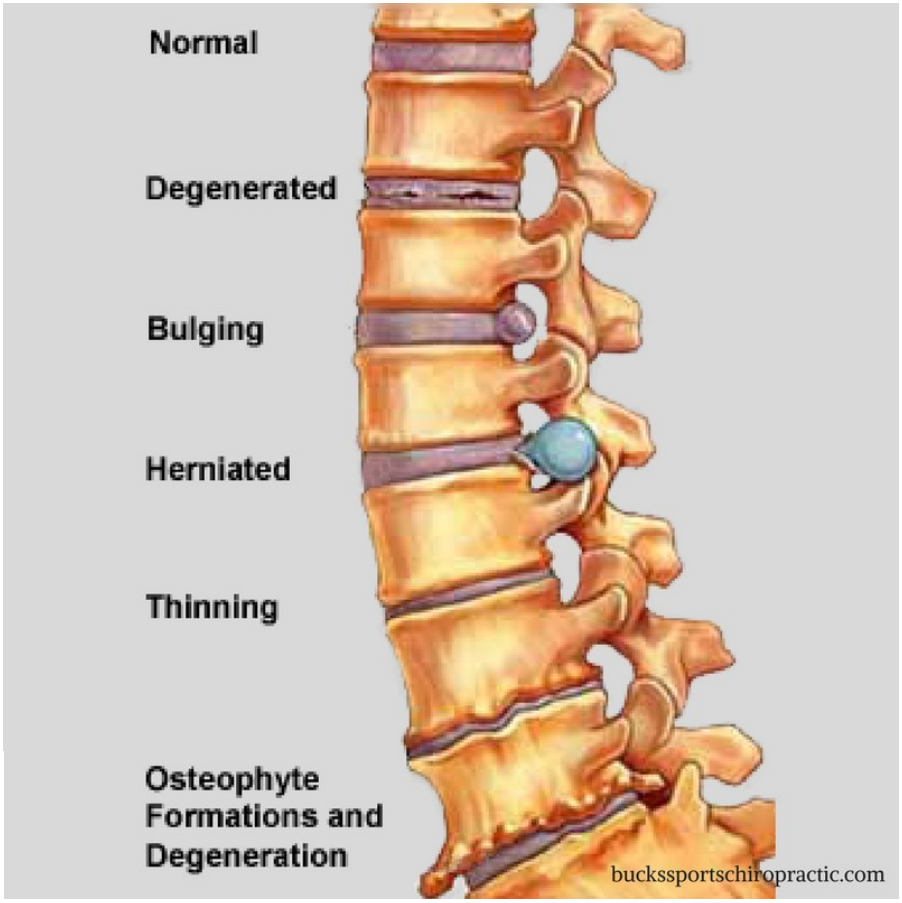
32 let

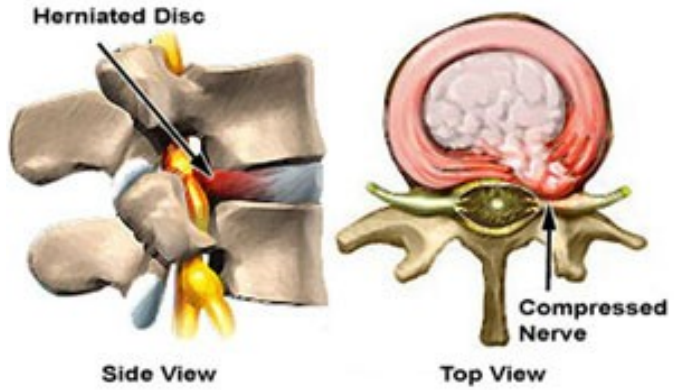
35 let

Risks of curve progression

- Progressive oppression of intra-abdominal organs
  - Heart + Lungs
  - Indigestion
- **Degeneration of spine structures**
  - Intervertebral joints
  - Intervertebral disc->

  production of osteophytes with possible nerve compression !





Goals of scoliosis surgery in childhood

- Stop deformity progression
- Correction of deformity
- Improvement of cardiopulmonary functions
- Prevention of degenerative spine changes

Scoliosis surgery in adult age

- **Higher** surgery risks with **lower success** rate of deformity correction
- Often associated with nerve impairment
- Difficult tolerance of corrected torso and spine position
- Slow postoperative convalescence (pain)
  - long-term rehabilitation care is required

Surgical risks in general

From GA

- Venous thrombosis
- Pulmonary embolism
- Nausea, vomiting, rhythm disorders, etc.

Chirurgické

- Surgical wound infection
  - ATB therapy
- Bleedig
  - blood transfusion

Surgical risks specific for scoliosis surgery

- Increased postoperative pain due to stretching of shortened muscles - in each patient

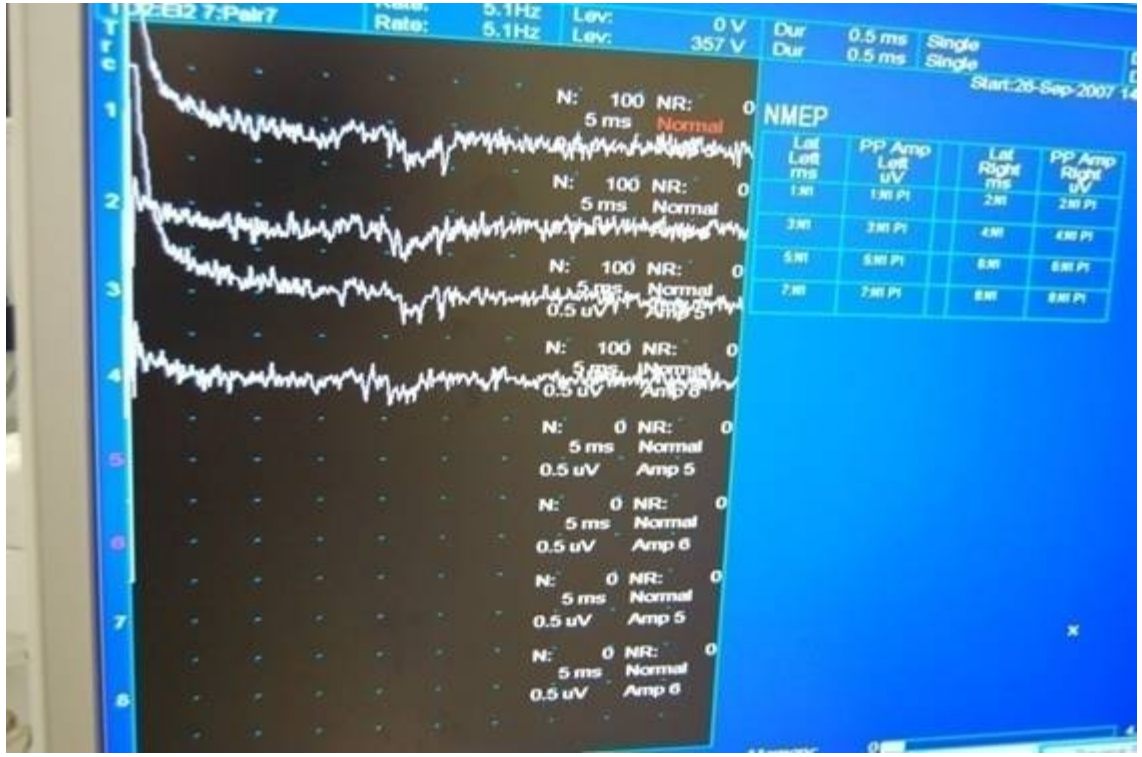
- Paralysis due to surgery
  - For thoracic and lumbar curves it refers to the lower limbs
    Very rare complication, but very serious as a result.

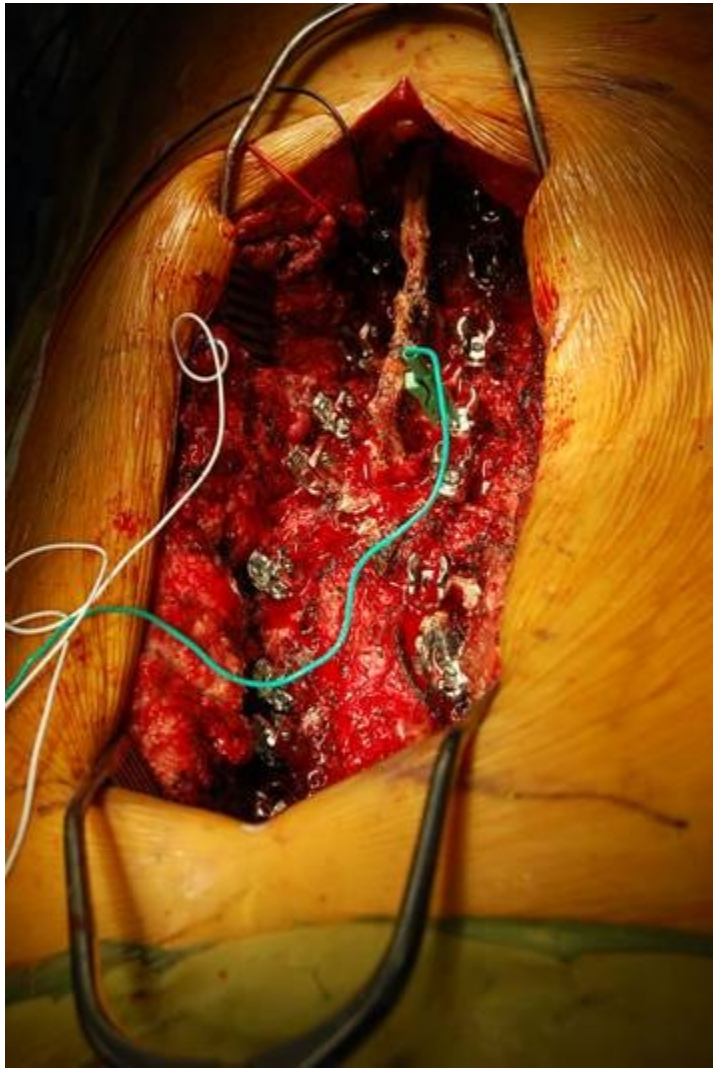
MEP – motor evoked potentials (SSEP)

- Monitoring of nervous system functionality during surgery
- It enables immediate reaction to the problem and thus minimizes the risk of permanent nervous disability

MEP – motor evoked potentials (SSEP)

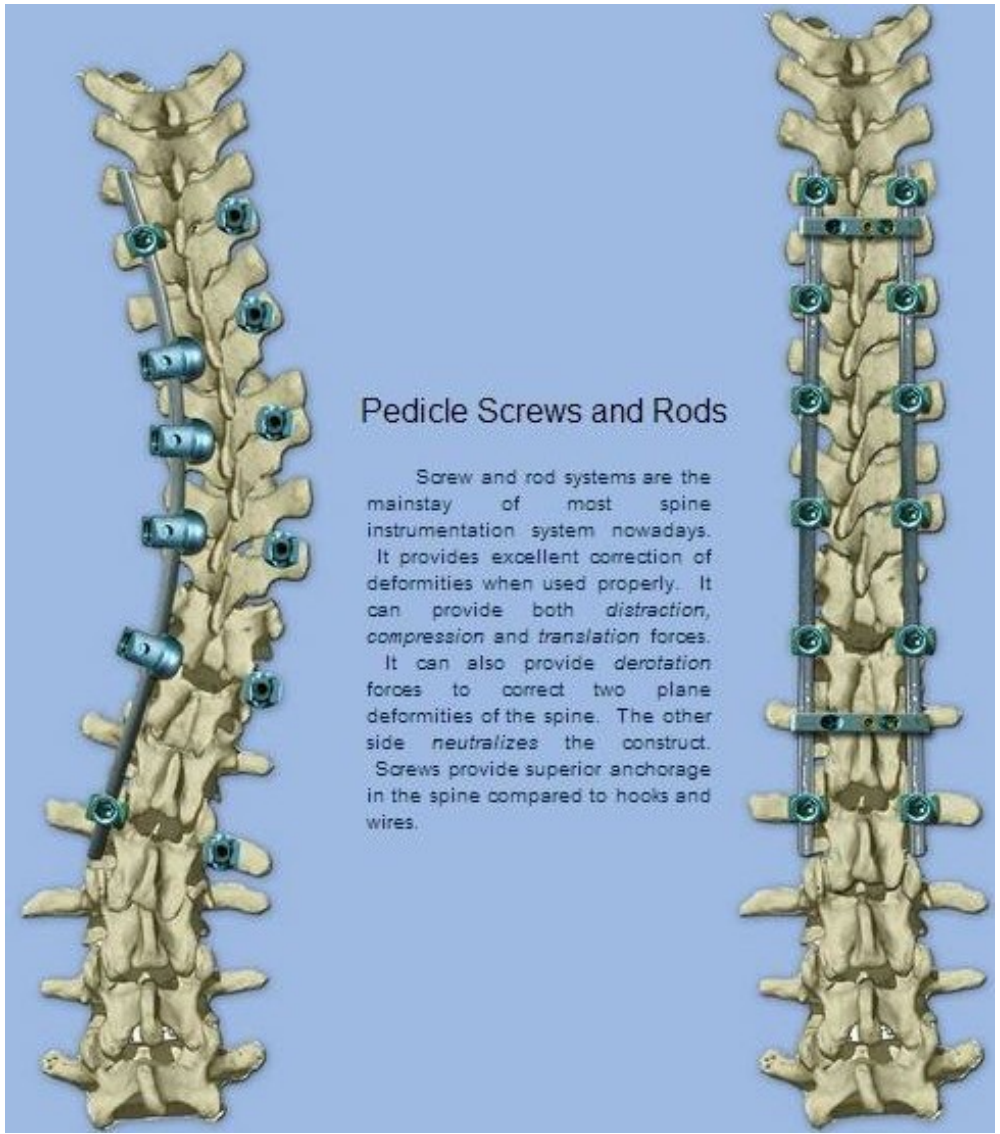
SEP a MEP

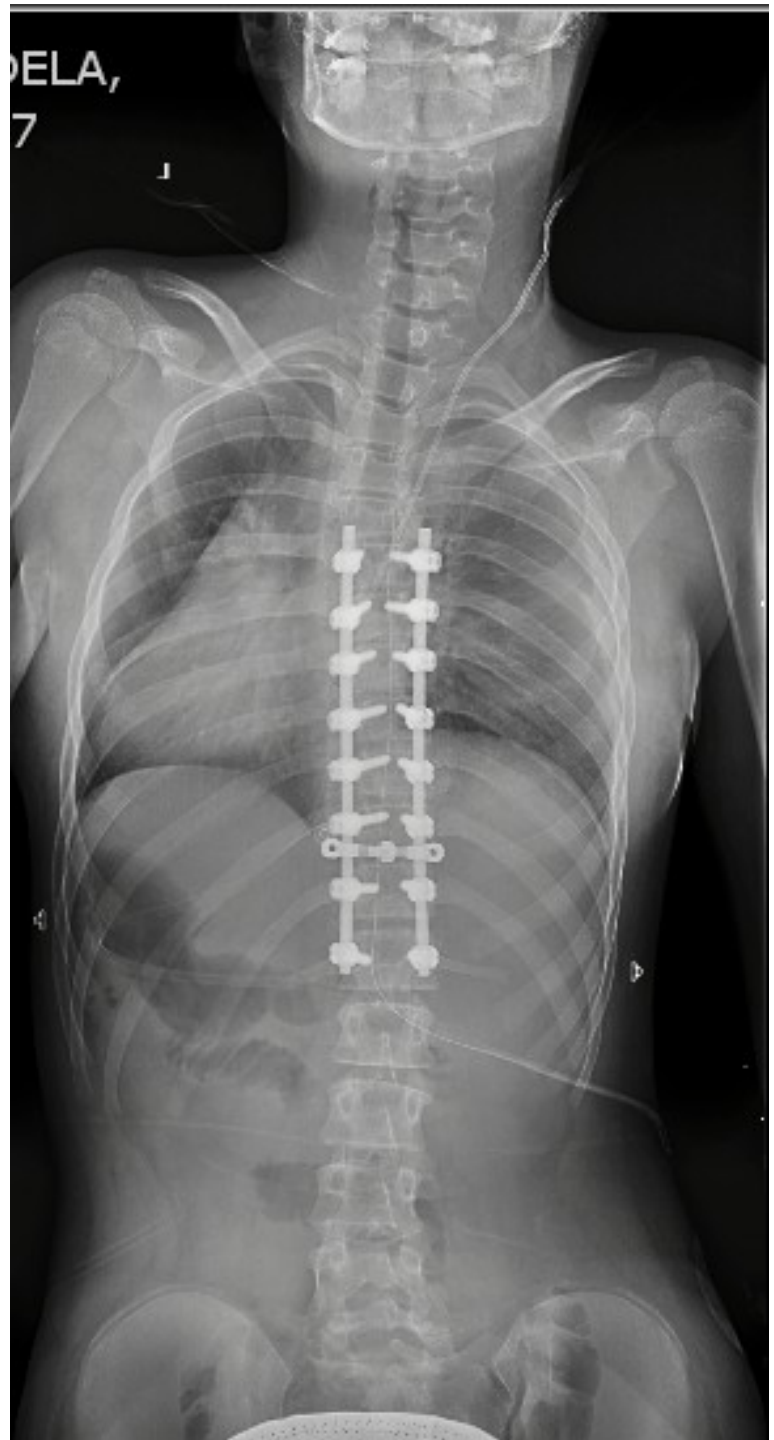


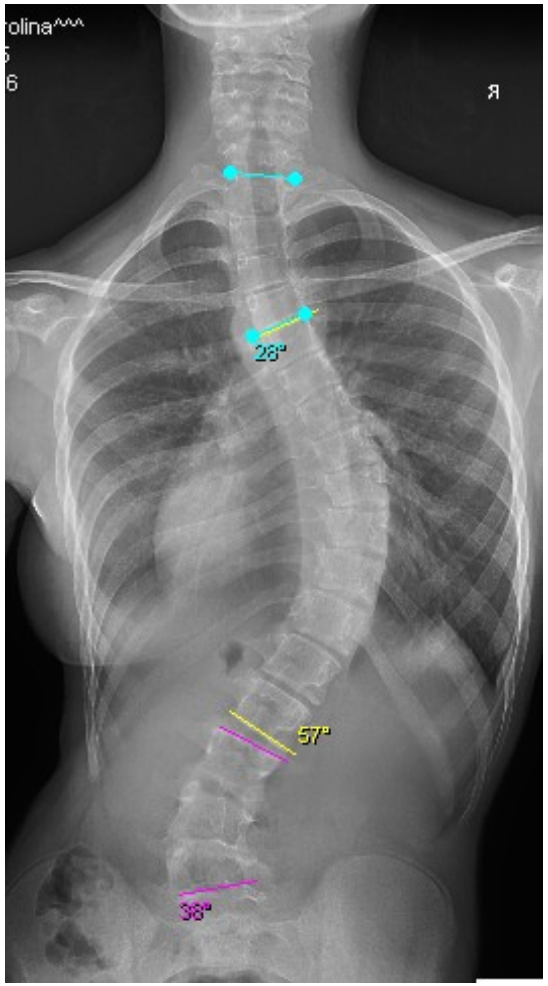


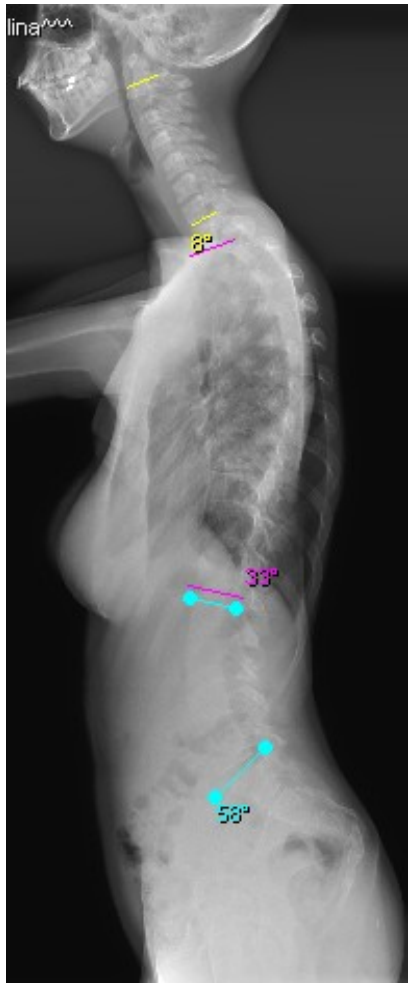
Method of surgical scoliosis treatment.

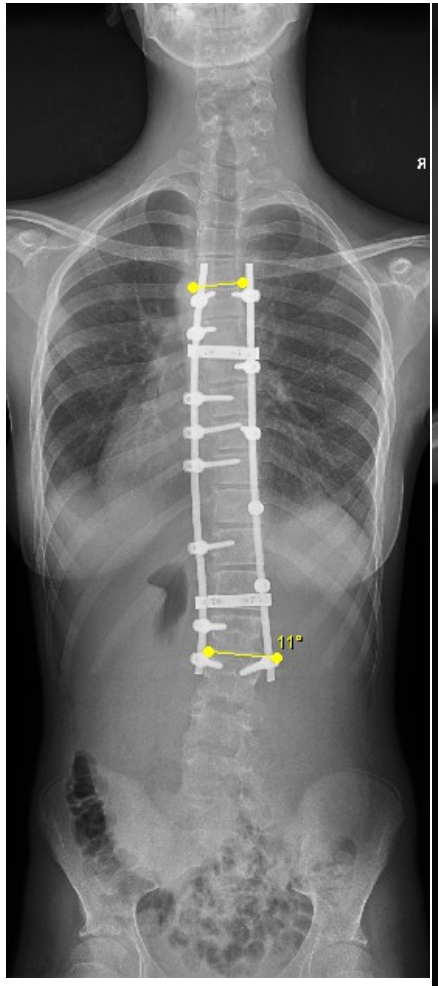
- Transpedicular screws
- Bended rods
- Bone grafts (autografts, alografts)
- = INTERVERTEBRAL FUSION

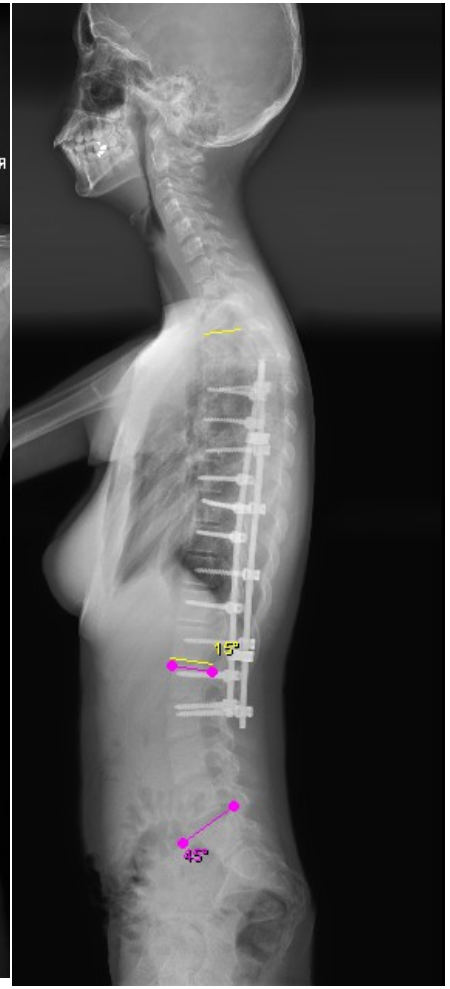


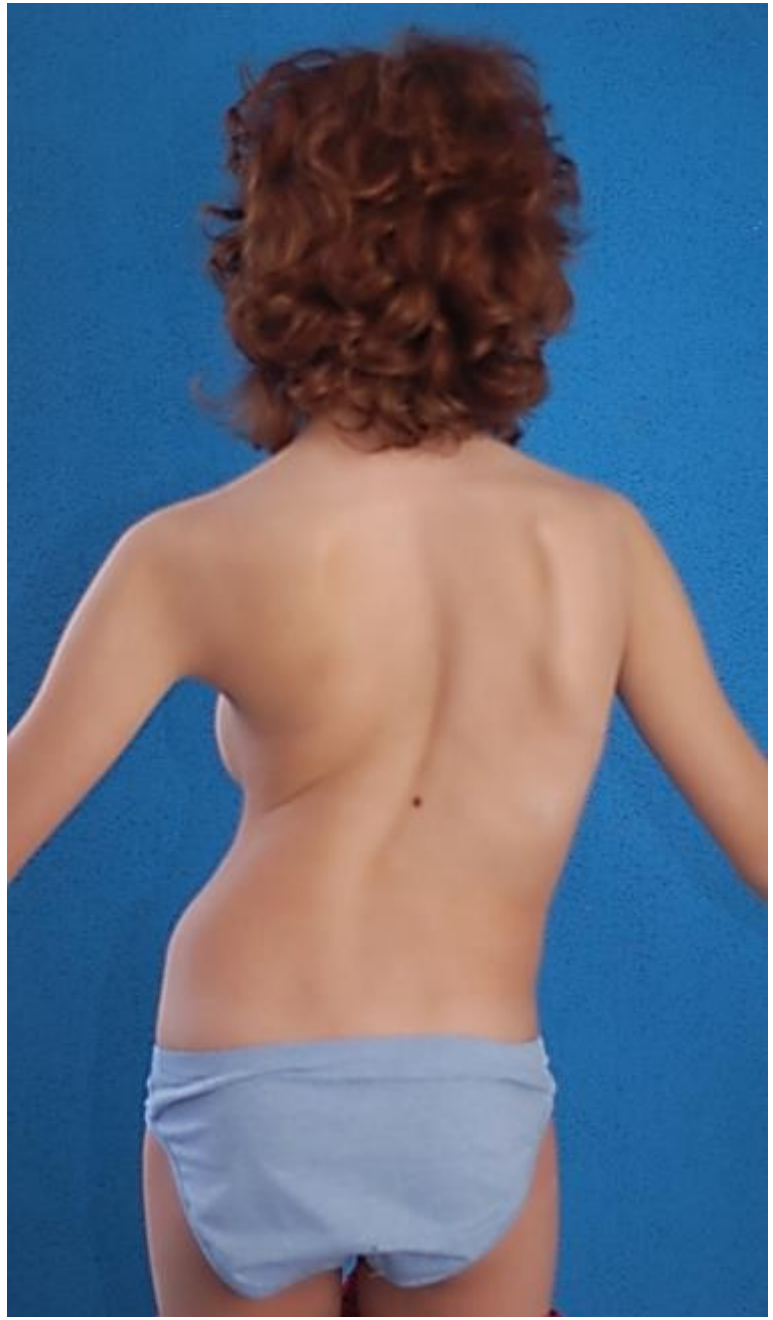



28°
57°
38°


8°
33°
58°


11°


15°
45°



Základní pojmy popisné

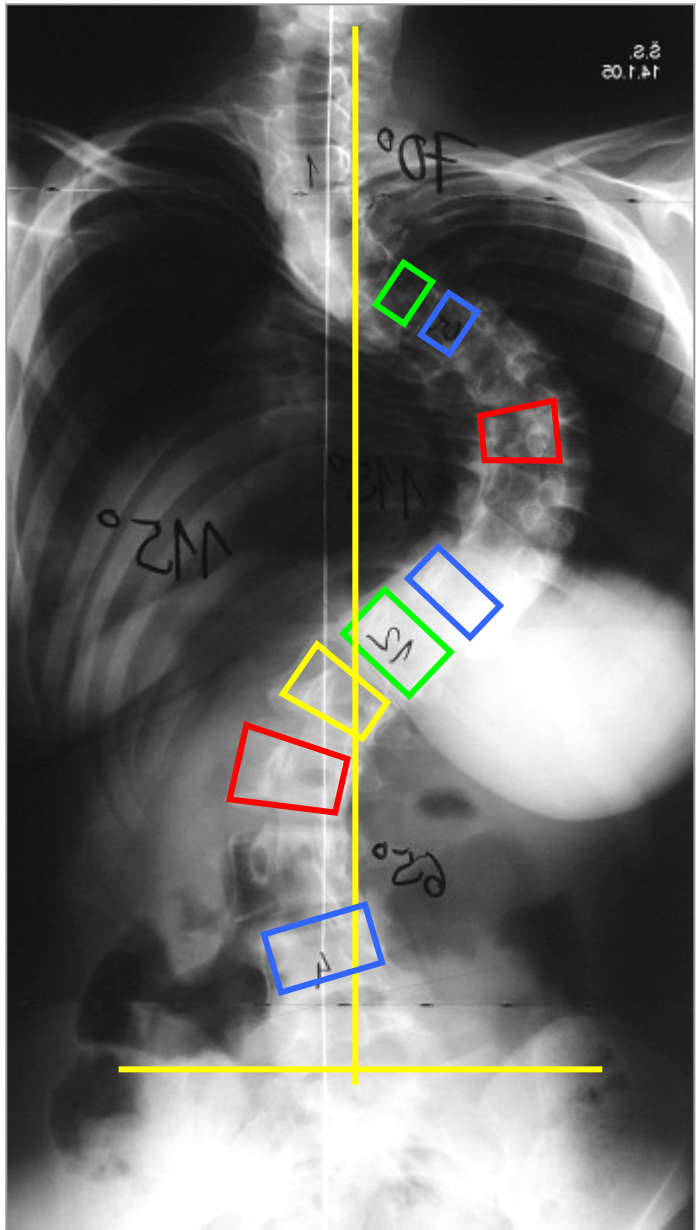
Apical vertebra

End vertebra

Neutral vertebra

CSVL

Stabile vertebra



Scoliosis types due to ethiology

- Idiopathic…….4/5 **80%**
  - infantile
  - juvenile
  - adolescent
- Neuromuscular
  - neuropathic
  - myopathic
- Syndromic - Neurofibromatosis
- Secondary
  - postural
  - tumors
  - Other syndromes(Marfan, Ehlers-Danlos……..)
- Histerical
- Degenerative

Scoliosis types due to ethiology

TYPU deformity

- Idiopathic
- Congenital
- Neuromuscular

VĚKU pacienta

- Infantile
  < 3 y
- Juvenile
  4-10 y
- Adolescent
  11-17 y
- Adult
  > 17 y

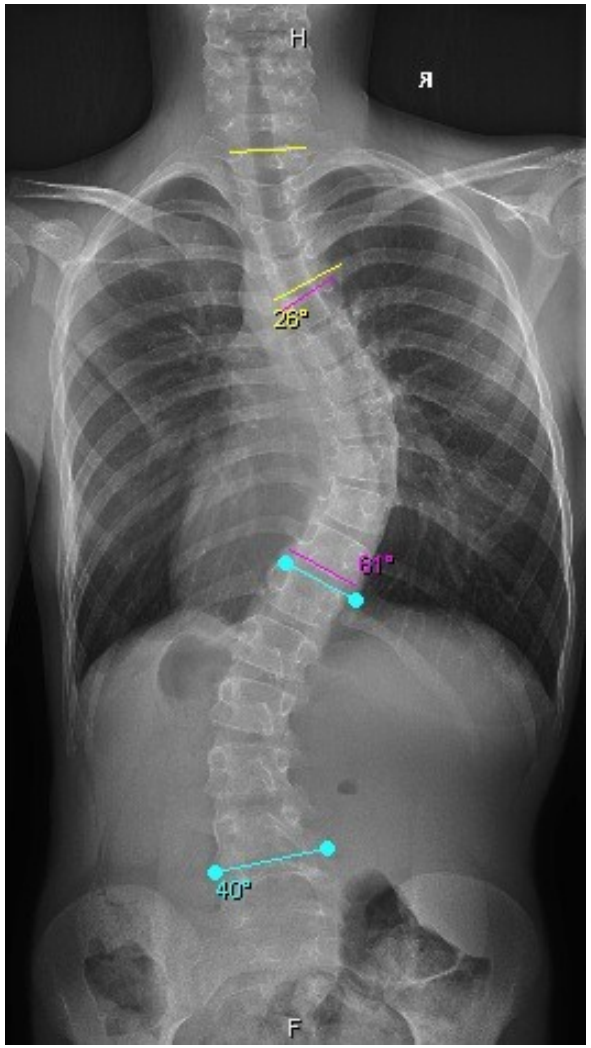
SCOLIOSIS
= 3 dimensional deformity

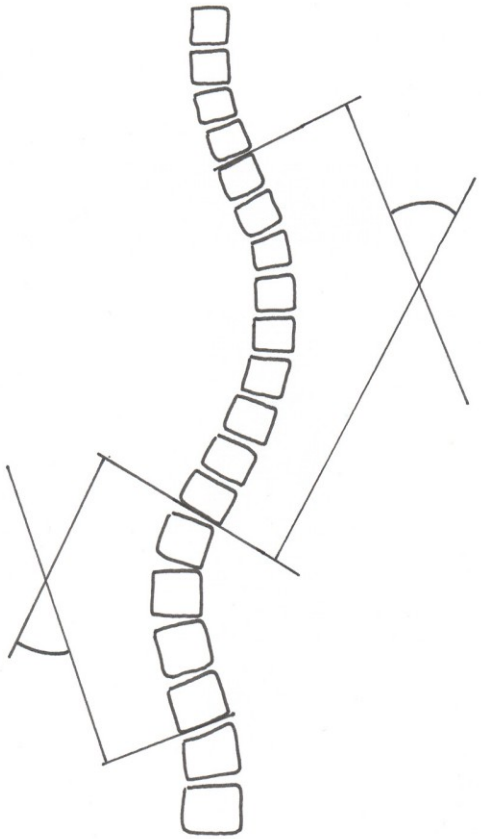
Coronal plane

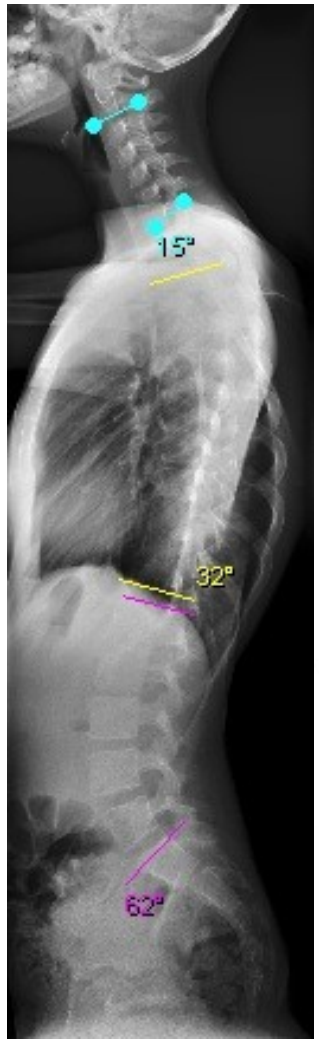
Sagittal plane

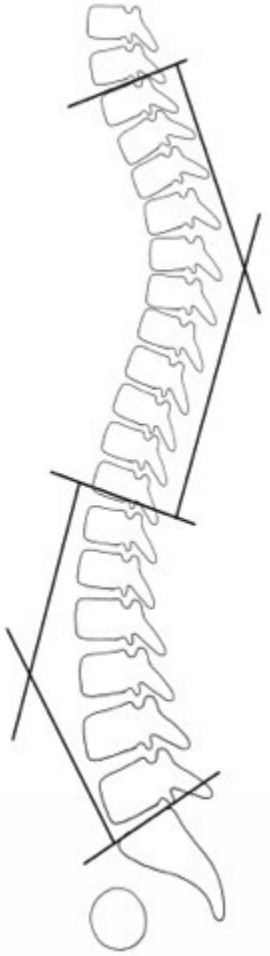
Transverse plane

COBB‘s angle





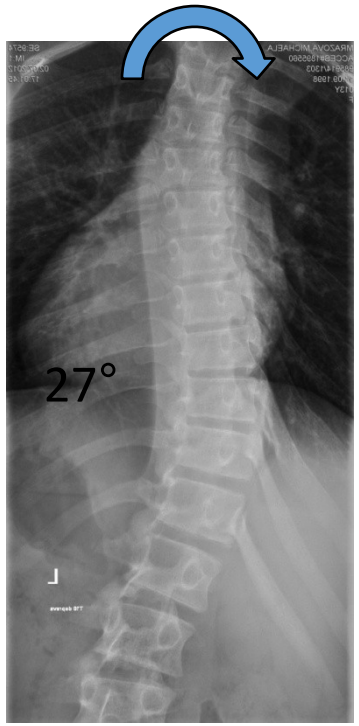


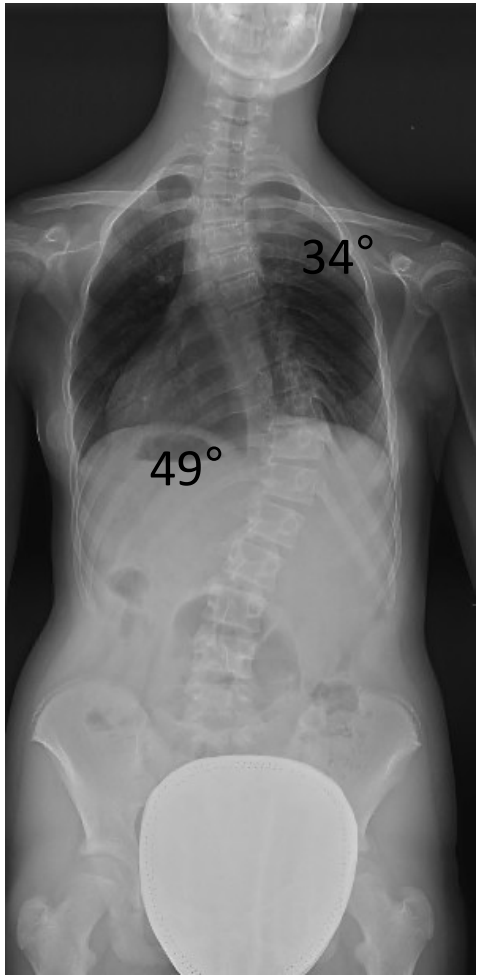


Essentially distinguish between:

Structural curve

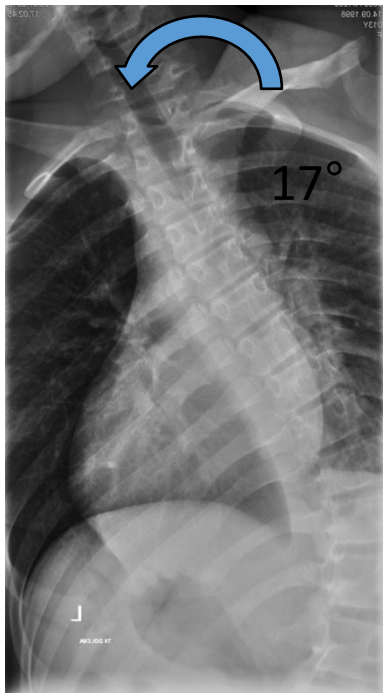
bending >25





Non-structural curve

bending <25

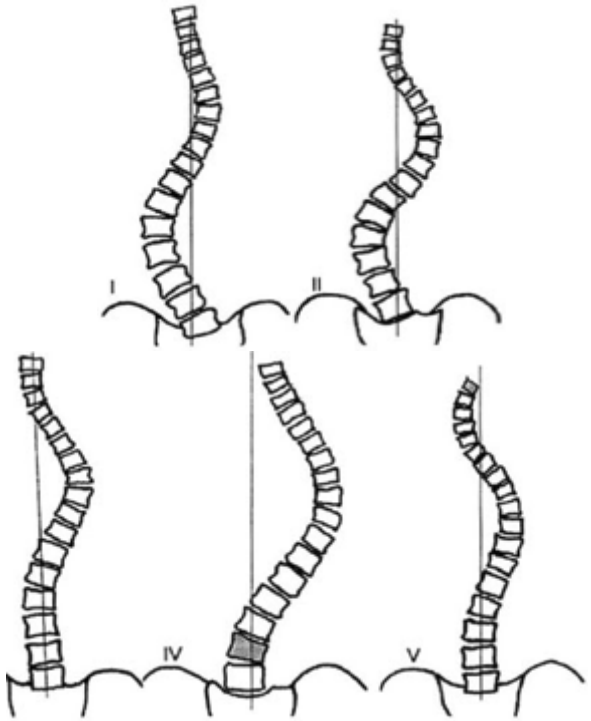


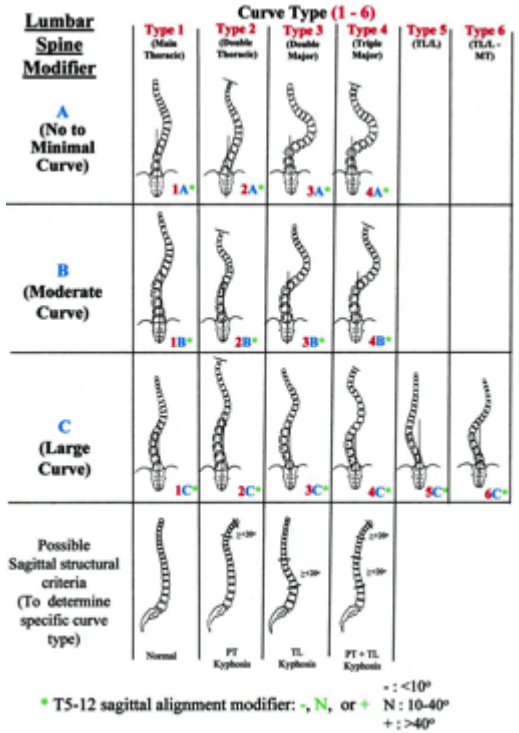
EVOLUTION
in scoliotic classifications

KING-MOE ➡ **LENKE** ➡ **3D**

1D
frontal

2D
frontal+sagittal





???

LENKE‘s classification

- Curve type
- Lumbar spine modifier
- Thoracic sagittal profile

LENKE's classification

- **Curve type**

Type	Proximal Thoracic	Main Thoracic	Thoracolumbar/Lumbar	Description
1	Non-Structural	Structural (Major)*	Non-Structural	Main Thoracic (MT)
2	Structural	Structural (Major)*	Non-Structural	Double Thoracic (DT)
3	Non-Structural	Structural (Major)*	Structural	Double Major (DM)
4	Structural	Structural (Major)*	Structural (Major)*	Triple Major (TM)§
5	Non-Structural	Non-Structural	Structural (Major)*	Thoracolumbar/Lumbar (TL/L)
6	Non-Structural	Structural	Structural (Major)*	Thoracolumbar/Lumbar-Main Thoracic (TL/L-MT)

STRUCTURAL CRITERIA
(Minor Curves)

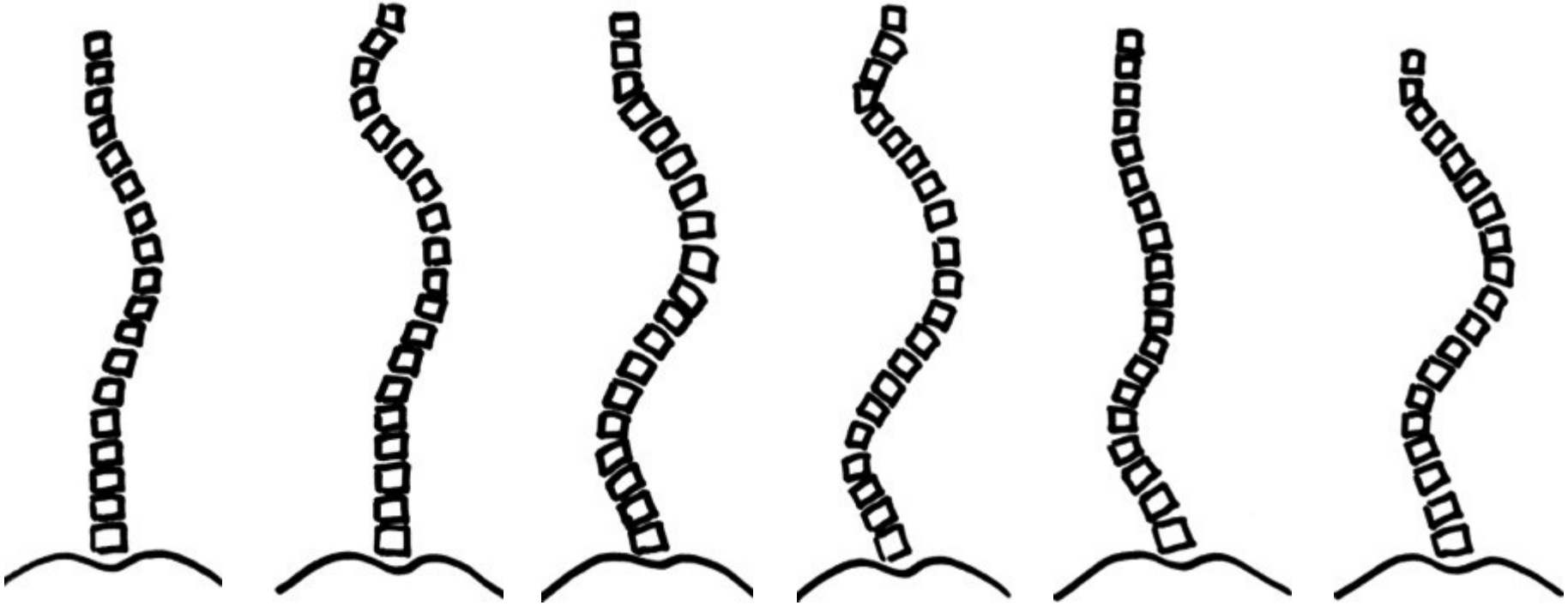
Proximal Thoracic	- Side Bending Cobb ≥ 25° - T2-T5 Kyphosis ≥ +20°
Main Thoracic	- Side Bending Cobb ≥ 25° - T10-L2 Kyphosis ≥ +20°
Thoracolumbar/Lumbar	- Side Bending Cobb ≥ 25° - T10-L2 Kyphosis ≥ +20°

*Major = Largest Cobb measurement, always structural
Minor = All other curves with structural criteria applied
§Type 4 - MT or TL/L can be major curve

LOCATION OF APEX
(SRS Definition)

CURVE	APEX
Thoracic	T2-T11/12 Disc
Thoracolumbar	T12-L1
Thoracolumbar/Lumbar	L1/2 Disc-L4

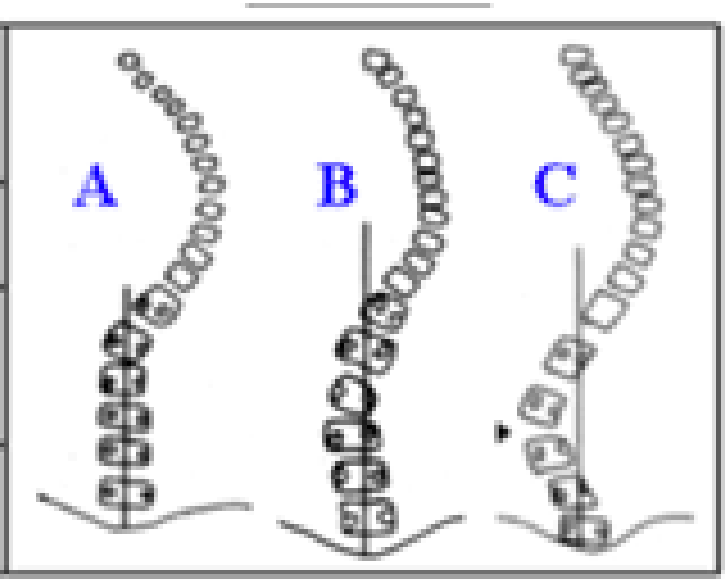
Lenke‘s classification curve types



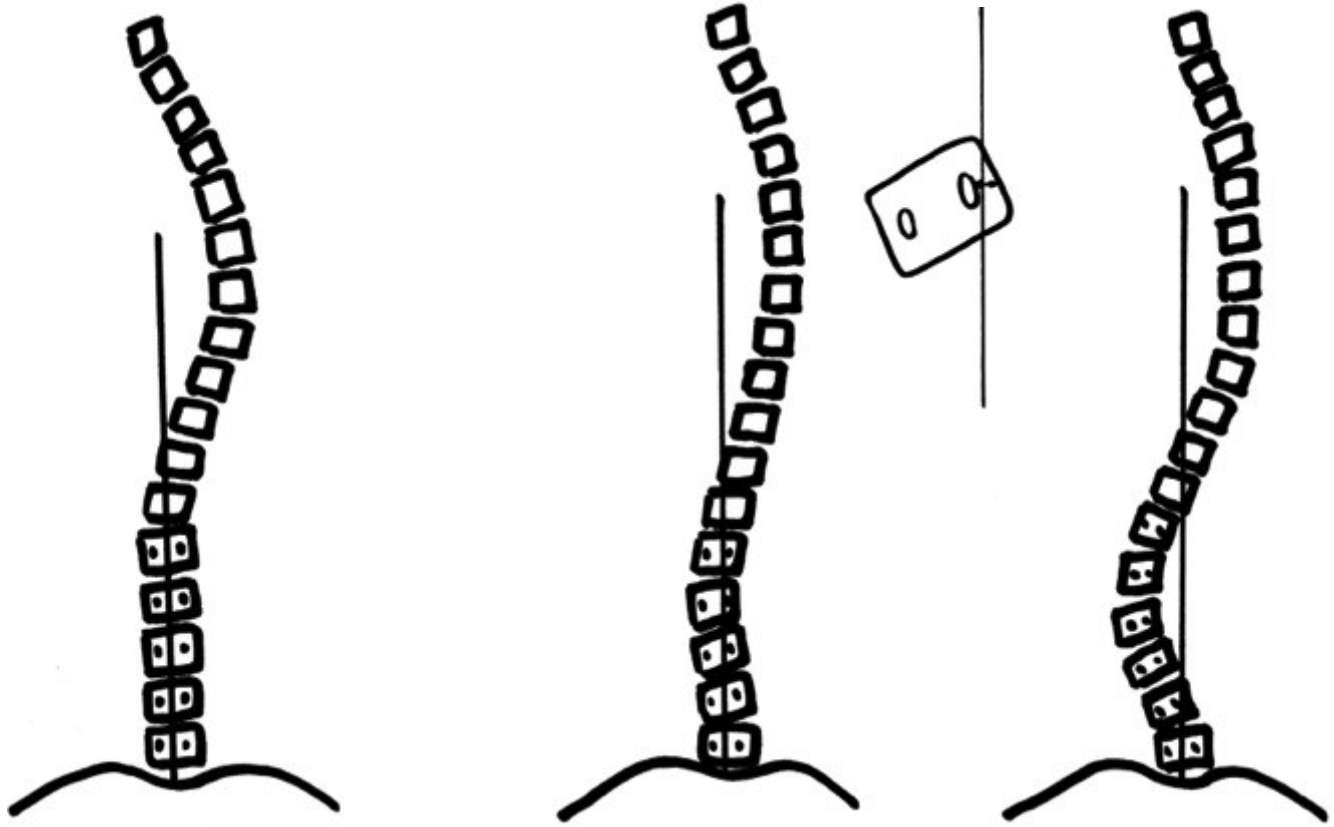
LENKE‘s classification

- **Lumbar spine modifier**

Lumbar Spine Modifier	CSVL to Lumbar Apex
A	CSVL between pedicles
B	CSVL touches apical body(ies)
C	CSVL completely medial



Lenke‘s classification lumbar parameter



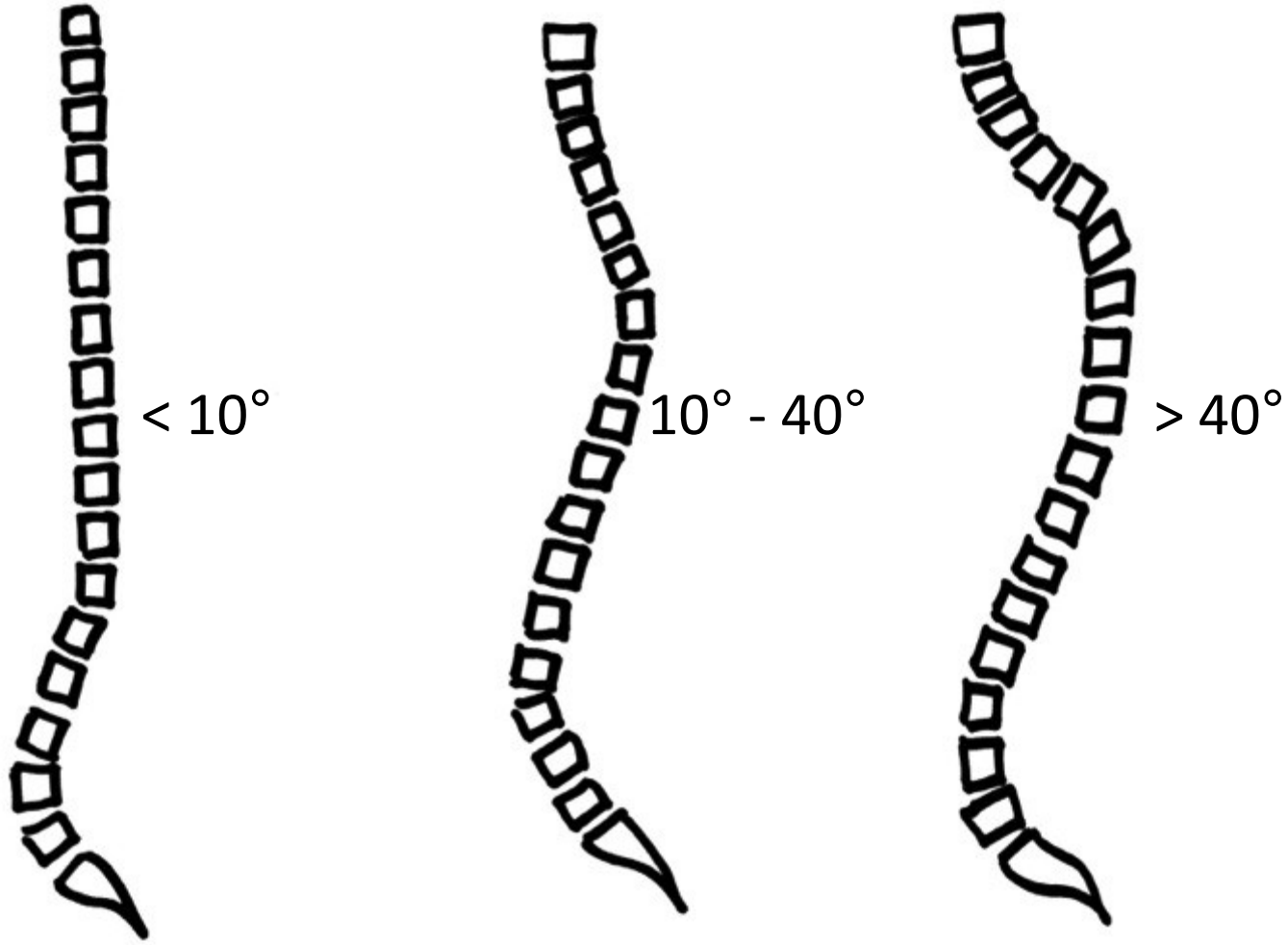
A B C

LENKE‘s classification

- **Thoracic sagittal profile**

Thoracic Sagittal Profile T5-T12	
- (Hypo)	< 10°
N (Nomal)	10° - 40°
+ (Hyper)	> 40°

Lenke‘s classification sagittal parameter



Lenke‘s classification
EXAMPLES

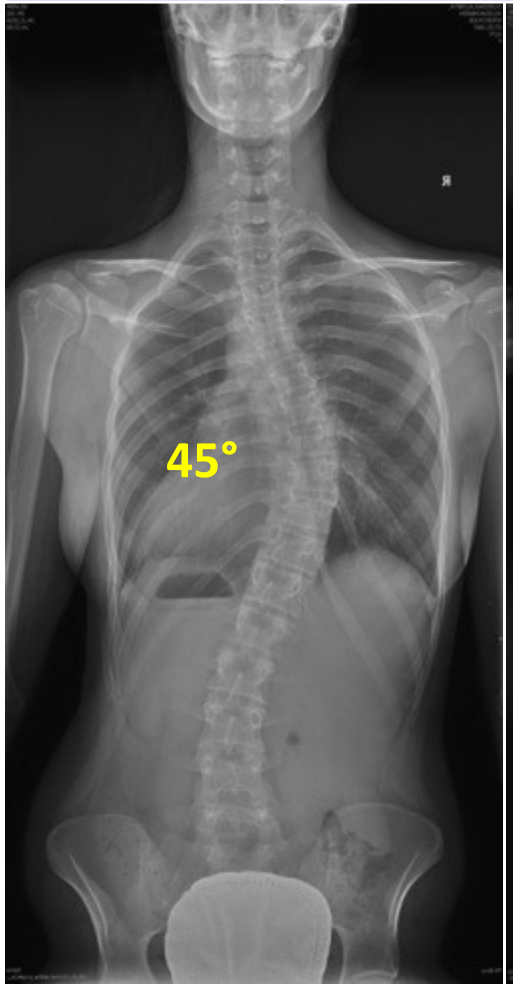
> 40°

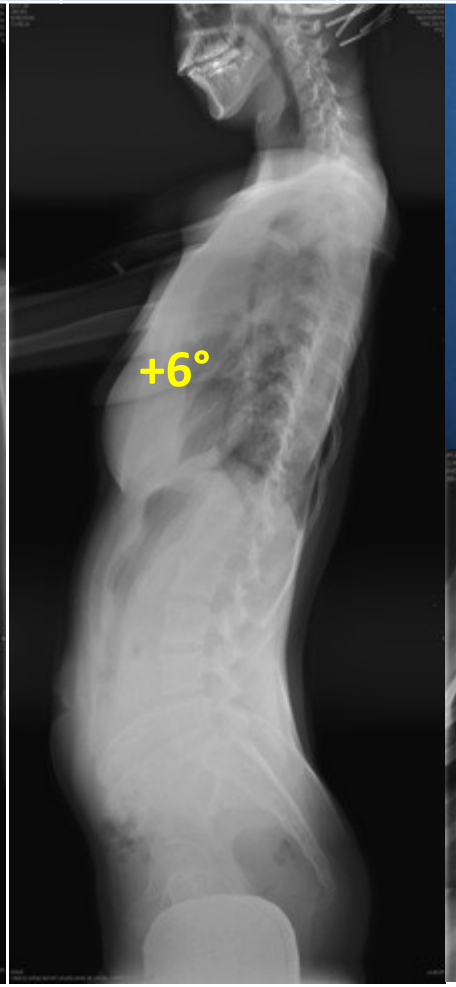
Girl 13+9

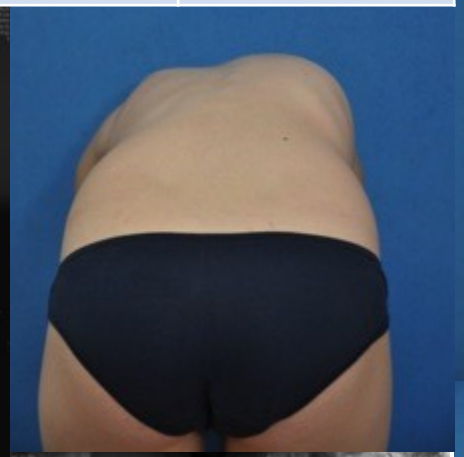
Lenke 1

Lenke 1A-

type	Proximal thoracic	Main thoracic	Thoracolumbar/lumbar	Description
1	Non-Structural	Structural (Major)	Non-Structural	MT (Main Thoracic)



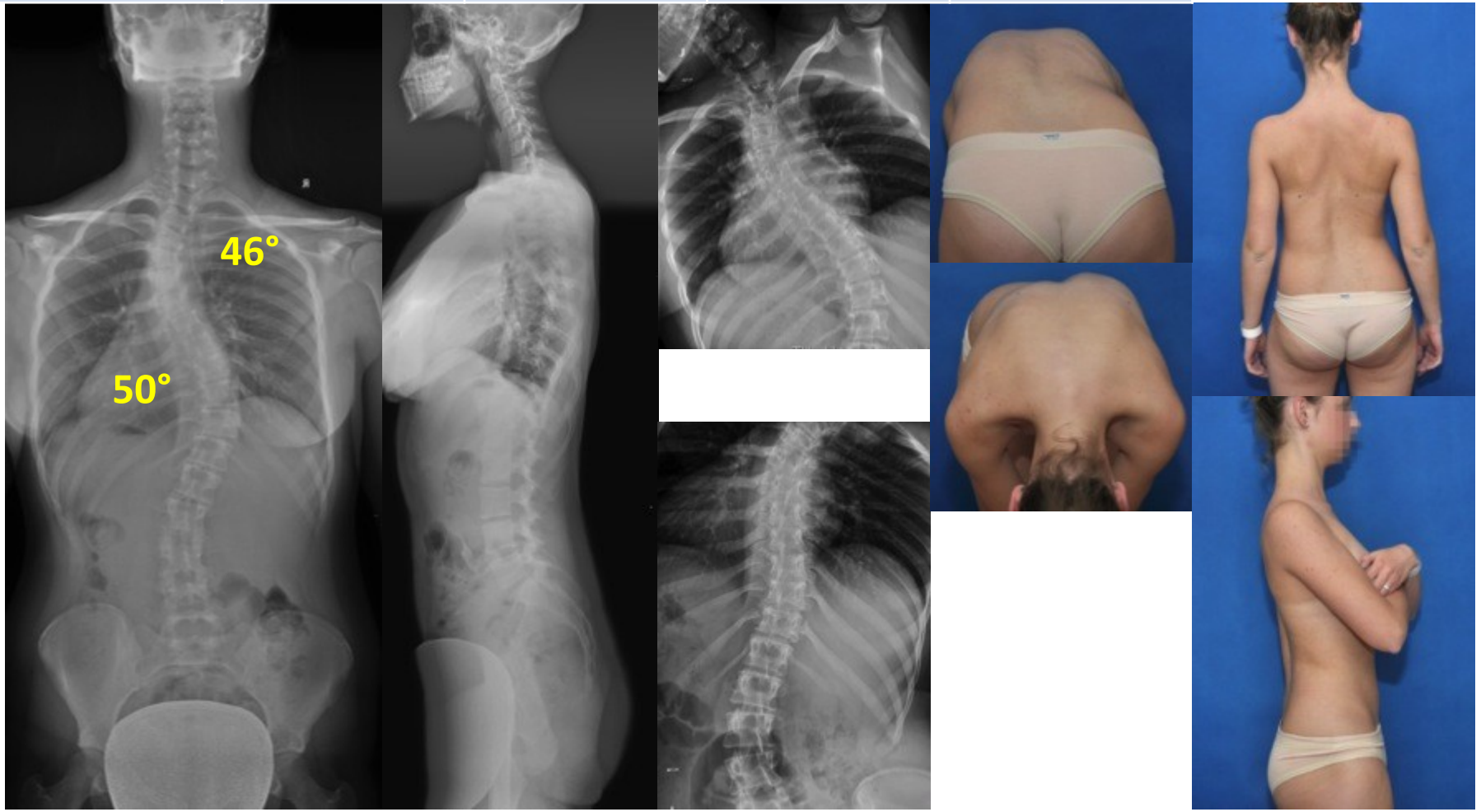




Girl 14+1

Lenke 2

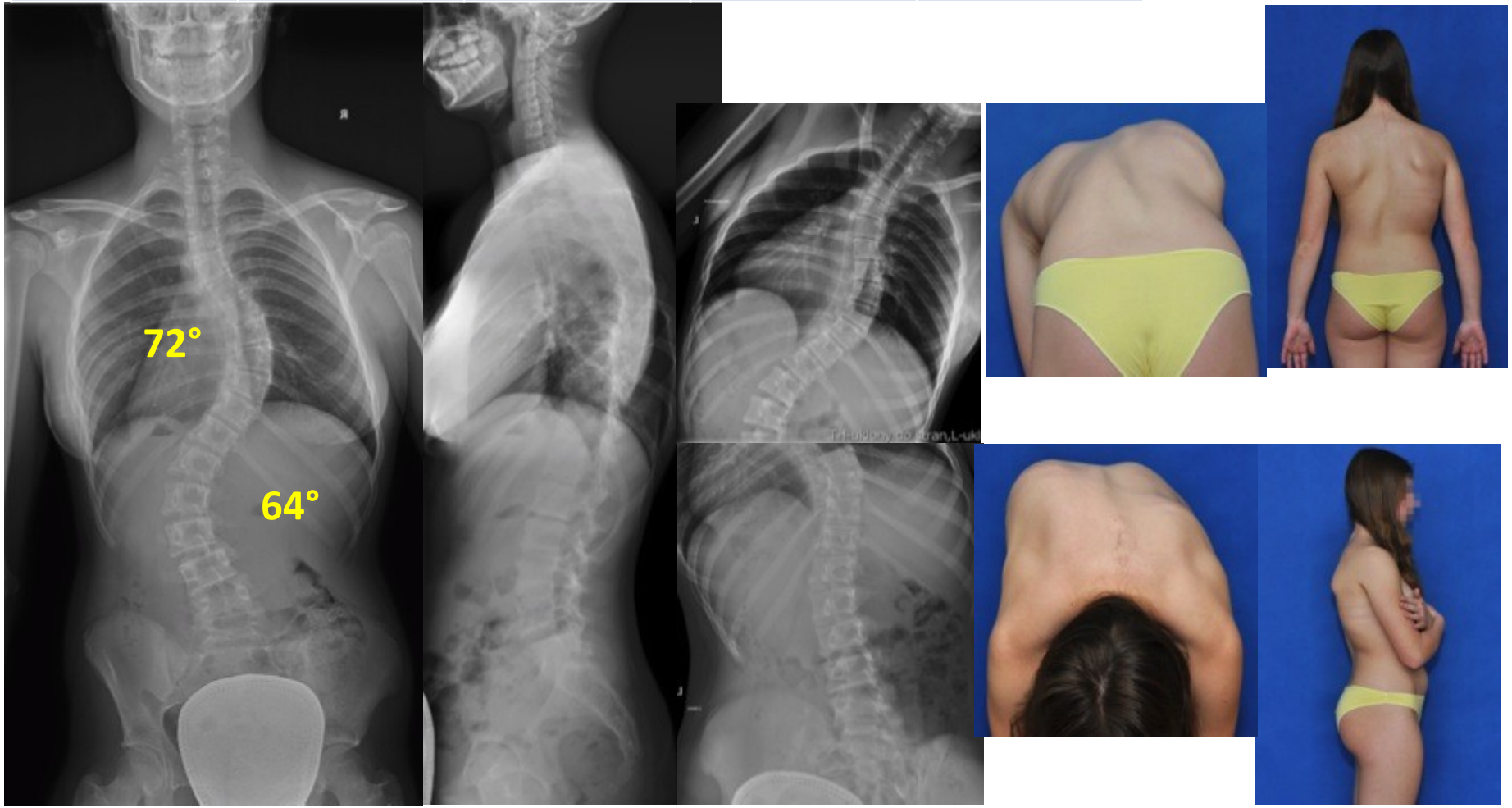
type	Proximal thoracic	Main thoracic	Thoracolumbar/lumbar	Description
2	Structural	Structural (Major)	Non-Structural	DT (Double Thoracic)



Girl 14+2

Lenke 3

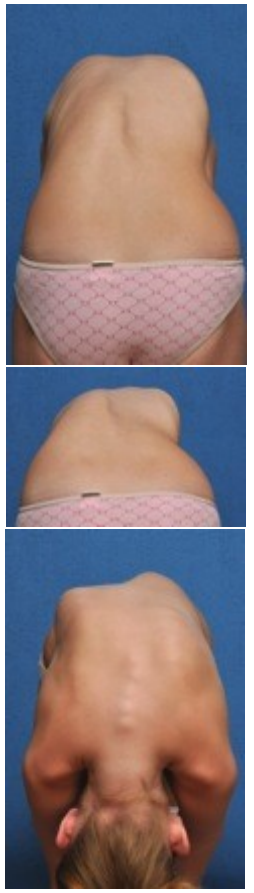
type	Proximal thoracic	Main thoracic	Thoracolumbar/lumbar	Description
3	Non-Structural	Structural (Major)	Structural	DM (Double Major)

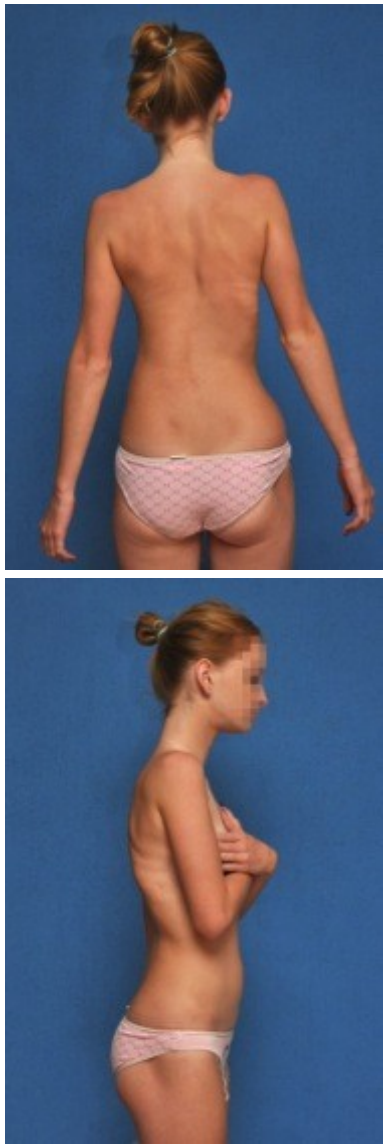


Girl 12+9

Lenke 4

type	Proximal thoracic	Main thoracic	Thoracolumbar/lumbar	Description
4	Structural	Structural (Major)	Structural (Major)	TM (Triple Major)

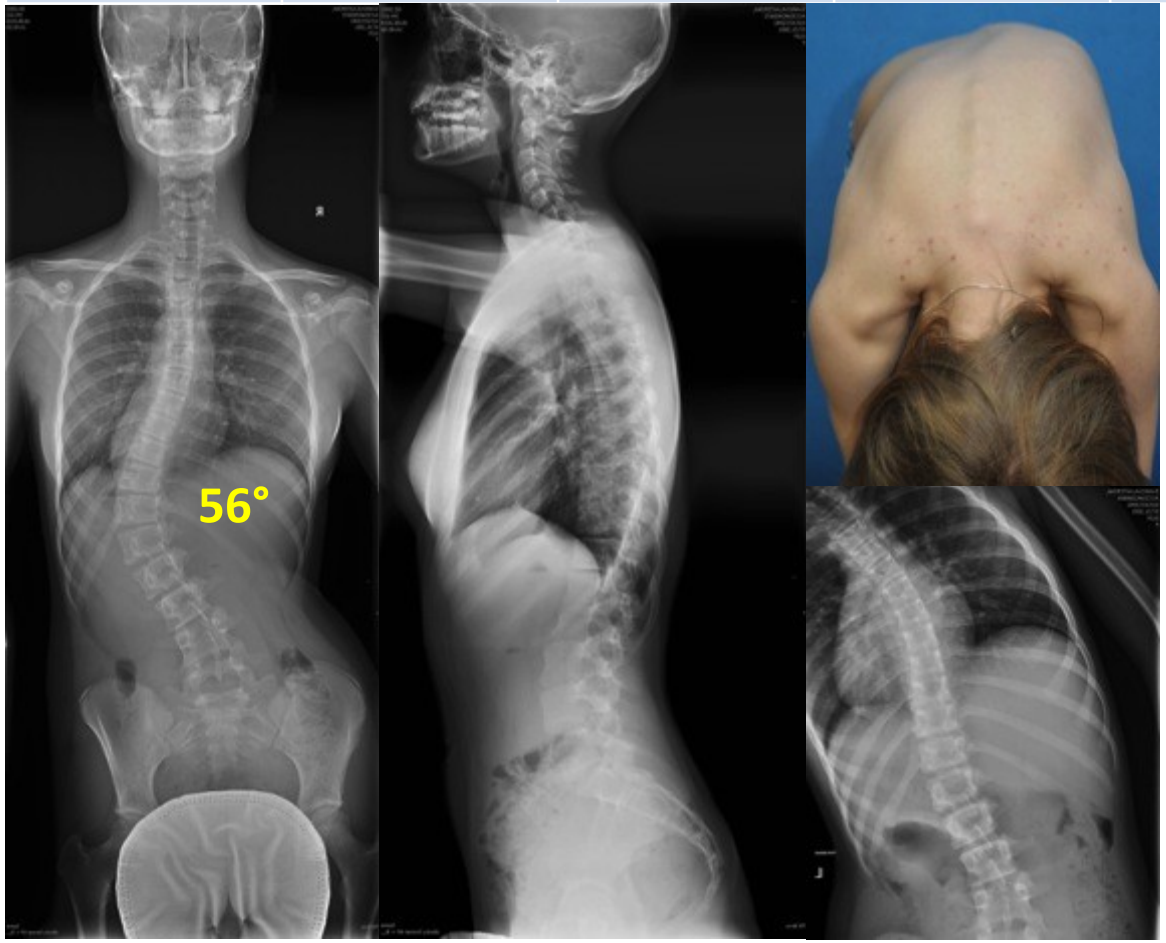


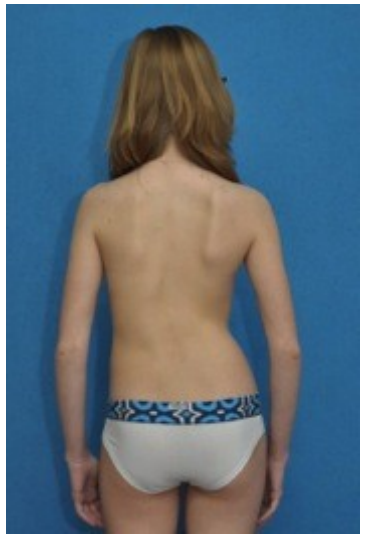


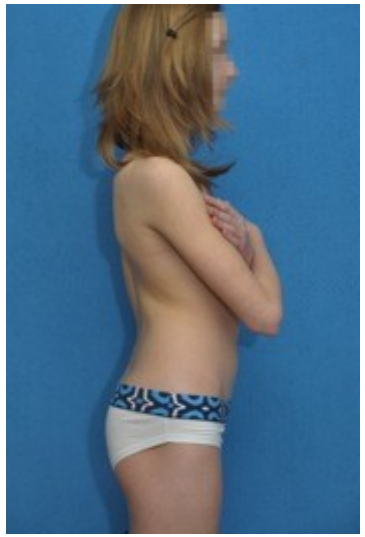
Girl 12+5

Lenke 5

type	Proximal thoracic	Main thoracic	Thoracolumbar/lumbar	Description
4	Non-Structural	Non-Structural	Structural (Major)	TL/T (Thoracolumbar/Lumbar)



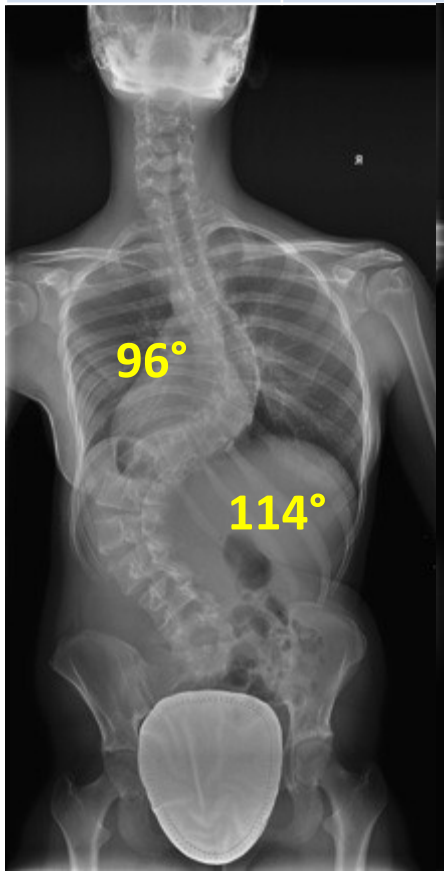


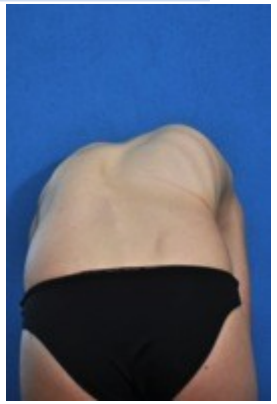


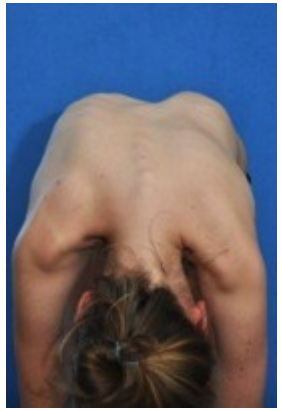
Girl 16+9

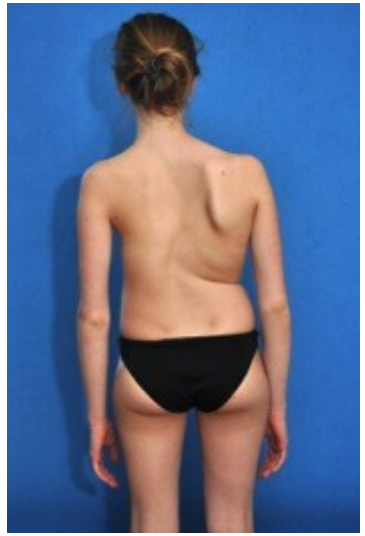
Lenke 6

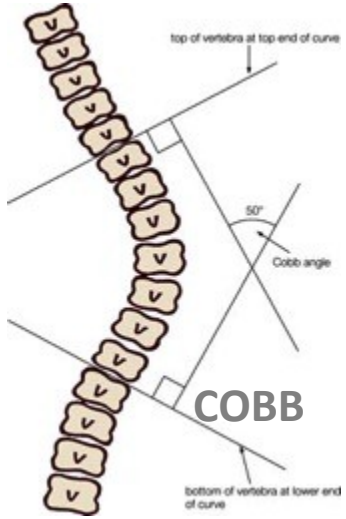
type	Proximal thoracic	Main thoracic	Thoracolumbar/lumbar	Description
4	Non-Structural	Structural	Structural (Major)	TL/T-MT (Thoracolumbar/Lumbar-Main Thoracic)



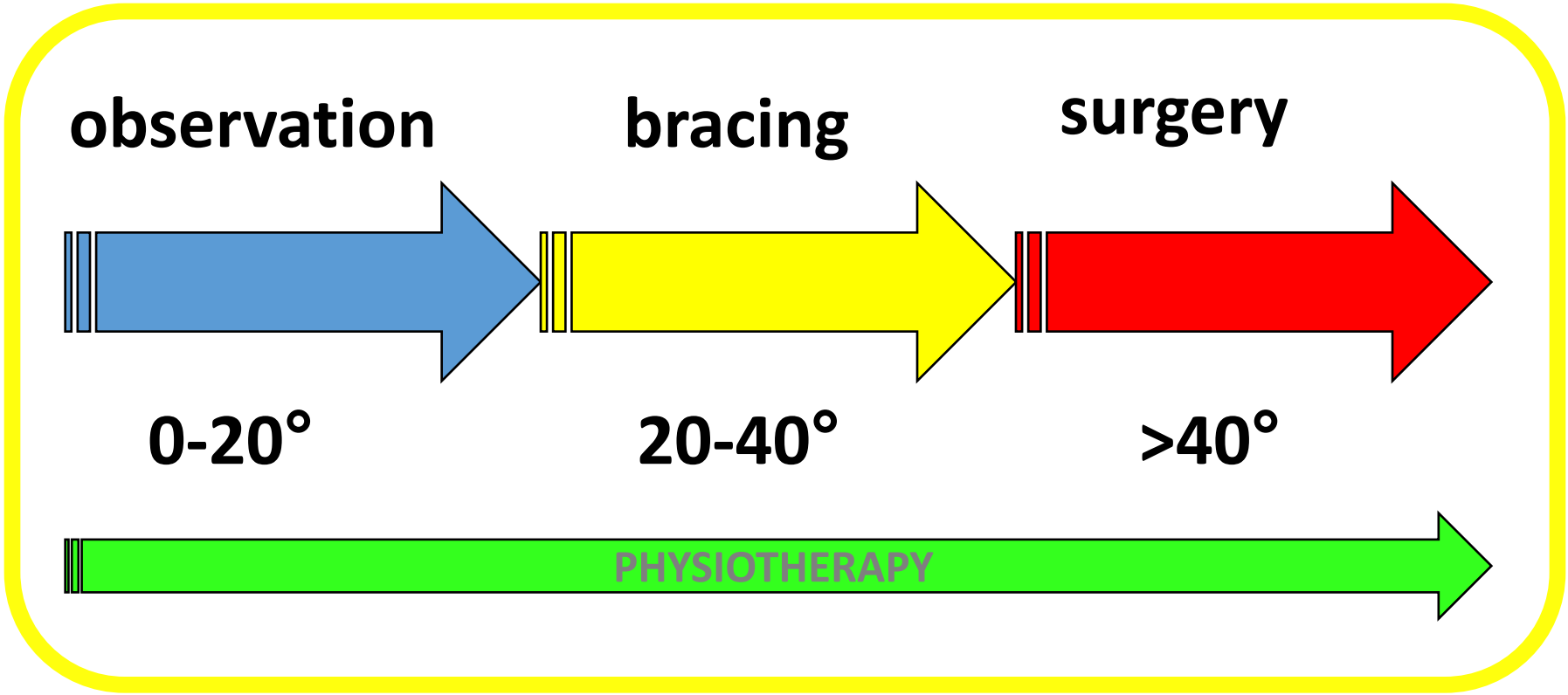








Therapeutic chart



Non-operative treatment

physiotherapy

casting

bracing

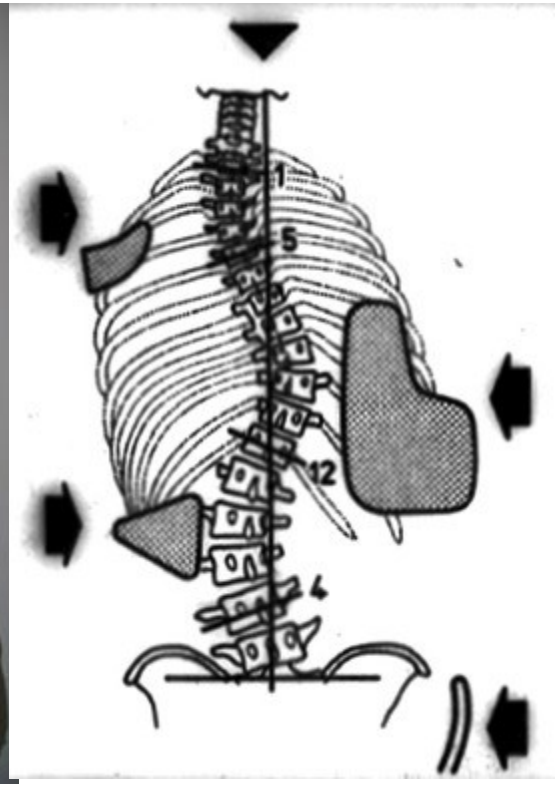
CASTING

Indication: INFANTILE scoliosis

Applying under the general anesthesia

Changing each and every 2 month

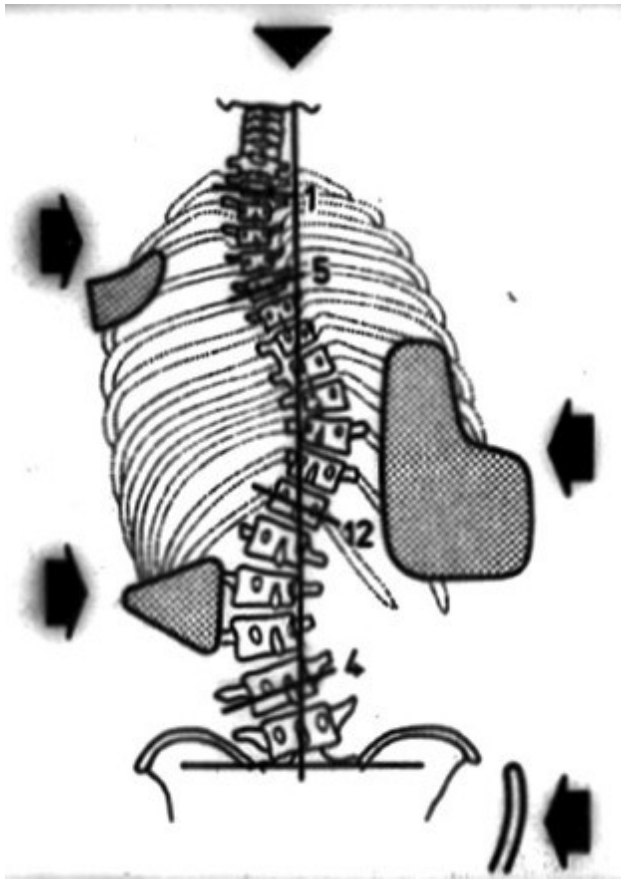
BRACING



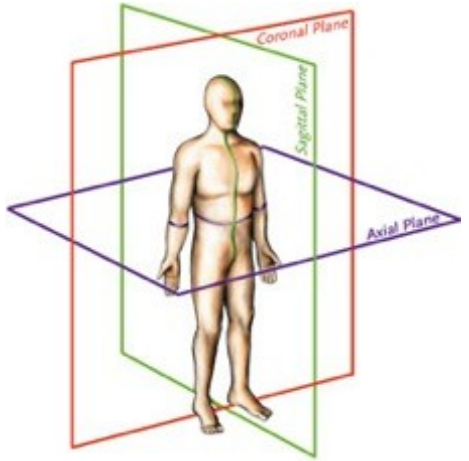
BRACING

Indication for bracing:

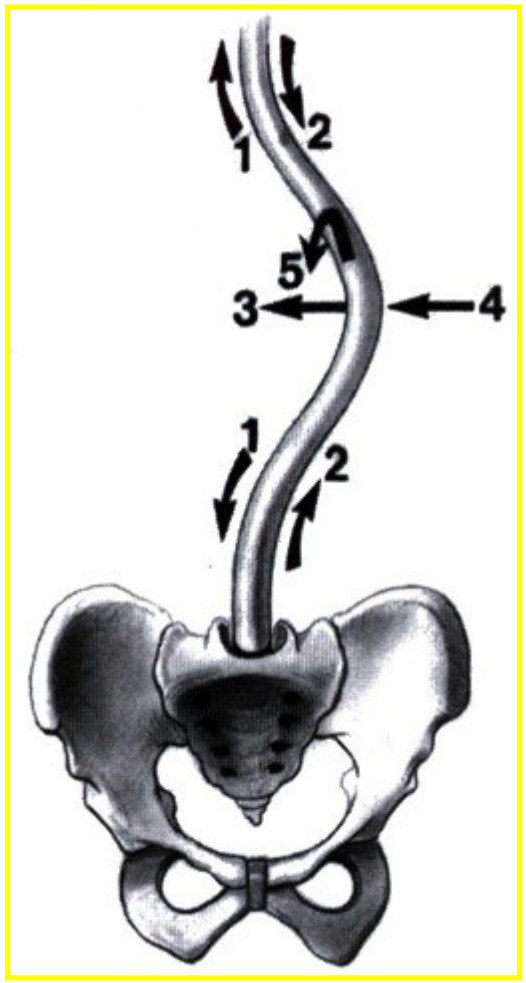
progressive scoliosis
poor or no casting toleration
unable to undergo surgery



3D
scoliotic correction



Corrective methods

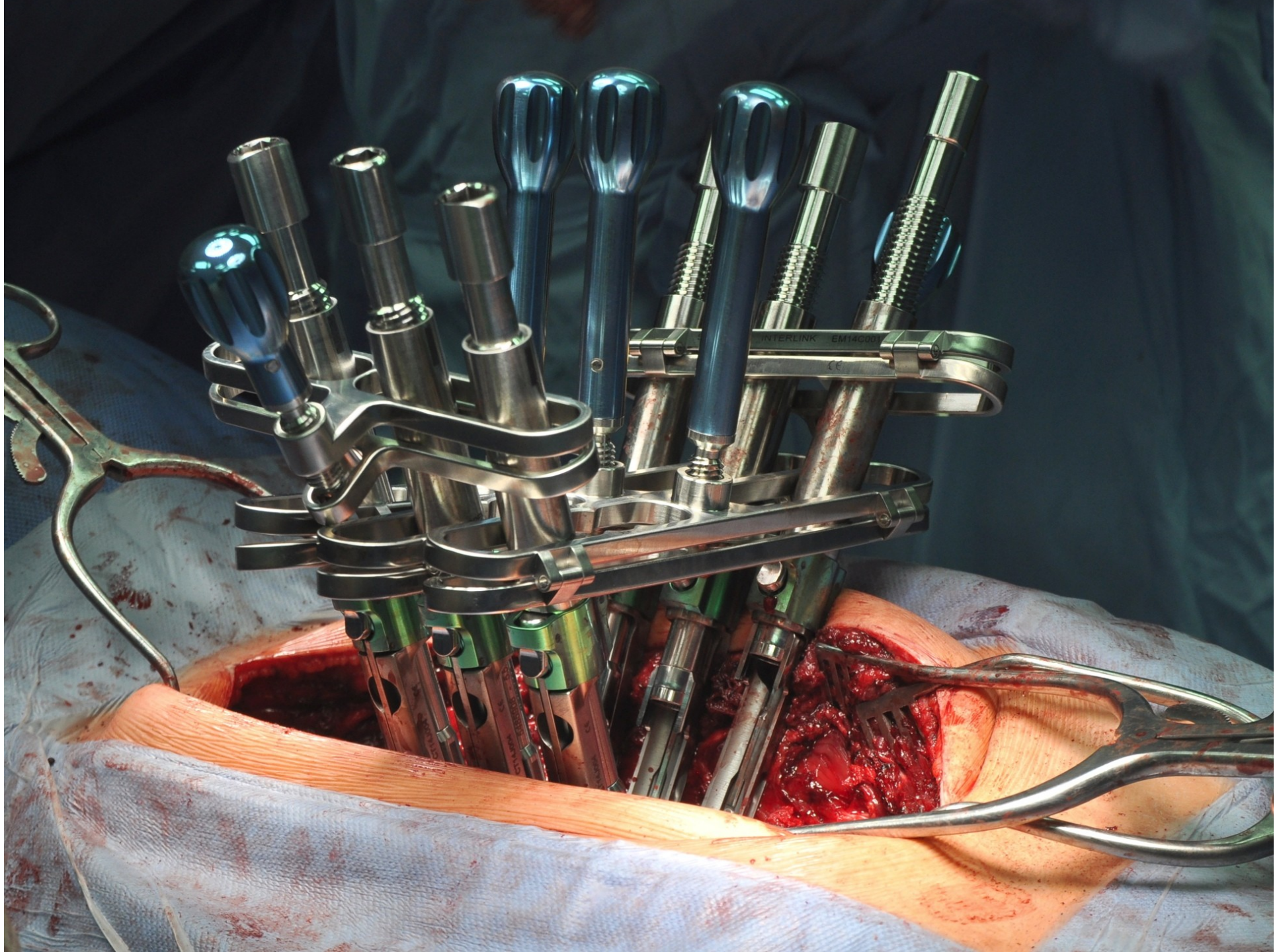


1-distraction

2-compression

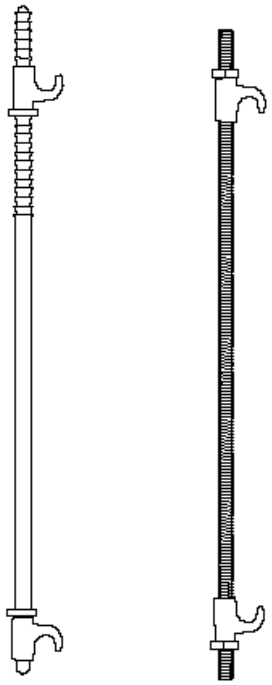
3,4-translation

5-derotation

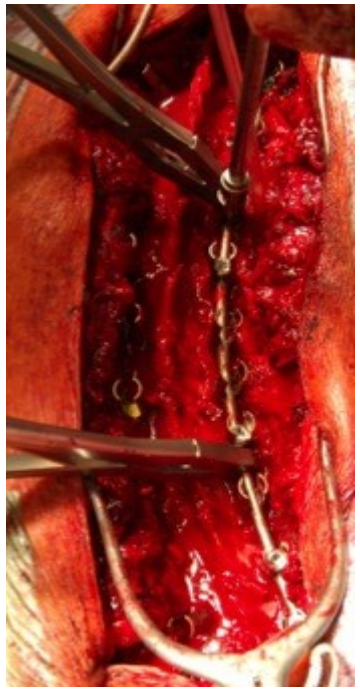


EVOLUTION
in corrective maneuvers

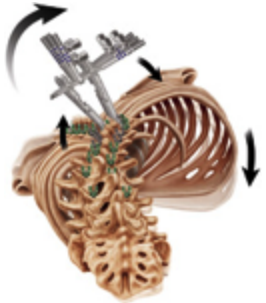
DISTRACTION → TRANSLATION → VCM → **Rod Roduction**

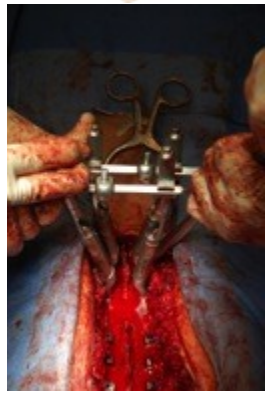


1D
frontal

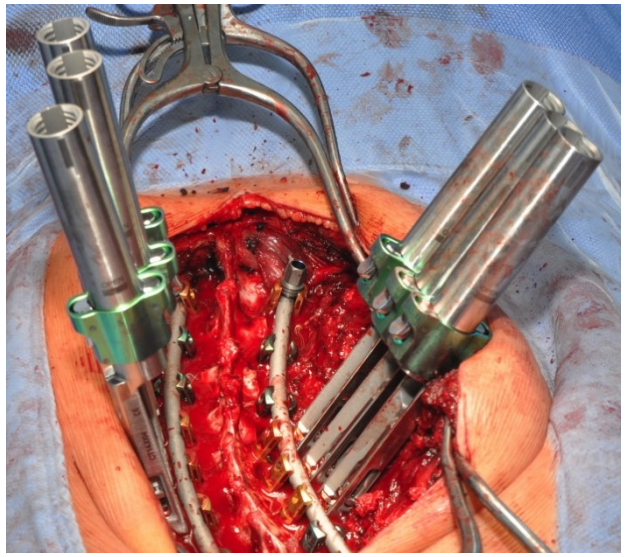


1D
frontal





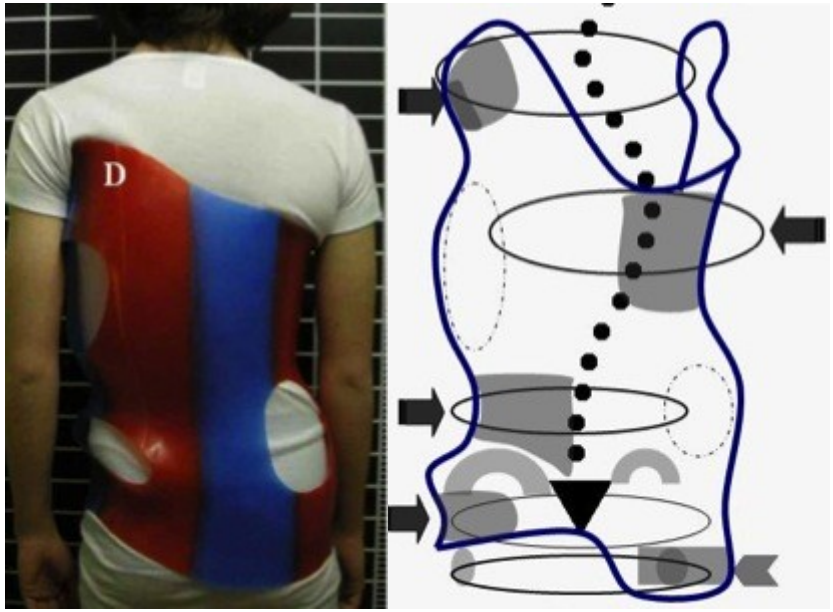
2D
frontal, axial

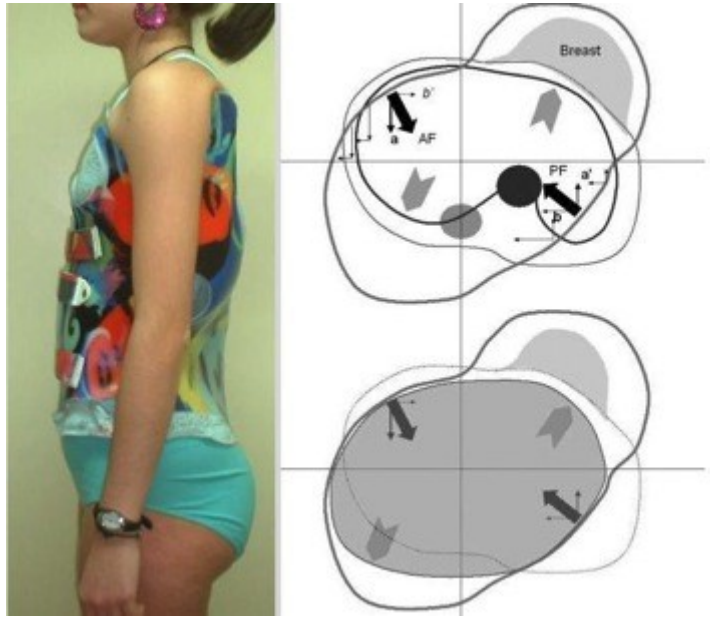


3D
frontal, axial, sagittal

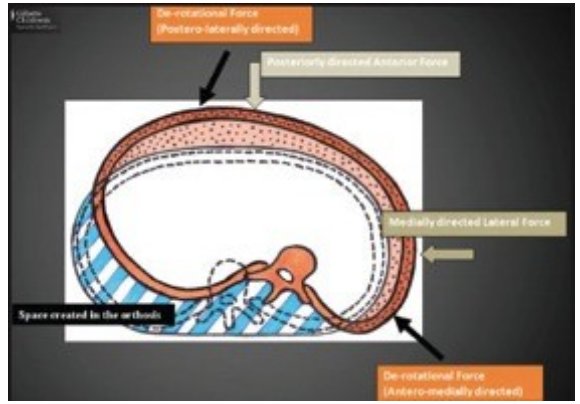
EVOLUTION
in corrective maneuvers

BRACING





Source: Rigo et al, Scoliosis 2010



BRACING

Advantages:

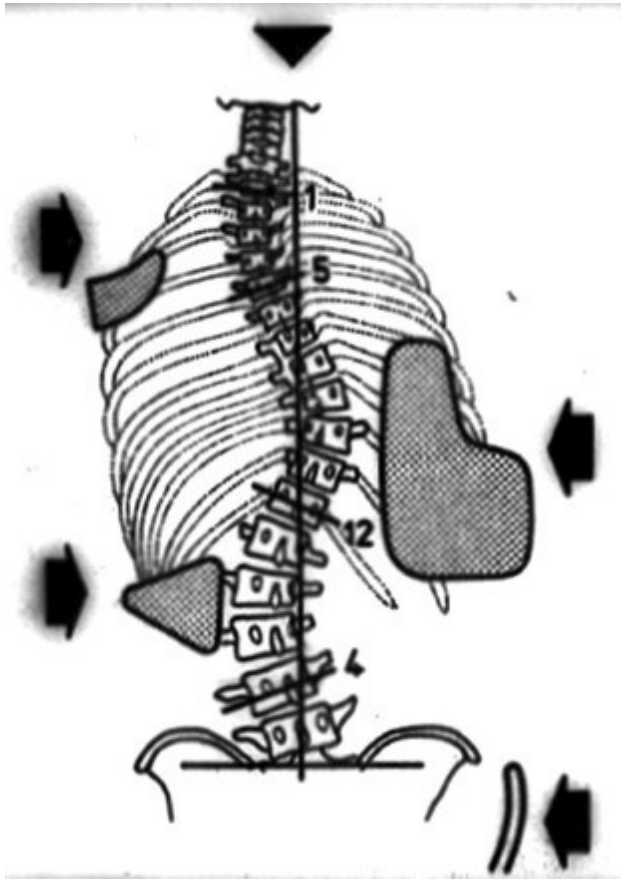
- Surgery elimination

Disadvantages:

- Poor toleration
- Lung function decreasing
- Muscle weaking

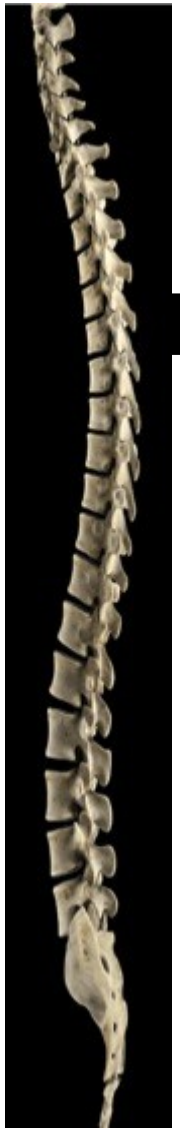
Problems:

- HYPOKYPHOSIS
- POOR DEROTATION

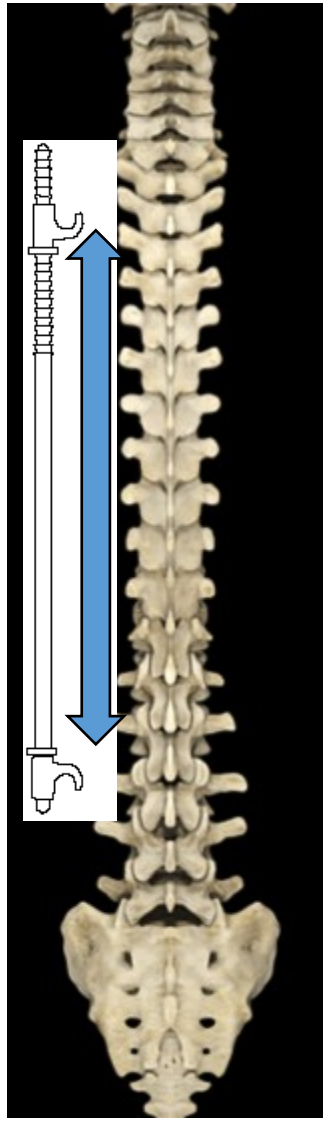


DISTRACTION

EVOLUTION
in corrective maneuvers



hypokyphosis



DISTRACTION

Advantages:

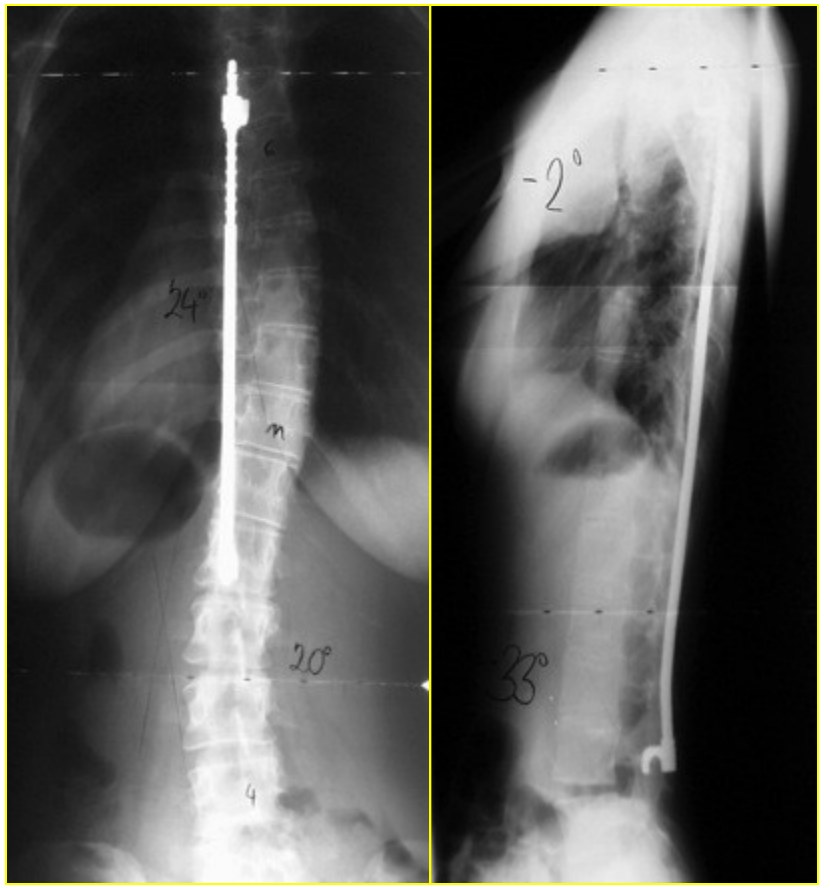
- Simple implantation
- Possibility of spine growth
- Miniinvasive approach

Disadvantages:

- Uniplanar correction (frontal)
- High rate of complications

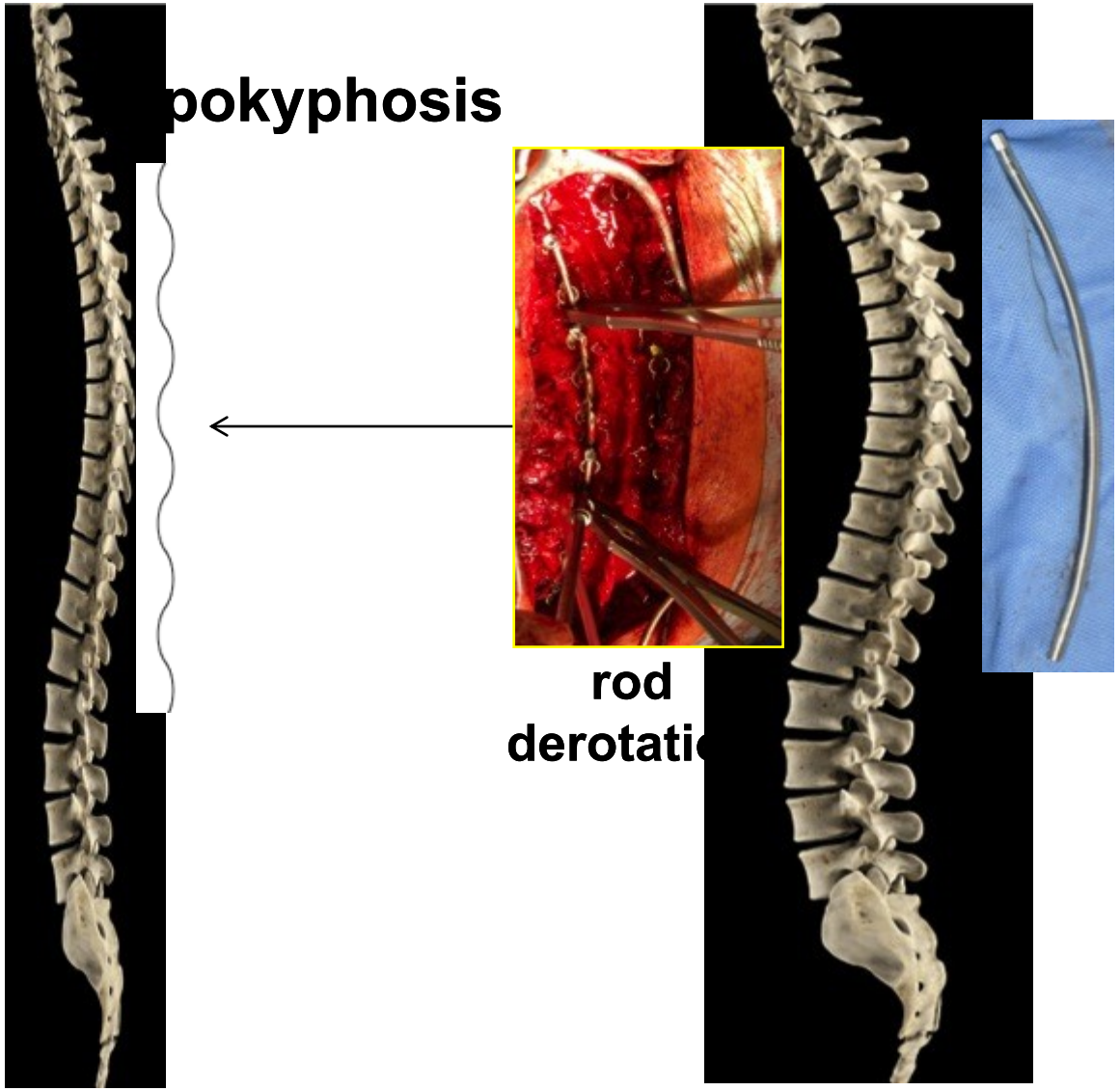
Problems:

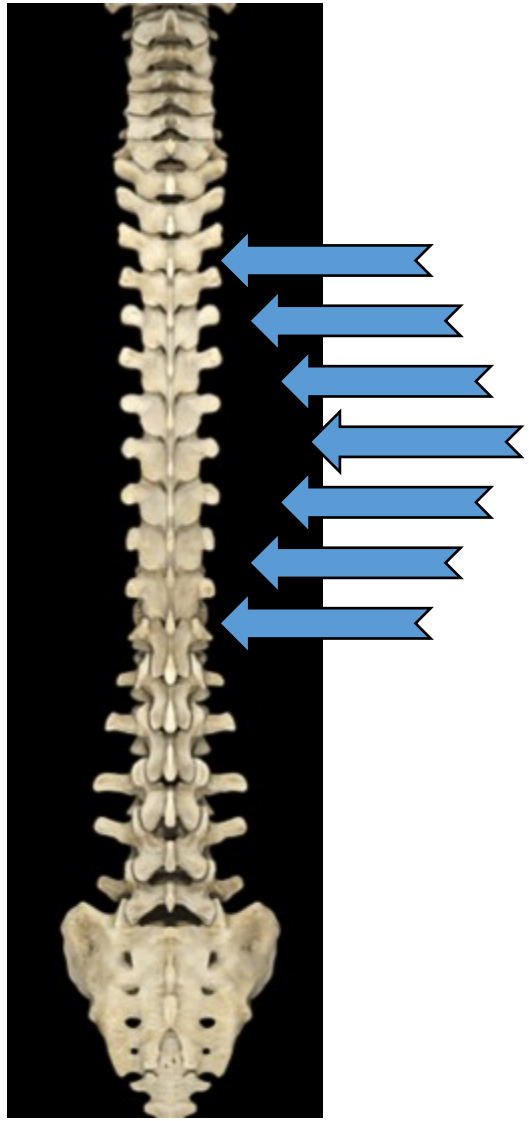
- **HYPOKYPHOSIS**
- **NO DEROTATION**



TRANSLATION

EVOLUTION
in corrective maneuvers





TRANSLATION

Advantages:

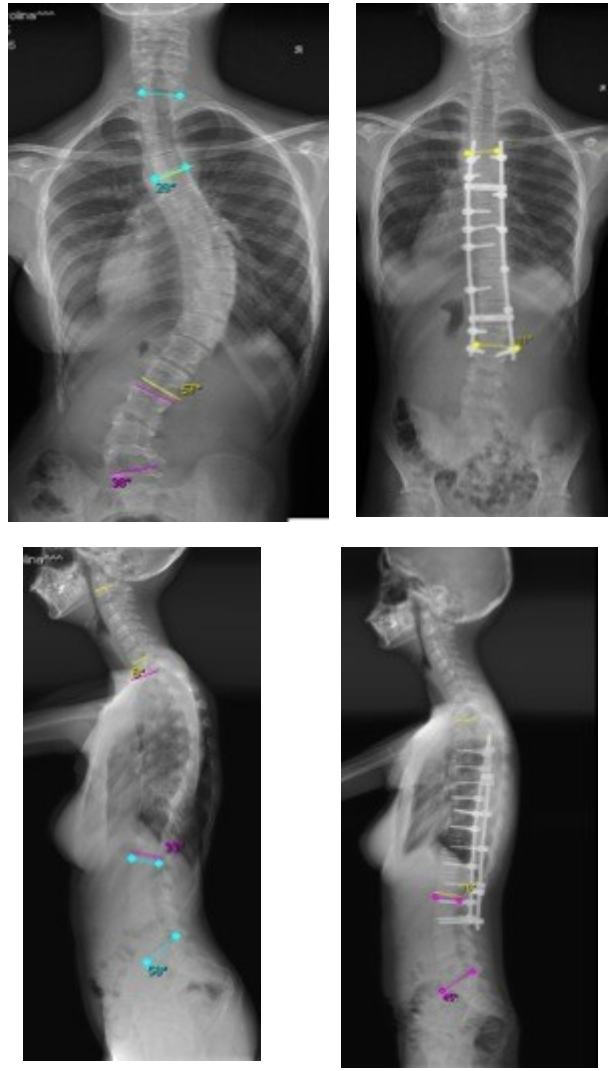
- Good frontal correction

Disadvantages:

- Uniplanar correction (frontal)

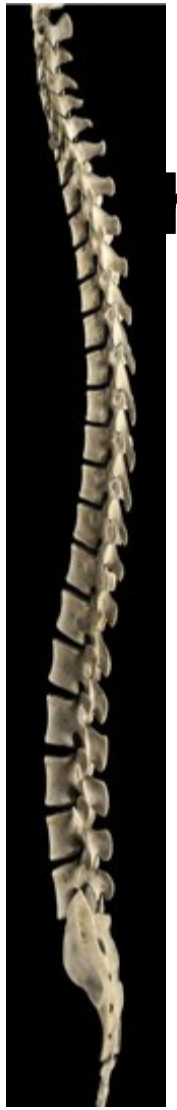
Problems:

- HYPOKYPHOSIS
- NO DEROTATION

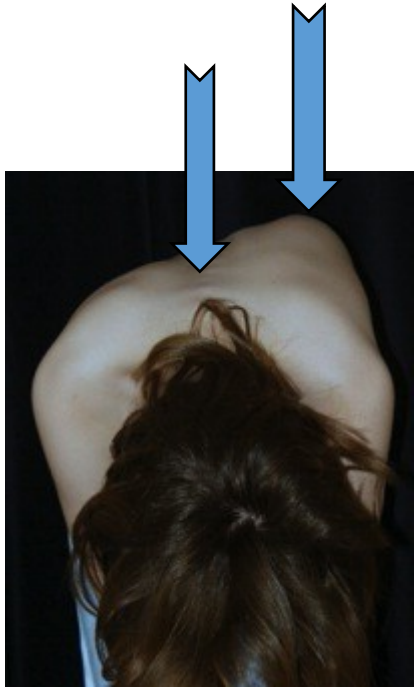


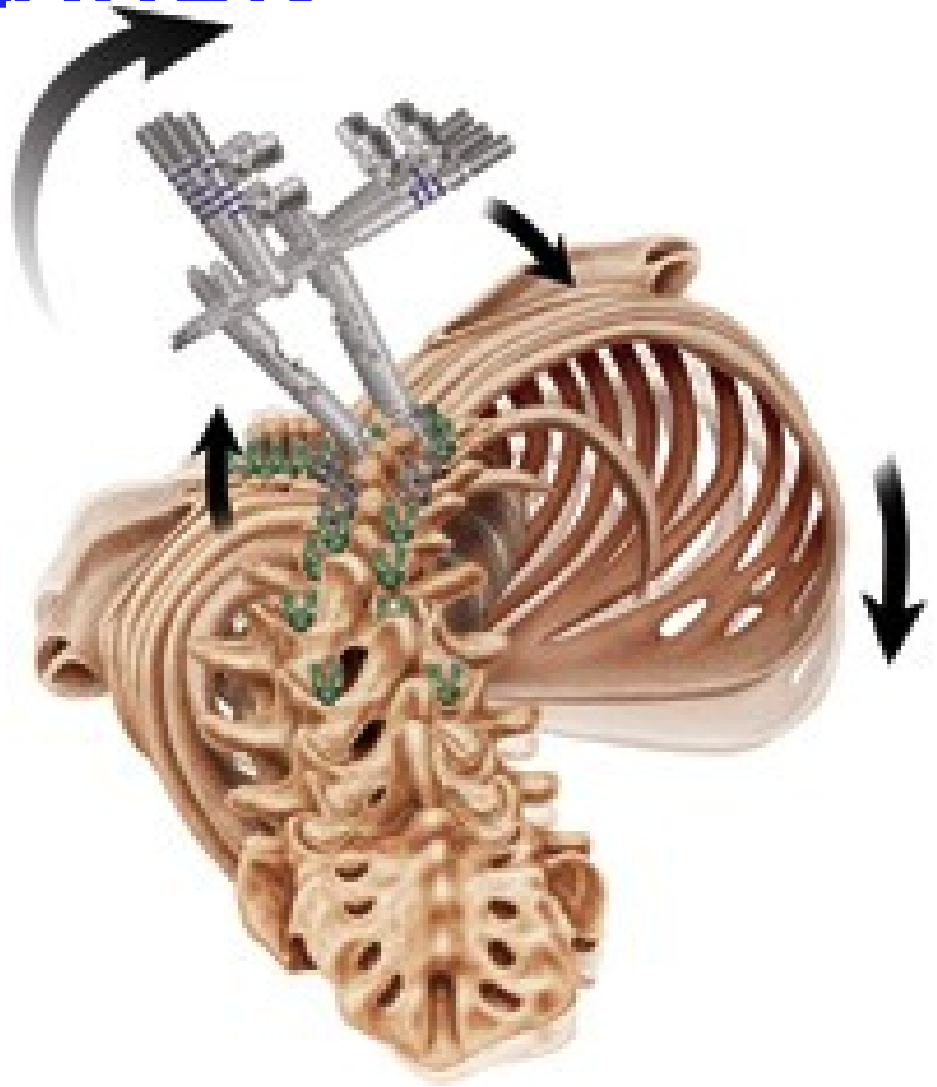
VCM
VERTEBRAL COLUMN MANIPULATION

EVOLUTION
in corrective maneuvers



hypokyphosis





Derotation

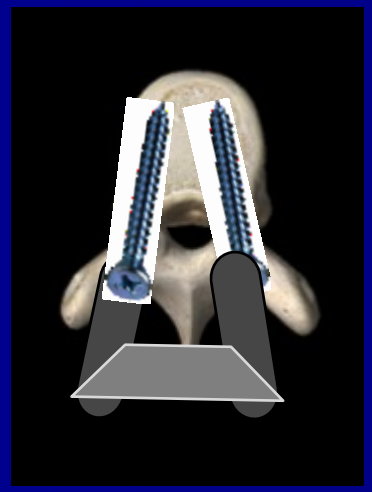
WHY derotation?

- 3D scoliotic correction
- Correction of Rib Hump prominence
- Secondary curve correction in selective fusion

Balanced spine

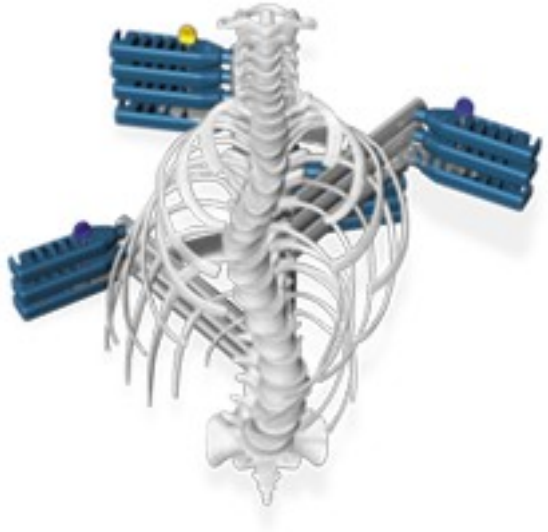
Transpedicular screw constructs

- Allows effective derotation of single vertebra



Derotation instruments

- Allows safe and effective derotation of single vertebra as well as the whole apical area.



VCM
Vertebral column manipulation

Advantages:

- Good frontal and axial correction

Disadvantage:

- little too forced isolated technique

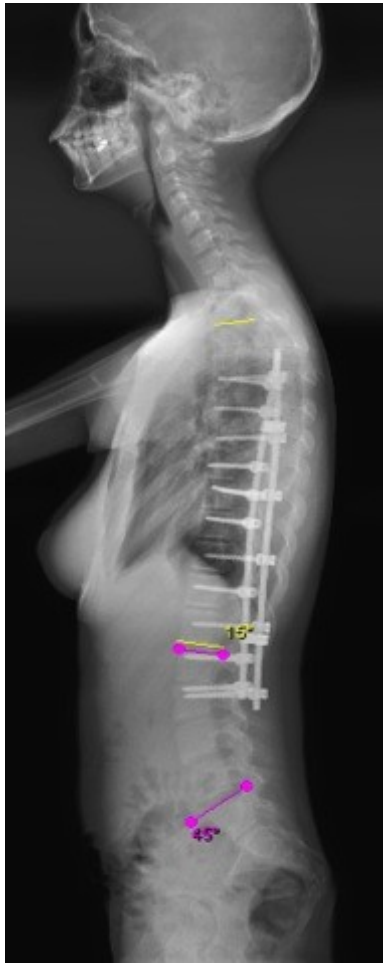
Problem:

- **HYPOKYPHOSIS**

RESULT
of most correction maneuvers

- **HYPOKYPHOSIS**

- **ABSENCE or RESTRICTIVE DEROTATION**

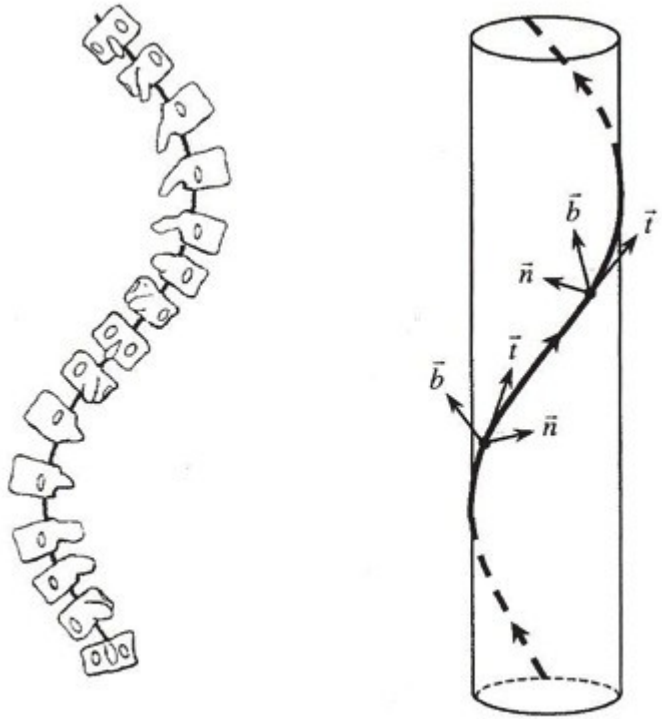


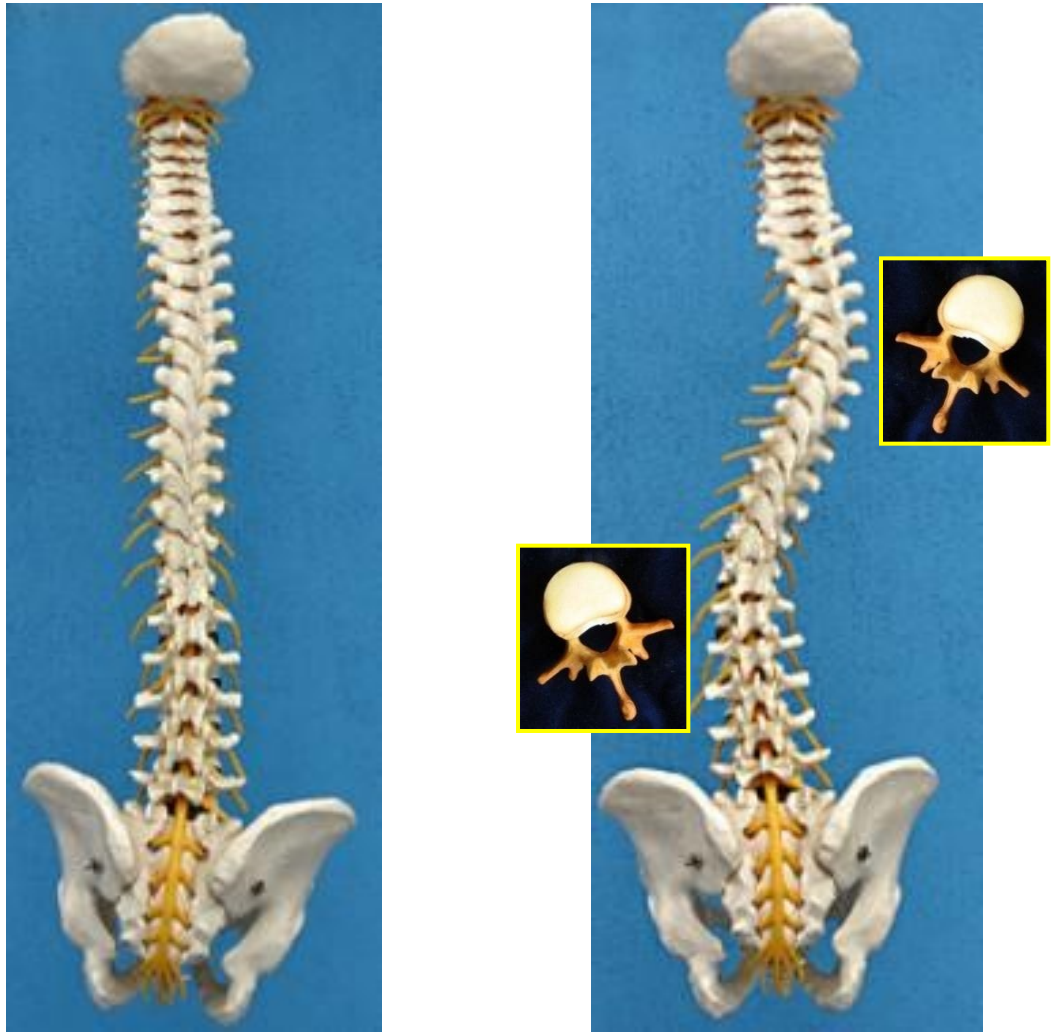
DEROTATION

Transversal plane

Scoliosis

Spiral concept

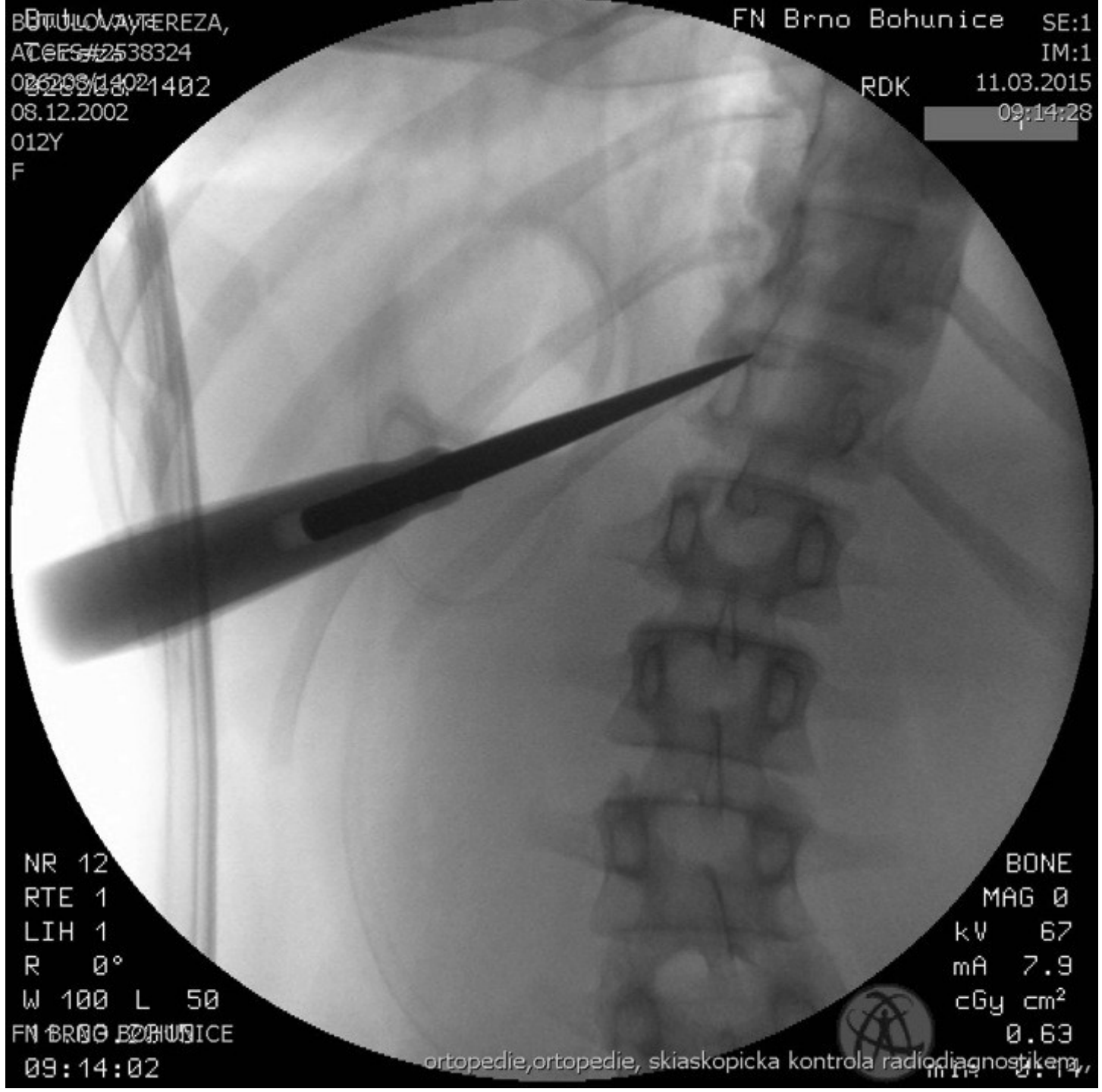




3D geometrical changes

Surgical posterior approach

level checking


FN Brno Bohunice
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IM:1
RDK
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08.12.2002
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F
NR 12
RTE 1
LIH 1
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BONE
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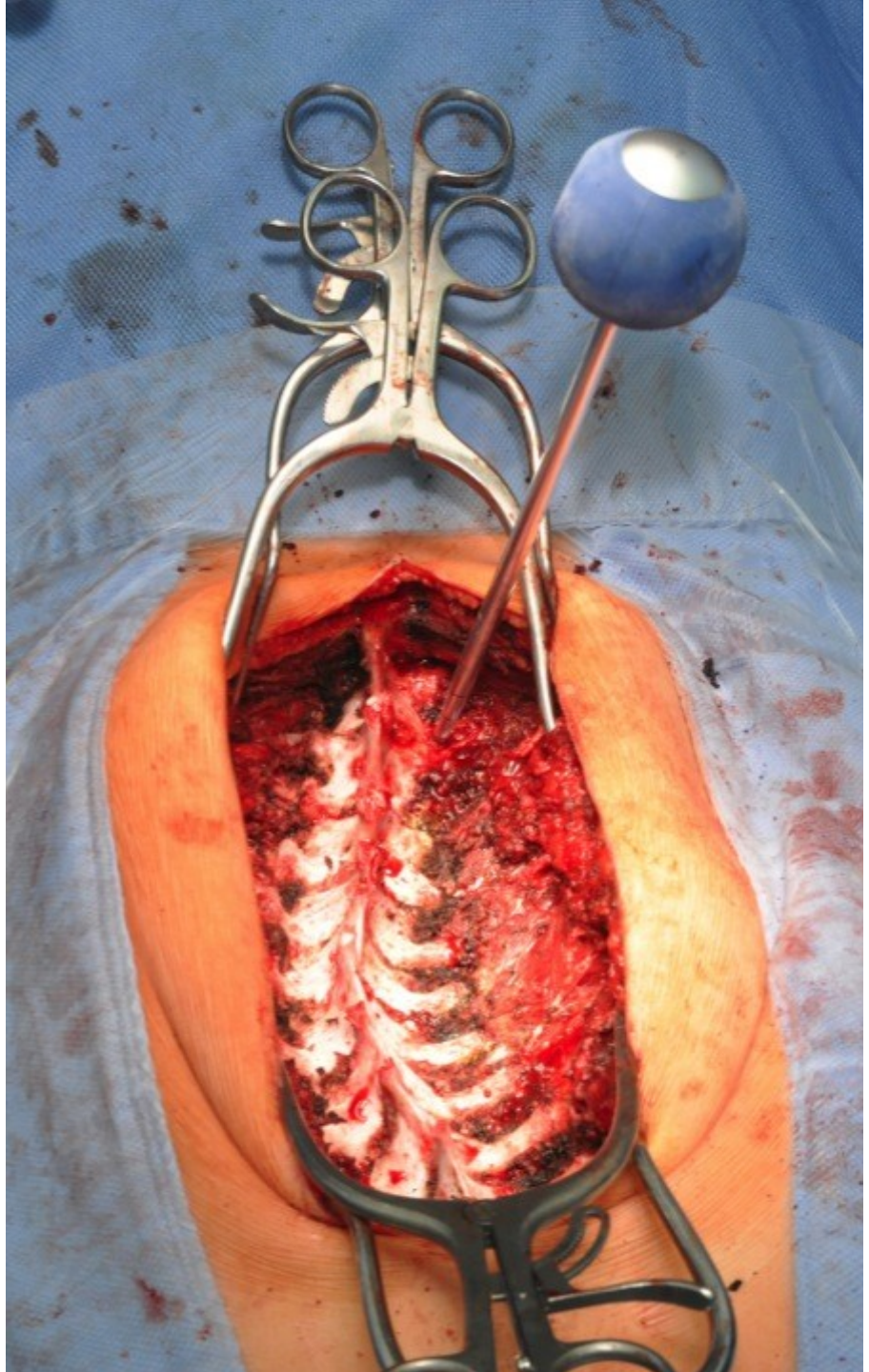
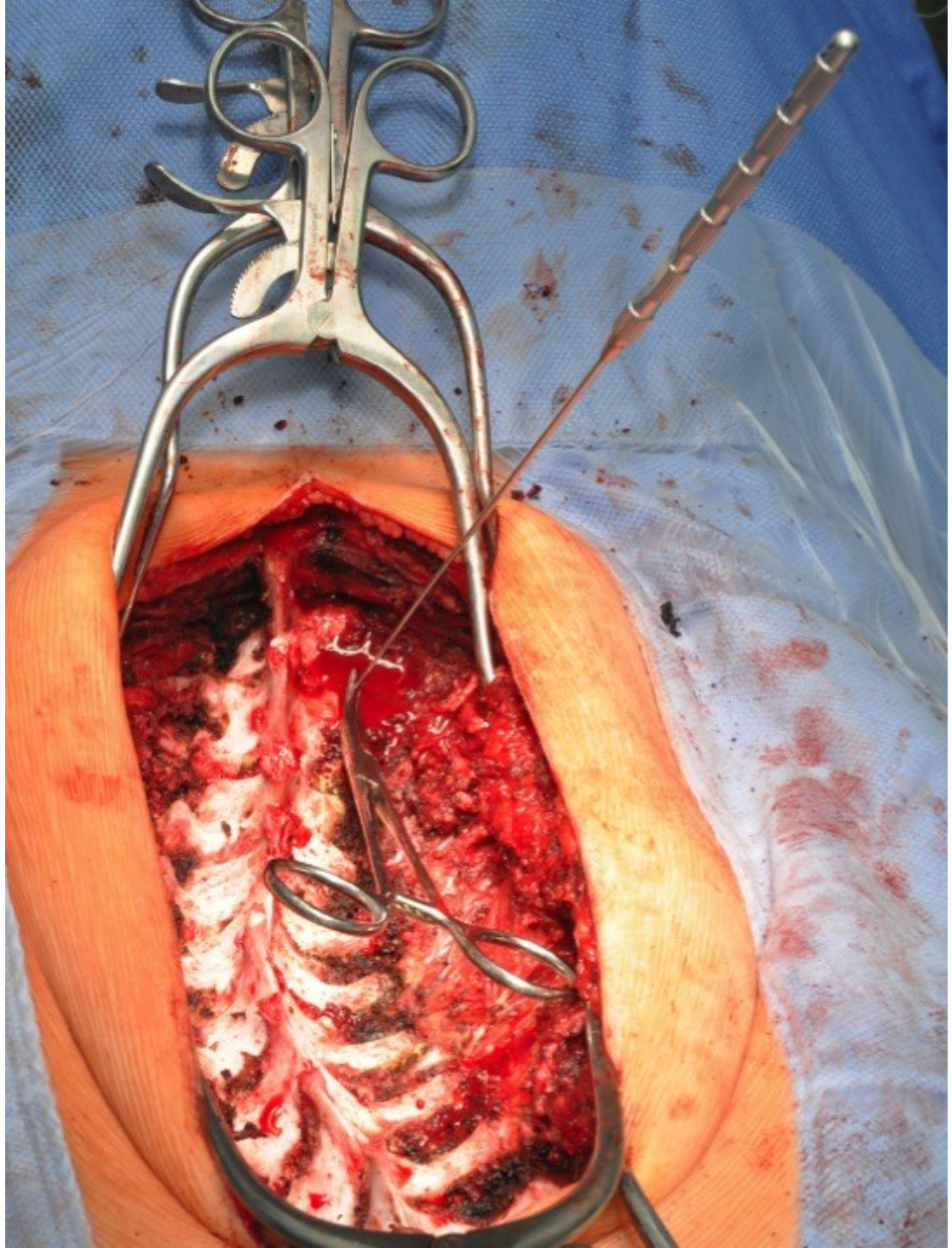
kV 67
mA 7.9
cGy cm²
0.63
ortopedie,ortopedie, skiaskopicka kontrola radiodiagnostikem,



Probe
-
pedikle finding



Sound

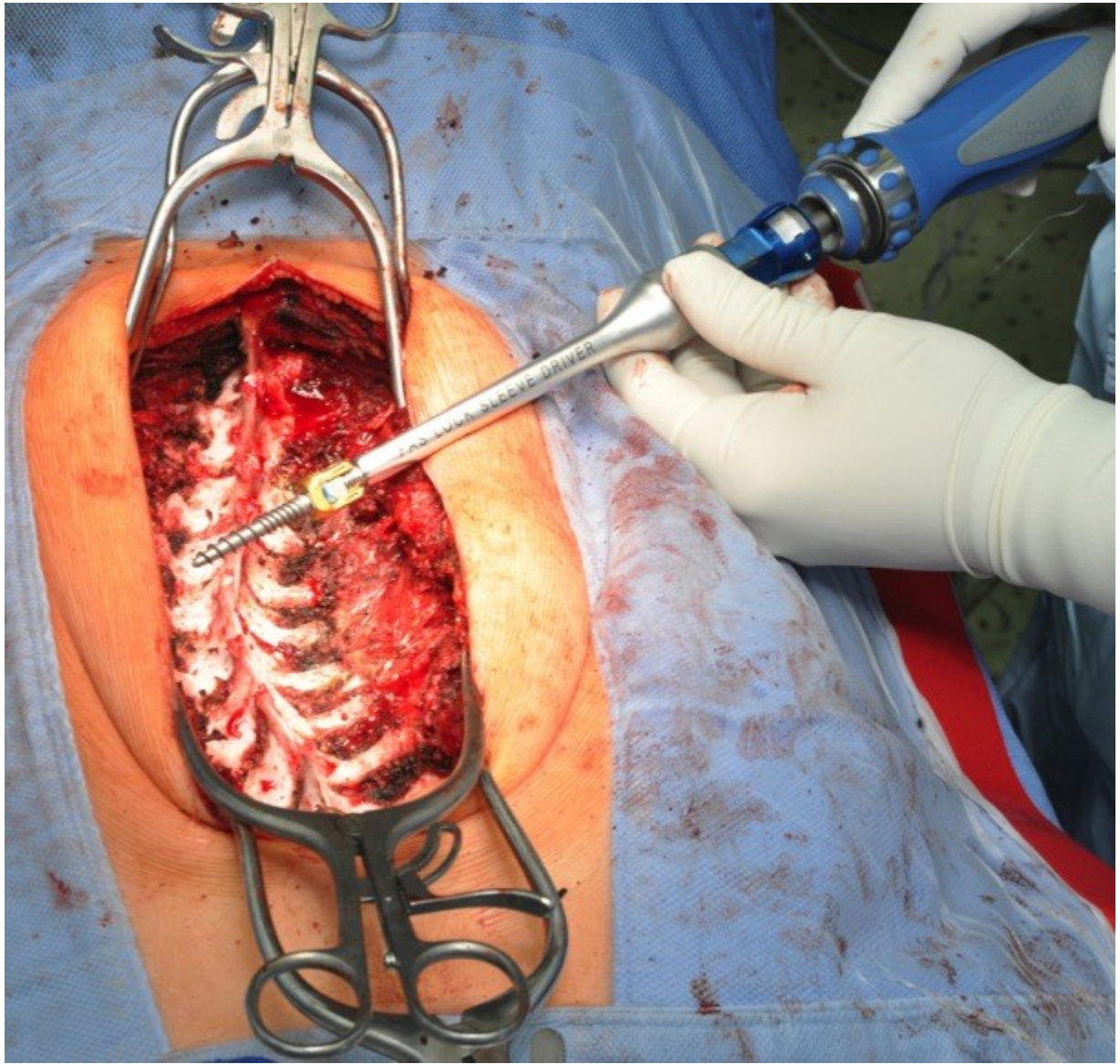
-

pedikle hole checking

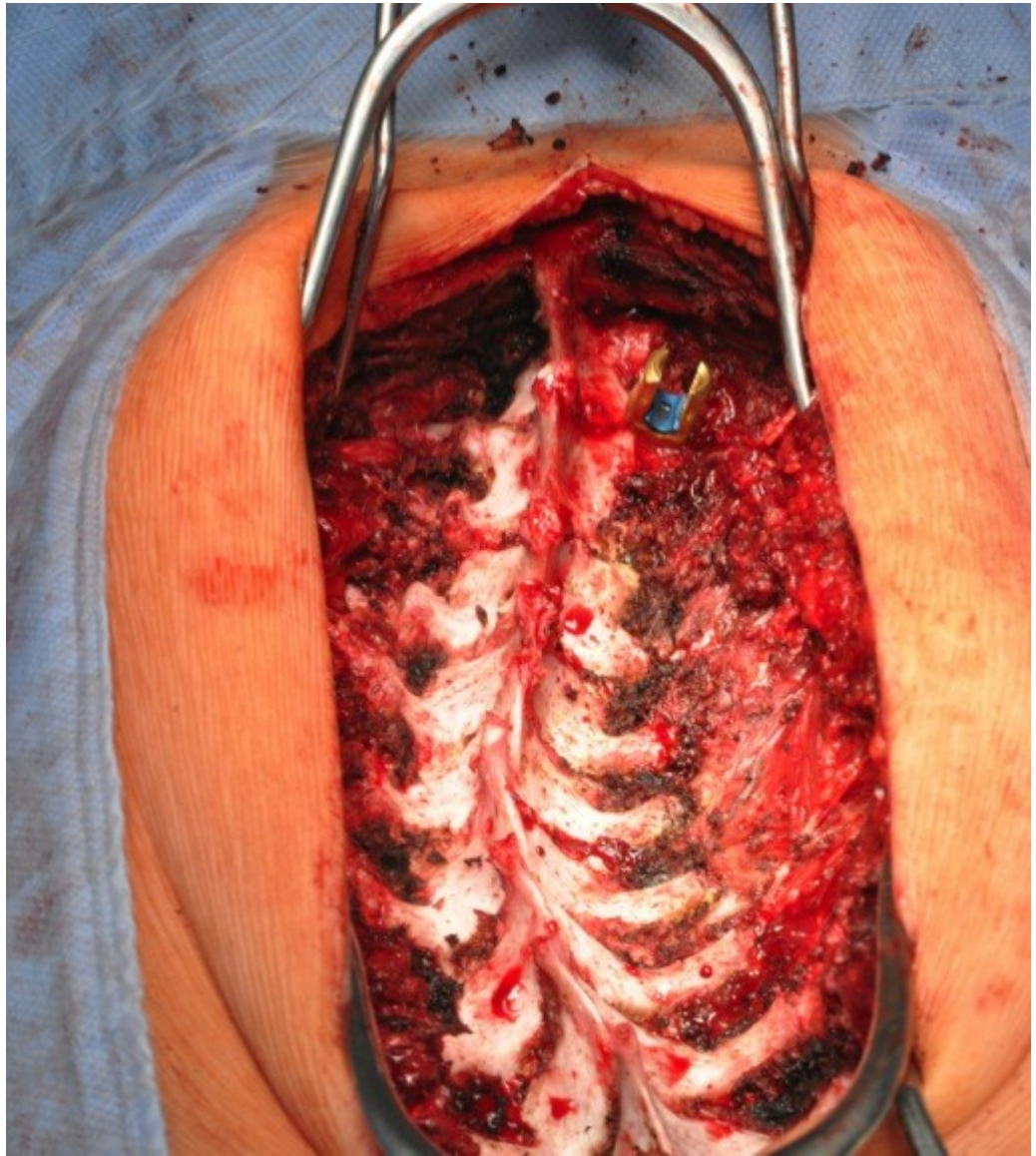
-

screw length measuring

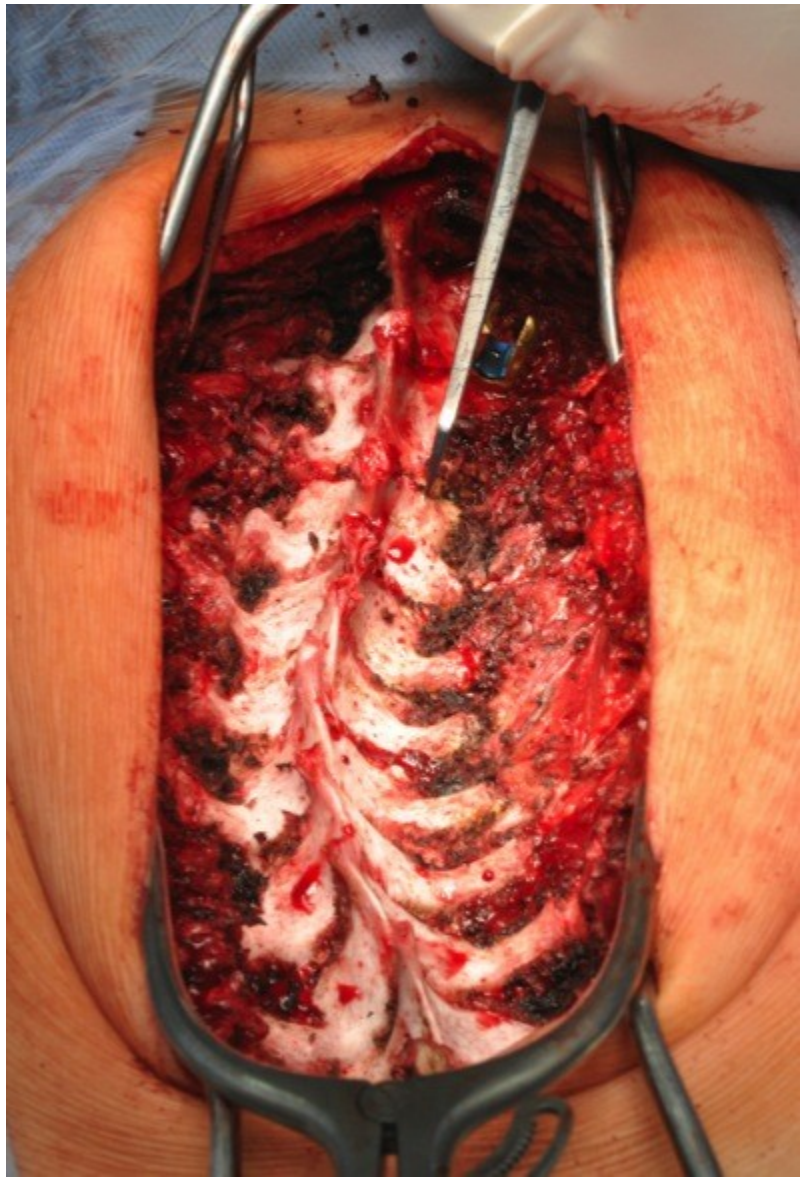
Screwdriver - screw insertion

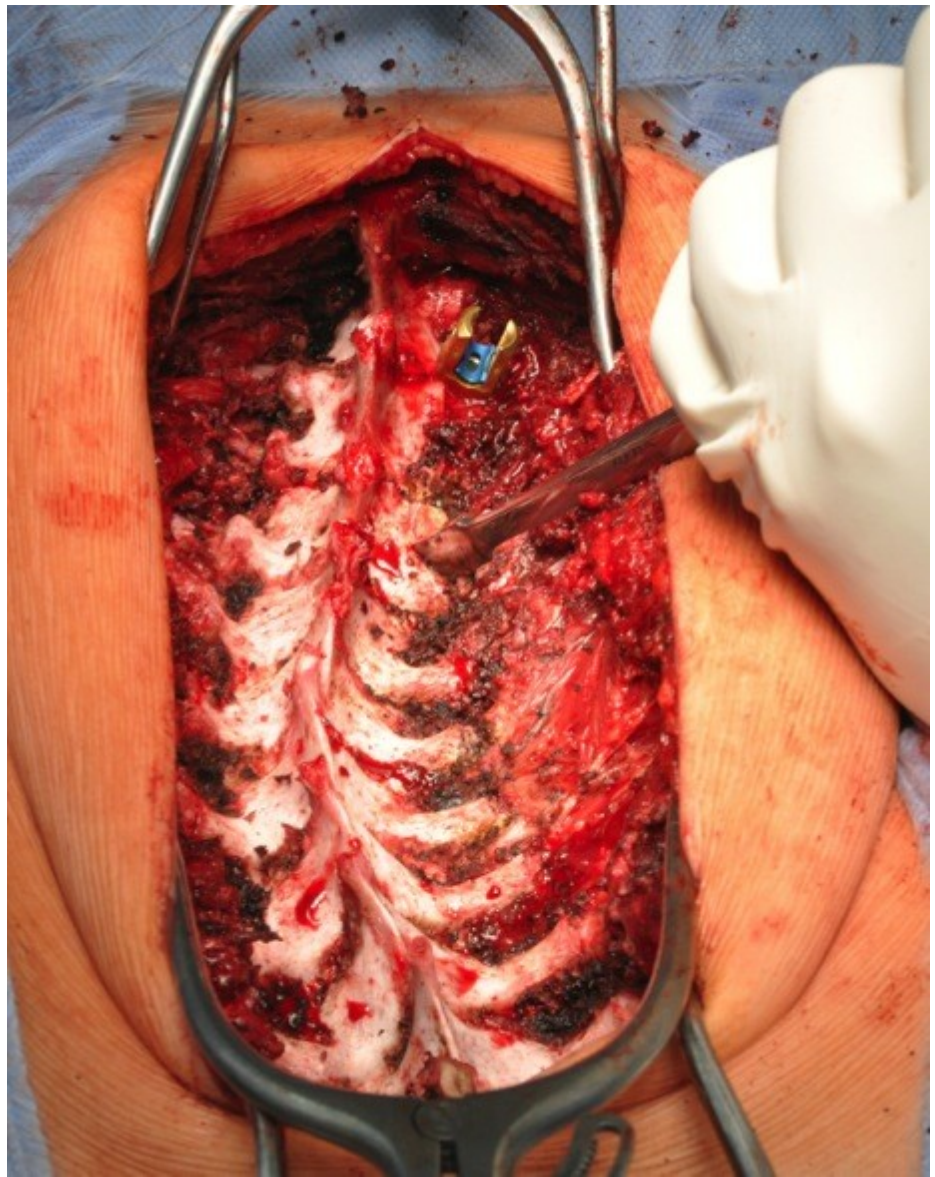


Screwdriver - screw insertion

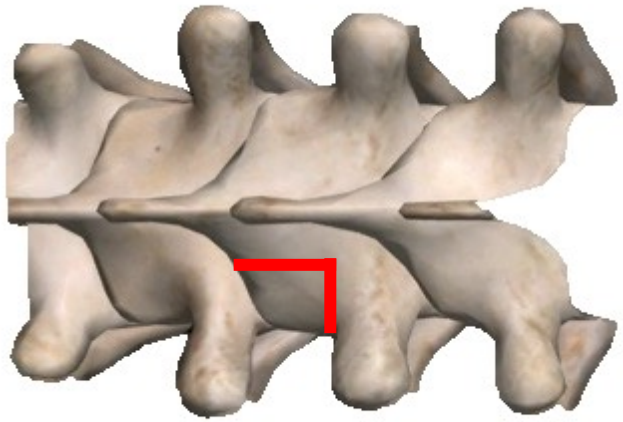


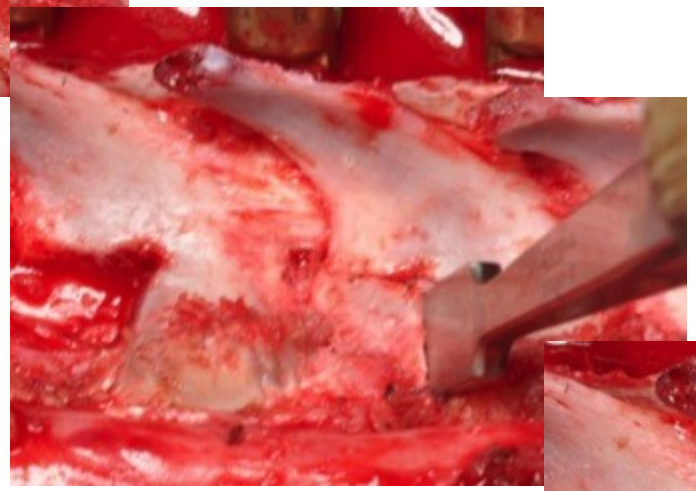
Chisel – facet resection

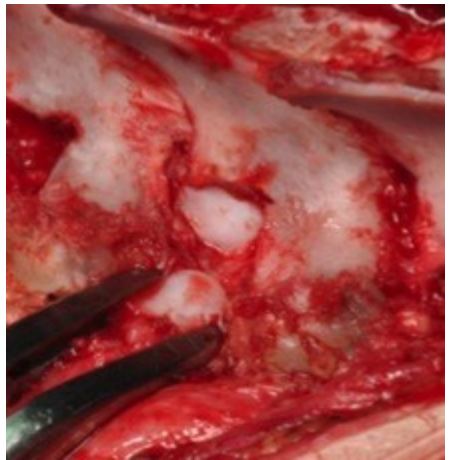




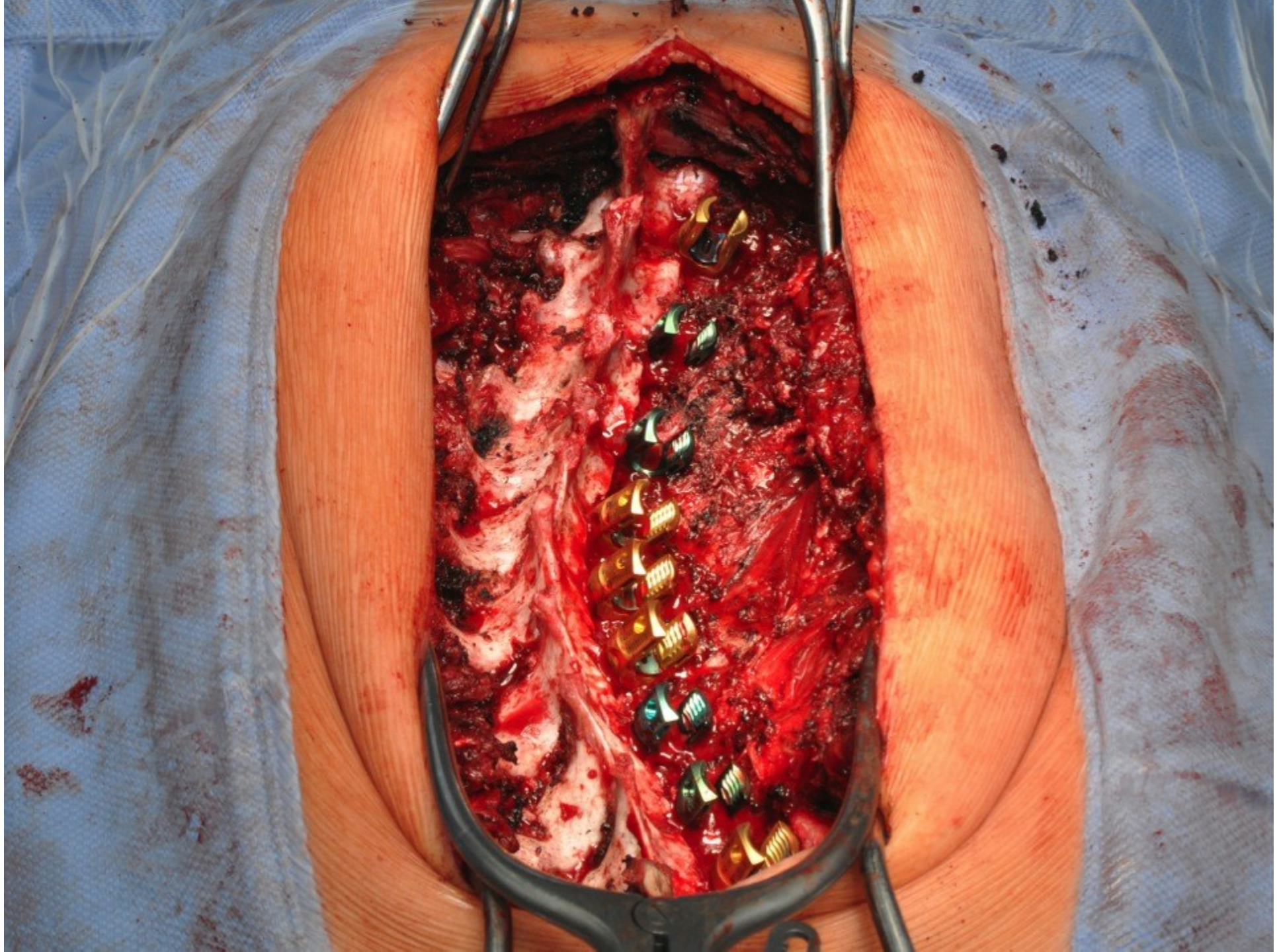
Chisel – facet resection

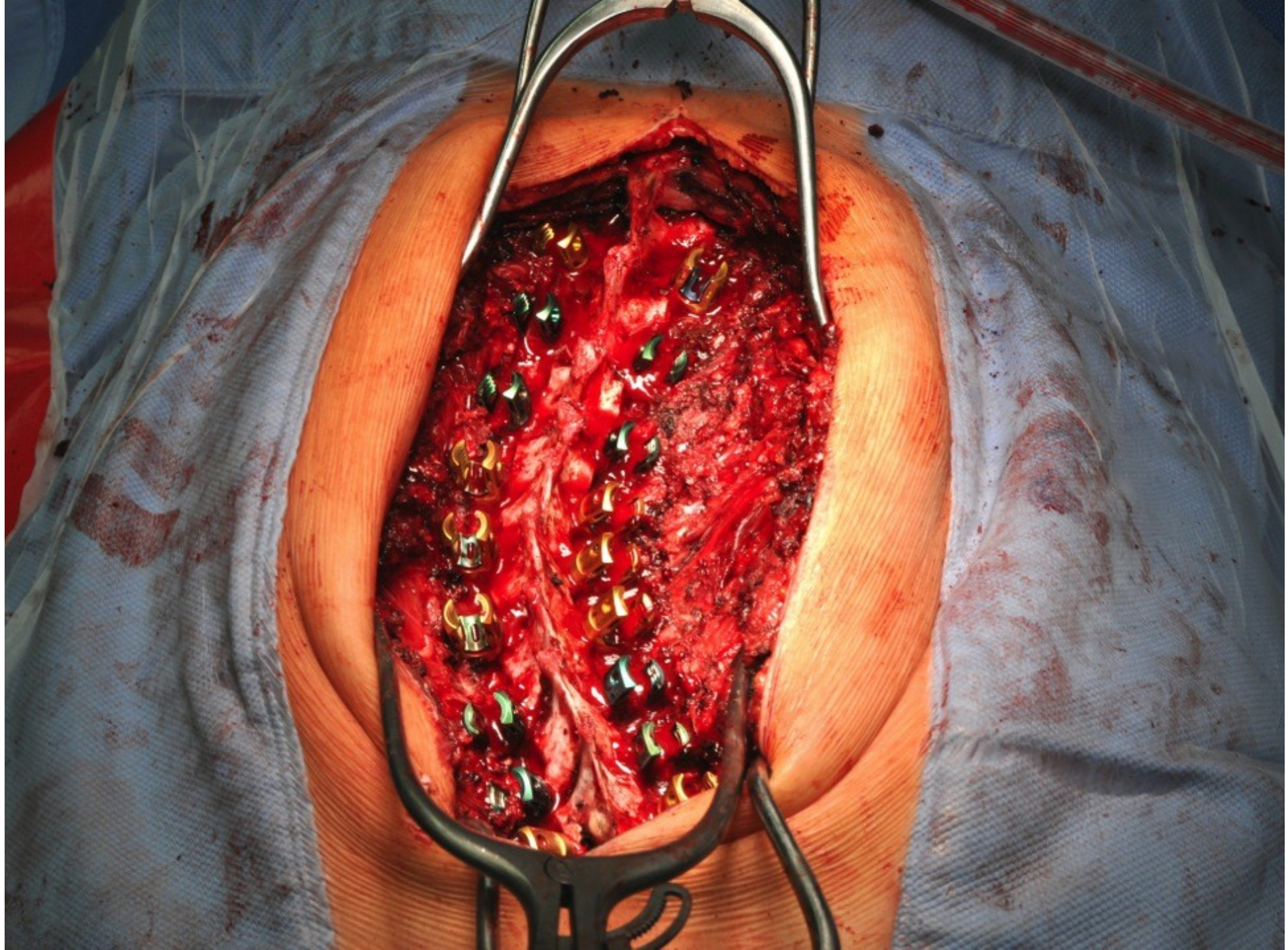






Luer – cortex resection



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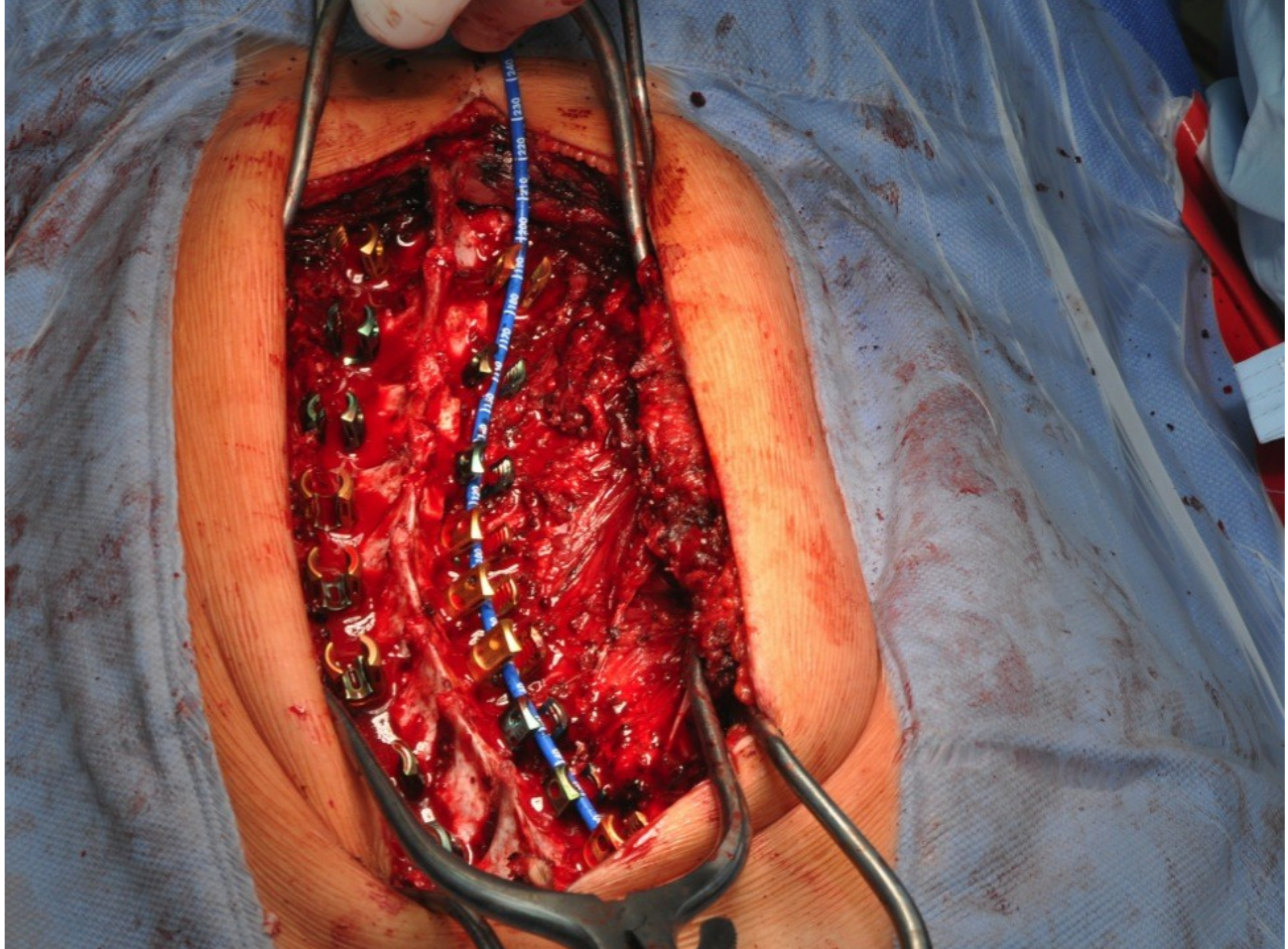

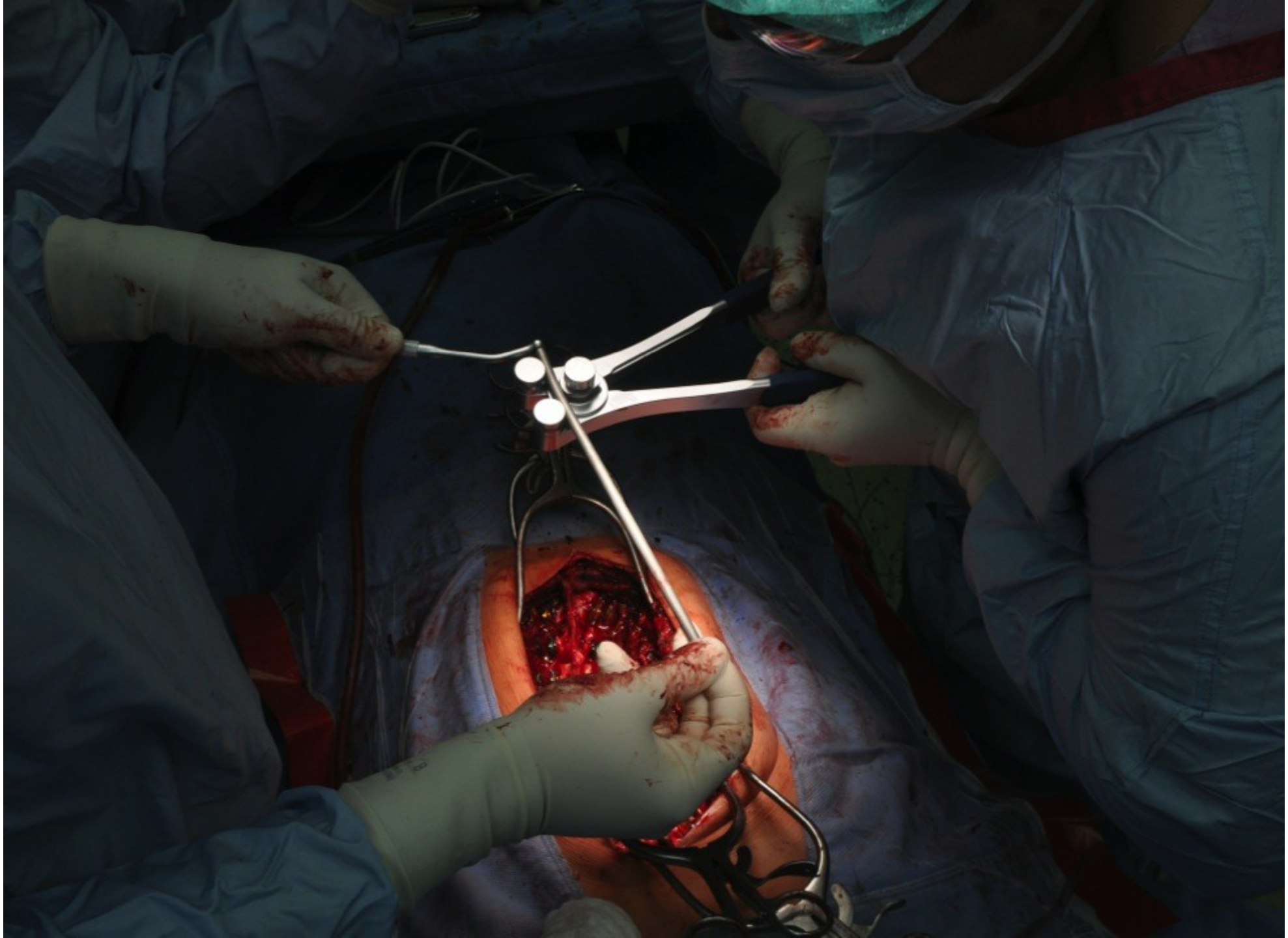

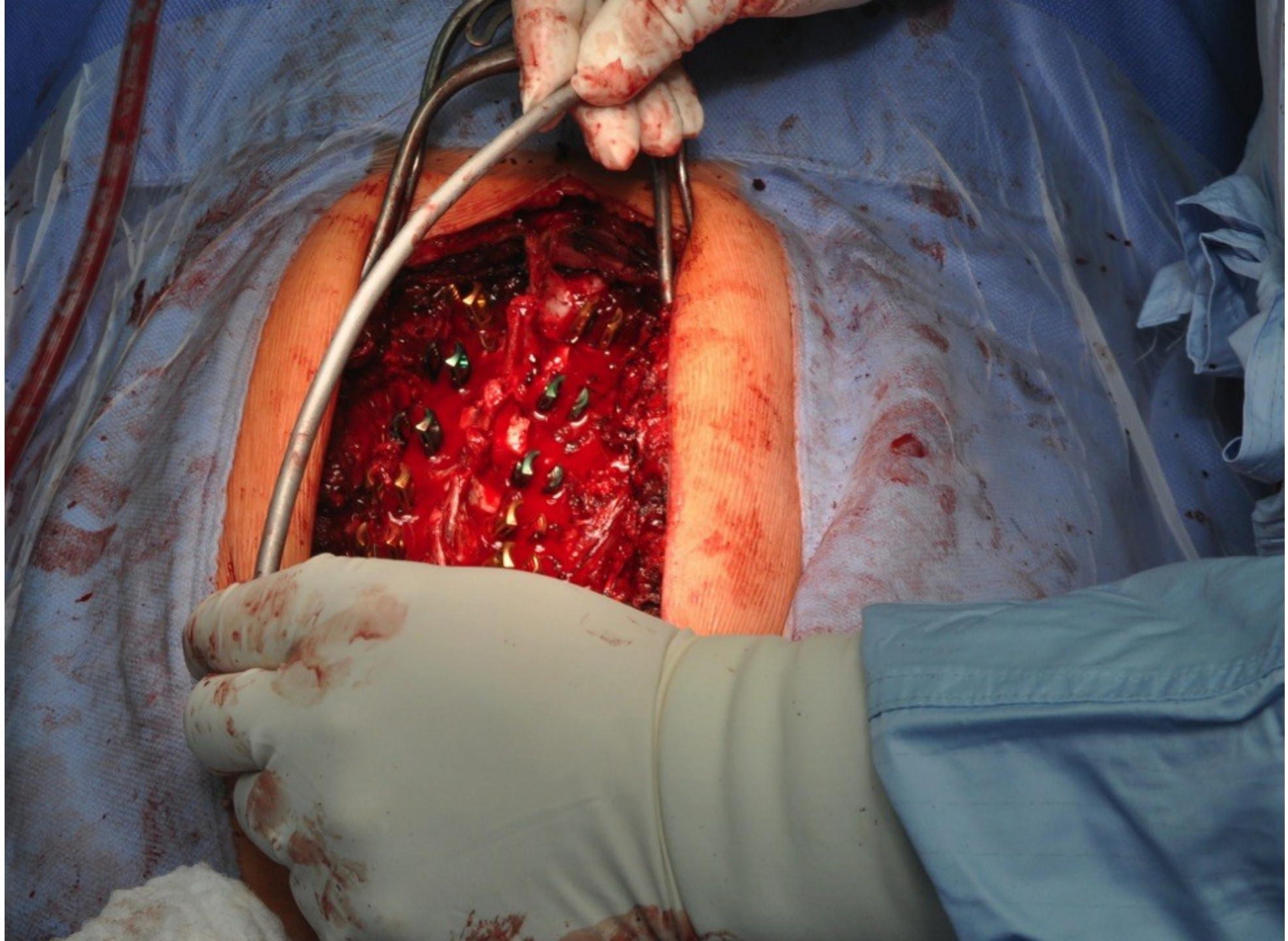

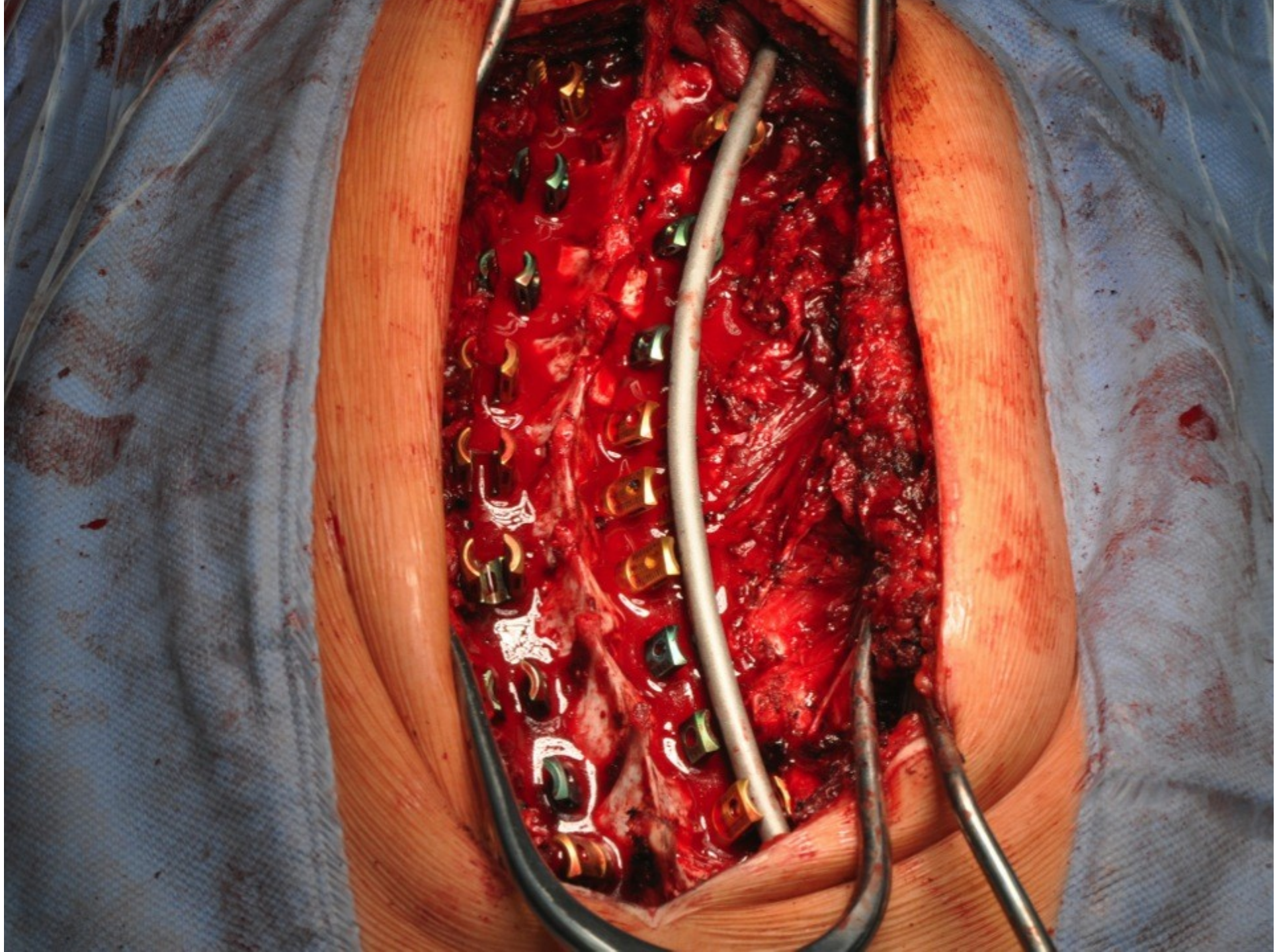

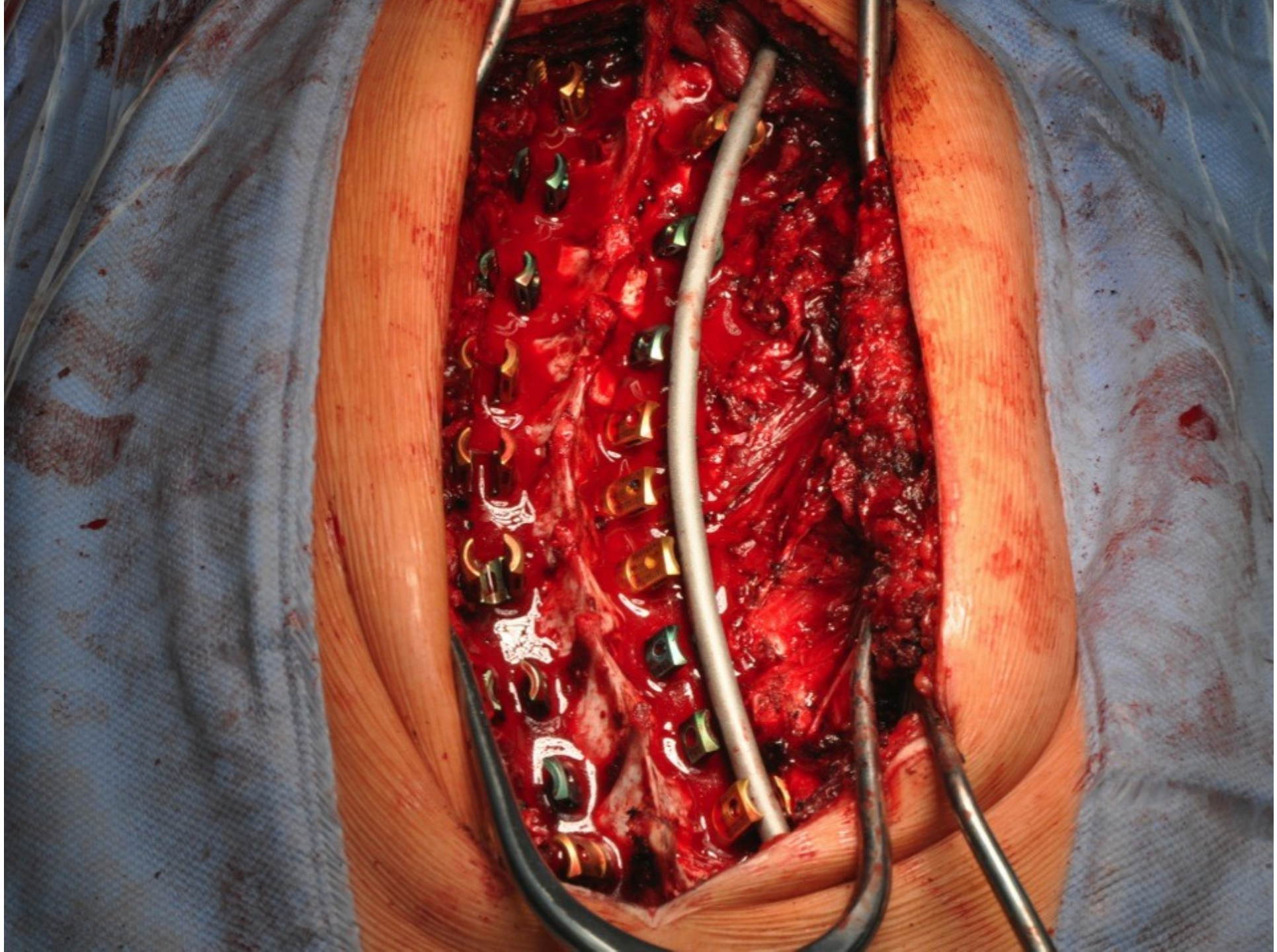

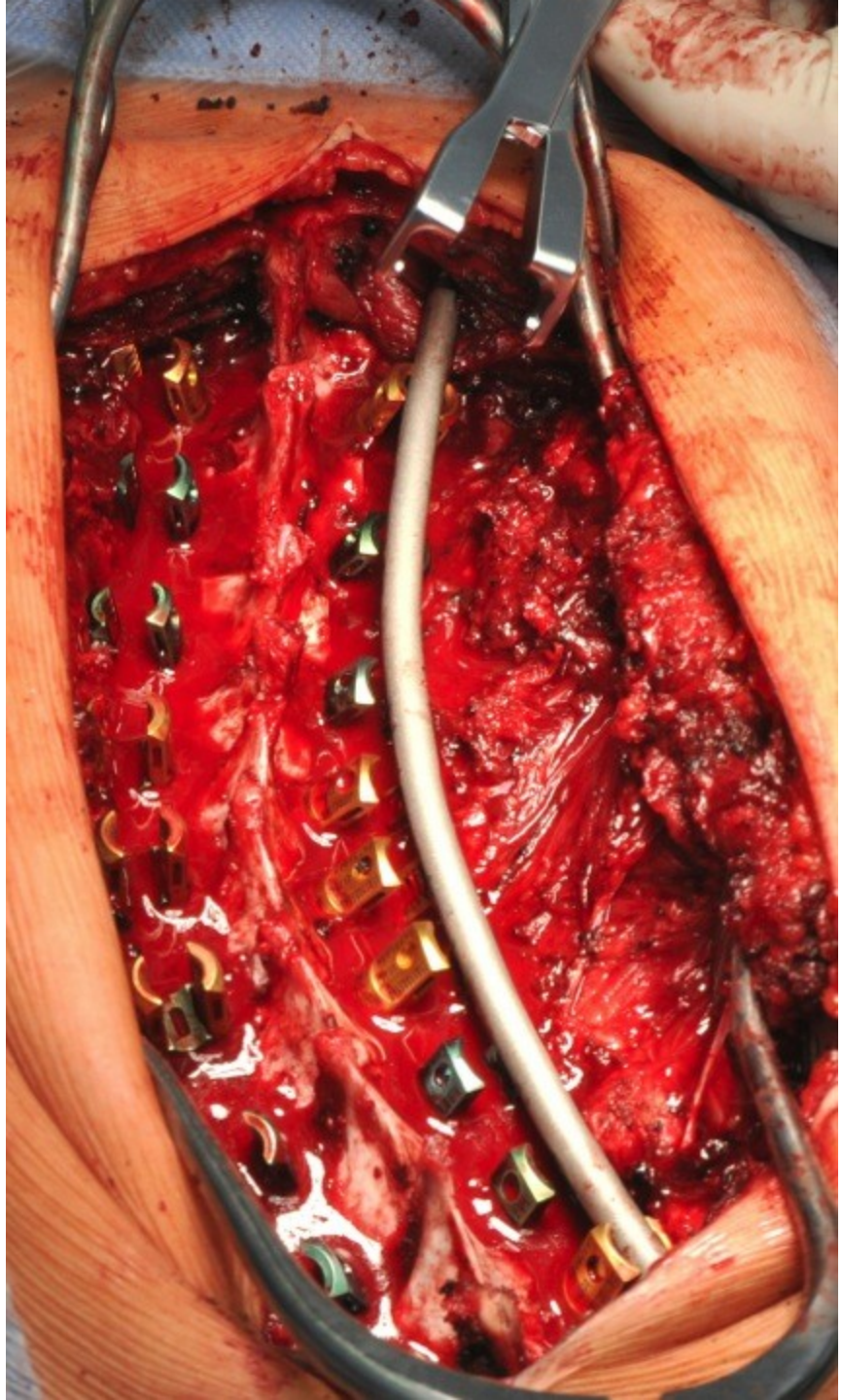

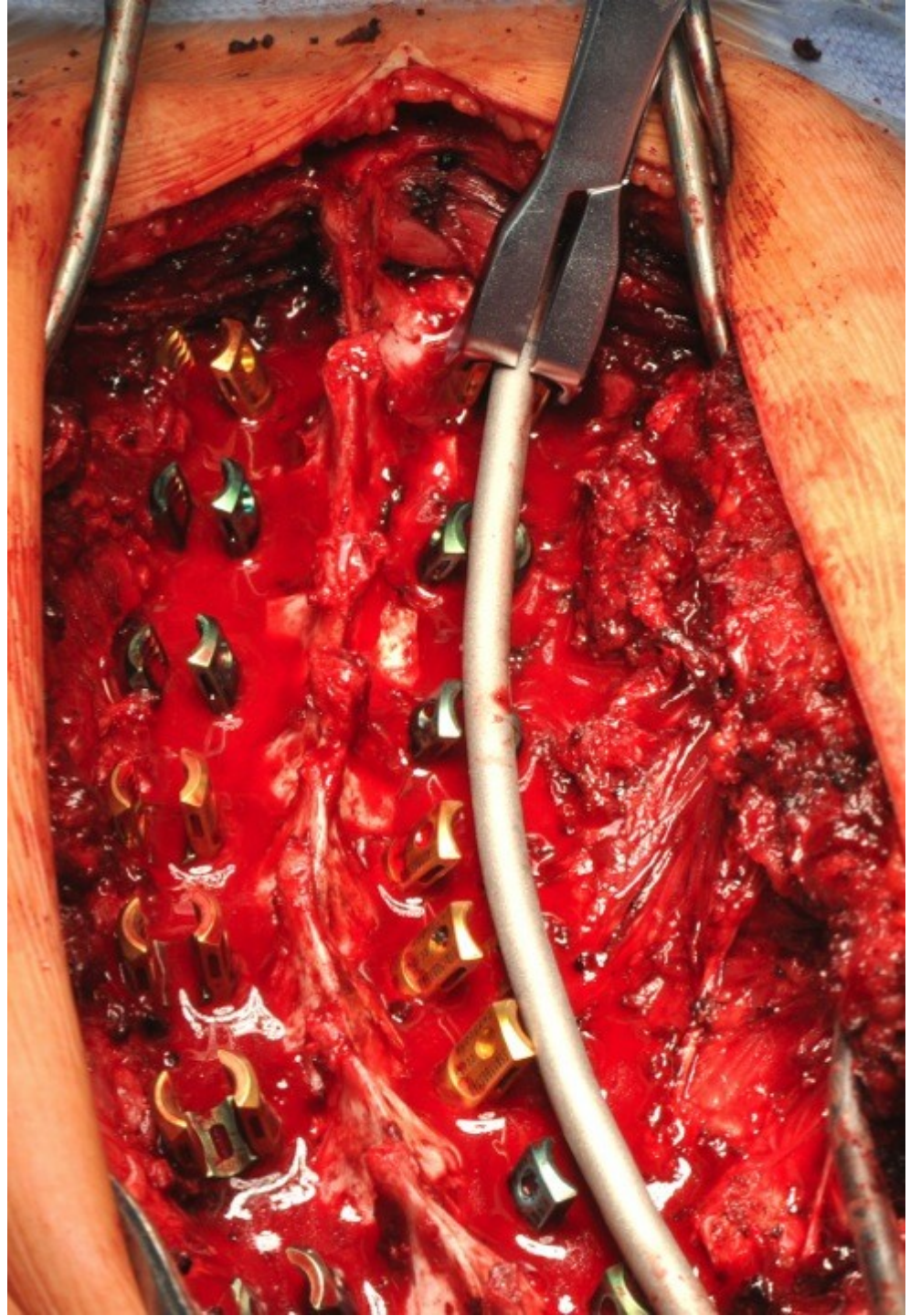

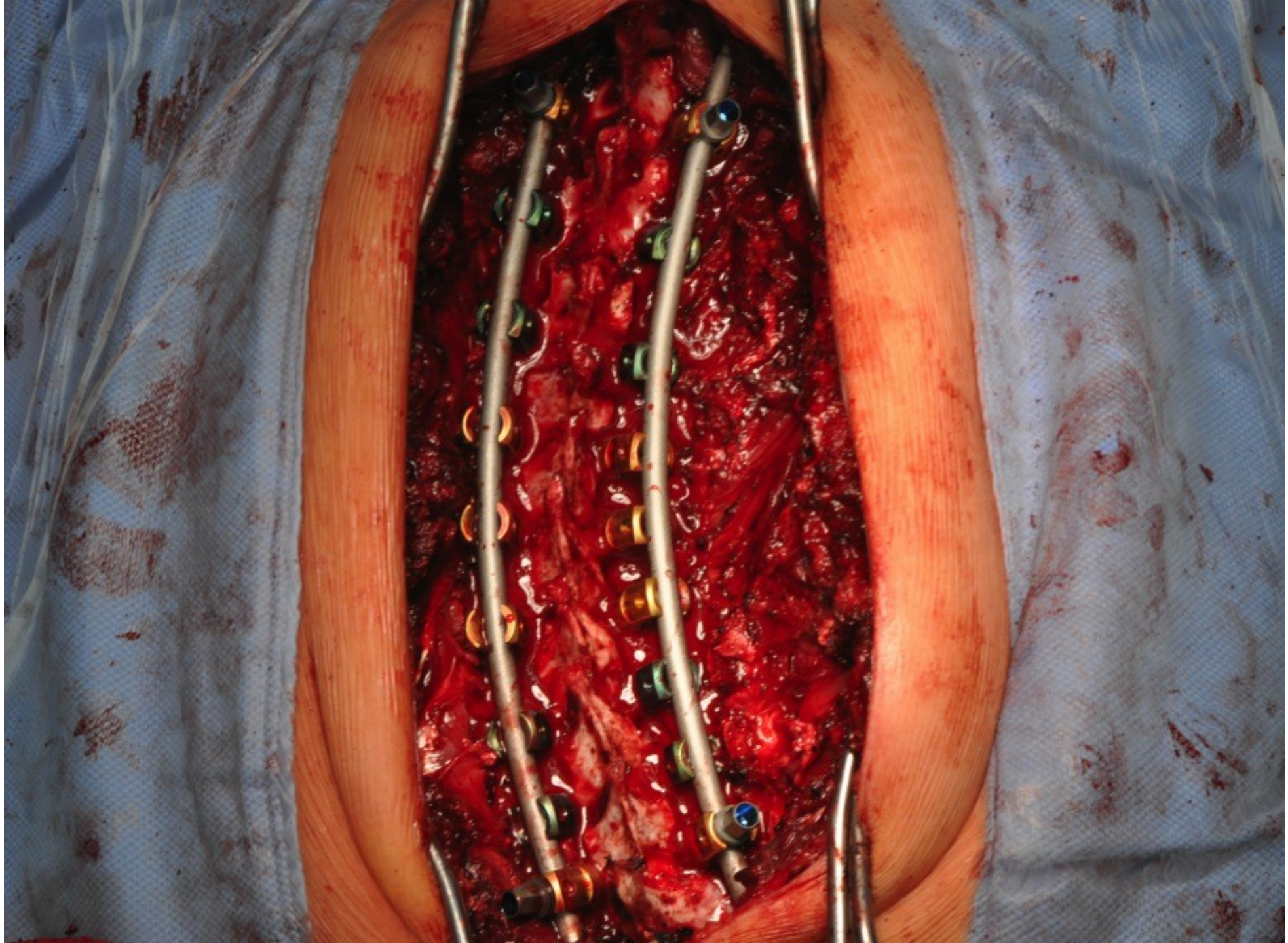

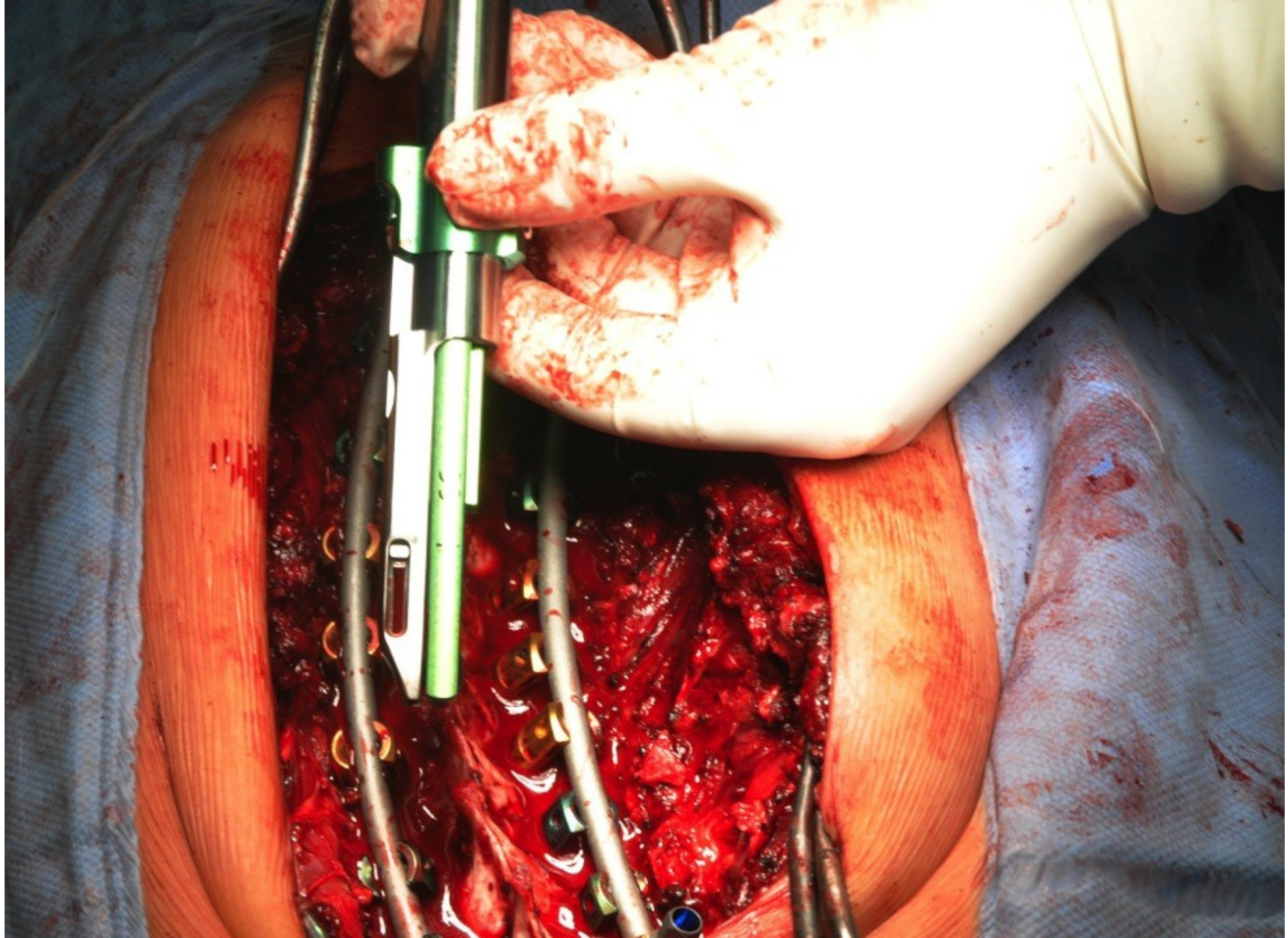

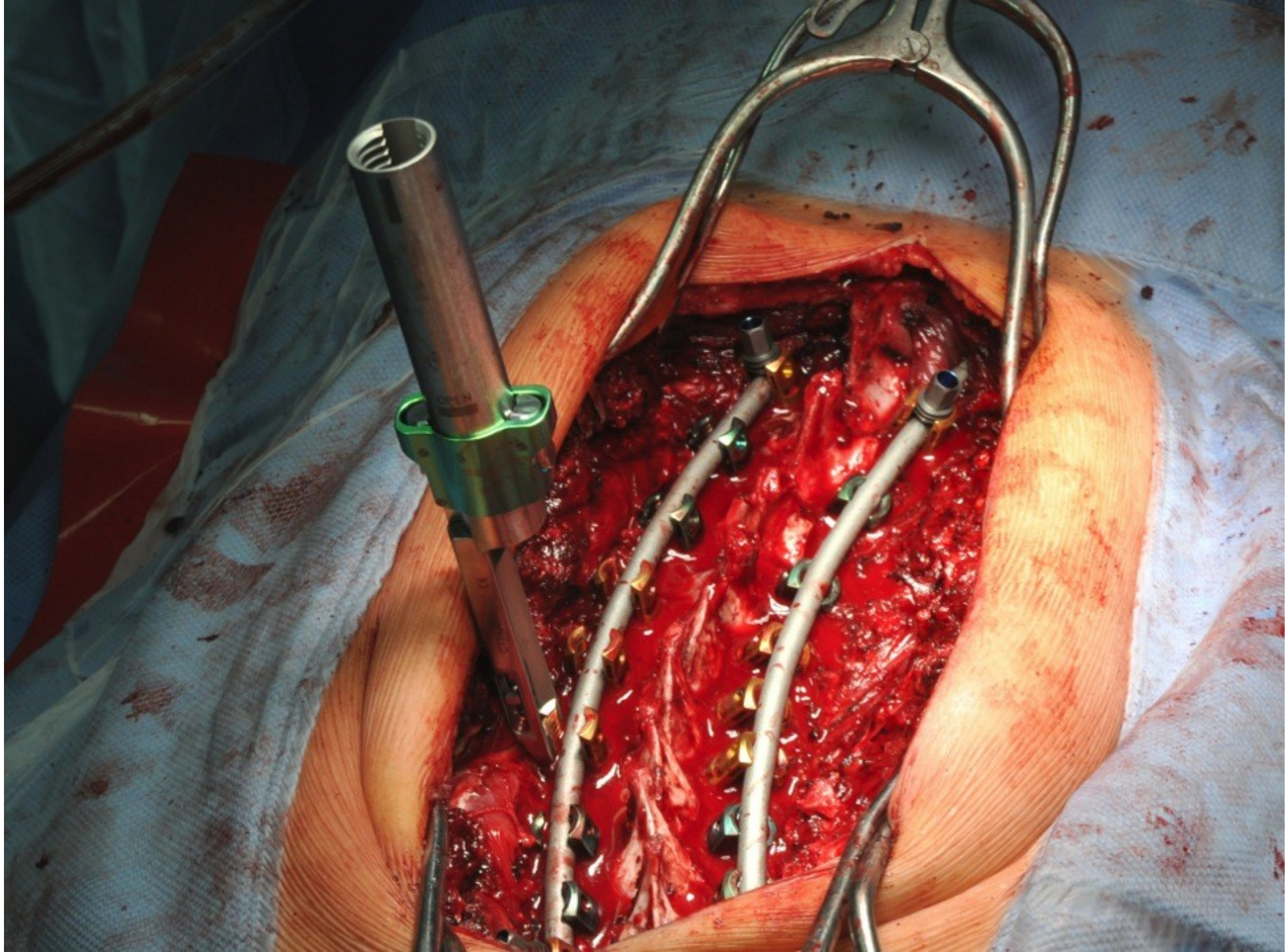

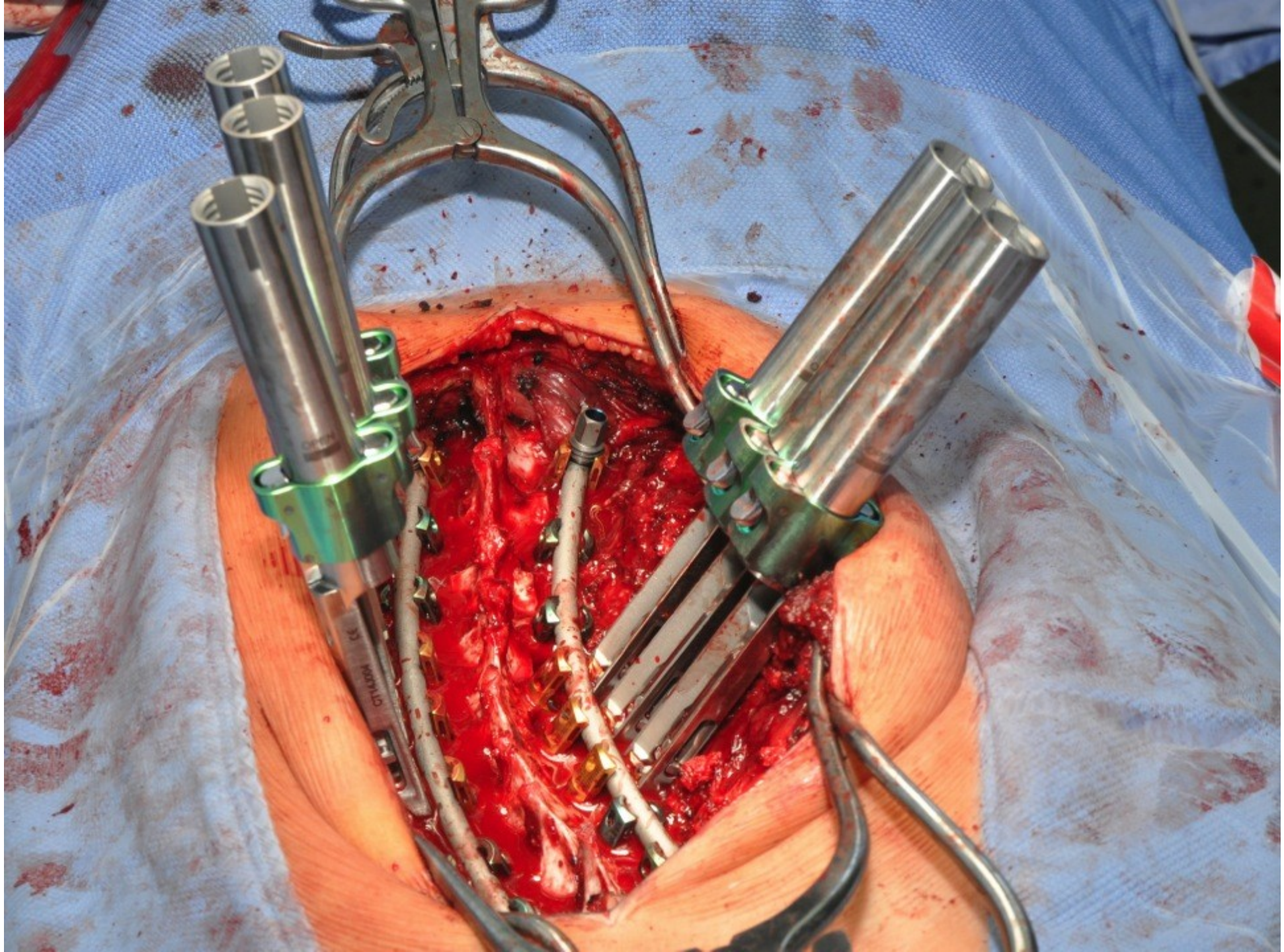

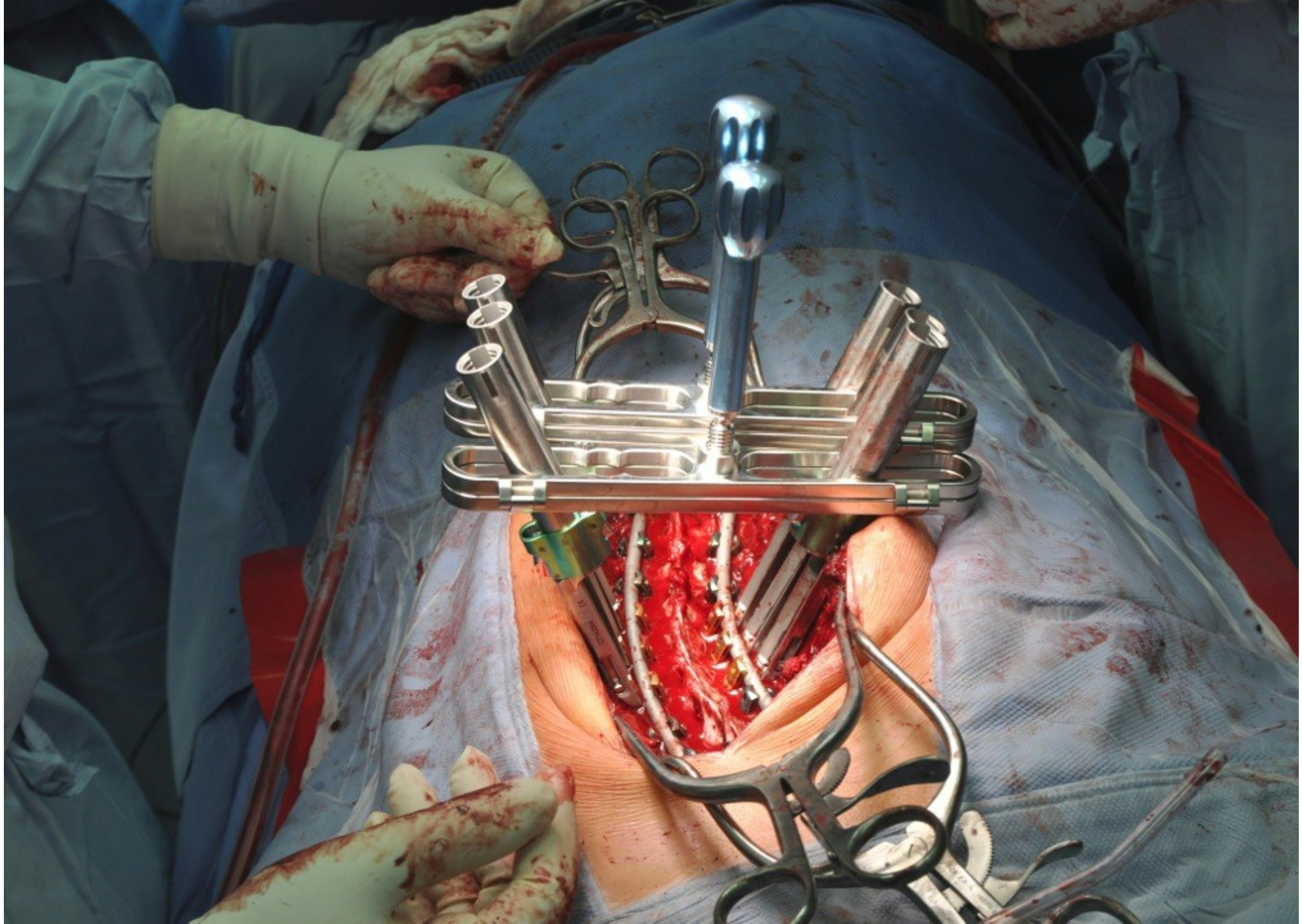

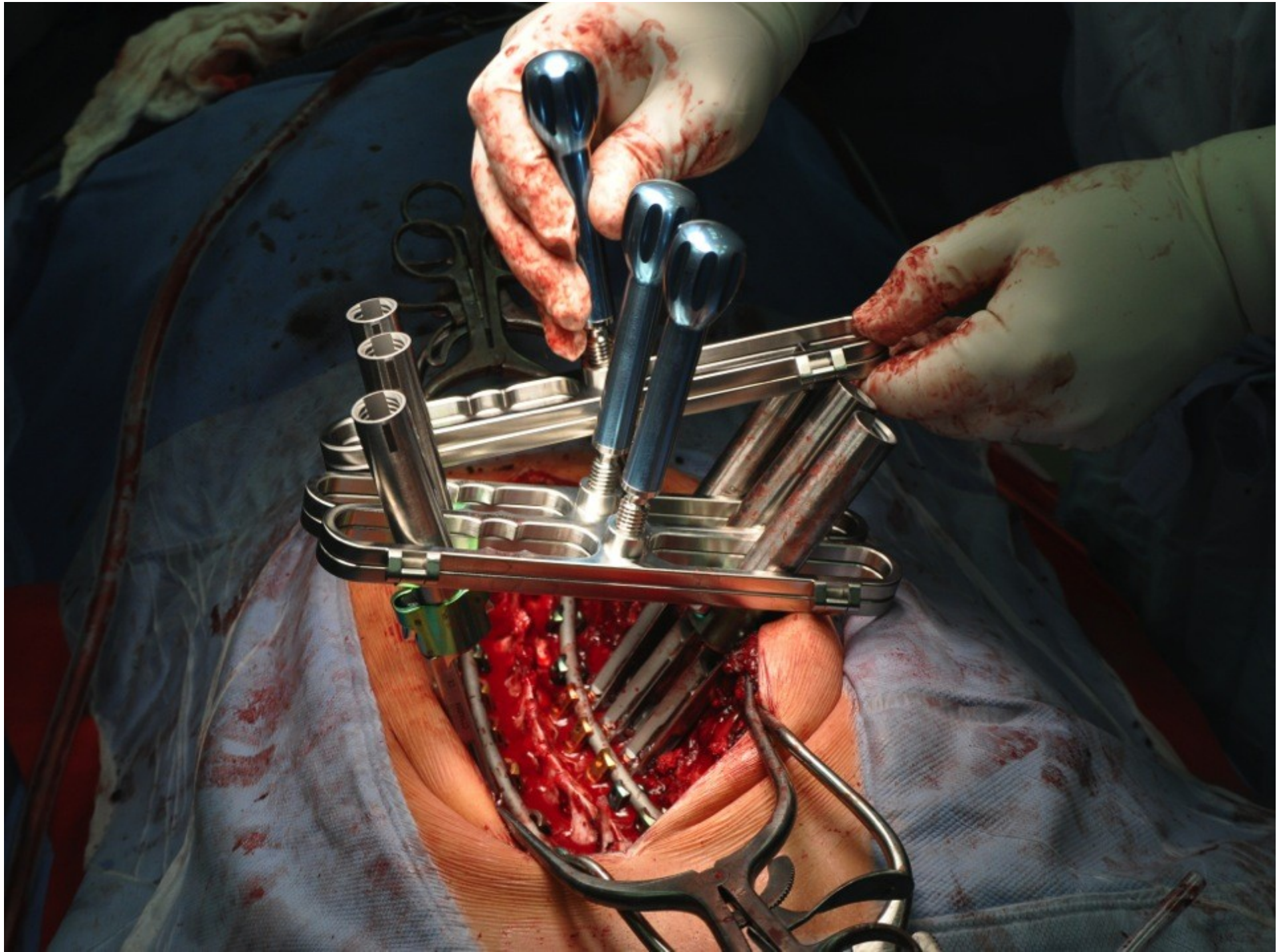

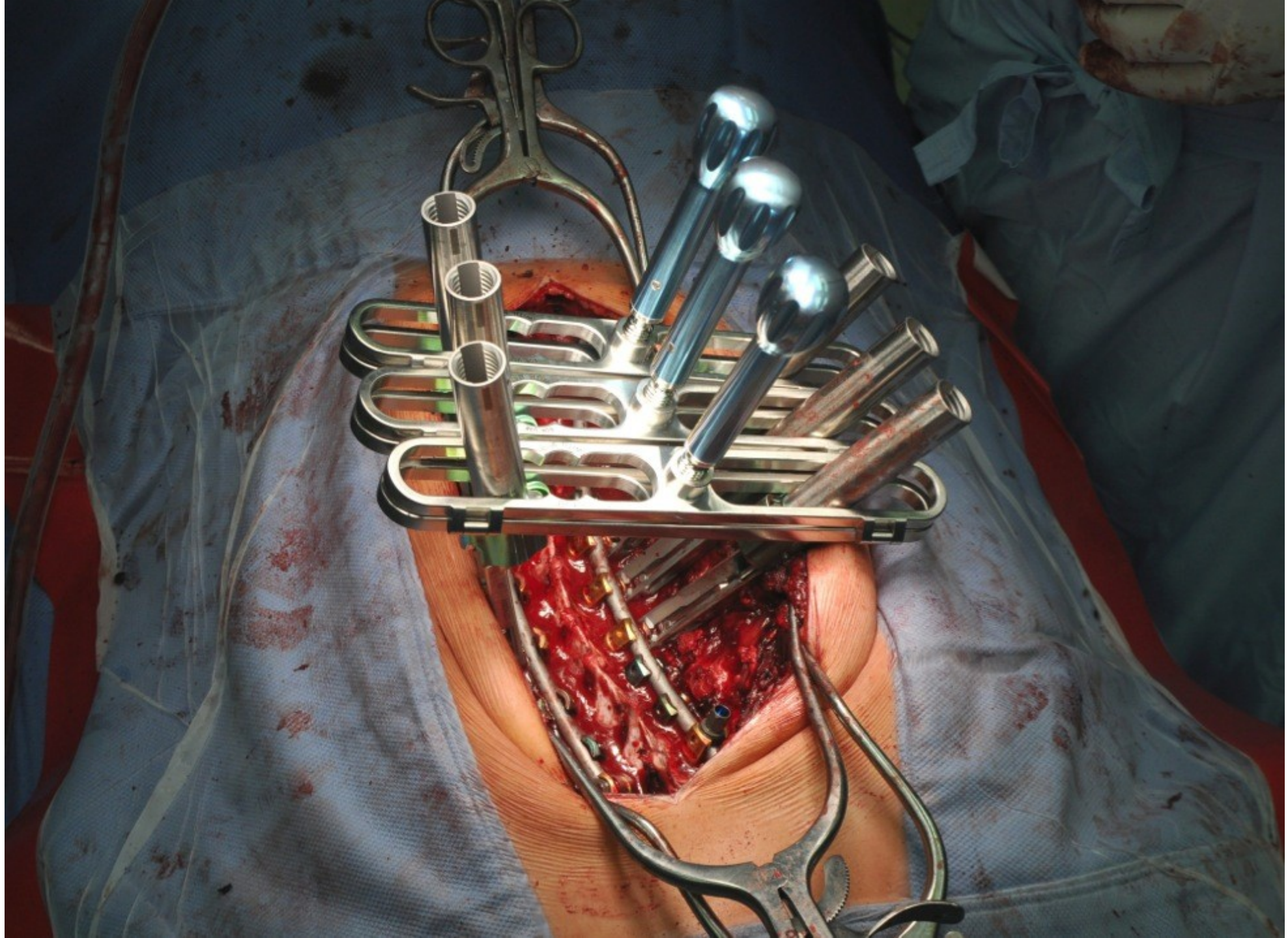

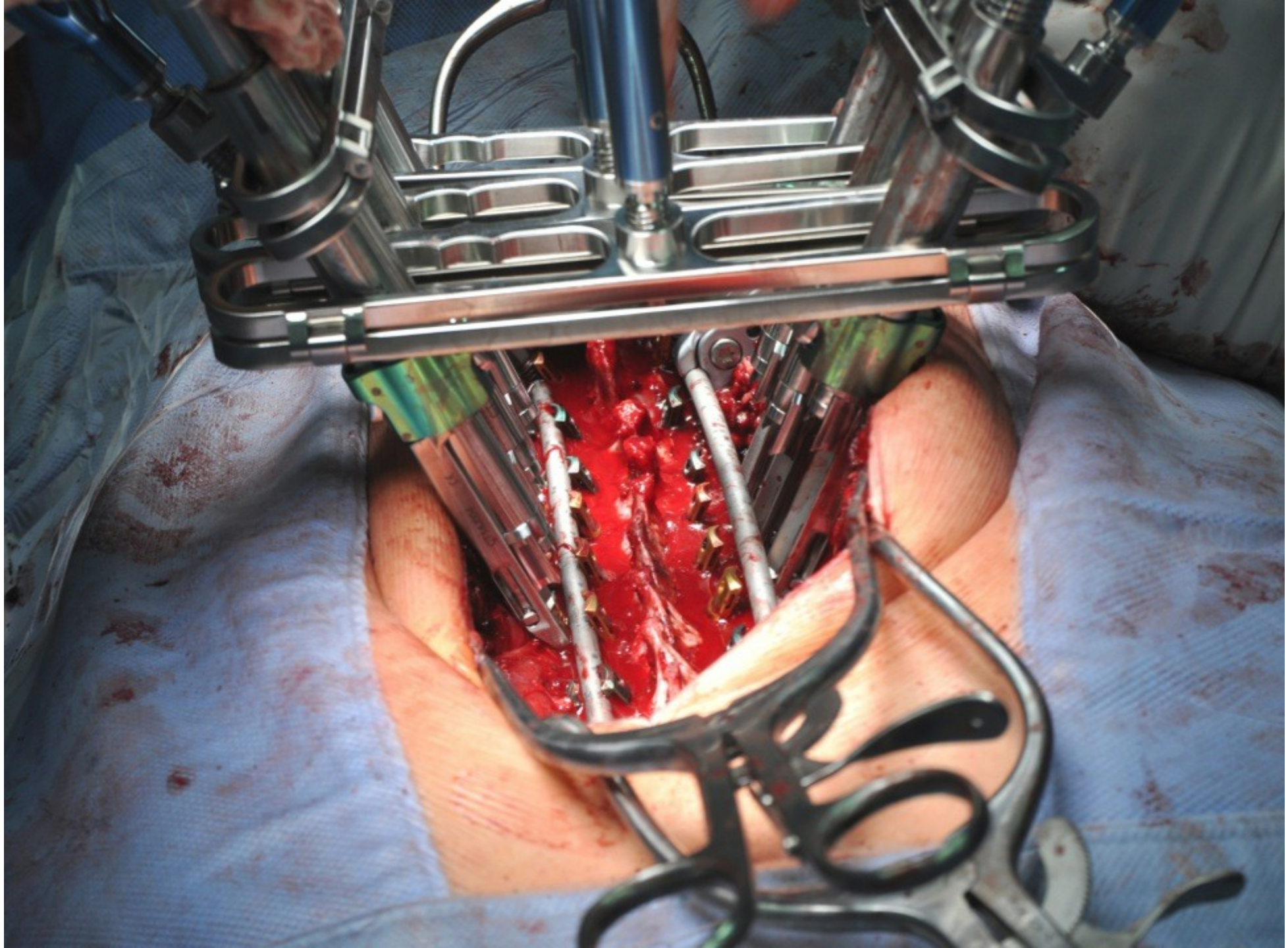

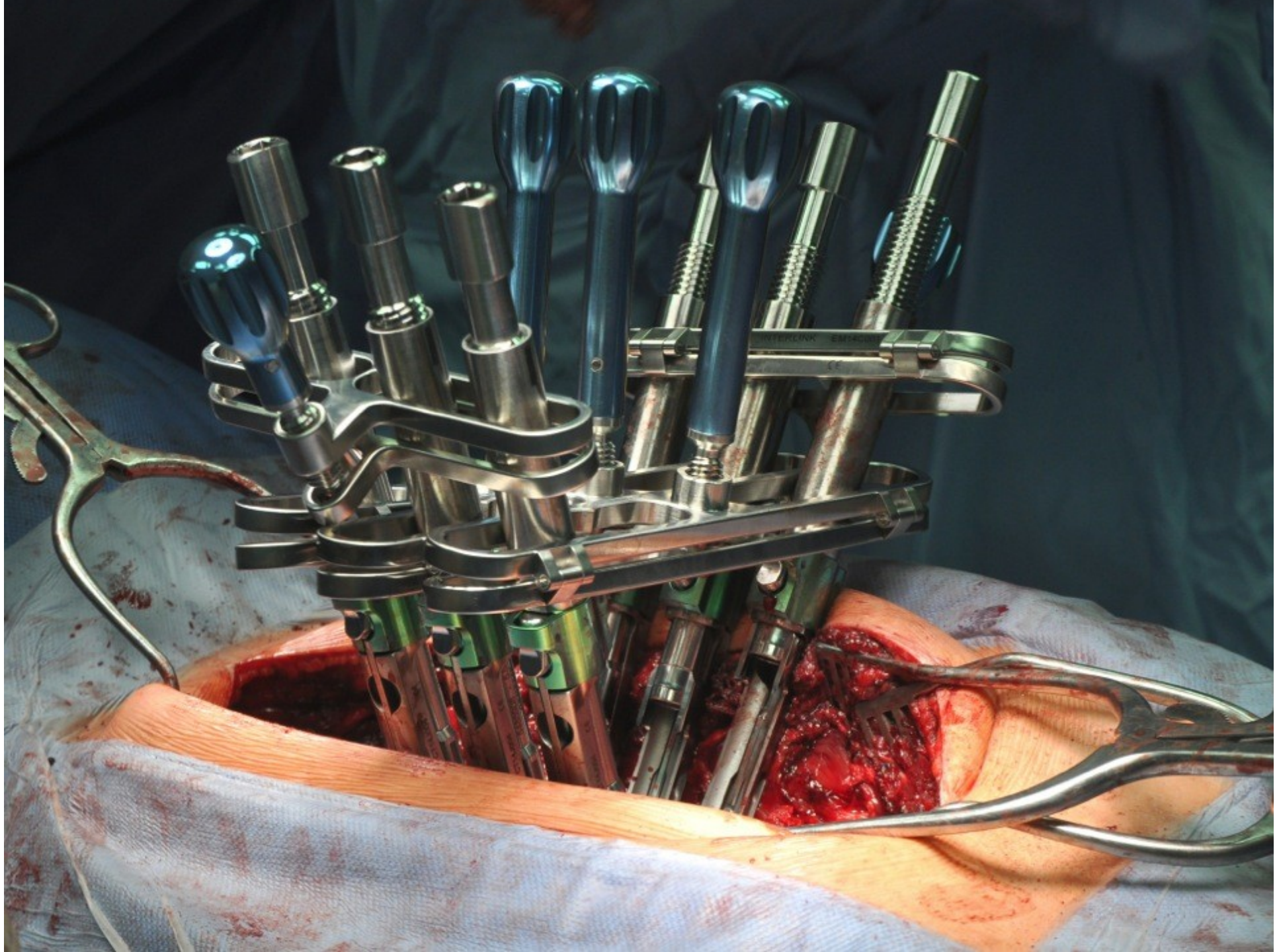

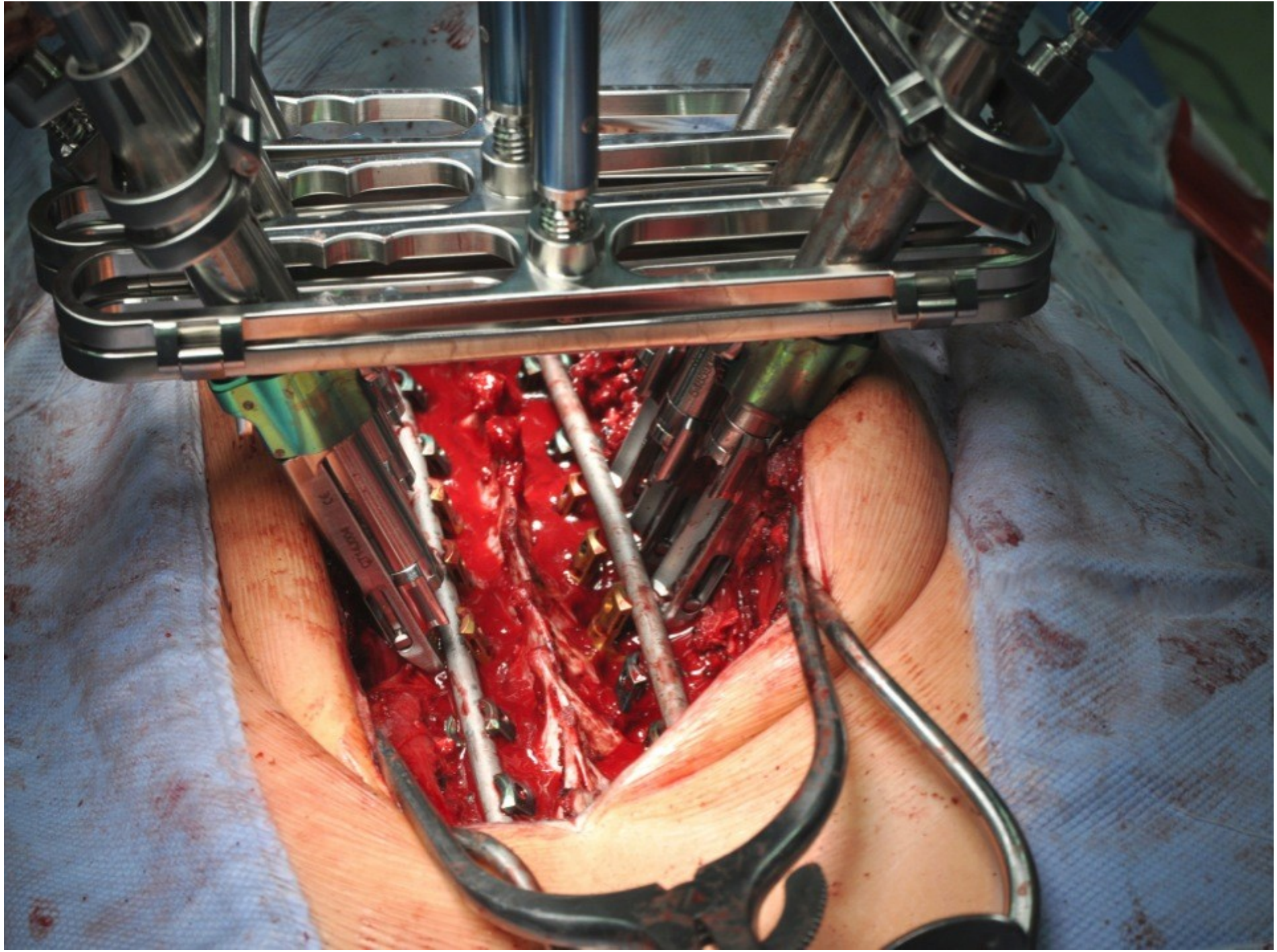

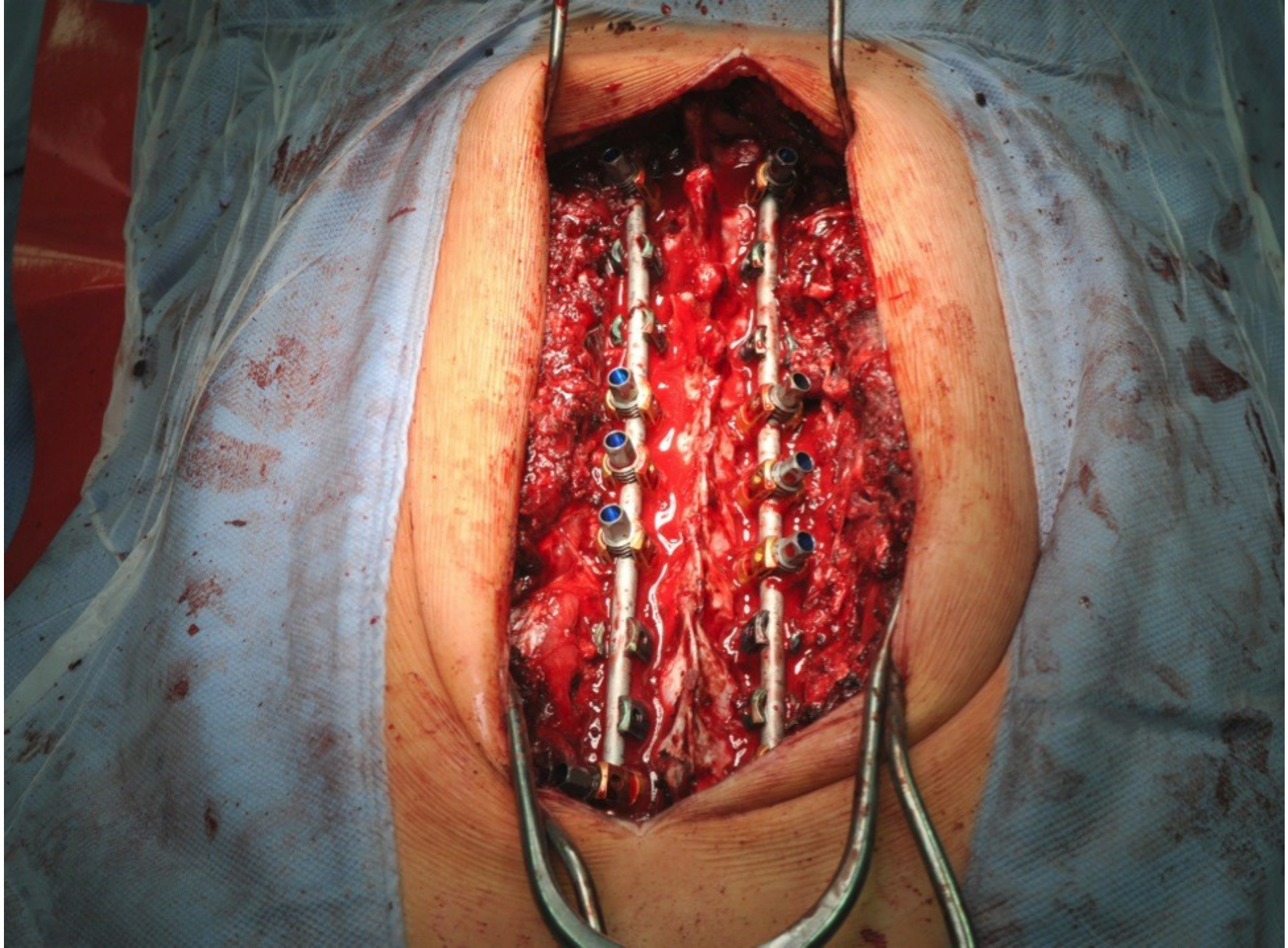


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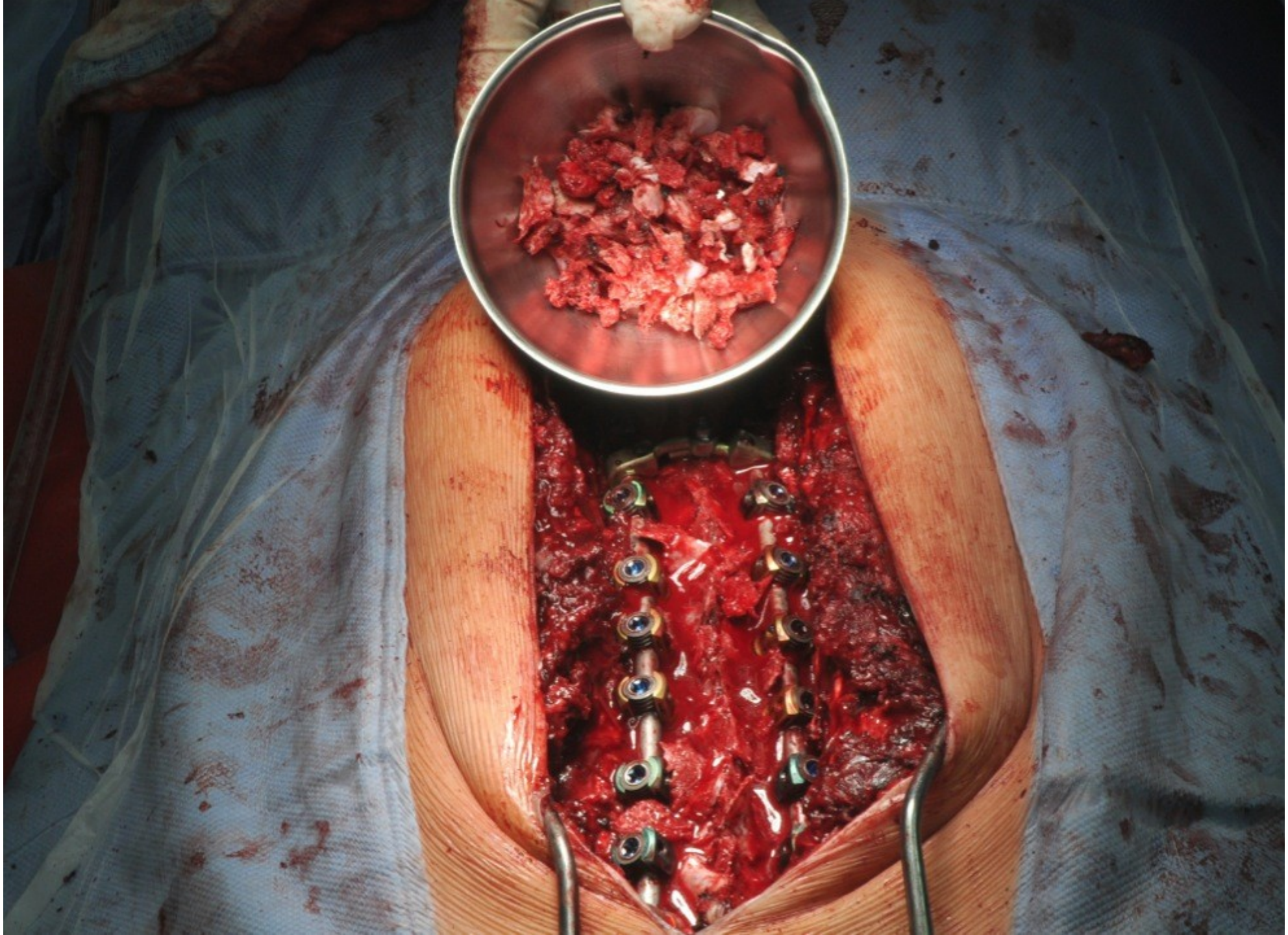
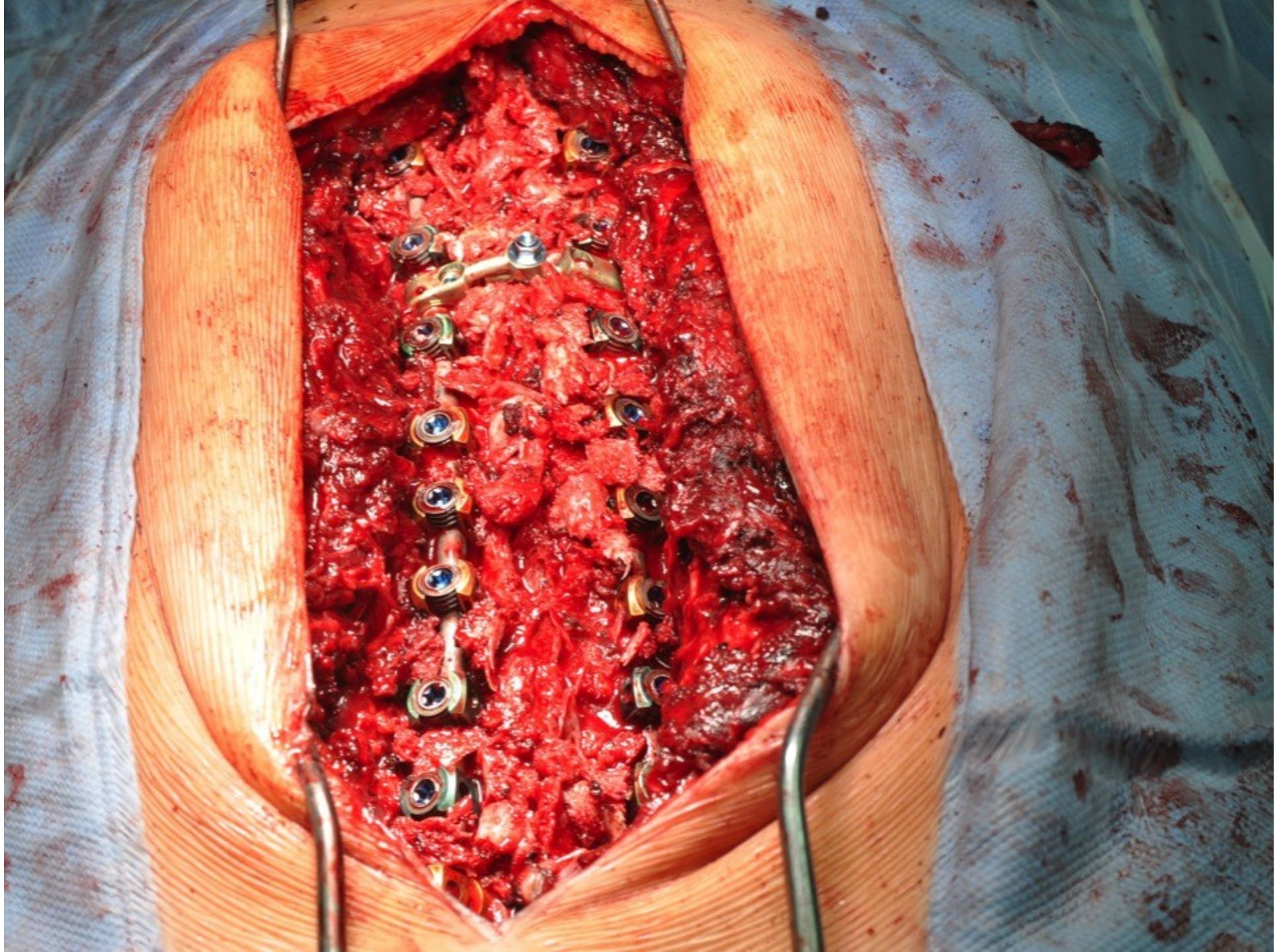
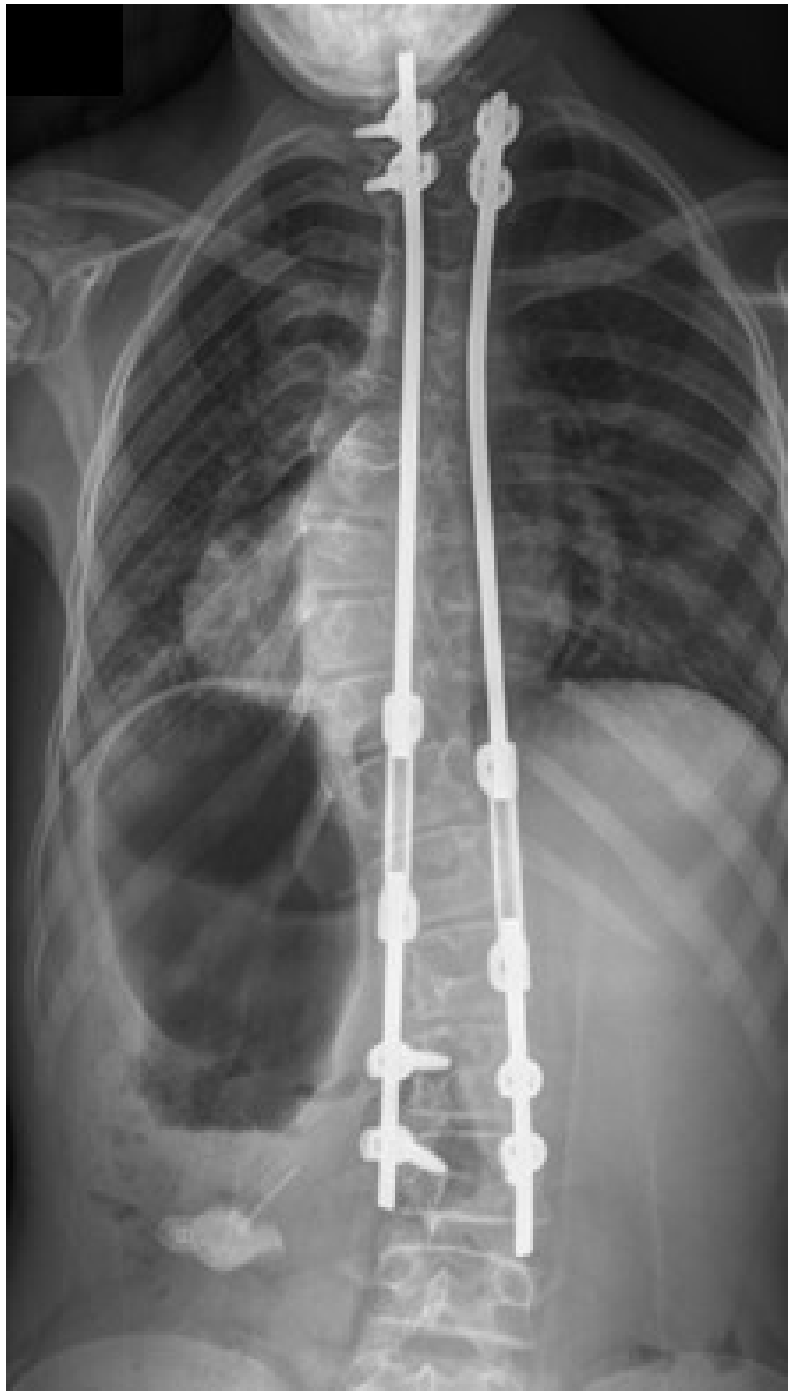




Nonfusion surgery methods

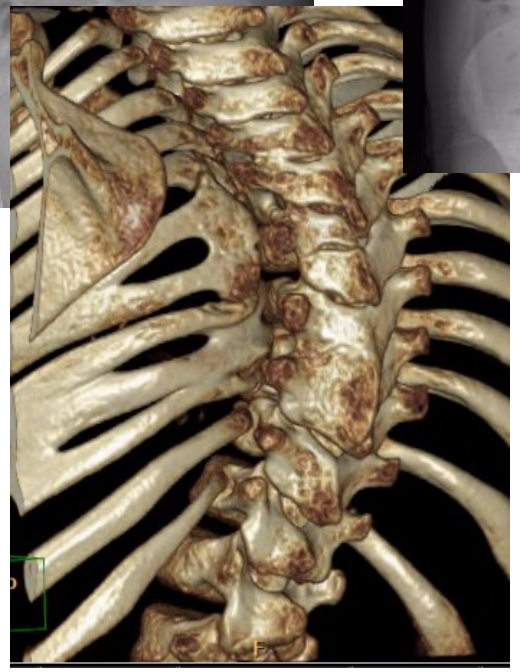


VEPTR
= vertical expandable prosthetic titanium rib

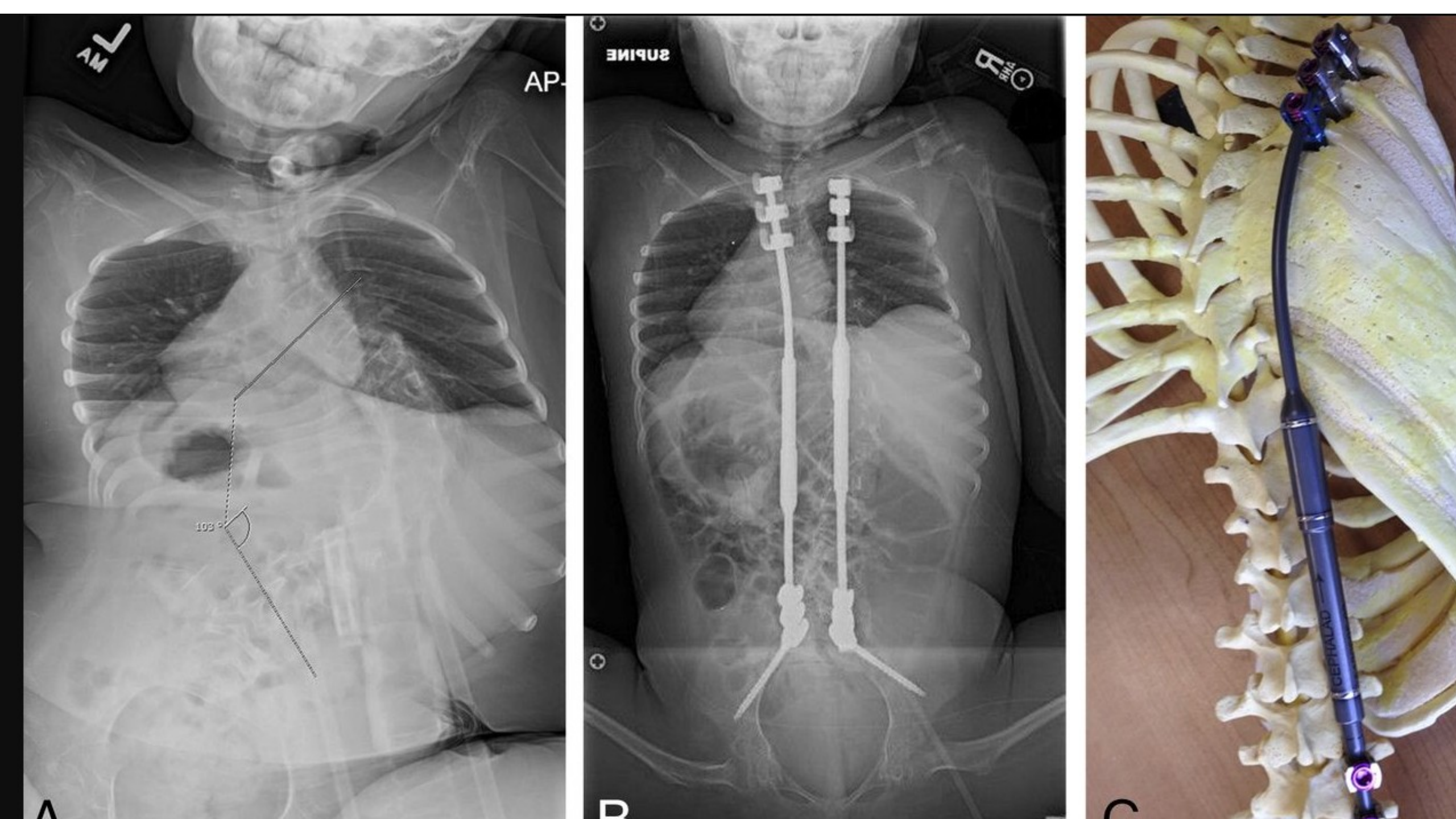
- Indikace: kong. def. + thoracic insufficiency syndrom
  + kostní nezralost
- Cíl: zvětšení objemu hrudníku + korekce deformity
- Nutné opakované redistrakce







Magnetické tyče (Magnetic rods)


AP
103 °
SUPINE
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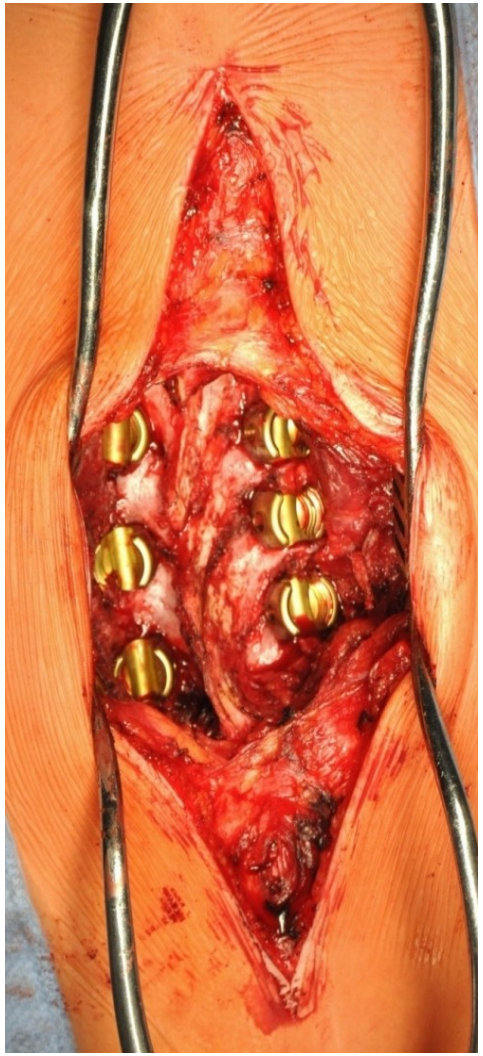
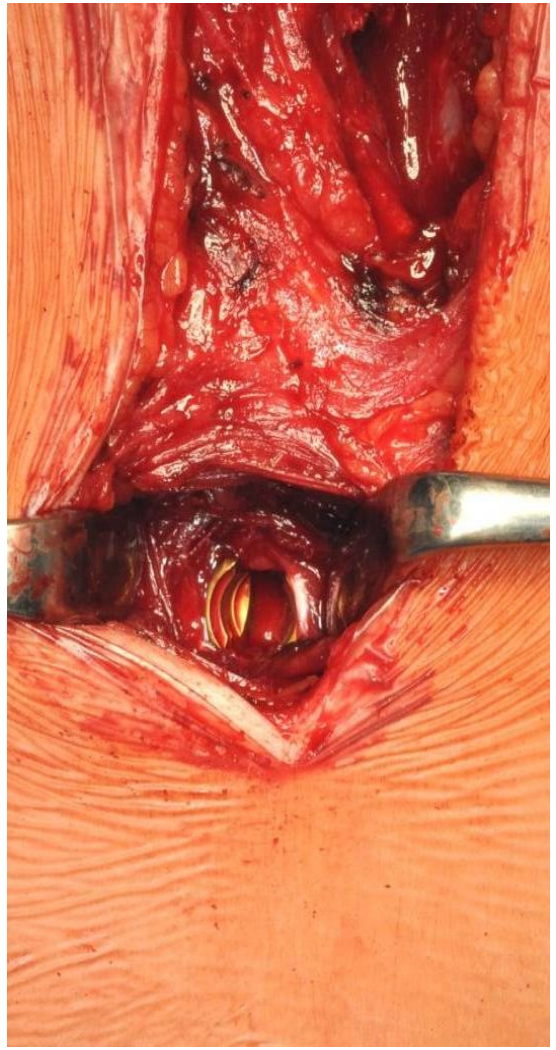
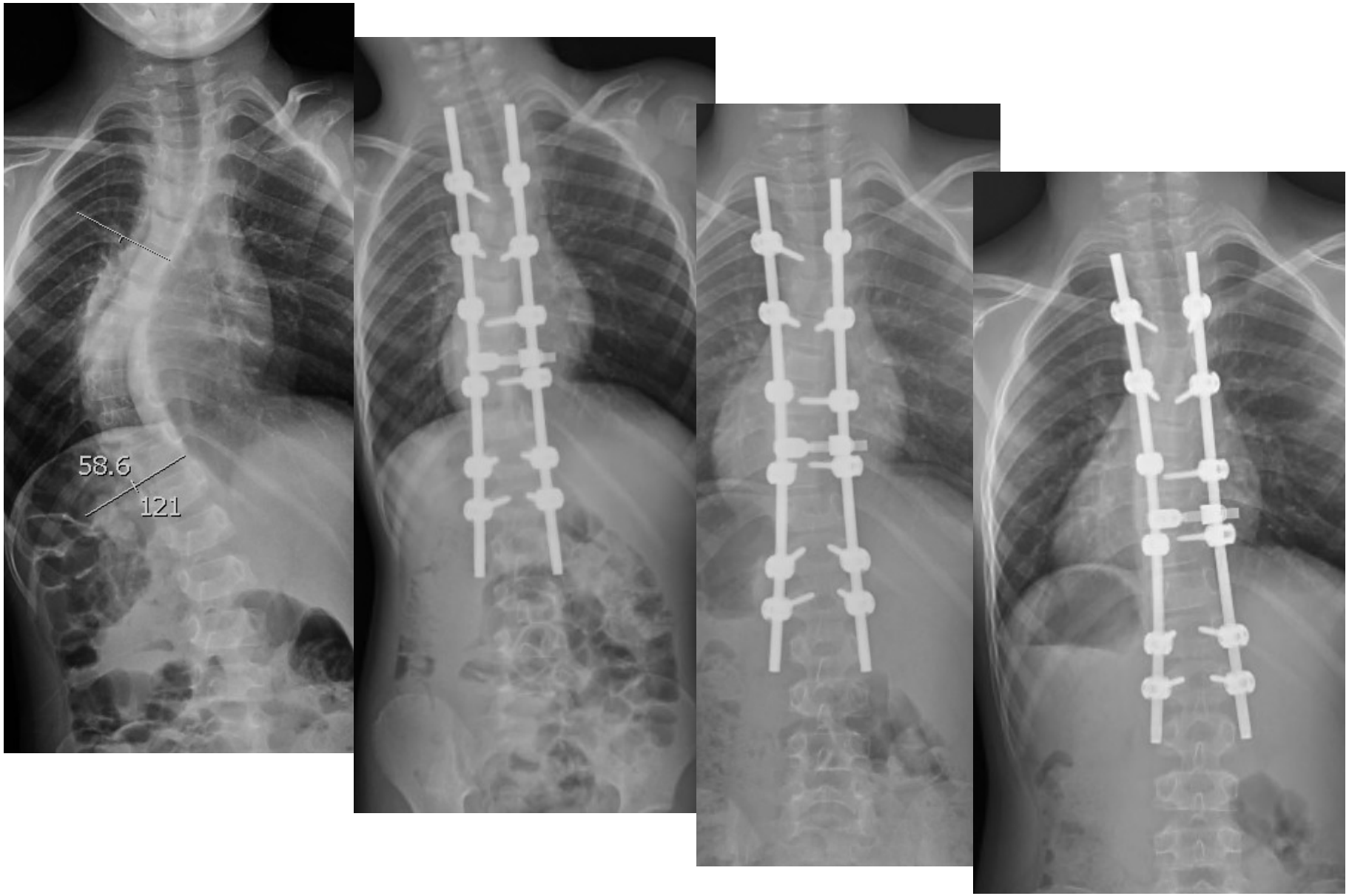
GEPHALAD

Growth Guided System

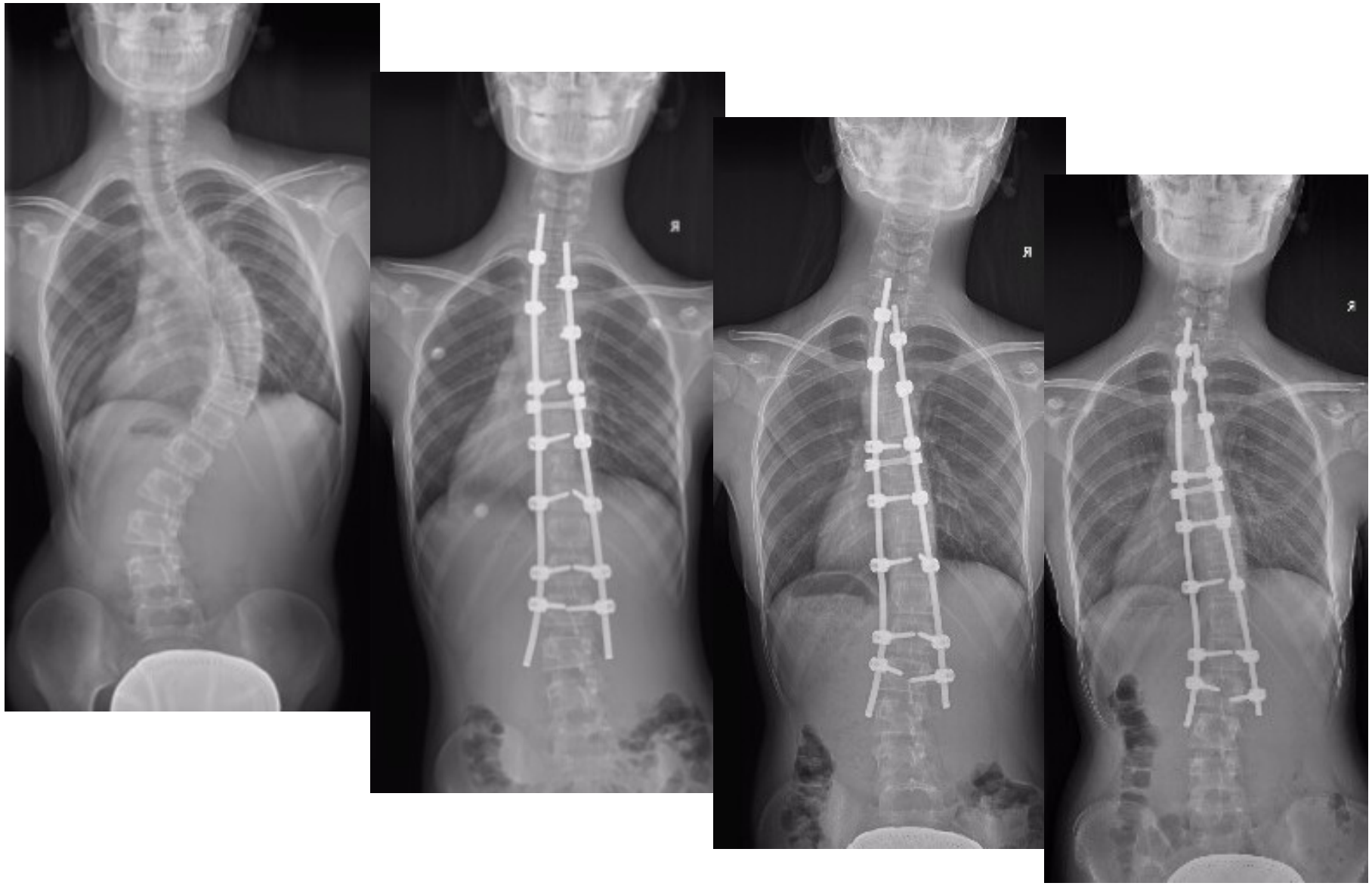
- Deformity correction + growth enabled
- Fusion of the apex of the curve
- The rest of spine grows guided along the rods







3+9 3+10 5+10 7+5



10 +9 poop 13+8 15+1

GGS requires definitive fusion !

Pts need 2 surgeries at least !

Convertion to definitive fusion after skeletal maturity.

Scoliosis types due to ethiology

TYPU deformity

- Idiopathic
- Congenital
- Neuromuscular

VĚKU pacienta

- Infantile
  < 3 y
- Juvenile
  4-10 y
- Adolescent
  11-17 y
- Adult
  > 17 y

Congenital scoliosis

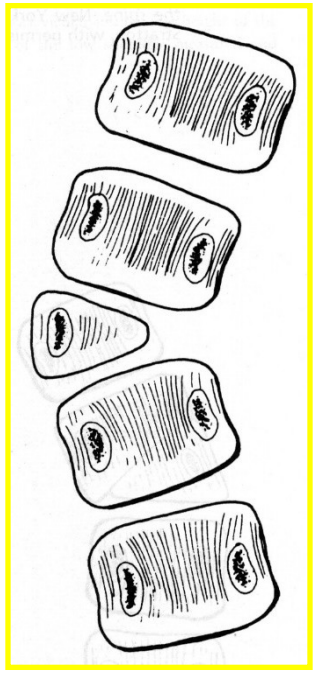
- Congenital Scoliosis- inborn spine deformity due to imperfect formation of vertebrae and their association.
- Hard to predict development and deformity progression …

Congenital scoliosis

- deformity occurs during the first 6 weeks of embryonic development without hereditary burden, it is not hereditary
- wide diversity of severity of disability
- dg. newborns / toddlers, can occur at any time during growth

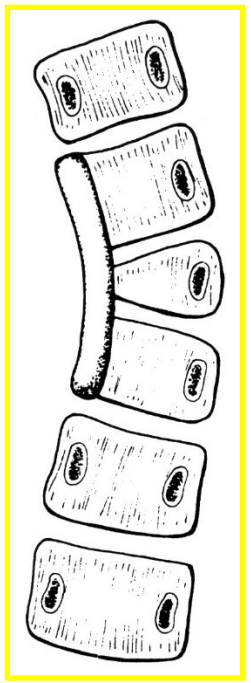
CONGENITAL scoliosis

Failure of FORMATION

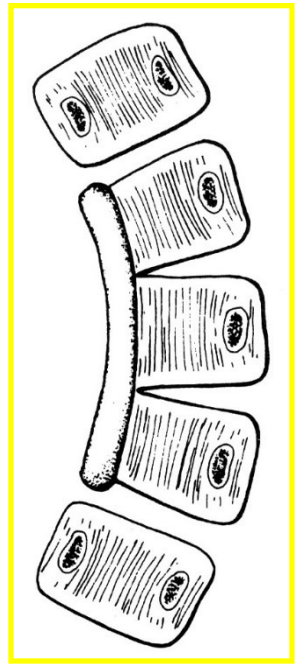


Hemivertebra

COMBINED failure



Failure of SEGMENTATION



Unsegmented bar

Congenital scoliosis

- Failure of SEGMENTATION- failure of the connection of one or more vertebrae on one side
- Failure of FORMATION- most often, disorder of vertebra formation, shape anomalies
- COMBINED failure

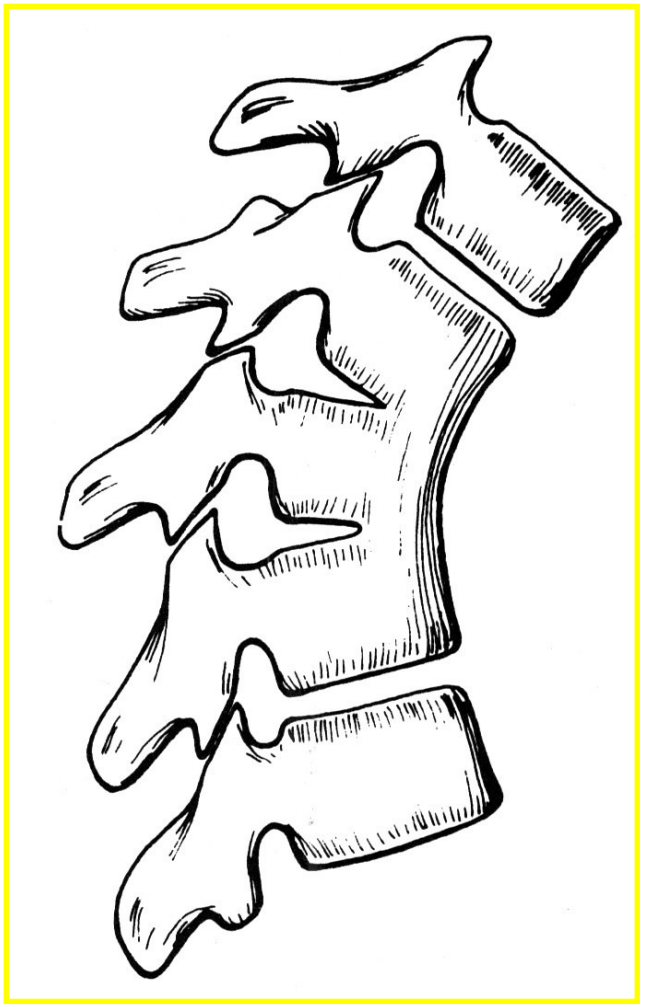
Failure of segmentation

- Anterior :

Vertebrae are held together due to unsegmented normaly all the posterior structures

-> kyphosis !

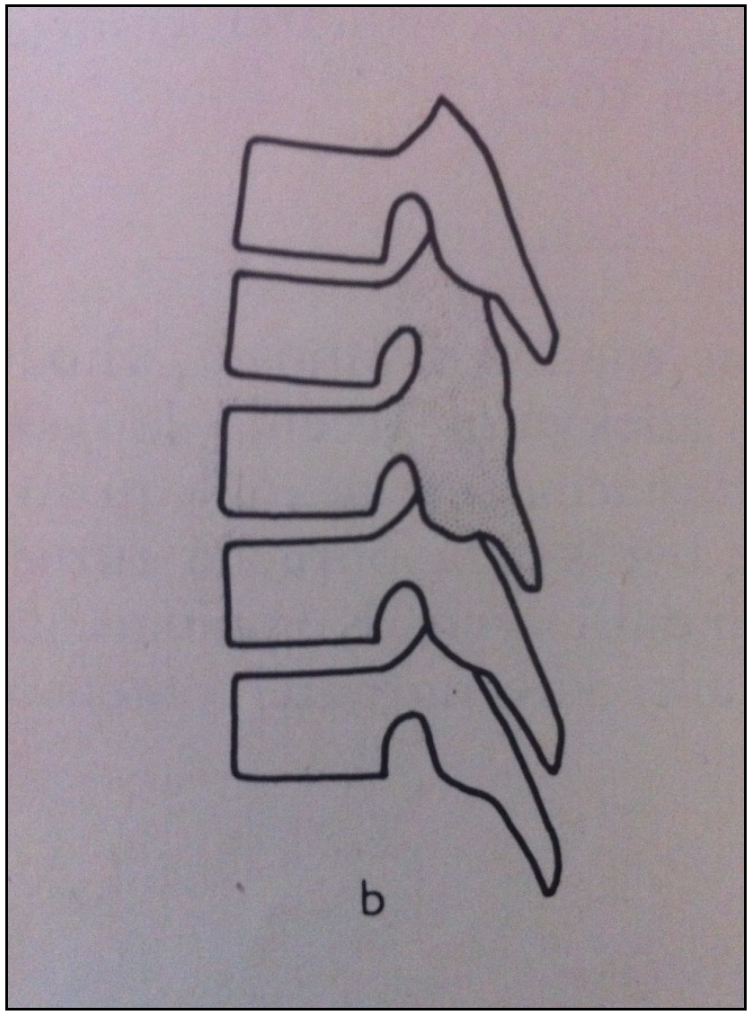
„anterior unsegmented bar“



Failure of segmentation

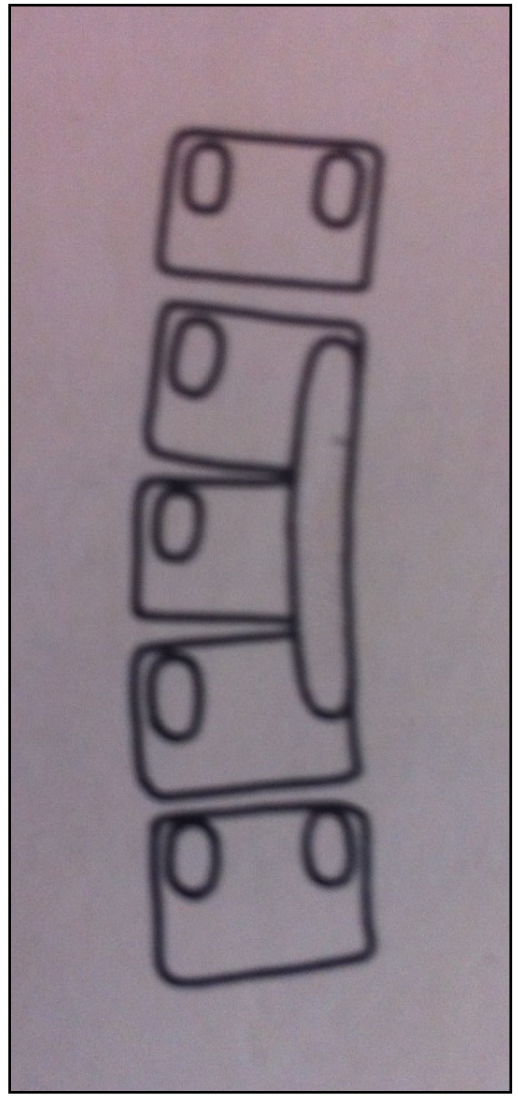
- Posterior unsegmented bar – fusion of intervertebral joints and laminas

-> lordotization



Failure of segmentation

- Unilateral unsegmented bar leads to sever scoliosis deofrmity

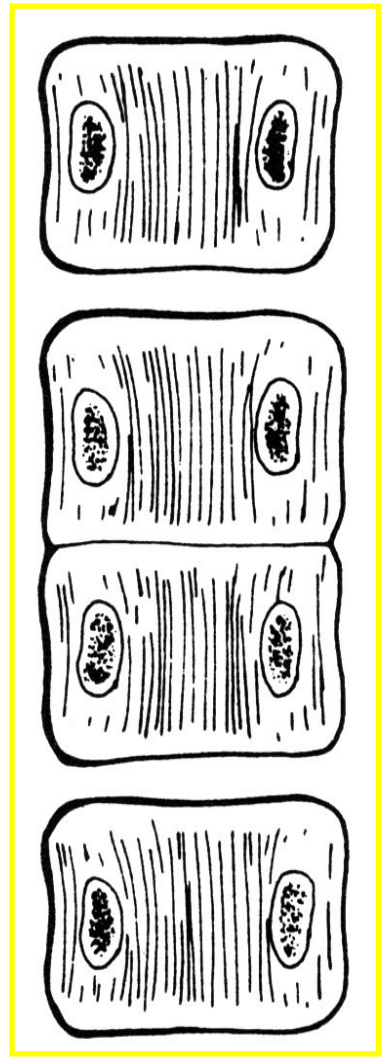


Failure of segmentation

Usualy asymptomatic

Can lead to relative shortening of spine

„block vertebra“ – iv disc is missing



Failure of formation

- anterior

Could affect just part of vertebra / all structures

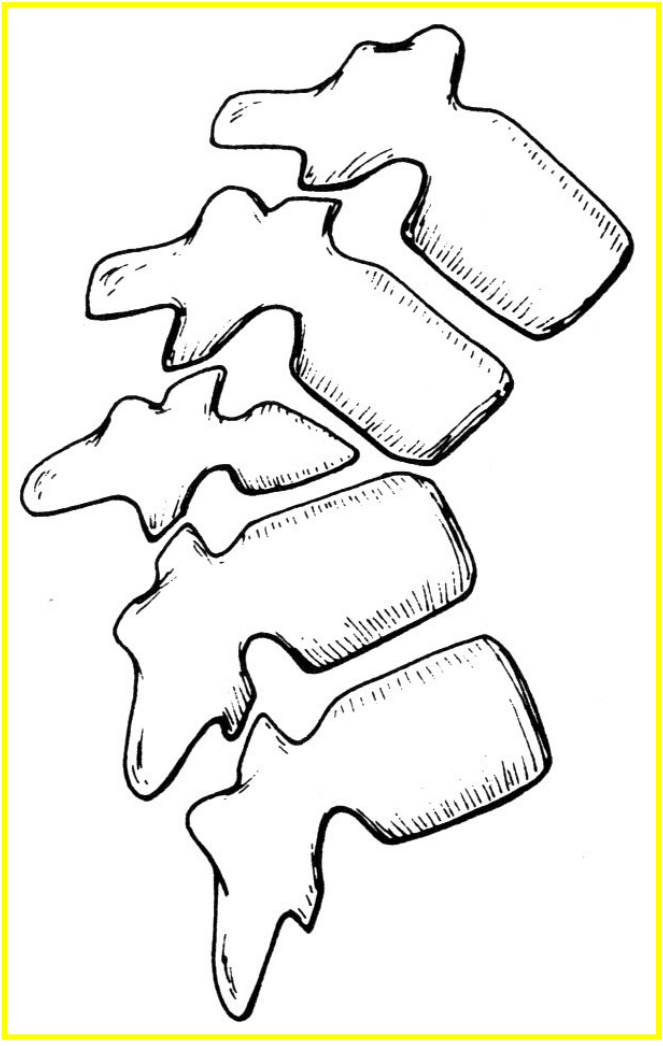
Solitary or multiple changes

„posterior hemivertebra“

-> kyphosis

- posterior – much less common

- > lordosis

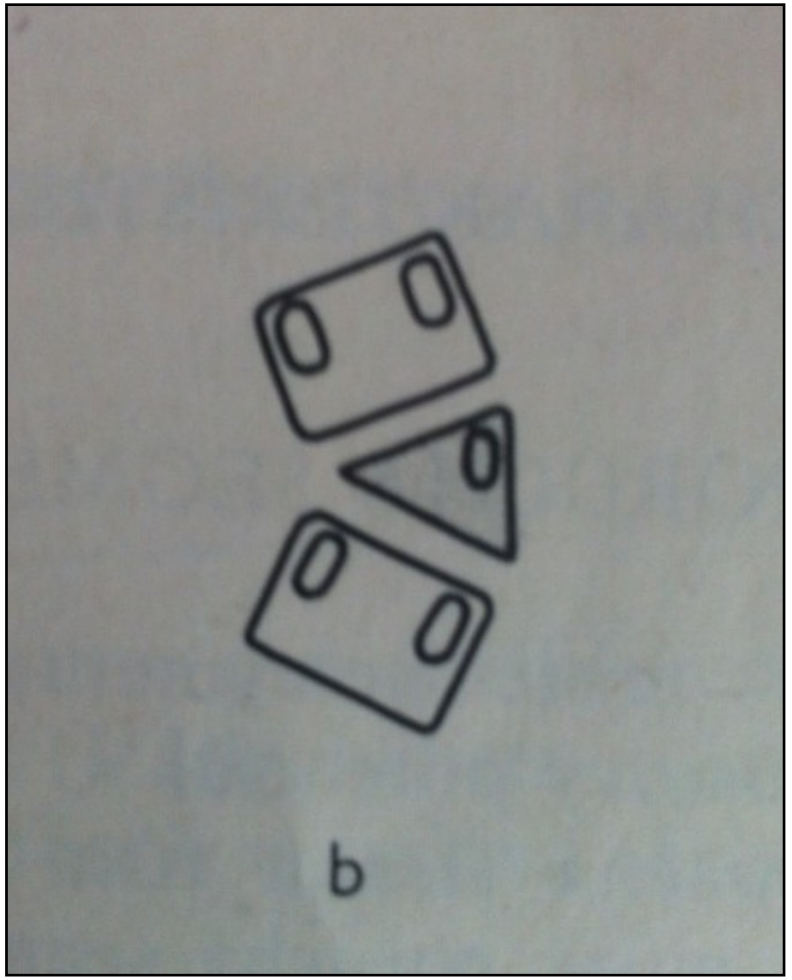


Failure of formation

- Lateral
- Hemivertebra

-> scoliosis deformity

Important one !



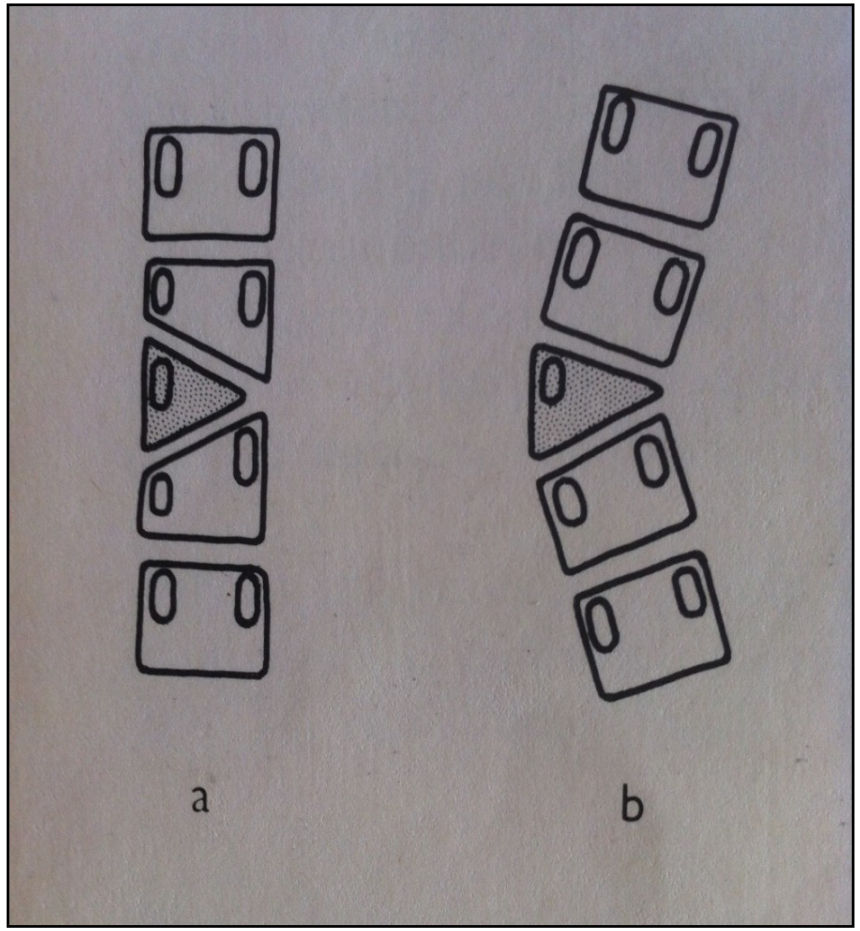
Failure of formation

Postižení solitární až mnohočetné

Postižení sousedních obratlů nebo
v různých úsecích páteře

Hemivertebra types

closed type / neuzavřený poloobratel



bez progrese / progrese deformity

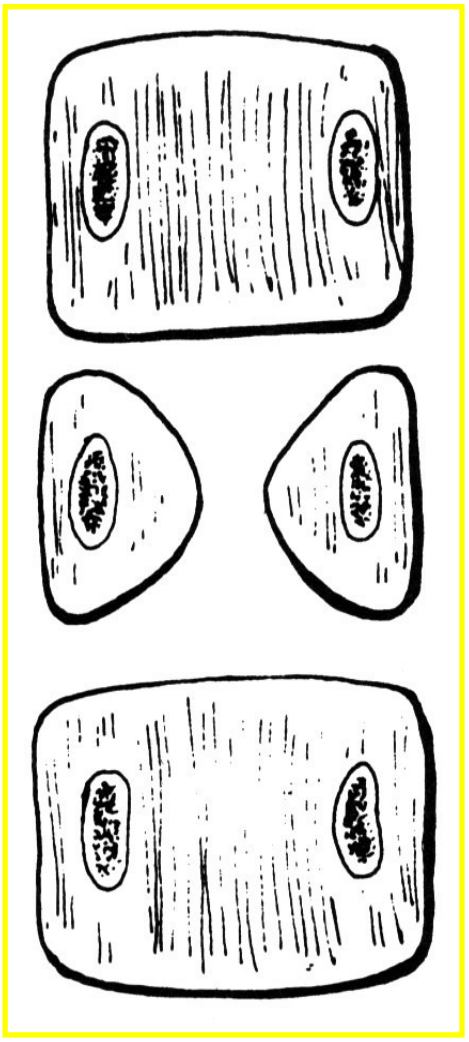
Failure of formation

- Aterior central defect

The two parts of vert. are not connected together

„butterfly vertebra“

- According to severity of the anterior defect can lead to kyphosis or is completely asymptomatic



Combined failure

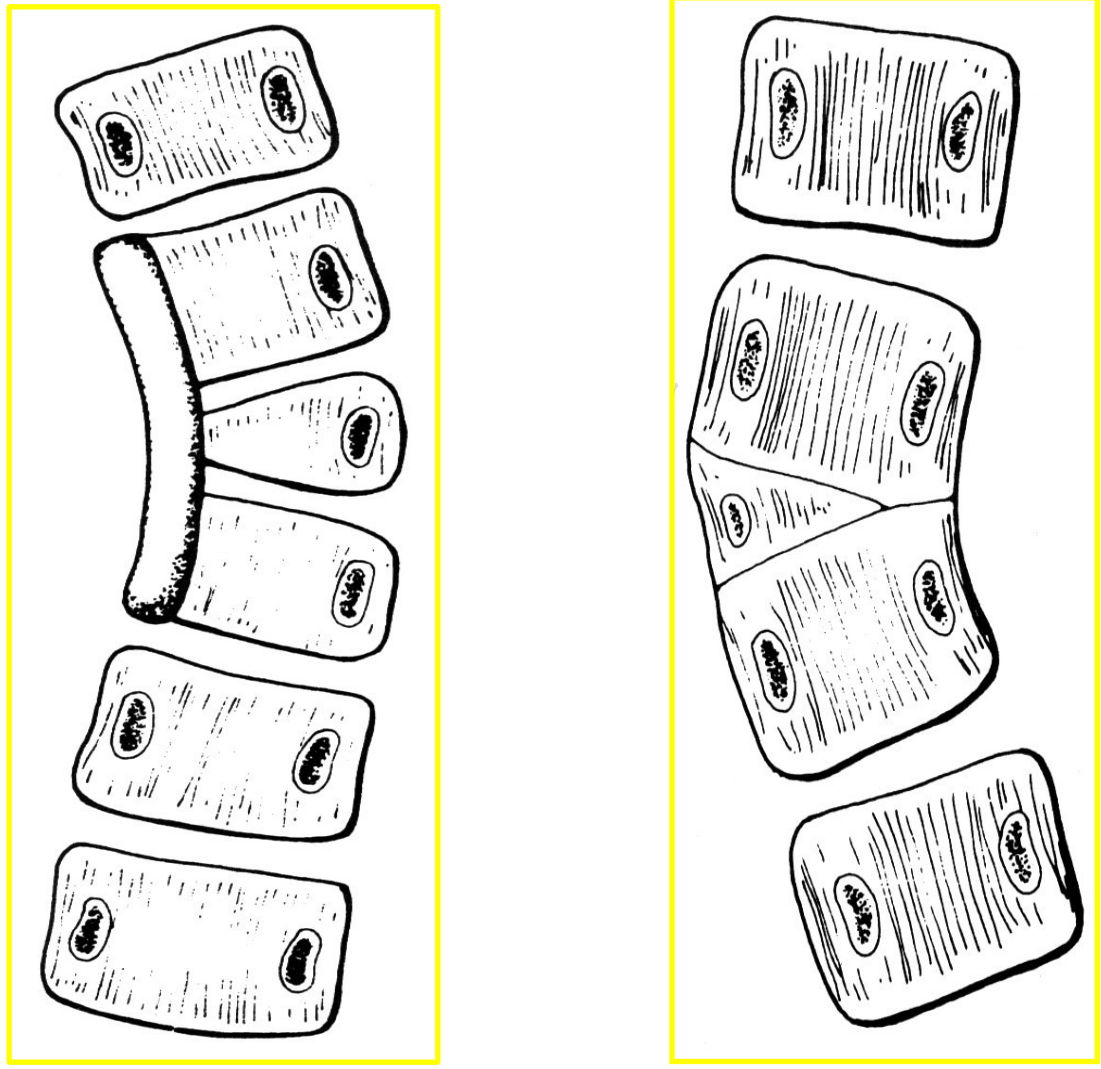
- Very common
- Multiple changes

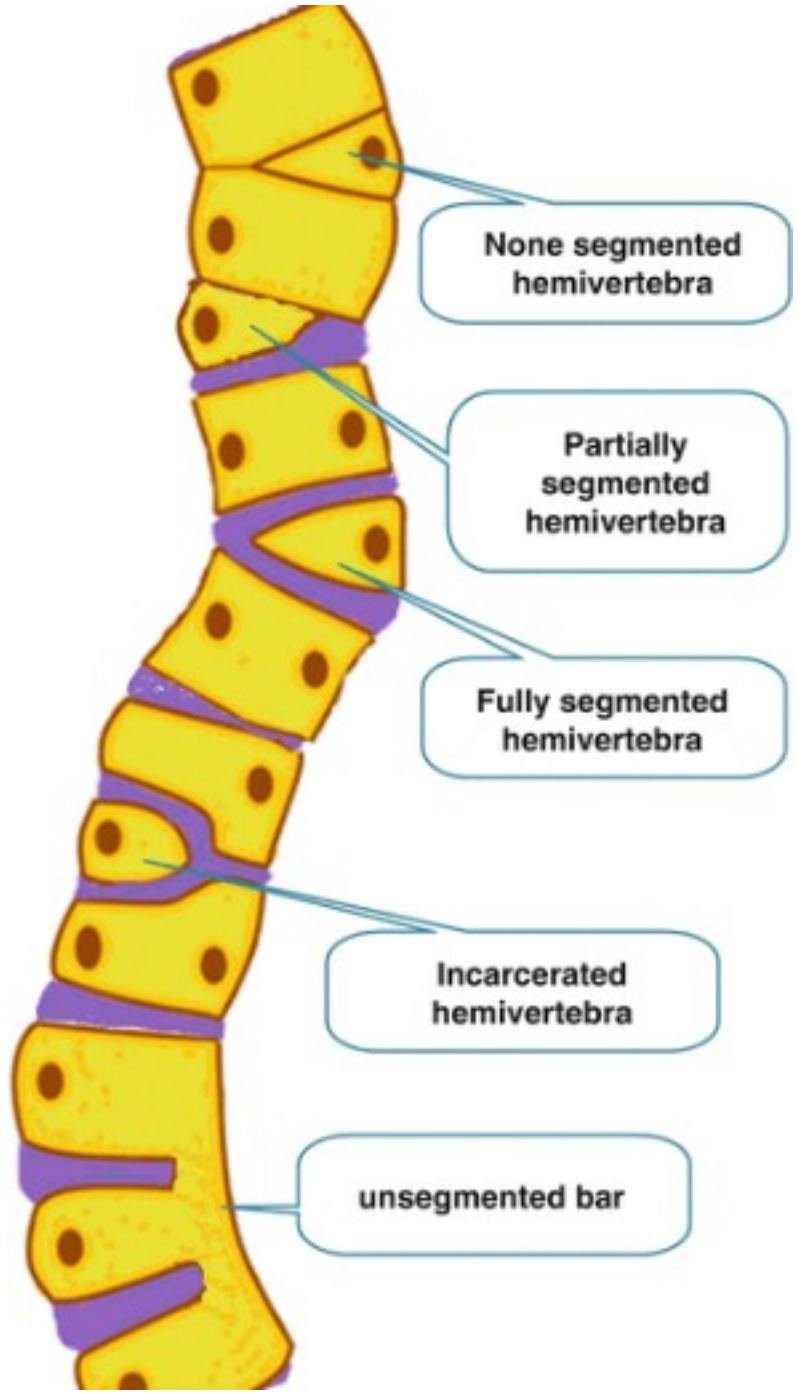
- Very individual

- Hard to predict progression in multiple changes, observation is the key.

Combined failure

The highest risk of progression = Fully segmented hemivertebra + contralateral unsegmented bar !!




None segmented hemivertebra
Partially segmented hemivertebra
Fully segmented hemivertebra
Incarcerated hemivertebra
unsegmented bar

Congenital scoliosis - therapy

Main rule – STOP the progression !

Observation – X-ray á 6months

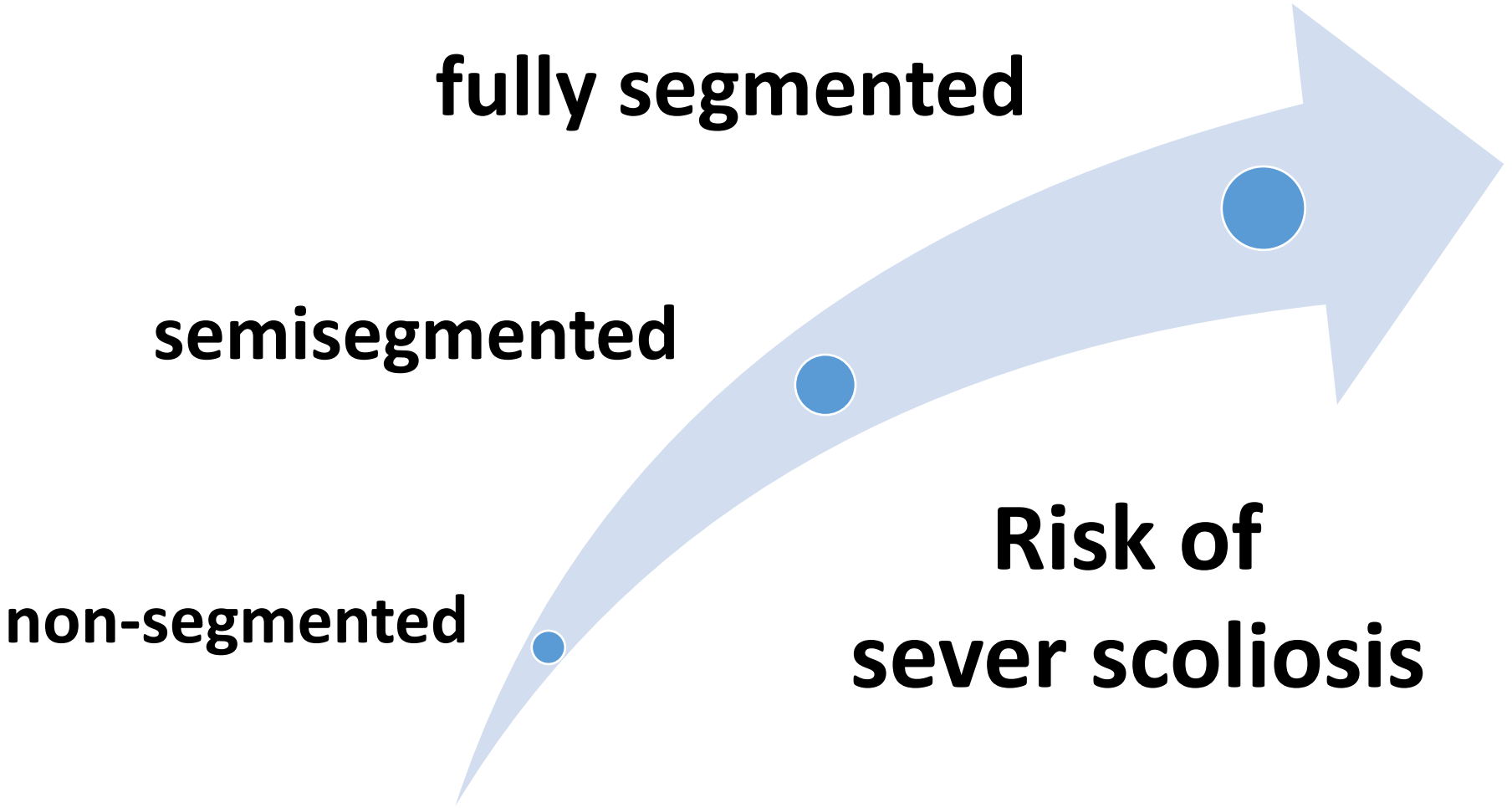
if there is progression of deformity -> surgery

fastest growth– frist 5y of age

+ adolescent growth spurt

-> highest risk of progression !!!

Hemivertebra



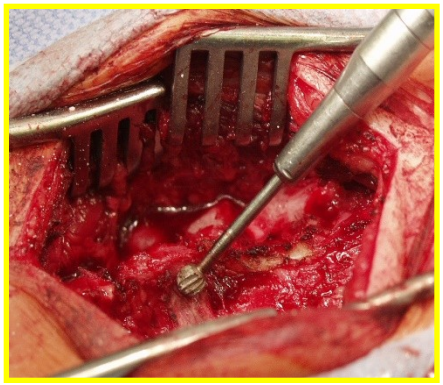
2 main used surgical techniques

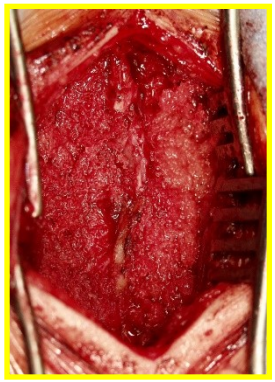
Simple bony fusion

Arrest of curve progression

(without direct correction)

-in small curves
-in early detection

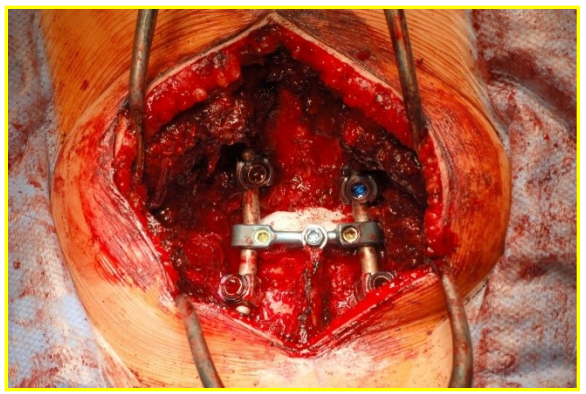




Hemivertebrectomy with instrumentation

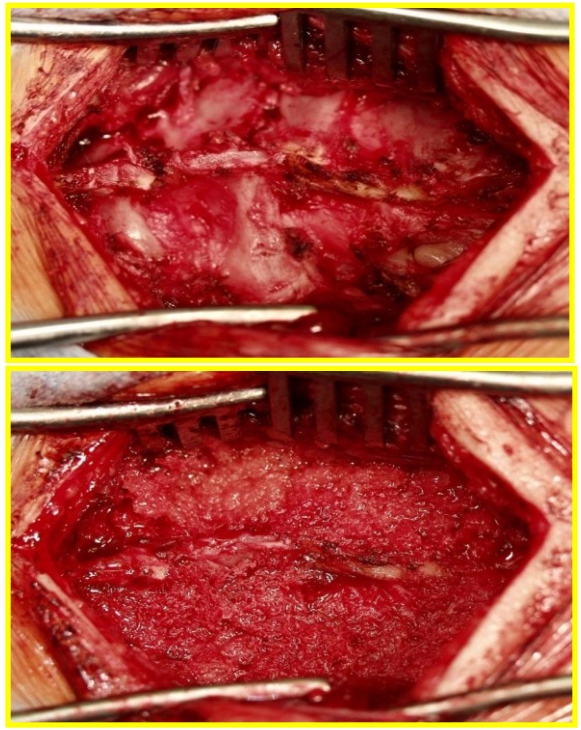
Correction of scoliotic curve

-in greater curves
-in supposed curve progression



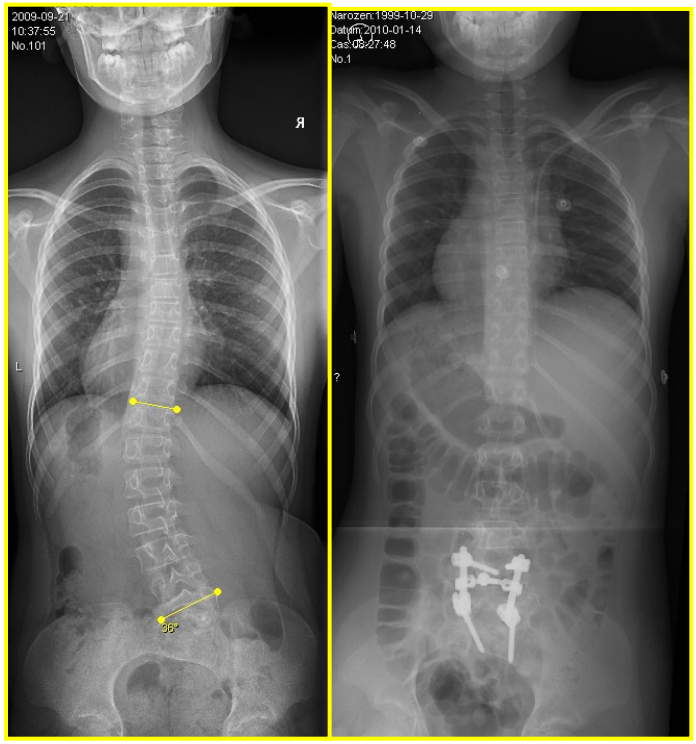
Surgery of hemivertebra

Simple fusion



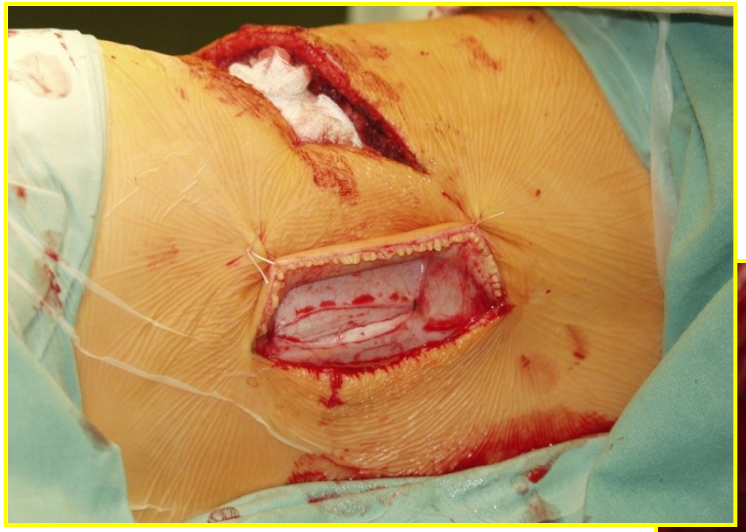
- Small deformities
- Blockage of worsening
- Without correction possibility

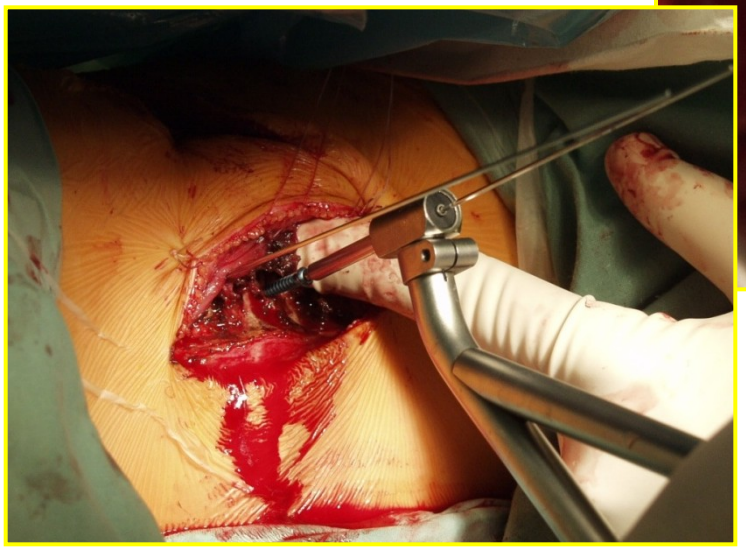
Hemivertebrektomy

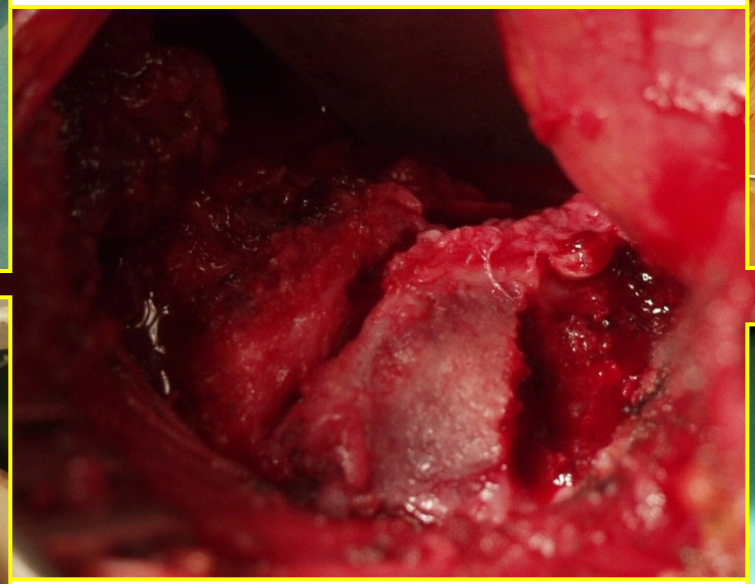


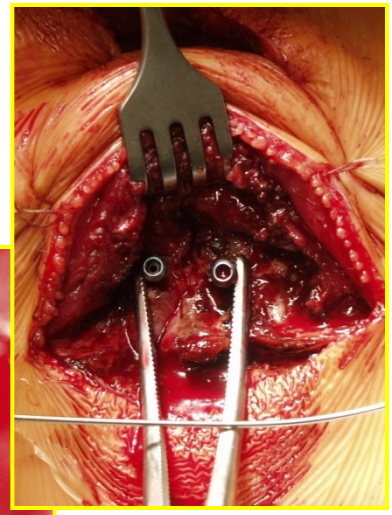
- Larger deformities
- Curve correction
- Prevention of secondary curves

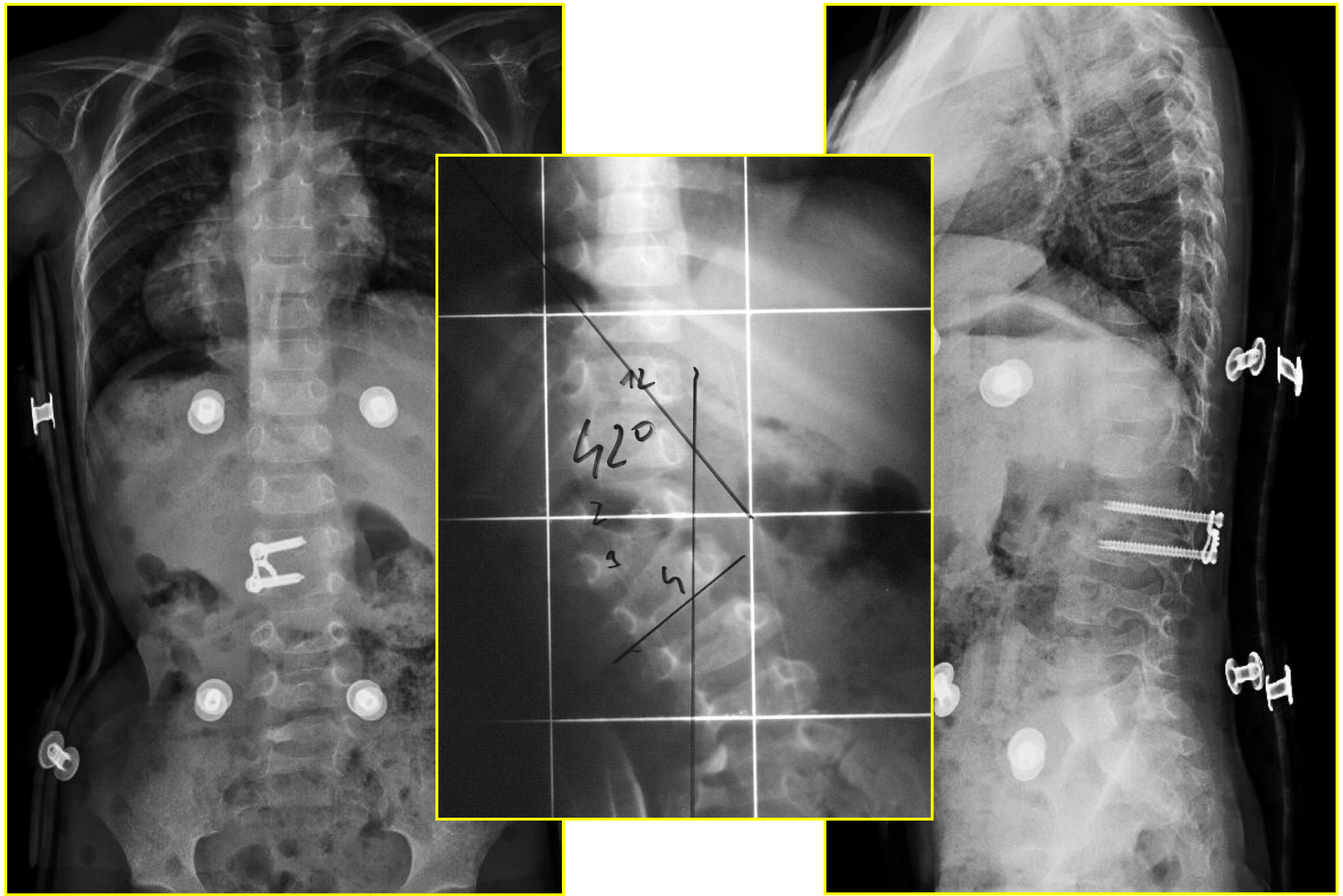
Hemivertebrectomy combined approach







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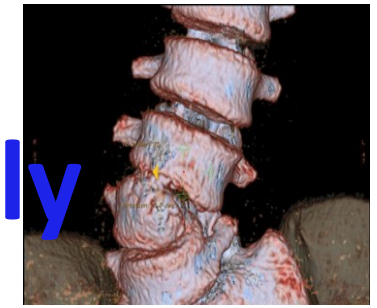
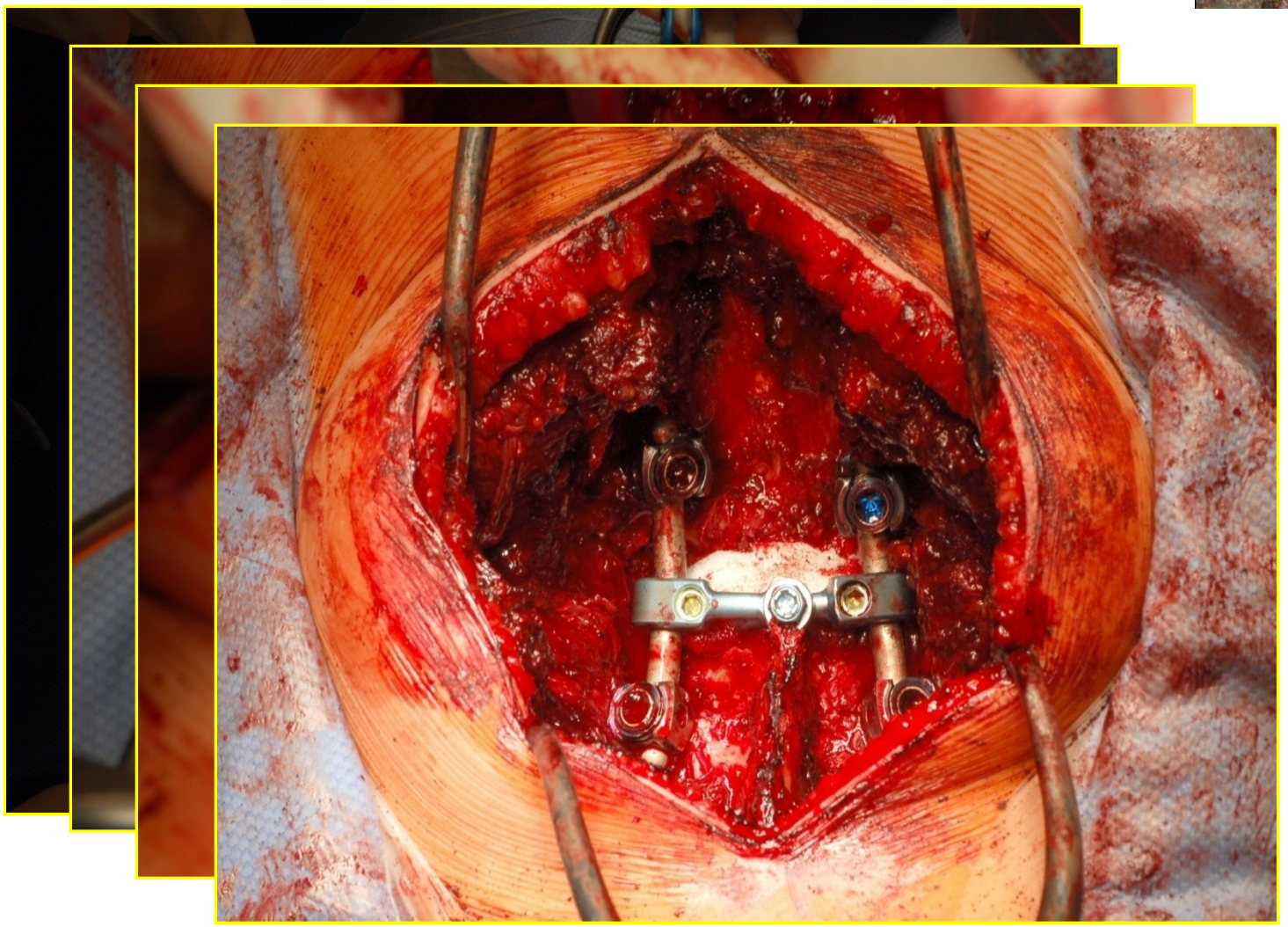
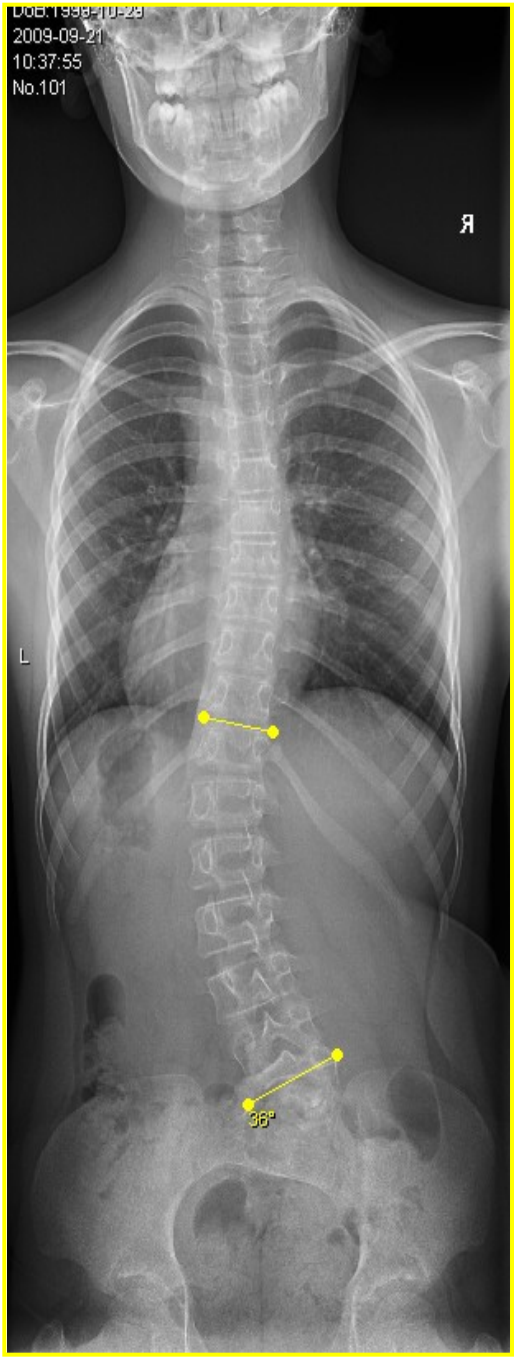
Hemivertebrektomy posterior approach only



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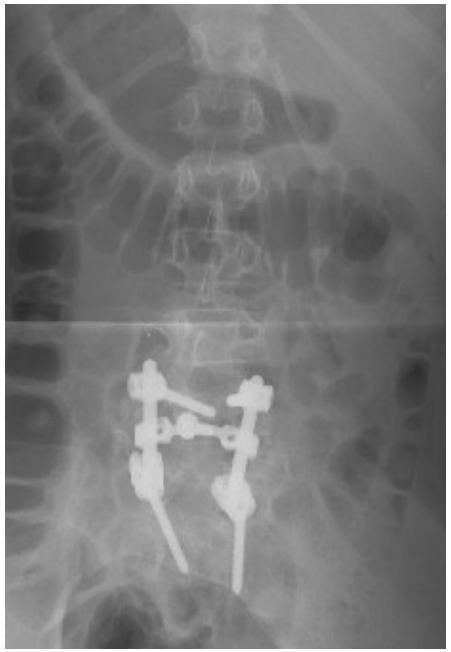

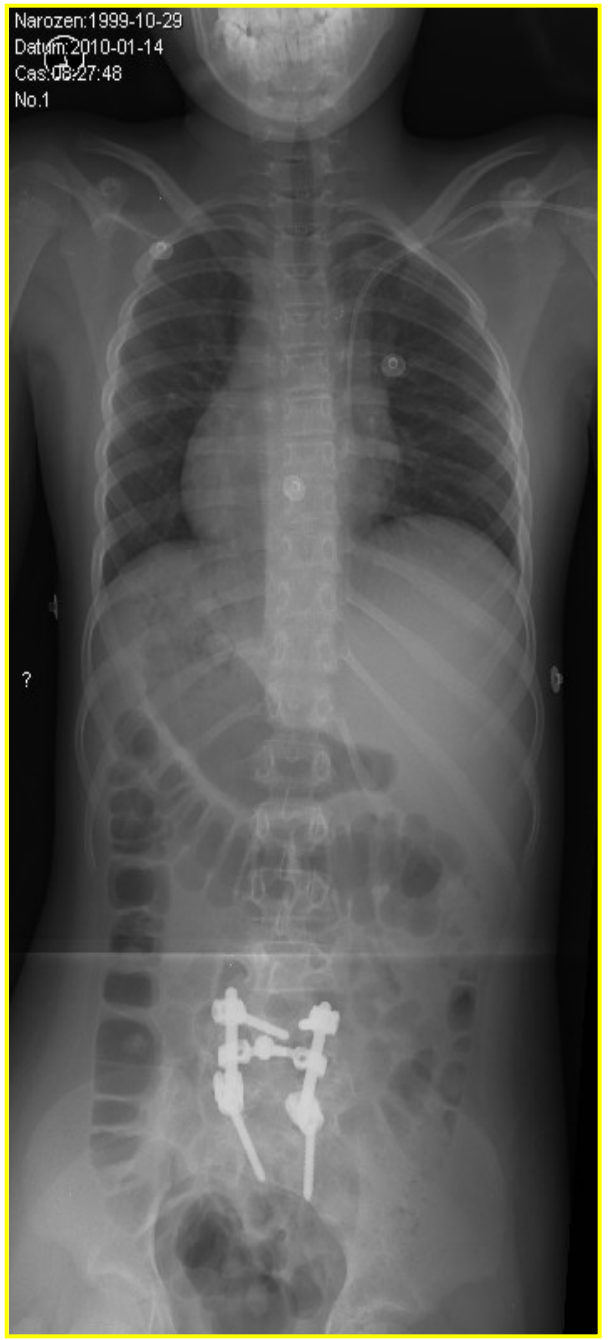
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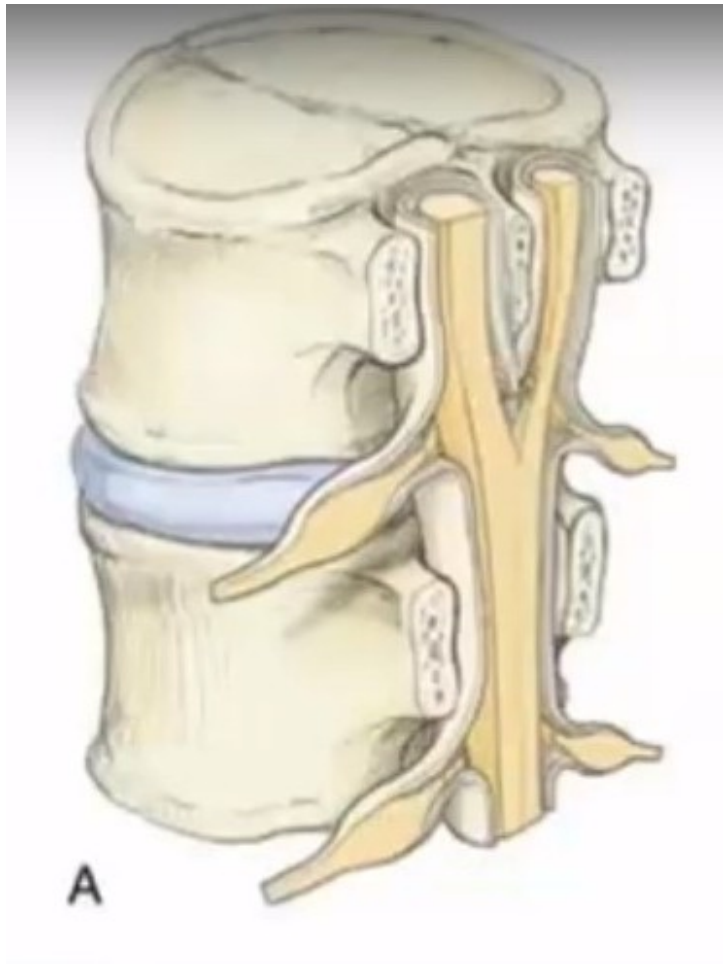
Conclusion

The main factors of succesful treatment of congenital scoliosis

- **early detection**
- **good timing**
- **adequate surgical approach**

Diastematomyelie



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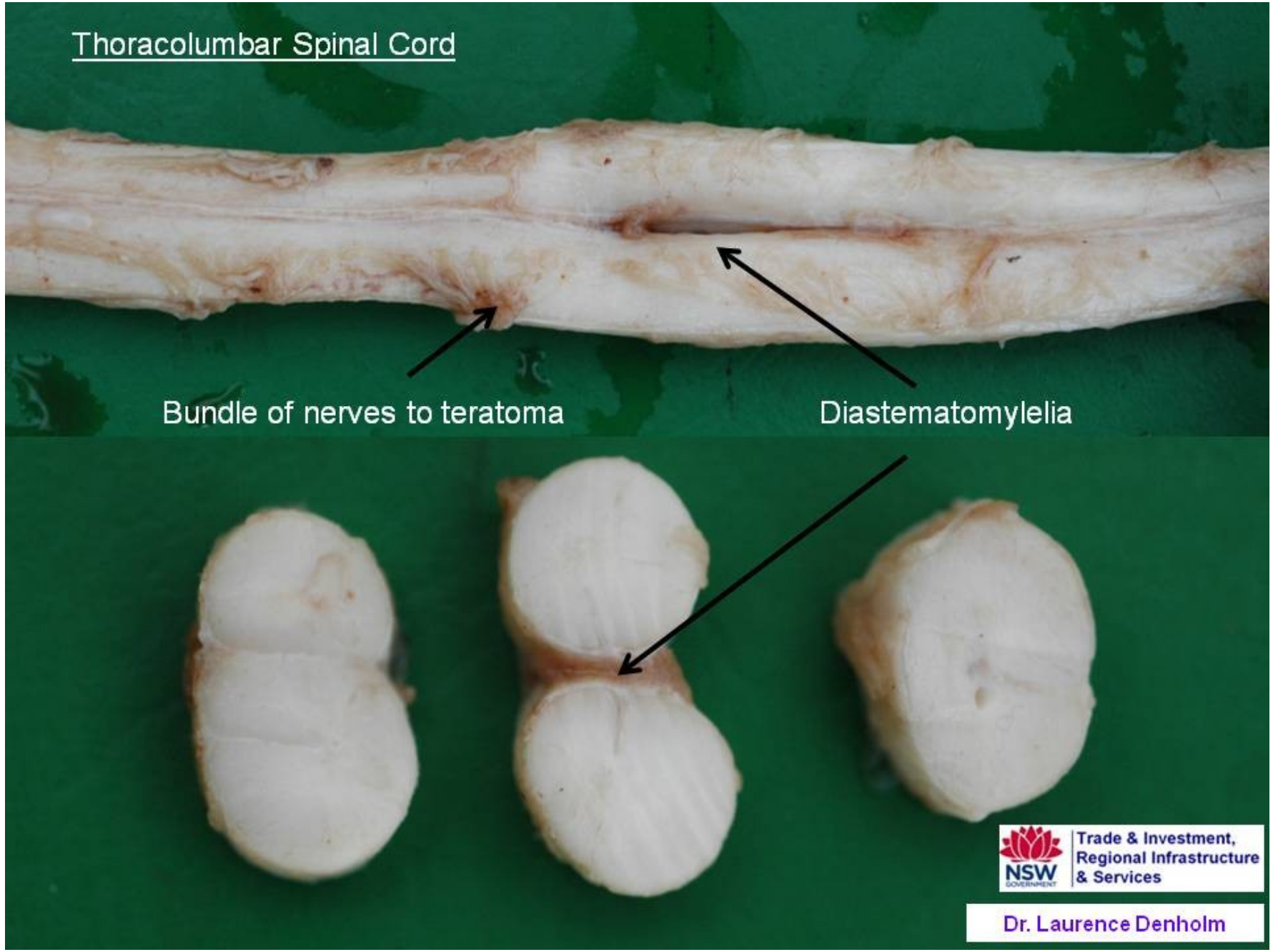
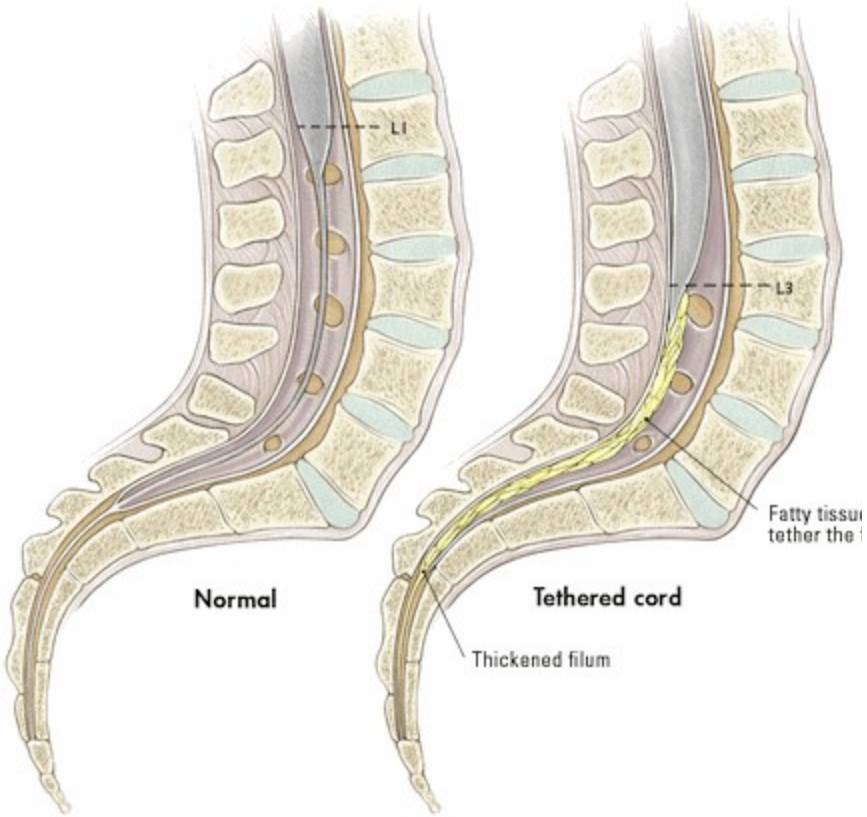
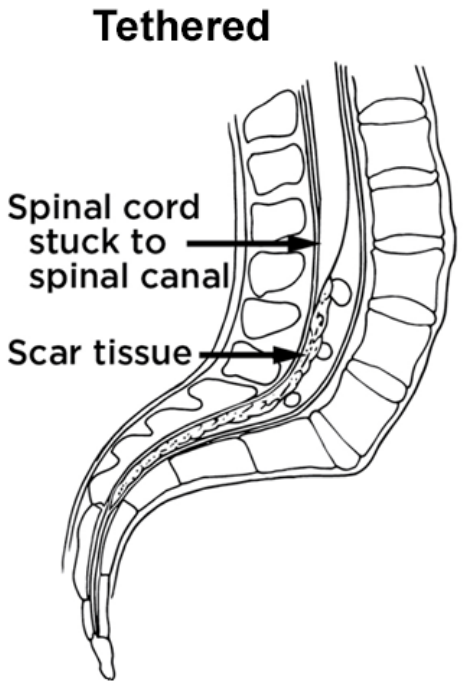
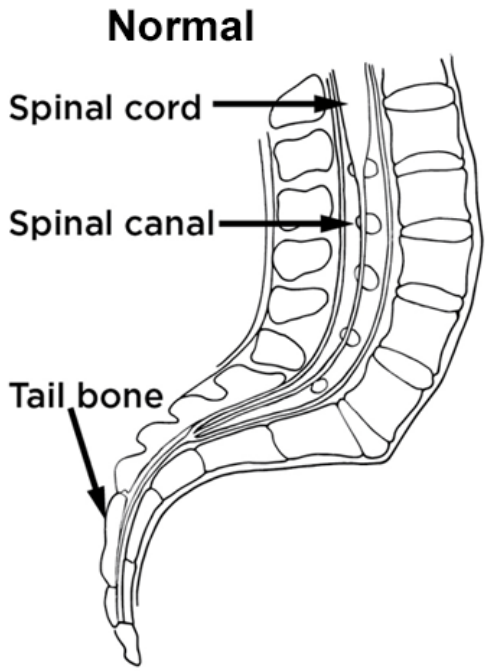

Thoracolumbar Spinal Cord
Bundle of nerves to teratoma
Diastematomylelia
Trade & Investment, Regional Infrastructure & Services
NSW GOVERNMENT
Dr. Laurence Denholm

Tethered cord syndrome







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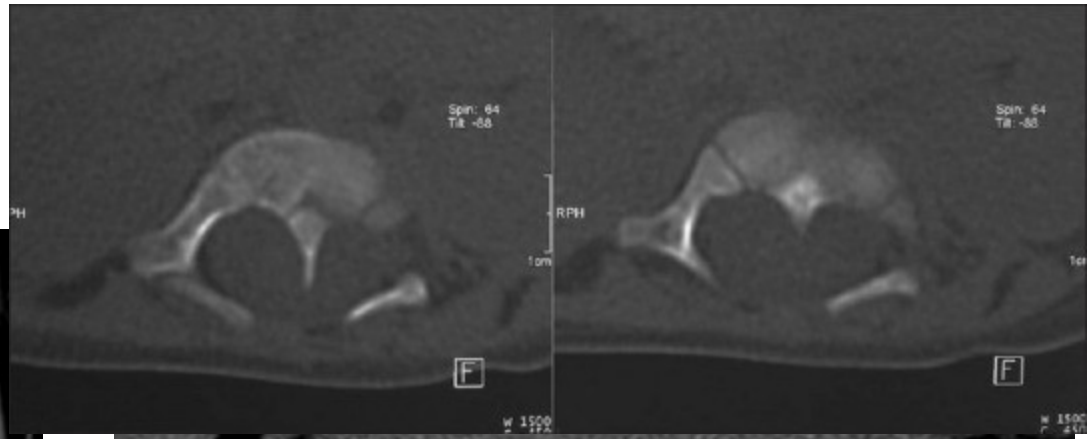
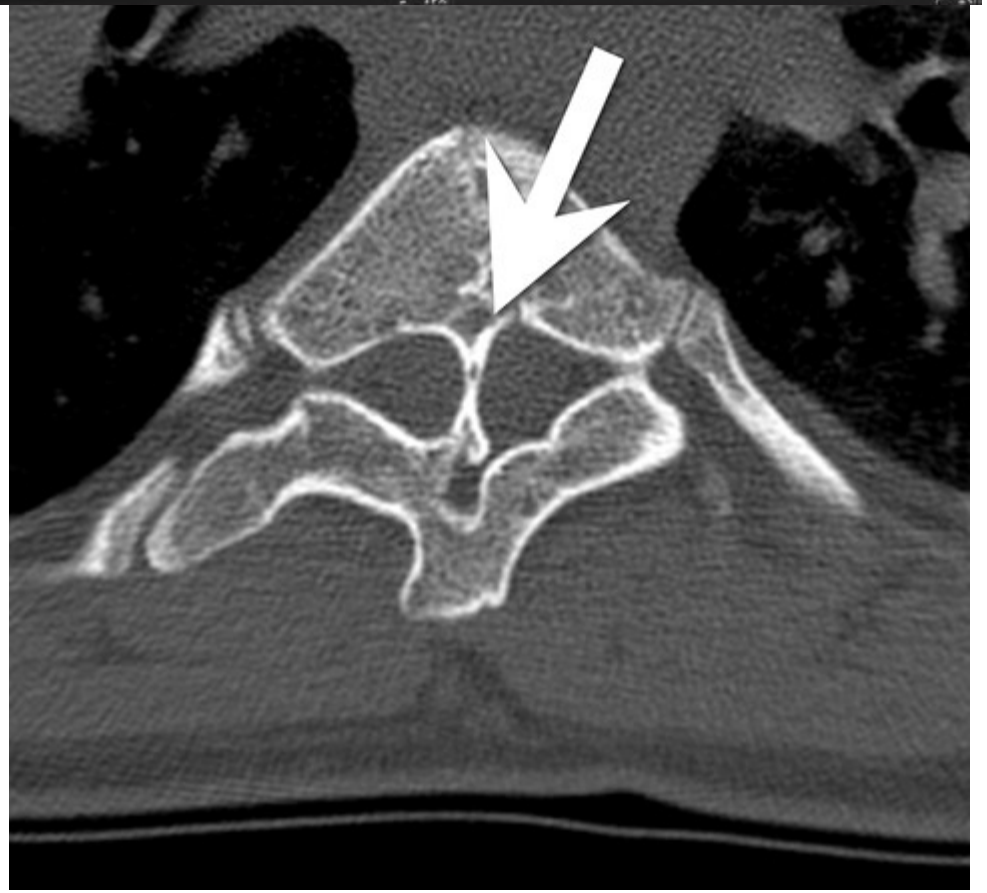
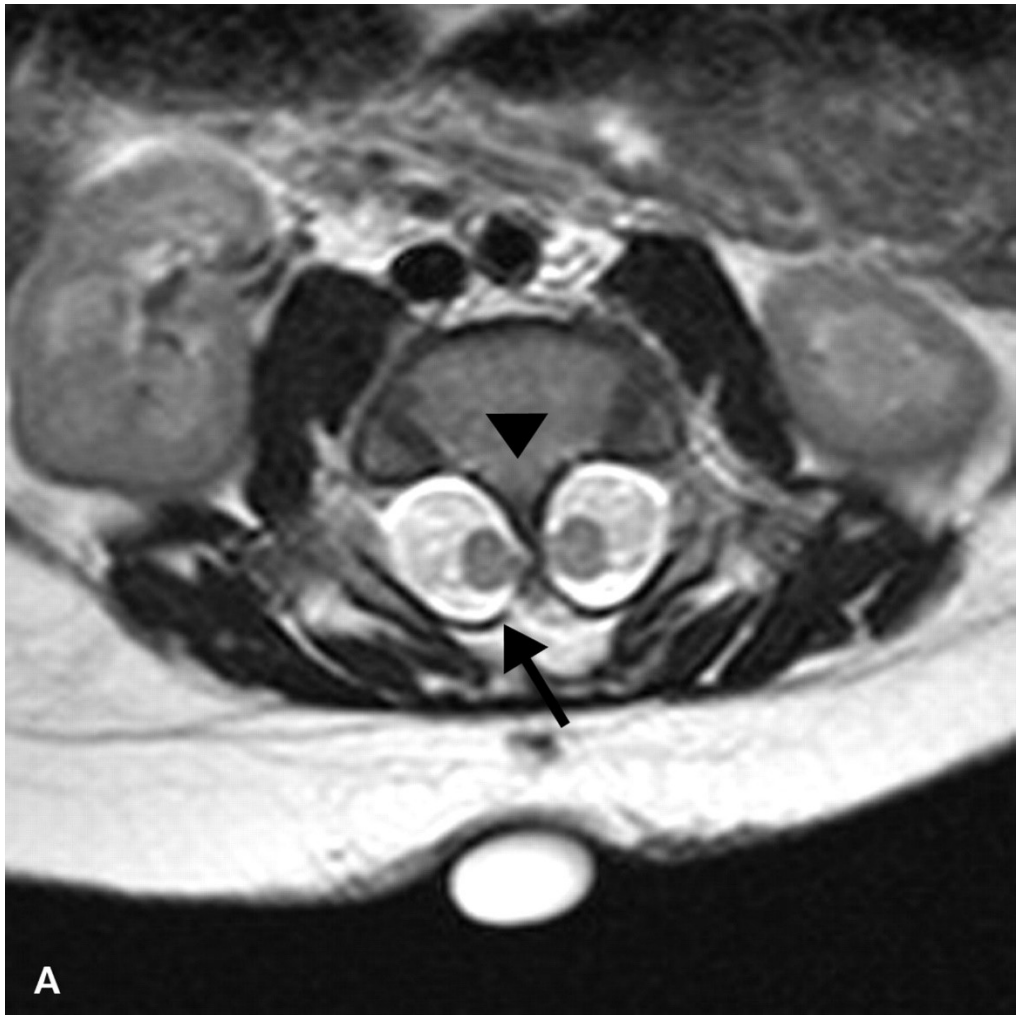




MRI



Neuromuscular scoliosis

Scoliosis types due to ethiology

TYPU deformity

- Idiopathic
- Congenital
- Neuromuscular

VĚKU pacienta

- Infantile
  < 3 y
- Juvenile
  4-10 y
- Adolescent
  11-17 y
- Adult
  > 17 y

Neuromuscular scoliosis

- Significant progression (even after growth)

- severe deformities
- combined with pelvic and hip deformities
- high degree of associated dysfunction
  - cardiopulmonary
  - urinary
  - pressure sores
  - osteoporosis

Conservative treatement

1.physiotherapy

2.Protsthetic care

- braces
- Sitting support brace in wheelchair

3.Nursing care

Léčebné postupy

1. Conservative treatement

disadvantages : -small effect
- Poor orthosis tolerance
-negative influence of K-P function with orthosis
-decubits

2. surgery

indication: -collapse and instability of the spine
-deterioration of cardiopulmonary functions by orthosis
-back pain
- the tendency to pressure sores

Neuromuscular spine deformity = complex deformity

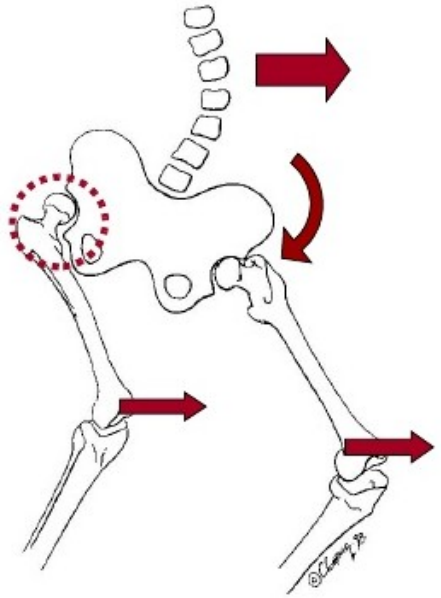
- Long thoracolumbar dx convex curve
- kyphoscoliosis
- hyperlordosis
- Hip anomaly
- Pelvic obliquity

Windswept hip

OXFORD BROOKES UNIVERSITY

School of **Health** and **Social Care**

Postural Management



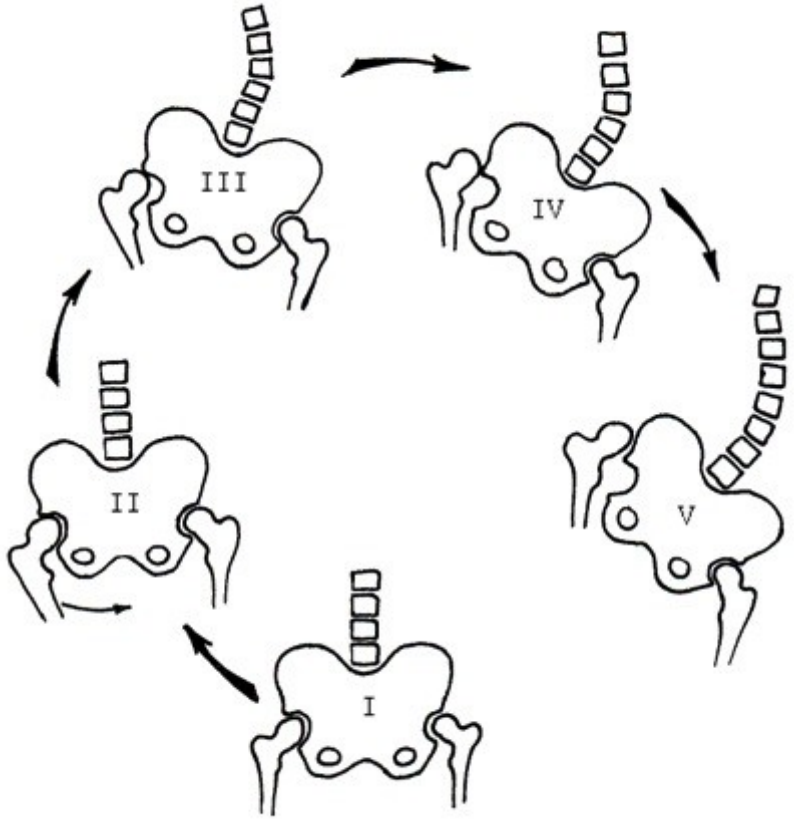
- Scoliosis
- Pelvic Obliquity
- Windswept Hips
- Hip Dislocation

Madigan & Wallace 1981
(36 participants)

Letts et al 1984
(22 participants)

Lonstein & Beck 1986
(29 participants)

Young et al 1998
(26 participants)



Basic NM scoliosis types

SPASTIC

- brain
- cerebellum
- Upper motoneuron

Stiff , rigid deformities

FLACCID

- Lower motoneuron
- Primary myopathy

Paralytic deformities

NM spine deformities

1. Spastic forms

↓

Rigid kyfoscoliosis

2.Hypotonic forms

↓

paralytic deformities

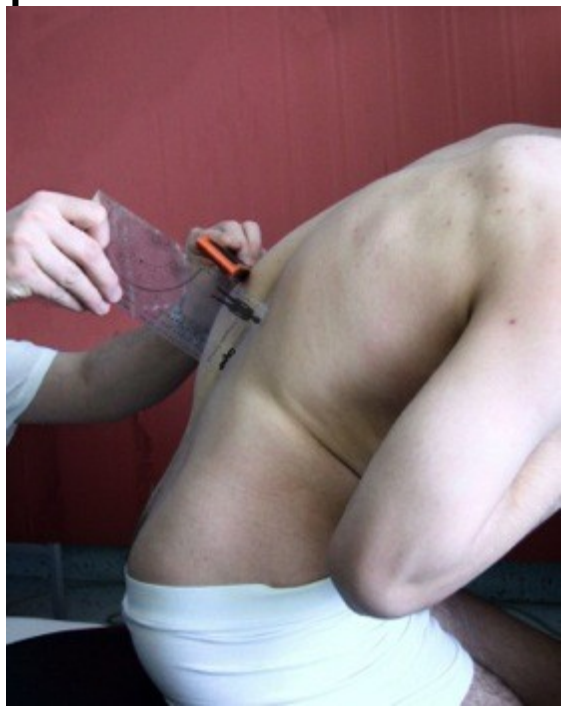
NM spine deformities

Sitting instability

Standing instability

Clinical examination of NM deformities

Gibbus prominence meas.



Plumb line

Correction in traction

FLACCID deformity

gravity

Trunk collapse

TYPES
A. Neuropathic
I.upper motoneuron failure

- cerebral palsy
- spinocerebellar degeneration
  (Friedrich's Ataxia, CHMT, Roussy-Levy syndrome)
- syringomyelie
- spinal tumors
- spinal cord injury

A. Neuropathic
II. ***lower motoneuron failure***

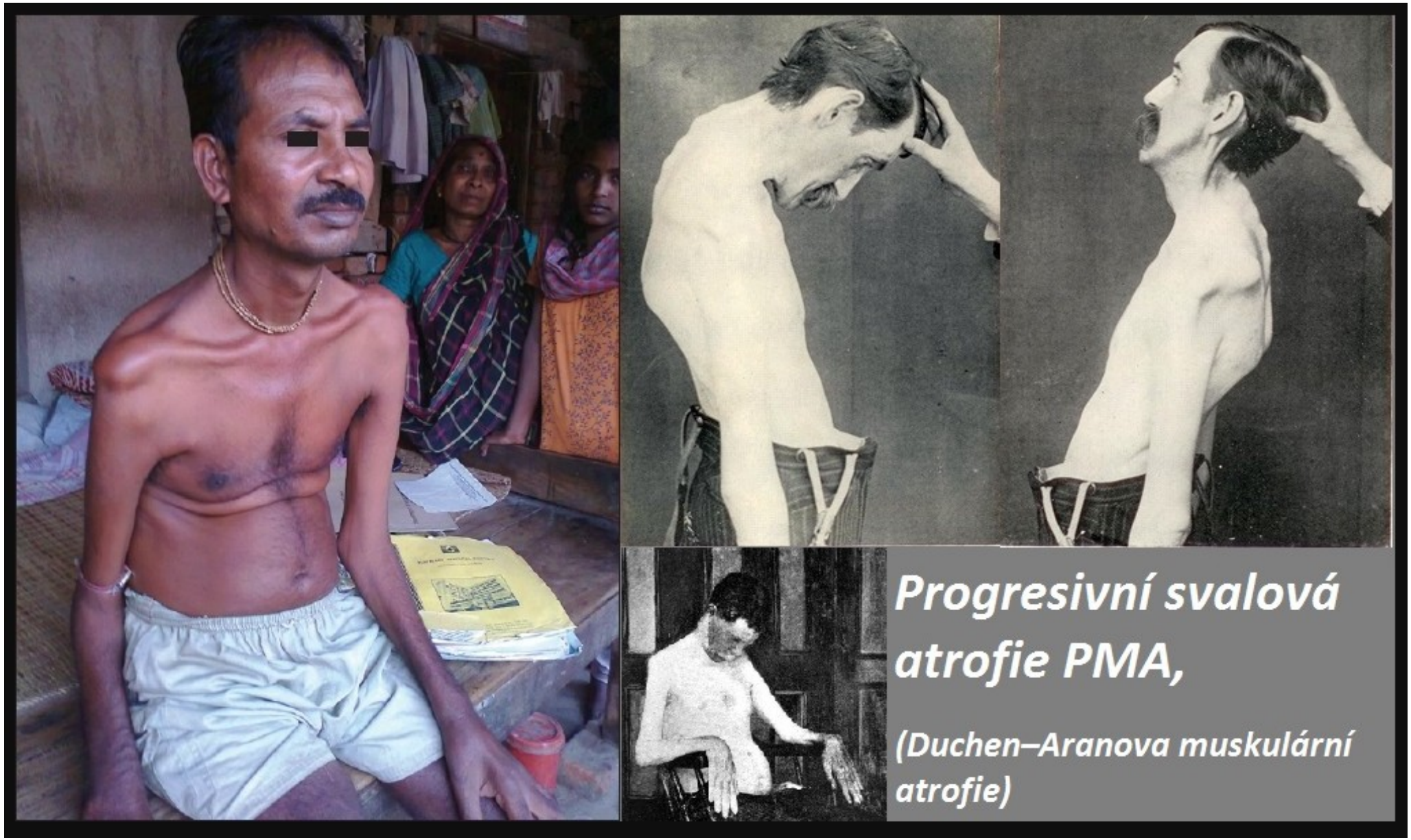
- Poliomyelitis
- other viral myelitis
- Injuries
- SMA spinal muscular atrophy
Werdnig-Hoffman, Kugelberger-Welander

B . Myopathic curves

- Arthrogryposis (not progressive)
- Muscular dystrophy (Duchene, limb-girdle syndrome, fascioscapulohumeral syndrome)
- fiber type disproportion syndrome
- congenital hypotonia
- dystrophic myotonia

SMA
Infantile
WERDING-HOFFMAN

- Most common
- Fleet contractures, disability
- Often without affecting the inteletctus
- Disability of the hips
- Scoliosis: paralytic curves, progression

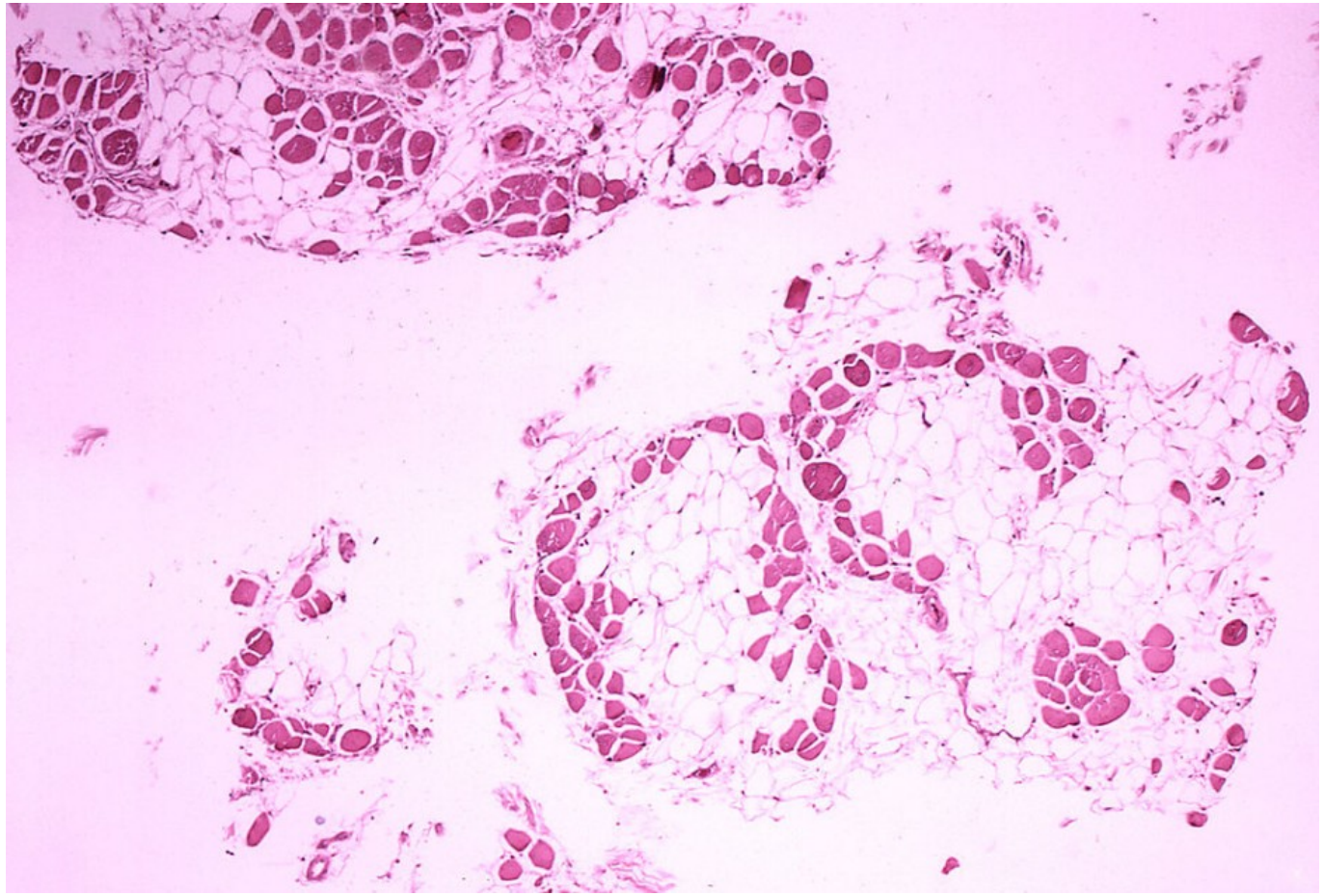


Progresivní svalová atrofie PMA,

(Duchen–Aranova muskulární atrofie)

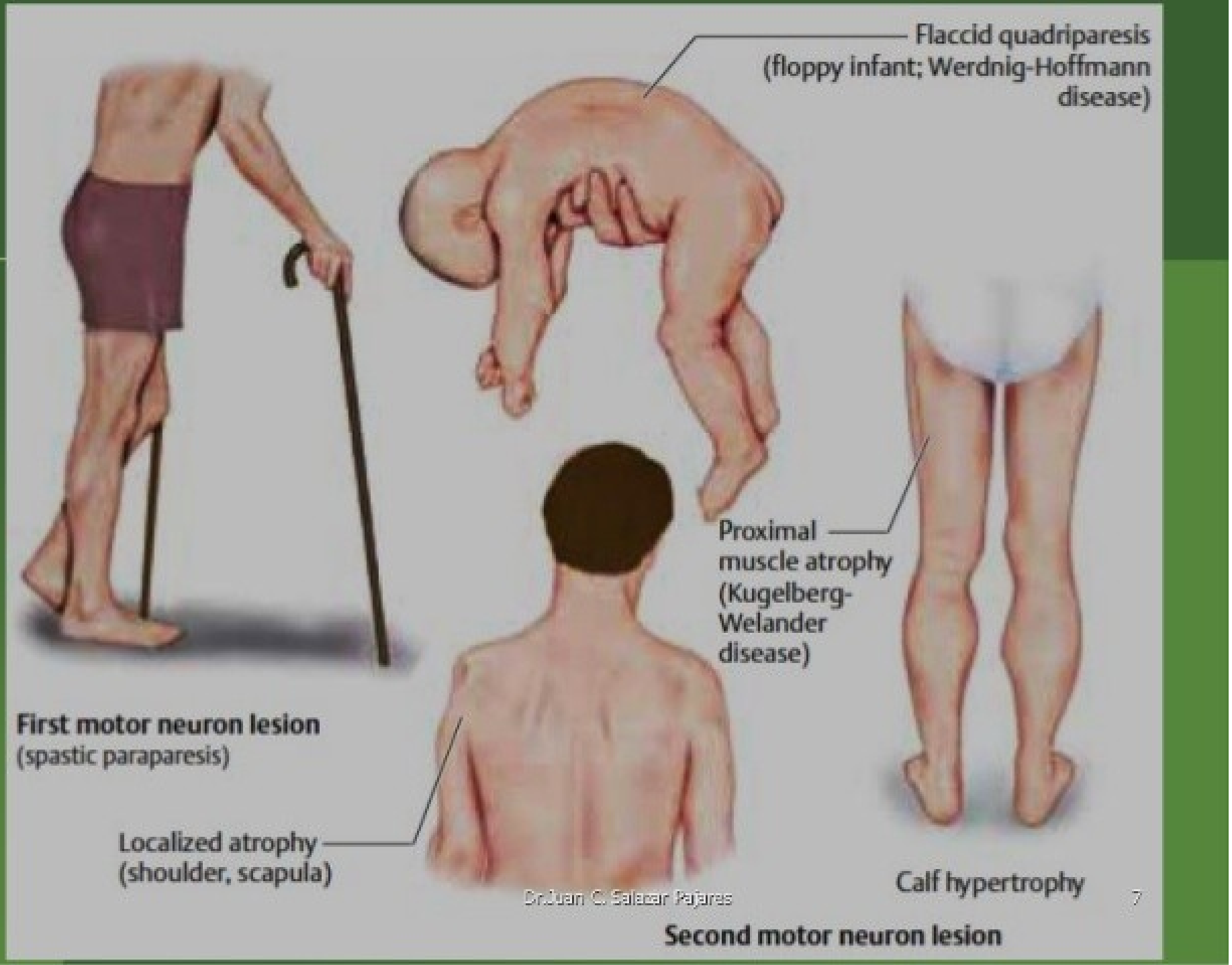
Duchene muscular dystrophy

- - absence of dystrophin protein
- Muscle biopsy
- DNA tests - absence of dystrophin + significant creatine phosphokinase elevae
- Poor muscle regeneration
- Gradual replacement of muscles by fibrous tissue.



Duchene muscular dystrophy

- 2– 6y - the first symptoms come,
  dystrophin deficiency and, as a consequence, dying muscle fibers are beginning to be replaced by ligaments.
- problems with walking, during, getting up from a lying or sitting position
- pseudohypertrophy of calves
- wheelchair
- developent of kyphoscoliosis


Flaccid quadriparesis
(floppy infant; Werdnig-Hoffmann disease)
Proximal muscle atrophy (Kugelberg-Welander disease)
First motor neuron lesion
(spastic paraparesis)
Localized atrophy (shoulder, scapula)
Calf hypertrophy
Second motor neuron lesion

Terapeutický postup

- A. Muscular disbalance of the lower limbs
  -extension of adductors in DMO
  B. solution of hip dislocations
  C. deformity of pelvis and spine

Operační léčba

INDICATION

- Paralytic curves
  collapse and instability of the spine
- Progressive deformity
- Sitting instability
- Impairment of cardiopulmonary functions
  by orthosis
- Back pain
- Tendency to pressure ulcers

CONTRAINDICATION

- Poor overall internal condition

  Very low breathing capacity

  General or local infection

  Significant non-cooperation of the patient

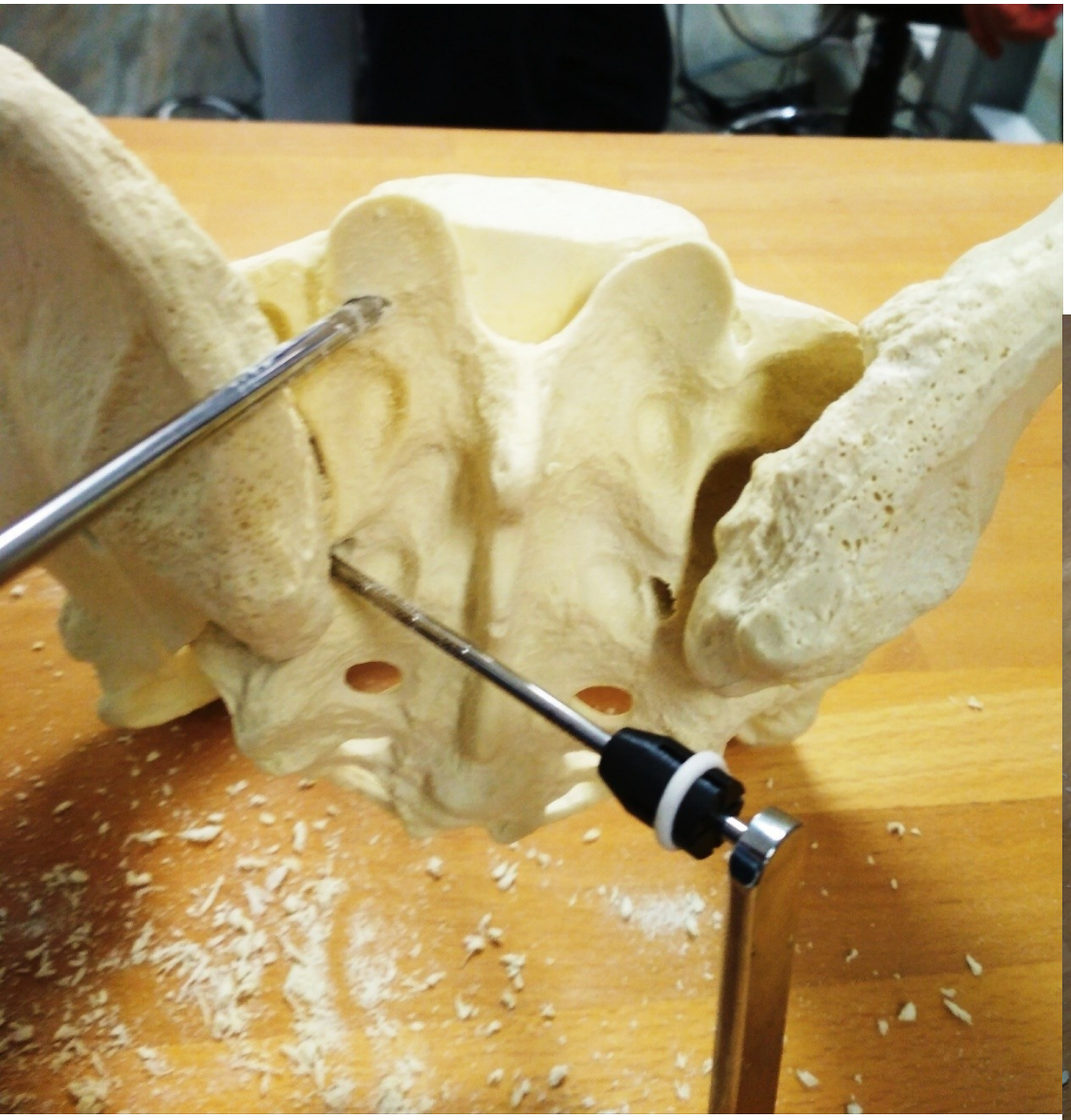
Operační léčba

Cíle

- avoiding curve progression
  improved sitting stability
- reduction of back pain
- preventing further loss of motor and sensitive functions
- Improvement of cardiopulmonary and GIT functions.

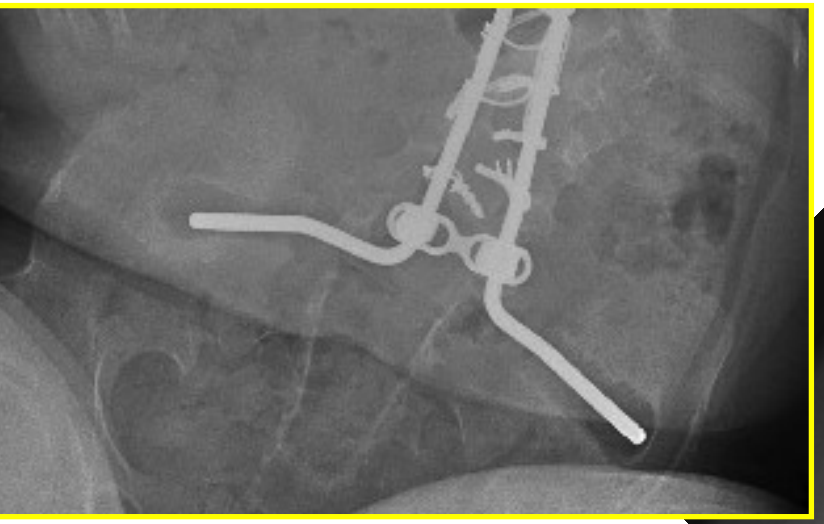
Komplikace

- nerve structures injury
  bleeding and extensive loss
  organ injury
  Heart Failure
  cerebral dysfunction
  sudden death
  neurolgical complications
  infection
  chronic infection
  instrumentation failure
  pseudoarthrosis



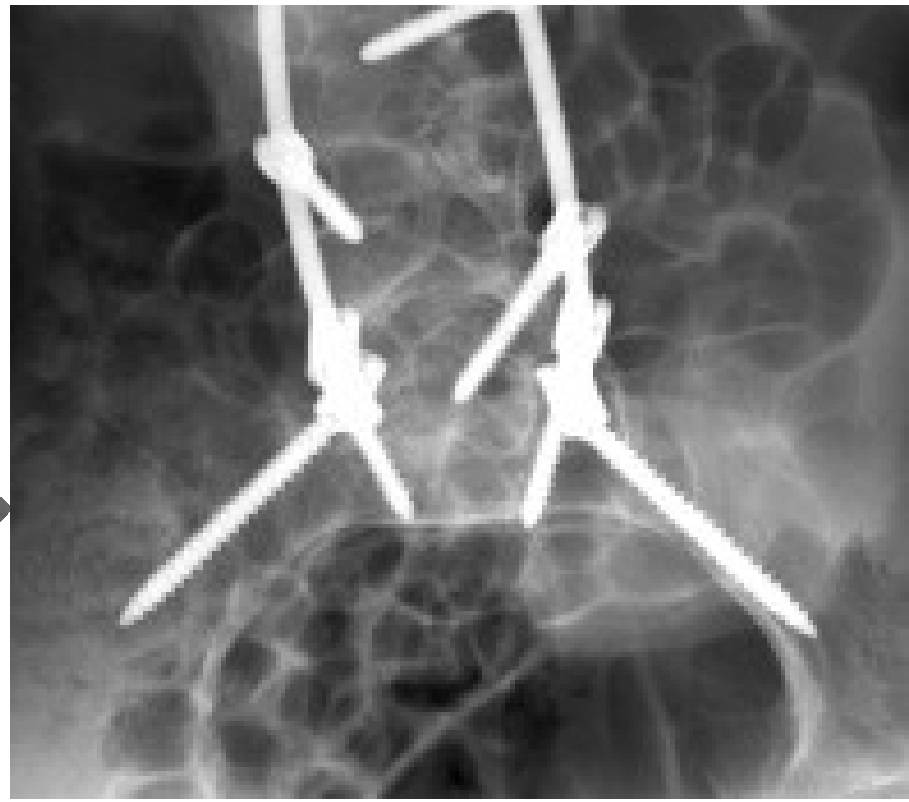
Pelvic fixation

Galveston

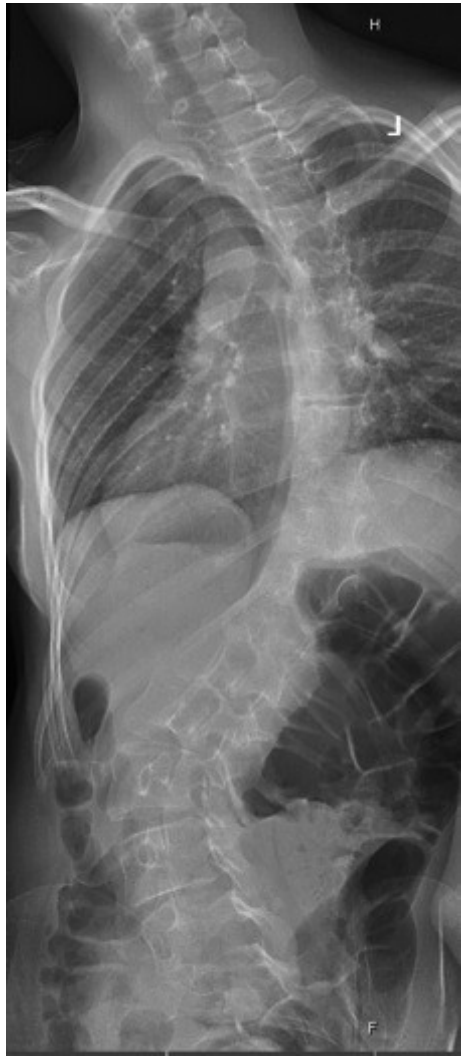
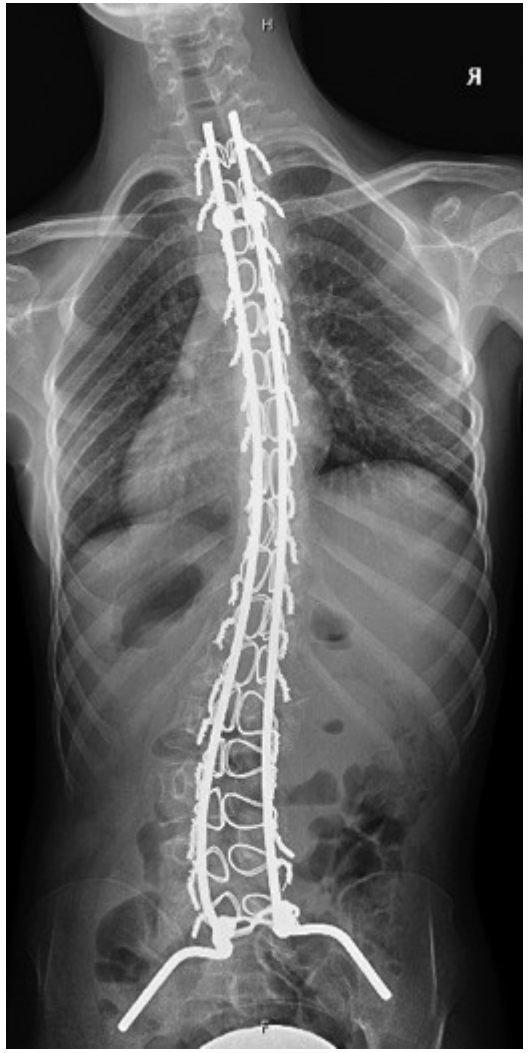


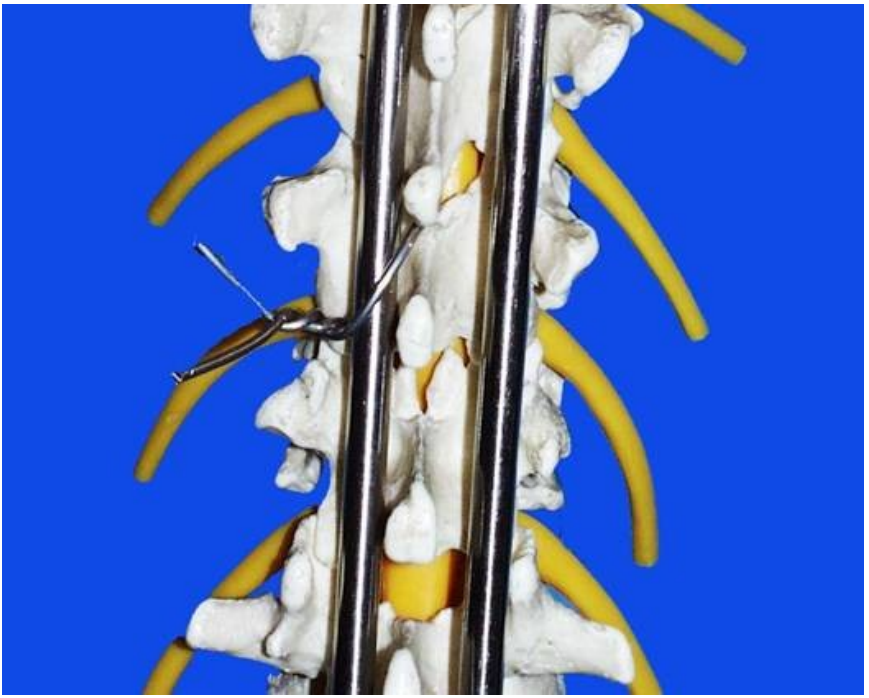
Iliac screw

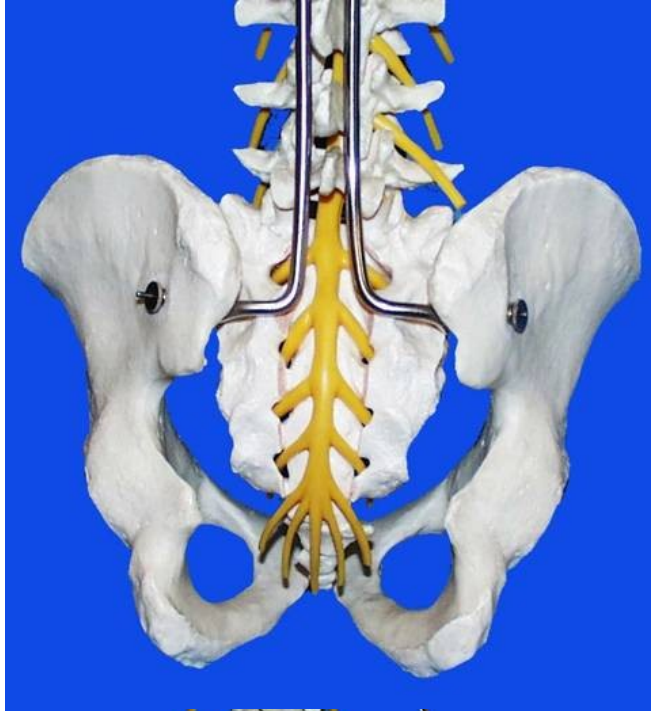
S2AI screw

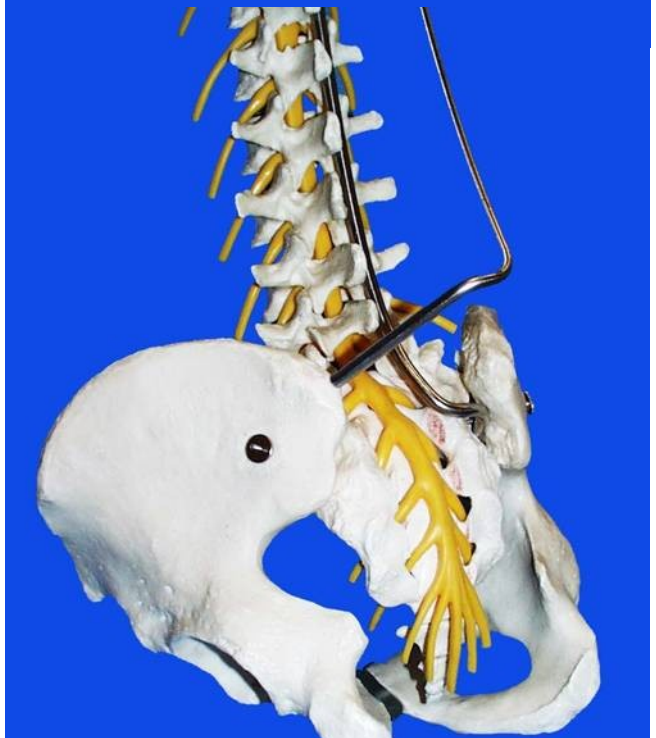


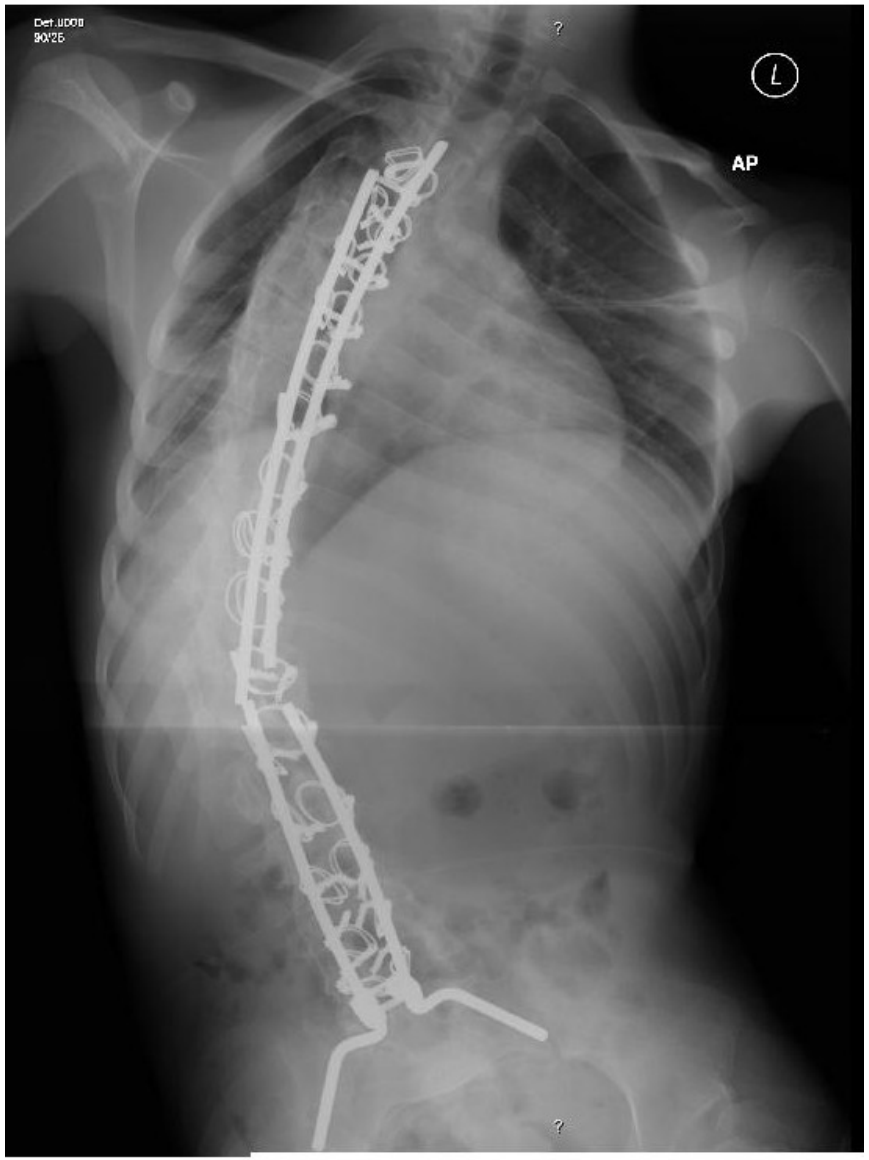
Luque Galveston technique





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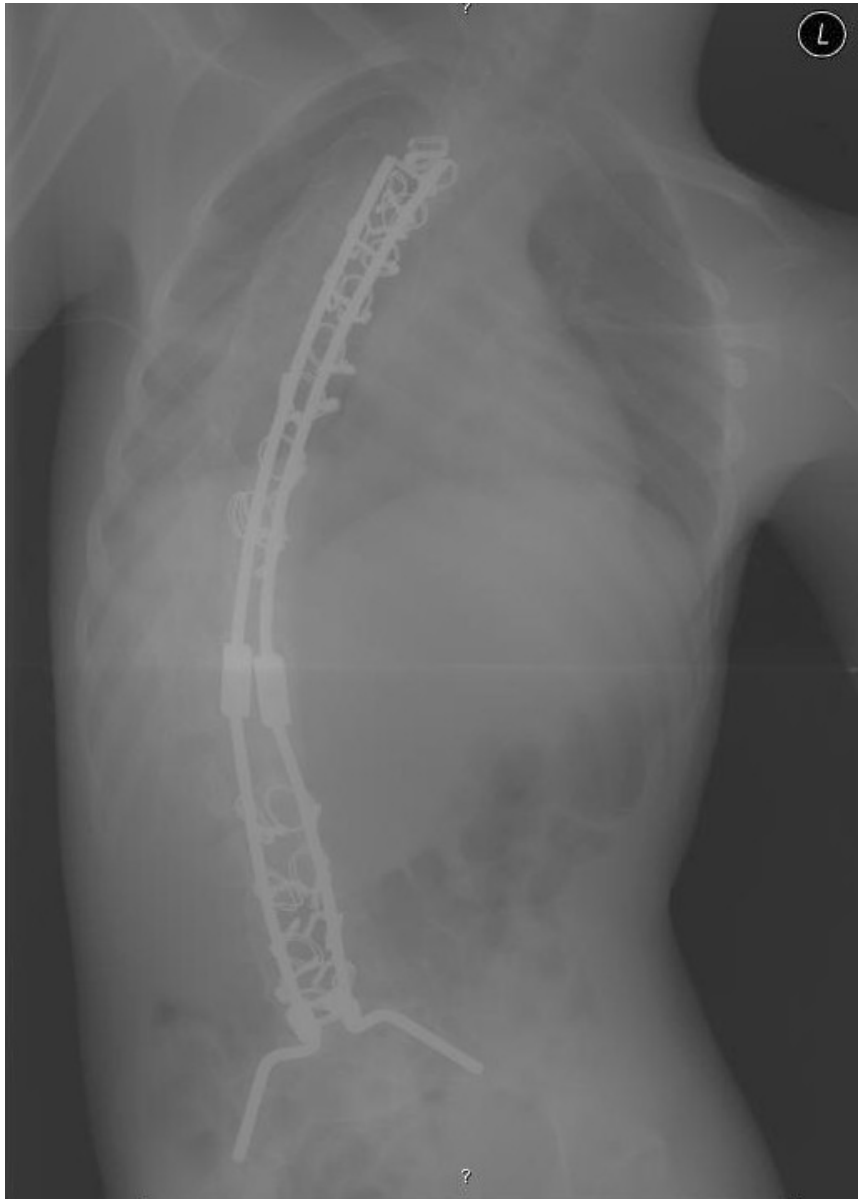

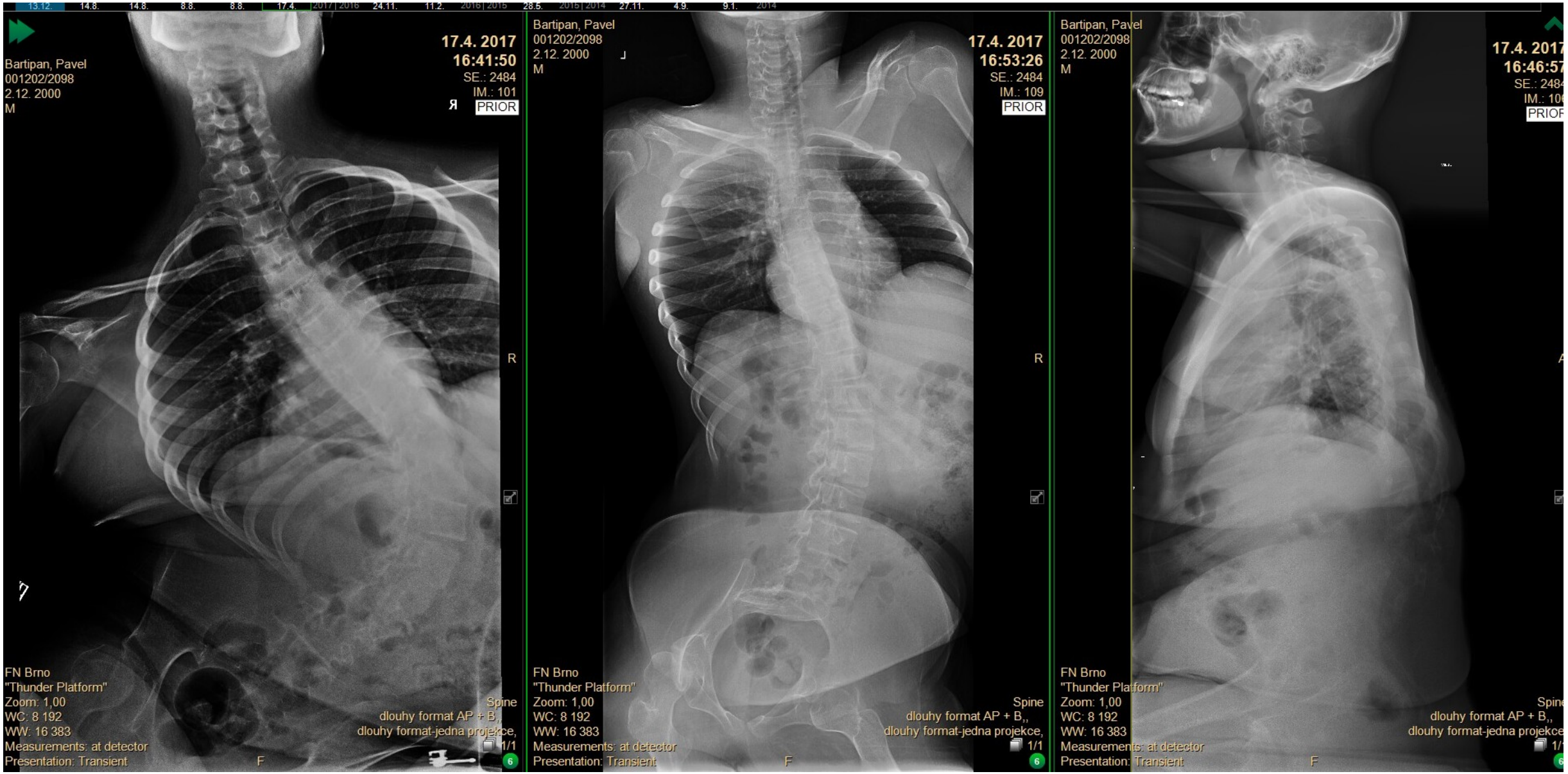
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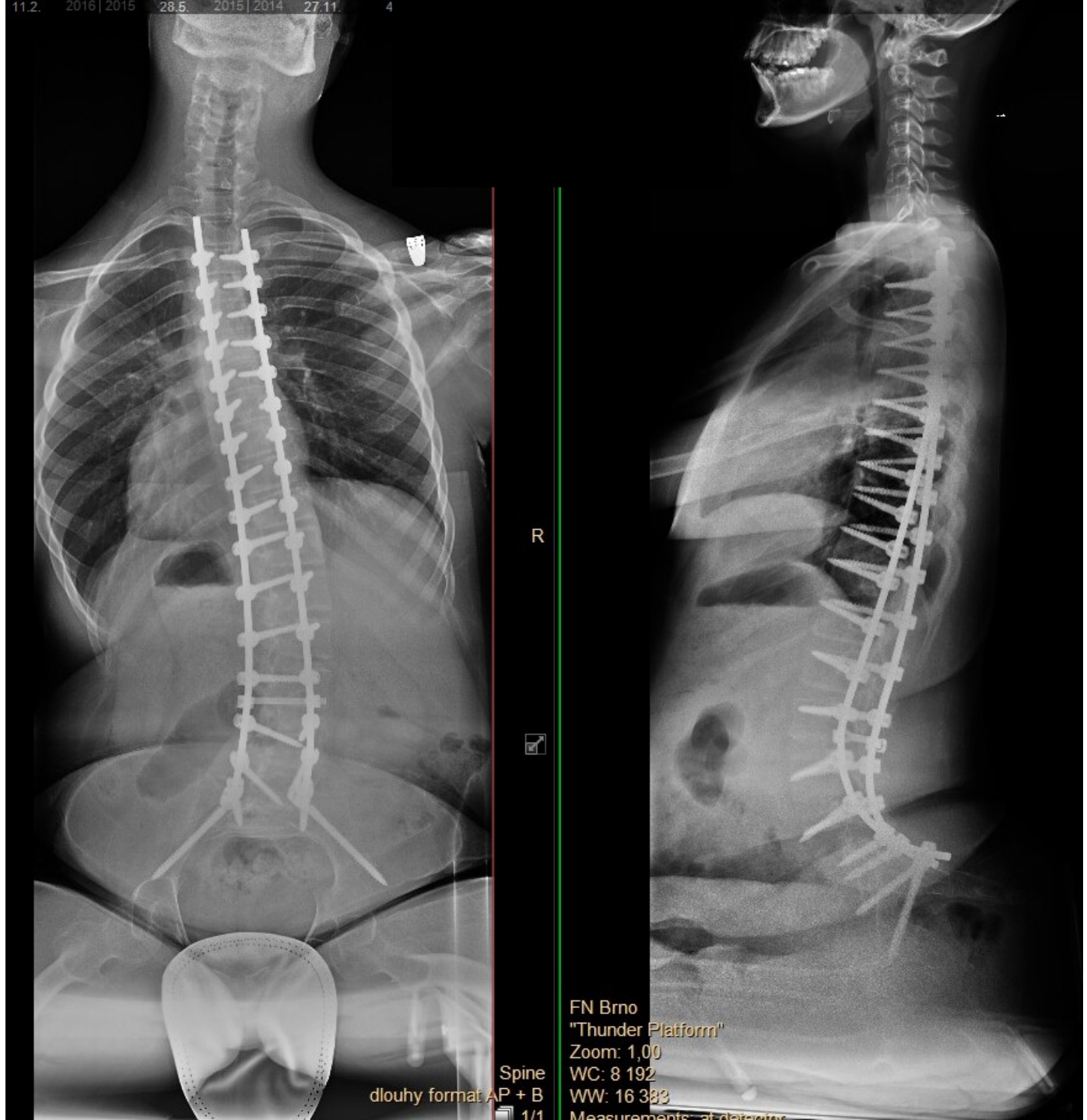
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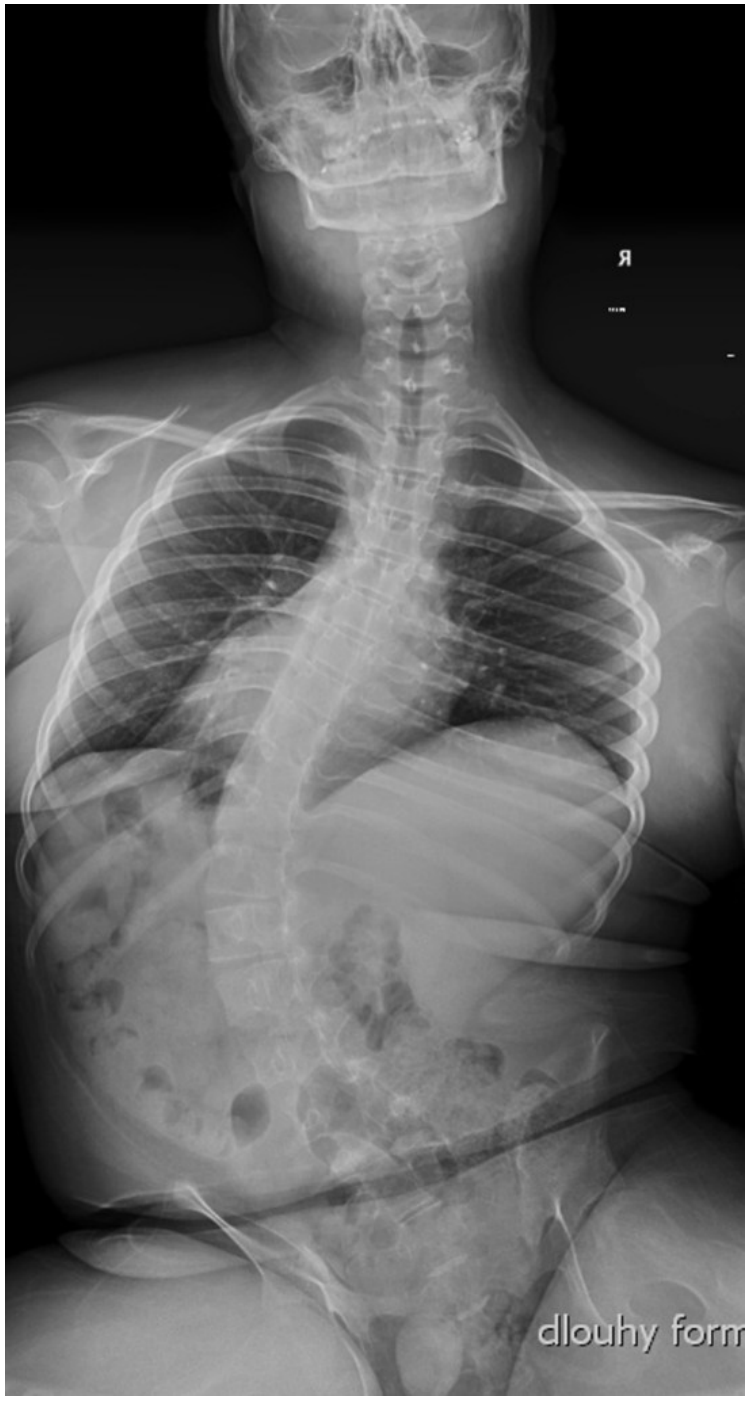
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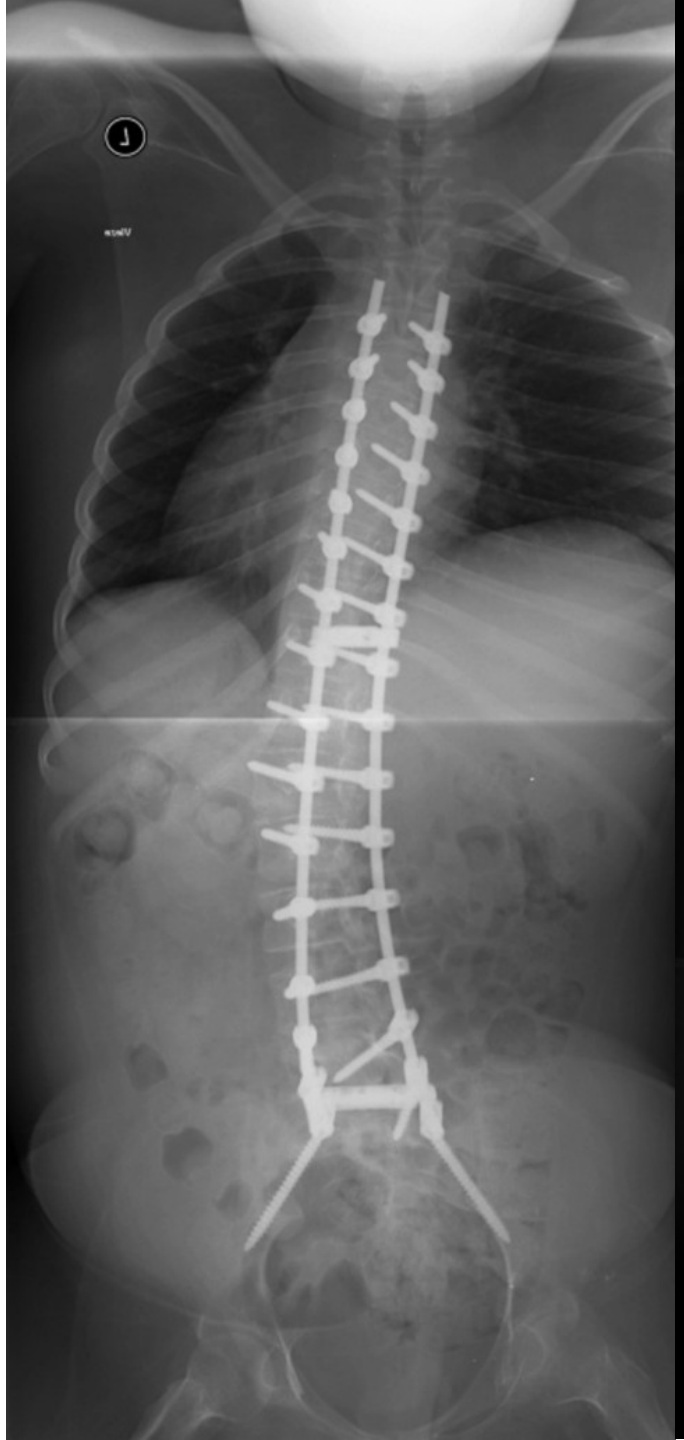
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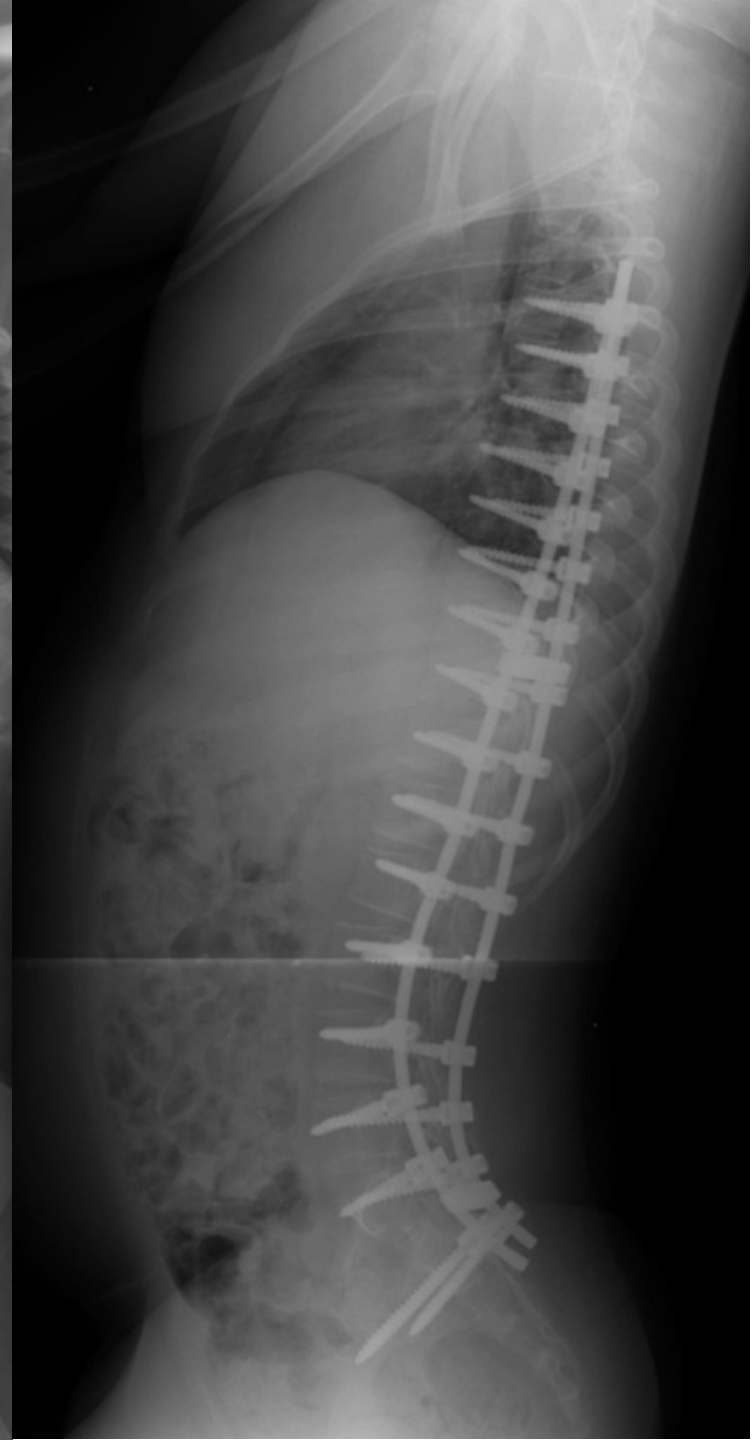
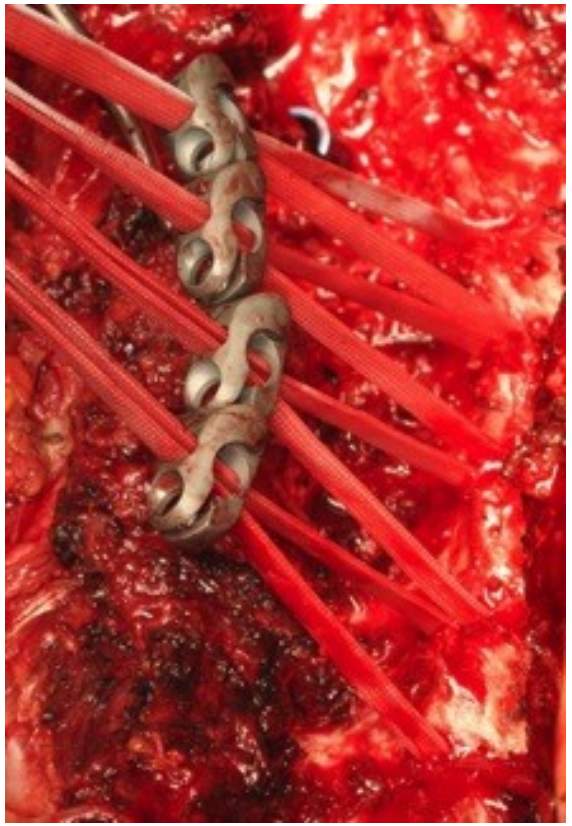




Universal Clamp

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NM scoliosis – take home

- Progression after even after skeletal maturity
- Numerous comorbidities
- Higher peri and postoperative complications
- Necessity to include pelvic fixation in pelvic obstruction deformities
- The need for post-operative care.

Scoliosis in general-take home message

- 3D deformity !
- AIS 80% of all deformities
- Physiotherapy does not stop progression in AIS !
- Brace from 20°Cobb to stop progression in growing patient
- Surgery above 40°Cobb angle