



**9º. CONGRESSO E CIRURGIA ESPINHAL
2-4/ABRIL 2009
SÃO PAULO**

PRINCÍPIOS BÁSICOS DO TRATAMENTO DA ESCOLIOSE

**Dr. Julio C. B. Santiago
H.Maria Amélia Lins
Fundação Hospitalar do Estado de Minas Gerais
FHEMIG**

ESCOLIOSE

Deformidade Lateral ?

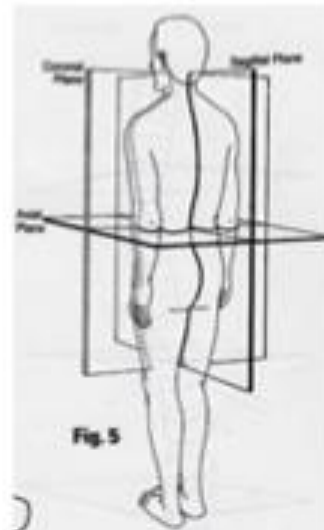
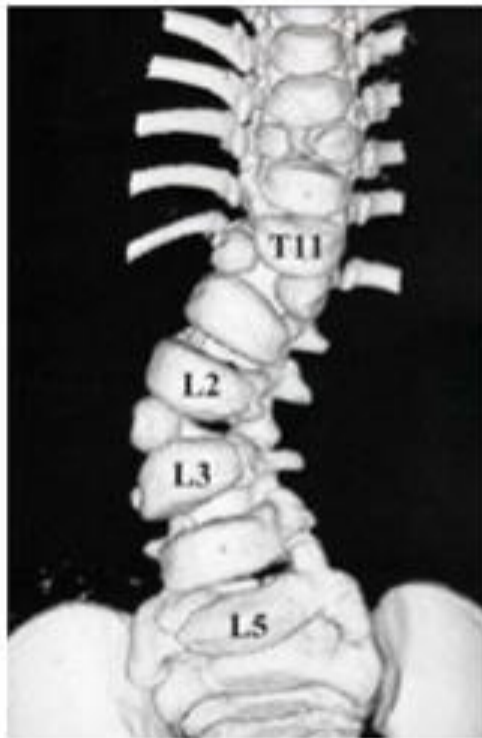
DEFORMIDADE ESTRUTURAL
TRIDIMENSIONAL

Lateral

Antero posterior

Rotacional

“ESPIRAL”



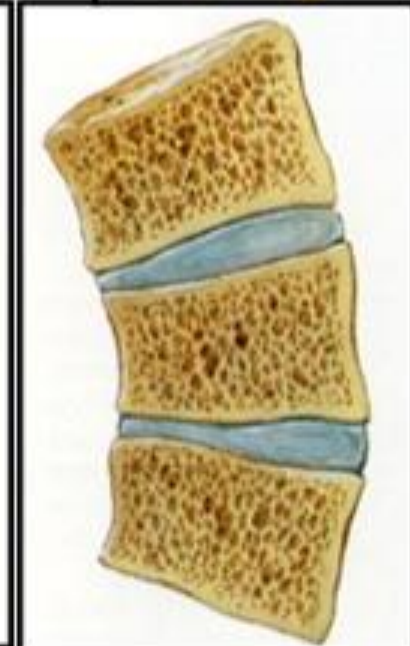
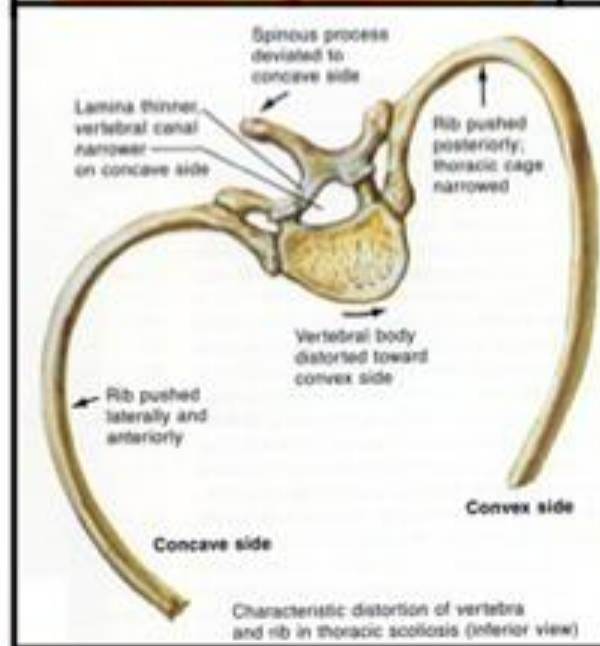


ESCOLIOSE TORAXICA DIREITA



ALTERAÇÕES MORFOLÓGICAS

costelas
vértebras
discos



OBJETIVOS

- ▶ CORREÇÃO DA DEFORMIDADE
- ▶ RESTAURAR O BALANÇO SAGITAL
- ▶ FUNÇÃO (NEUROLÓGICA/RESPIRATÓRIA)
- ▶ FUSÃO / ESTABILIZAÇÃO (CIRURGICO)



IDENTIFICAÇÃO

NÃO ESTRUTURAL X ESTRUTURAL



Manobra de Adams





GIBOSIDADE TORÁXICA

GIBOSIDADE LOMBAR



CLASSIFICAÇÃO

I – Não estrutural

- Postural
- Funcional
(encurtamento MMII deformidade)
- Antálgica (irritação de raiz, HDL, tumor , espondilolistese)
- Inflamatória
(apendicite, psoite)



CLASSIFICAÇÃO (S.R.S.)

I I- Estrutural

- 1 - **Idiopática (85%)**
- 2 - Neuromuscular
 - Neuropática (NMI,NMS,outras)
 - Miopática (distrofia muscular,artrogripose)
- 3 - Congênita
- 4 - Neurofibromatose
- 5 - Alterações mesenquimais (Marfan-E.Danlos)
- 6 - Doenças reumáticas
- 7 - Traumáticas (fraturas, pós-laminectomia,pós toracoplastia, pós irradiação)



- 8 – Contraturas extra – espinais (empiema e queimaduras)
- 9 – Osteocondrodistrofias (Morquio, displasia espondiloepifisária, disp. epifisária múltipla)
- 10 – Infecção
- 11 – Alterações metabólicas (osteogênese imperfeita)
- 12 – Alterações lombosacras (anomalias congênitas, espondilolistese)
- 13 – Tumores: ósseo e medular (osteoma osteóide, histiocitose)



AValiação CLÍNICA




EXAME NEUROLOGICO

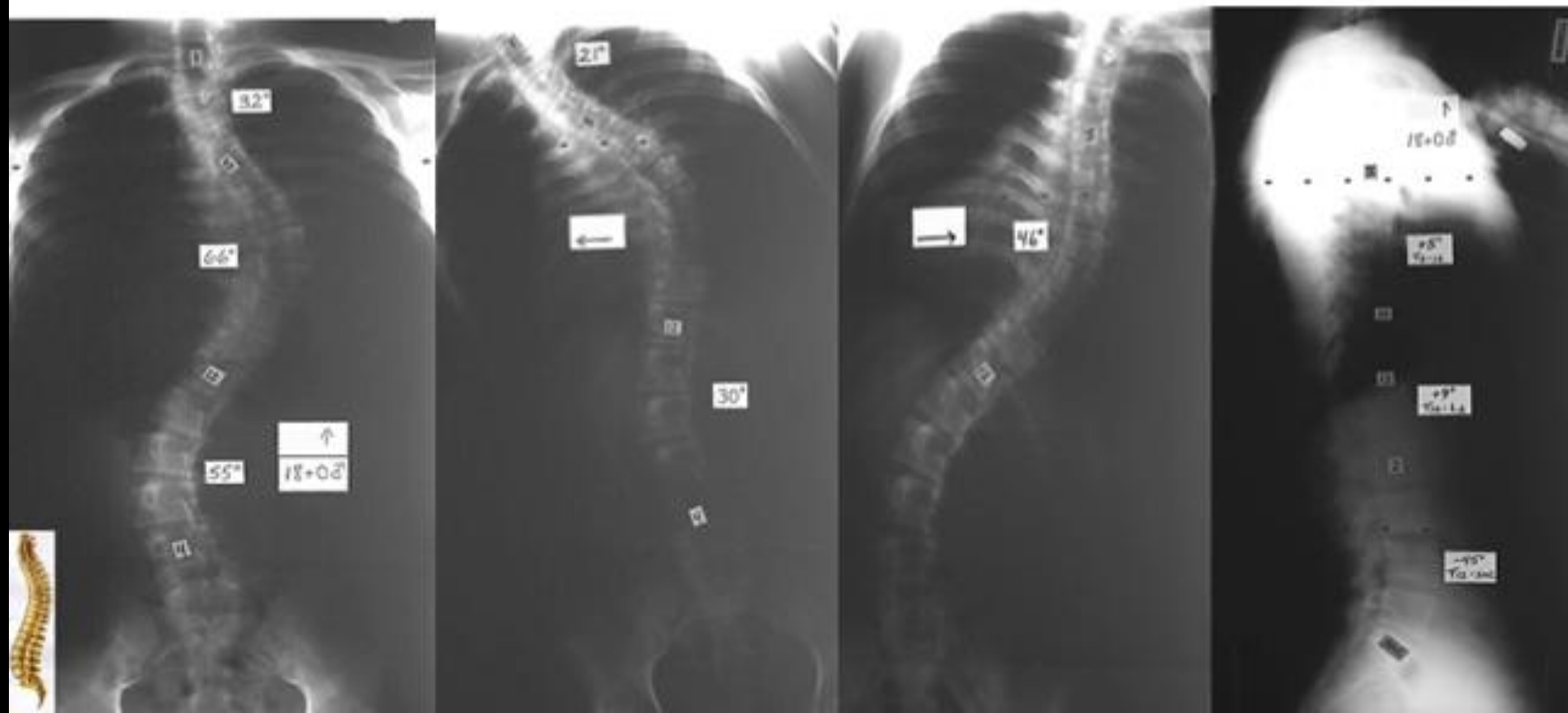


AVALIAÇÃO RADIOLÓGICA

Radiografia panorâmica AP e perfil ortostatismo

RX panorâmica com inclinação dir.esq. EM DECUBITO

RX do punho e bacia em AP  maturidade óssea





Iliac crest progressing posteromedially



Vertebral growth plate in formation



Excursion complete



Growth plate complete but not united



Crest fused with ilium; maturation complete

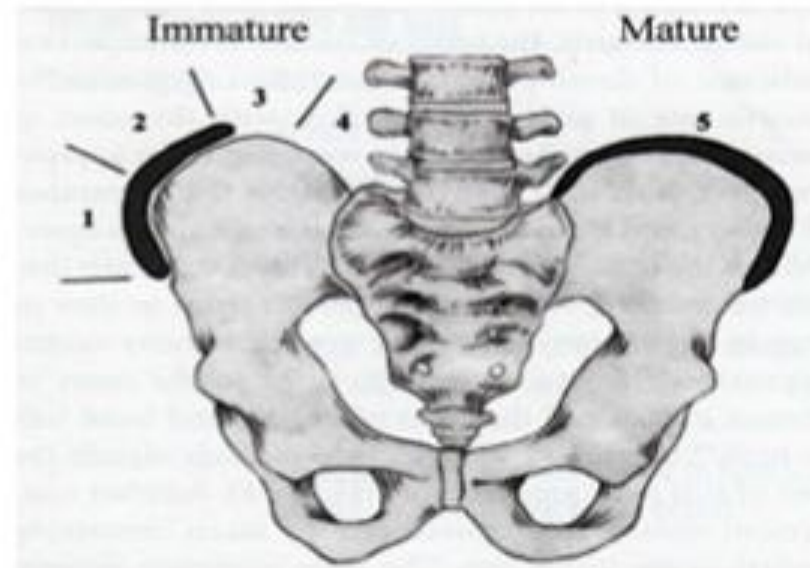


Growth plate united to vertebral body; maturation complete

Maturidade esquelética

Sinal de Risser

(0 a +++++)

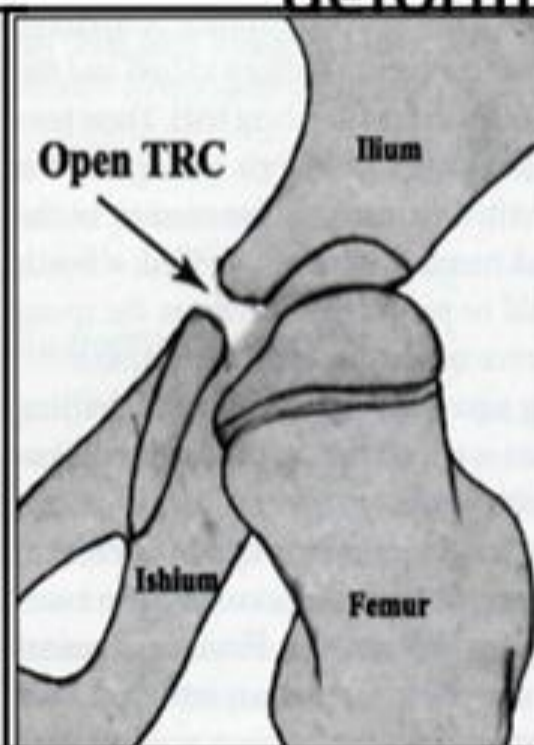


Avaliação das características sexuais secundárias

Fechamento da cartilagem triirradiada Avaliação do risco de progressão da deformidade

Tanner Stages in Girls and Boys

Tanner Stage	Girls	Boys
	Breast Staging	Genitalia Ratings
1	Preadolescent, elevation of papilla only	Preadolescent, testes, scrotum and penis are of about the same size and proportion as in early childhood.
2	Breast bud stage, elevation of breast and papilla as a small mound, enlargement of areola diameter	Scrotum and testes are enlarged with change in texture of the scrotal skin with slight reddening of the skin.
3	Further enlargement of breast and areola, with no separation of their contours	Increase in size of the penis, in length mainly but also in breadth, with continued growth of the testes and scrotum
4	Projection of areola and papilla to form a secondary mound above the level of the breast	Further enlargement of the testes, scrotum, and penis with development of the glans and darkening of the scrotal skin
5	Mature stage, projection of papilla only due to recession of the areola to the general contour of the breast	Genitalia adult in size and shape
	Pubic Hair Stages	Pubic Hair Stages
1	Preadolescent, no pubic hair	Preadolescent, no pubic hair
2	Slight growth of long, slightly pigmented downy hair, appearing chiefly along the labia	Slight growth of long, slightly pigmented downy hair, appearing chiefly at the base of the penis
3	Darker, coarser hair that is more curled and spread sparsely over the junction of the pubes	Darker, coarser hair that is more curled and spread sparsely over the junction of the pubes
4	Hair is adult in type with no spread to medial surface of the thigh	Hair is adult in type with no spread to medial surface of the thigh.
5	Adult in quantity and quality with no inverse triangle distribution and spread to the medial thighs	Adult in quantity and quality with no inverse triangle distribution and spread to the medial thighs

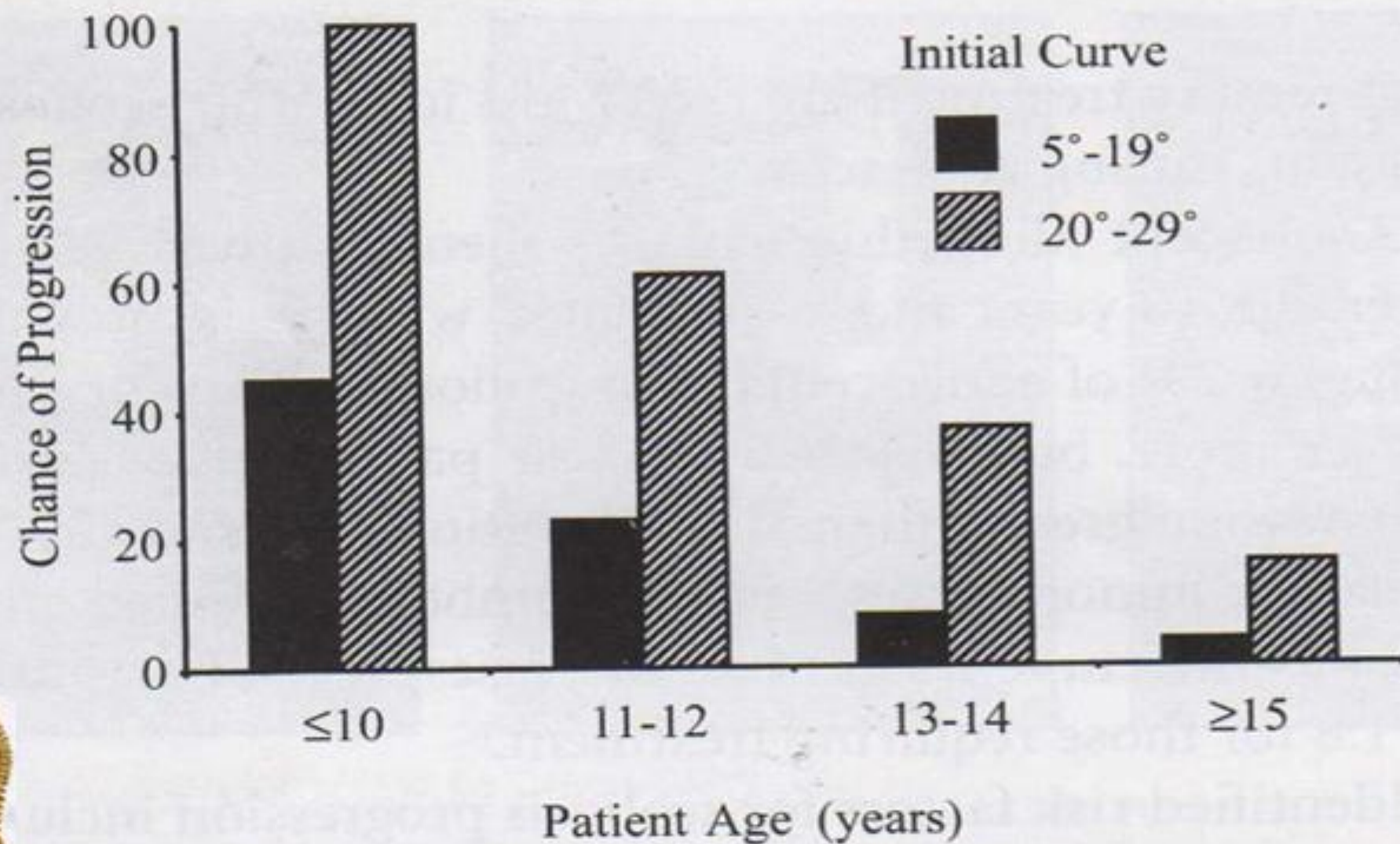


HISTÓRIA NATURAL PROGNÓSTICO

- Maturidade óssea
- Diminuição da cifose torácica ou lordose (pior)
- Rotação do corpo vertebral
- Flexibilidade/rigidez da curva
- Padrões definidos de curvas



HISTÓRIA NATURAL



ESCOLIOSE

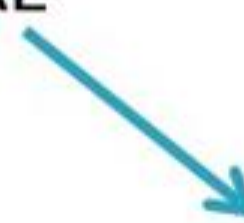
DEFORMIDADE



ESTUDO RADIOGRÁFICO



CLASSIFICAÇÃO
HISTÓRIA NATURAL



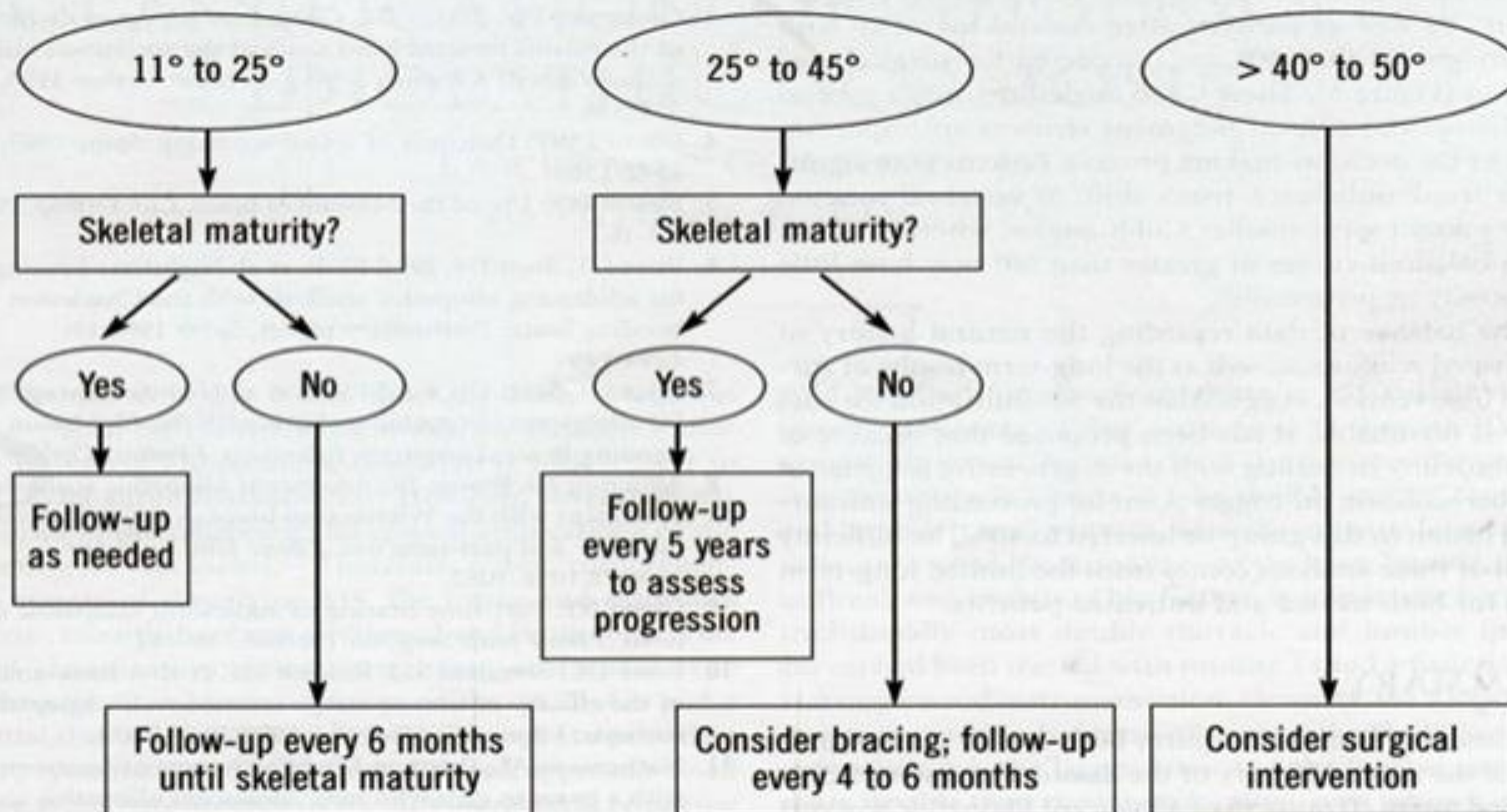
OBSERVAÇÃO

CONSERVADOR

CIRURGICO

Algoritmo (S.R.S.)

Patient Presenting With Idiopathic Scoliosis





O.T.L.S

CLASSIFICAÇÃO (S.R.S.)

Lenke LG, Betz RR, Harms J, Bridwell KH, Clements DH, Lowe TG et al. "Adolescent idiopathic scoliosis: a new classification to determine extent of spinal arthrodesis".

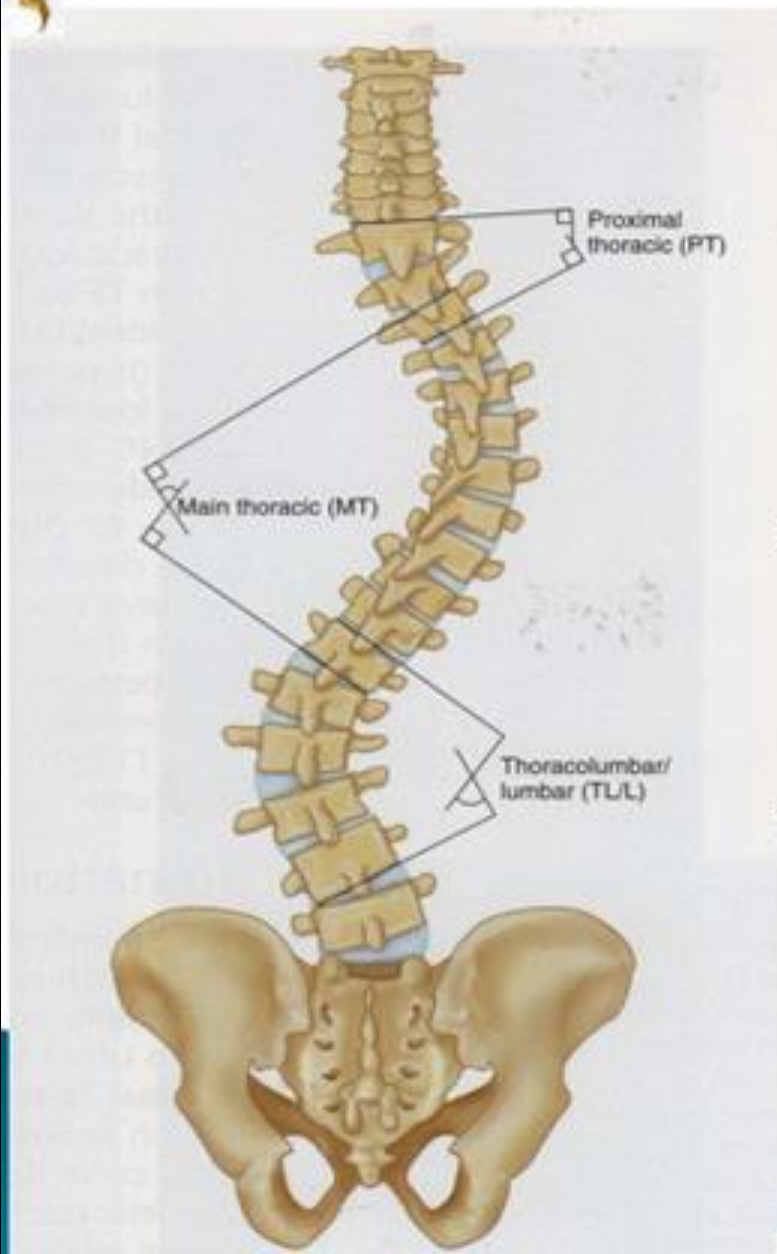
J.Bone Joint Surg.Am. 2001; (8) 1169-81

CARACTERÍSTICAS

- analisar os diversos tipos de curvas
- fusão nas curvas estruturais
- preservação das curvas não estruturais
- fusão seletiva apropriada
- ênfase no balanço sagital
- uso prático para cirurgiões e residentes



Classificação de Lenke – S.R.S.



TORAXICA PROXIMAL

TORAXICA PRINCIPAL

TORACOLOMBAR/LOMBAR

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	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 $\geq 25^\circ$
 - T2-T5 Kyphosis $\geq +20^\circ$

Main Thoracic - Side Bending Cobb $\geq 25^\circ$
 - T10-L2 Kyphosis $\geq +20^\circ$

Thoracolumbar/Lumbar - Side Bending Cobb $\geq 25^\circ$
 - T10-L2 Kyphosis $\geq +20^\circ$

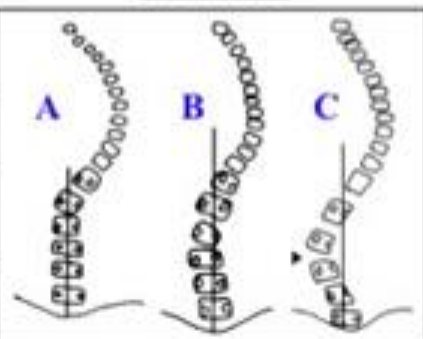
*Major = Largest Cobb measurement, always structural
 Minor = All other curves with structural criteria applied
[‡]Type 4 - MT or TL/L can be major curve

**LOCATION OF APEX
(SRS Definition)**

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

Modifiers

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



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

Curve Type (1-6) + Lumbar Spine Modifier (A, B, C) + Thoracic Sagittal Modifier (-, N, +)
 Classification (e.g. **1B+**):



DESCRIÇÃO DOS TIPOS DE CURVAS

MT
"Main
Thoracic"



Type 1

DT
"Dupla
thoracic"



Type 2

DM
"Dupla
Maior"



Type 3

TM
"Tripla
Maior"



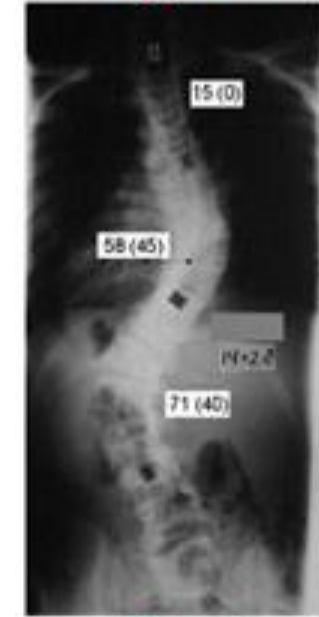
Type 4

TL/L
"Thoraco
lombar /
Lombar"



Type 5

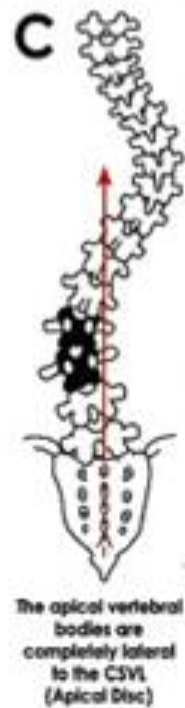
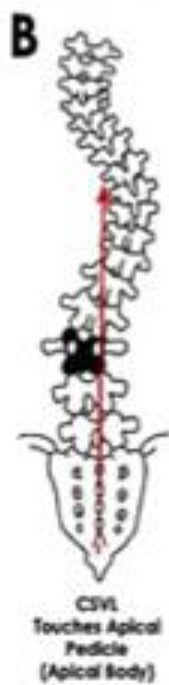
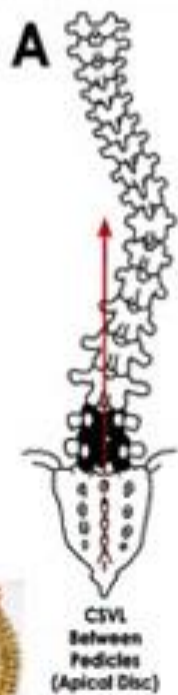
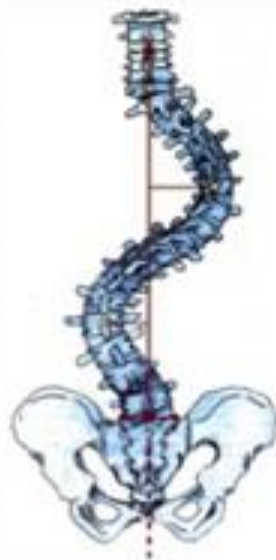
TL/L/MT
"Thoraco
Lombar /
Lombar /
Main
thoracic"



Type 6



MODIFICADOR LOMBAR



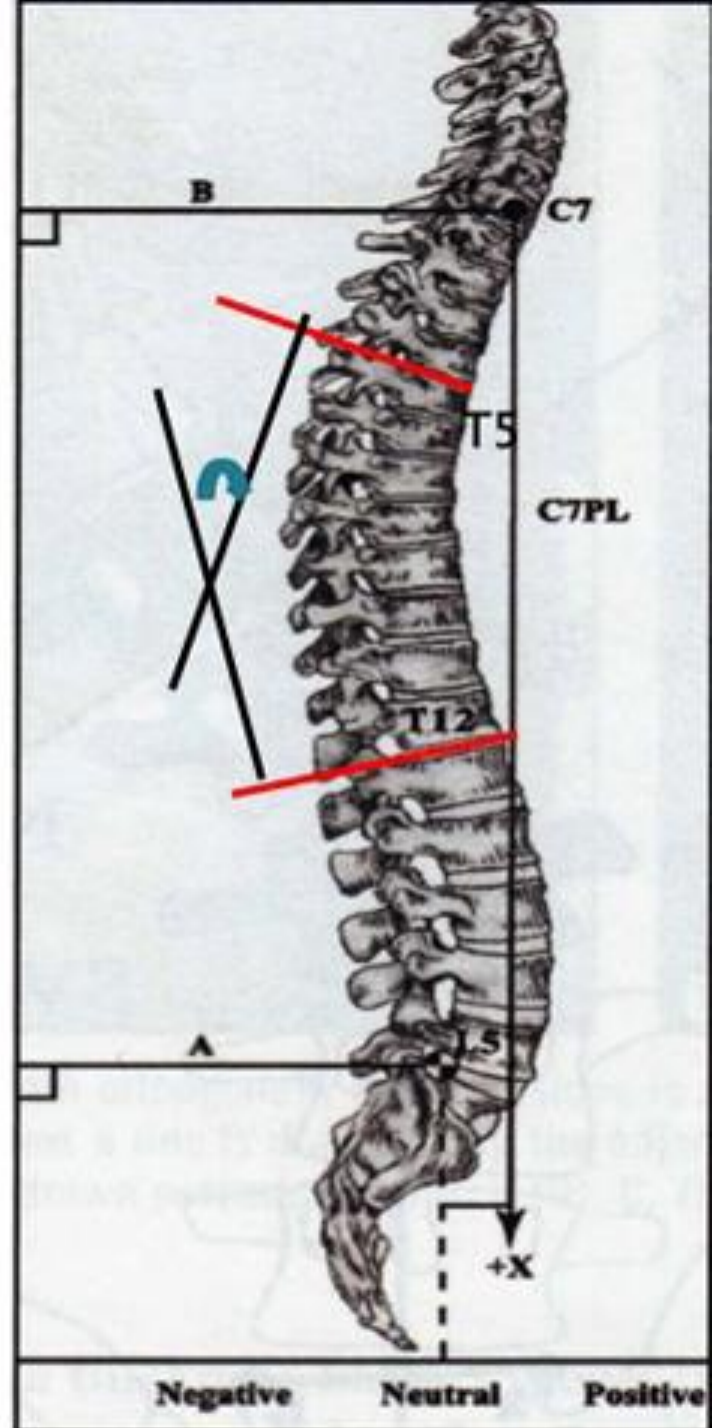
MODIFICADOR TORÁXICO

ÂNGULO DE CIFOSE DE
T5 A T12

- se $< 10^\circ$.

N de 10 a 40° .

+ se $> 40^\circ$.



42 tipos de curva

- ▶ Combinação dos diferentes tipos de curva (1 a 6)
- ▶ Modificadores lombares (A,B,C)
- ▶ Modificadores sagitais torácicos (- ; N; +)



Curve Type (1-6)						
Lumbar Spine Modifier	Type 1 (Main Thoracic)	Type 2 (Double Thoracic)	Type 3 (Double Major)	Type 4 (Triple Major)	Type 5 (TL/L)	Type 6 (TL/L - MT)
A	1A*	2A*	3A*	4A*		
B	1B*	2B*	3B*	4B*		
C	1C*	2C*	3C*	4C*	5C*	6C*
Possible sagittal structural criteria (To determine specific curve type)	Normal	PT Kyphosis	TL Kyphosis	PT and TL Kyphosis	Normal	TL Kyphosis

*T5-12 sagittal alignment modifier: -, N, or +

-: <10°

N: 10-40°

+: >40°

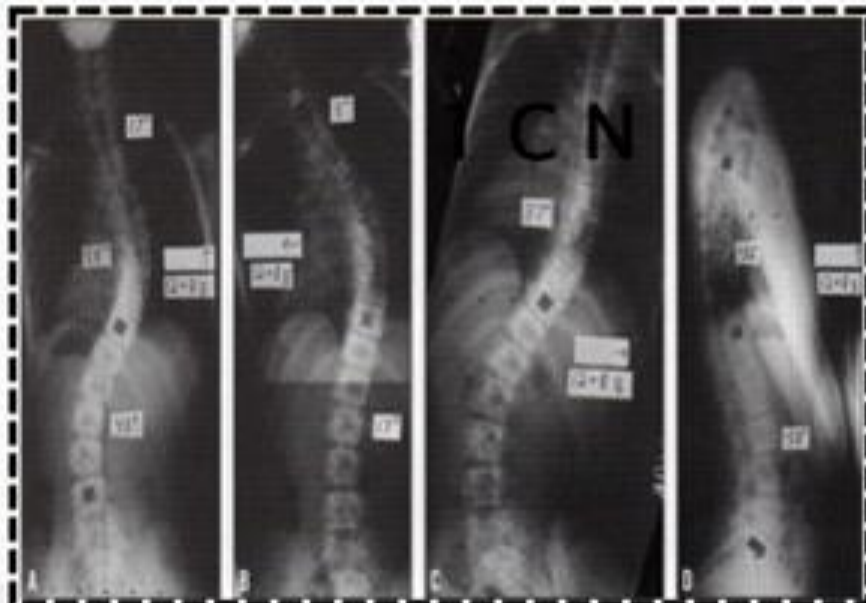
Classificação

12a8m, fem. pré-menarca

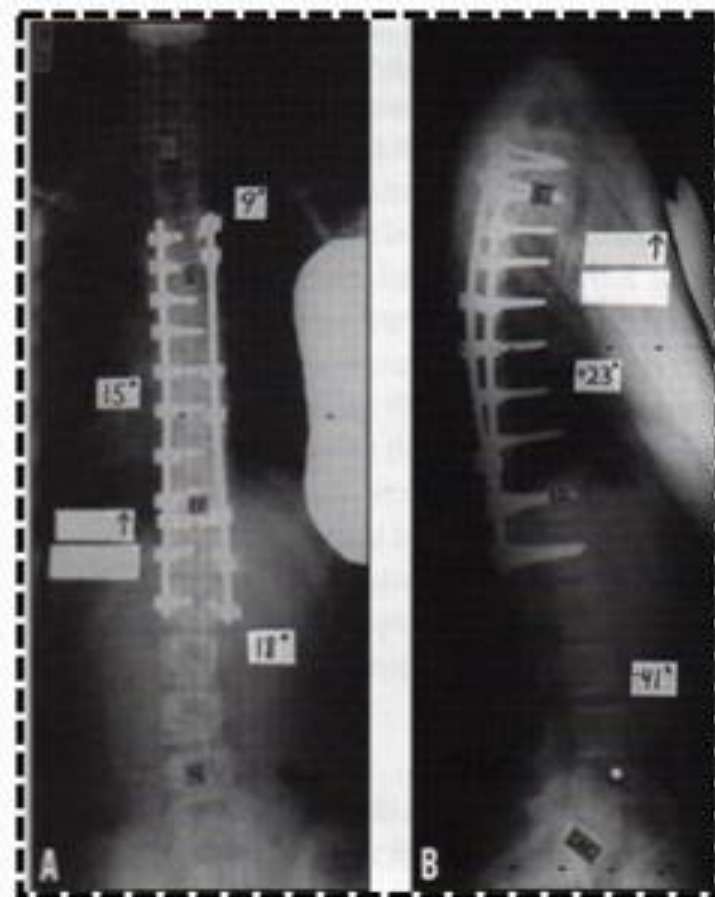
17°. P.T. 8°. NS

58°. M.T. 37°. S

43°. TL/L 17°. NS



PARA QUE SERVE?



Tratamento Cirúrgico

INSTRUMENTAÇÃO + ARTRODESE

Curvas > 40°-45°. crianças

> 50° adultos

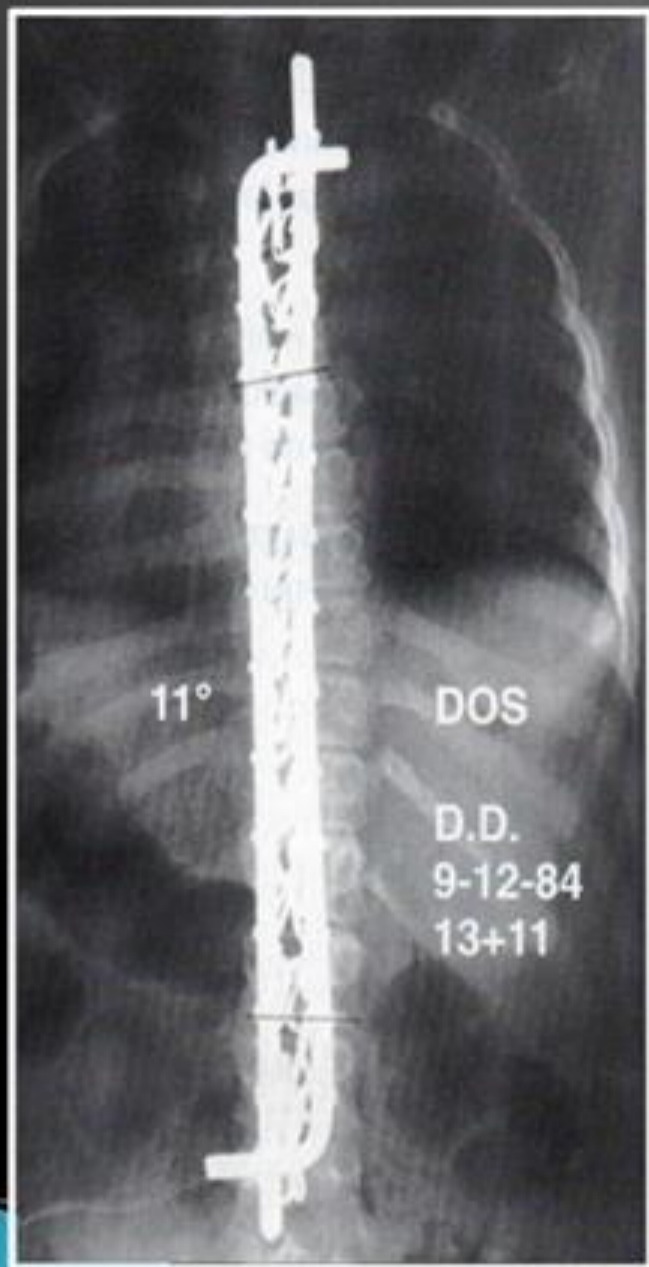
Fracasso do tratamento c/ órteses





FLAT BACK !

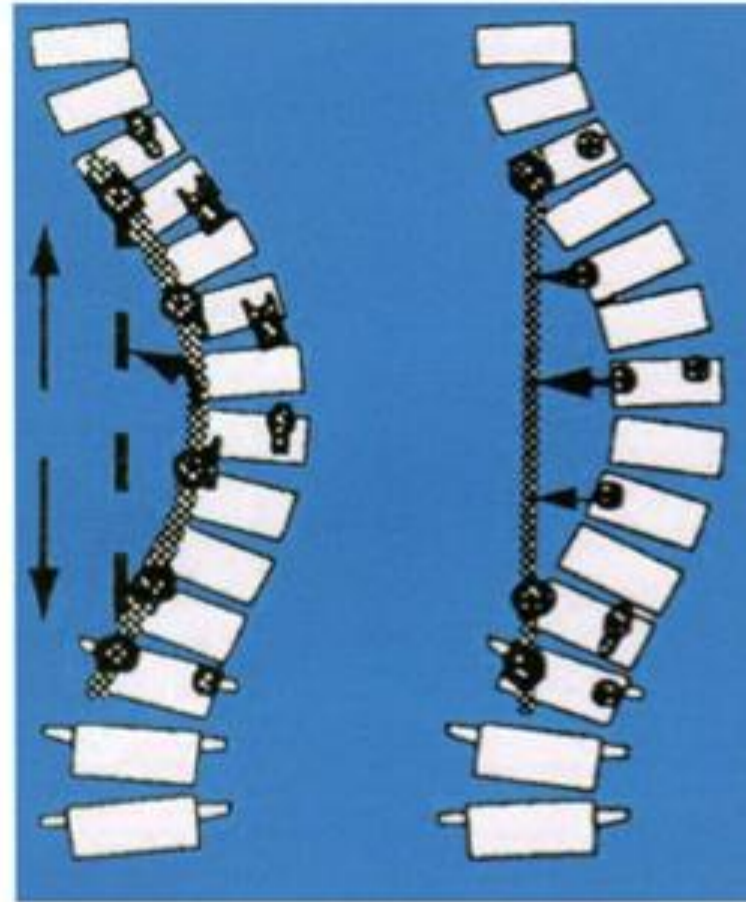




Correção Segmentar (dec.80)

PRINCÍPIOS

- Aplicação de forças de correção para restabelecer o **equilíbrio sagital**
- Utilização de ganchos e hastes
- Utilização de ganchos, parafusos e hastes
- Utilização de parafusos e hastes (atual)



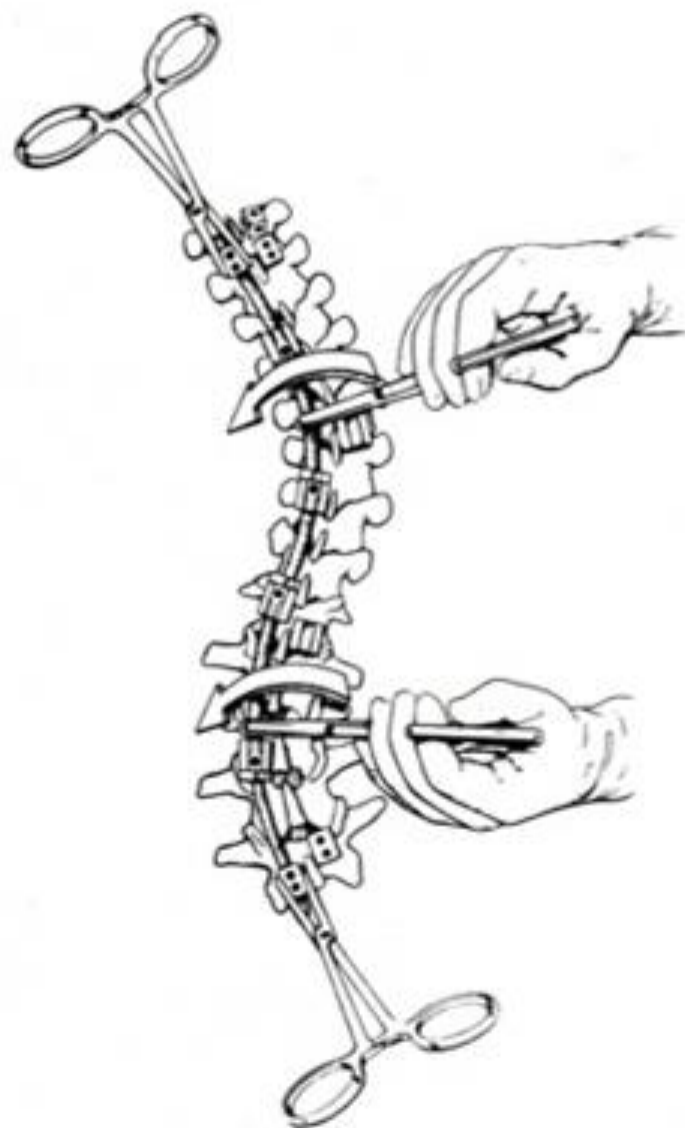
Distração na concavidade
Compressão na convexidade
Translação



CORREÇÃO SEGMENTAR – GANCHOS E HASTES (I.COTREL / J.DUBOUSSET)

MANOBRA DE DEROTAÇÃO Passo a Passo

- 1- Colocação dos parafusos pediculares nas vértebras estratégicas
- 2- Modelagem da haste na concavidade da curva principal e curva secundária, obedecendo a cifose torácica e lordose lombar fisiológicas
- 3 - Bloqueio parcial da haste nos parafusos
- 4- derotação simultânea das curvas



T.C.A.M.; 18a ; fem. Dor nas costas
Não aceita o fato de ser torta e a “cintura diferente”

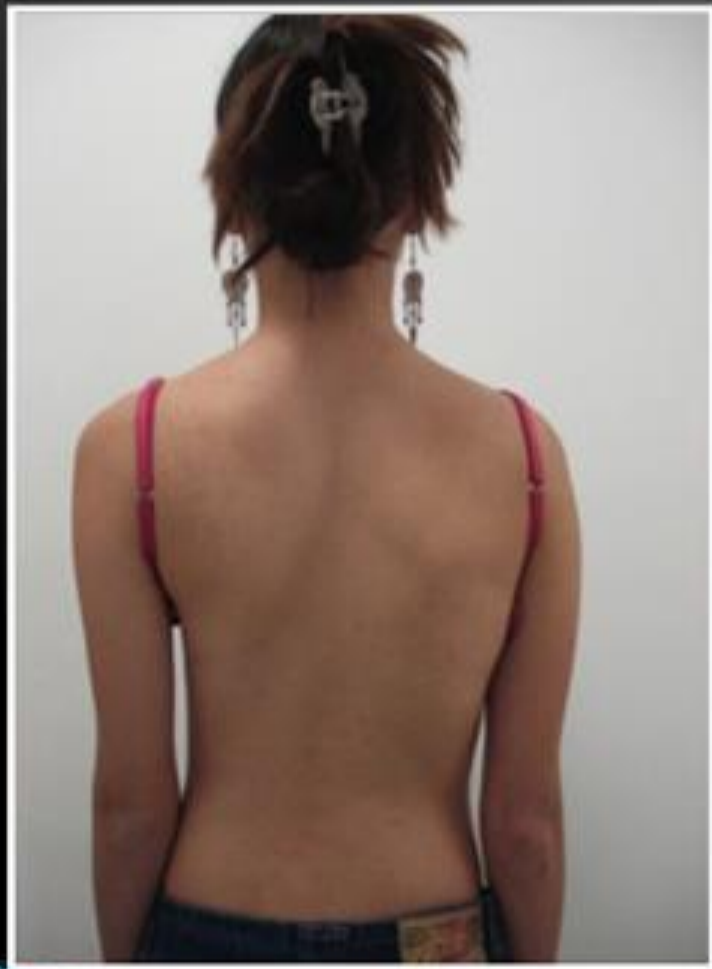


TIPO 1 A N
TORAXICA DIREITA
MOD.LOMBAR A
MOD.TOR. N

PÓS-OPERATÓRIO



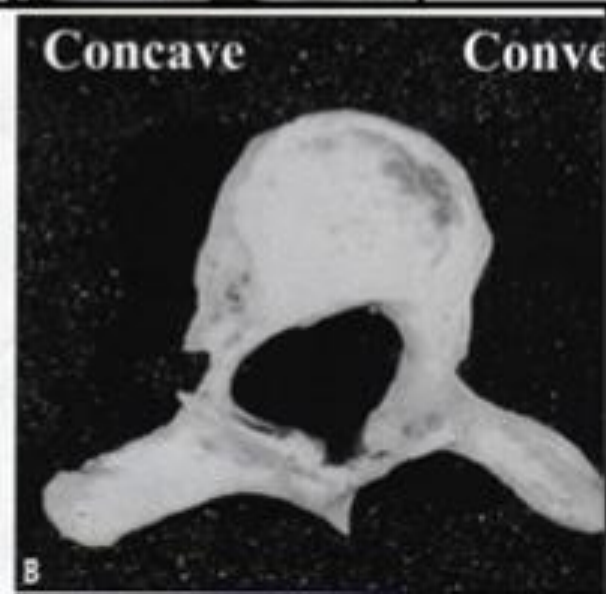
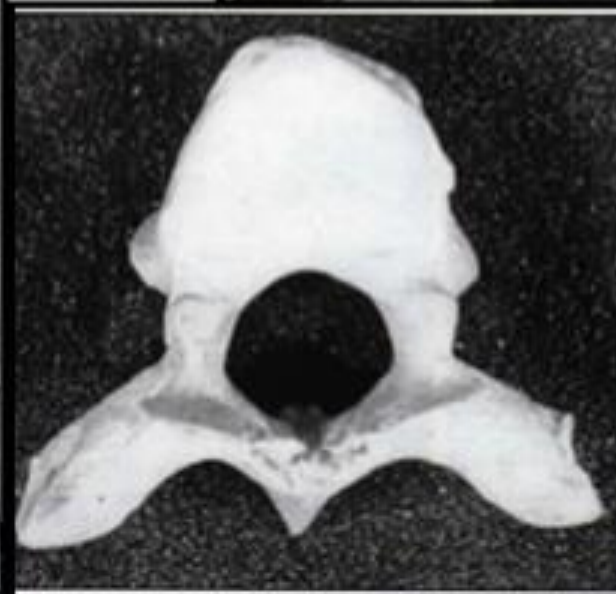
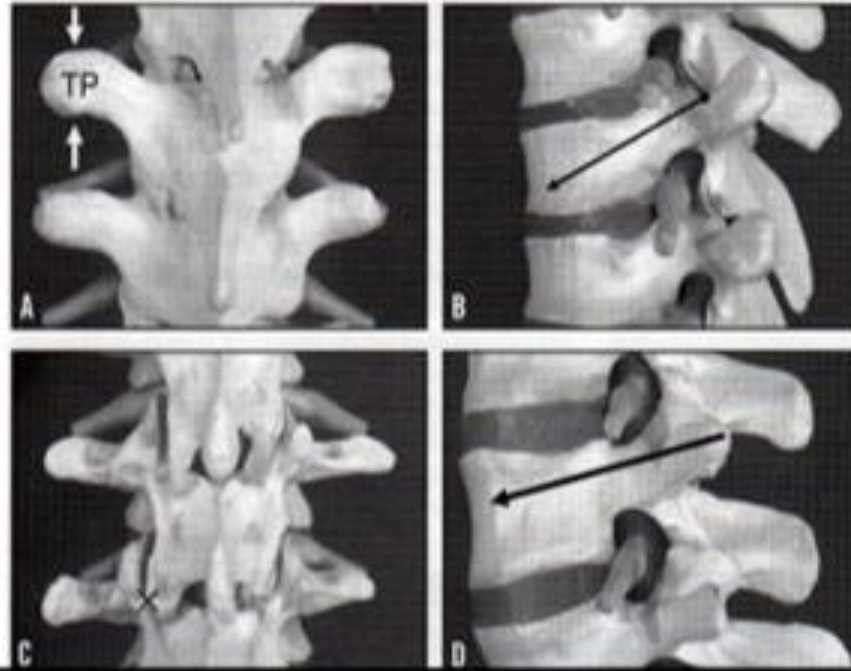
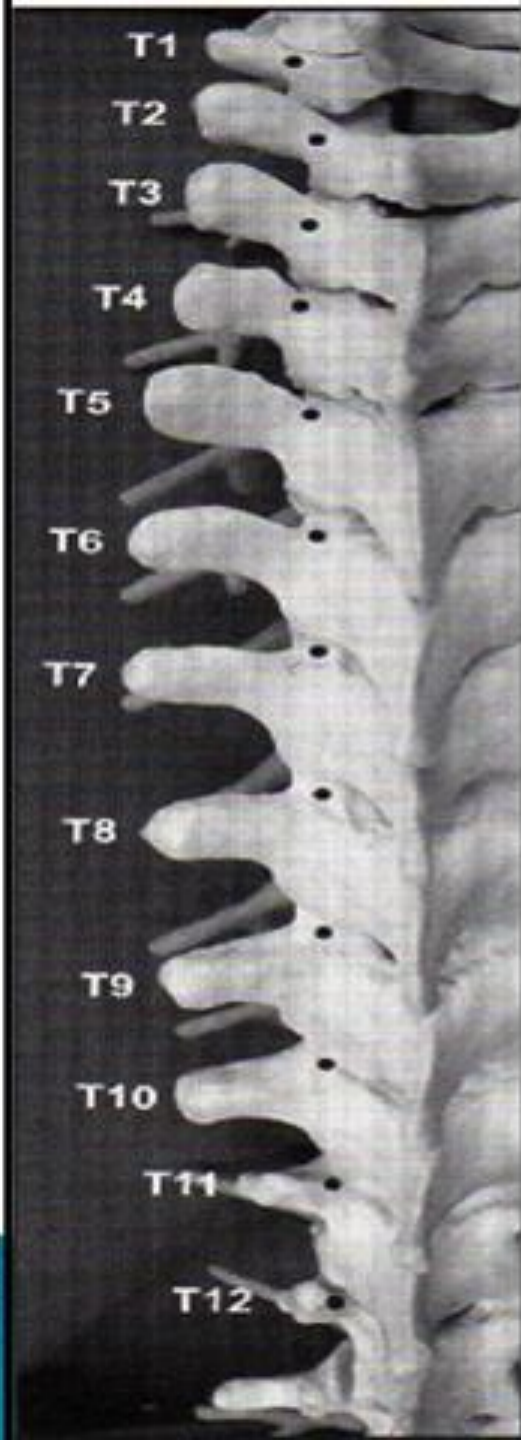
VISÃO DO DORSO PRÉ OP.



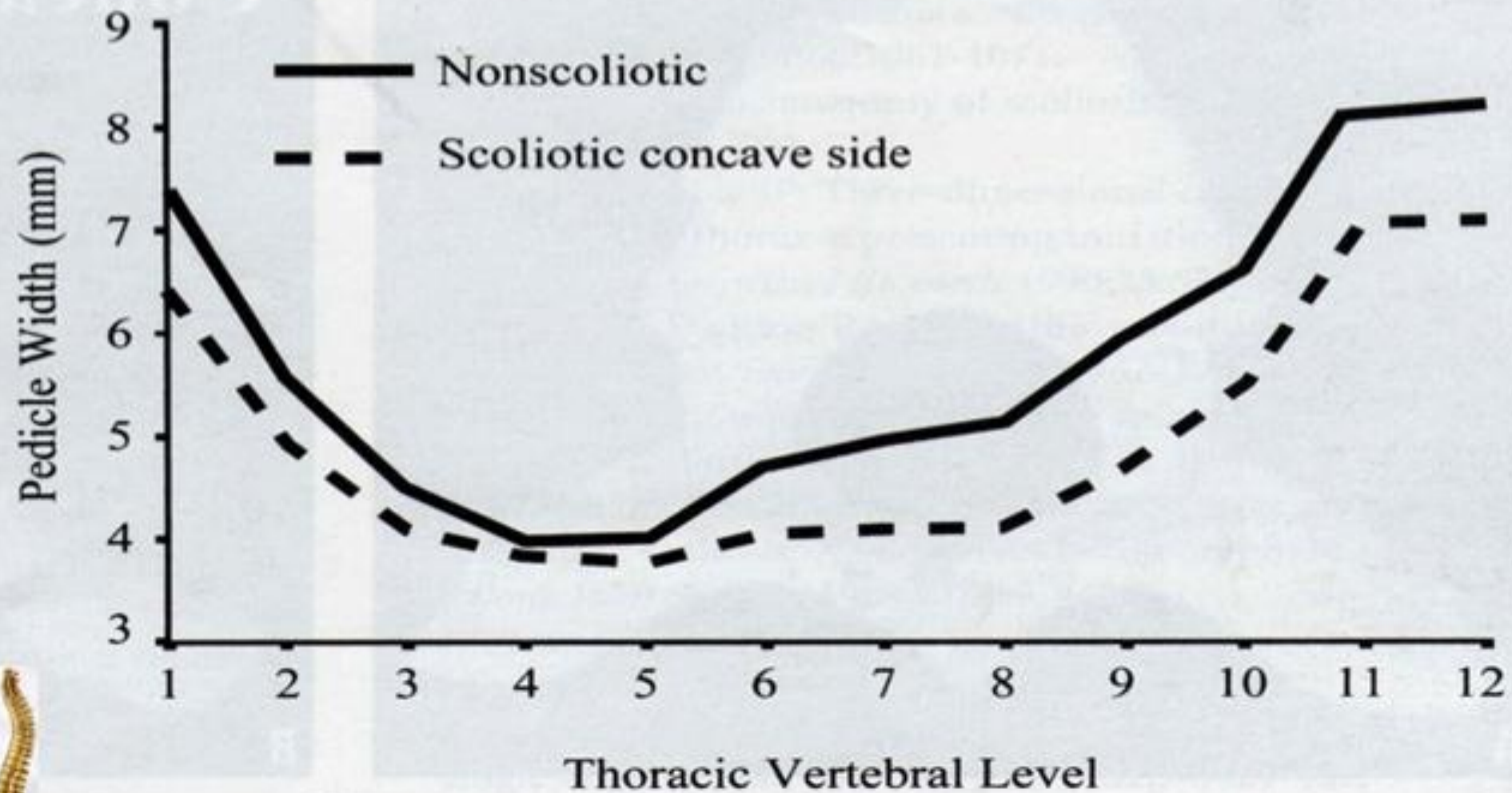
ASPECTO PÓS CIRURGICO

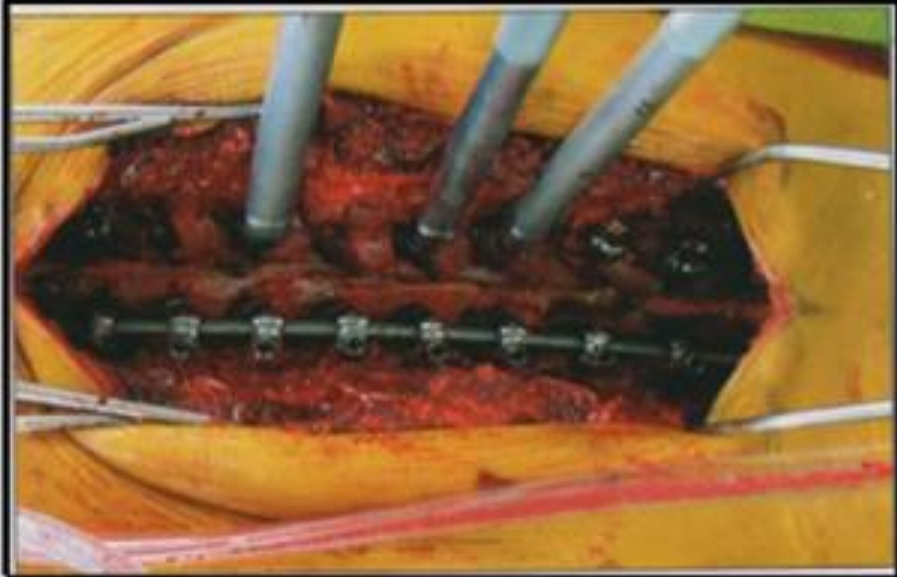


Parafuso Pedicular



Parafuso Pedicular





REQUISITOS

- CURVA DE APRENDIZADO
- MANEJO DO INSTRUMENTAL
- IMAGEM PER-OPERATÓRIA
- MONITORIZAÇÃO MEDULAR
- ANESTESIA

PLANEJAMENTO PRÉ-OP!



A photograph of a multi-story brick building with a fire in one of the upper windows. A person is climbing a metal fire escape on the side of the building. The fire escape is extended from a lower level up to the top of the building. The person is shirtless and is climbing upwards. A red fire helmet is visible on the fire escape. The text "OPS...! ESQUECI DO PIJAMA !!!" is overlaid on the image, with a blue arrow pointing to the person's back.

OPS...!
ESQUECI DO PIJAMA !!!

A blue-tinted photograph of a dense forest of evergreen trees, likely spruce or fir, covering a hillside. The trees are densely packed and their branches are visible against the sky. The overall color palette is a range of blues, from deep navy to a lighter, almost white-blue at the top of the frame. The word "OBRIGADO" is centered in the lower half of the image in a bold, white, sans-serif font.

OBRIGADO