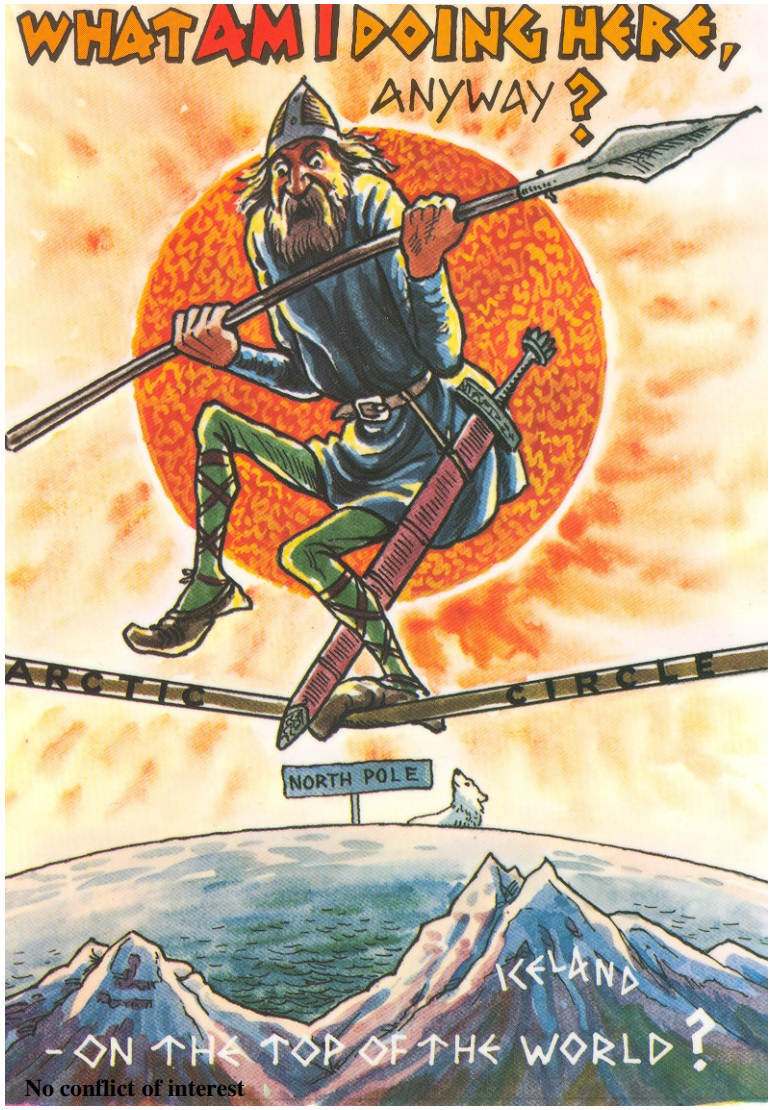
# Spine Anatomy

**Halldór Jónsson jr**

**Orthopaedic Department Landspítali**

**Reykjavík**

# Welcome to Iceland




No conflict of interest

# …. to Spinal Instructional Course, *Monday, June 11th,*

**Faculty:**
Anna Lena Robinsson, Uppsala Sweden
Peter Försth, Uppsala, Sweden
Helena Brisby, Gothenburg, Sweden

Christian Hellum, Oslo, Norway

F C Öner, Utrecht, Netherlands

Halldór Jónsson jr, Reykjavik, Iceland
Hildur Einarsdóttir, Reykjavík, Iceland
Bjarni Valtýsson, Reykjavík, Iceland
Kristjan G. Guðmundsson, Reykjavik Iceland
Magnús Ólason, Reykjavik, Iceland


**Moderators:** Ragnar Jónsson, Halldór Jónsson jr., Peter Försth

*17:00-17:30* ***Introduction. Diagnostic tests. Applied anatomy.*** *- Halldór Jónsson Jr*
*17:30-18:00* ***Spinal imaging. Principles and pitfalls.*** *- Hildur Einarsdóttir*
*18:00-18:30* ***Pathophysiology of spinal & nerve root pain*** *- Helena Brisby*
*18:30-19:00* ***Spinal Pain: Epidemiology & life style factors*** *- Kristján G. Guðmundsson*

***19:30-*** ***Dinner - Vox, Hilton Reykjavík Nordica***

# …. and Spinal Instructional Course, *Tuesday, June 12th,*

*08:00-08:30* ***Clinical investigations, correlation with symptoms & imaging*** *- Halldór Jónsson Jr*
*08:30-09:00* ***Nonoperative treatment of chronic cervical and lumbar pain*** *- Magnus Ólason*
*09:00-09:30* ***Acute and chronic cervical axial and nerve root pain, herniated disc of the cervical spine. Diagnosis and treatment*** *- Björn Zoëga*
*09:30-10:00* ***Lumbar spinal stenosis. Diagnosis, and state of the art for surgery.*** *- Peter Försth*

***10:00-10:20 COFFEE***

*10:20-10:50* ***Herniated disc of the lumbar spine. Diagn, treatm and state of the art for surgery.*** *- Christian Hellum*
*10:50-11:20* ***Spondylolisthesis. Classification, Etiology, Epidemiology. Diagnosis and treatment.*** *- Peter Försth*
*11:20-11:50* ***EB treatment and MI modalites of chronic lumbar and cervical pain.*** *- Bjarni Valtýsson*

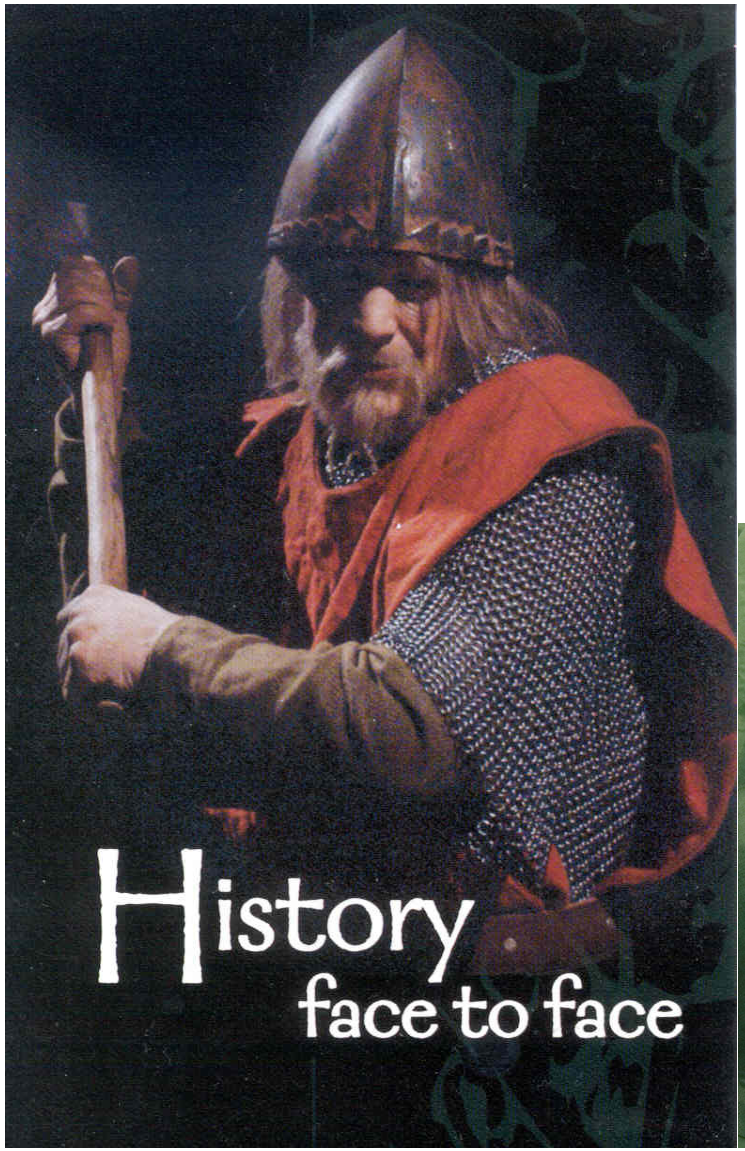
***11:50-12:30 LUNCH***

*12:30-13:00* ***Lumbar and thoracic spinal injuries. Conservative and operative treatment.*** *- Halldór Jónson Jr*
*13:00-13:30* ***Cervical injuries. Conservative and operative treatment.*** - Anna Lena Robinsson
*13:30-14:00* ***Surgery for chronic lumbar pain.*** *- Christian Hellum*
*14:00-14:30* ***Surgical complications, postoperative infection and neurological complications. How to avoid, diagnose and treat.*** *- F. Cumar Öner*
*14:30-15:00* ***Patients with spinal problems. When is a referral to a spinal surgeon indicated.*** *- Helena Brisby*

***15:00-15:20 COFFEE***

*15:20-16:40* ***Clinical cases and imaging*** *- Smaller groups, one faculty member/group.*
*16:40-17:00* ***Take home message. Closing remarks. Course evaluation formula.*** *- Ragnar Jónsson/Peter Försth*

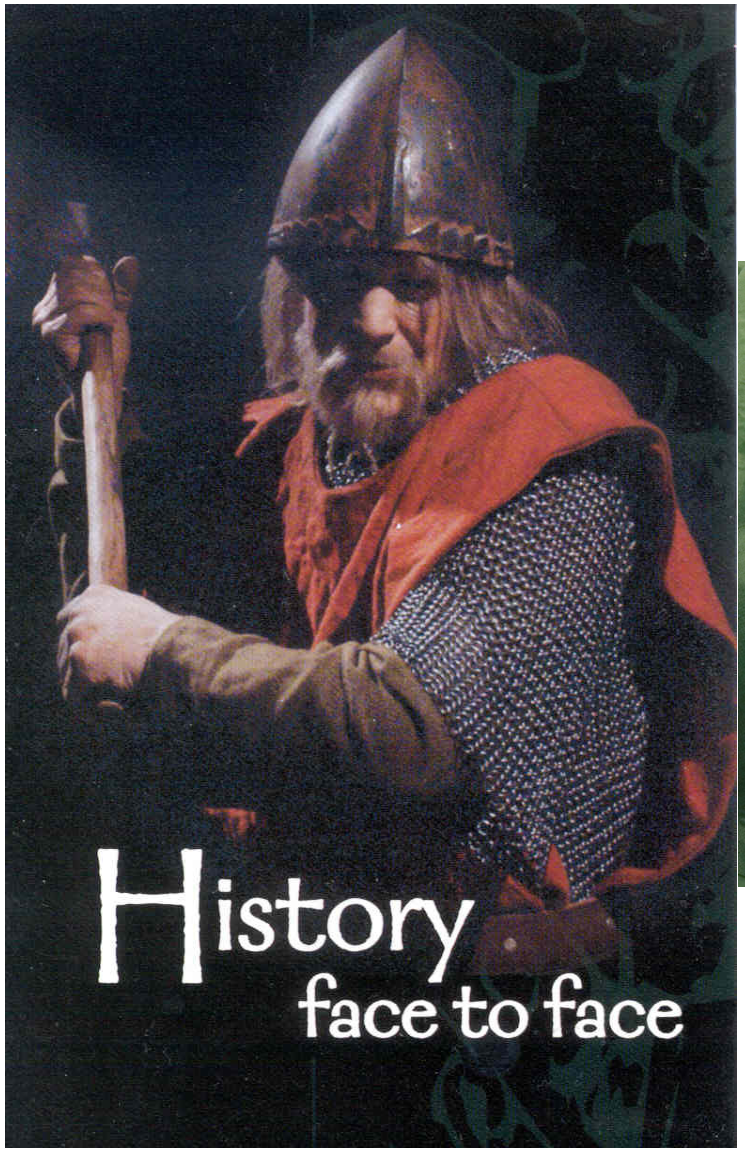
# Anatomy of the spine: “Keys or the cutters ……..”!

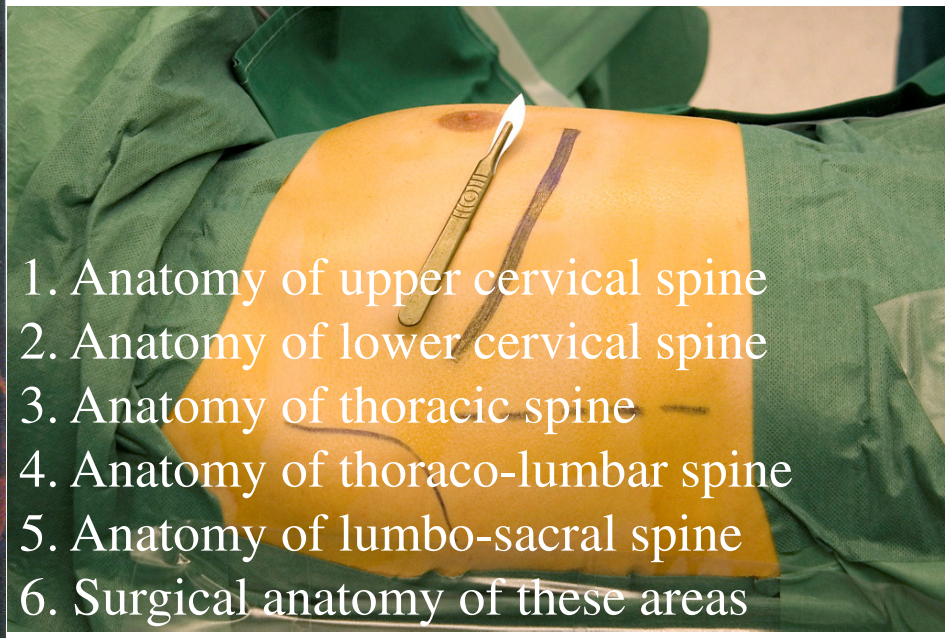




*JPHjr*

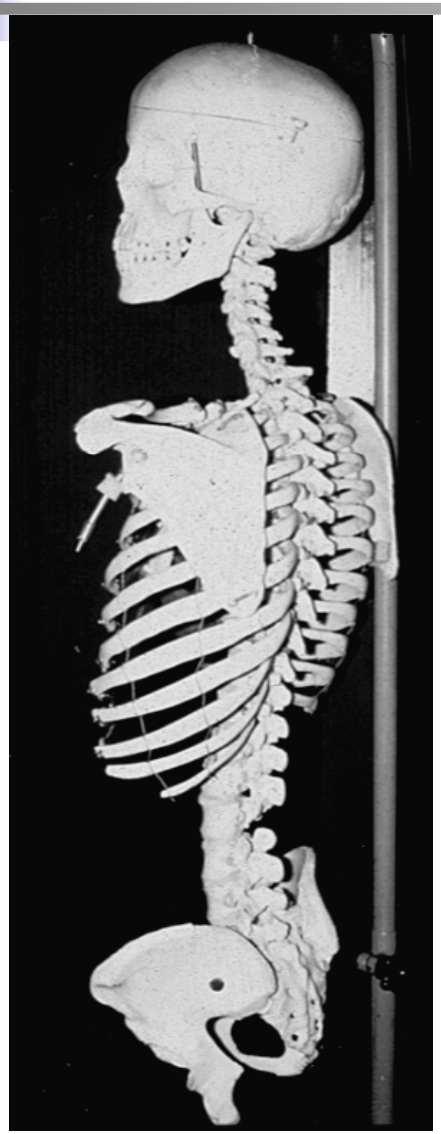
# My aim is to teach you:



1. Anatomy of upper cervical spine
2. Anatomy of lower cervical spine
3. Anatomy of thoracic spine
4. Anatomy of thoraco-lumbar spine
5. Anatomy of lumbo-sacral spine
6. Surgical anatomy of these areas

# 3 main functions: Support, Movement and …..



Occipito-Cervical region

**Cervical LORDOSIS**

Cervico-Thoracal region

**Thoracal KYPHOSIS**

Thoraco-Lumbar region

**Lumbar LORDOSIS**

Lumbo-Sacral region

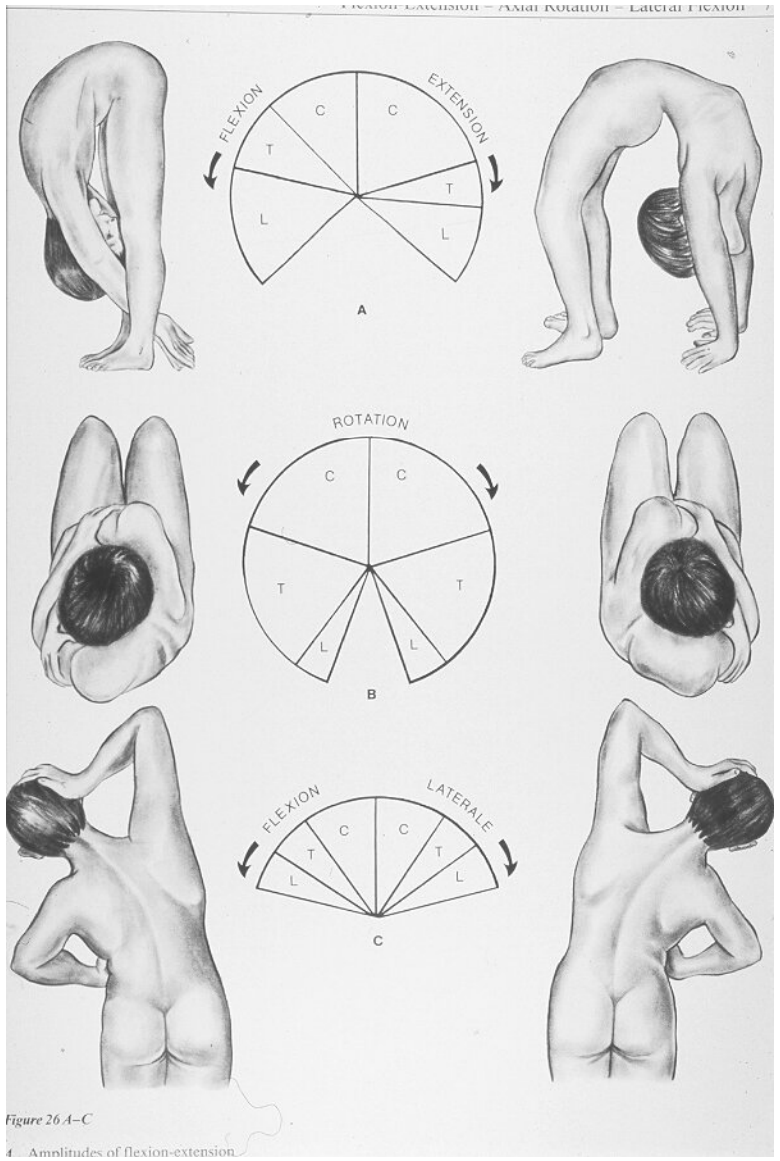
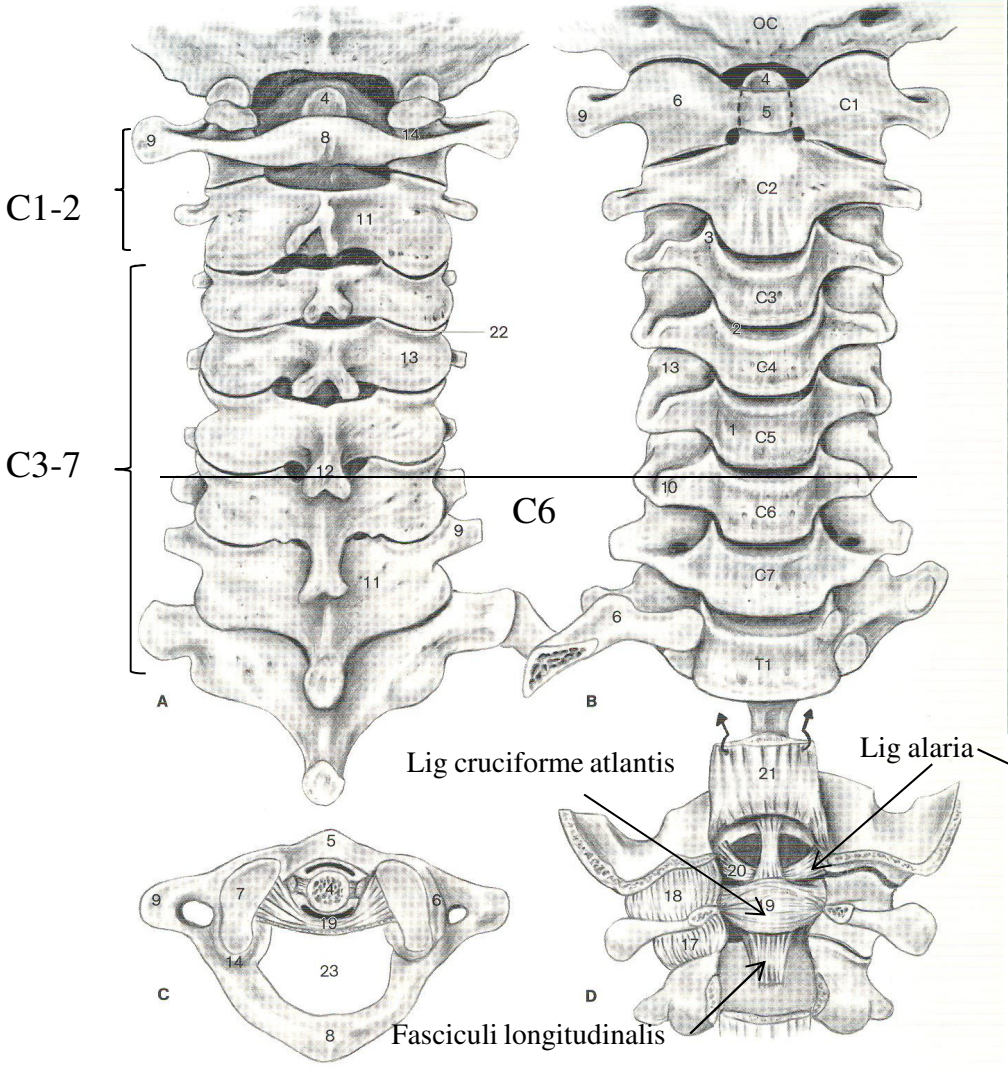


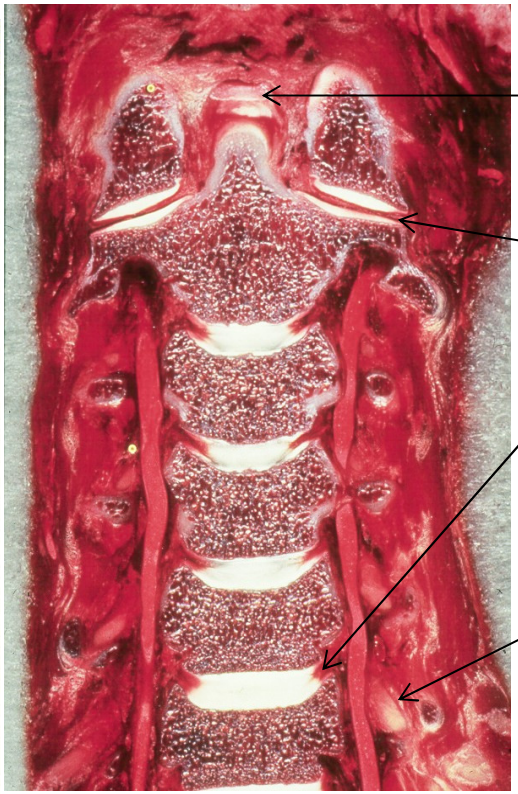

Figure 26 A–C

4 Amplitudes of flexion-extension

# 3 main functions: … Protection of neural structures

# Anatomy of the Upper (C1-2) and lower (C3-7) cervical spine



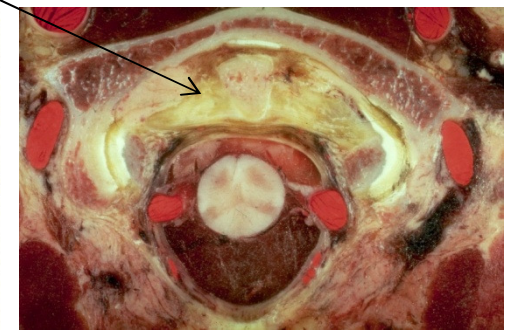
Lig transversum
(7mm vs 3-5mm)

A.A. joint

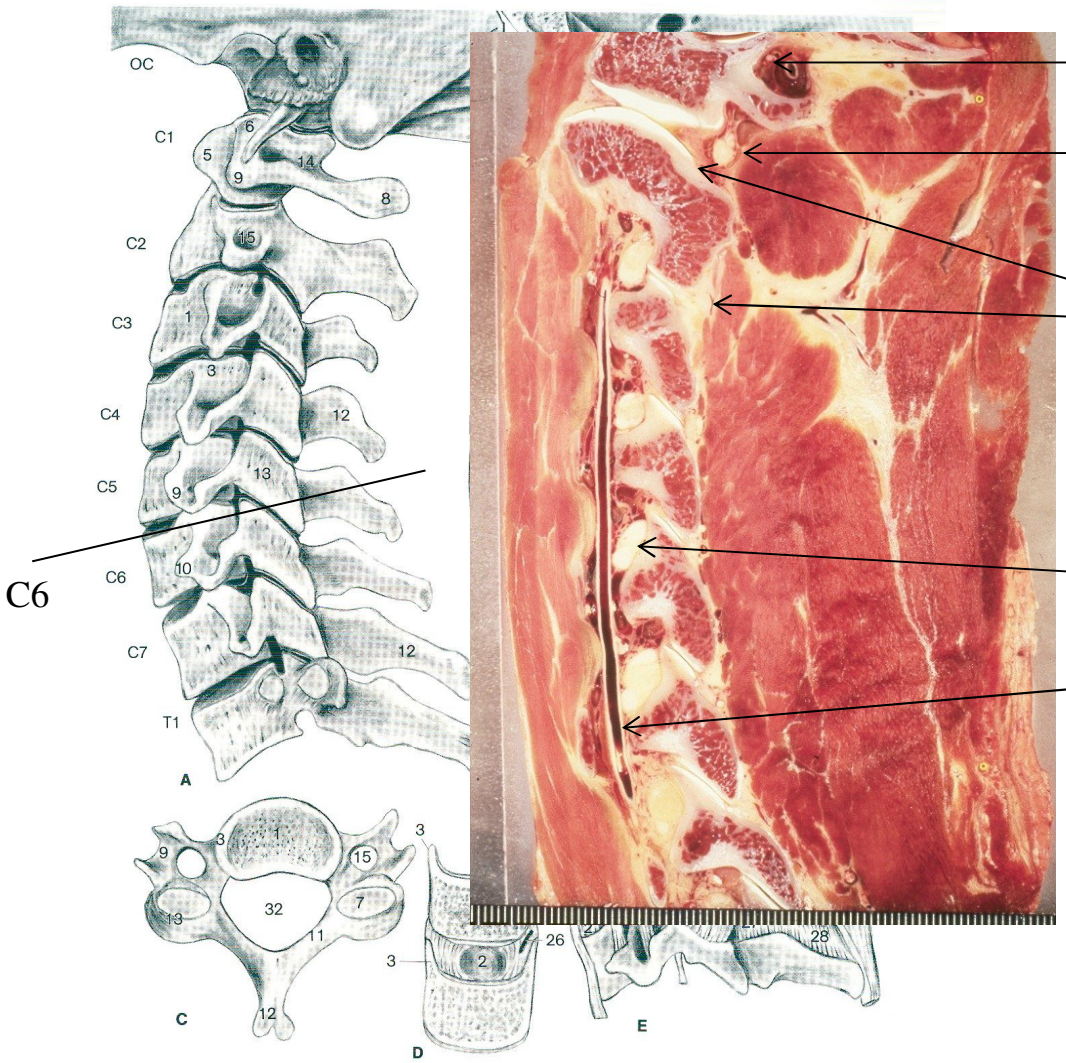
Uncovertebral joint

Nerves behind and lateral to A.

Lig alaria



# Anatomy of the Upper and lower cervical spine






C1 nerve

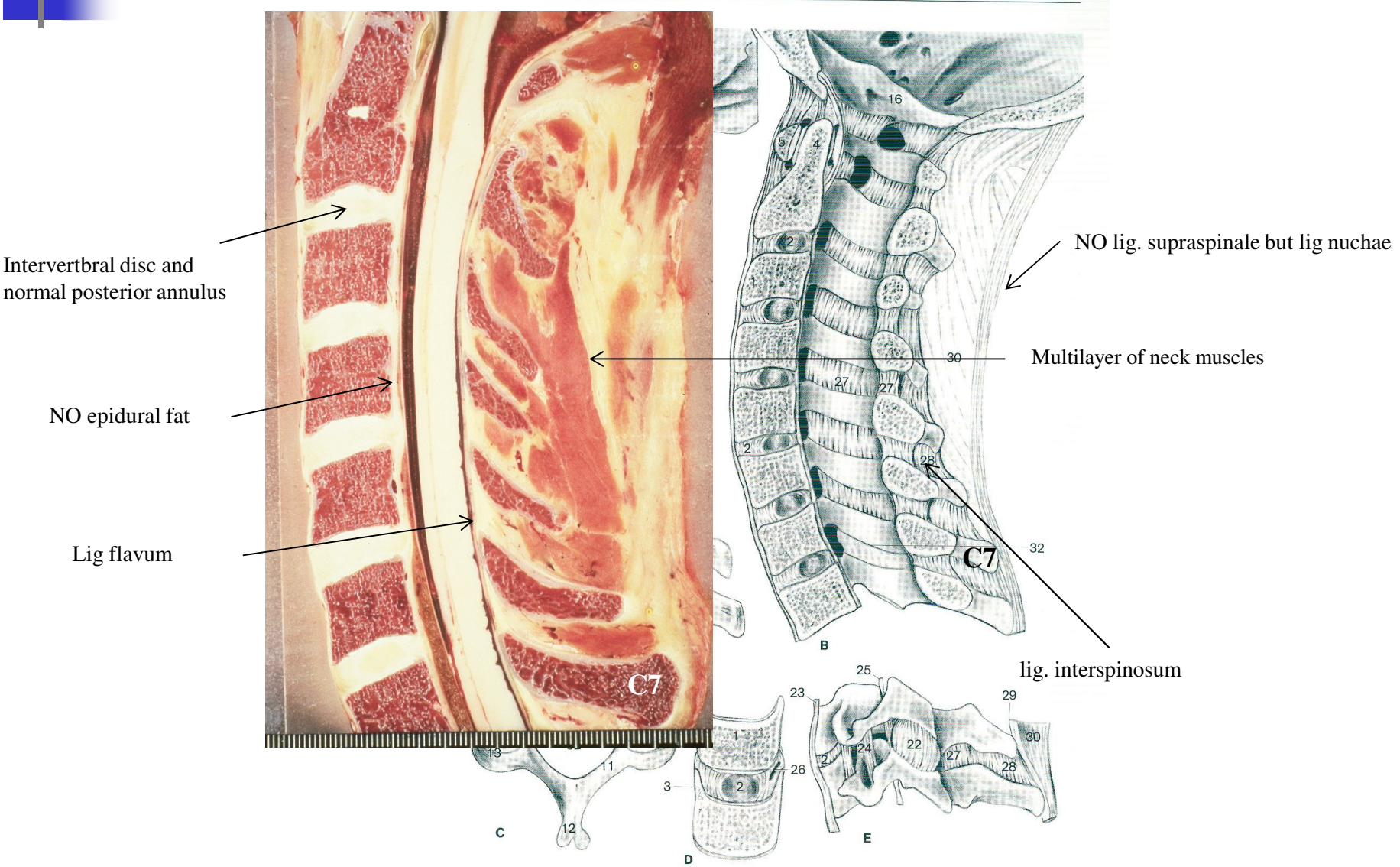
C2 nerve

A.A. and facet joints
with meniscoids

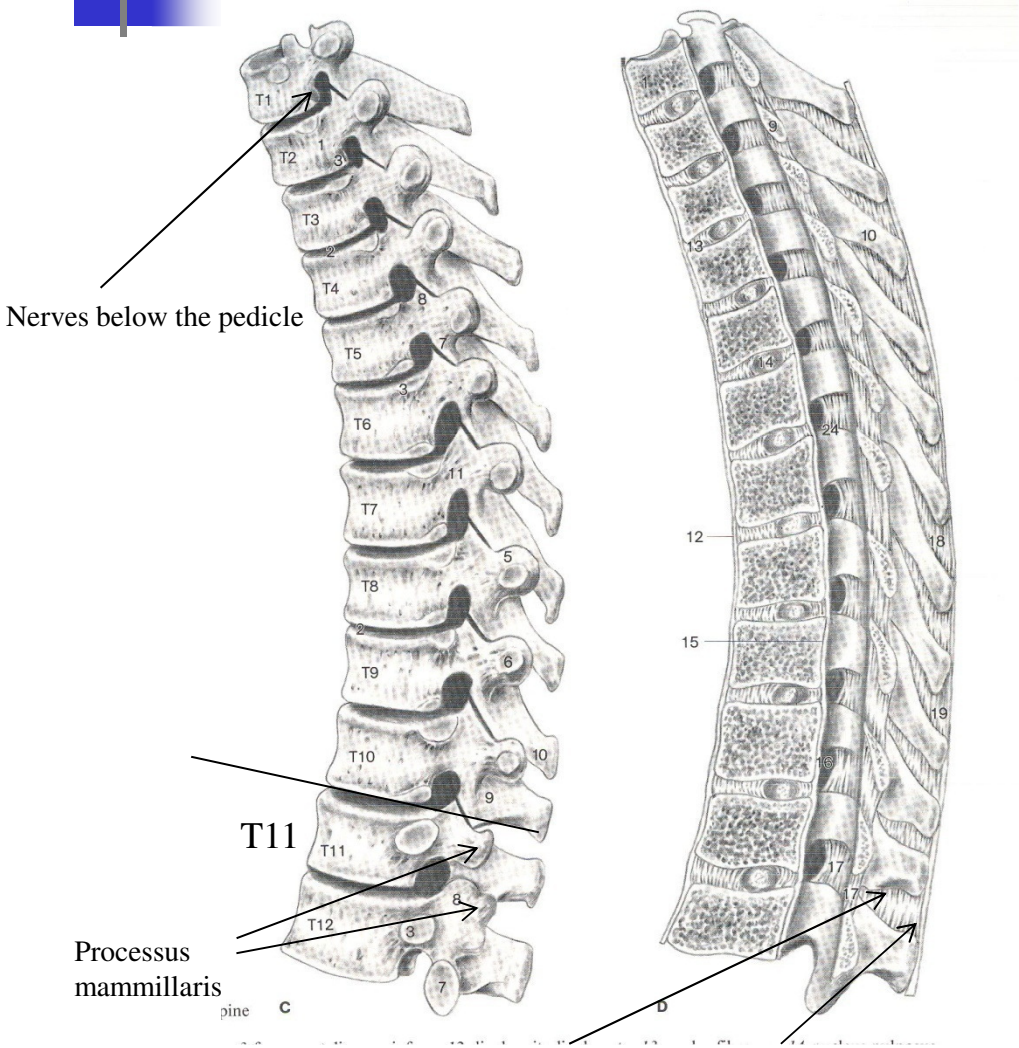
nerves above the pedicle

a. vertebralis

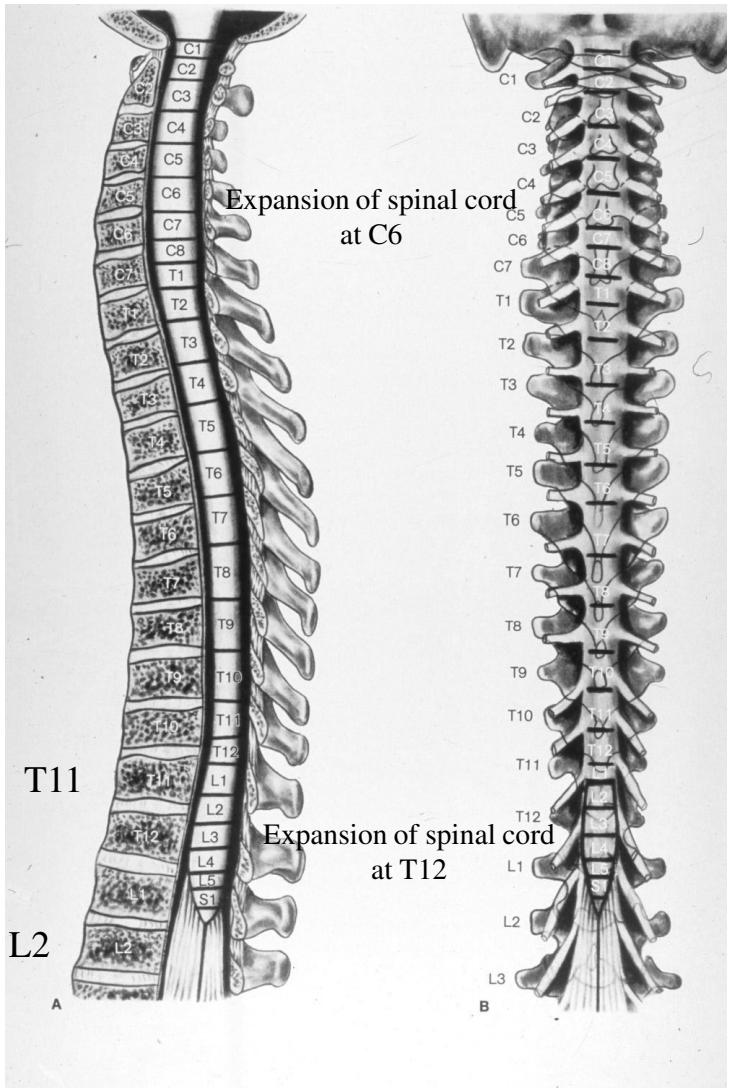
# Anatomy of the Lower cervical spine



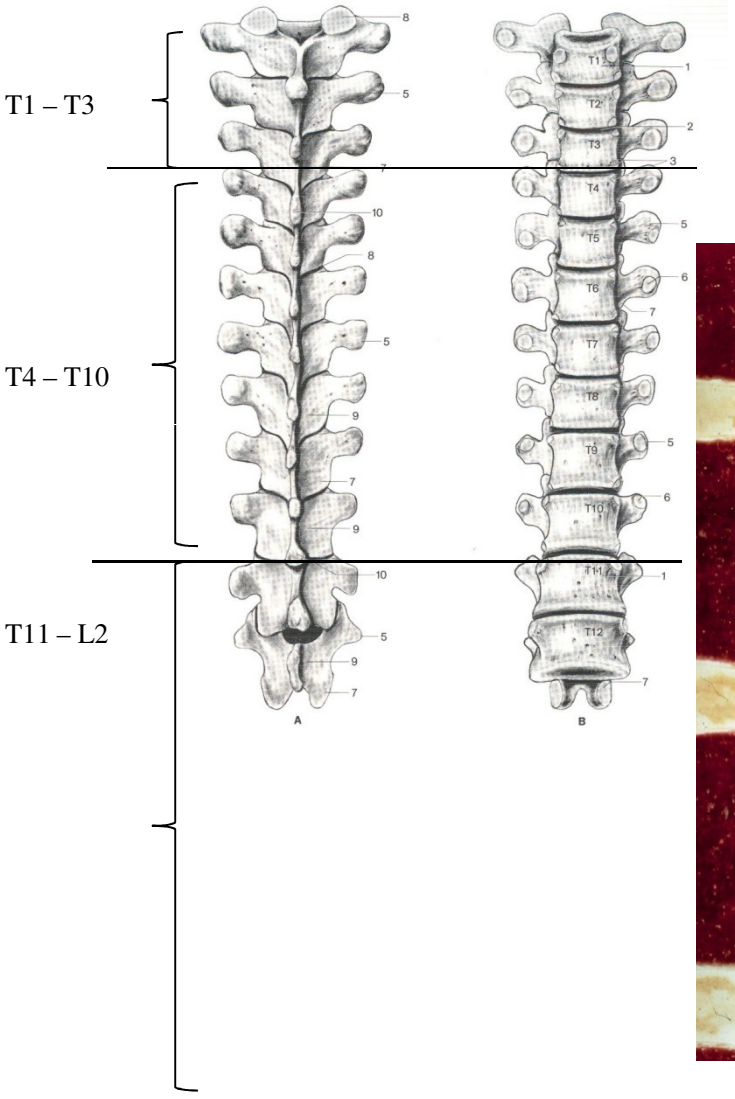
# Anatomy of the Thoracic and thoraco-lumbar (T-L) spine

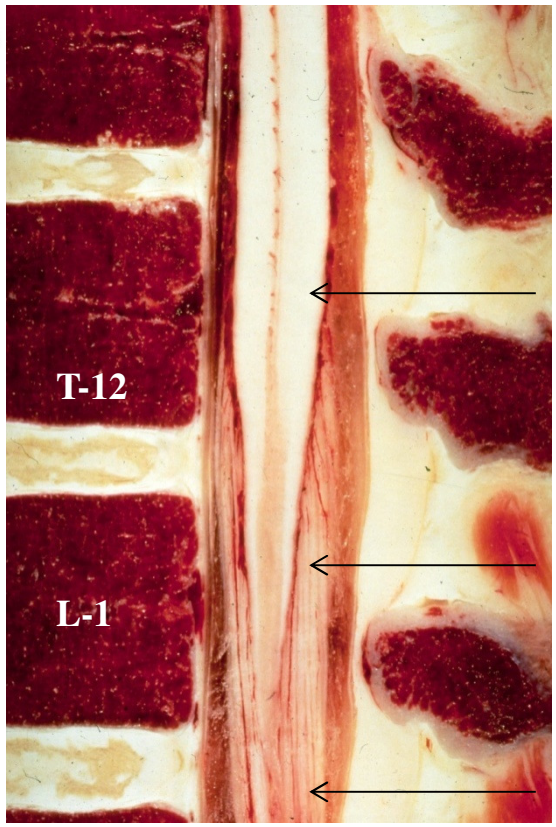



lig. interspinosum and supraspinale



# Anatomy of the Thoracic and thoraco-lumbar (T-L) spine



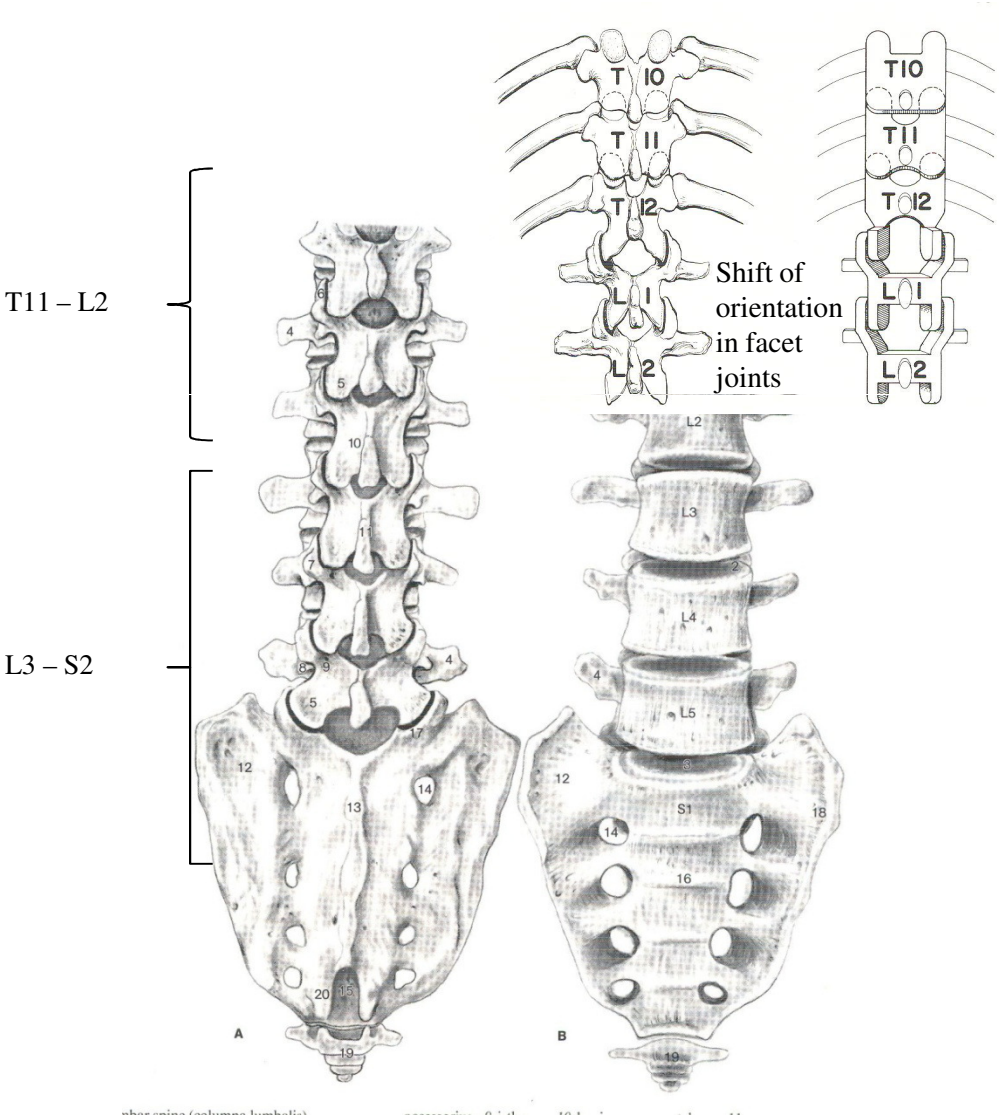




Spinal cord
– central nerves

Conus medullaris
– mixed nerves

Lumbo-sacral
– peripheral nerves

# Anatomy of the Thoraco-lumbar and lumbo-sacral spine

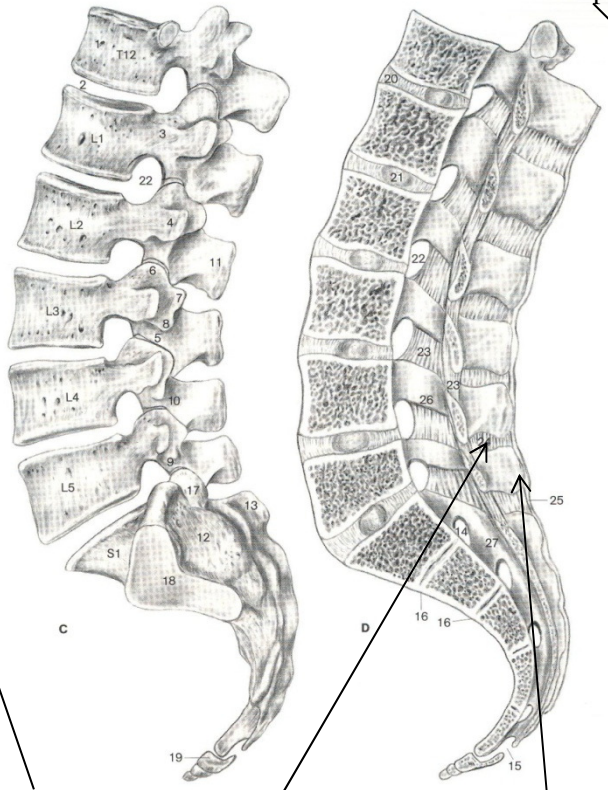


# Anatomy of the Lumbar and lumbo-sacral spine

nerves below the pedicle

facet joints

meniscoids




multilayer of back muscles

lig. interspinosum and supraspinale

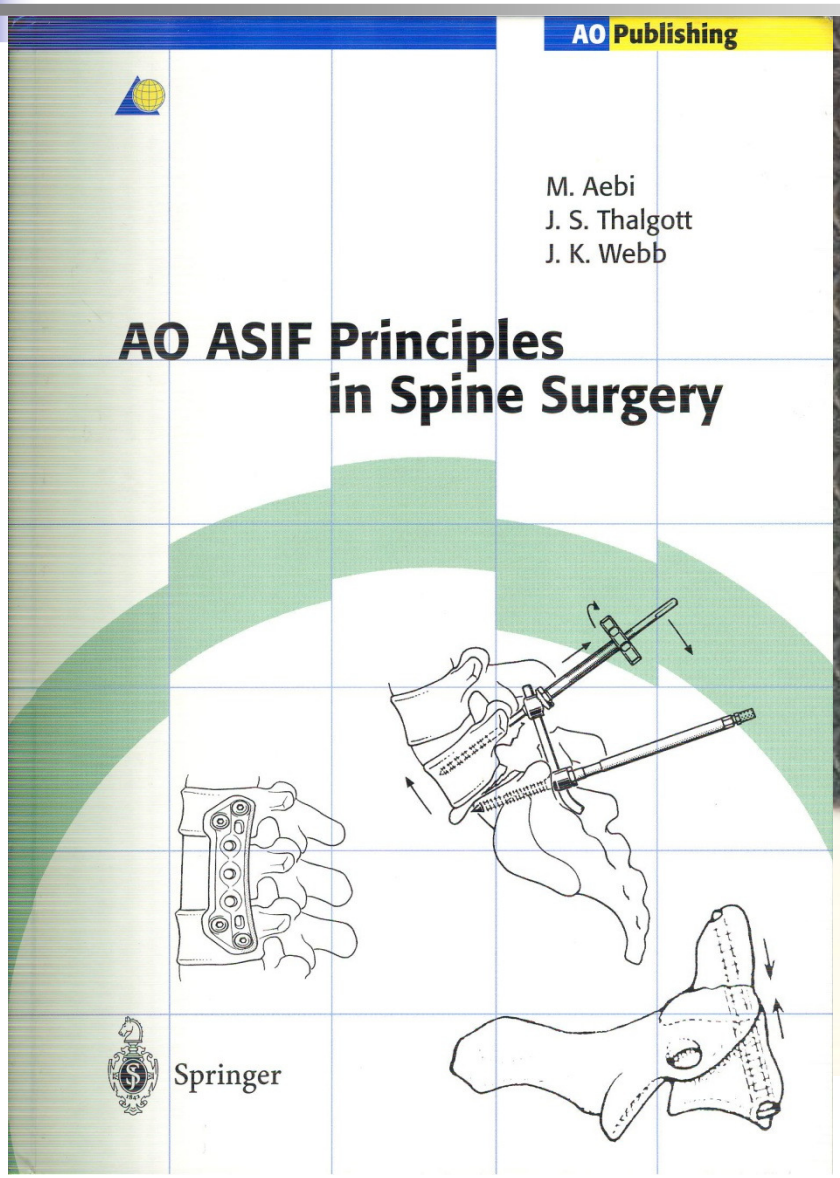
Cauda equina nerves
posterior in thecal sac

Epidural fat and
Batson venous plexus

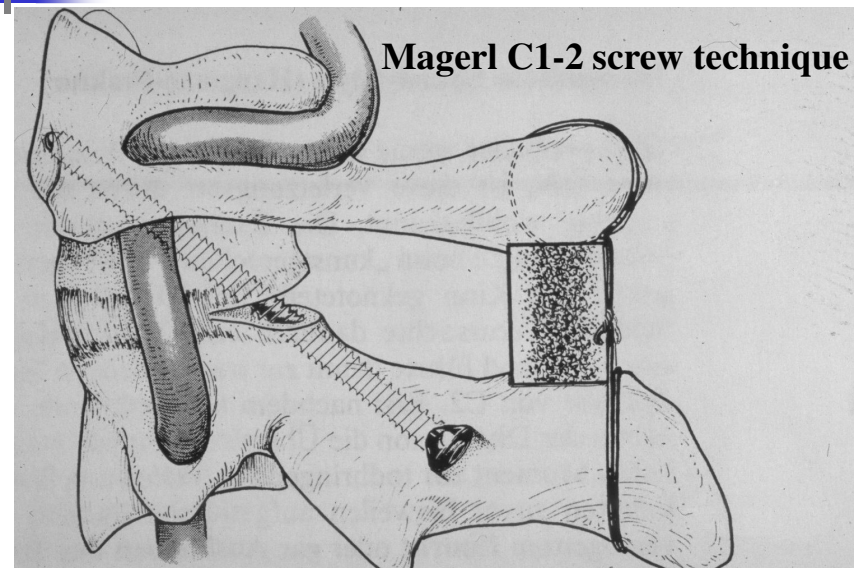
intervertbral disc and
normal posterior annulus

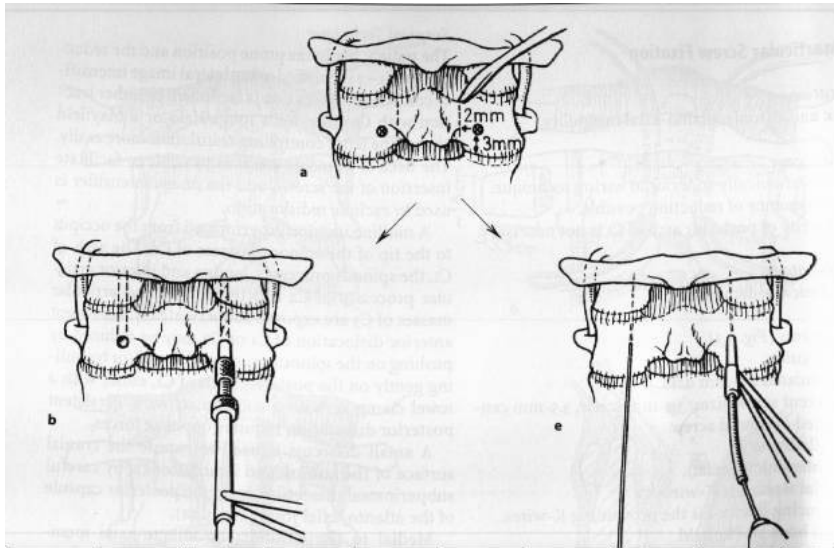
lig flavum

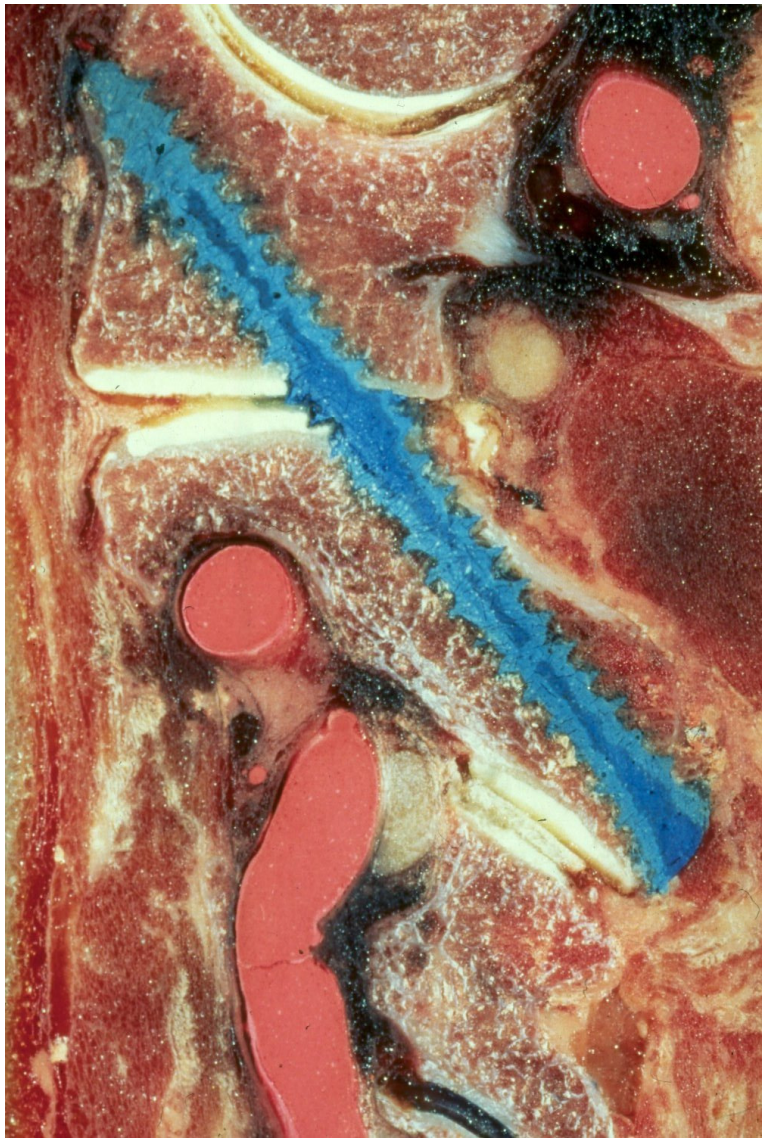
# Surgical anatomy of the spine:



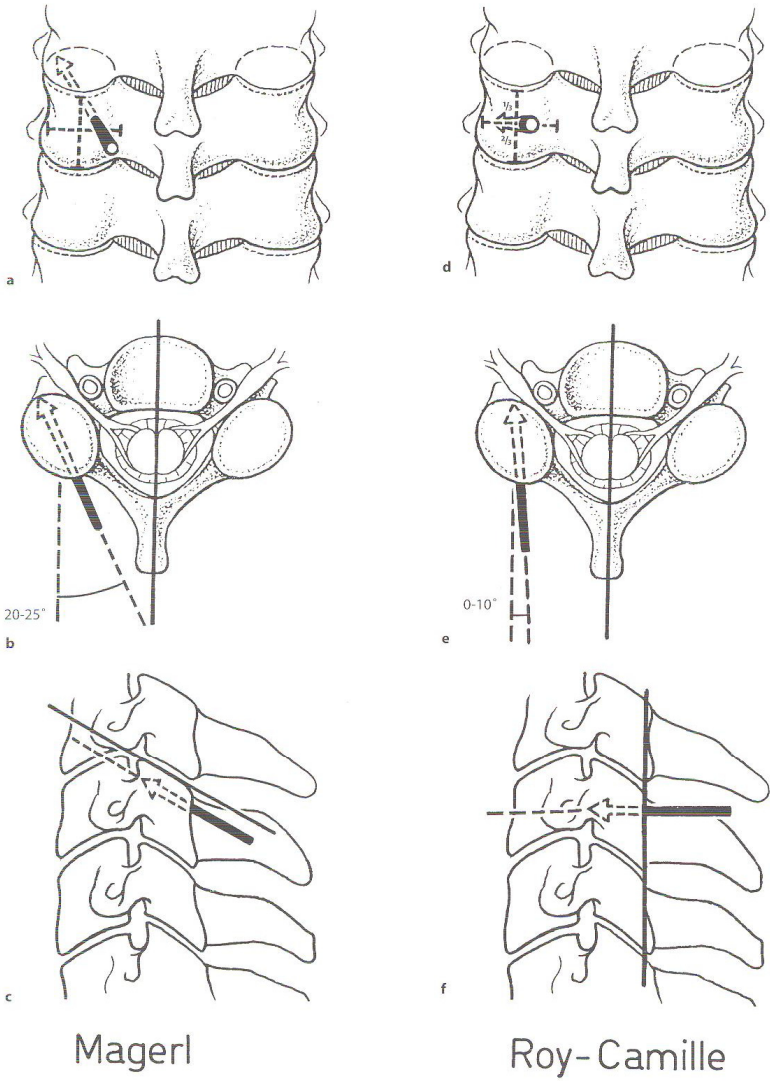

# Surgical anatomy of the Upper cervical spine – C1-C2

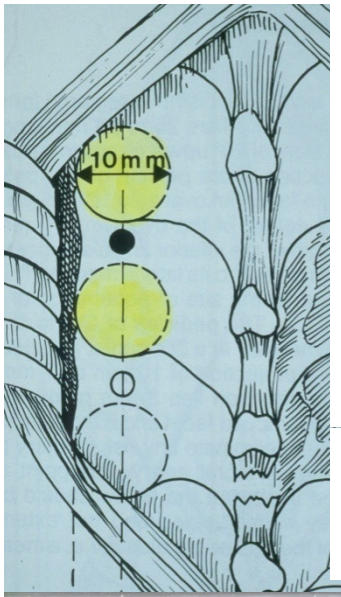


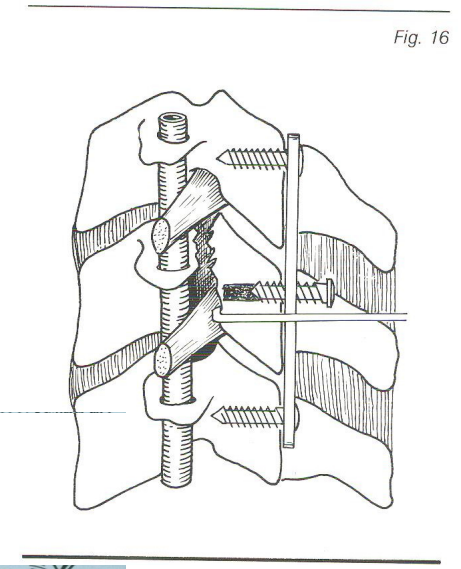



# Surgical anatomy of the Lower cervical spine – C3-C7




# Surgical anatomy of the Lower cervical spine – C3-C7

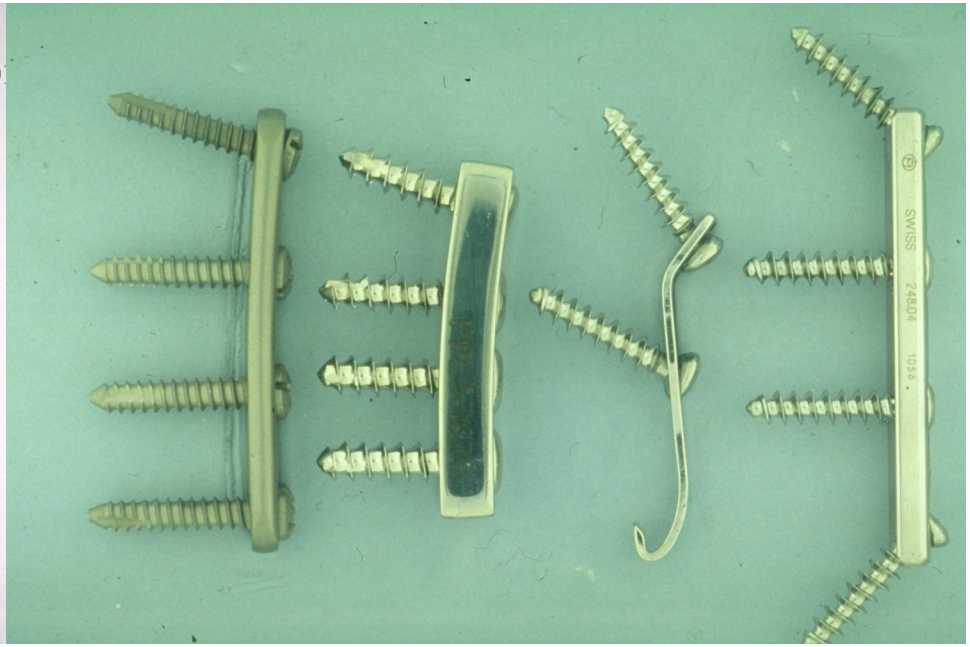
## Anatomical and Morphometric Studies in Posterio Cervical Spinal Screw-Plate Systems

Halldór Jónsson, Jr. and Wolfgang Rauschning

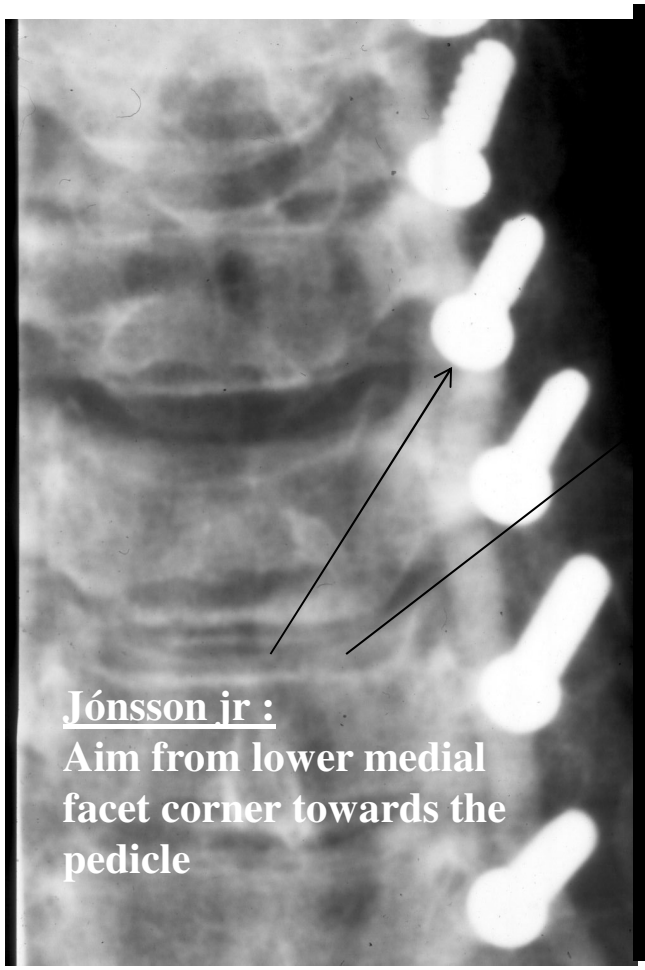
*Department of Orthopaedic Surgery, Academic University Hospital, Uppsala, Sweden*

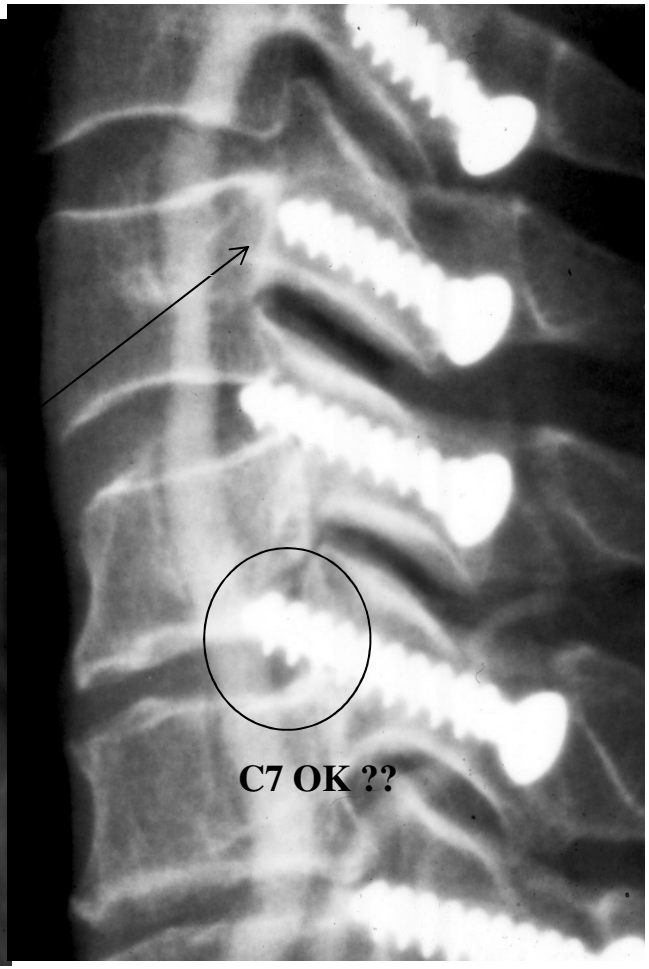
**Summary:** To study potential risks for complications in posterior articular pillar plate fixation, screw-plate systems of Roy-Camille, Louis and Magerl were implanted into the cervical spines of cadavers under authentic operation theater conditions and also in vitro into isolated spine specimens according to the inaugurators' recommendations with regard to plate and screw positioning. We compared these systems with the method of our preference, using the small AO compression plate and monitoring each screw insertion fluoroscopically. The screws were directed towards the projection of the pedicles and their length was measured individually. Radiographic analysis of the specimens and cryoplaning after implant removal and casting of the screw-plate cavities showed significant differences of the four systems with respects to effective screw length, possible and desirable screw trajectories, and risk for injuries of the facet joints, foraminal neurovascular elements and the vertebral artery and mechanical conflict of the plate with adjacent facet joints.

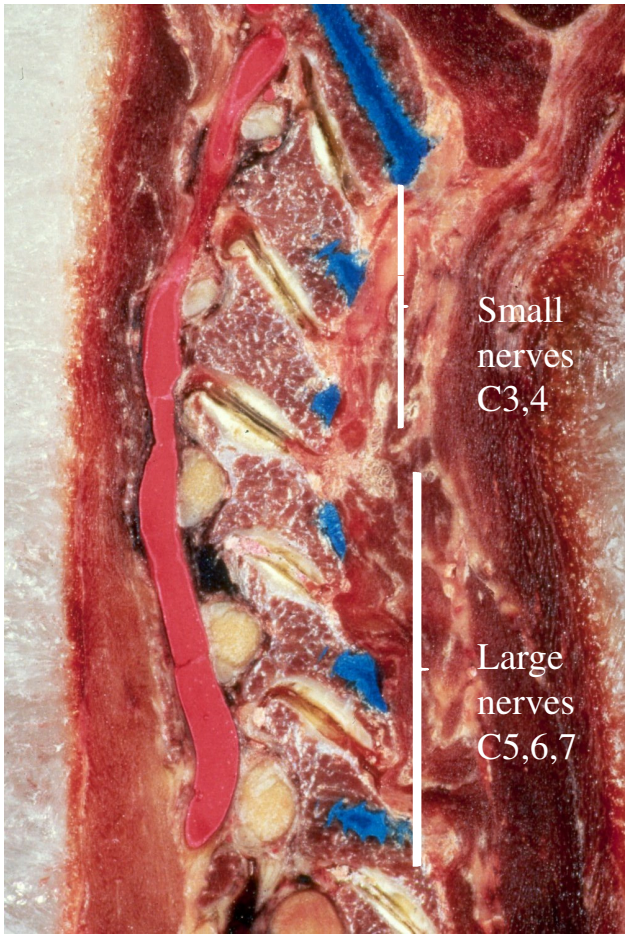
**Key Words:** cervical spine; articular pillar; articular mass; facet joints; neuroforamen; screw placement; screw-plate fixation



# Surgical anatomy of the Lower cervical spine – C3-C7



# Surgical anatomy of the Thoracic spine T1-3 and T4-10

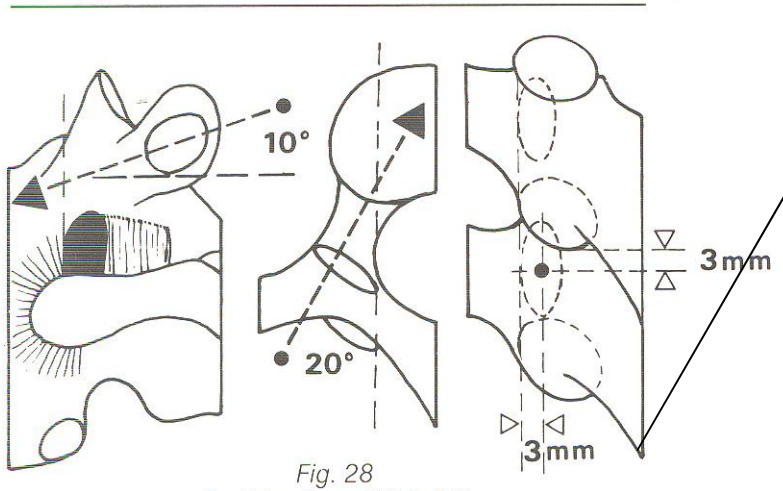



Fig. 28
Pedicles from T 1 to T 3

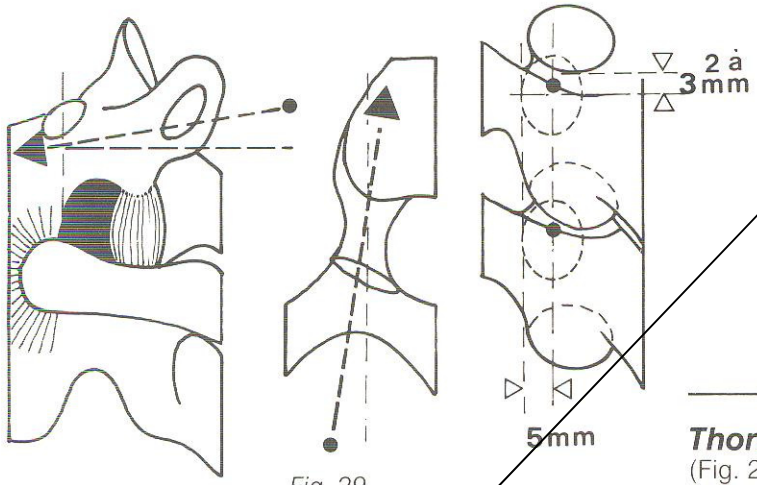
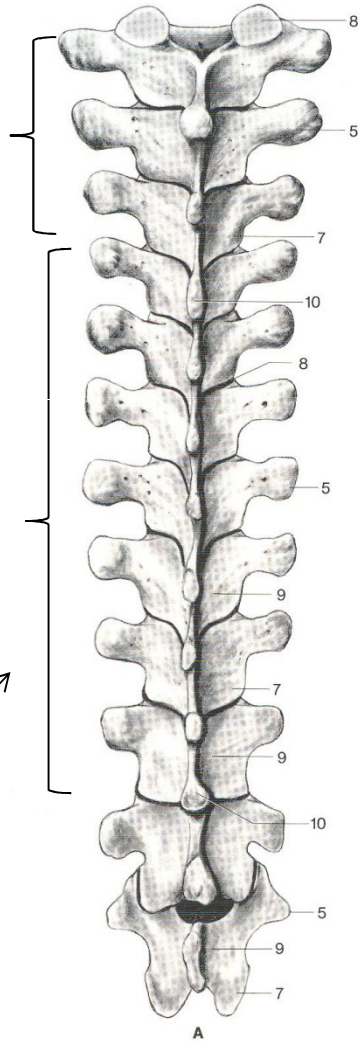
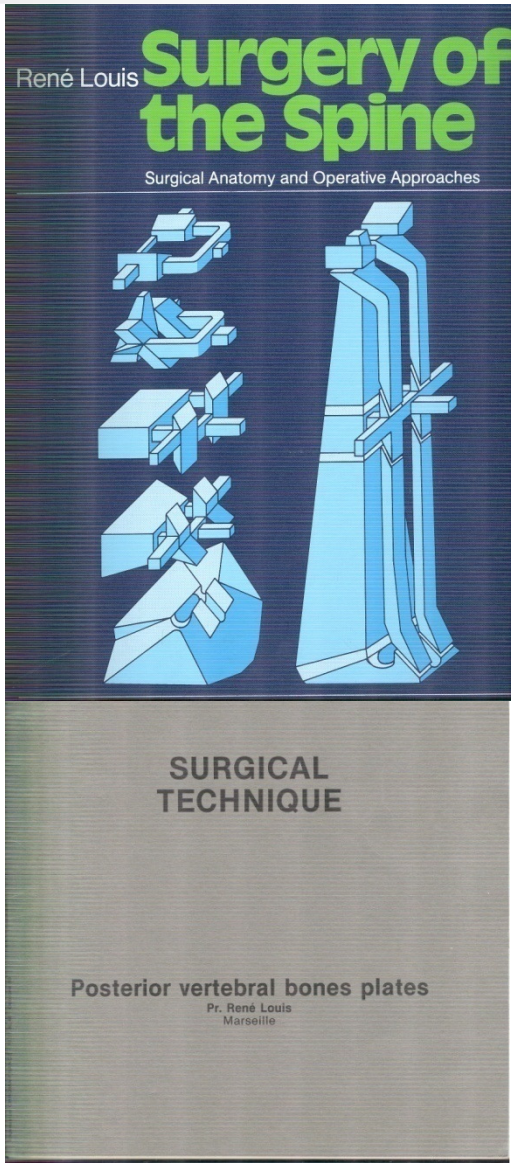



Fig. 29
Pedicles from T 4 to T 10

Thorac
(Fig. 28,
The uppe



# Surgical anatomy of the Thoraco-lumbar (T-L) spine – T11-L2

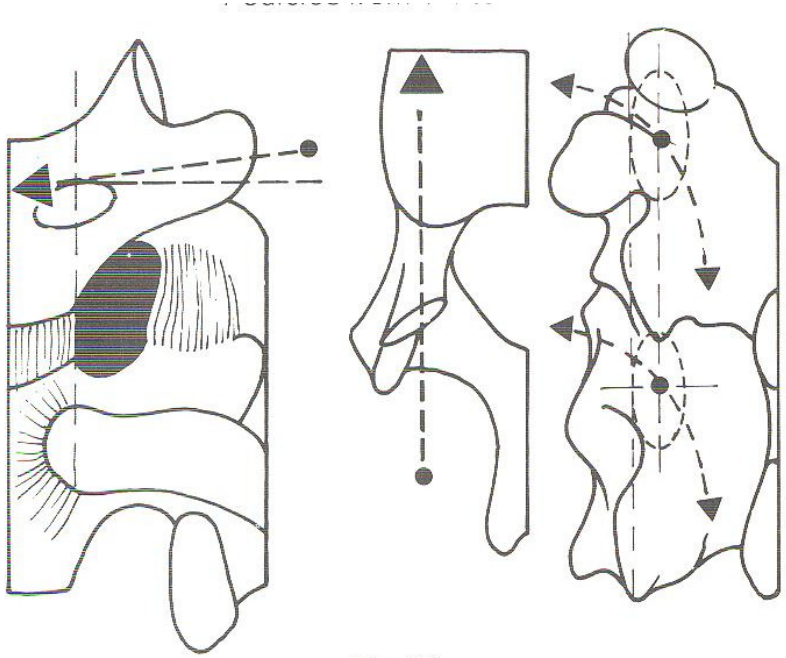
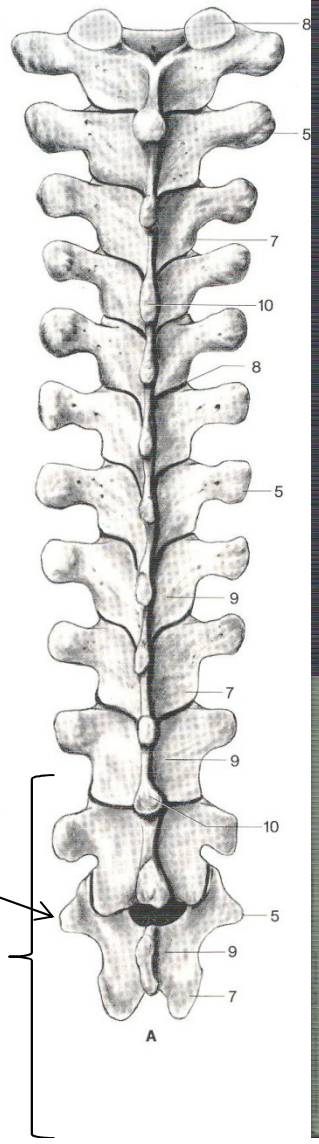
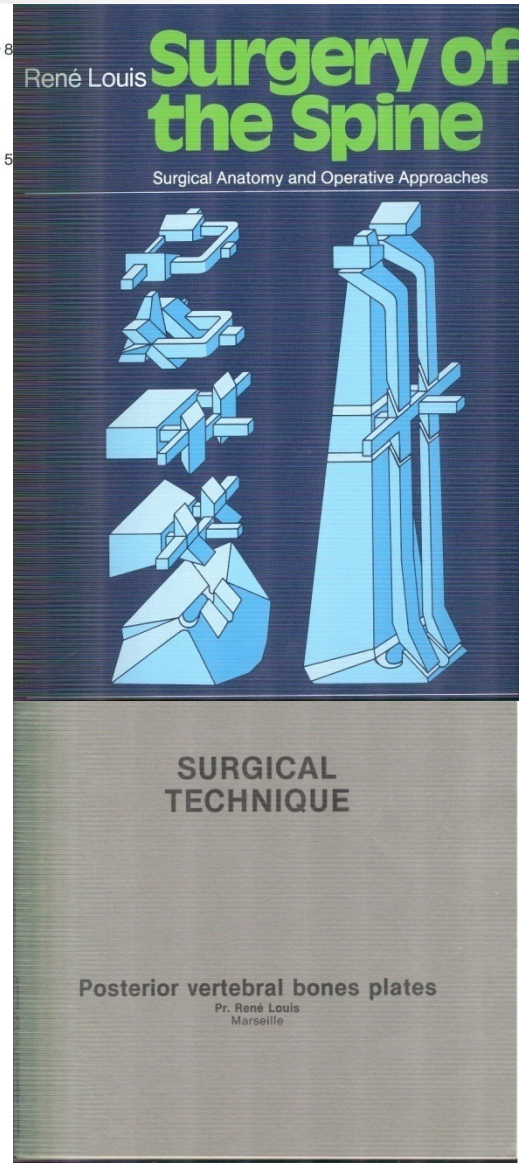


Fig. 30
Pedicles from T 11 to L 2

Proc mamillaris or the lower corner of the upper facet



# Surgical anatomy of the Lumbo-sacral (L-S) spine – L3-S2

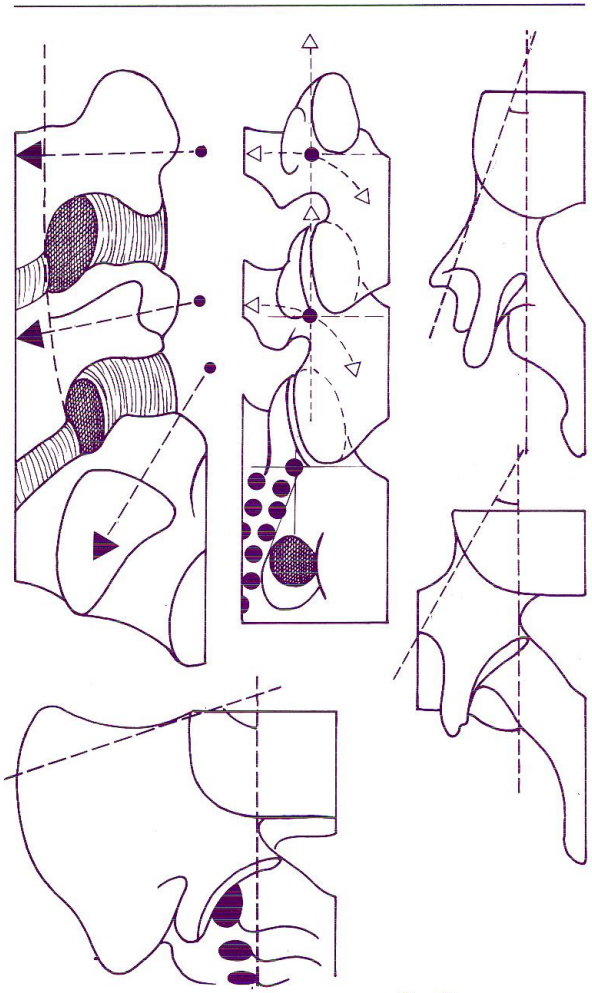
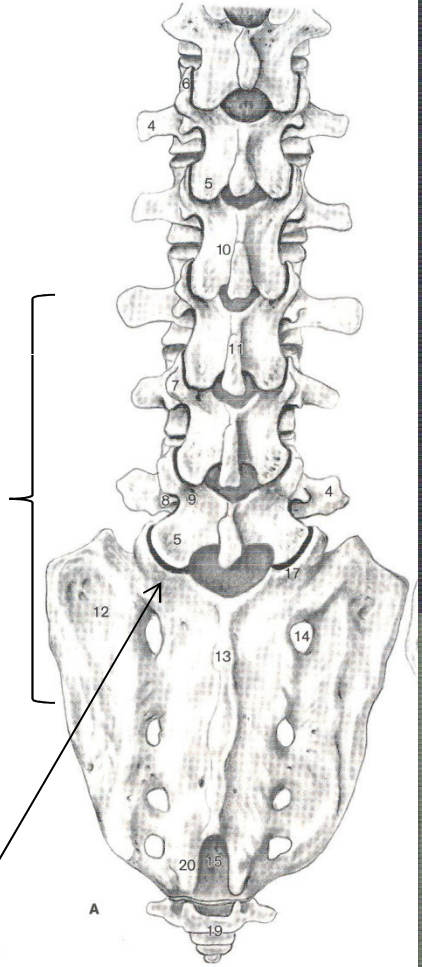
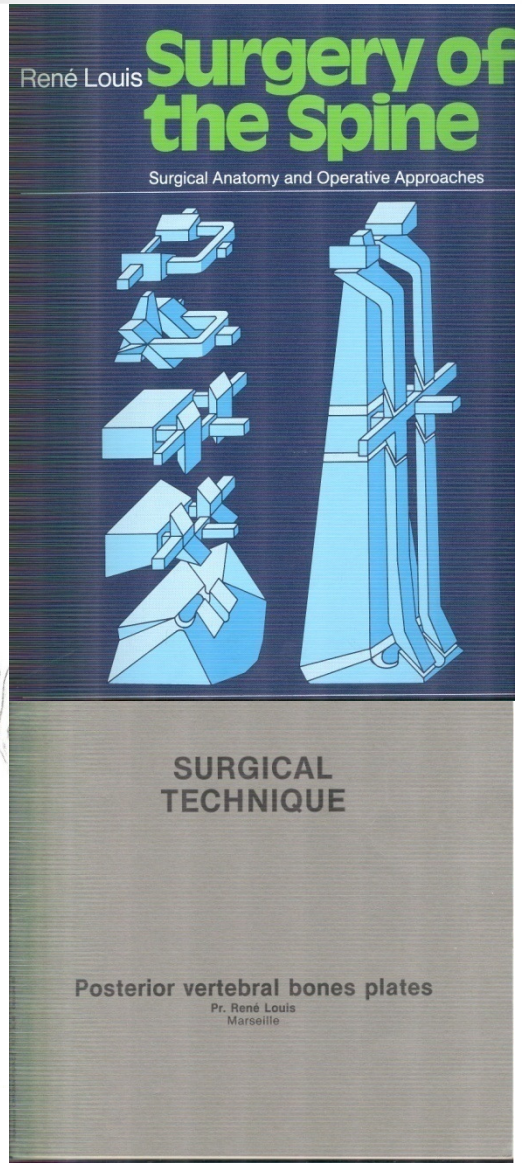


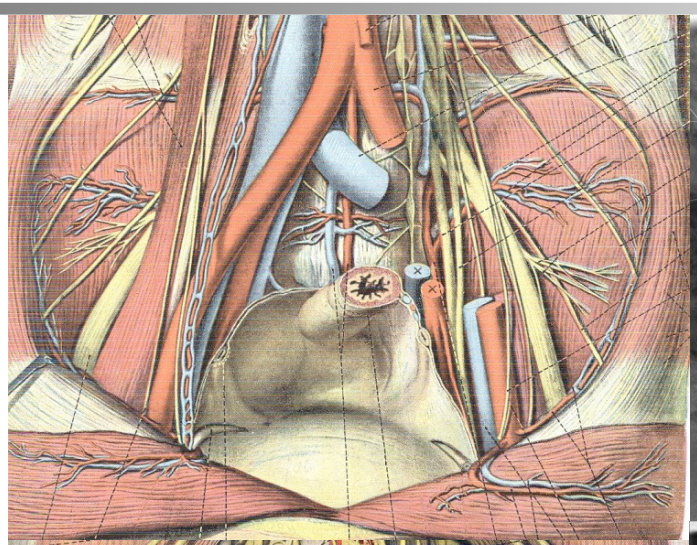
*Fig. 31*
*Lumbosacral pedicles (L 3 to S 2)*

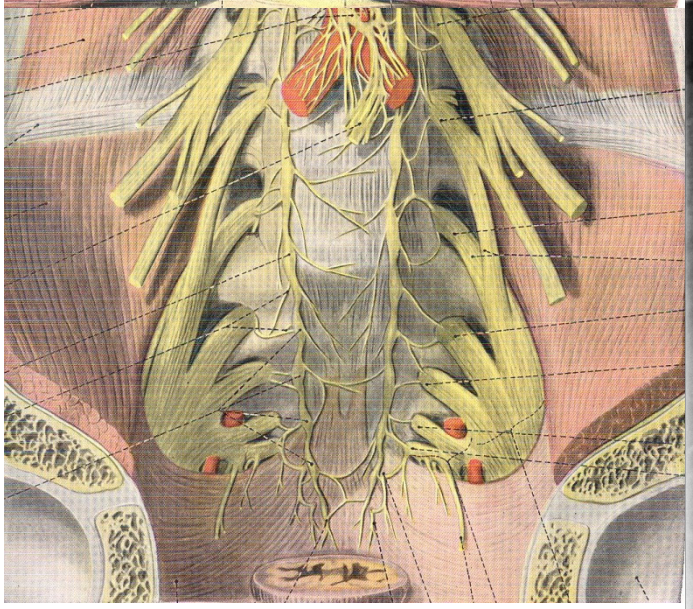


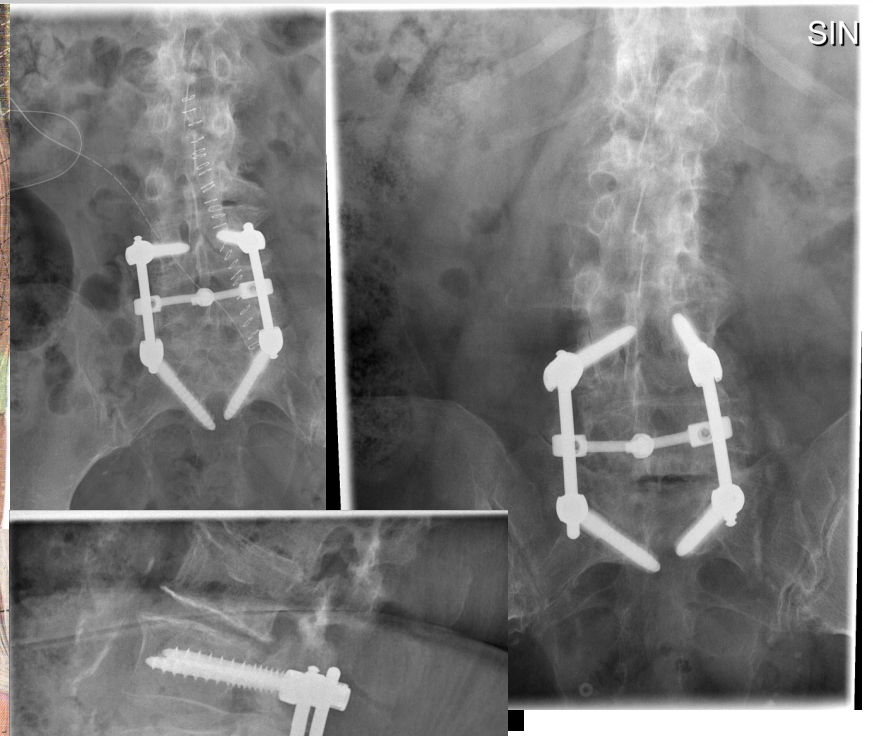

Proc mamillaris or the lower corner of the upper facet



# Surgical anatomy of the Lumbo-sacral (L-S) spine - L3-S2








# *THANK YOU!*