

# Gerinctraumák

IDEGSEBÉSZETI MEGFONTOLÁSOK



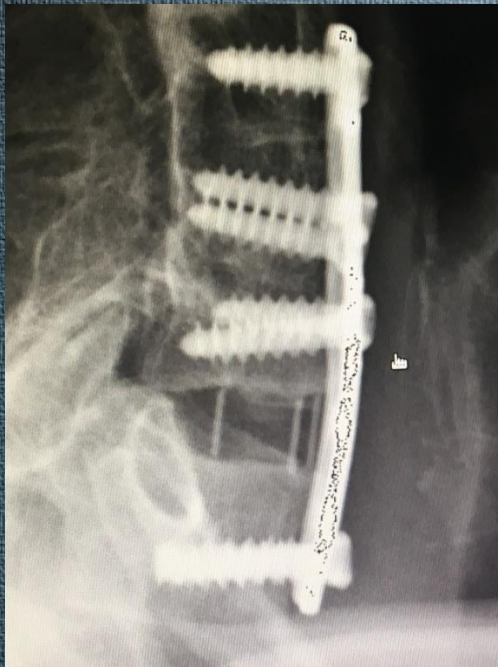
# Statisztika - gerincsérülés

- ▶ Incidencia: 350/1 millió lakos/év (USA)  
Magyarországon kb. 280
- ▶ Elnézett sérülések aránya kb. 3-30%!
- ▶ Gyakran társul
  - ▶ koponya
  - ▶ mellkas
  - ▶ medence
  - ▶ Végtagsérülésekhez
- ▶ Arteriás dissectio ! (CAROTIS, AORTA ABD.)



# Statisztika - gerincsérülés

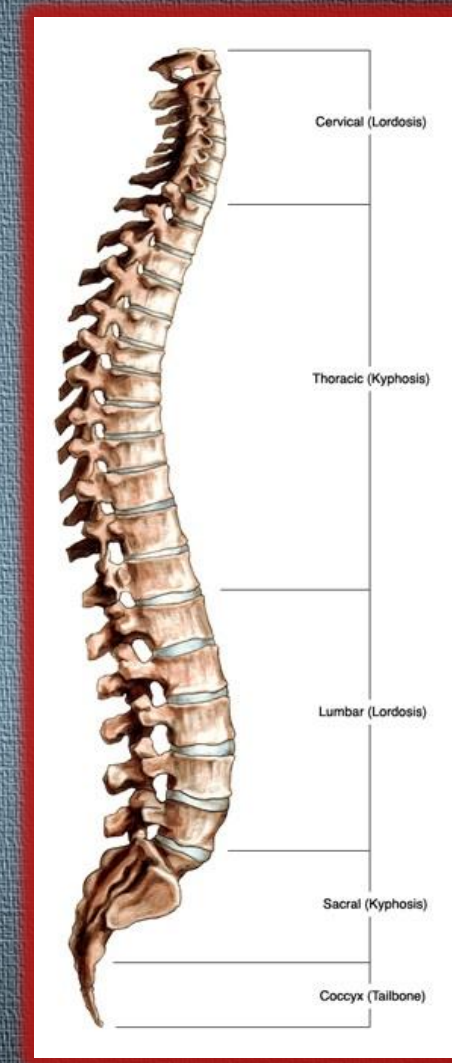
- ▶ 20%-ban jelen van egy második, különálló gerincsérülés





# Statisztika - gerincsérülés

- ▶ 20%-ban jelen van egy második, különálló gerincsérülés
- ▶ felnőtteknél alsó nyaki C.IV-VII, alsó háti Th.X-L.I. (időseknél C.II) a leggyakoribb
- ▶ gyerekkori (5%), felső nyaki C.I.-C.II., felső háti, 40% **SCIWORA**!
  - ▶ [J Trauma](#). 1989 May;29(5):654-64. Spinal cord injury without radiographic abnormality in children--the SCIWORA syndrome. [Pang D](#)<sup>1</sup>, [Pollack IF](#).





# statisztika- gerincvelő-sérülés

- ▶ Az összes gerincsérülés **5-10%**-a jár gerincvelő sérüléssel (Mo. 2-5/100.000 lakos)
- ▶ Alacsony incidencia- magas prevalencia
- ▶ **55%** nyaki szakaszon fordul elő
- ▶ **50%** közlekedési baleset következménye
- ▶ A gerincvelő sérülések **50%** komplett harántlézió!
- ▶ Gerincvelő sérülés esetén **25-50%**-ban társul koponya sérülés
- ▶ Súlyos koponyasérülteknél **5-10%**-ban társul gerincvelő-sérülés





# Prehospitalis ellátás





# Prehospitalis ellátás – legjobb esetben...

- ▶ Megelőzés- **elsődleges** preventio
- ▶ Baleset elkerülése
- ▶ Sérülés csökkentése

**ThinkFirst**  
National Injury Prevention Foundation





# Prehospitalis ellátás...nil nocere!

- ▶ Megelőzés - **másodlagos** preventio
- ▶ Gerincsérültként kezeljük:
  - ▶ Koponya
  - ▶ Polytraumatizált
  - ▶ Közlekedési baleset
  - ▶ Sport vagy szabadidős tevékenység
  - ▶ Magasból esett
  - ▶ Súlyos munkahelyi baleset





# Prehospitalis ellátás...nil nocere!

- ▶ Minden gerincsérültet  
INSTABIL gerincsérültként kezelünk!
- ▶ Gerinc sérülés gyanúja esetén a nyaki,  
háti gerincet instabilnak kell tekinteni  
amíg az ellenkezője be nem bizonyosodik!





# Prehospitalis ellátás

- ▶ Immobilisatio (BACKBOARD, do NOT remove the helmet in the field! , Stiff Neck- nyaki gerinc stabilitásának megítélése)
- ▶ Gyors neuro status
- ▶ Oxigenisatio fenntartása (intubatio, O<sub>2</sub>)
  - ▶ légúti elzáródás
  - ▶ Mm.Intercostales, diaphrag. paralyzed
  - ▶ Tudatzavar
  - ▶ C-spine!!!
- ▶ Tensio fenntartása  
(Dopamin, Volumen...,MAST)





# Combined medical and surgical treatment after acute spinal cord injury: results of a prospective pilot study to assess the merits of aggressive medical resuscitation and blood pressure management

FERNANDO L. VALE M.D., JENNIFER BURNS M.D. , AMIE B. JACKSON M.D. AND MARK N. HADLEY M.D.

**MAP > 85 mmHg**

Prospective report on 77 acute SCI patients who received aggressive interventions to maintain MAP 85 mmHg for 7 days. Recovery at 1 year was reportedly enhanced compared with expected outcomes for this cohort.

**J Neurosurgery 87: 239-246, 1997**



# Gerincvelő sérült kezelésének szempontjai, ellátás menete

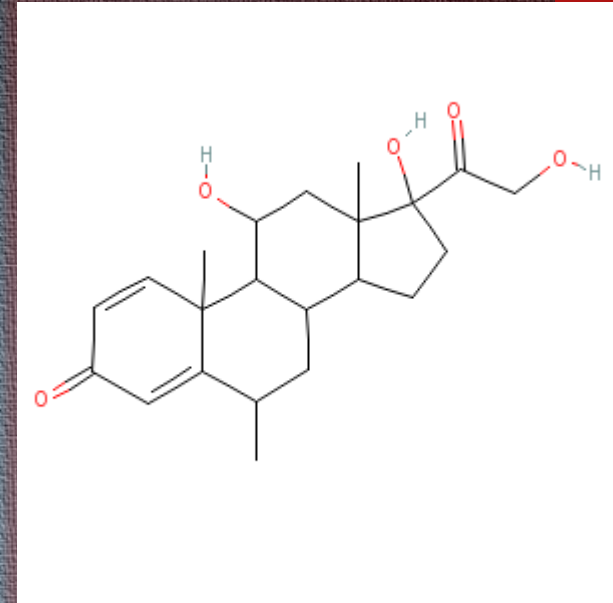
- ▶ Rövidtávú (ITO) –perfusio fenntartása, oxigenisatio, gyógyszeres kezelés (steroid?, anticoagulatio?)
- ▶ Hosszútávú (Rehabilitáció)
- ▶ Időleges rögzítés  
Diagnosis (rtg, CT,MRI)  
Decompressio, repositio (skeletalis húzás, műtéti repositio)  
Végleges rögzítés ( MŰTÉT, CHENEAU korzett, MIAMI-J, HALO)



# A Clinical Practice Guideline for the Management of Patients With Acute Spinal Cord Injury: Recommendations on the Use of Methylprednisolone Sodium Succinate

Our recommendations were:

- ▶ (1) “We suggest not offering a 24-hour infusion of high-dose MPSS to adult patients who present after 8 hours with acute SCI”;
- ▶ (2) “We suggest a 24-hour infusion of high-dose MPSS be offered to adult patients **within 8 hours of acute SCI as a treatment option**”; and
- ▶ (3) “We suggest not offering a 48-hour infusion of high-dose MPSS to adult patients with acute SCI.”





# Thromboprophylaxis

...We suggest commencing anticoagulant thromboprophylaxis **within the first 72 hours after injury**, if possible, in order to minimize the risk of venous thromboembolic complications during the period of acute hospitalization. (Grade: Weak Recommendation; Low Evidence)



# Diagnosztika

- ▶ RTG diagnosis 70-90%-ban, AP és lateralis, transoral
- ▶ CT csontos strukturák megítélése
- ▶ MRI lágy képletek (discus, ligamentum, vérzés, myelon)

## Indikáció:

- ▶ ha a tünetek alapján várt és a CT- n észlelt sérülések nem korrelálnak
- ▶ Tünetek progrediálnak (kiterjedés vagy súlyosság)

Epiduralis haematoma? contusio?

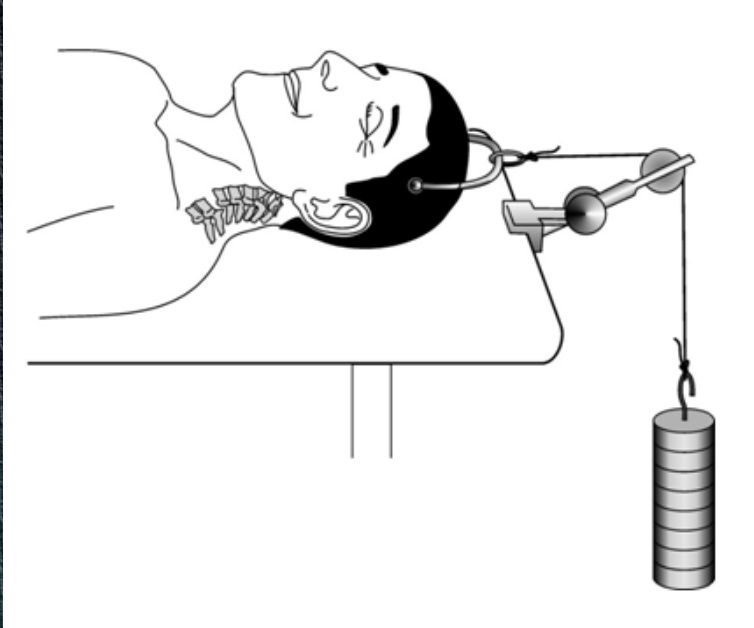
## A Clinical Practice Guideline for the Management of Acute Spinal Cord Injury: Introduction, Rationale, and Scope

We suggest that MRI be performed in adult patients with acute SCI prior to surgical intervention, when feasible, to facilitate improved clinical decision-making. (Grade: Weak Recommendation; Very Low Evidence)

We suggest that MRI should be performed in adult patients in the acute period following SCI, before or after surgical intervention, to improve prediction of neurologic outcome. (Grade: Weak Recommendation; Low Evidence)

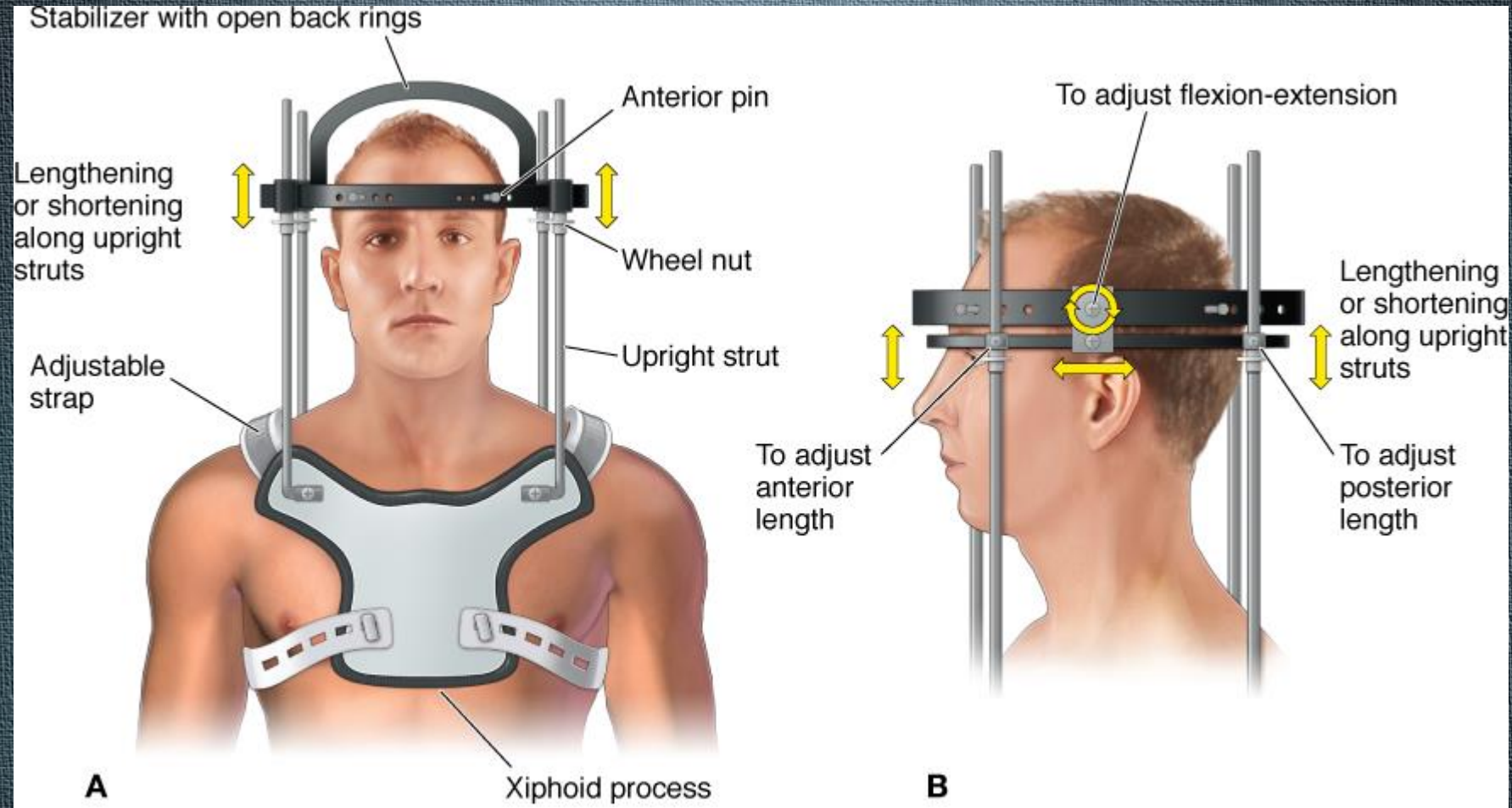


# Decompressio, repositio, stabilisatio





# Decompressio, repositio, stabilisatio





# MŰTÉT

- ▶ Cél: károsodott funkciók lehetőség szerinti javítása, megmaradt funkciók megőrzése, stabilitás helyreállítása, a korai rehabilitáció lehetőségének megteremtése
- ▶ Elemei: decompressio, repositio, stabilisatio
- ▶ Időzítés : AKUT, ha nyílt sérülés, neur. Progressio

Halasztott műtét: harántlaesio esetén az akut műtét a betegen nem segít (cél csak a korai mobilisatio és rehab. feltételeinek megteremtése)



[Global Spine J.](#) 2017 Sep; 7(3 Suppl): 195S–202S. Published online 2017 Sep 5.

## **A Clinical Practice Guideline for the Management of Patients With Acute Spinal Cord Injury and Central Cord Syndrome: Recommendations on the Timing ( $\leq 24$ Hours Versus $>24$ Hours) of Decompressive Surgery**

*Population Description:* Patients with acute SCI.

*Key Question:* Should we recommend early decompressive surgery ( $\leq 24$  hours after injury) for adult patients with acute SCI regardless of neurological level of injury at hospital admission?

*Recommendation 2:* We suggest that early surgery be offered as an option for adult acute SCI patients regardless of level.

*Quality of Evidence:* Low

*Strength of Recommendation:* Weak



[J Neurotrauma](#). 2015 Sep 15;32(18):1385-92. doi: 10.1089/neu.2014.3767. Epub 2015 Apr 22.

**Neurological Recovery after Traumatic Cervical Spinal Cord Injury Is Superior if Surgical Decompression and Instrumented Fusion Are Performed within **8 Hours versus 8 to 24 Hours after Injury**: A Single Center Experience.**

[Jug M](#)<sup>1</sup>, [Kežar N](#)<sup>2</sup>, [Vesel M](#)<sup>1</sup>, [Al Mawed S](#)<sup>1</sup>, [Dobrovec M](#)<sup>1</sup>, [Herman S](#)<sup>1</sup>, [Bairdvić FF](#)<sup>3,4</sup>.



# Felosztás - neurológiai károsodás súlyossága szerint

- ▶ **Komplett laesio**- a sérülés szintjétől számított három szegmentumtól caudalisabban semmiféle motoros vagy sensoros funkció nincs
- ▶ **Inkomplett laesio**
  - ▶ **Central cord syndrome** (motoros deficit FV>AV )
  - ▶ **Brown-Sequard syndrome** (cord hemisection. **Azonos** oldalon: motoros kiesés, propiocepcio és vibratioérzés kiesés. **Ellenoldal**: disszociált érzészavar- hő fájdalom két segmentummal lejjebb
  - ▶ **Anterior cord syndrome** ( **a. spin ant.** területe paraplegia+ disszociált érzészavar: hő és fájdalom kiesett, kétpont diszkrimináció, ízületi helyzetérzés megtartott) *A legrosszabb prognózis*
  - ▶ **Posterior cord syndrome** (ritka, nyak és FV enyhébb paresise, érzészavara)



# Spinalis shock

Általában két teljesen eltérő értelemben használjuk:

- ▶ Gerincvelősérülést követő **hypotensio** (SBP~ 80mmHg)
  - ▶ Vegetatív idegrendszer sympathicus tónusvesztés
    - ▶ Csökkenő értónus
    - ▶ Bradycardia
  - ▶ Csökkenő izomtónus                      relatív hypovolaemia
  - ▶ Társuló sérülések miatti vérzés      valódi hypovolaemia
- ▶ Minden **neurológiai functio** teljes időleges elvesztése



# Spinalis shock

- ▶ A sérülés pillanatában létrejöhet
- ▶ Rossz prognosztikai faktor
- ▶ Flaccid plegia, areflexia, atonia
- ▶ Tartama: néhány perc - néhány hét
- ▶ 99 %-ban 24 óra alatt lezajlik
- ▶ Spinalis reflexek visszatérte jelzi az állapot végét (pl. bulbocavernosus reflex)



# ASIA/IMOP és AIS

- ▶ Állapotfelmérési adatlap
- ▶ Klinikai és tudományos igényű feldolgozásra alkalmas pontrendszer
- ▶ American Spinal Injury Association: International standards for neurological classification of spinal cord injury, revised 2000. 6th ed American Spinal Injury Association, Chicago, IL, 2000.
- ▶ youtube: <https://www.youtube.com/watch?v=hO9hADODTw8>



Examiner Name \_\_\_\_\_ Signature \_\_\_\_\_

REV 11/15



## Muscle Function Grading

- 0 = total paralysis  
 1 = palpable or visible contraction  
 2 = active movement, full range of motion (ROM) with gravity eliminated  
 3 = active movement, full ROM against gravity  
 4 = active movement, full ROM against gravity and moderate resistance in a muscle specific position  
 5 = (normal) active movement, full ROM against gravity and full resistance in a functional muscle position expected from an otherwise unimpaired person  
 5\* = (normal) active movement, full ROM against gravity and sufficient resistance to be considered normal if identified inhibiting factors (i.e. pain, disuse) were not present  
 NT = not testable (i.e. due to immobilization, severe pain such that the patient cannot be graded, amputation of limb, or contracture of > 50% of the normal ROM)

## Sensory Grading

- 0 = Absent  
 1 = Altered, either decreased/impaired sensation or hypersensitivity  
 2 = Normal  
 NT = Not testable

## When to Test Non-Key Muscles:

In a patient with an apparent AIS B classification, non-key muscle functions more than 3 levels below the motor level on each side should be tested to most accurately classify the injury (differentiate between AIS B and C).

| Movement                                                                                  | Root level |
|-------------------------------------------------------------------------------------------|------------|
| <b>Shoulder:</b> Flexion, extension, abduction, adduction, internal and external rotation | C5         |
| <b>Elbow:</b> Supination                                                                  |            |
| <b>Elbow:</b> Pronation                                                                   | C6         |
| <b>Wrist:</b> Flexion                                                                     |            |
| <b>Finger:</b> Flexion at proximal joint, extension.                                      | C7         |
| <b>Thumb:</b> Flexion, extension and abduction in plane of thumb                          |            |
| <b>Finger:</b> Flexion at MCP joint                                                       | C8         |
| <b>Thumb:</b> Opposition, adduction and abduction perpendicular to palm                   |            |
| <b>Finger:</b> Abduction of the index finger                                              | T1         |
| <b>Hip:</b> Adduction                                                                     | L2         |
| <b>Hip:</b> External rotation                                                             | L3         |
| <b>Hip:</b> Extension, abduction, internal rotation                                       | L4         |
| <b>Knee:</b> Flexion                                                                      |            |
| <b>Ankle:</b> Inversion and eversion                                                      |            |
| <b>Toe:</b> MP and IP extension                                                           |            |
| <b>Hallux and Toe:</b> DIP and PIP flexion and abduction                                  | L5         |
| <b>Hallux:</b> Adduction                                                                  | S1         |

## ASIA Impairment Scale (AIS)

**A = Complete.** No sensory or motor function is preserved in the sacral segments S4-5.

**B = Sensory Incomplete.** Sensory but not motor function is preserved below the neurological level and includes the sacral segments S4-5 (light touch or pin prick at S4-5 or deep anal pressure) AND no motor function is preserved more than three levels below the motor level on either side of the body.

**C = Motor Incomplete.** Motor function is preserved at the most caudal sacral segments for voluntary anal contraction (VAC) OR the patient meets the criteria for sensory incomplete status (sensory function preserved at the most caudal sacral segments (S4-S5) by LT, PP or DAP), and has some sparing of motor function more than three levels below the ipsilateral motor level on either side of the body.  
 (This includes key or non-key muscle functions to determine motor incomplete status.) For AIS C – less than half of key muscle functions below the single NLI have a muscle grade  $\geq 3$ .

**D = Motor Incomplete.** Motor incomplete status as defined above, with at least half (half or more) of key muscle functions below the single NLI having a muscle grade  $\geq 3$ .

**E = Normal.** If sensation and motor function as tested with the ISNCSCI are graded as normal in all segments, and the patient had prior deficits, then the AIS grade is E. Someone without an initial SCI does not receive an AIS grade.

**Using ND:** To document the sensory, motor and NLI levels, the ASIA Impairment Scale grade, and/or the zone of partial preservation (ZPP) when they are unable to be determined based on the examination results.



## Steps in Classification

The following order is recommended for determining the classification of individuals with SCI.

### 1. Determine sensory levels for right and left sides.

The sensory level is the most caudal, intact dermatome for both pin prick and light touch sensation.

### 2. Determine motor levels for right and left sides.

Defined by the lowest key muscle function that has a grade of at least 3 (on supine testing), providing the key muscle functions represented by segments above that level are judged to be intact (graded as a 5).

Note: in regions where there is no myotome to test, the motor level is presumed to be the same as the sensory level, if testable motor function above that level is also normal.

### 3. Determine the neurological level of injury (NLI)

This refers to the most caudal segment of the cord with intact sensation and antigravity (3 or more) muscle function strength, provided that there is normal (intact) sensory and motor function rostrally respectively.

The NLI is the most cephalad of the sensory and motor levels determined in steps 1 and 2.

### 4. Determine whether the injury is Complete or Incomplete.

(i.e. absence or presence of sacral sparing)

If voluntary anal contraction = **No** AND all S4-5 sensory scores = 0 AND deep anal pressure = **No**, then injury is **Complete**.

Otherwise, injury is **Incomplete**.

### 5. Determine ASIA Impairment Scale (AIS) Grade:

Is injury **Complete**?

NO



If YES, AIS=A and can record ZPP (lowest dermatome or myotome on each side with some preservation)

Is injury **Motor Complete**?

NO



If YES, AIS=B  
 (No=voluntary anal contraction OR motor function more than three levels below the motor level on a given side, if the patient has sensory incomplete classification)

Are **at least half** (half or more) of the key muscles below the neurological level of injury graded 3 or better?

NO



AIS=C

YES



AIS=D

If sensation and motor function is normal in all segments, AIS=E

Note: AIS E is used in follow-up testing when an individual with a documented SCI has recovered normal function. If at initial testing no deficits are found, the individual is neurologically intact; the ASIA Impairment Scale does not apply.



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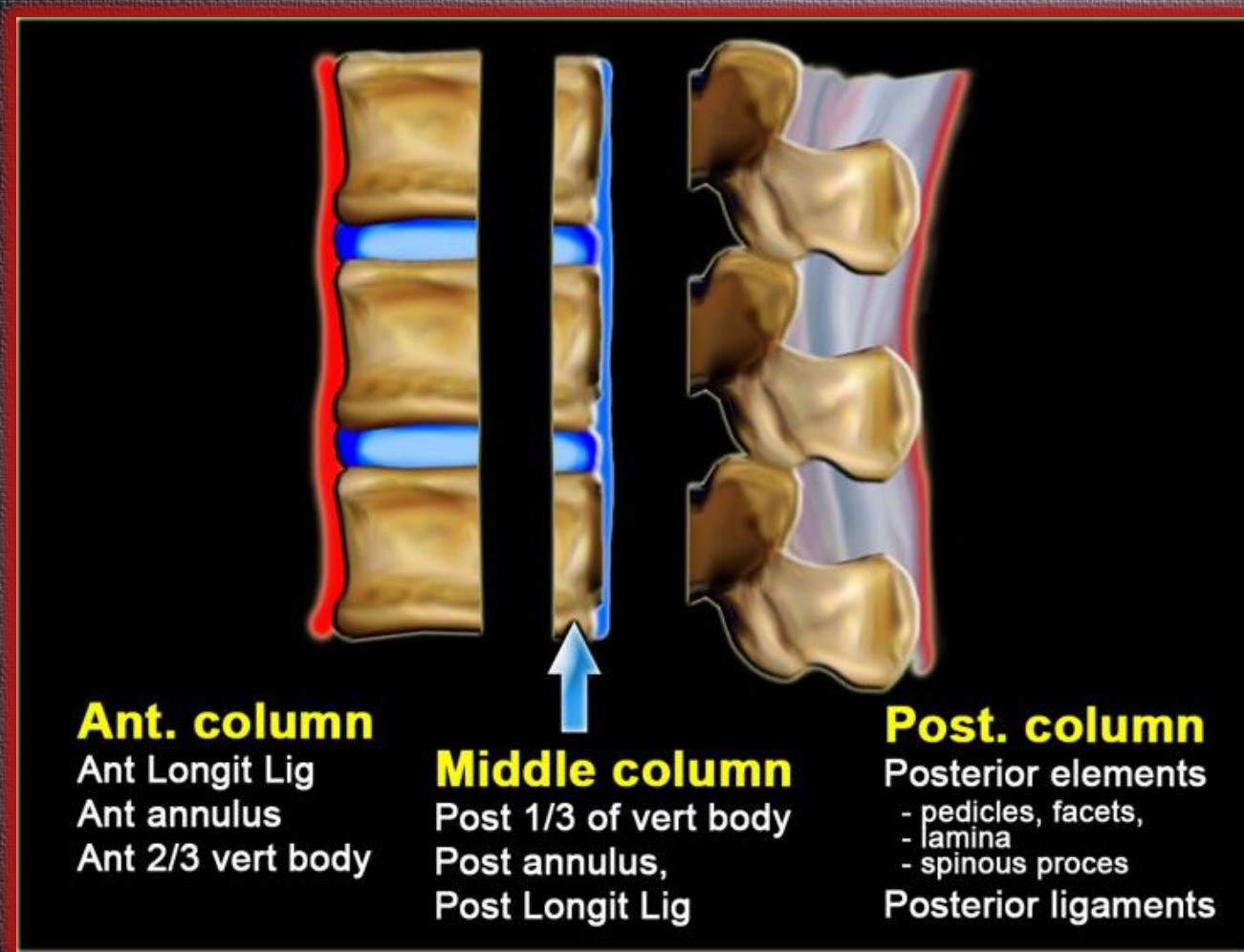


# Felosztás- morfológiai

- ▶ Felső nyaki gerincszakasz- **Anderson-D'Alonzo**, Effendi, Veres
- ▶ Alsó nyaki gerincsérülések- **McAfee** , Cooper
- ▶ Th-L gerinc osztályozása- **Denis**-féle „hármasszlop” elmélet, 1983
- ▶ TLICS
- ▶ AO classification  
(Magerl, Harms, Gertzbein, Aebi és Nazarian, 1992)

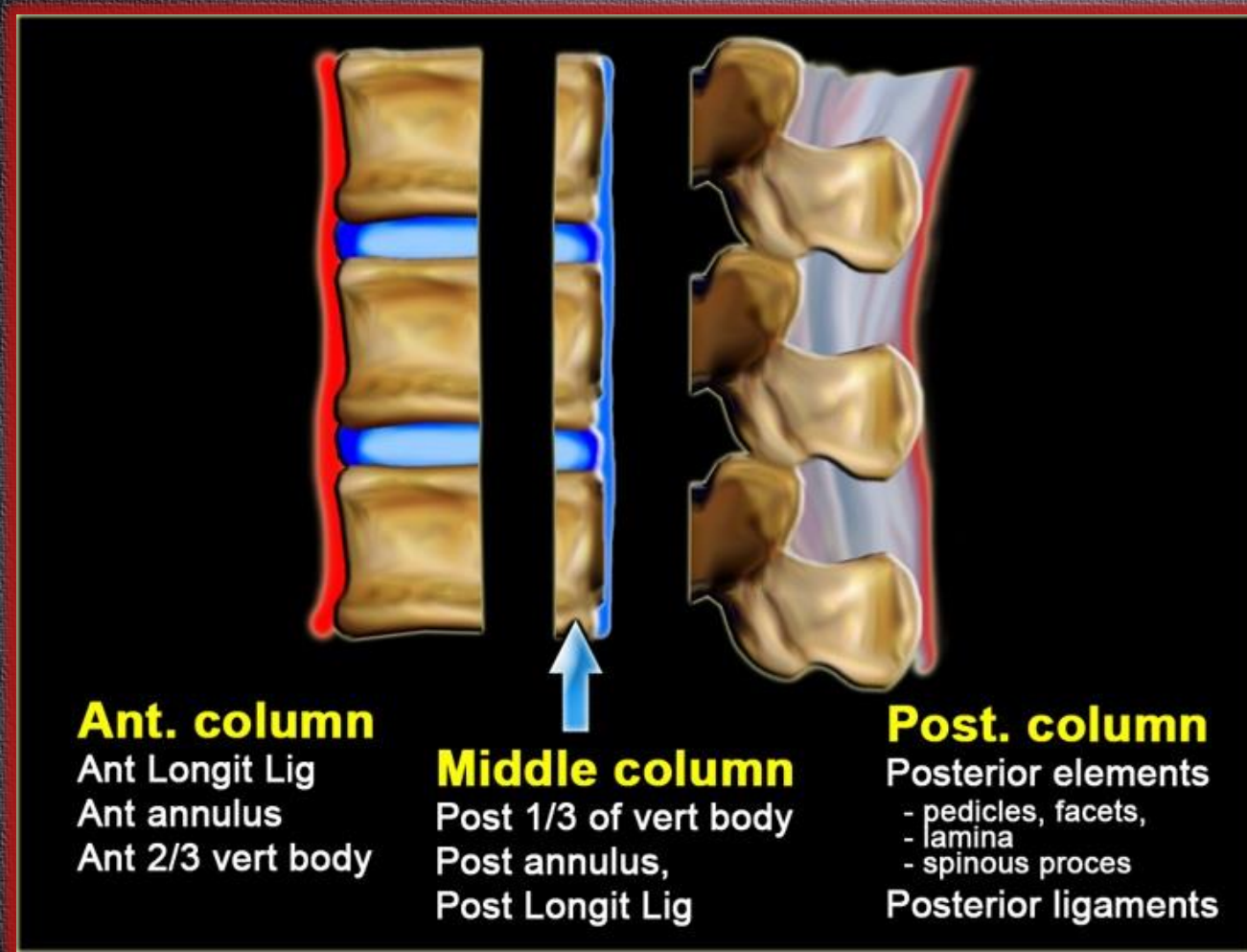


# DENIS-féle „hármass oszlop” koncepció





# DENIS-féle „hármass oszlop” koncepció



- I. **Compressio**  
csak az elülső oszlop
- II. **Burst**  
I-II-III oszlop
- III. **Seat-belt típus**  
Chance és  
discoligamentér  
sérülések
- IV. **Dislocált törések**



# Stabil-instabil

Önmagában kérdéses a jelentése, mire vonatkoztatjuk?

- ▶ direkt csontos stabilitás?
- ▶ neurológiai stabilitás?
- ▶ hosszútávú (ligamentosus)stabilitás?

Mennyire korrellál a sebészi beavatkozás igényével?

TLICS (Posterior Ligamentous Complex fogalma, sebészi beavatkozás szükségét meghatározó score rendszer)



# Spine injury - TLICS Classification

## Thoraco-Lumbar Injury Classification and Severity score

by Clark West, Stefan Roosendaal, Joost Bot and Frank Smithuis

Department of Radiology and Regional Spinal Cord Injury Center of the Delaware Valley, Thomas Jefferson University Hospital, Philadelphia and the Radiology Department of the Free University Medical Center and the Academical Medical Center, Amsterdam

### Introduction

Morphology  
Posterior Ligamentous Complex  
Neurological status  
Modifiers

### Morphology

Simple compression  
Burst fracture  
Translation - Rotation  
Distraction

### Additional Cases

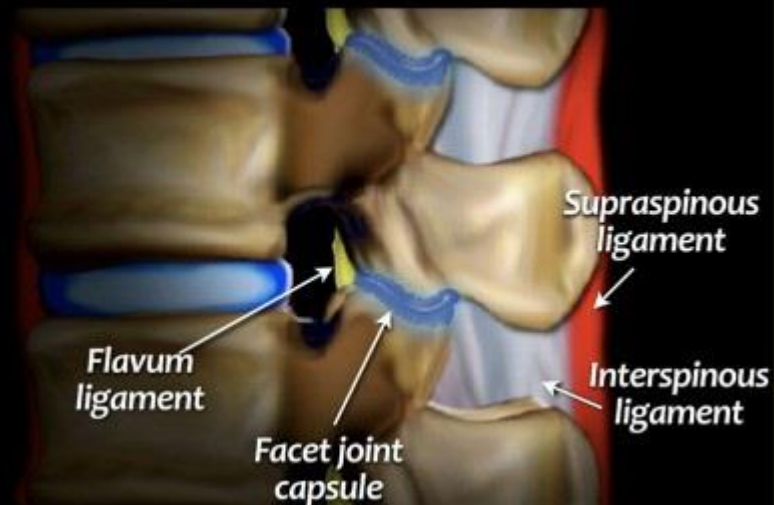
Publication date May 1, 2015

The Thoraco-Lumbar Injury Classification and Severity score (TLICS) is a classification system for thoracolumbar spine injuries, designed to assist in clinical management.

Unlike other classifications, the TLICS is an easy scoring system that depicts the features important in predicting spinal stability, future deformity, and progressive neurologic compromise.

TLICS also facilitates appropriate treatment recommendations.

### PLC - Posterior Ligamentous Complex



### TLICS 3 independent predictors

|                 |                                                  |                           |       |                           |
|-----------------|--------------------------------------------------|---------------------------|-------|---------------------------|
| 1               | <b>Morphology</b><br>immediate<br>stability      | - Compression             | 1     | - Radiographs<br>- CT     |
|                 |                                                  | - Burst                   | 2     |                           |
|                 |                                                  | - Translation/rotation    | 3     |                           |
|                 |                                                  | - Distraction             | 4     |                           |
| 2               | <b>Integrity of PLC</b><br>longterm<br>stability | - Intact                  | 0     | - MRI                     |
|                 |                                                  | - Suspected               | 2     |                           |
|                 |                                                  | - Injured                 | 3     |                           |
| 3               | <b>Neurological status</b>                       | - Intact                  | 0     | - Physical<br>examination |
|                 |                                                  | - Nerve root              | 2     |                           |
|                 |                                                  | - Complete cord           | 2     |                           |
|                 |                                                  | - Incomplete cord         | 3     |                           |
|                 |                                                  | - Cauda equina            | 3     |                           |
| <b>Predicts</b> |                                                  | - <b>Need for surgery</b> | 0 – 3 | - nonsurgical             |
|                 |                                                  |                           | 4     | - surgeon's<br>choice     |
|                 |                                                  |                           | > 4   | - surgical                |





**AOSPINE**

- ▶ MAGERL classificatio rendszerezett áttekintése
- ▶ a törés **morphologia** és a therapiás döntéshozást érintő **klinikai tényezők** figyelembevételével létrehozott rendszeren alapuló konszenzus
- ▶ validált rendszer





- ▶ Upper Cervical Classification System
- ▶ Subaxial Classification System
- ▶ Thoracolumbar Classification System
- ▶ Sacral Classification system





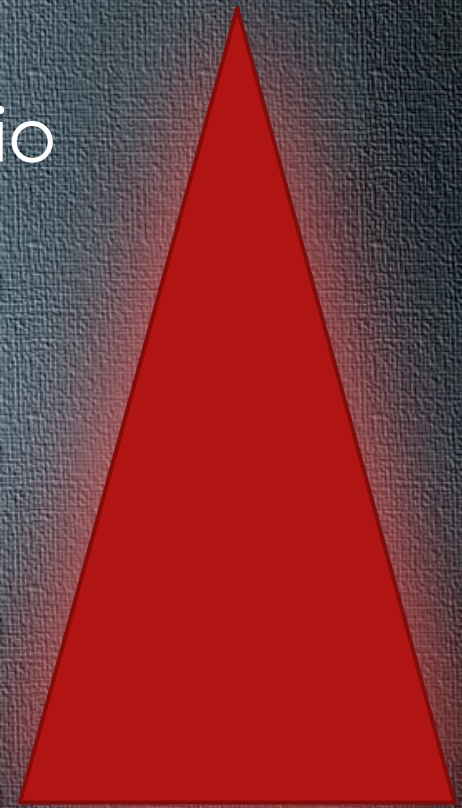
# AOSPINE

- ▶ Upper Cervical Classification System
- ▶ Subaxial Classification System
- ▶ Thoracolumbar Classification System
- ▶ Sacral Classification system

**A** compressio

**B** distractio

**C** rotatio,  
translatio,  
separatio







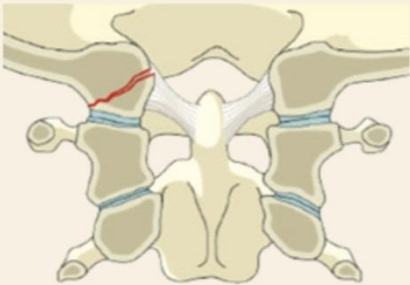
- ▶ Upper Cervical Classification System
- ▶ Subaxial Classification System
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- ▶ Sacral Classification system



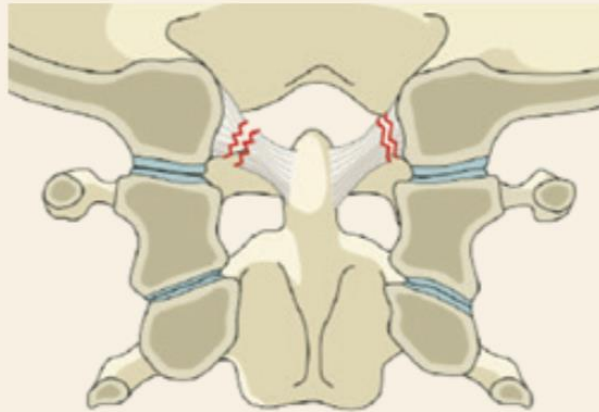


## I. Occipital Condyle and Craniocervical junction

**Type A.** Isolated bony injury (condyle)



**Type B.** Non-displaced ligamentous injury (craniocervical)



!

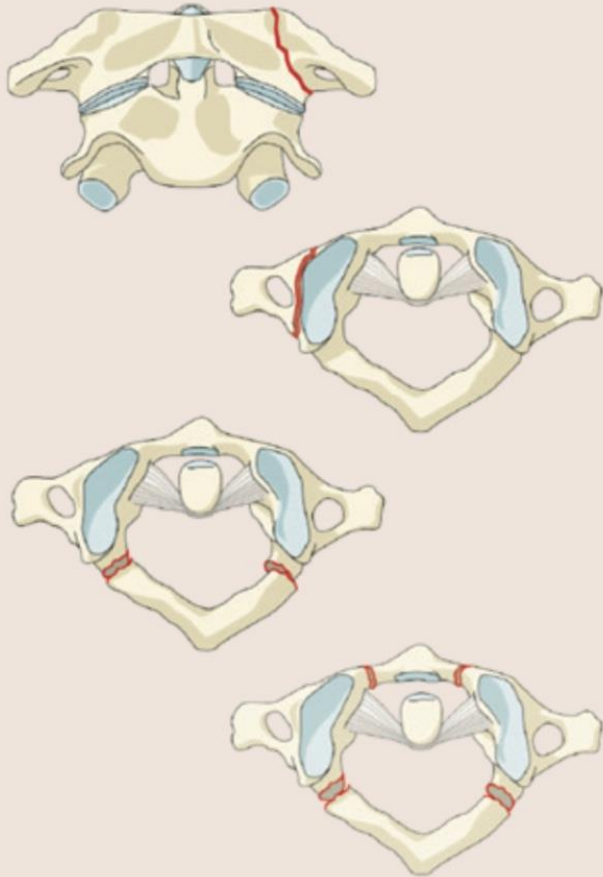
**Type C.** Any injury with displacement on spinal imaging



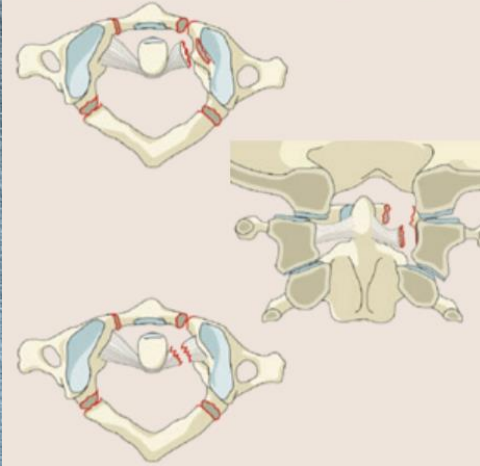


## II. C1 Ring and C1-2 Joint

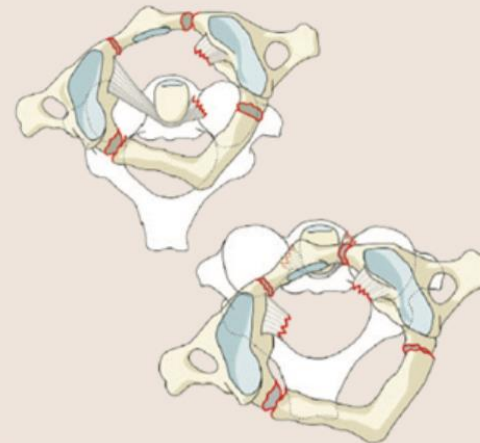
### Type A. Isolated bony only (arch)



### Type B. Ligamentous injury (transverse atlantal ligament)



### Type C. Atlantoaxial instability / Translation in any plane

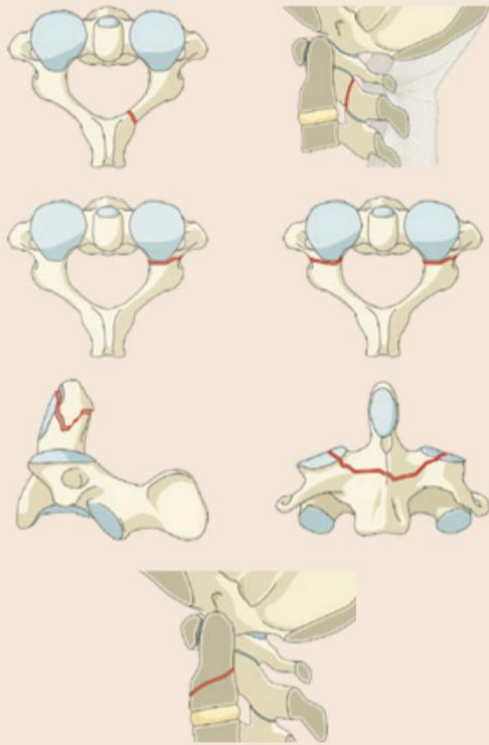


M2 Injury with  
significant potential  
for instability



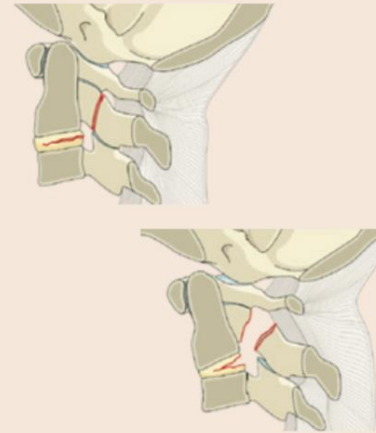
### III. C2 and C2-3 Joint

**Type A.** Bony injury only without ligamentous, tension band, discal injury

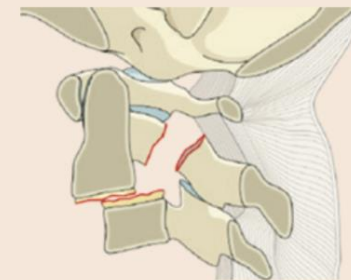


**M1** Injury at High Risk of Non-Union with cons. Tx

**Type B.** Tension band / Ligamentous injury with or without bony injury



**Type C.** Any injury that leads to vertebral body translation in any directional plane



Instabil!



## Upper Cervical Spine Fractures Overview

**I. Occipital condyle and occipital cervical joint complex injuries**

**II. C1 ring and C1-2 joint complex injuries**

**III. C2 and C2-3 joint complex injuries**

### Type A.

Bony injury only

- Without significant ligamentous, tension band, discal injury
- Stable injuries

### Type B.

Tension band/ligamentous injury

- With or without bony injury
- No complete separation of anatomic integrity
- Stable or unstable depending on injury specifics

### Type C.

Translation injury

- Any injury with significant translation in any directional plane and separation of anatomic integrity
- Unstable injuries

## Neurology

| Type | Neurological                      |
|------|-----------------------------------|
| N0   | Neurologically intact             |
| N1   | Transient neurologic deficit      |
| N2   | Radiculopathy                     |
| N3   | Incomplete Spinal cord injury     |
| N4   | Complete spinal cord injury       |
| NX   | Unexaminable patient              |
| +    | Continued spinal cord compression |

## Modifiers

| Type | Description                                             |
|------|---------------------------------------------------------|
| M1   | Injuries at High Risk of Non-Union with Nonoperative Tx |
| M2   | Injury with significant potential for instability       |
| M3   | Patient Specific Factors Affecting Tx                   |
| M4   | Vascular Injury or Abnormality Affecting Tx             |

## Classification nomenclature

Atlanto-occipital dissociation with a complete spinal cord injury.



I.e. Type II Odontoid fr

I.e. Myel substance injury, Displaced C1 unilat lat mass, Displ >6.9mm of lat masses



Hátsó atlantoaxialis transzartikularis  
csavaros rögzítés (Magerl- Sonntag)

Harms- Goel C1-CII fusio

Elülső dens csavarozás

Occipito-cervicalis desis



## AOSpine Subaxial Classification System

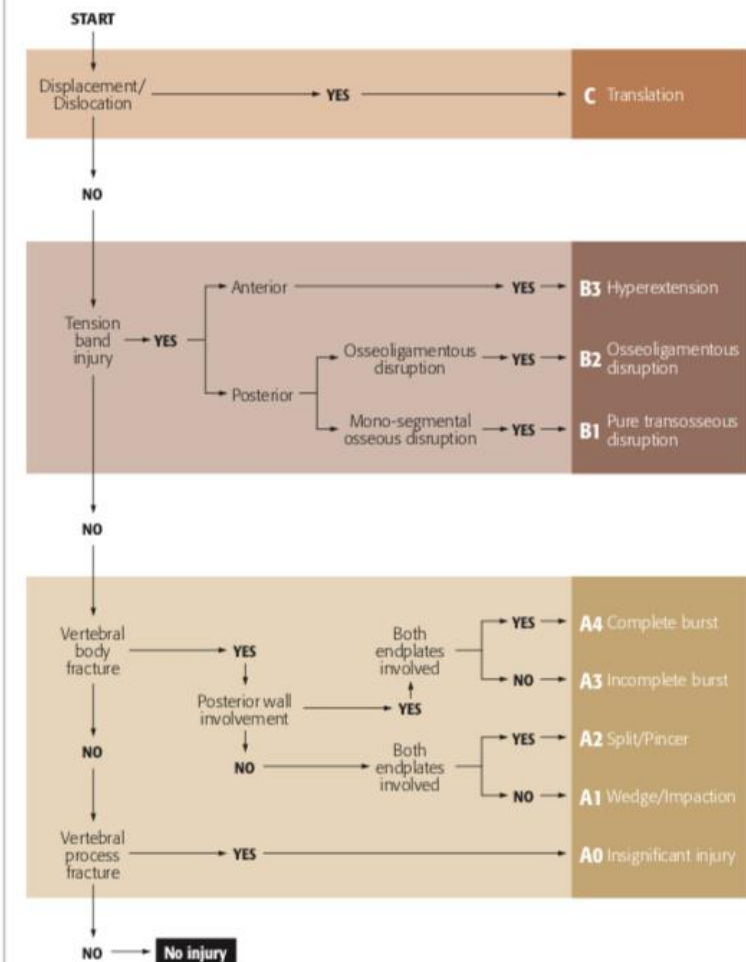


Contact: [research@aospine.org](mailto:research@aospine.org)

Further information: [www.aospine.org/classification](http://www.aospine.org/classification)

## AOSpine Subaxial Classification System

### Algorithm for Morphologic Classification







65é ffi,  
intox cum alc,  
arccal előre esett  
AV pleg, FV paresis  
(...Bal FV )  
CT





TR 5000.00048828125  
TE 70

F

Szeletvast: 2.8  
Soroz: STIR TSE sag

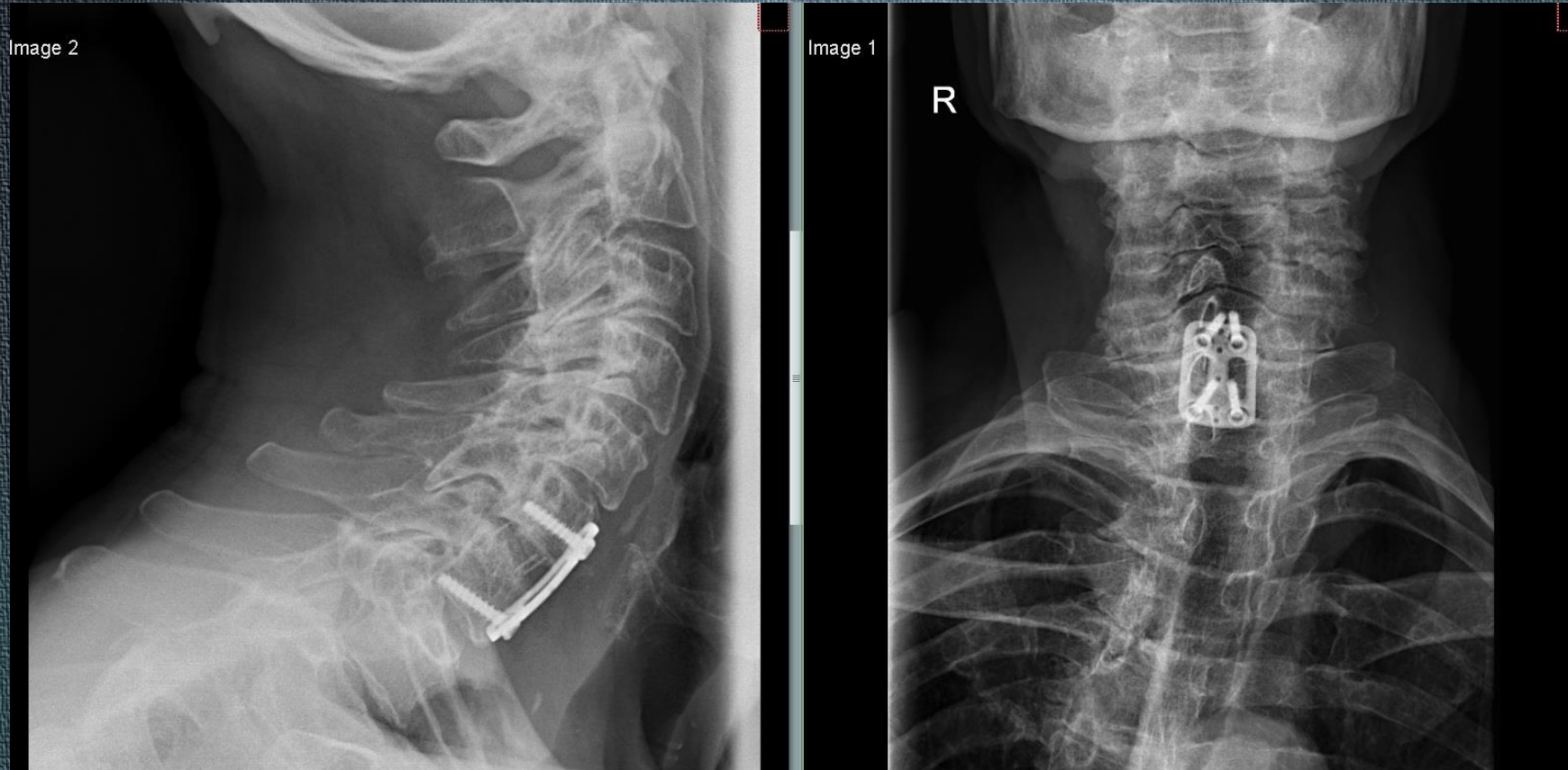


TR 3399.73828125  
TE 148.509

F

Szeletvast: 3  
Soroz: T2W TSE

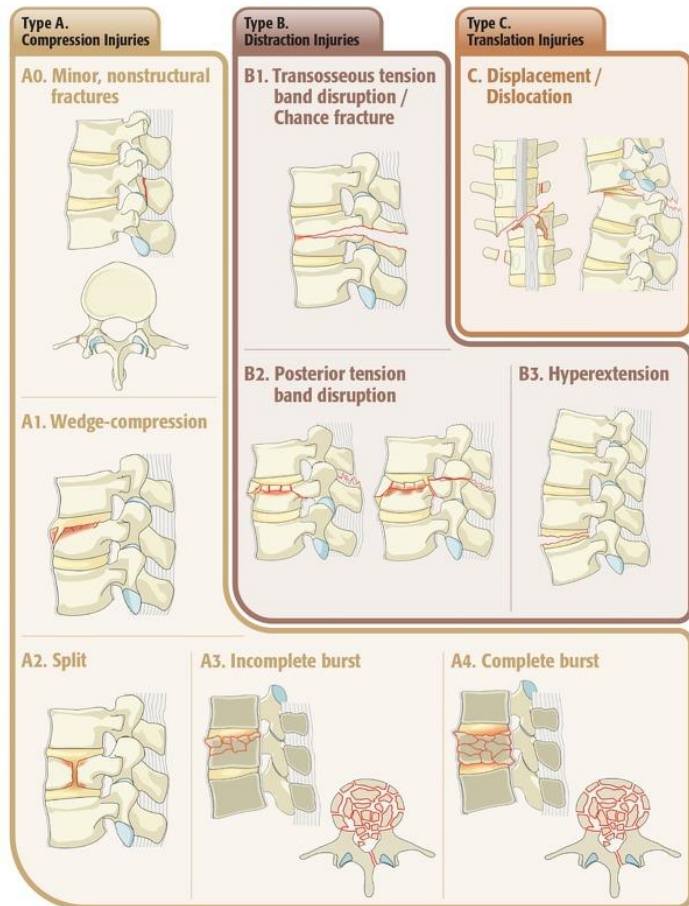




ACF CVI-CVII, javuló klinikum, emissiokor járókerettel közlekedik,  
hat hetes kontroll segédeszköz nélkül, panaszmentes



## AOSpine Thoracolumbar Classification System

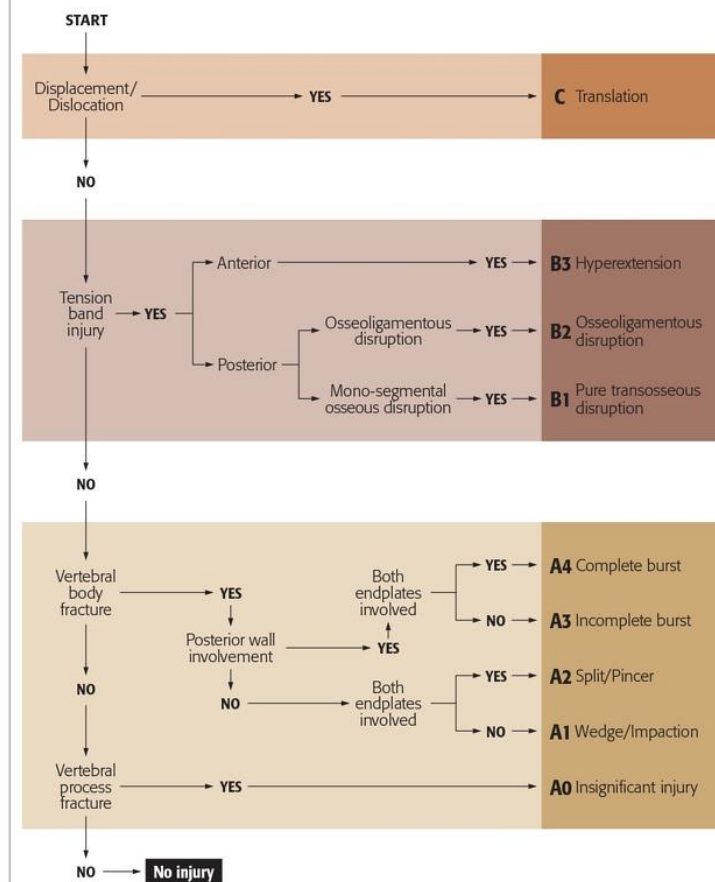


Contact: [research@aospine.org](mailto:research@aospine.org)

Further information: [www.aospine.org/TLclassification](http://www.aospine.org/TLclassification)

## AOSpine Thoracolumbar Classification System

### Algorithm for Morphologic Classification





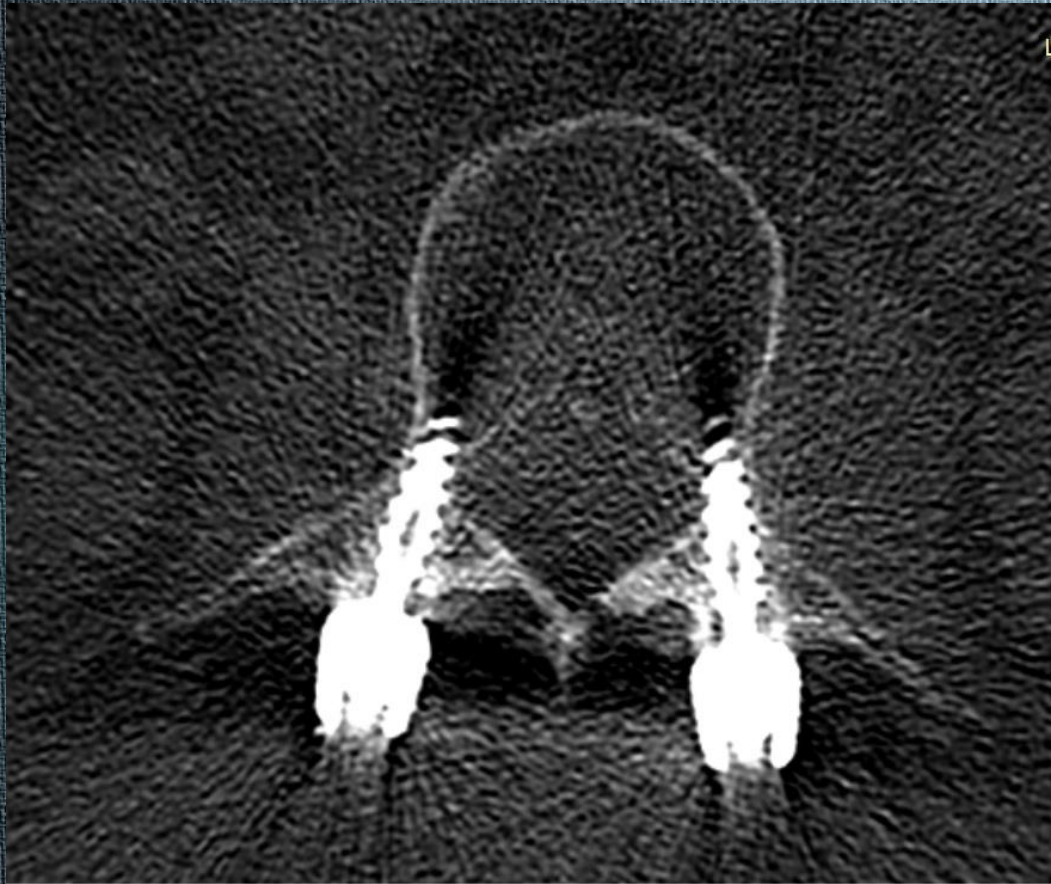
# Thoracolumbalis gerincsérülések Műtéti megoldások





# Thoracolumbalis gerincsérülések

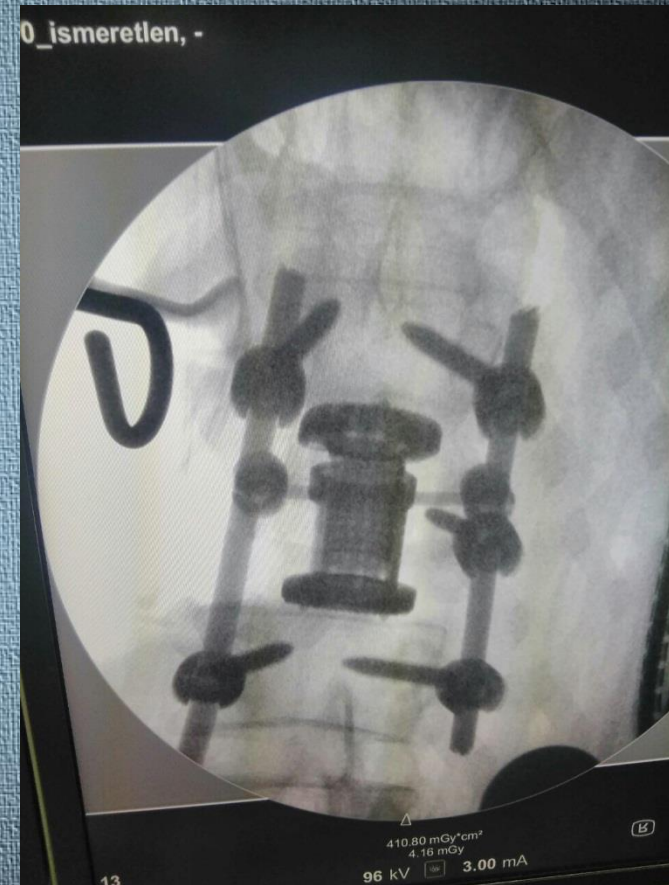
## Műtéti megoldások





# Thoracolumbalis gerincsérülések

## Kombinált műtéti megoldások





# Osteoporosis

## Csonttömeg és csontsűrűség

- ▶ életkor - csonttömeg és ásványianyag (BMD) tartalom csökken (Bone Mineral Density)
- ▶ BMD csúcs 25-30 között
- ▶ Az első postmenopausalis decád során 2-3% hanyatlás, corticalis csontállomány 10%, trabecularis állomány 30%
- ▶ BMD- csont erőssége- törésrizikó predictor
- ▶ WHO definíció: BMD T-score  $\leq -2.5$



# Osteoporosis epidemiologia és problémák

- ▶ Poroticus csigolyacompressiók a leggyakoribb insuffientia törések
- ▶ A betegek kb. 35%-a tünetei súlyossága miatt hospitalisatiora kerül
- ▶ Ezek kb. fele ápolási osztályos elhelyezést igényel
- ▶ 1.5x mortalitási ráta 2évre számolva
- ▶ Gyakori komorbiditások



# OP Th-L törések

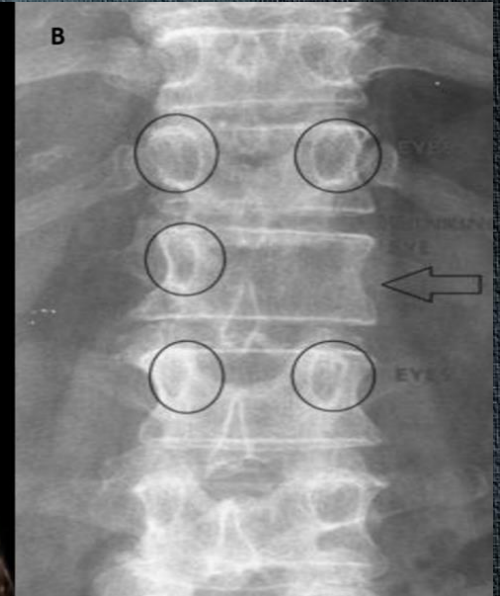
## anamnesis és fizikális vizsgálat

- ▶ Összehasonlítás!
- ▶ Főként hátul jelentkező fájdalom, melyet az érintett csigolya **proc.spin.** nyomása provokál
- ▶ Előre is sugározhat, főként gyöki irritatio esetén
- ▶ Mechanikai jellegű(állás, hajlás fokozza )
- ▶ Neurológiai jelek és tünetek ritkán



# Differential diagnosis- tumor anamnesis...

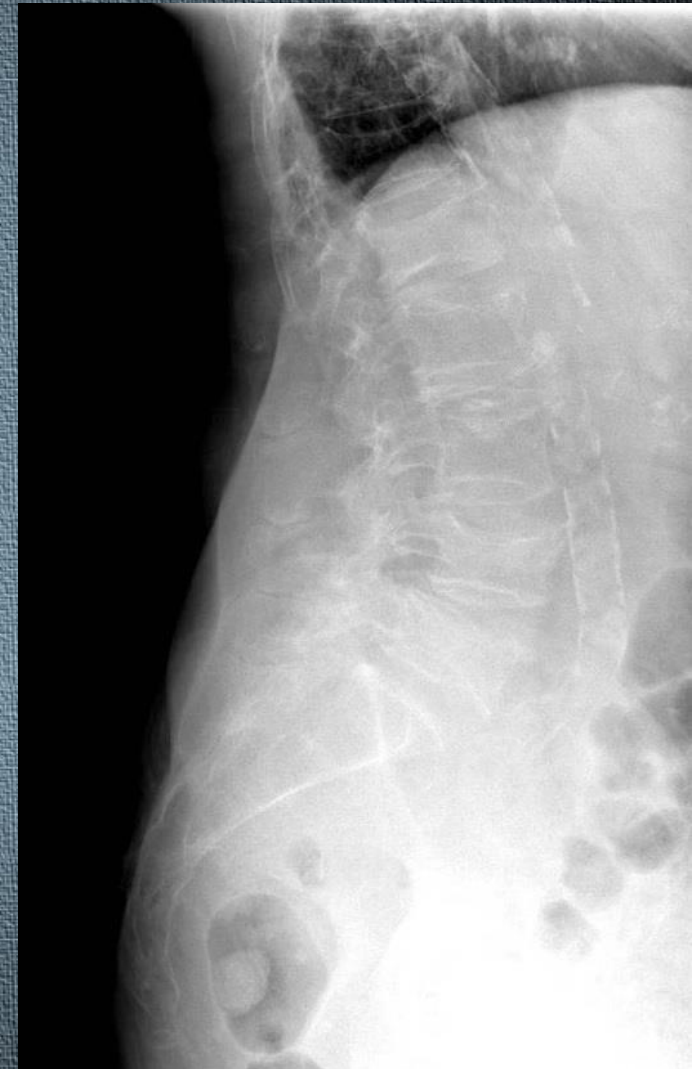
- ▶ Th. V. feletti törés
- ▶ Atipusos radiológiai lelet (blastic-lytic jelleg, kortikális érintettség, pediculus destructio- **winking owl sign** )
- ▶ Lágyrész massa a laesio körül
- ▶ Többszörös, nem szomszédos csogolyák
- ▶ Myeloma multiplex/plasmocytoma  
nem feltétlenül jelenik meg





# Képző röntgenvizsgálat

- ▶ Def: 20%-ot meghaladó (vagy  $\geq 4\text{mm}$ ) magasságvesztés
- ▶ Ágyéki szakasz - gyakran bikonkáv
- ▶ Háti szakasz - gyakori ékcsigolya





# Képalkotó

## MRI

- ▶ Poroticus comp. klinikai gyanújakor hasznos, de nem definitív
- ▶ Elkülönítés

nem gyógyult (és vsz. fájdalmas), oedemas törés



gyógyult (és vélhetően fájdalomatlan) chr. Compressio  
Fat Supressed Short Tau Inversion Recovery





# Képkötő

## CT scan

- ▶ Törésvonal élessége: acut -chr.
- ▶ Stress fractura? (törésvonal)
- ▶ Kiváló a sebészi tervezéshez és kontrollhoz (cement augment. csavar ins.)





# Konzervatív kezelés

Átfogó és agresszív kezelés lenne indokolt!

- ▶ Pharmacotherapy- 50% incidenciacsökkenés és még jelentősebb a többszörös fracurák tekintetében
- ▶ Aktivitás fokozása, fájdalomcsillapítók, fűzők
- ▶ Antiresorptive therapy (hormonpótlás, calcitonin, raloxifen, denosumab, és a bisphosphonátok)
- ▶ Anabolikus therapy (teriparatide)
- ▶ Fizikotherapy



# Sebészi kezelés

Indikációk- fájdalom, deformitás, neur.deficit

- ▶ A betegek 2/3-ának spontán javulnak a panaszai
- ▶ A napi tevékenységet korlátozó vagy ágyhoz kötöttséget okozó fájdalom
- ▶ 4-6 hét hatástalan konz. Th,
- ▶ Nyitott gerincműtétet igénylő, neur. Tünetekkel járó compressiok viszonylag ritkák



# Sebészi kezelés

## sebészi szempontok

- ▶ Cél: deformitas megszüntetése, fragmentek stabilizálása
- ▶ A korcsoport **kevésbé ideális** bármiféle sebészi beavatkozásra, így a lehető legminimalisabban invazívnak kell lennie, a lehető legkisebb potenciális kockázati rátával
- ▶ Sebészi komplikációk arányát egyes statisztikák **80%-ra** teszik!
- ▶ Instrumentáció: több pontos rögzítés, nagyobb csavarok, cement augmentáció, kampók, drótok stb...



# Sebészi kezelés

## Vertebroplasty vs. Kyphoplasty



Balloon inserted into fractured vertebra



Balloon inflated inside damaged vertebra



Special material injected into fractured vertebra



Special material hardens, stabilizing vertebra



# COCHRANE SYST REV

Cochrane database syst rev,2018 Percutaneous vertebroplasty for osteoporotic vertebral compression fracture.

## ► AUTHORS' CONCLUSIONS:

- Based upon high- to moderate-quality evidence, our updated review **does not support a role for vertebroplasty for treating acute or subacute osteoporotic vertebral fractures in routine practice**. We found no demonstrable clinically important benefits compared with placebo (sham procedure) and subgroup analyses indicated that the results did not differ according to duration of pain  $\leq$  6 weeks versus  $>$  6 weeks. Sensitivity analyses confirmed that open trials comparing vertebroplasty with usual care are likely to have overestimated any benefit of vertebroplasty. Correcting for these biases would likely drive any benefits observed with vertebroplasty towards the null, in keeping with findings from the placebo-controlled trials. Numerous serious adverse events have been observed following vertebroplasty. However due to the small number of events, we cannot be certain about whether or not vertebroplasty results in a clinically important increased risk of new symptomatic vertebral fractures and/or other serious adverse events. Patients should be informed about both the high- to moderate-quality evidence that shows no important benefit of vertebroplasty and its potential for harm.



Osteoporos Int. 2019 Feb;30(2):287-298. doi: 10.1007/s00198-018-4804-2. Epub 2019 Jan 12.

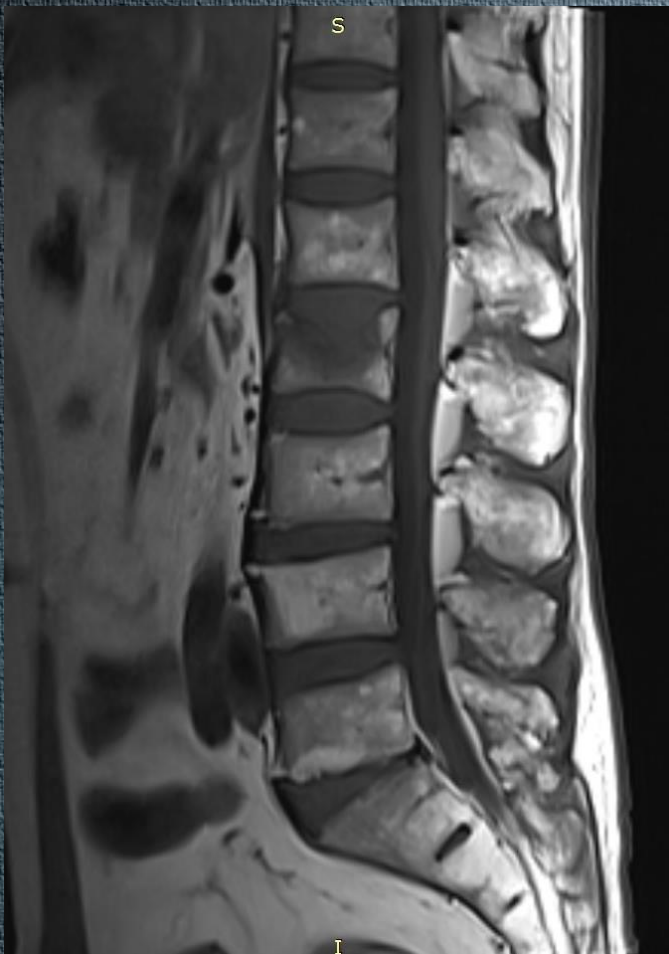
## **Which is the best treatment of osteoporotic vertebral compression fractures: balloon kyphoplasty, percutaneous vertebroplasty, or non-surgical treatment? A Bayesian network meta-analysis.**

Zhu RS1, Kan SL1, Ning GZ2, Chen LX3, Cao ZG1, Jiang ZH1, Zhang XL4, Hu W5.

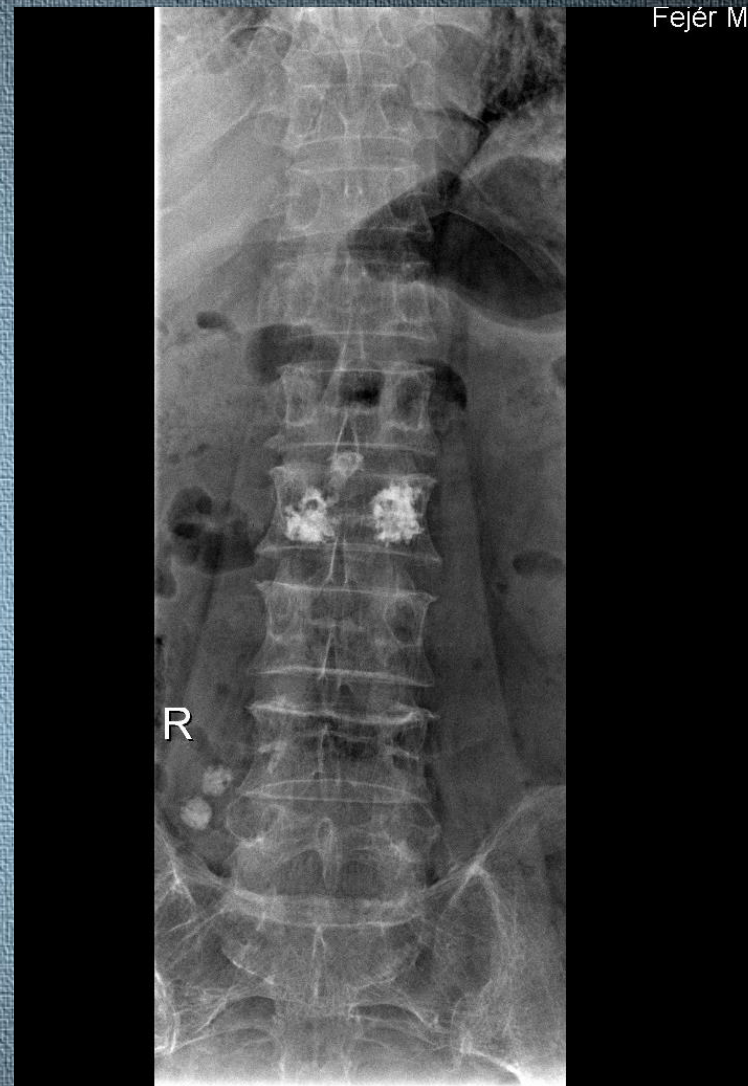
### ► CONCLUSION:

**PVP** was the most effective method for improving pain, functional status, and quality of life (based on EQ-5D). BK emerged as the best intervention for decreasing the risk of subsequent vertebral fractures and re-fractures at the treated level. **NST** could be ranked first in reducing adjacent vertebral fractures. The future directions of OVCFs treatment will depend on the outcomes of additional and larger randomized trials in comparing BK with PVP.











# Kontraindikációk

- ▶ Instabil törés
- ▶ Neurológiai deficit
- ▶ Hátsó korticalis törése
- ▶ Infectio
- ▶ Coagulopathia
- ▶ Allergia
- ▶ Vertebra plana



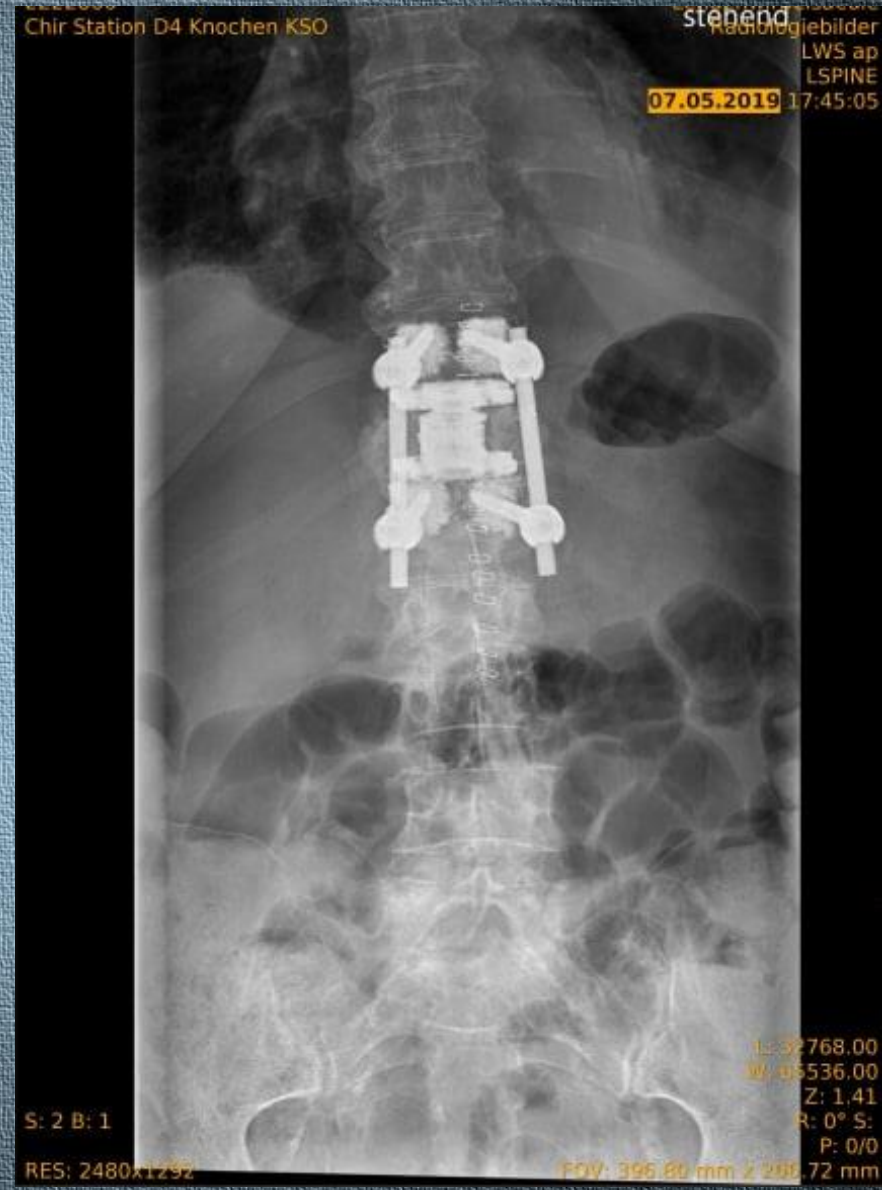
# Hátsó fixációs műtét

## cement augmented transpedicularis csavarok

- ▶ Instabil törések
- ▶ Neurológiai deficit
- ▶ Progr. deformitás
- ▶ Fájdalom
- ▶ Elülső stabilizálás?



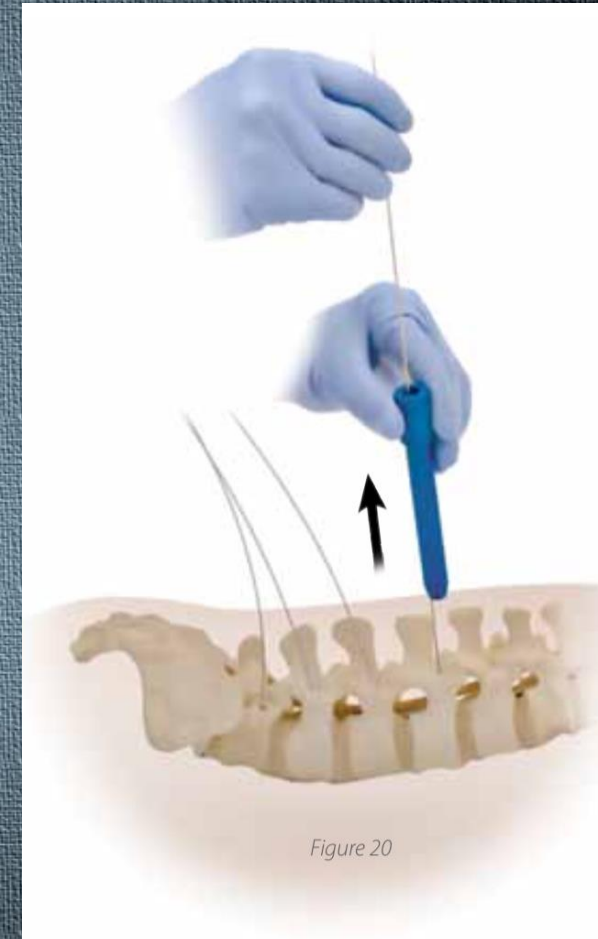
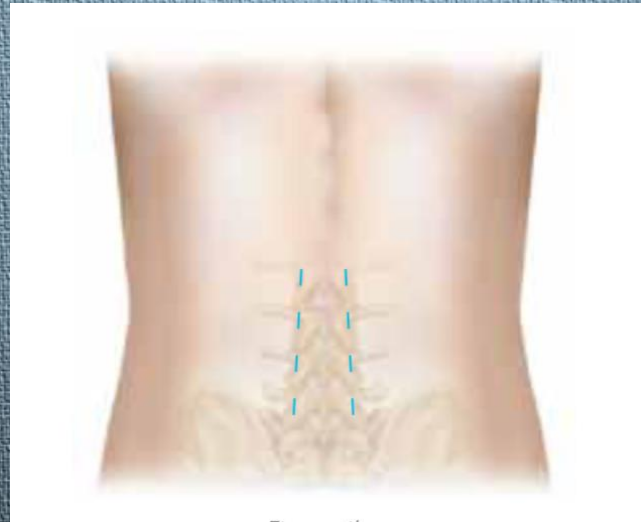






# Jövő?

- ▶ Minimal Invasive Spine Surgery
- ▶ Neuronavigatio
- ▶ O-ARM
- ▶ Robotika





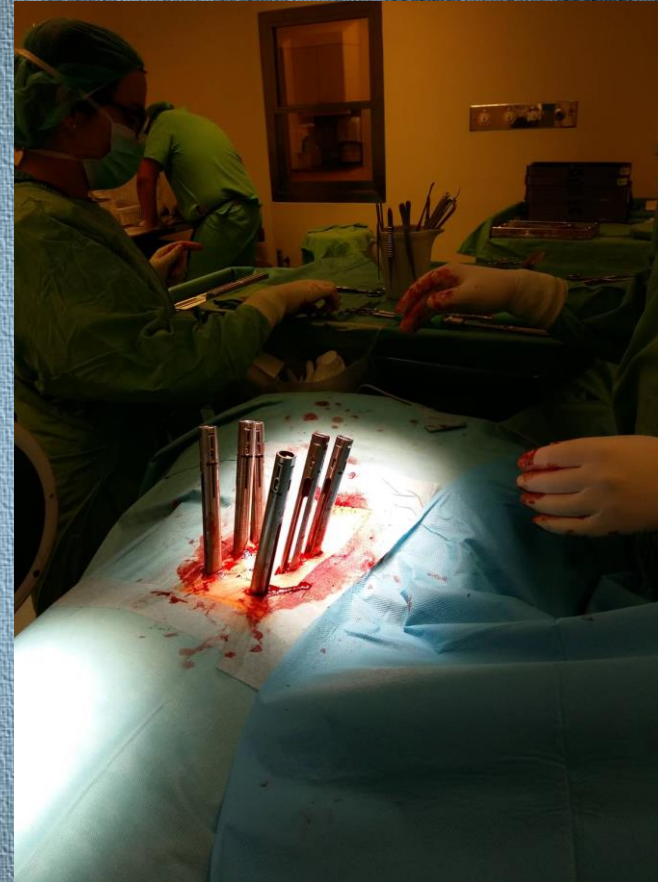








Image 60

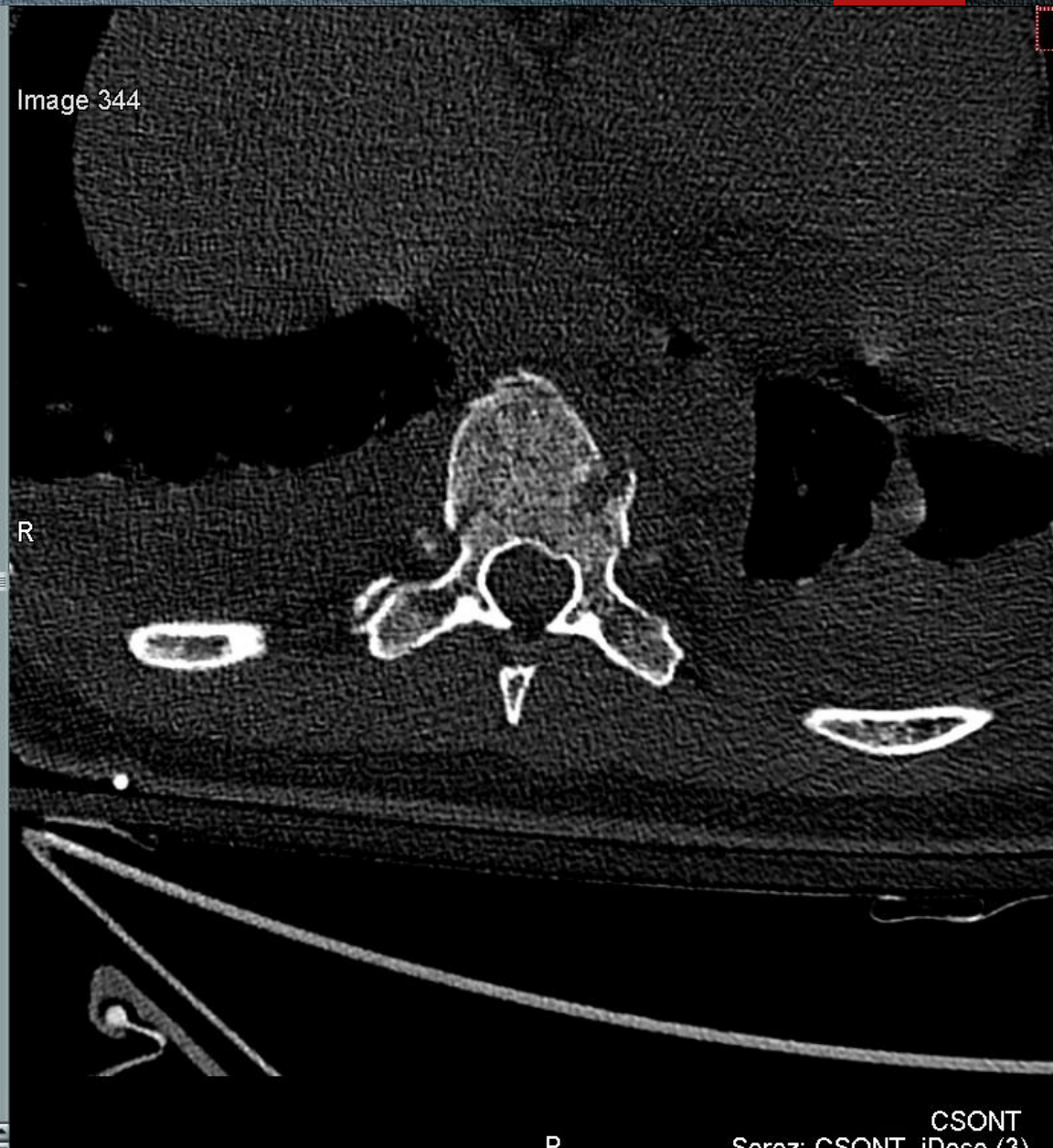
A



Serco: DISCUS  
iDose (4)

Image 344

P R



CSONT  
Serco: CSONT  
iDose (3)



Image 1



KV: 90  
uAs: 6600

Soroz: T026b L-gerinc lat

Image 4



KV: 89.9  
uAs: 6800

Image 5



KV: 89.9  
uAs: 7500

Soroz: T026b L-gerinc lat

Image 6



KV: 51.8  
uAs: 2200



KÖSZÖNÖM A FIGYELMET!