Evaluation of the intervertebral disc in type A thoracolumbar fractures


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Thoracolumbar spine fractures are frequent and may lead to poor functional outcome.

Optimal management remains controversial.

No consensus:
- Criteria of gravity?
- Therapeutic options? (conservative/surgical)
- Surgical approaches?
- Criteria of effective reduction?
- Causes of loss of reduction?
Main controversies

- Notion of disc lesions in Magerl type A fractures:
  - ALIF, disc removal
  - Loss of reduction due to disc lesions
  - Oner placed emphasis on MRI changes of the intervertebral disc and proposed a classification which combines alteration of disc morphology and signal intensity.

Eysel P, Rompe JD, Hopf C, Meinig G. Significance of the intervertebral disk in failed reduction of surgically stabilized fractures of the truncal spine. Unfallchirurg 1994


Purpose of the study

To assess on CT-scan and MRI the initial changes in the intervertebral discs adjacent to type A thoracolumbar fractures in a series of patients submitted to conservative or surgical treatment.
Prospective study with 56 patients diagnosed with 95 type A thoracolumbar fractures.
Conservative treatment (43%) or surgical treatment (57%).
Mean age: 44.3 yo (19-64).
Radiological evaluation consisted of performing CT-Scan and MRI
Initially, within a week of trauma and at a follow-up of two years.
Radiological assessment

- **CT-Scan** analysis included:
  - Fracture pattern characterization (Magerl)
  - Measurement of fractured and adjacent vertebral bodies’ heights in millimeters on midline sagittal images.

- Disc height index = \( D/d \)
- Vertebral height index = \( v/V \)

- 3 measurements:
  - anterior (a)
  - central (c)
  - posterior (p)
Radiological assessment

- MRI
  - Sagittal T2-weighted images
  - Evaluation of disc signal and morphological modifications according to Oner’s classification.
Distribution of thoraco-lumbar fractures according to Magerl
Mean vertebral height was 0.88 ± 0.2 initially and 0.86 ± 0.26 after treatment. Mean disc height was 1.03 ± 0.36 initially and 0.98 ± 0.23 after treatment.

There was no loss of height concerning discs adjacent to Magerl Type A thoracolumbar fractures.

There was a loss of height of the vertebral body, more important in A3 than in A1 fractures.
Results of MRI assessment

- No signal intensity modification was identified.
- Disc morphology was either normal or altered with creeping of discal tissue in the vertebral endplate depression.
  - With the exception of three discs, suprajacent discs were either normal (type 1) or presenting a depression of the superior vertebral endplate responsible for an increased disc height (type 3).
  - Subjacent discs were type 1 except for seventeen discs which were cranial to a second fracture and corresponding type 3 pattern.
- Overall, 98% of the discs were either type 1 or type 3.
Distribution of intervertebral discs according to Oner’s classification

- Suprajacent disc
- Subjacent disc
At final follow-up of 2 years, mean values and observations did not differ.

Disc patterns remained the same, except for two patients with late surgical site infections causing the disc to degenerate.

Mean disc and vertebral heights were respectively 0.97 ± 0.35 and 0.85 ± 0.24 at last follow-up.
Decision-making factors in thoracolumbar fractures should include the evaluation of intervertebral disc integrity as well as an accurate analysis of vertebral endplate depression in order to restore it.

Finally, our study concurs with several investigators to emphasize that disc structural integrity is preserved in type A fractures and that morphological changes most likely correspond to a creeping of the discal tissue in the vertebral endplate depression.

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