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Is There Correlation Between Kyphotic Deformity and Pain in Thoracolumbar Osteoporotic Compression Fractures?

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Introduction

Clinical Context

Thoracolumbar osteoporotic compression fractures are frequent in the elderly and are typically associated with chronic pain and progressive kyphotic deformity. As Korea enters a super-aged society, management of these fractures is crucial.

Research Conflict

While radiographic deformity is generally believed to cause pain, previous studies have shown conflicting evidence regarding the direct relationship between spinal deformity severity and pain intensity.

MATERIALS & METHODS

- **Patients**

Study Design

- Retrospective observational study.
- Period: January 2022 to December 2023.
- Subjects: Patients with single-level thoracolumbar (T10-L2) osteoporotic compression fractures.
- Follow-up: 3 months post-fracture assessment.

Exclusion Criteria

- High-energy trauma or pathologic fractures.
- Multiple or subsequent compression fractures.
- History of vertebroplasty, kyphoplasty, or instrumented fusion surgery.
- Fractures beyond the T10-L2 range.

**All patients were managed with a thoracolumbosacral orthosis (TLSO) for 3 months.*

MATERIALS & METHODS

- **Evaluation of kyphotic deformity**

Standing lateral radiographs were analyzed 3 months after the fracture to measure three key deformity parameters:

1. Local Kyphotic Angle (LKA)

The angle measured between the superior and inferior endplates of the fractured vertebral body

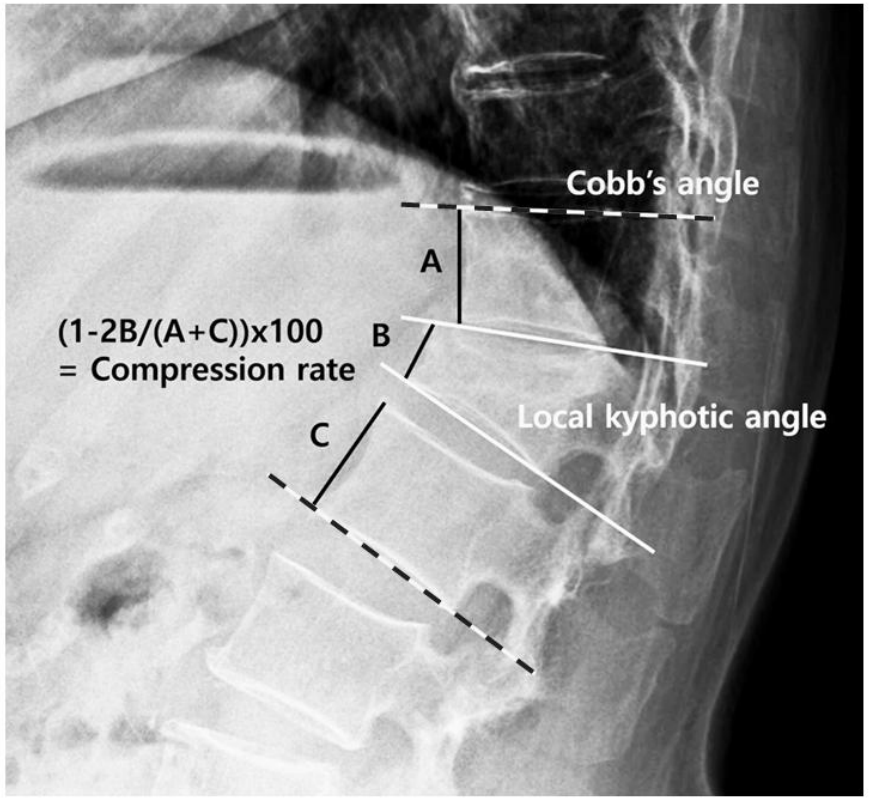
2. Cobb's Angle (CA)

The angle between the superior endplate of the vertebra above and the inf erior endplate of the vertebra below

3. Compression Rate (CR)

Calculated as: **(1 - 2B / (A + C)) × 100%**

Where A and C are the anterior heights of the vertebrae above and below, and B is the anterior height of the fractured vertebra



MATERIALS & METHODS

- Evaluation of pain

Pain Assessment

- **Visual Analog Scale (VAS):** Patient-reported intensity from 0 to 10.
- **Analgesic Use:** Verification of medication prescriptions (Acetaminophen, Tramadol, NSAIDs) and frequency.

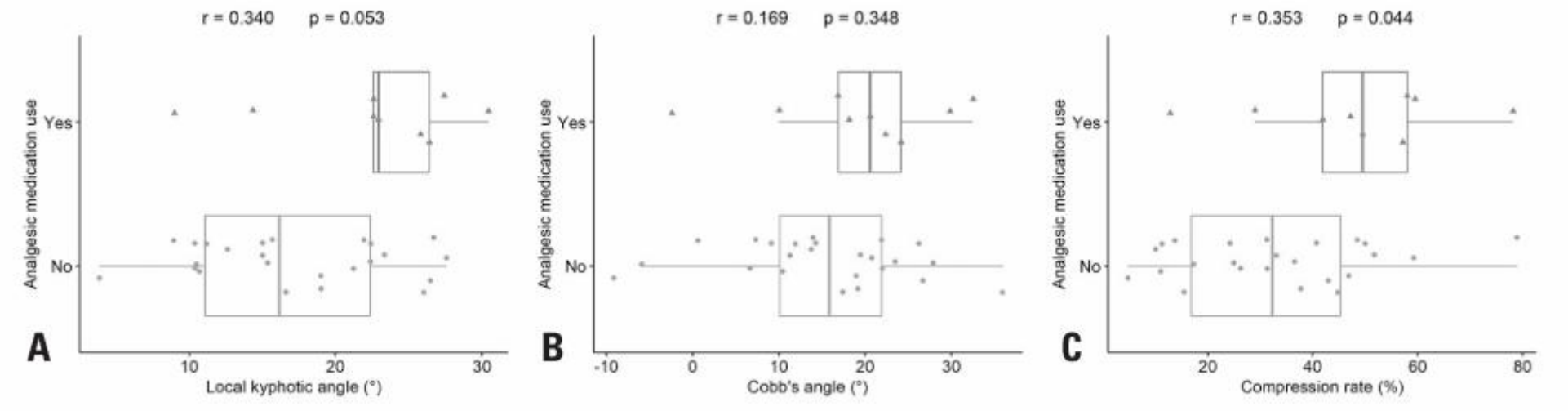
Spinal Disability Criteria

Classification based on Korean Life Insurance criteria:

Classification	LKA/CA or CR (%)
Mild Deformity	< 15° or 20–40%
Distinct Deformity	15–35° or 40–60%
Severe Deformity	> 35° or > 60%

RESULTS: CORRELATION FINDINGS

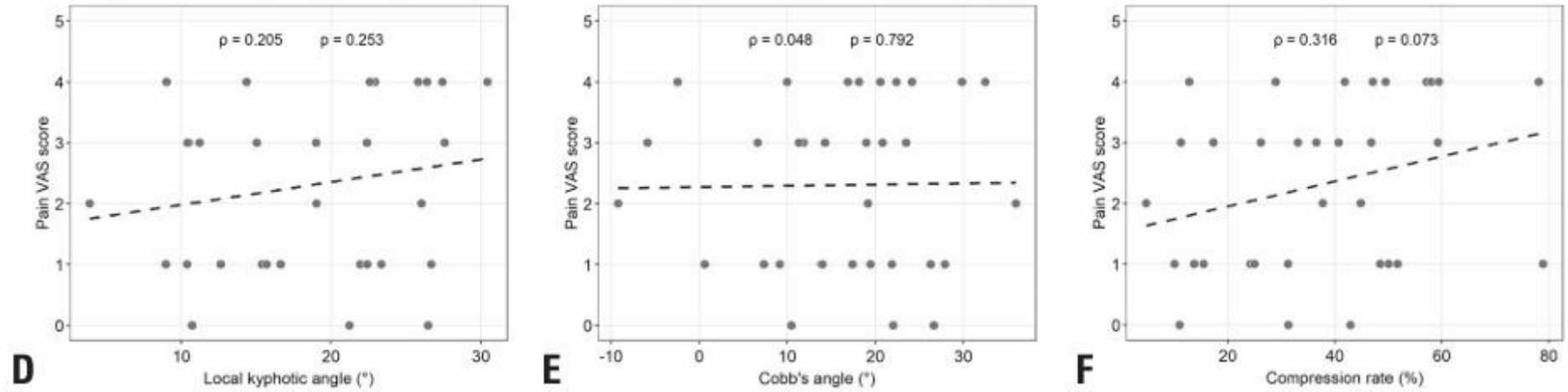
Relationship with Analgesic Medication Use



- **Local Kyphotic Angle (LKA):** Showed a weak correlation with marginal significance (r = 0.340, p = 0.053).
- **Cobb's Angle (CA):** No statistically significant correlation found (p = 0.348).
- **Compression Rate (CR):** Demonstrated a weak but significant correlation (r = 0.353, **p = 0.044**).

RESULTS: CORRELATION FINDINGS

Relationship with Pain VAS Scores



- **All Parameters:** No significant correlations found between LKA, CA, or CR and pain VAS scores ($p > 0.05$)

- Findings indicate that pain intensity does not directly correspond to the magnitude of the measured radiographic deformity.

COMPARISON BY DEFORMITY GRADE

Analysis across groups classified by the Korean life insurance criteria for spinal deformity disability evaluation:

Severity Group	n	Mean Pain VAS Score	Analgesic Use (%)
Mild Deformity	12	2.2 ± 1.3	16.7%
Distinct Deformity	18	2.4 ± 1.5	33.3%
Severe Deformity	3	2.7 ± 1.2	33.3%

Statistical Finding: No significant differences in VAS scores (p=0.881) or analgesic medication use (p=0.586) were observed between groups.

DISCUSSION

Individual Pain Variability

Post-fracture pain varies considerably among individuals. While deformity develops as vertebral height decreases, the pain typically improves over time as bone healing progresses (sclerotic changes), regardless of the residual kyphosis.

Insurance Criteria vs. Clinical Pain

Insurance disability criteria are based on objective radiographic assessments for financial compensation. However, they do not incorporate patient-reported pain, which this study found to be poorly associated with radiographic severity.

Limitations: Relatively small sample size (n=33), retrospective design, short follow-up period, and exclusion of global sagittal parameters (SVA, pelvic tilt).

CONCLUSION

- **Compression Rate (CR)** and **Local Kyphotic Angle (LKA)** demonstrate only a partial/weak correlation with analgesic medication use.
- **Cobb's Angle (CA)** and standard spinal deformity disability criteria do not significantly correlate wit h pain parameters (VAS).
- The degree of radiographic kyphotic deformity does not directly correspond to pain severity in thoracolumbar osteoporotic compression fractures.
- Future prospective studies with larger cohorts are needed to identify factors contributing to chronic pain outcomes.