

# The Results of Conservative Treatment for Low-energy Vertebral Fracture in Non-fused Segments among Elderly Patients with Diffuse Idiopathic Skeletal Hyperostosis: A Retrospective Observational Study

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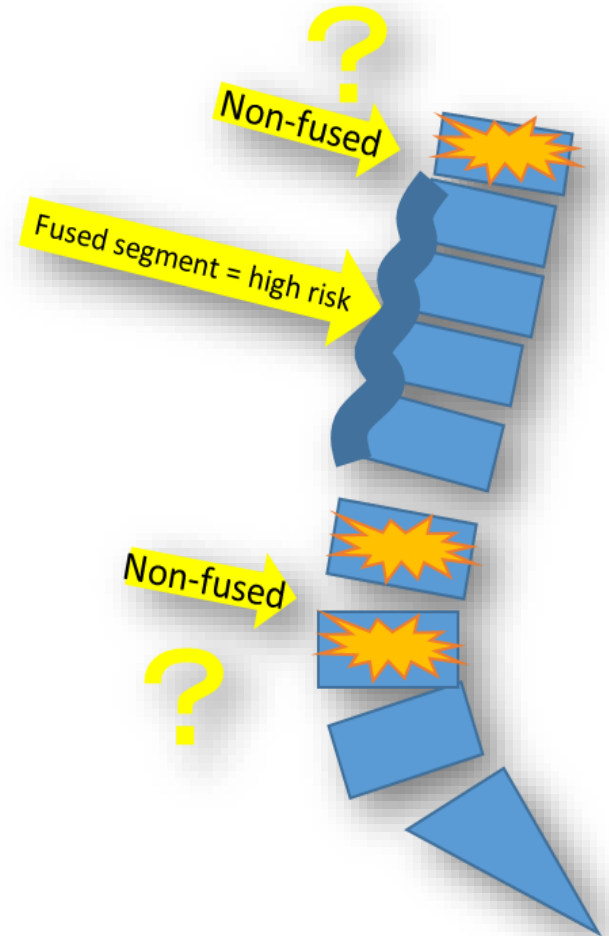
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# Introduction

- Diffuse idiopathic skeletal hyperostosis (DISH) is a common condition characterized as spontaneous osseous fusion of the spine with anterior bridging osteophytes.
- Fracture in the ankylosing segments of DISH is considered a high-risk fracture for secondary displacement, neurological deterioration, or delayed/non-union.
- Little is known about the effects of fused segments due to DISH on the results of conservative treatment for fractures in **non-fused** segments.
- The purpose of this study was to identify the results of conservative treatment for vertebral fracture in non-fused segments among patients with DISH lesions.



# Materials and Methods

390 Pts with T-L spinal fracture



33 patients with confirmed diagnosis of DISH  
(with T-L radiographs and/or CT)



24 patients with non-fused segment  
fracture



9 :fracture in fused  
segment



7 treated surgically  
3 followed up at outside  
clinic

14 patients with conservative treatment  
(upper=1, lower =13)

## > Inclusion

- # Presence of  $\geq 3$  fused vertebrae with bridging osteophyte
- # New T-L fracture within 3 levels from fused segment

## > Exclusion

- # Fused vertebrae only in cervical spine
- # Previous T-L fracture
- # Previous spinal fusion surgery
- # High-energy trauma
- # Known diagnosis of ankylosing spondylitis

# Materials and Methods(cont.)

- Bone union status, neurological complication, and malunion (>30 kyphosis) were recorded.
- Compared with matched-control group extracted from patients who did not have DISH lesion on thoracolumbar radiograph and/or CT. (1:2 matching with gender, age, and fracture regions (thoracic: T3-10, T-L junction(T11-L1), lumbar(L2-5))
- In patients who had a fracture below T11, diagnosability of fused segment with a lateral lumbar spine radiograph was also assessed.
- Statistical analysis was conducted utilizing paired t test for continuous variables, Mantel-Haenszel test for categorical variables, and log-rank test for cumulative probability of bone union.

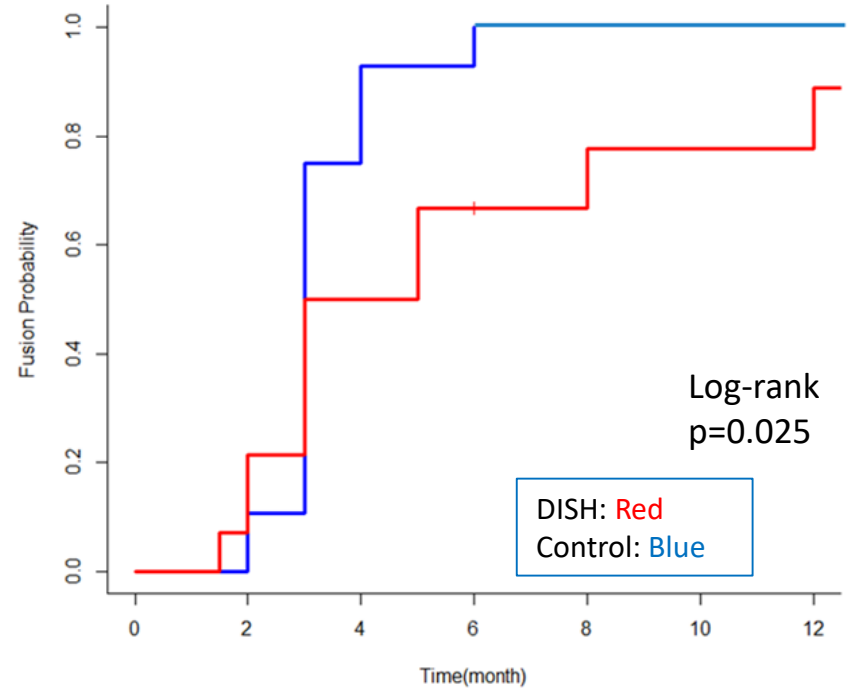
# Results 1 Demographics

Variable	DISH	Control	p-Value
No. of patients	14	28	
Mean Age $\pm$ SD (years)	77.7 $\pm$ 8.0	78.6 $\pm$ 7.9	0.298
Gender (M:F (Female %))	11:3(21.4)	22:6(21.4)	1
Injury level Thoracic (T10 or above)	1(3.8)	2(3.8)	1
Thoraco-lumbar (T11-L1)	6(46.2)	12(46.2)	
lumbar (L2 or below)	7(50.0)	14(50.0)	
Current smokers (%)	1(7.1)	1(3.6)	0.617
Diabetes (%)	3(21.4)	8(28.6)	0.637
Mean No. of fused levels $\pm$ SD (range)	5.4 $\pm$ 2.5 (3-11)	NA	
Mean No. of levels between fracture and fused level	1.9 $\pm$ 0.9(1-3)	NA	

## Results 2

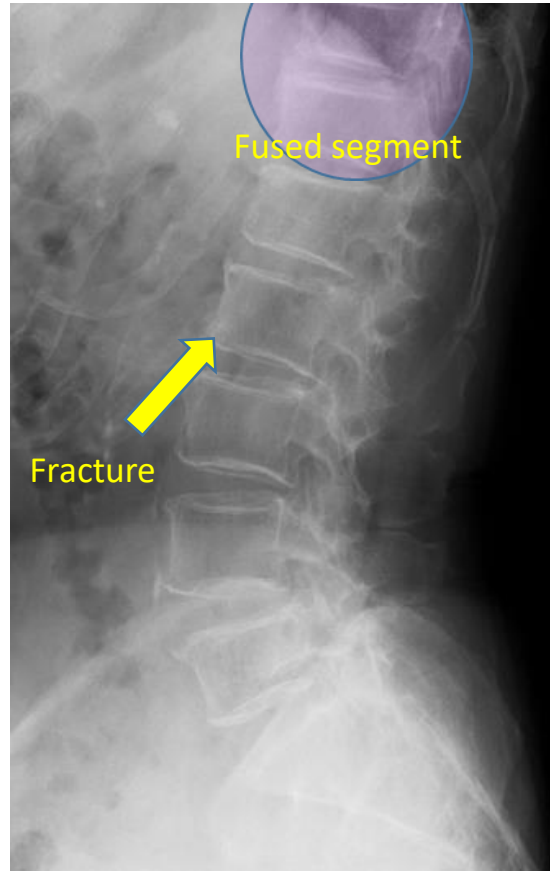
Result	DISH	Control	p-Value
Bony Union at 3m	9/14(64%)	21/28(75%)	0.423
Bony Union at 6m	11/13(85%)	28/28(100%)	0.046

- Presence of DISH lesion was associated with more **delayed/non-union**.
- Endpoint: bony union
- No patients was converted to surgical treatment.
- One patient in DISH group dropped out at 4 months before bony fusion due to deterioration of medical condition.

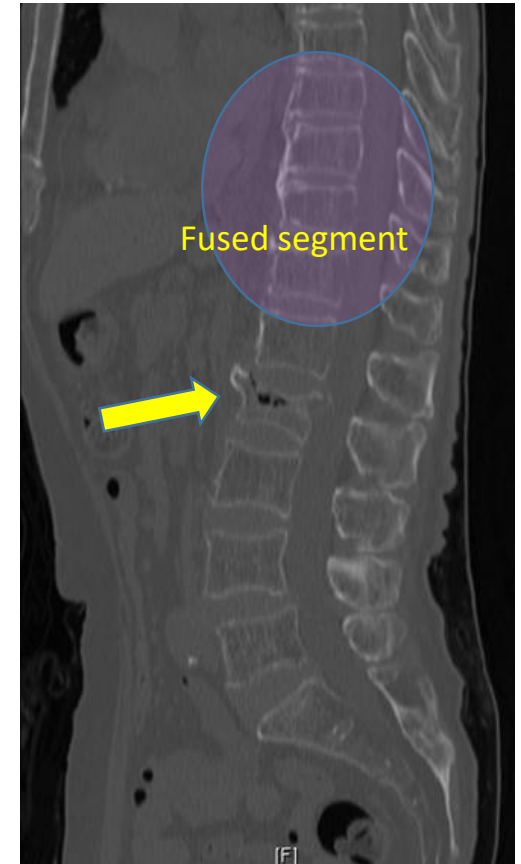


# Case

- 87-year-old woman with T9-T12 fused segment
- L2 fracture after a fall from standing height
- Treated with Jewett orthosis
- Showing vacuum phenomenon in L2 body and persistent mechanical back pain.



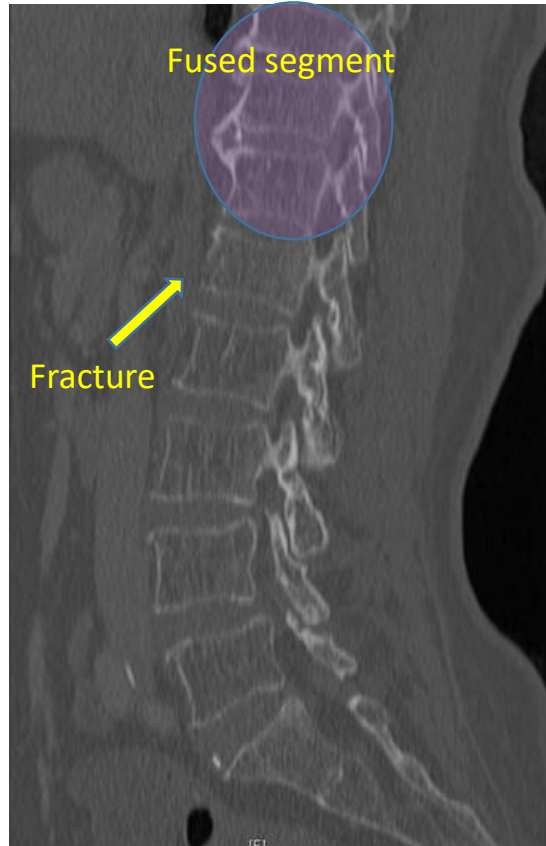
Initial presentation



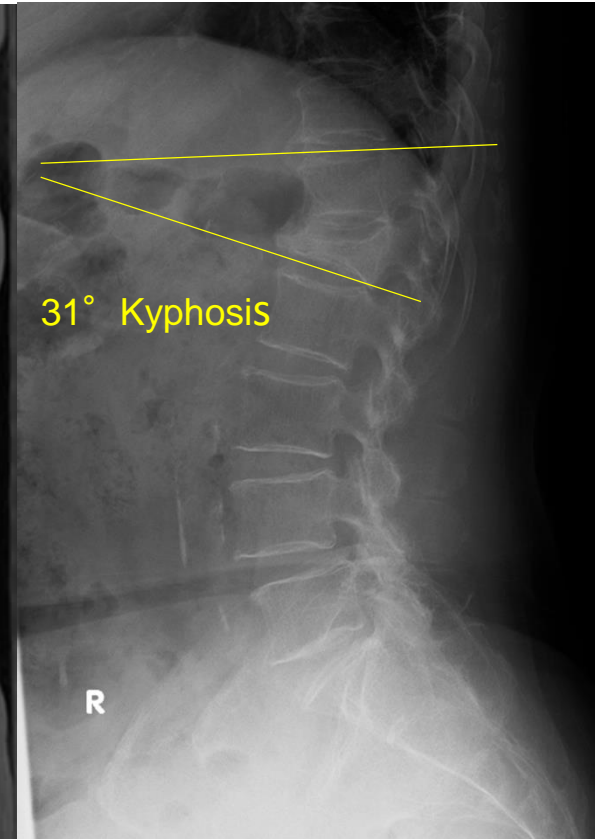
6 months follow up

## Results 3

- No neurological complication was observed in both groups.
- One patients in DISH group showed 31° kyphotic malunion. (right)
- Among the 13 patients with fractures below T11, **fused-segments were not diagnosable in 61.5% (8/13) of patients based on the initial standard radiographs of the lumbar spine.**



Initial presentation



4 months follow up



# Discussion

- The outcome of conservative treatment for ordinary osteoporotic vertebral fractures was reported to be excellent.
- More than 95% patients with vertebral compression fracture had success with 3 weeks of conservative treatment. (Lee et al., *Spine J*, 2012)
- Increased biomechanical demands upon other spinal segments after an arthrodesis was considered as a possible cause of adjacent segmental disease after fusion surgery. (Radcliff et al., *Spine J*, 2013)
- The presence of DISH lesion was a risk factor for further surgery due to adjacent segmental disease or pseudoarthrosis. (Otsuki et al., *Eur Spine J*. 2015)

-> Biomechanical change caused by DISH segment might play a role for delayed bony healing in patients who had non-fused segment fracture.

# Conclusion

- Fractures in non-fused segments in DISH spine might have a worse prognosis with conservative treatment than ordinary osteoporotic vertebral fractures.
- The diagnosis of coexisting DISH lesions can be missed when only radiographs of the lumbar spine are used for the diagnosis.

# Disclosures

- None of the authors has any potential conflict of interest