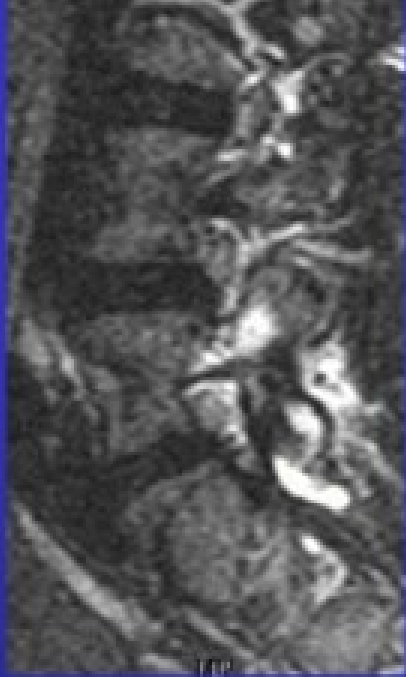
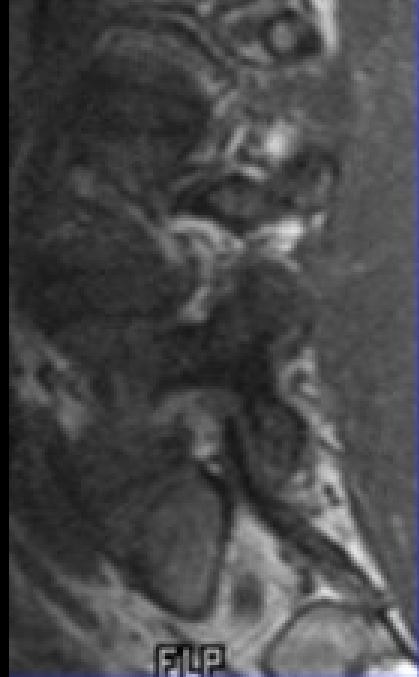


Relationship with Symptoms

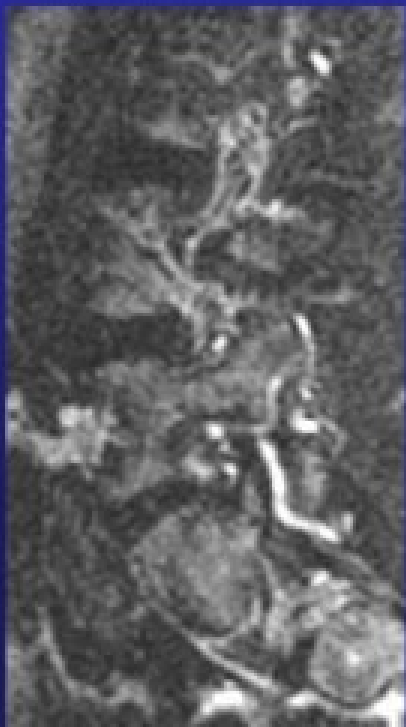
- 30 patients studied longitudinally (4-22 months, mean 11)
- Extent and intensity of marrow changes vs Sx
 - Statistically significant relationship with the degree of functional limitation due to LBP (Roland)
 - Trend for improvement in self reported pain scores

Type I Signal Changes

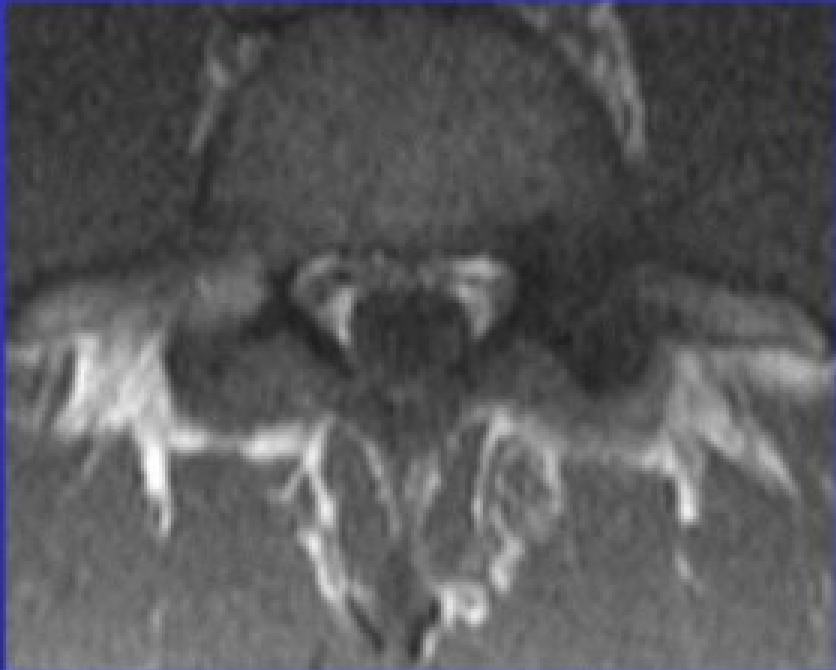
- 17 resolved (6 converted to Type II)
 - 7 improved
 - 5 unchanged
 - 1 worse
-
- 9 patients with adjacent ST changes, all resolved



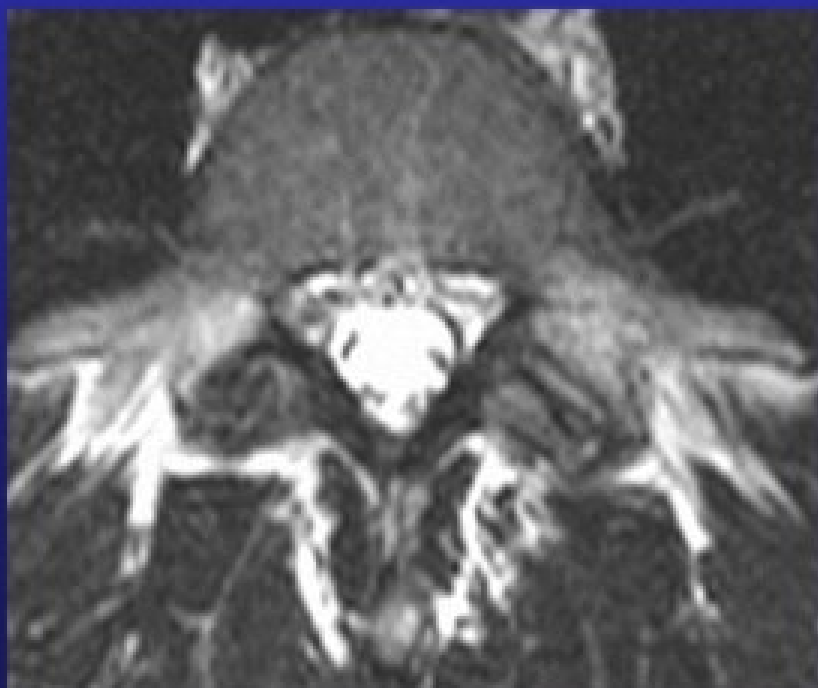
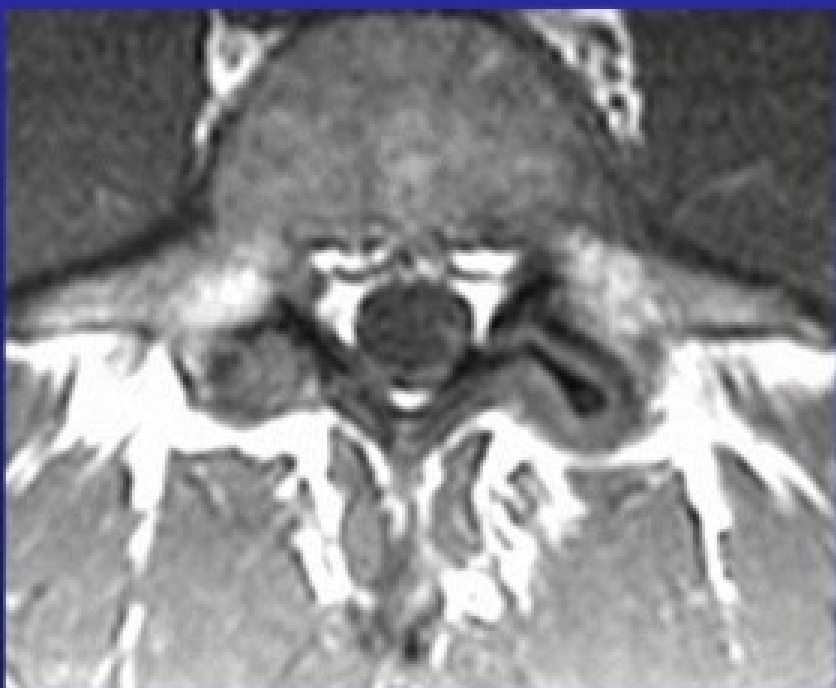
10/19/06



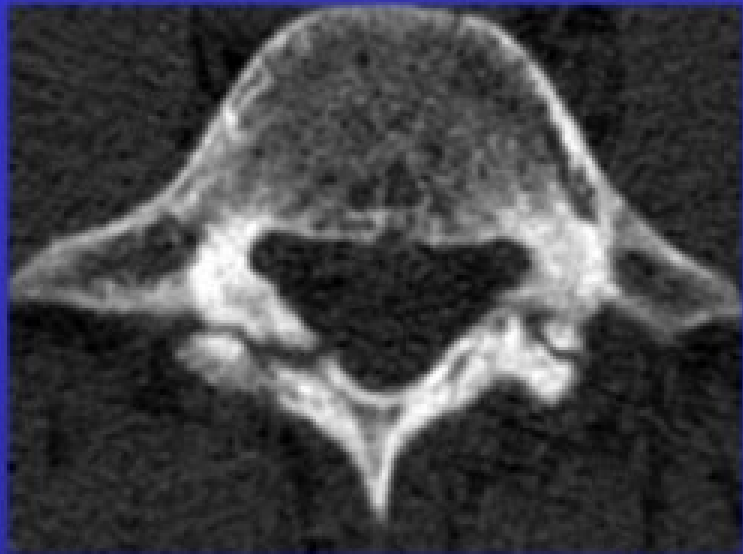
3/08/07

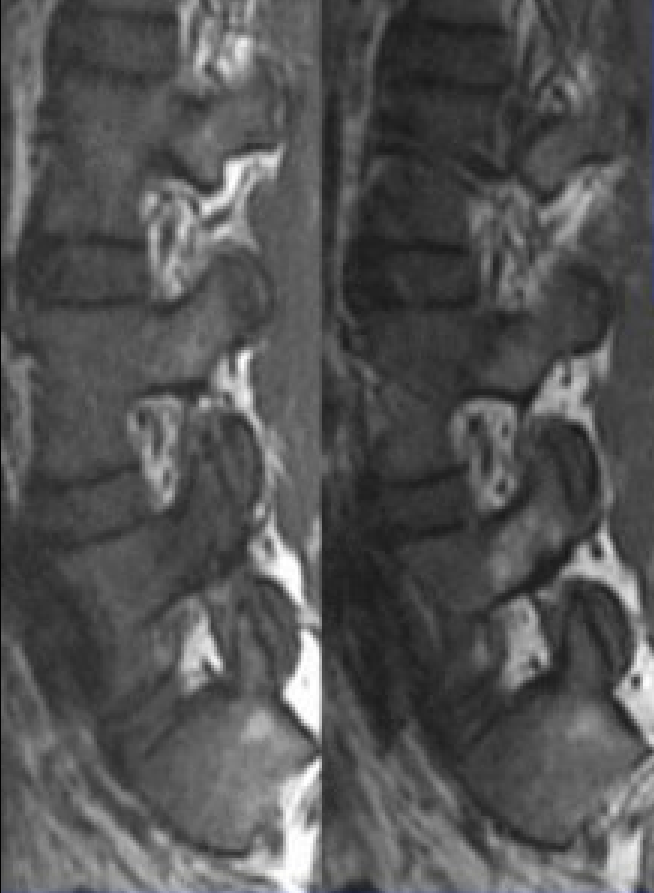


10/19/06



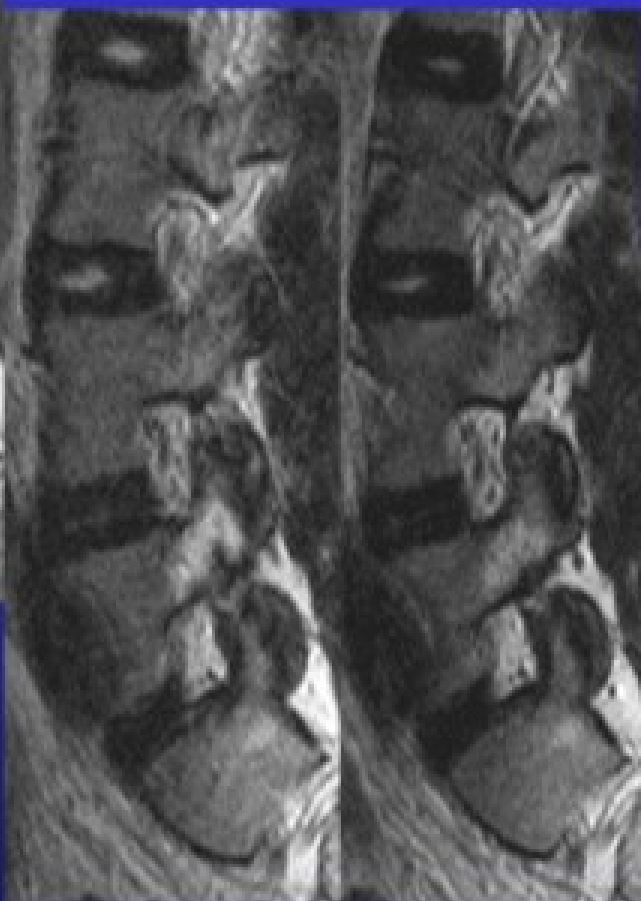
3/08/07





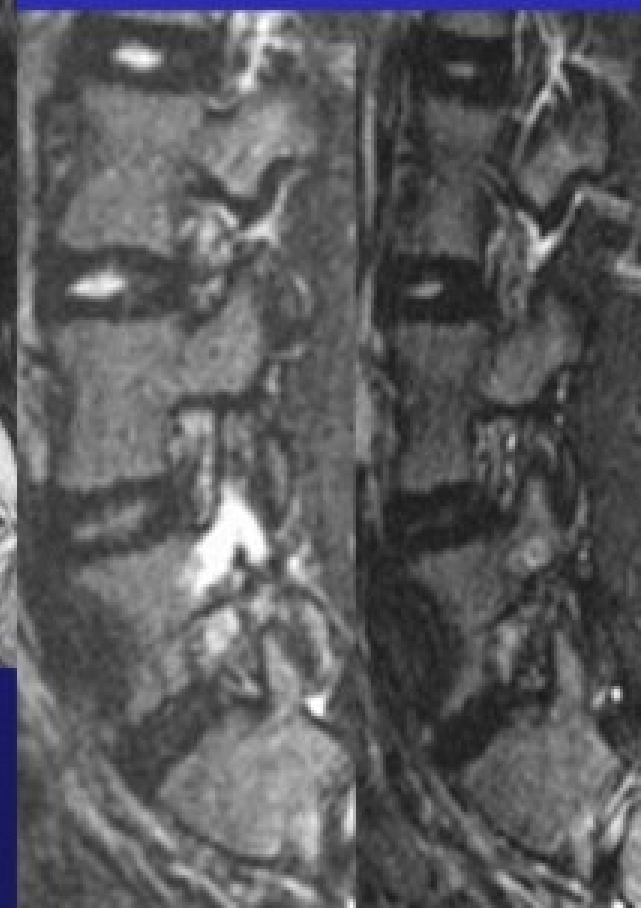
8/03/06

1/19/07



8/03/06

1/19/07

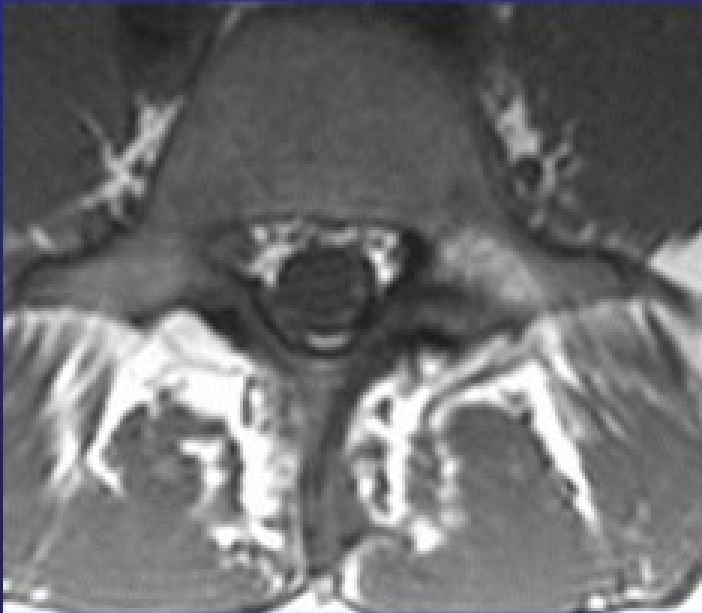
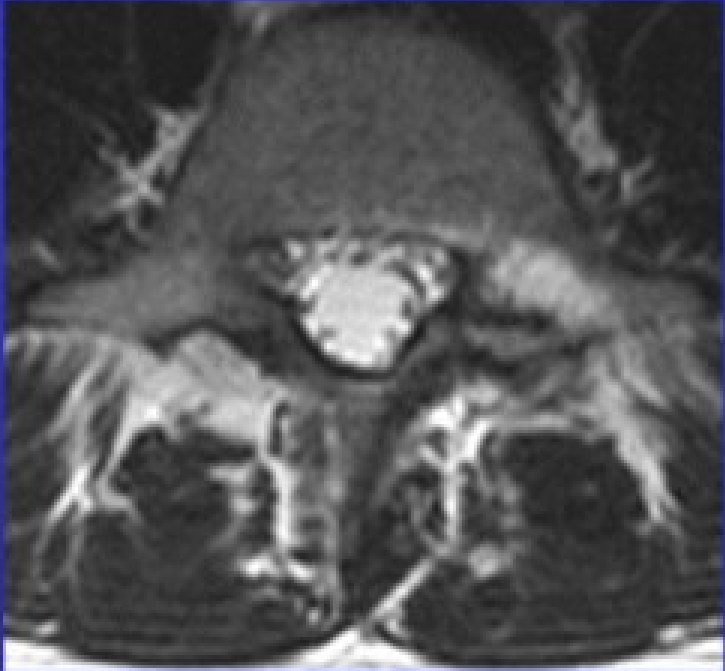
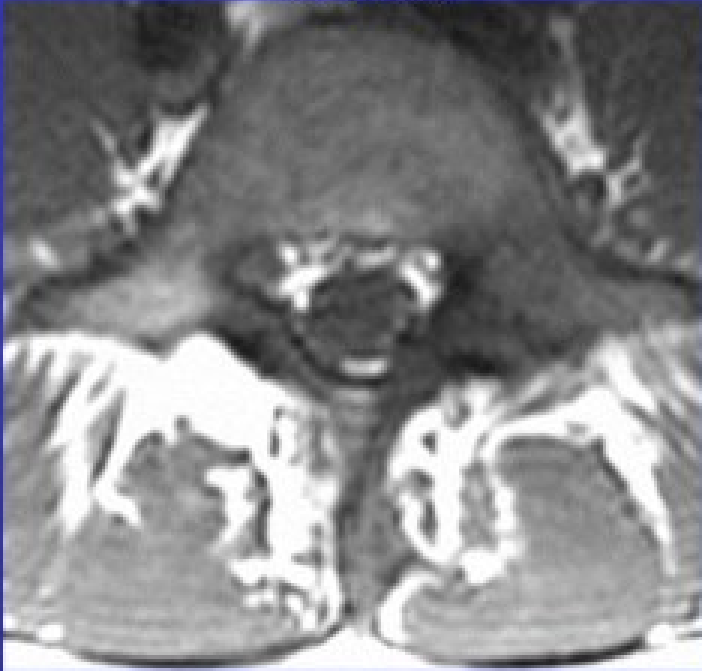


8/03/06

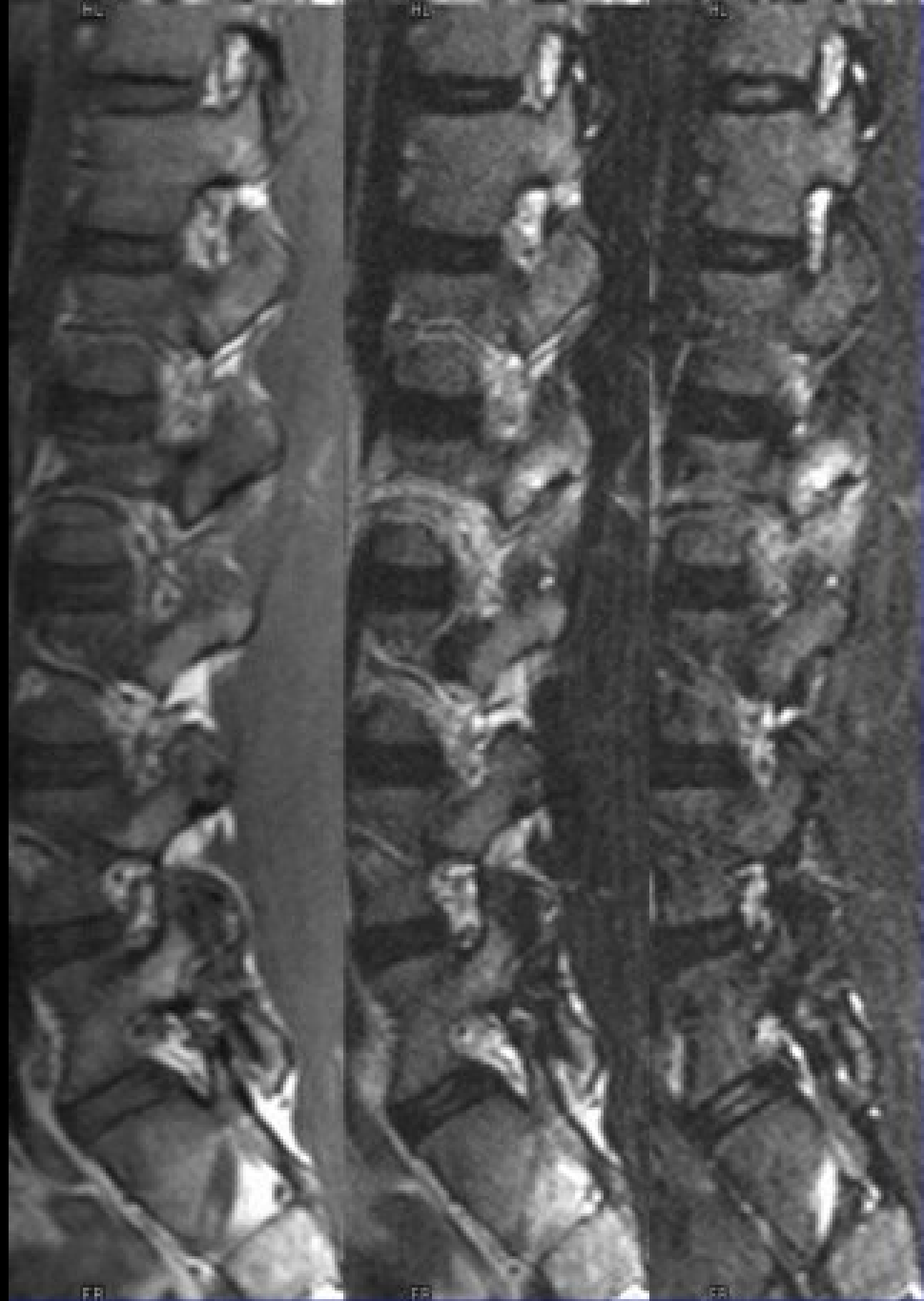
1/19/07

L

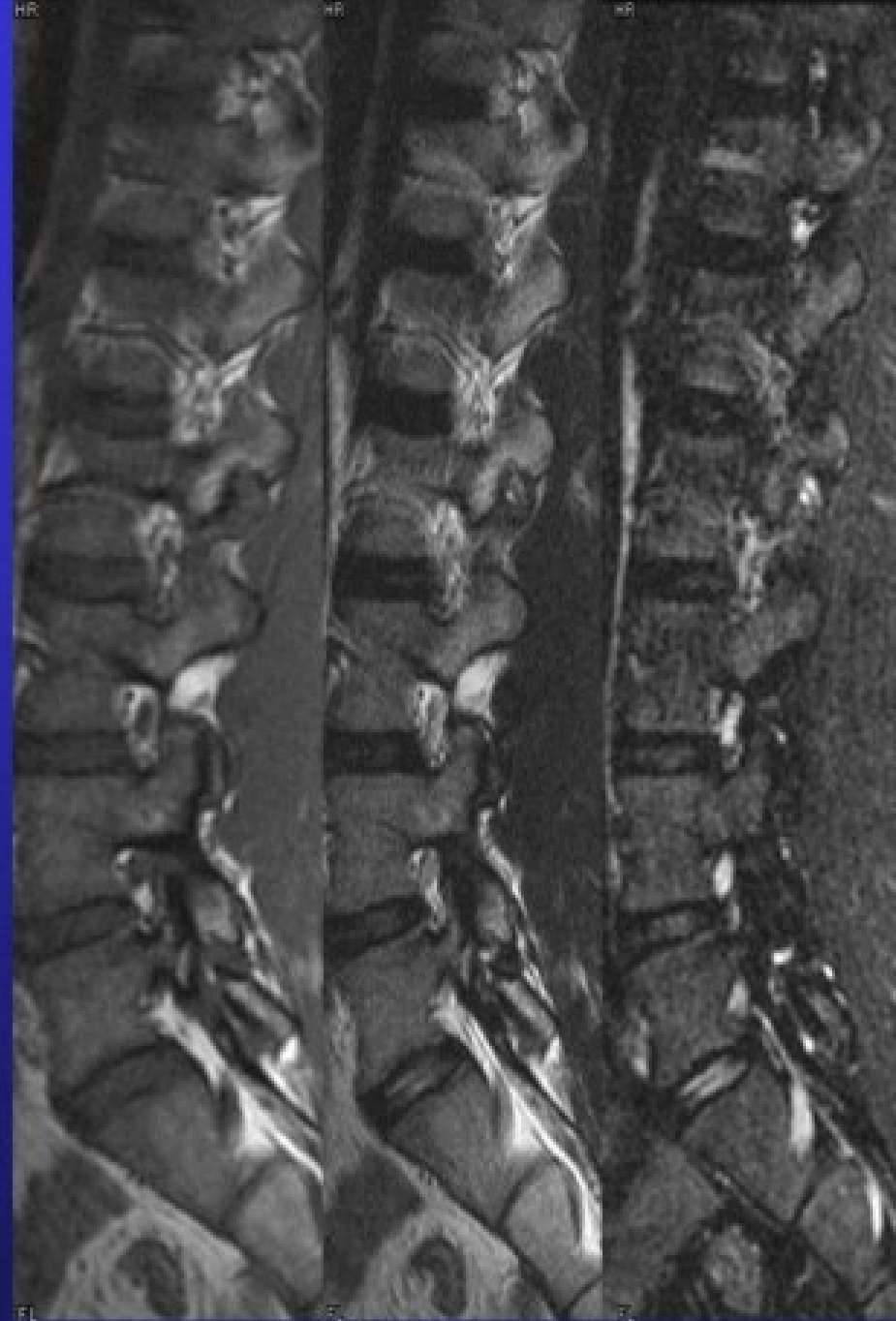
8/03/06



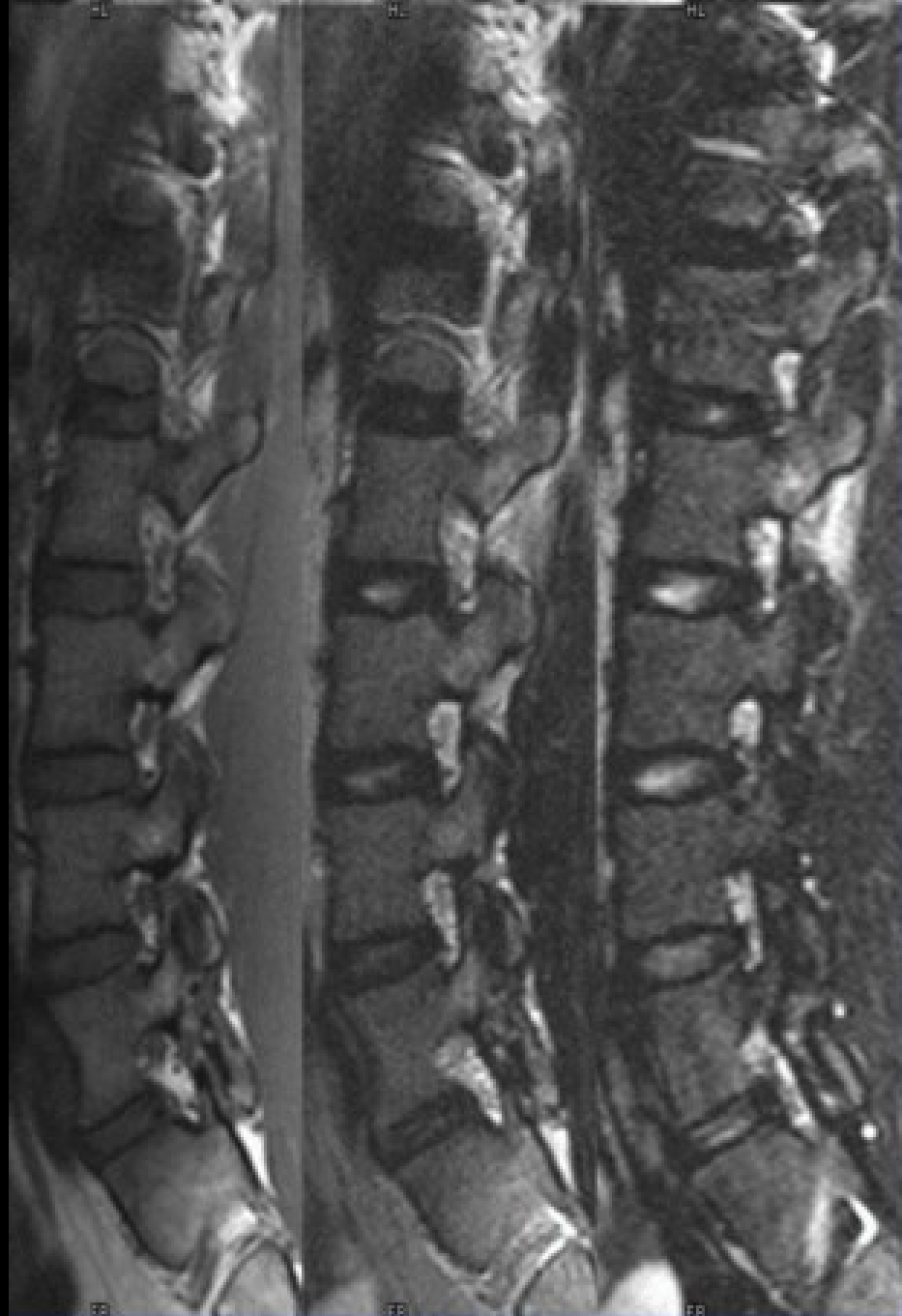
1/19/07



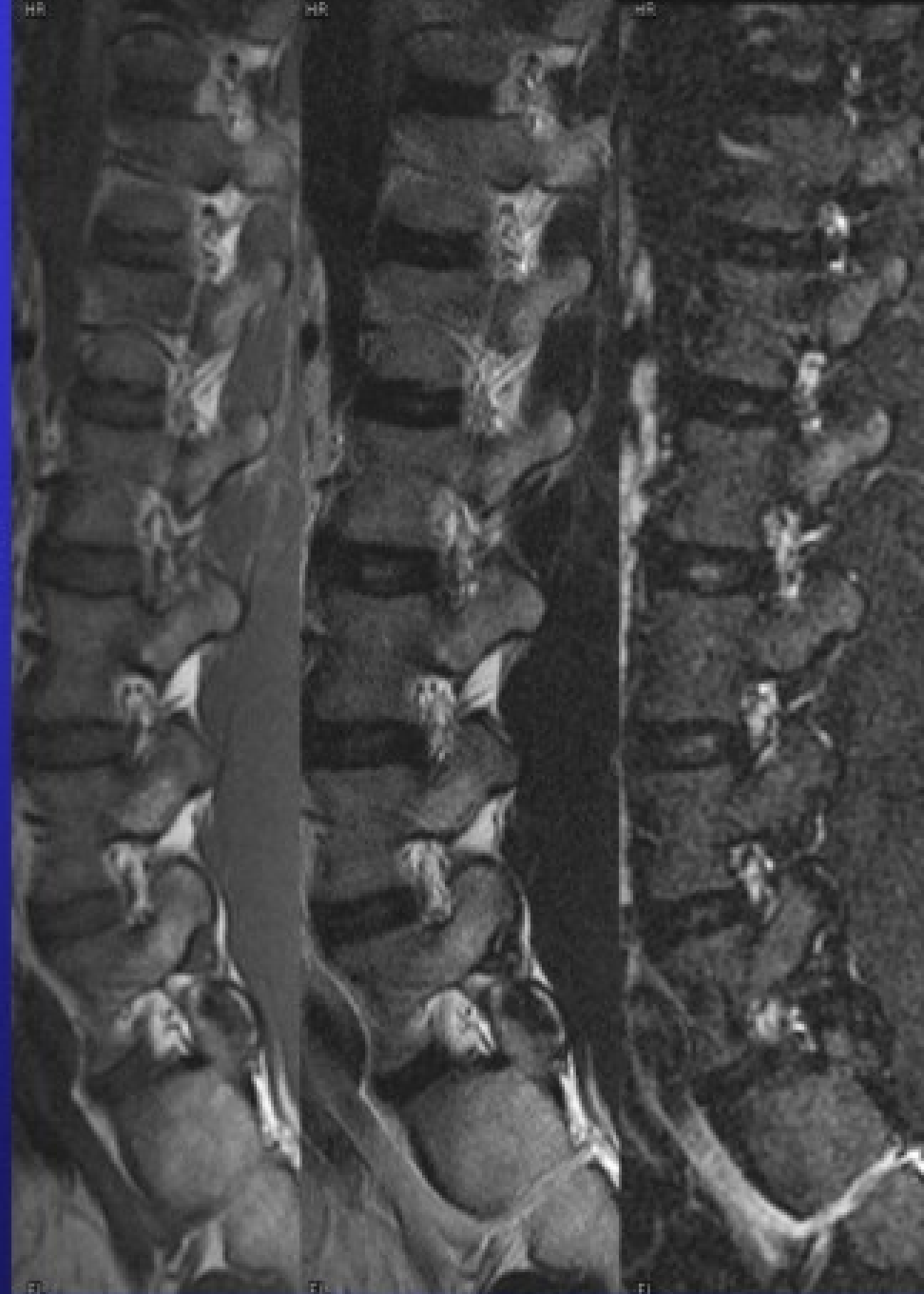
R - 5/18/06



R- 11/21/06



L - 5/18/06



L - 11/21/06



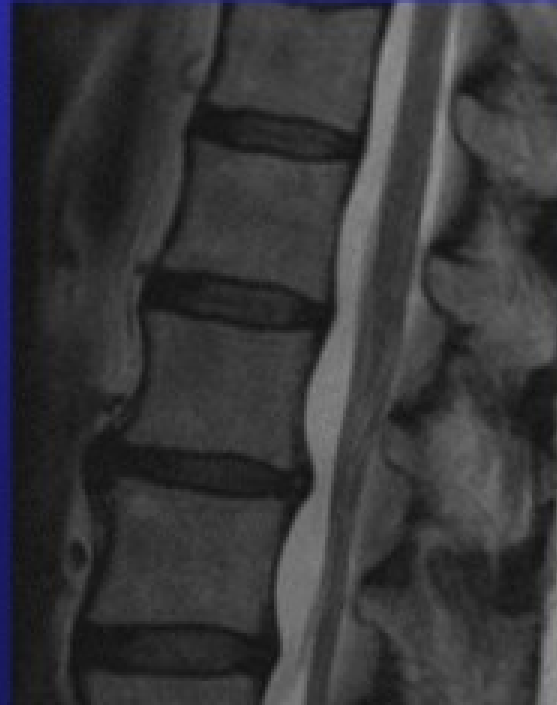
Finite Element Models

- Highest strain with lumbar motion in the pars, then the pedicle
- Early stage of pars fx more associated with ipsilateral pedicle signal changes
- Contra lateral changes occur with older fxs
- Pedicle stress decreases with pars fxs

DIFFERENTIAL

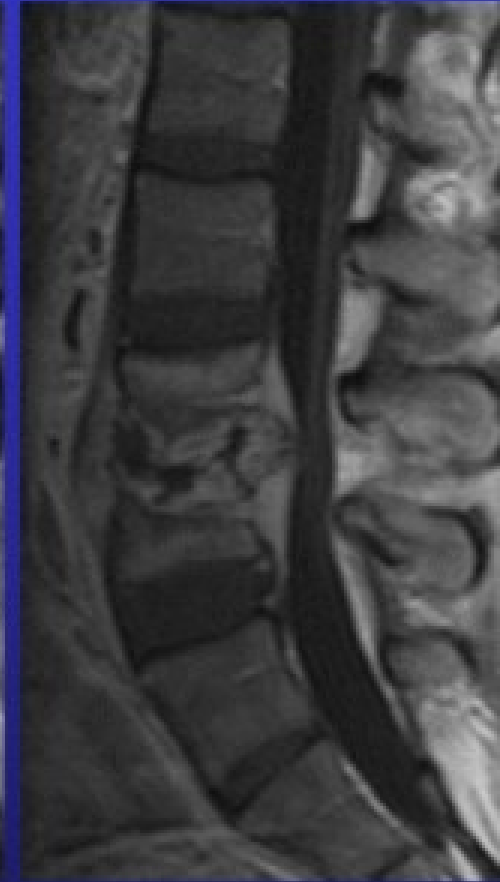
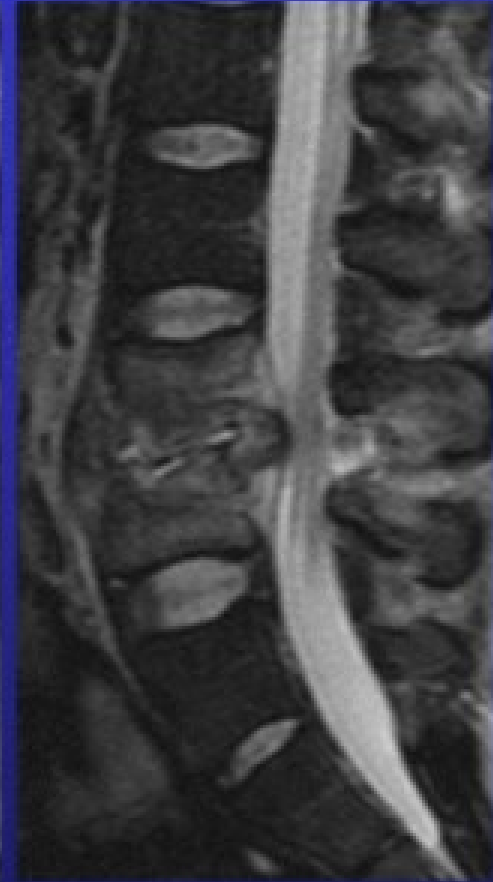
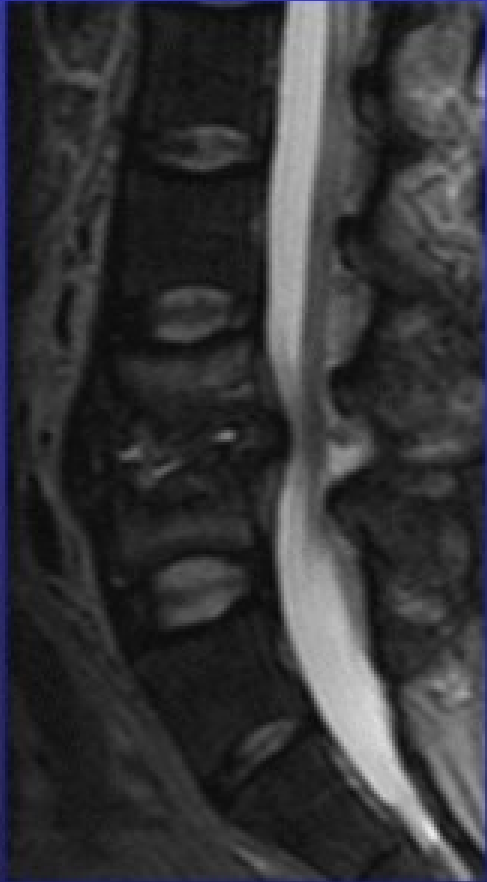
- DDD - TYPE I
- DSI
- POST OP CHANGES
- PSUEDOARTHROSIS
- AS



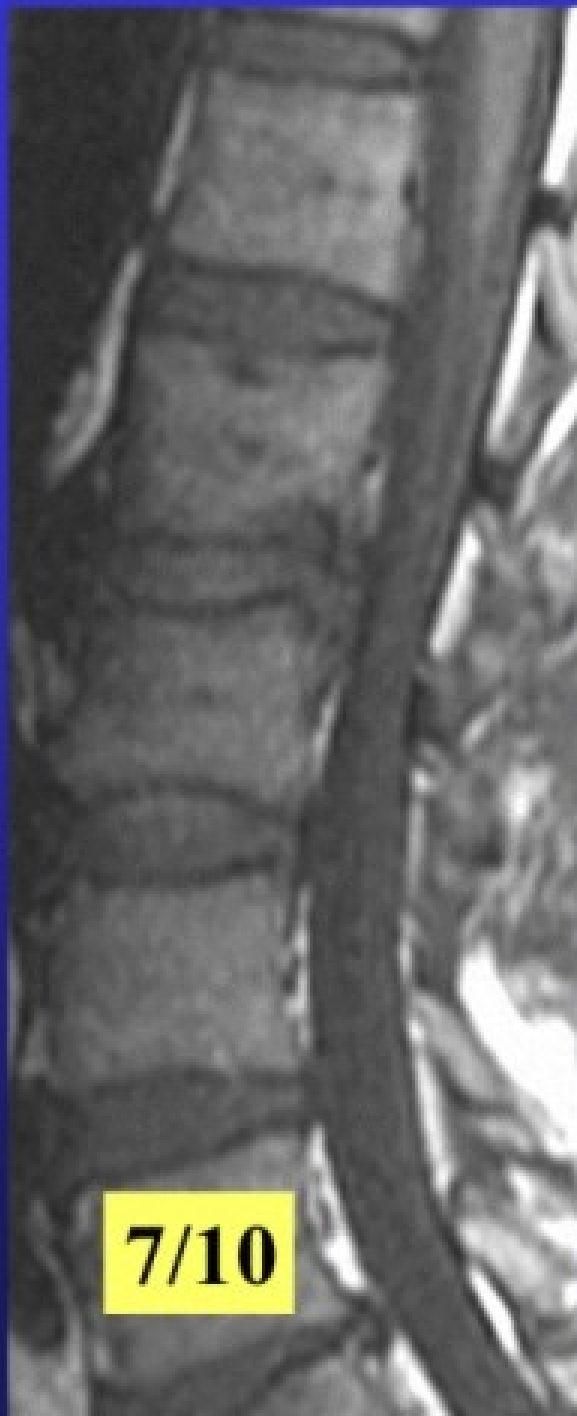
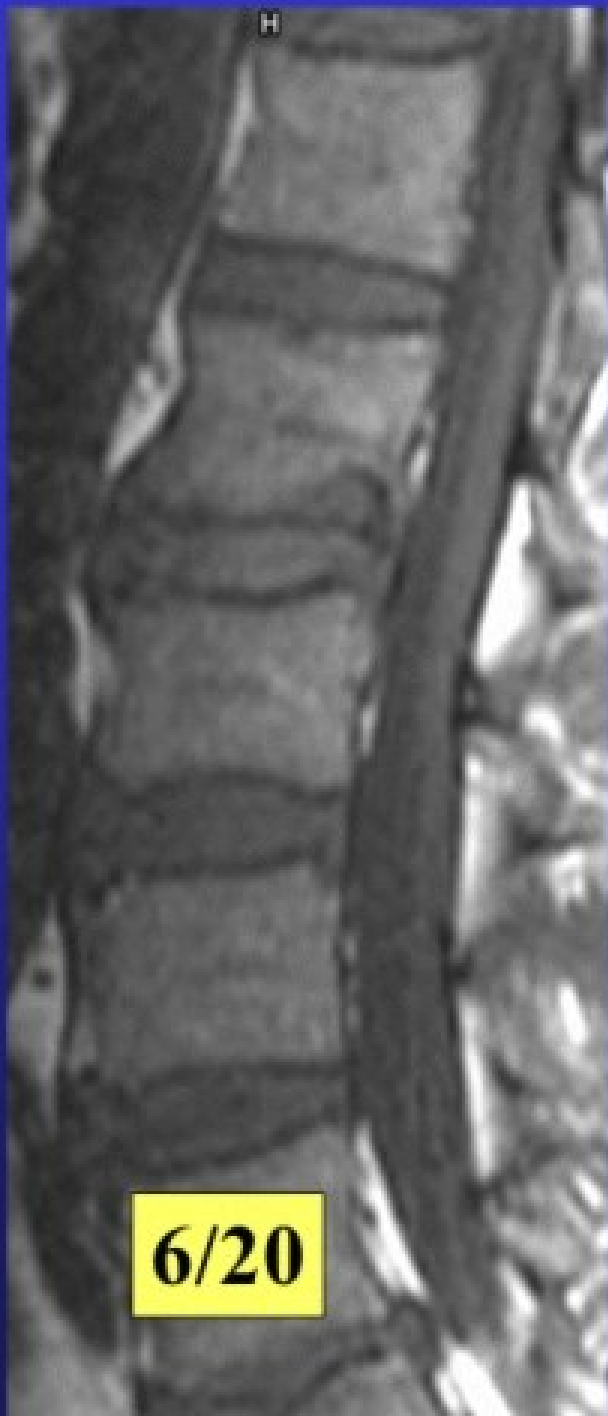


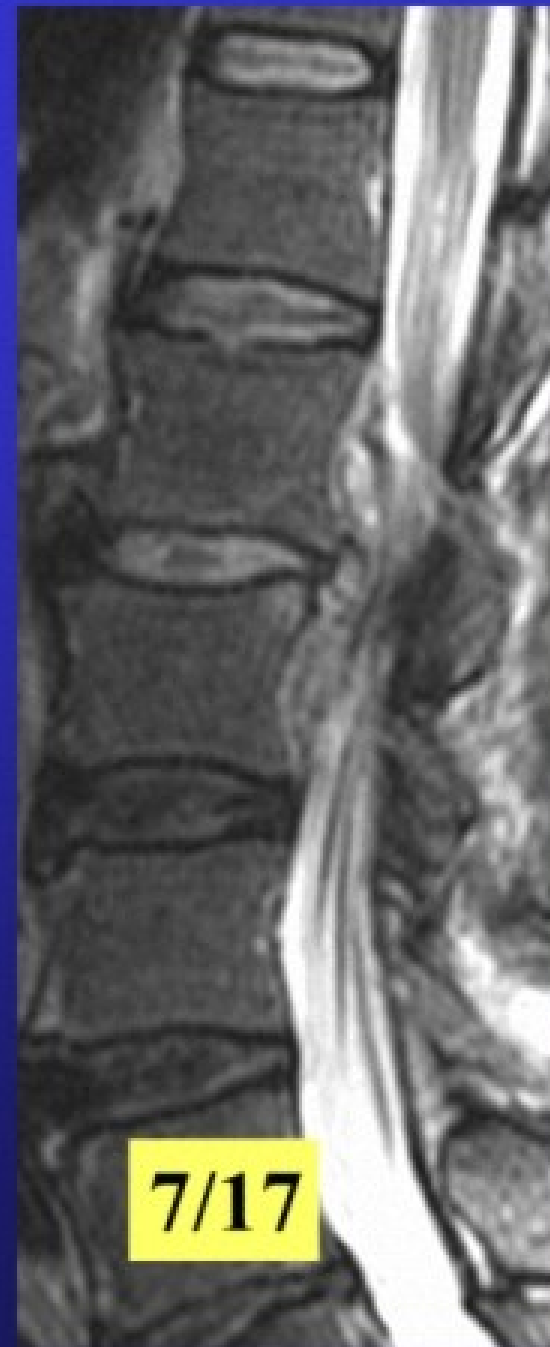
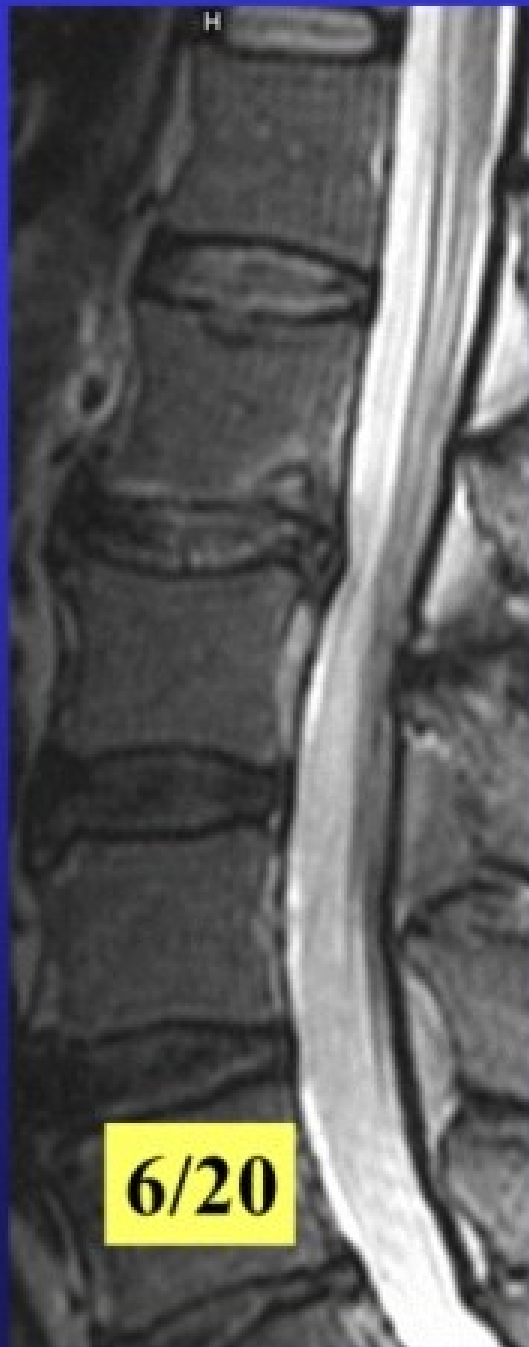
DIFFERENTIAL

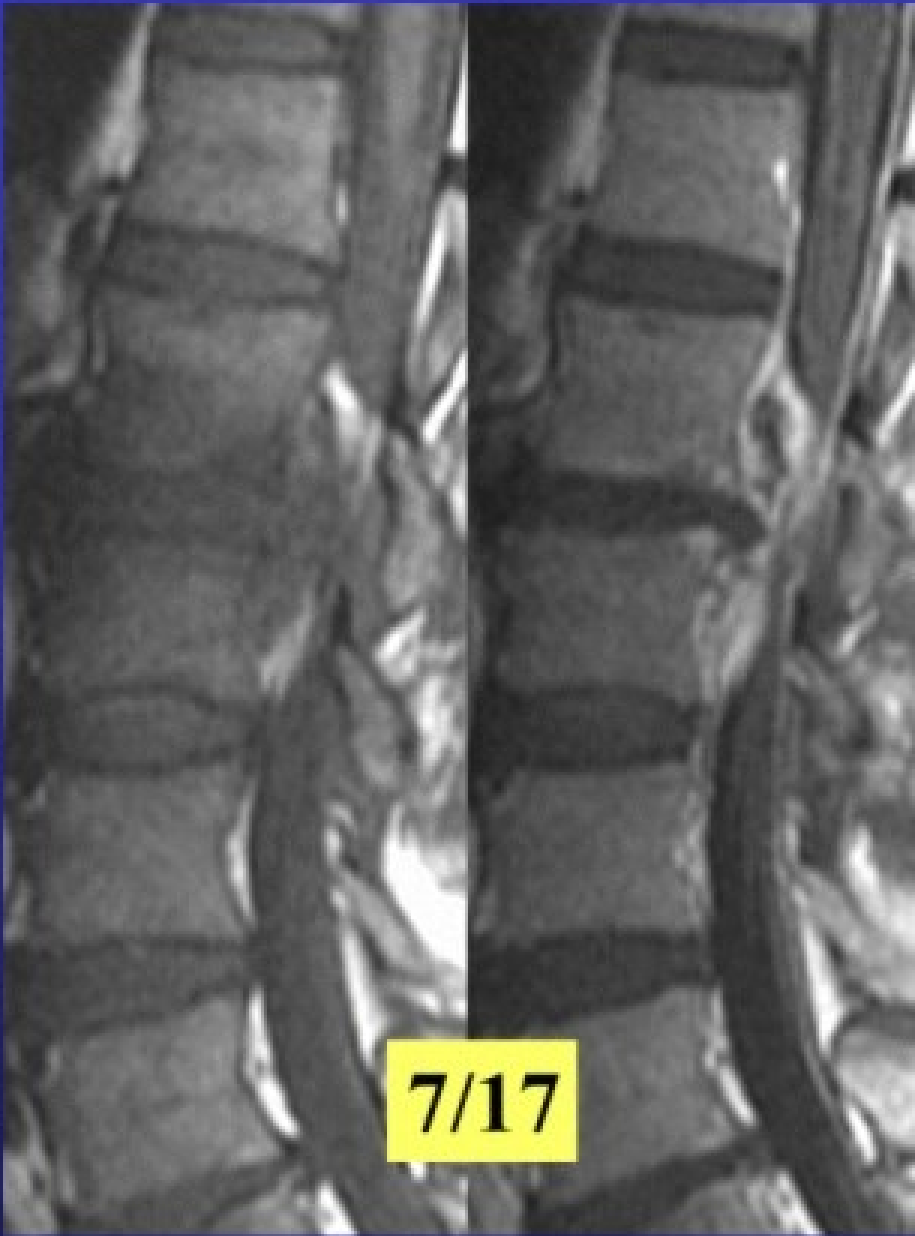
- DDD - TYPE I
- DSI
- POST OP CHANGES
- PSUEDOARTHROSIS
- AS







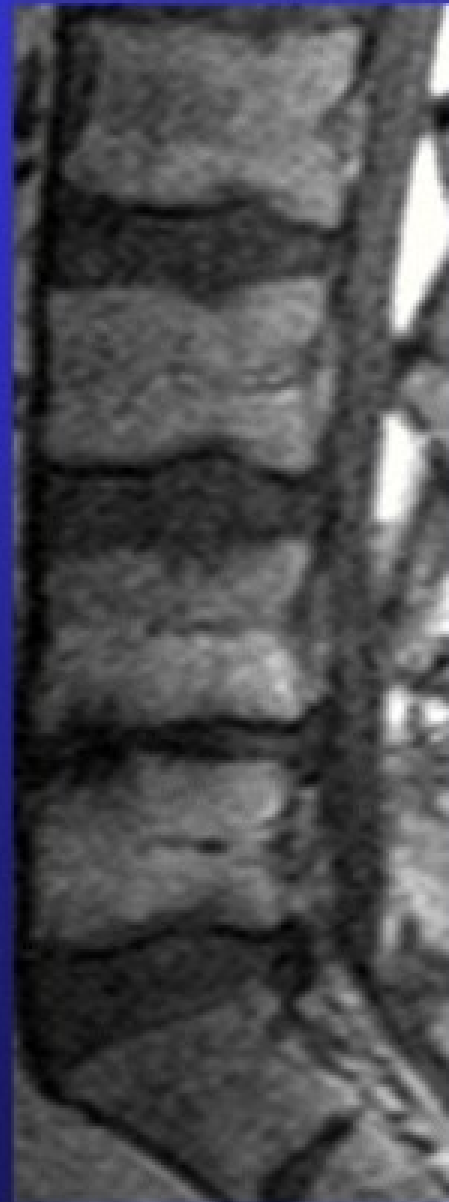




3/03



8/03



3/03



8/03



DIFFERENTIAL

- DDD - TYPE I
- DSI
- POST OP
CHANGES
- PSUEDOARTHROSIS
- AS

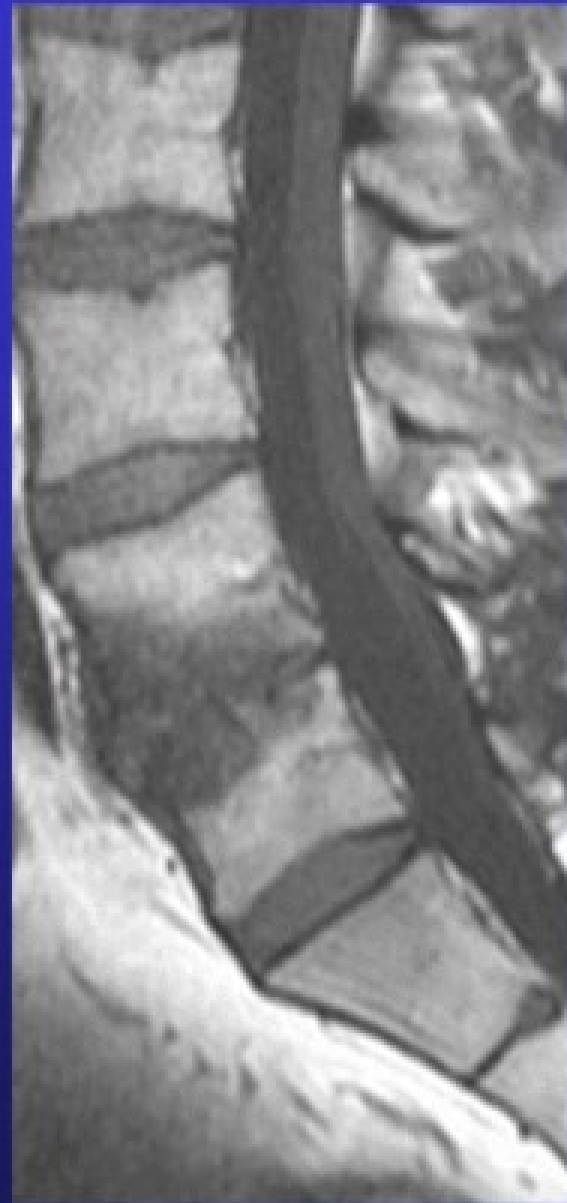
1/05/02



7/07/02



11/08/02

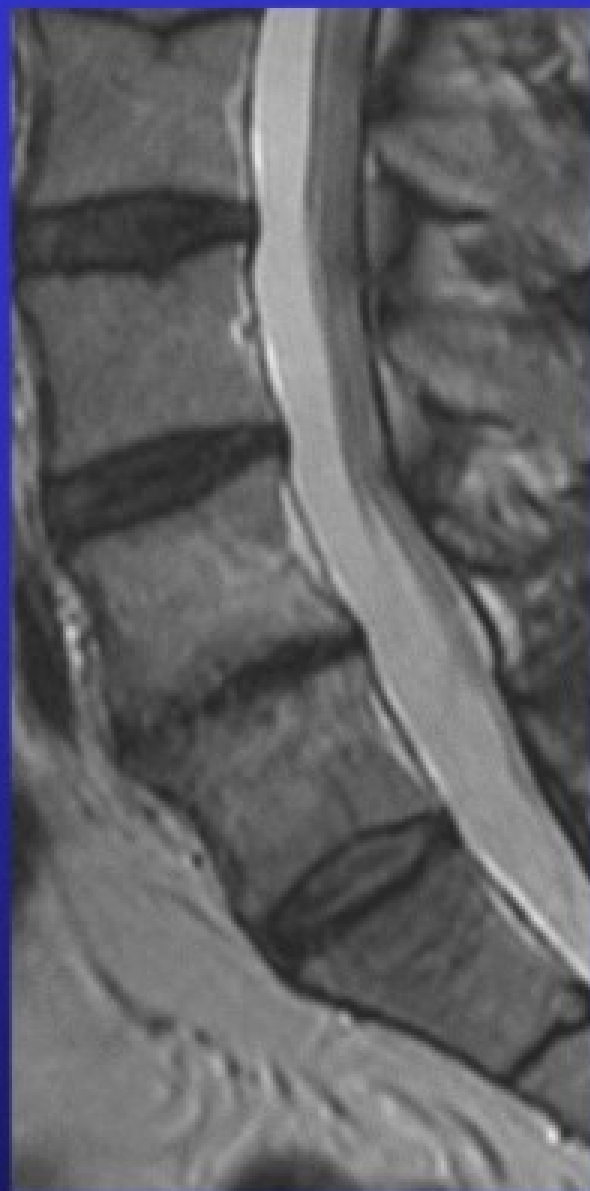




1/05/02



7/07/02



11/08/02

DIFFERENTIAL

- DDD - TYPE I
- DSI
- POST OP CHANGES
- PSUEDOARTHROSIS/
OSTEONECROSIS
- AS

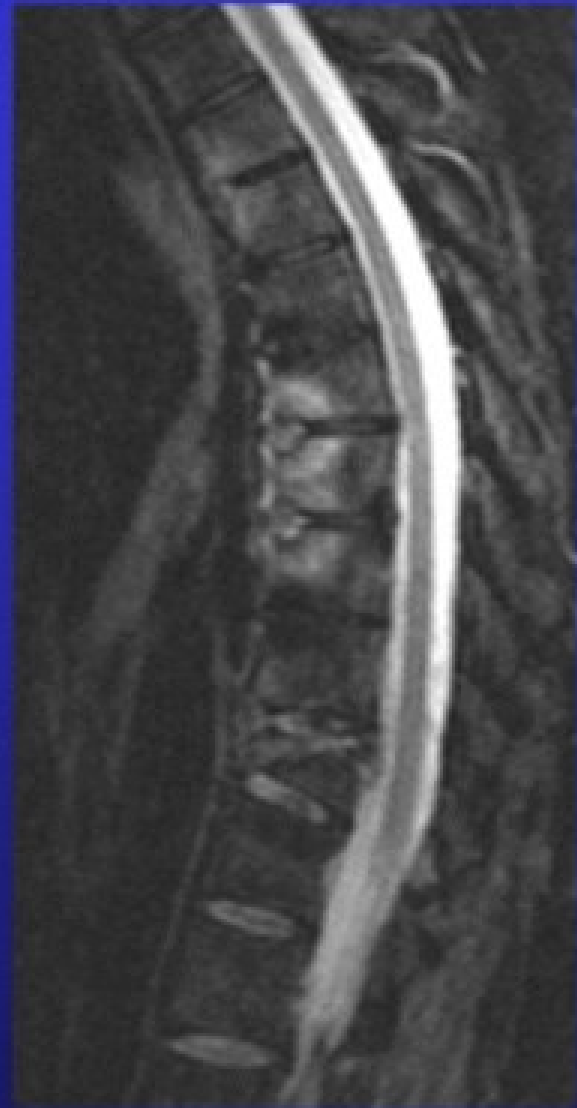






DIFFERENTIAL

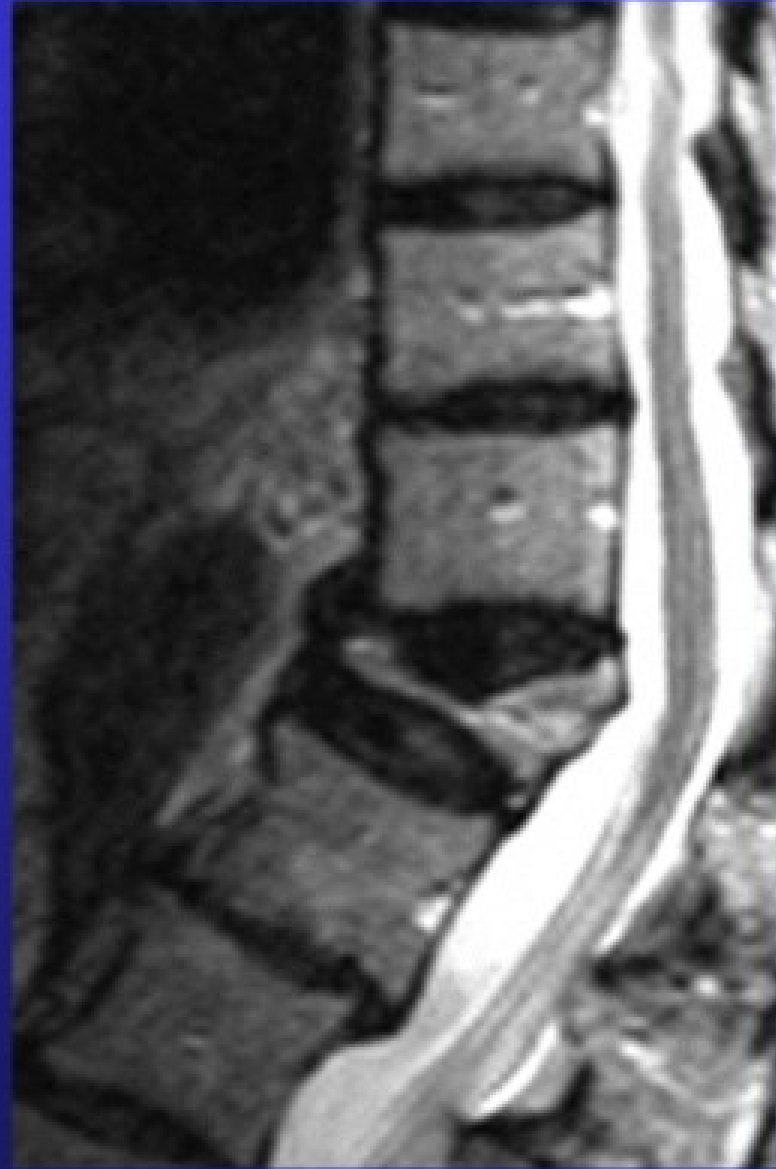
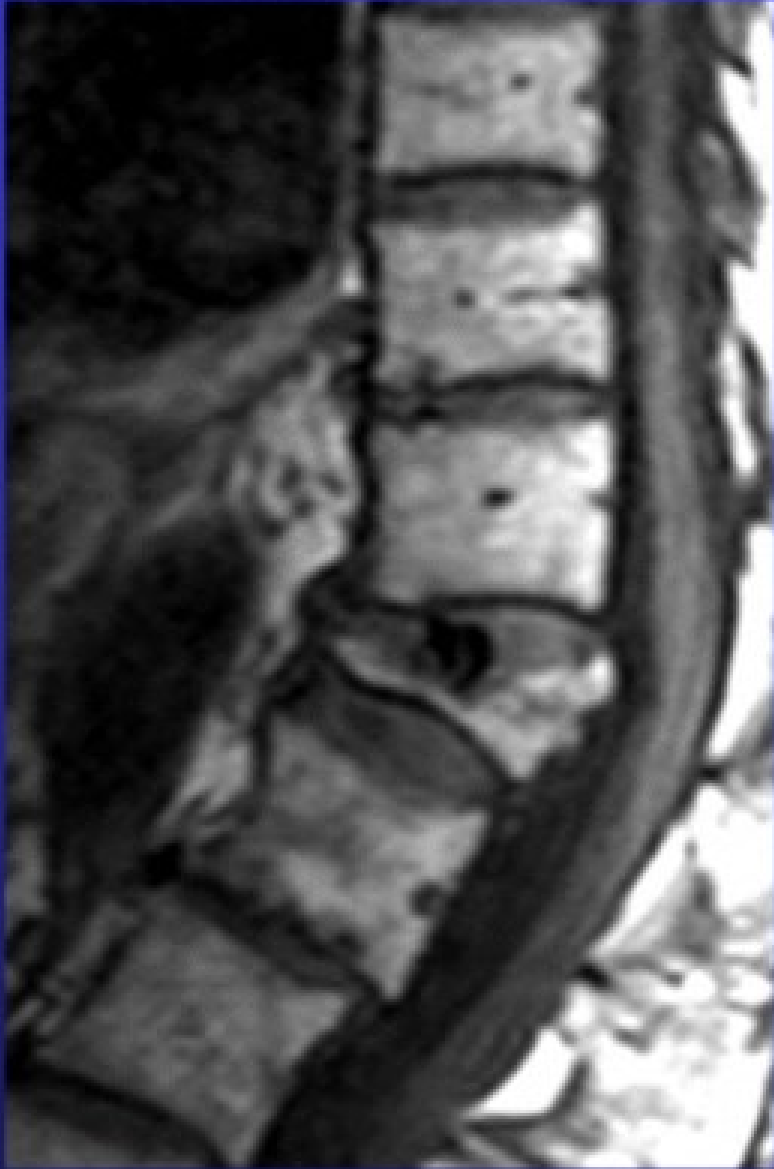
- DDD - TYPE I
- DSI
- POST OP CHANGES
- PSUEDOARTHROSIS/
OSTEONECROSIS
- AS





DIFFERENTIAL

- DDD - TYPE I
- DSI
- POST OP CHANGES
- PSUEDOARTHROSIS/
OSTEONECROSIS
- TRAUMA



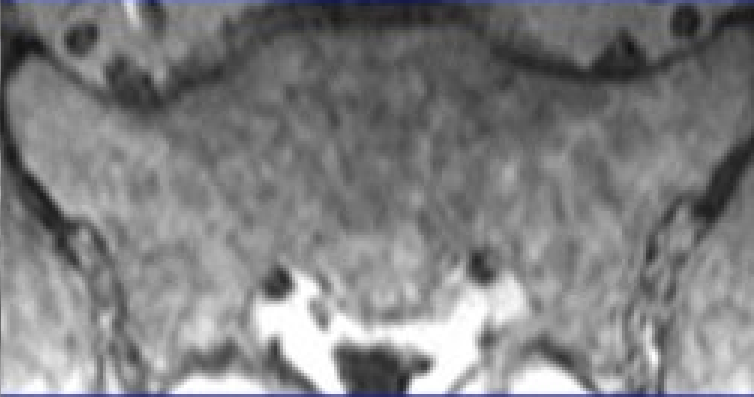
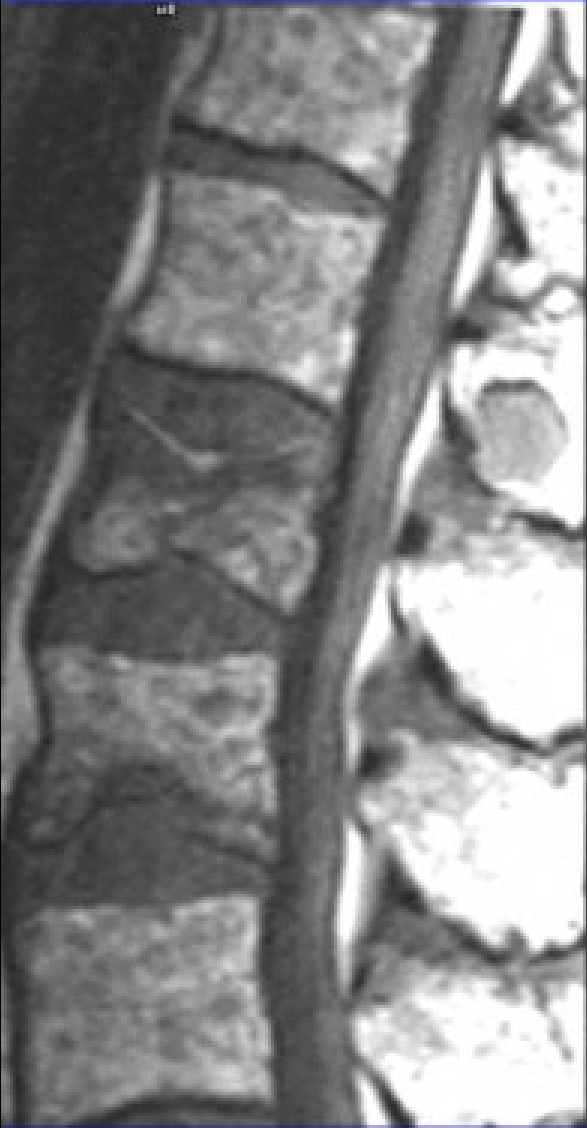




DIFFERENTIAL

- DDD - TYPE I
- DSI
- POST OP CHANGES
- PSUEDOARTHROSIS/
OSTEONECROSIS
- TUMOR







OSTEOPOROSIS



MULTIPLE MYELOMA



COMPRESSION FRACTURES

BENIGN

- NORMAL SIGNAL
- POST ELEMENTS (23%)
- FRAGMENTATION
- ADD' L FX"S (50%)
- DISC HERNIATION

MALIGNANT

- DIFFUSE REPLACEMENT
- POST ELEMENTS (90%)
- CONVEX MARGINS
- ADD' L METS (90%)

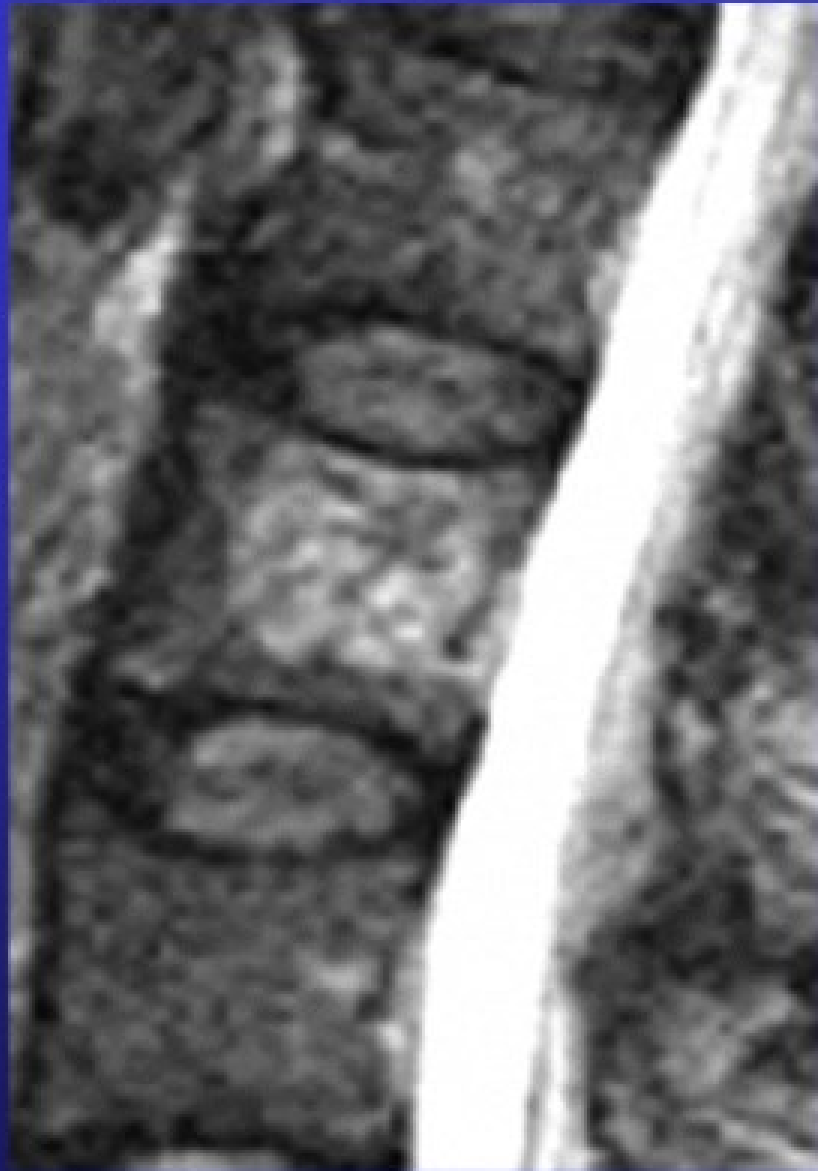
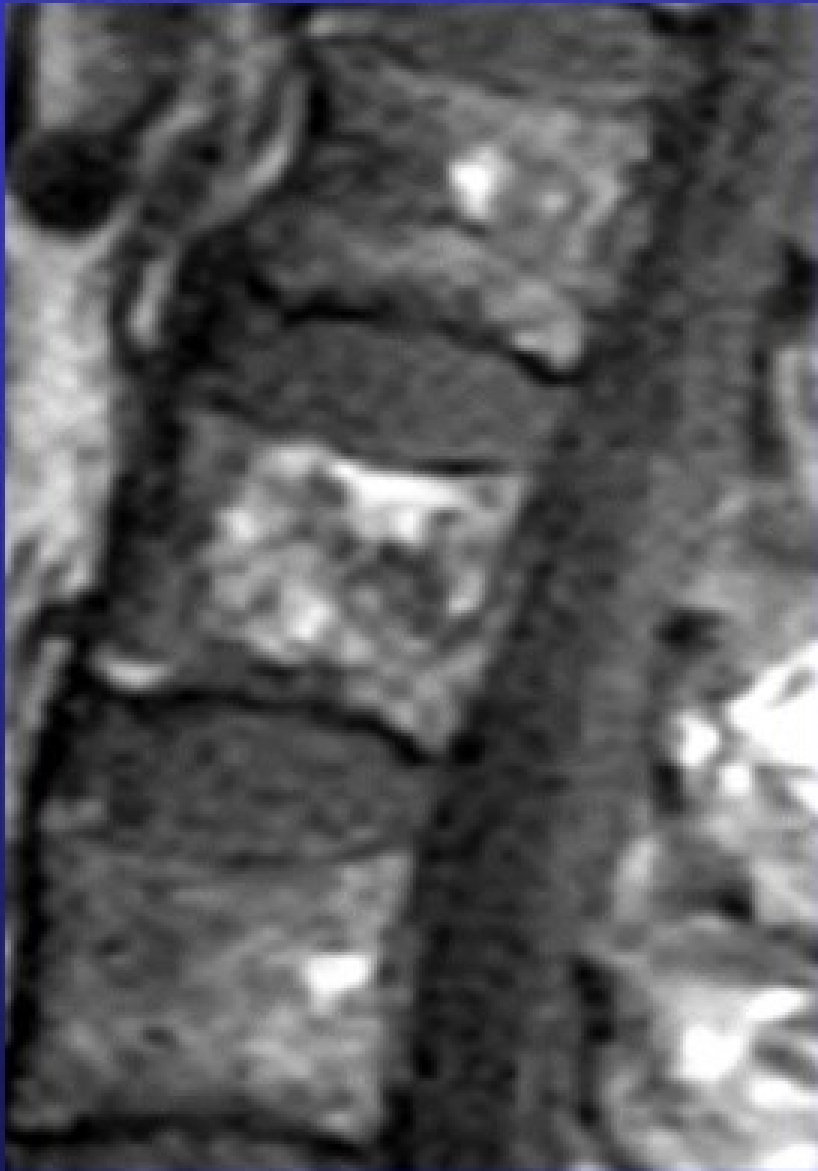
MARROW REPLACEMENT

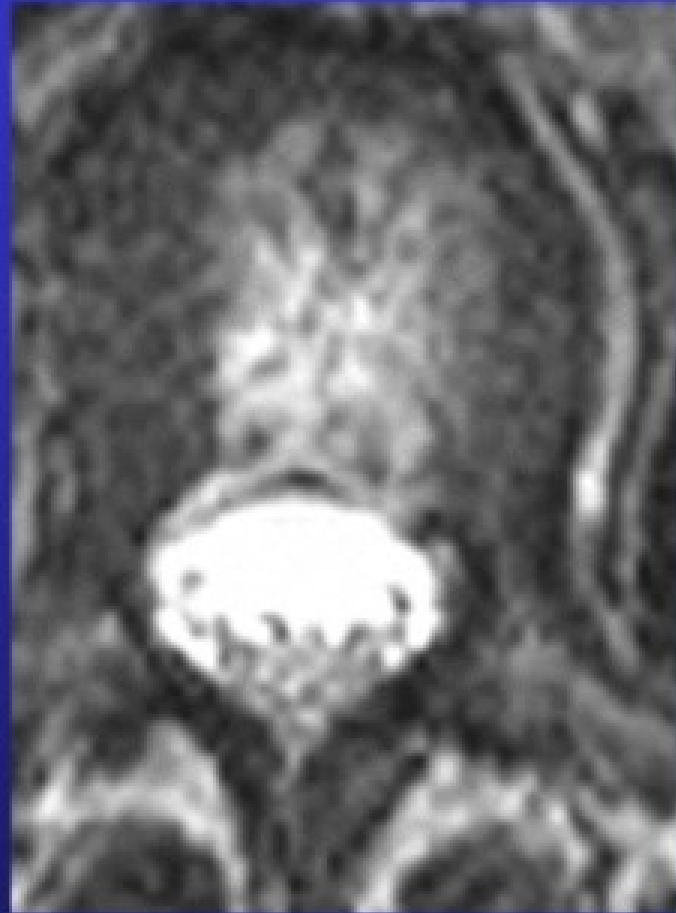
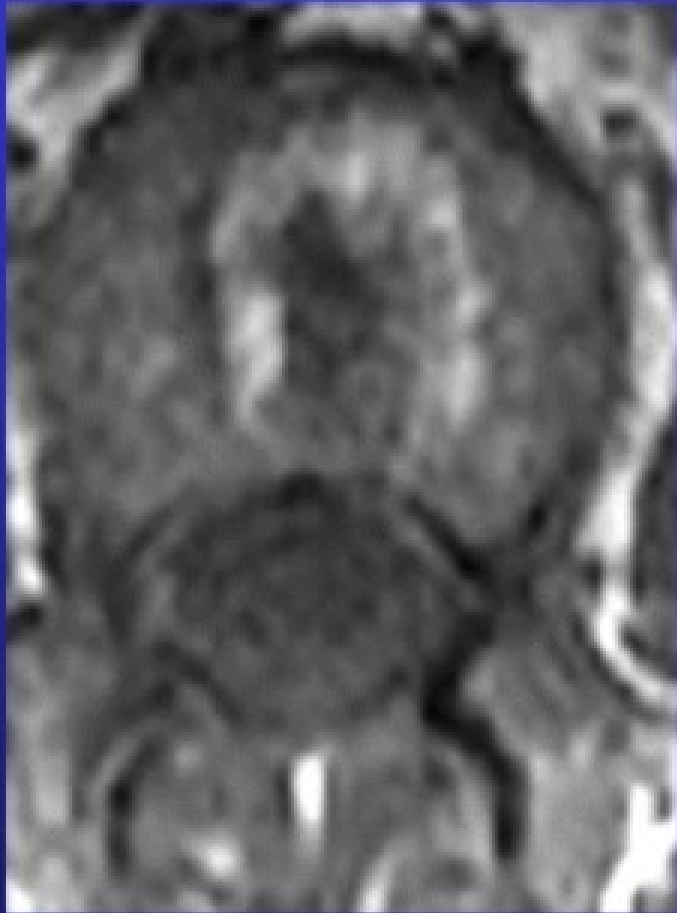
- TRAUMA
- TUMOR
- INFECTION
- DEGENERATIVE
- Misc

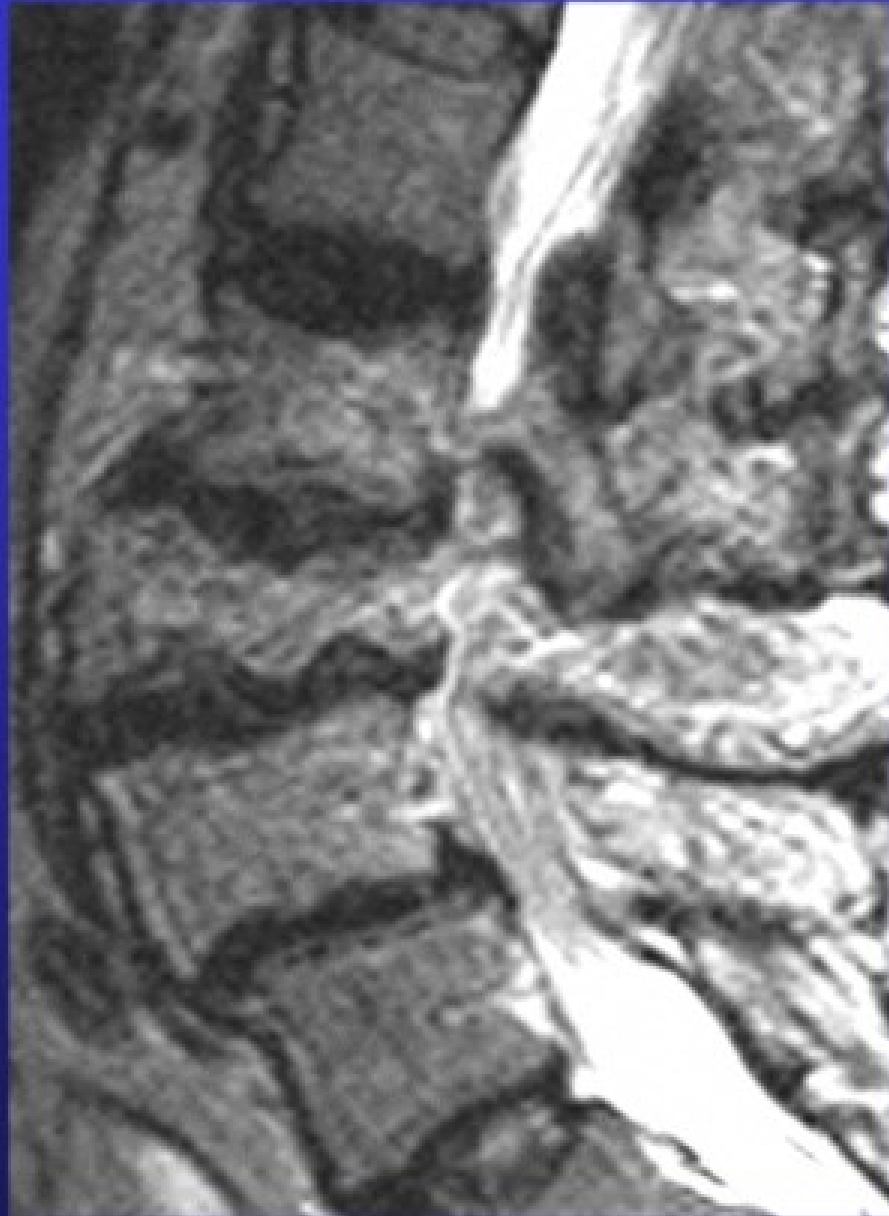
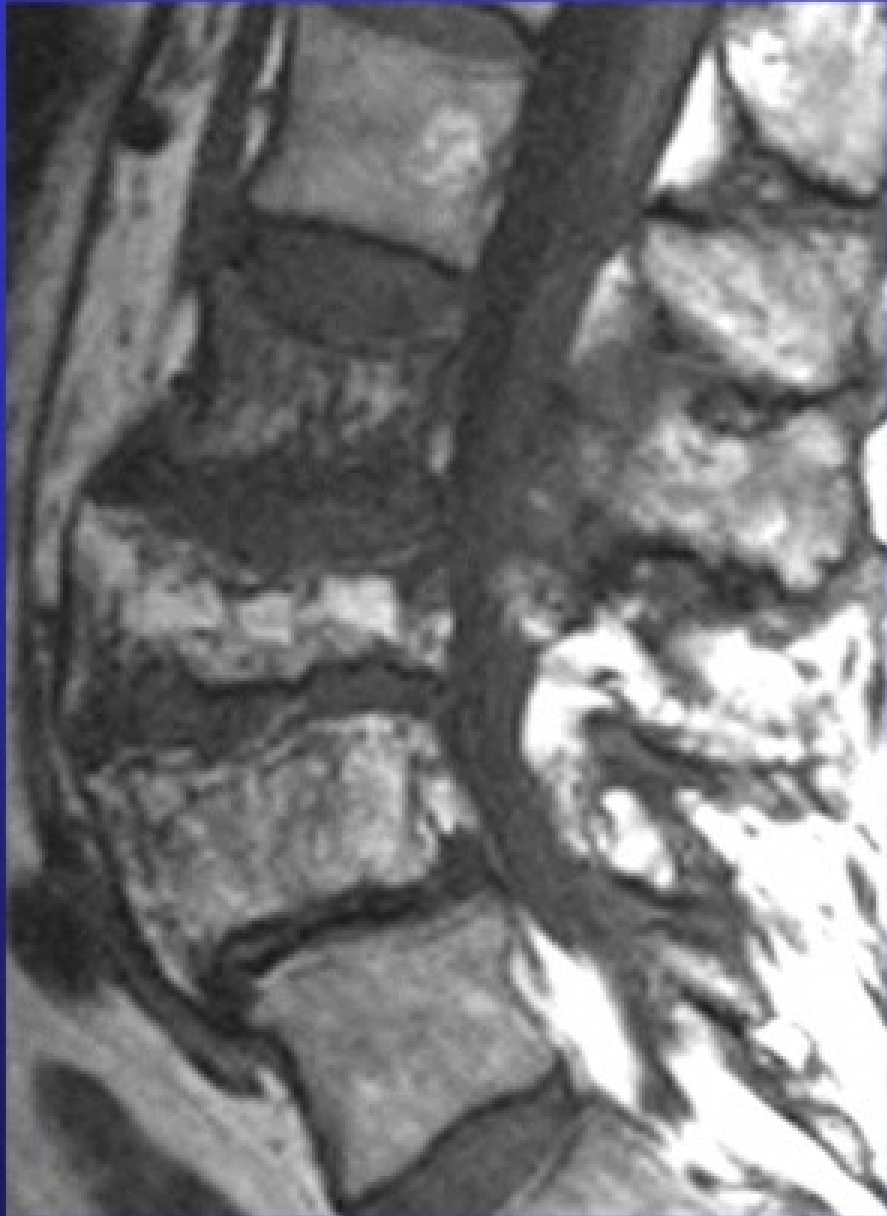
**HEMANGIOMA
VS
LIPID REST**

HEMANGIOMA

- **BENIGN VASCULAR NEOPLASM**
- **HONEYCOMB ON PLAIN FILMS**
- **MAY BECOME EXTRAOSSEOUS**
- **INCREASED SIGNAL ON T1 (FAT)**
- **INCREASED SIGNAL ON T2 (TUMOR)**









Points that may be true, sometimes

- Type I marrow changes are usually associated with back pain
- The presence of type I marrow changes suggests some type of biomechanical alteration or increased stress / forces and microfractures
- They can revert to normal or advance to more significant morphologic change
- They can be altered by various therapies
- They may suggest types of therapy

