Spinal Imaging

Degenerative diseases

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Mamdouh Mahfouz  MD
mamdouh.m5@gmail.com
Extremity MRI
The bed rotates from Upright to Recumbent, stopping at any angle in between.
Does a Lie-Down-Only Scanner see the patient’s problem? **NO!**

*Case courtesy of M. Rose, MD, Rose Radiology Centers*
Dynamic MRI
Surface coils
Degenerative diseases

- Spinal canal stenosis
- Disc lesions
- Bone marrow changes
- Ligamentous pathology
- Osseous changes
- Spondylolisthesis
- Cord pathology
Spinal canal stenosis

- **Idiopathic type** = Reduced sagittal diameter
Spinal canal stenosis

- Developmental type = Hypertrophied laminae, articular facets and Ligamenta flava
Ligamenta Flava hypertrophy
Ligamenta Flava Hypertrophy
Spinal canal stenosis
Spinal canal stenosis

- **Idiopathic type**
  - Reduced sagittal diameter

- **Developmental type**
  - Hypertrophied laminae, articular facets and Ligamenta flava

1.2 cm
Lateral recess spinal canal stenosis
Lumbar spinal canal
Spinal canal stenosis

- Developmental type
  - Hypertrophied laminae, articular facets and Ligamenta flava
Developmental canal stenosis
Cervical canal stenosis
Cervical canal stenosis
Cervical canal stenosis
Severe canal stenosis
Capacious spinal canal
Capacious spinal canal
Disc lesions

- Degeneration
- Bulge
- Herniation
Disc Lesions

Normal lumbar CT

L4-5
Normal cervical disc

CT

L3-4

C4-5
Normal lumbar disc

MRI
Normal cervical disc

MRI
Disc lesions

L4-5
**Disc degeneration**

- Loss of water $\rightarrow$ ↓ T2 signal [MRI]
- Loss of height $\rightarrow$ narrowing of disc space [X ray, MR, CT?]
- Intradiscal air (vacuum phenomena) [CT]
Disc degeneration
Disc lesions
Vacuum phenomena
Disc lesions

Disc bulge = Intact annulus = Diffuse pathology
Disc herniation = Torn annulus = Focal pathology
Disc Herniation

- Normal
- Herniation
- Sequest.
Disc Herniation
Disc Bulge Herniation

![MRI images showing L5-S1 bulge and herniation.](image)
Disc bulges
Bulge / Herniation
Protrusion / herniation
Disc Protrusion
Disc herniation
Disc herniation
Disc herniation
Disc herniation
Disc herniation
Disc herniation
Disc herniation
Disc herniation
Migration / Sequestration
Disc herniation with caudal migration
Disc migration
Disc migration
Disc Sequestration
Disc Sequestration
Disc and granulation
Disc and granulation
Bone marrow changes

[ Only seen on MRI][3 types ]

Type I  Marrow edema

Type II  Fatty marrow
Type I: Marrow edema
Type II  
Fatty marrow
Type II

Fatty marrow
Type III  Bone sclerosis
Osseous pathology

- Osteophytes
  - Anterior
  - Posterior [Important]
- Osteoarthritis
Osteoarthritis

- Narrowing of the joint space
- Subarticular bone sclerosis
- Osteophytic lippings
- Pseudo cystic changes
- Vacuum phenomena
Osteo - arthritis
Disc / osteophyte complex
Ligament pathology

- Hypertrophy
- Calcification
- Ossification
Ligamenta flava hypertrophy [ Buckling ]
OPLL: Ossification of Posterior Longitudinal Ligament
OPLL
Vertebral displacement

- Spondylolisthesis
  - [Anterior displacement ]
- Lytic
- Degenerative
- Retrolisthesis
  - [Posterior displacement ]
Spondylo - listhesis
Spondylo - listhesis

Multi-level
Spondylo - listhesis

[ Pseudo – disc bulge ]
Spondylo - listhesis

[Pseudo – disc bulge]
Spondylo - listhesis

[ Pseudo – disc bulge ]
Spondyloolisthesis [Multi-level]
Spinal instability
Cord pathology

- Edema
- Myelomalacia [early, late]

Both produce focal area of low signal in T1 and high signal in T2. Differentiation by clinical presentation of the patient ± contrast injection.
Cord pathology

**Compressive myelomalacia**
Focal area of high signal in T2 WIs
Decompression leads to regression or resolution of early lesions
**NB:** Early lesion shows contrast enhancement
Para-vertebral shadows

- Hemorrhage, bone fragments,...[ Trauma]
- Abscesses [inflammatory lesions]
- Neoplastic extra osseous masses [ Tumors]
Disc herniation, Right postero-lateral
Type II Fatty marrow
Q. 

Type III

Bone sclerosis

- Lumbar degenerative changes
- L3-4 disc herniation with cephalic migration
- L2-3 disc herniation
Disc herniation, left postero-lateral
Disc herniation, left postero-lateral
Lytic Spondylo - listhesis with pseudo-disc bulge
Type II Fatty marrow
L5-S1 disc herniation with cephalic migration
Disc herniation and granulation
Normal lumbar disc

CT Myelography, osteophyte
Sequestrated L4-5 disc with cephalic migration
L5-S1 disc herniation with granulation
Foraminal disc herniation
Thank you

سبحانك اللهم و بحمدك × نشهد ان لا اله الا انت × نستغفرك و نتوب اليك
Degenerative changes
Disc lesion
Multiple disc lesions
Cervical discs
Lumbar L.flava
Lumbar discs & L.flava
Canal stenosis

Capacious canal, disc
Disc lesions
DISC AND GRANULATION
Type II Fatty marrow