Short vs. Long Spinal Cord T2 Lesions: Differential Diagnosis

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Purpose

To review imaging findings & propose a step-by-step approach to generate a differential diagnosis of short & long T2 hyperintense spinal cord (SC) lesions.

Approach/Methods

We searched teaching files of 2 institutions for short & long T2 bright SC lesions & review & discuss pertinent literature emphasizing distinguishing features for these entities.

Findings/Discussion

T2 hyperintense SC lesions have a long differential diagnosis including MRI artifacts; trauma; compression myelopathy; 1ry & 2ry neoplasms; radiation myelitis; inflammatory & necrotizing diseases; subacute combined degeneration (B12 deficiency); drug toxicity; vascular causes; infections, post infective and granulomatous diseases & cavitary lesions among less common causes. Correlation between clinical data & imaging characteristics of T2 hyperintense SC lesions helps us generate a deferential diagnosis to suggest the correct diagnosis.

A practical approach is a time-based scheme which emphasizes acute, chronic & relapsing symptoms. As shown in the **Table**, multiple diagnoses overlap in the same time classification so the first step is to differentiate between short & long T2 lesions followed by lesion location on the axial T2 images which helps differentiate between lesions involving either of white & gray matter such as infarcts, polio and Hirayama disease in the anterior horns; B12 deficiency, copper deficiency, syphilis & less frequently infarcts in posterior columns; & acute transverse myelitis, inflammation (ADEM, NMO and some anti-MOG + myelitis) & ependymoma which occur in the central SC.

Presence of other signs such as the *pancake sign* in compressive myelopathy, *trident sign* in sarcoidosis, *owl/snake eyes* in anterior spinal artery infarct, *inverted V sign* in B12 deficiency & *bright spots* in neuromyelitis optica as shown below.

Summary/Conclusion

In this educational exhibit we describe short & long T2 hyperintense lesions, highlight the features that suggest the correct diagnosis, provide a short literature review as well as a diagnostic approach.

Onset	MRI Sagittal	Differential Diagnosis	Imaging Findings
ACUTE/SUBACUTE	SHORT	MS Infective Autoimmune Sarcoidosis	Viral : central grey matter Tuberculosis : WM nodules or target lesions Parasitic : Eccentric nodular pattern
	LONG	NMOSD Autoimmune ADEM Sarcoidosis Infective (viral) Paraneoplastic Vascular Metabolic	NMOSD : Central grey matter/transverse myelitis Sarcoidosis : Variable: dorsal cord subpial GAD enhancement may help differentiate from NMOSD Metabolic : Symmetric T2 hyperintensity dorsal tracts
CHRONIC PROGRESSIVE	SHORT	Sarcoidosis MS Neoplastic (ependymoma, astrocytoma, metastatic)	Ependymoma : homogenous enhancement; clear borders; central; rostral and caudal cysts Astrocytoma : heterogeneous or no enhancement; irregular margins; eccentric location Metastatic : eccentric location
	LONG	Paraneoplastic Sarcoidosis Chronic infection Vascular (MF) Metabolic Neoplastic	Syphilis and HIV : dorsal column (may mimic metabolic) HTLV-1 : lateral columns > central and anterior cord Astrocytoma > Ependymoma
RELAPSING	SHORT	MS	Posterolateral lesions; less than half the axial area
	LONG	NMOSD Sarcoidosis Vascular

Left to right: SHORT lesions. 1. Posterior disc herniation causes compressive myelopathy with high T2 signal. Post-operative T1WI Gd+ shows classic “pancake” sign; 2. Screwdriver puncture lesion shows short T2 bright area with posterolateral blooming artifact; 3. Small cystic lesion of neurocysticercosis with high T2 in SC; 4. Renal cell carcinoma metastasis seen as nodular lesion with heterogeneous T2 signal & hemorrhage with intense contrast enhancement; 5. Sarcoidosis with high T2 signal due to edema showing patchy contrast enhancement and in axial view the “trident” sign; 6. MS lesions with short longitudinal extension & high T2 signal.

LONG lesions: 7. ADEM with long, tumefactive, T2 bright lesion involving the cervical SC; 8. Infarct in anterior spinal artery territory shows the characteristic owl eyes sign; 9. HIV-related myelopathy shows atrophy & longitudinally extensive high T2 signal in anterior gray matter; 10. B12-deficiency with long T2 hyperintensity in posterior funiculi with typical inverted V sign; 11. Astrocytoma characterized by long/tumefactive and heterogeneous T2 hyperintense lesion with a small cyst; 12. NMOSD shows longitudinally extensive lesion with high T2 signal including area postrema & intralesional bright spots.