
بسم الله الرحمن الرحيم

Spine MRI

Part 1

Dr. Mohamad Hasan Alkousy

Ass. Professor of Radiology

Sohag University

Cystic components

1-Intratumoral cysts

Lie entirely within the boundaries of the tumor.

Enhancement of cyst wall. The signal behavior of these cysts is usually different from CSF (due to the high protein content of the fluid).

2-Polar / "satellite" cysts

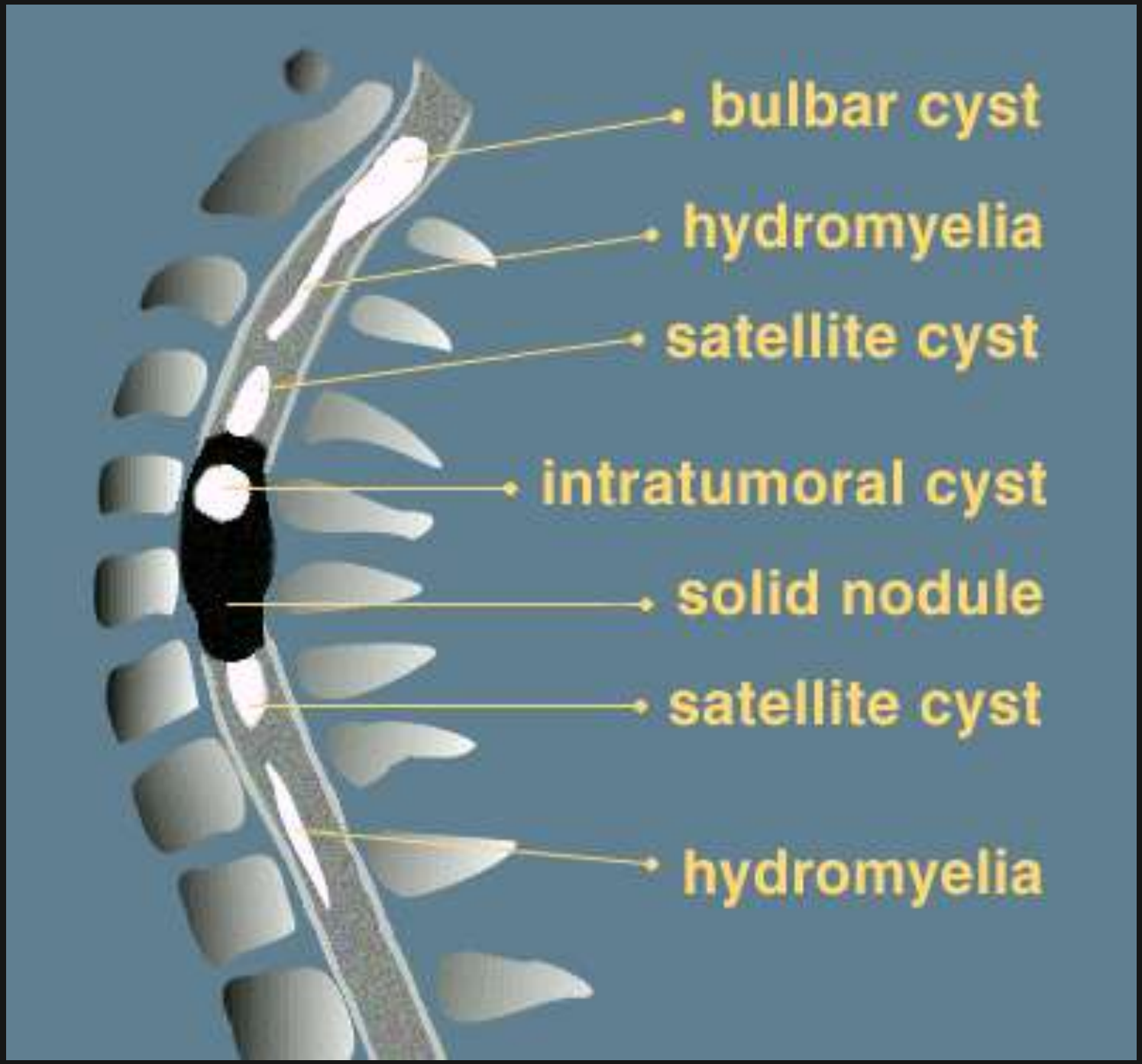
Cavities located cephalad / caudal to the solid nodule.

Walls do not enhance.

3-Hydromyelia Due to enlargement of the ependymal canal.

4-Bulbar cyst

Focal enlargement of hydromyelic cysts at cephaled part (bulbar level).


bulbar cyst
hydromyelia
satellite cyst
intratumoral cyst
solid nodule
satellite cyst
hydromyelia

Astrocytoma

The only tumor type found in children.

More in males.

Large mass, located in the thoracic region.

If a cystic component is present, it is typically intratumoral.

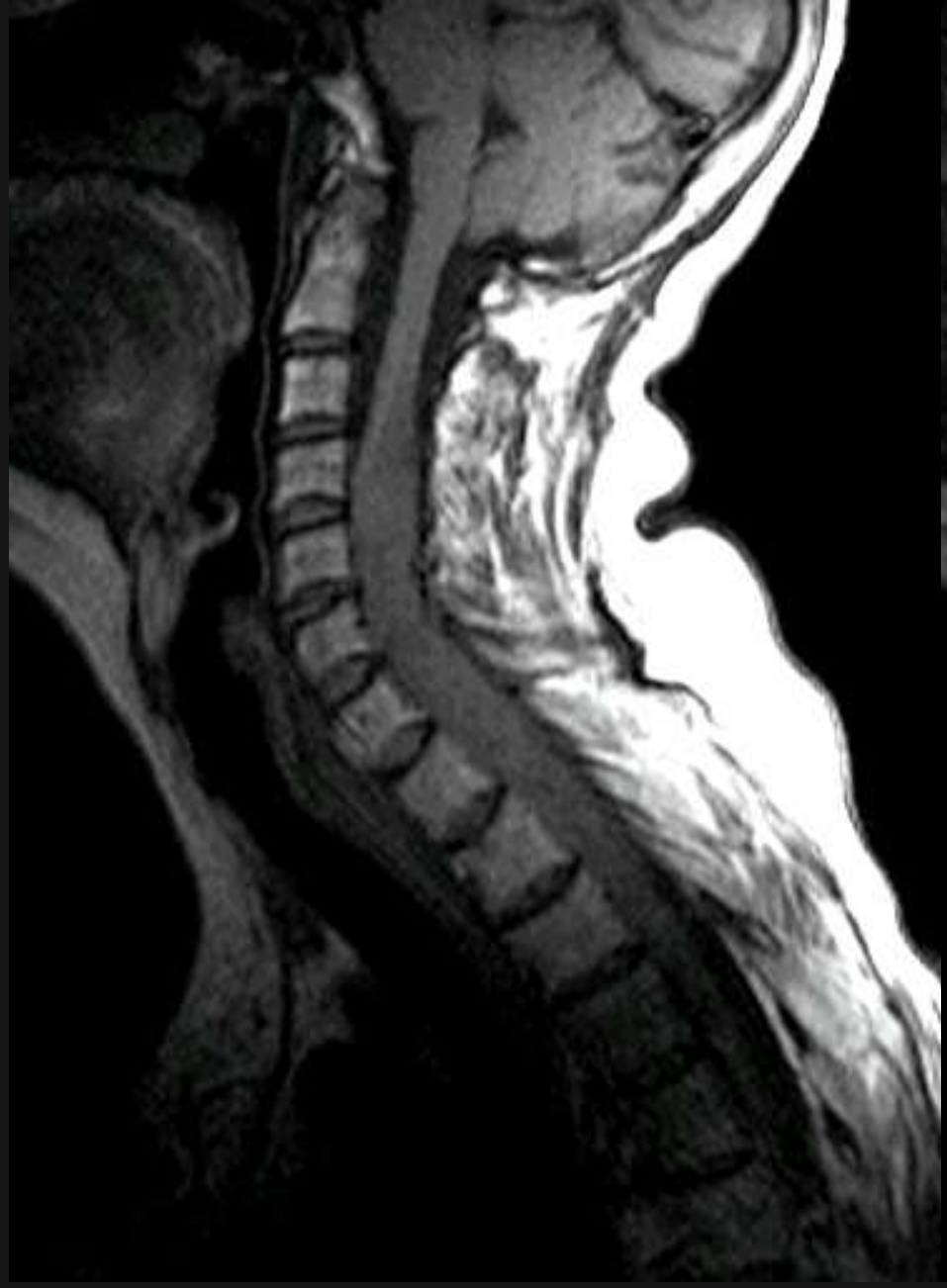
Satellite cysts & 2ry hydromyelia can also seen.

Usually eccentric.

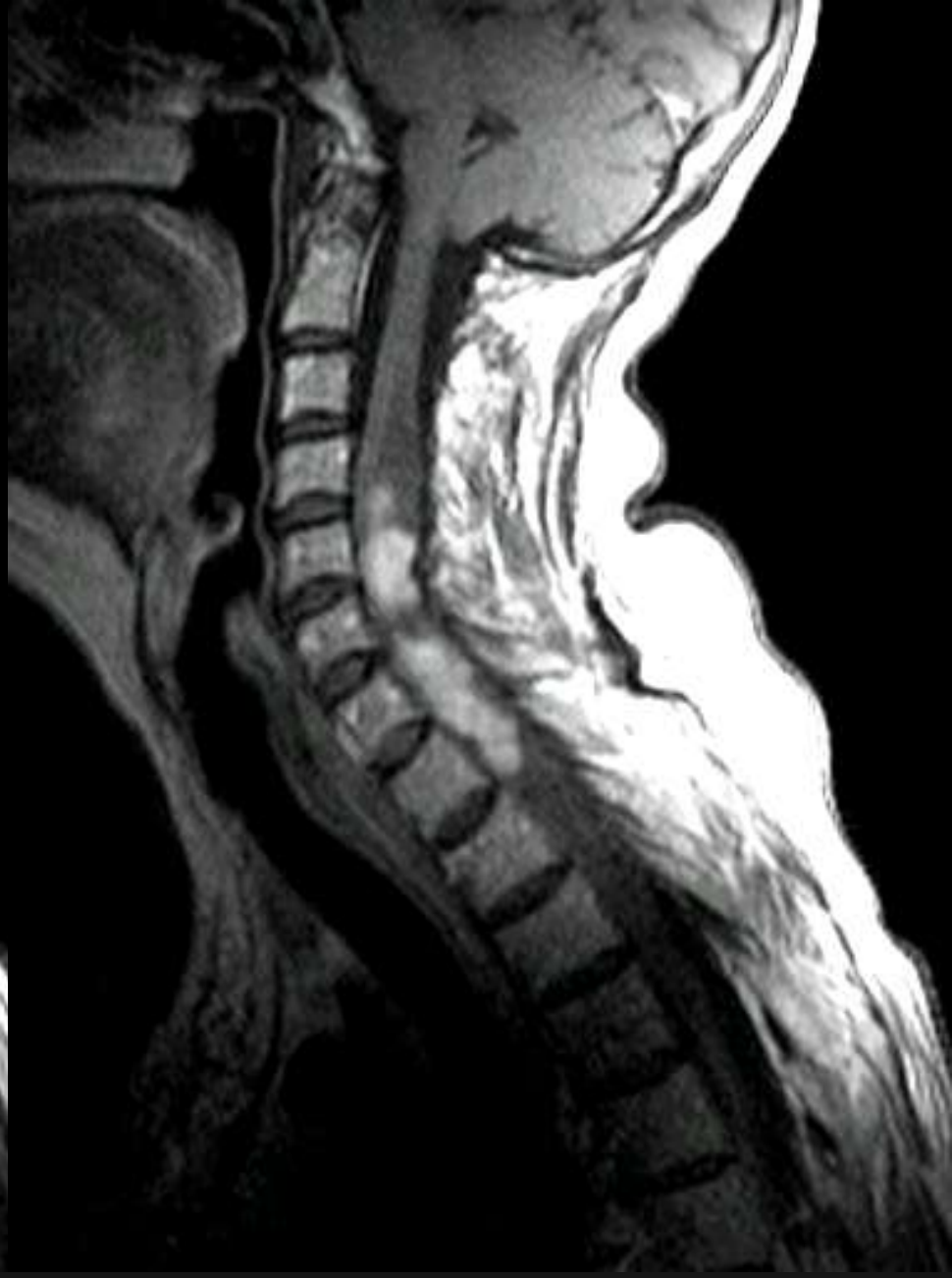
Shows heterogeneous moderate & partial enhancement.

Borders are frequently ill-defined.

Mean T. height is 5.6 vertebral bodi

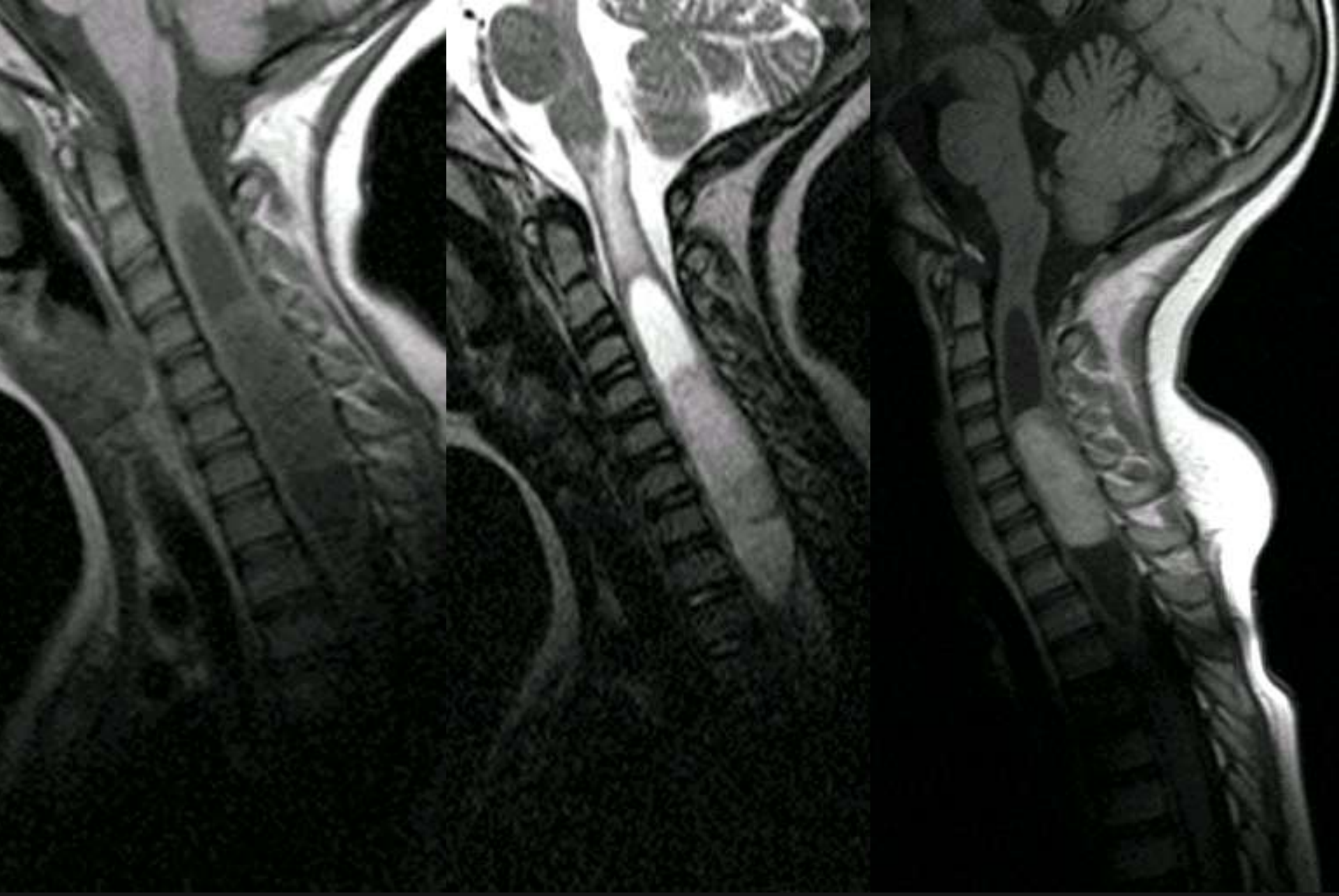


T1
Grade II

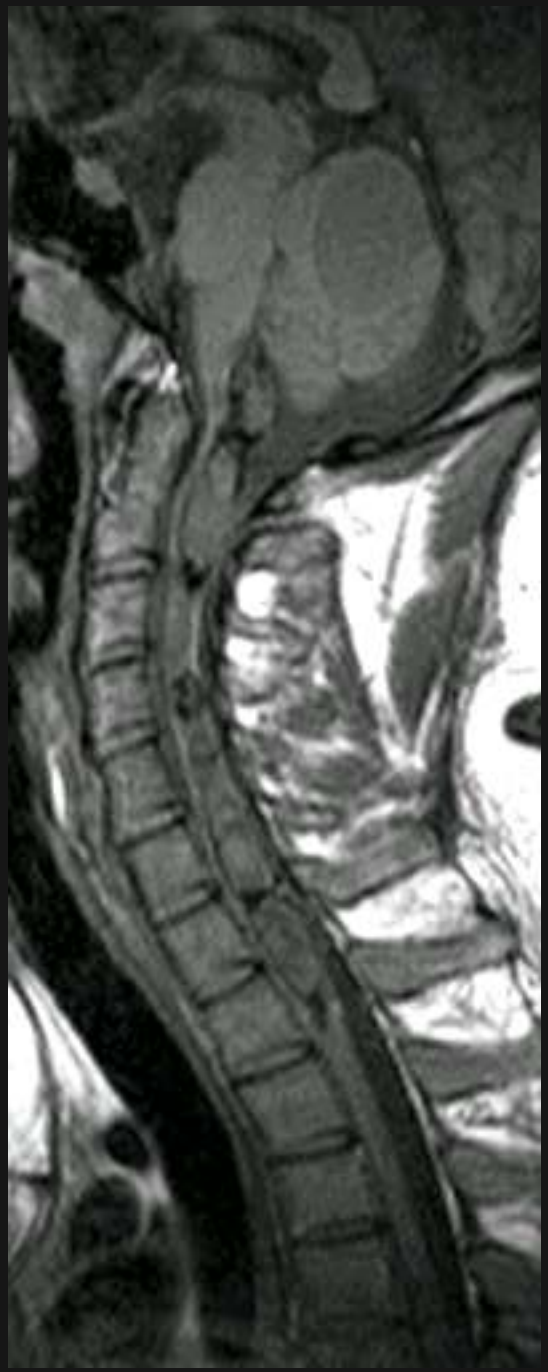


Gad T1

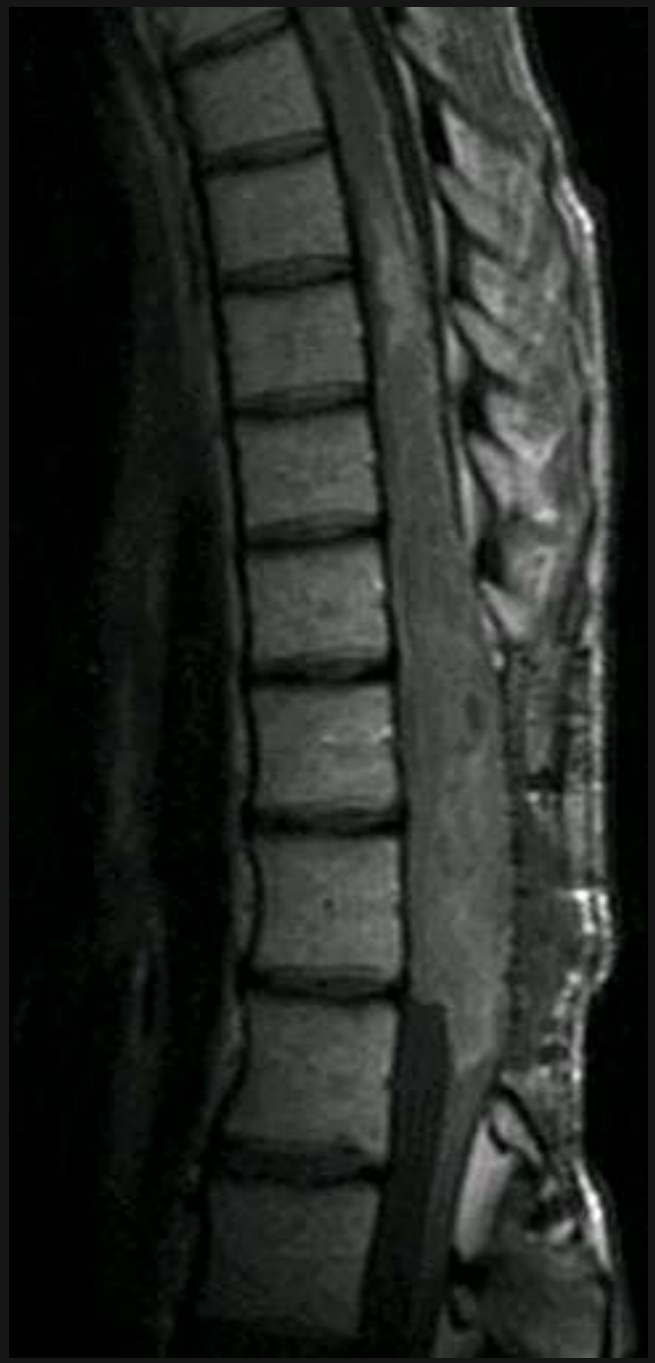
Fibrillary astrocytoma


T1
T2
Gad T1

Dysplastic astrocytoma

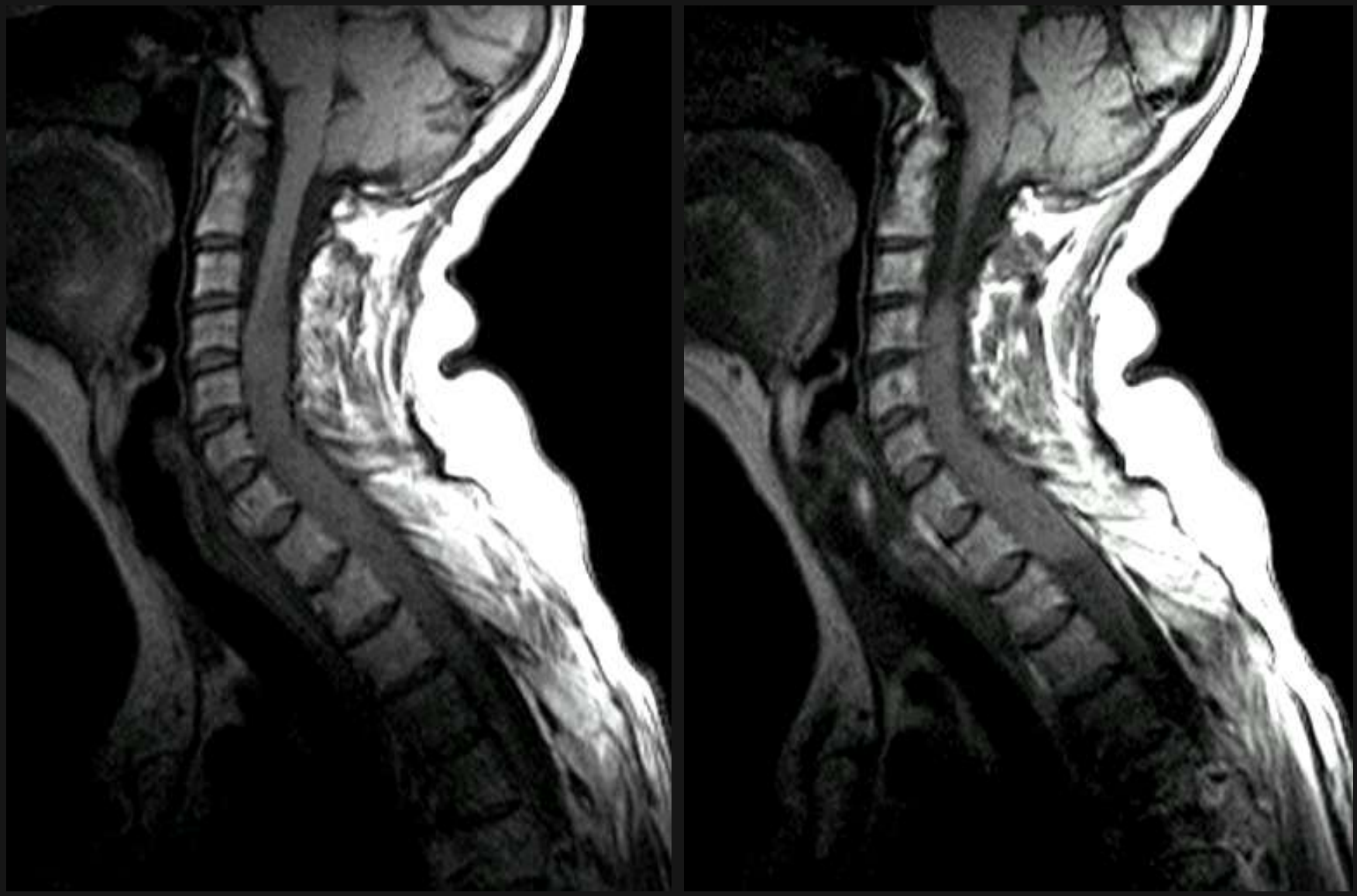


M. anaplastic astrocytoma

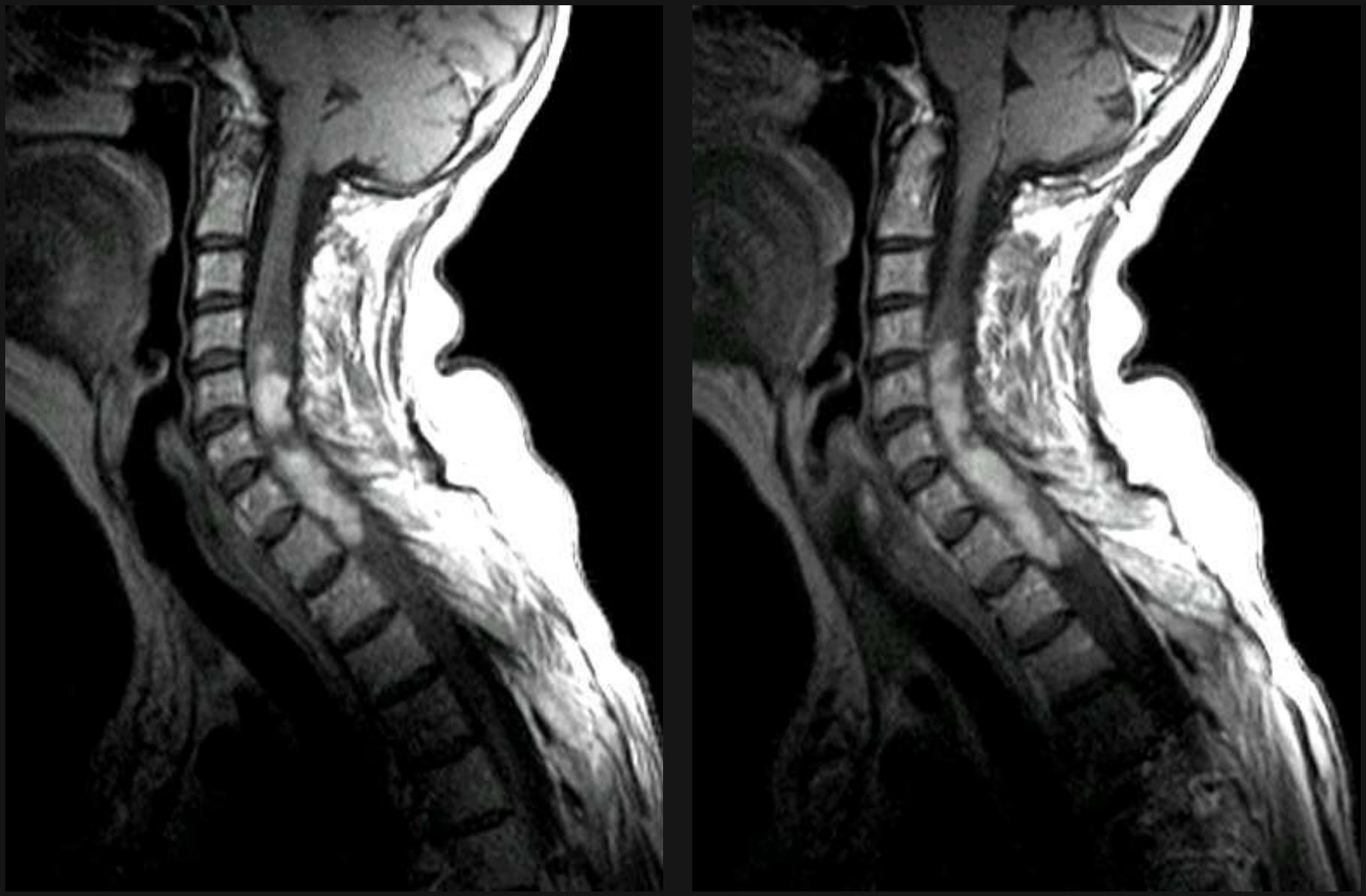


Astrocytoma

Case 1

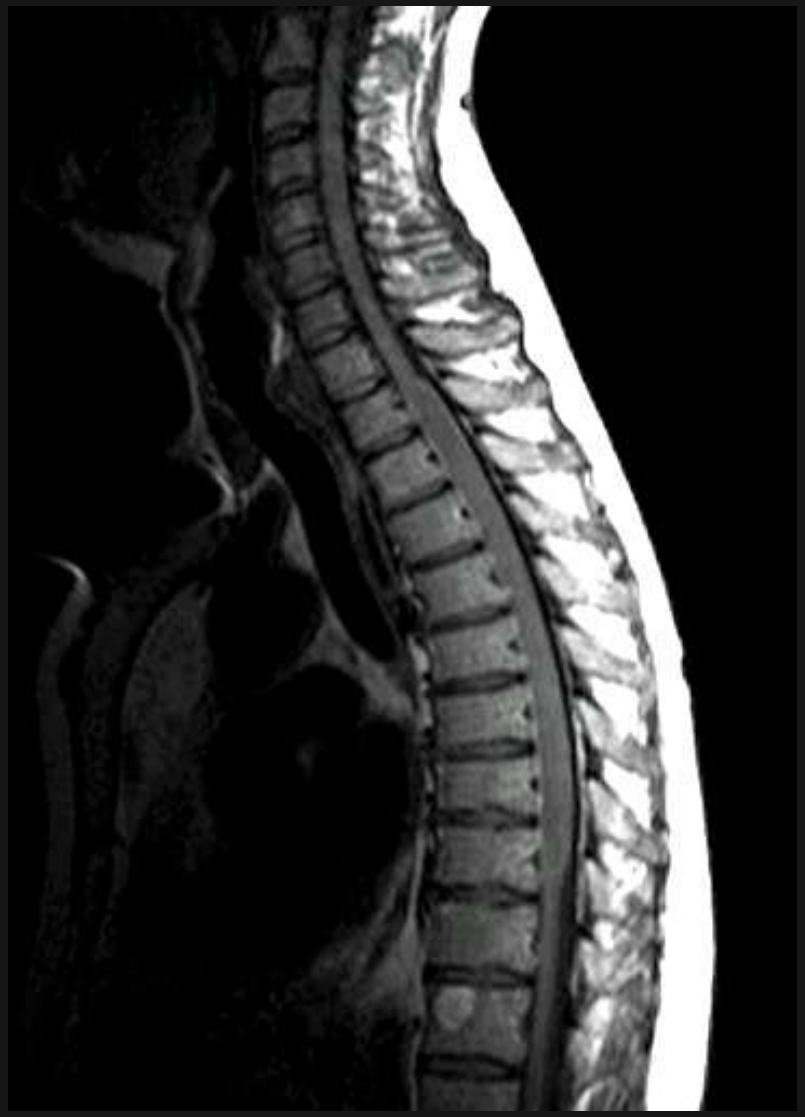


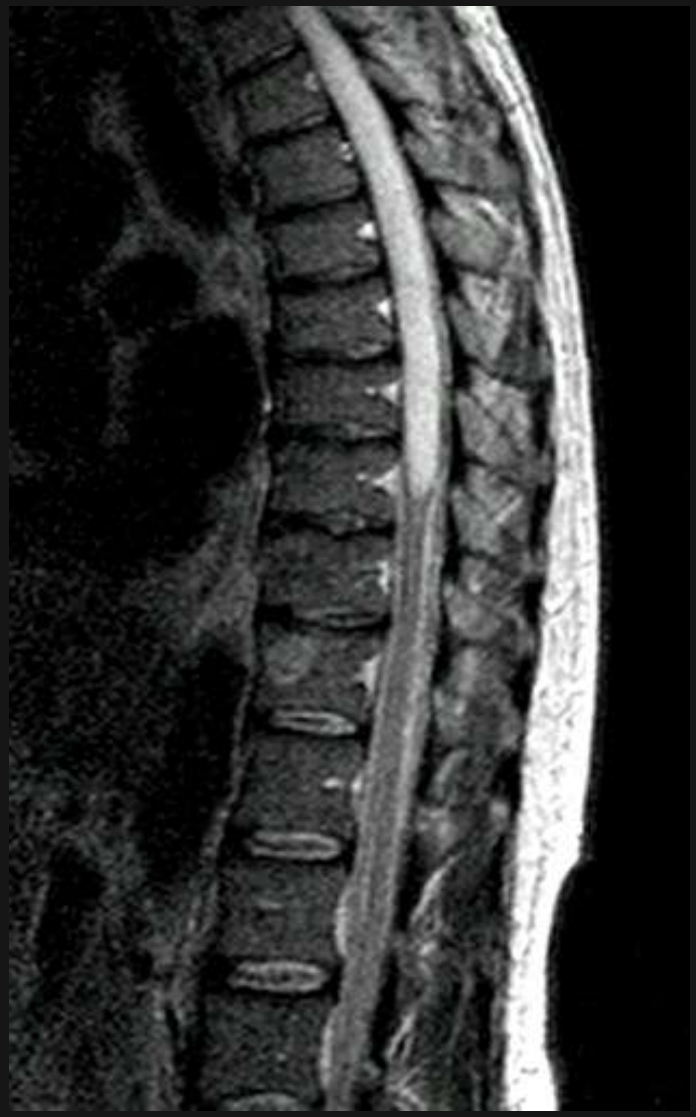
Sagittal T1. Spinal cord enlargement from C3 to T2: ill-defined iso/slightly hyperintense mass lesion



Sagittal Gd T1. Intense but inhomogeneous tumor enhancement

Case 2

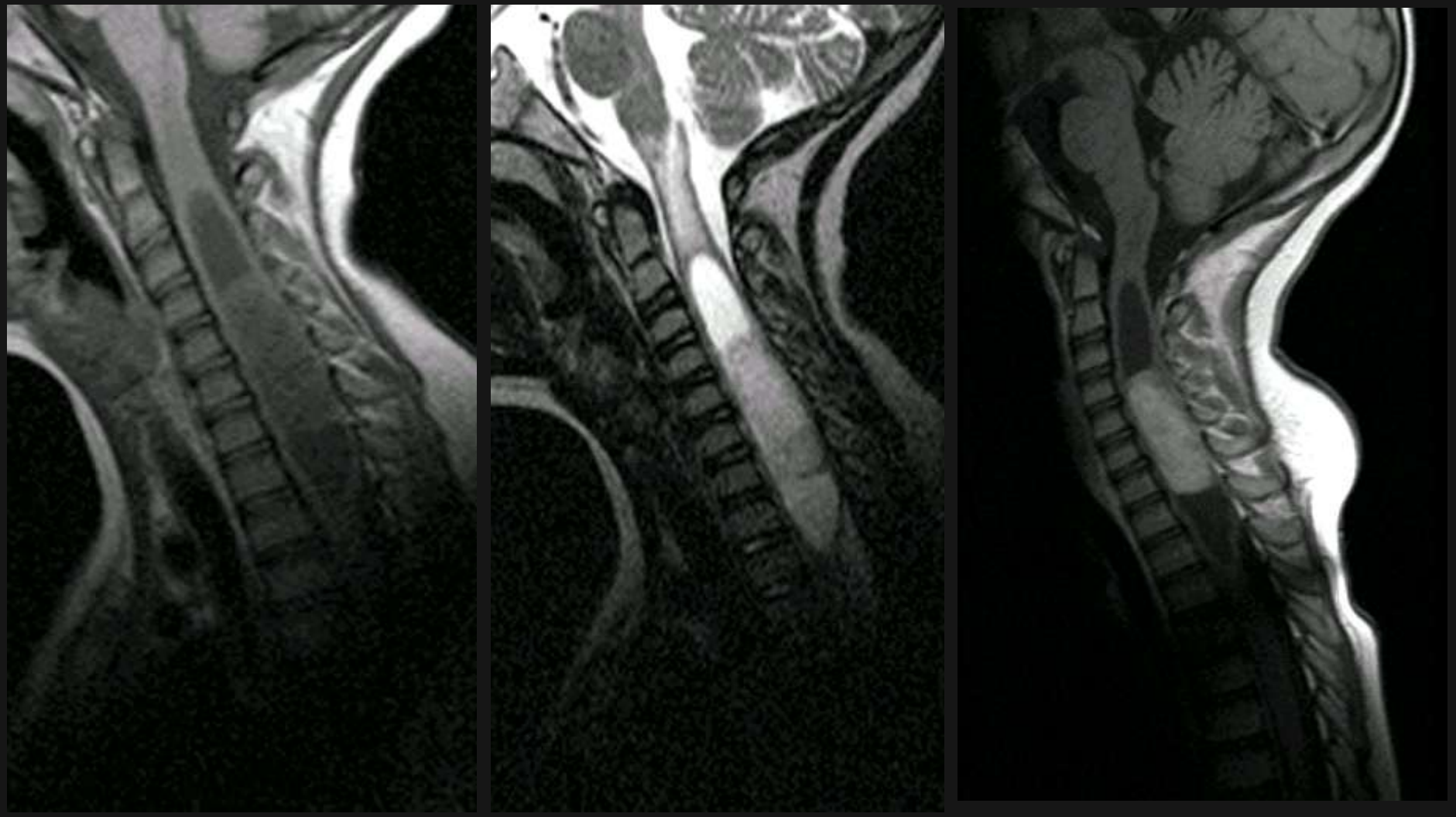




Spinal cord enlargement from D2-9 due to an ill-defined low T1 & high T2 lesion. Mild cord oedema caudal to the mass.

Note D11 vertebral body hemangioma.

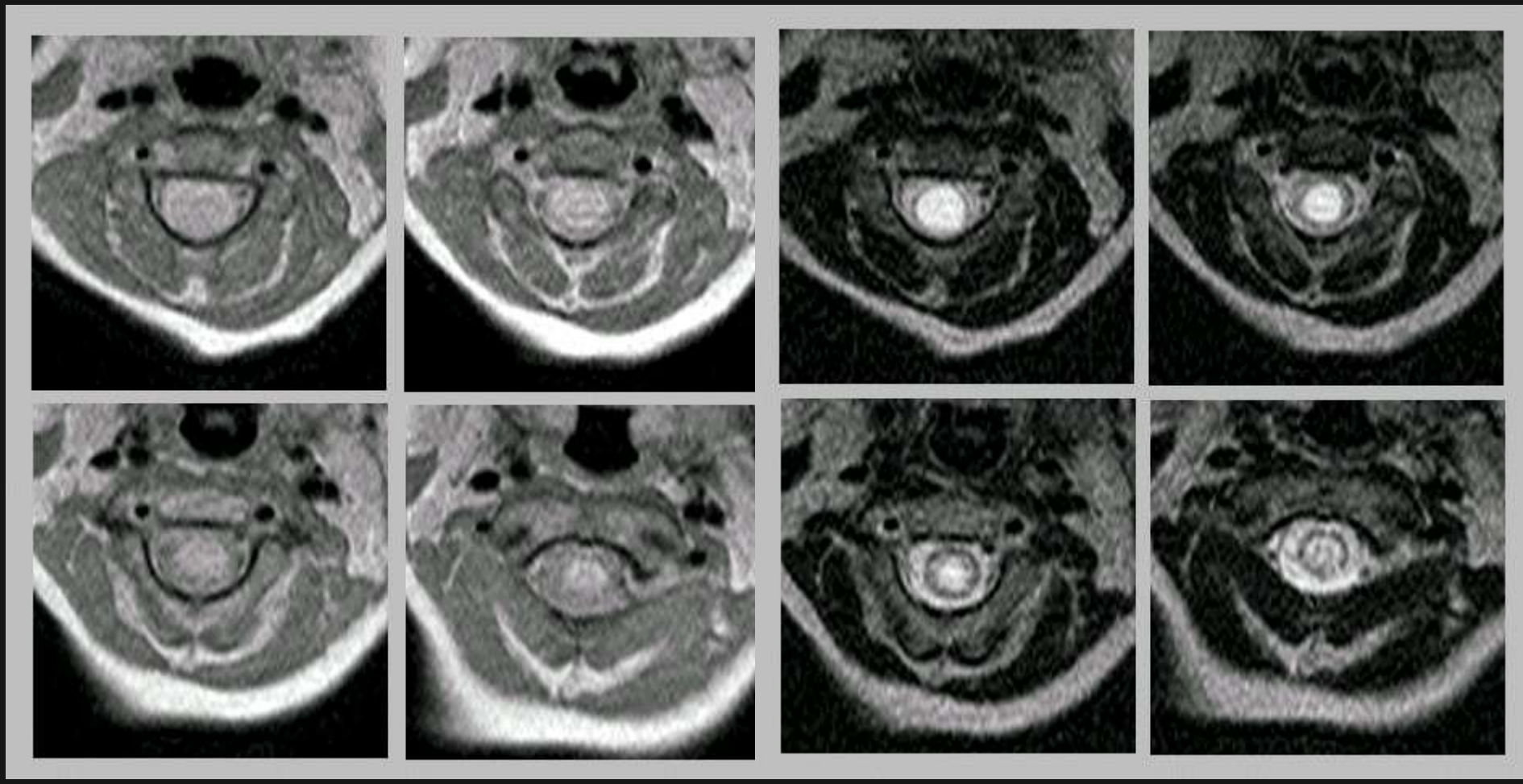
Case 3



Extensive cord enlargement from C1-D5 with an iso- to slightly hypo solid nodule at C5-D1, capped at both ends by two cystic components.

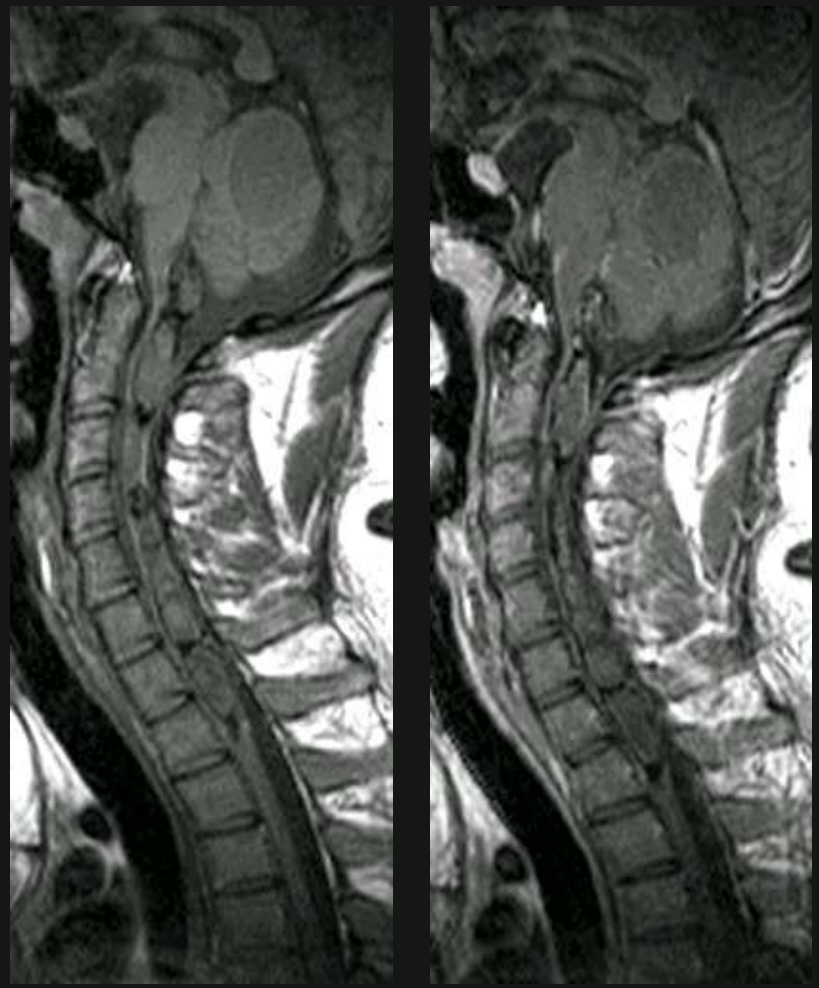
On T2, the solid nodule is hyper. The hyperintense appearance of the medulla oblongata and upper cervical cord is due to associated edema.

On gad, intense nodular enhancement seen.



Axial PD & T2 show the cystic component with smooth margins

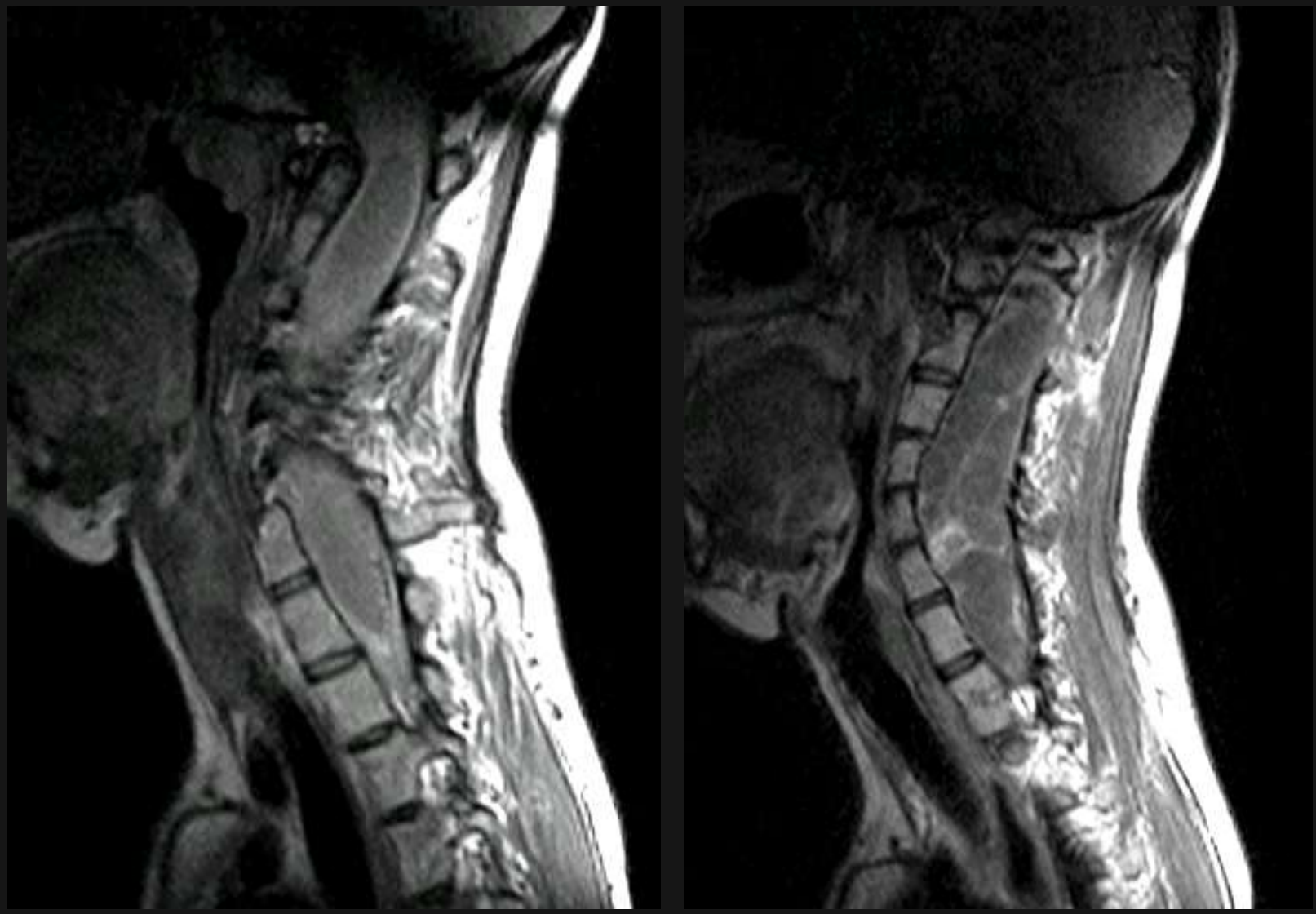
Case 4



Sagittal T1, large low signal cyst in upper cerebellar vermis. In the cervical cord, from C1-D1, multiple cystic lesions are seen, capped by hypointense areas, suggestive of hemosiderin deposits.
Sagittal Gd, multiple patchy areas of enhancement at the periphery of the cervical cyst and at the upper part of the vermian cyst.

D.D. Hemangioblastoma, cystic astrocytoma & syringomyelia 2ry to arachnoiditis.

Case 5



Sagittal Gd T1WI. Massive spinal cord enlargement is seen, caused by a mainly polycystic tumor with several enhancing ill-defined solid components. Note the pathological enlargement of the spinal canal with scalloping of the vertebral bodies

Ependymoma

Typically lies in cervical region.

Associated large satellite cysts +/- bulbar cyst.

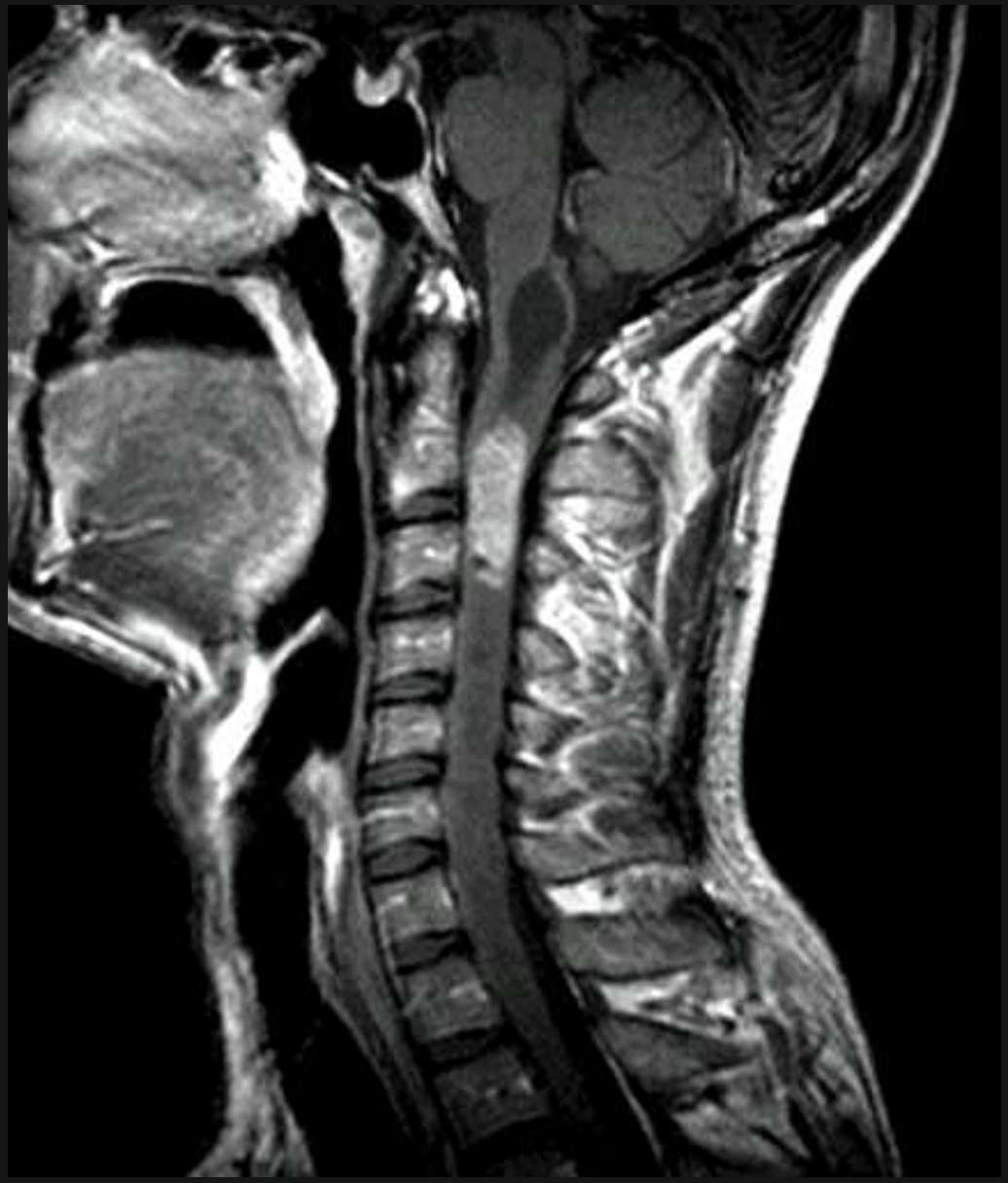
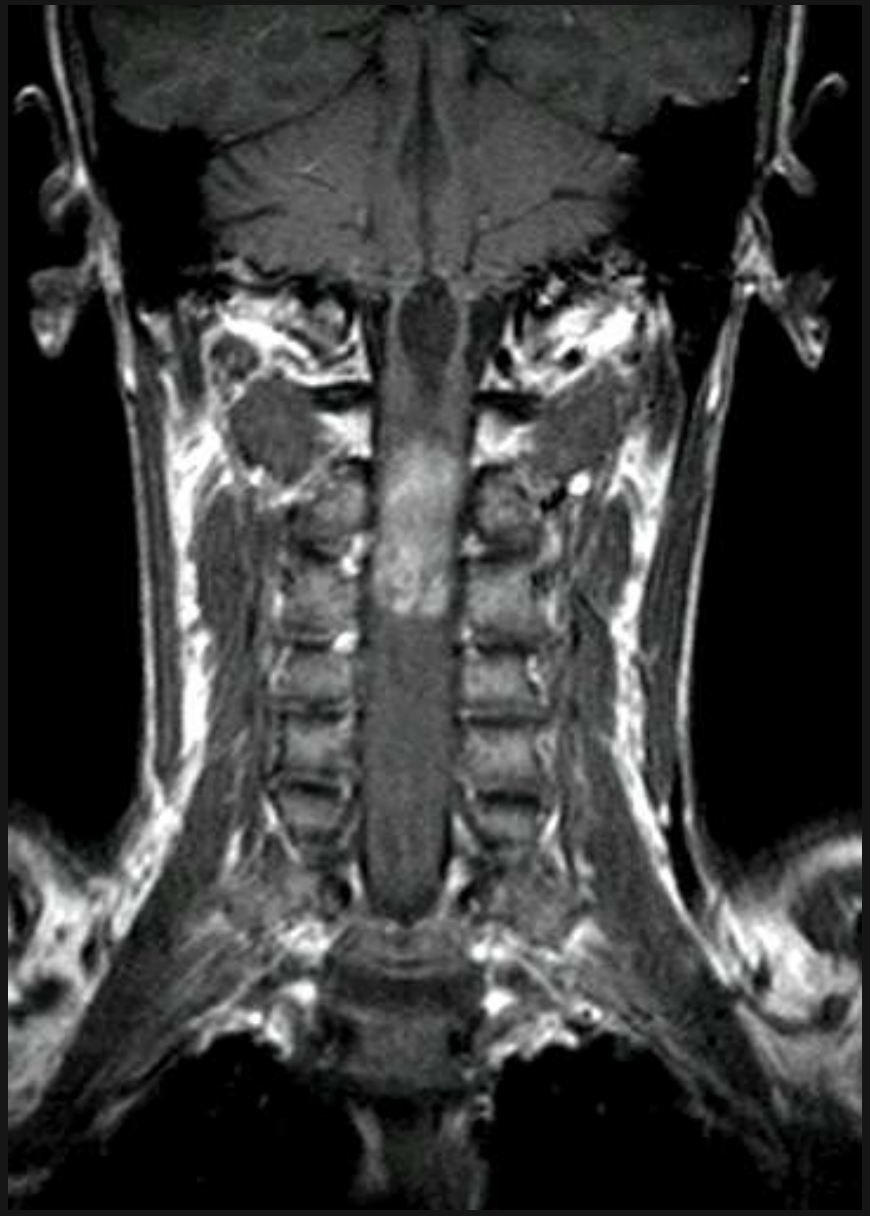
"Cap sign" is often seen.

Lies centromedially.

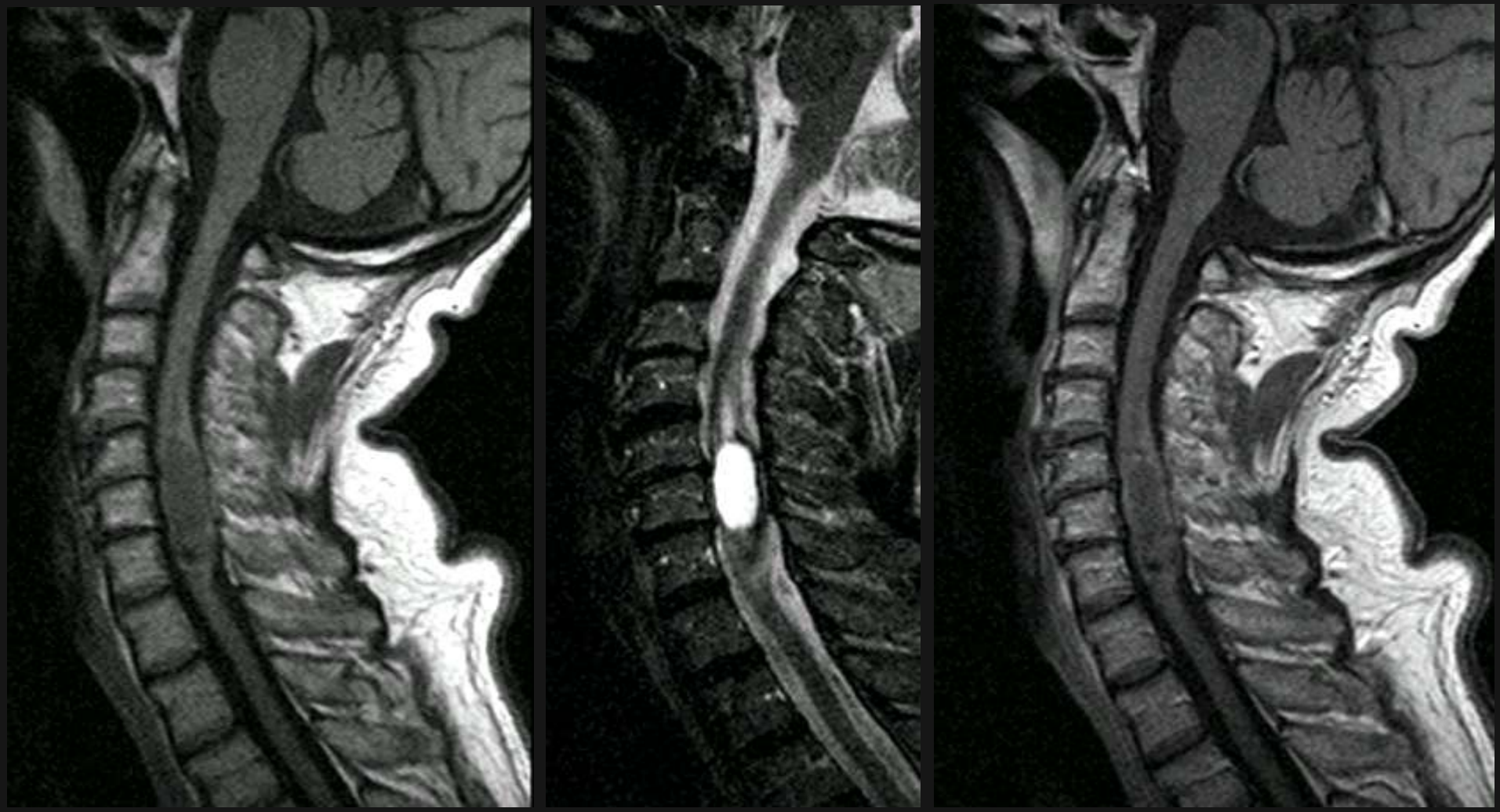
Homogeneous enhancement.

Well defined borders.

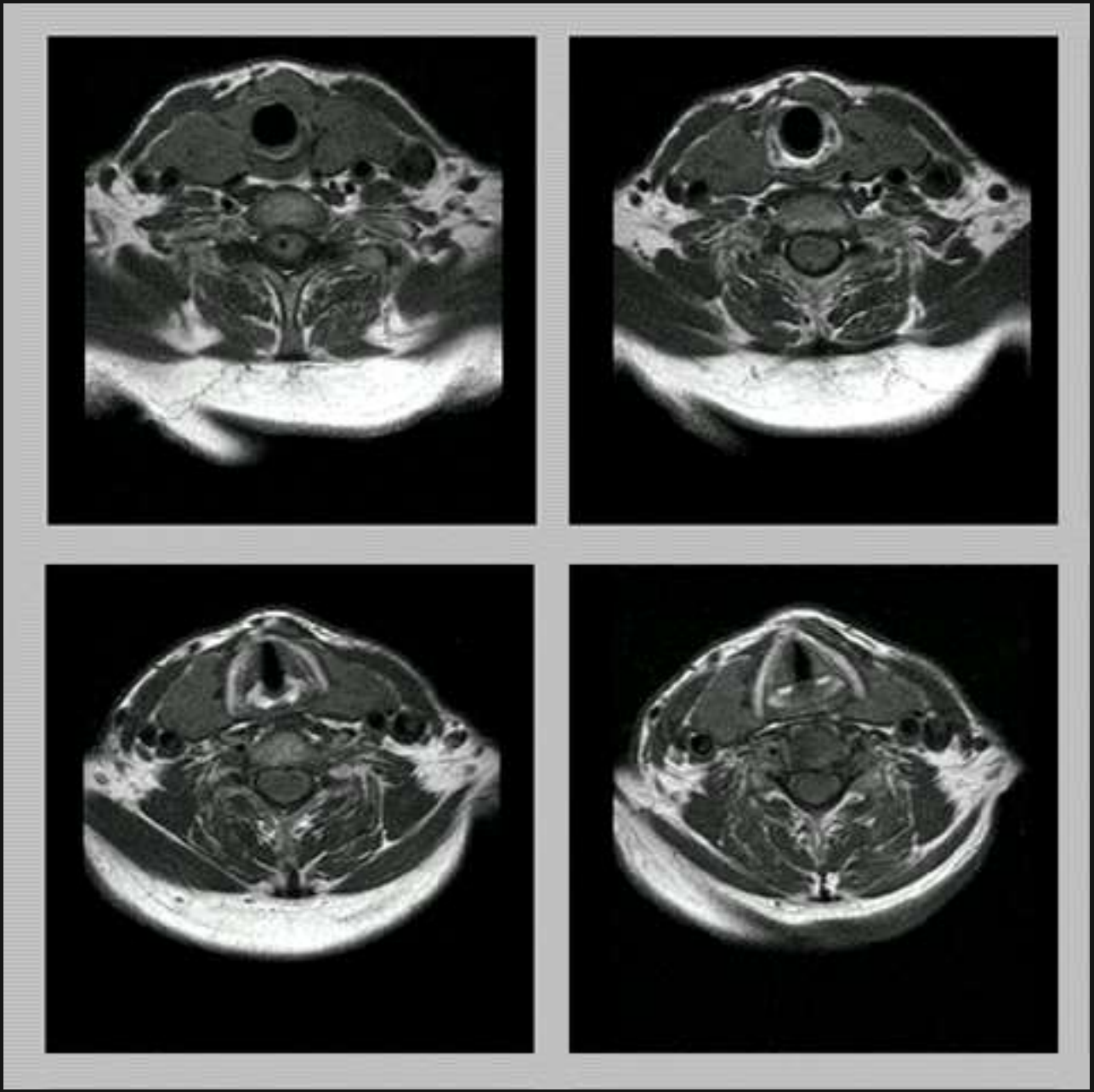
Mean T. height is 3.6 vertebral bodies.

Case 1

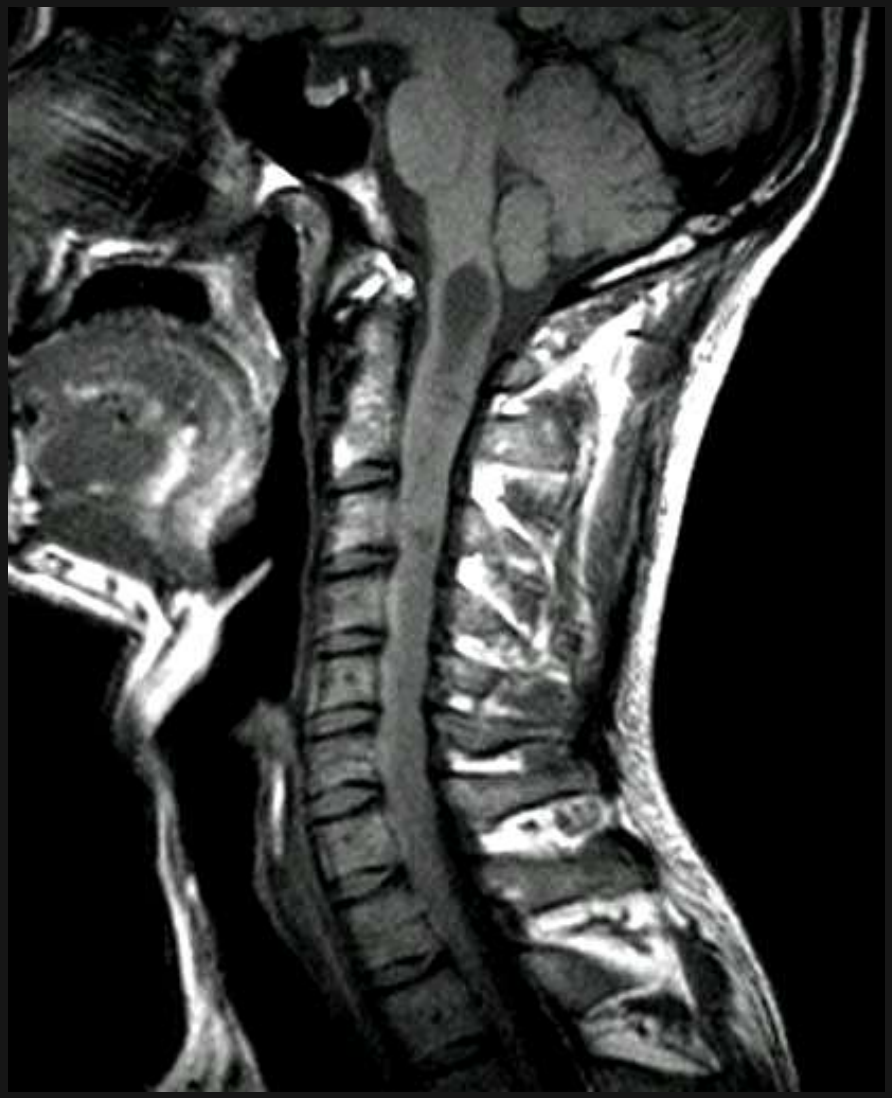


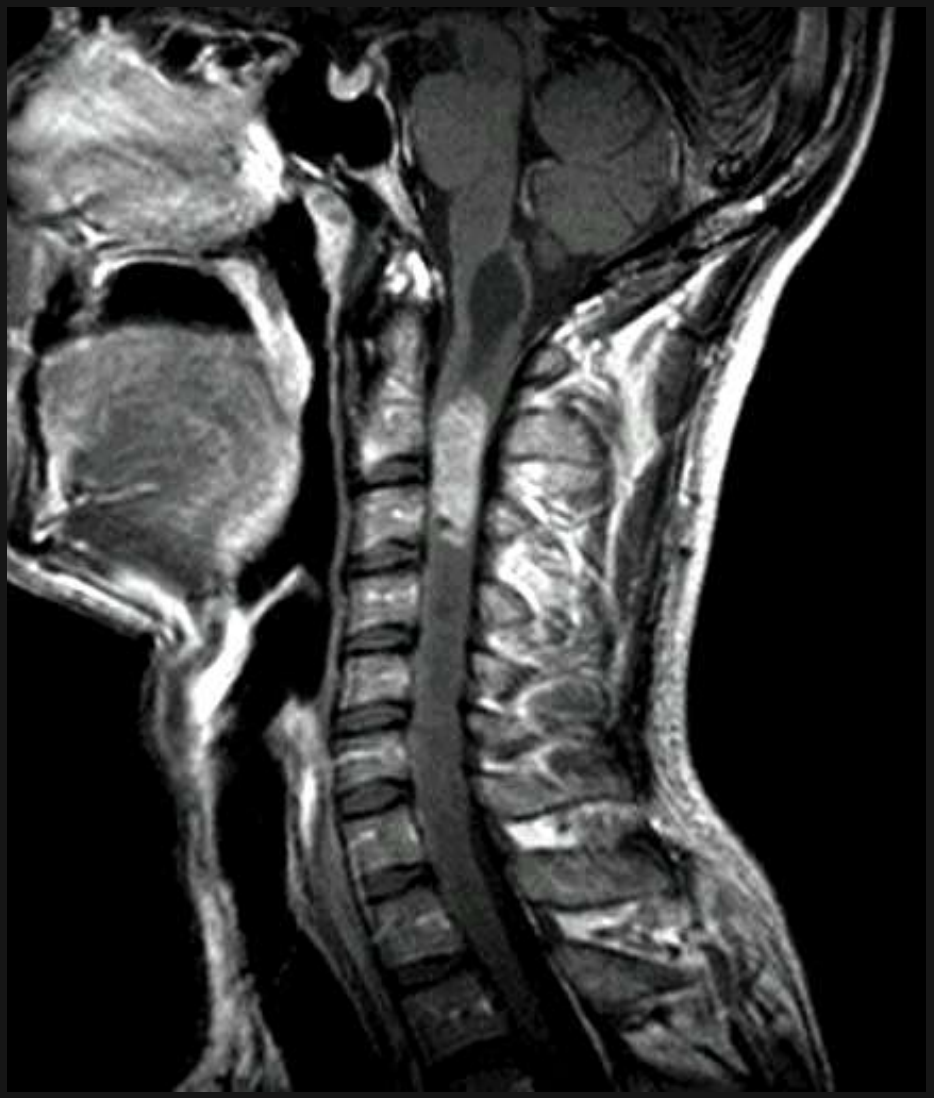
T1, cord enlargement from C4-7 with a well defined intra-medullary oval low signal lesion from C5-7. Note the small intra-medullary hypointense focus at the inferior pole of the tumor.
T2, oedema superior to the cyst. Hypointense rim at superior and inferior pole of the cyst (hemosiderin & ferritin deposits) "cap sign“.
Gad, no enhancement is seen.



T1 show spinal cord enlargement.

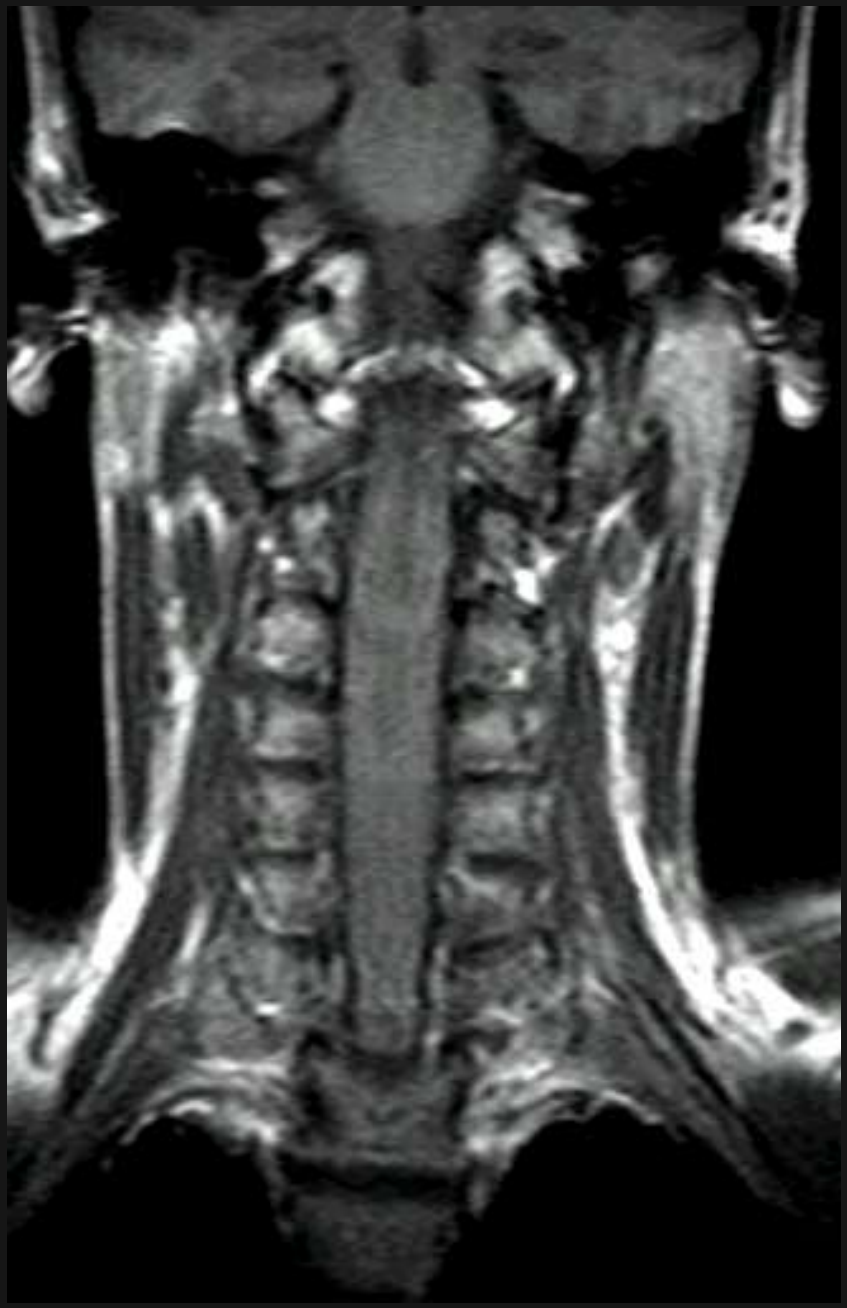
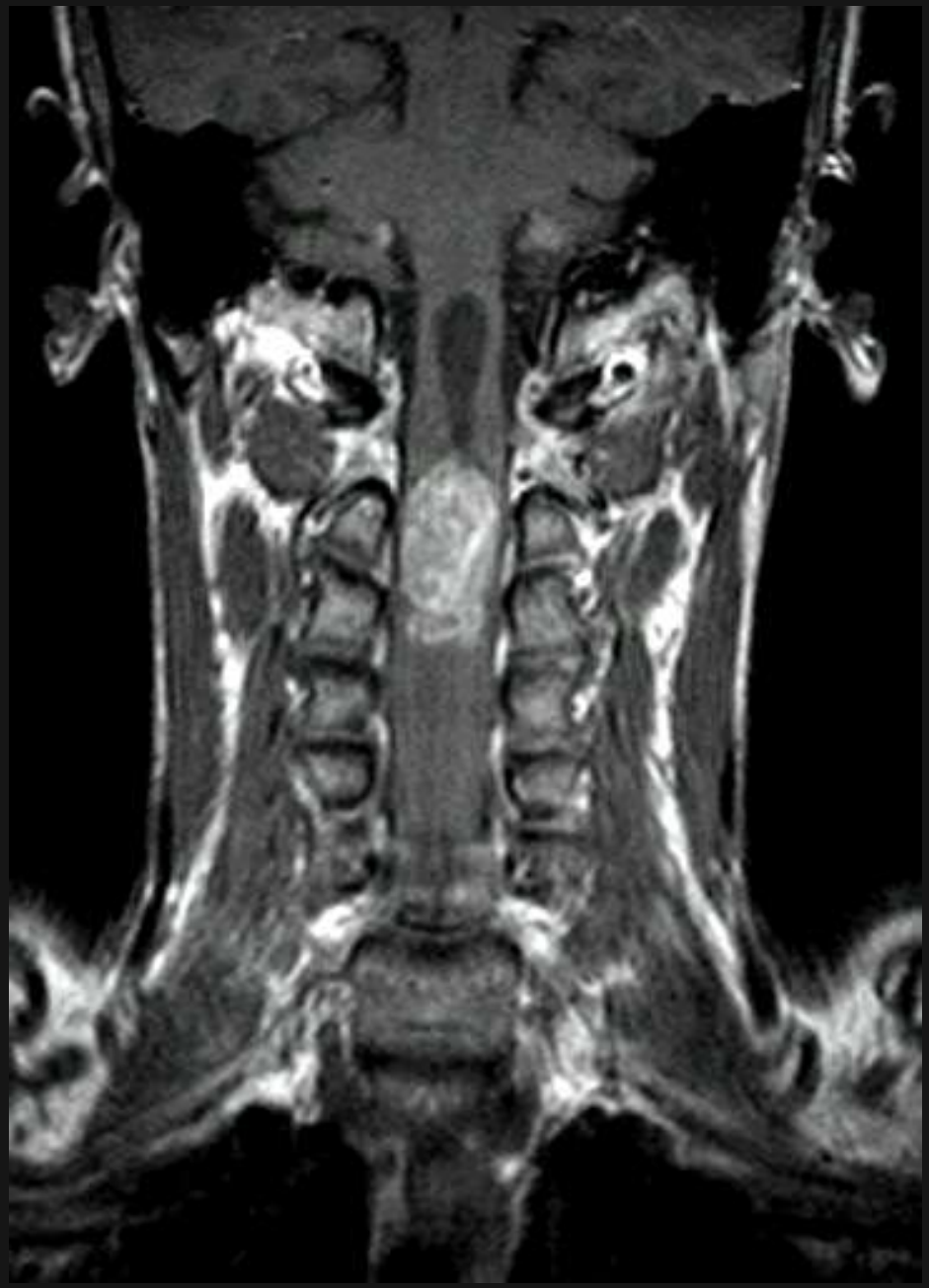
Case 2



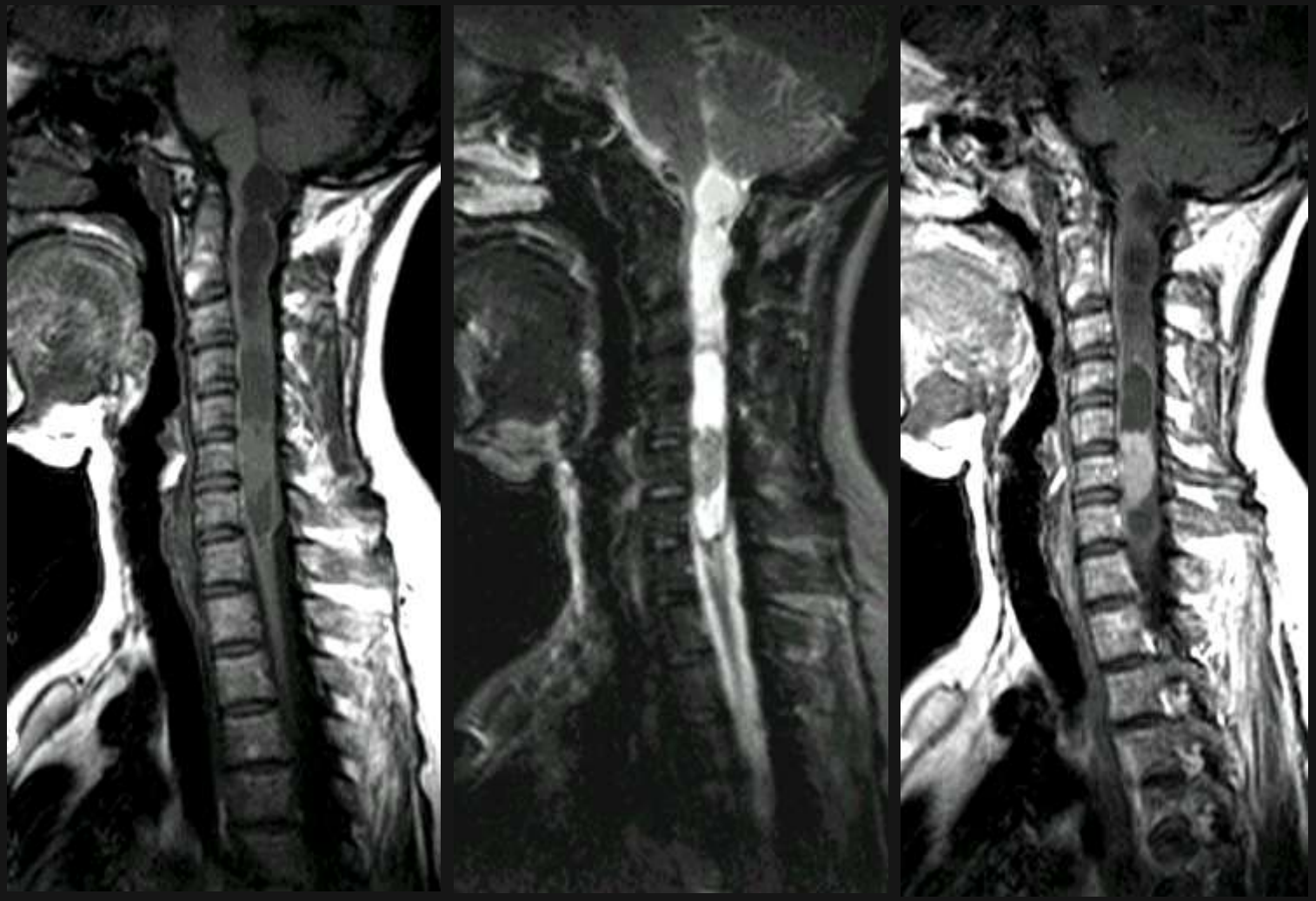


T1, enlarged cord from cranio-cervical to D1 with a well defined low signal at C1 level (intramedullary cyst).

Gad, markedly enhancing nodule at C2-3 with superior polar cyst better seen.

Case 3



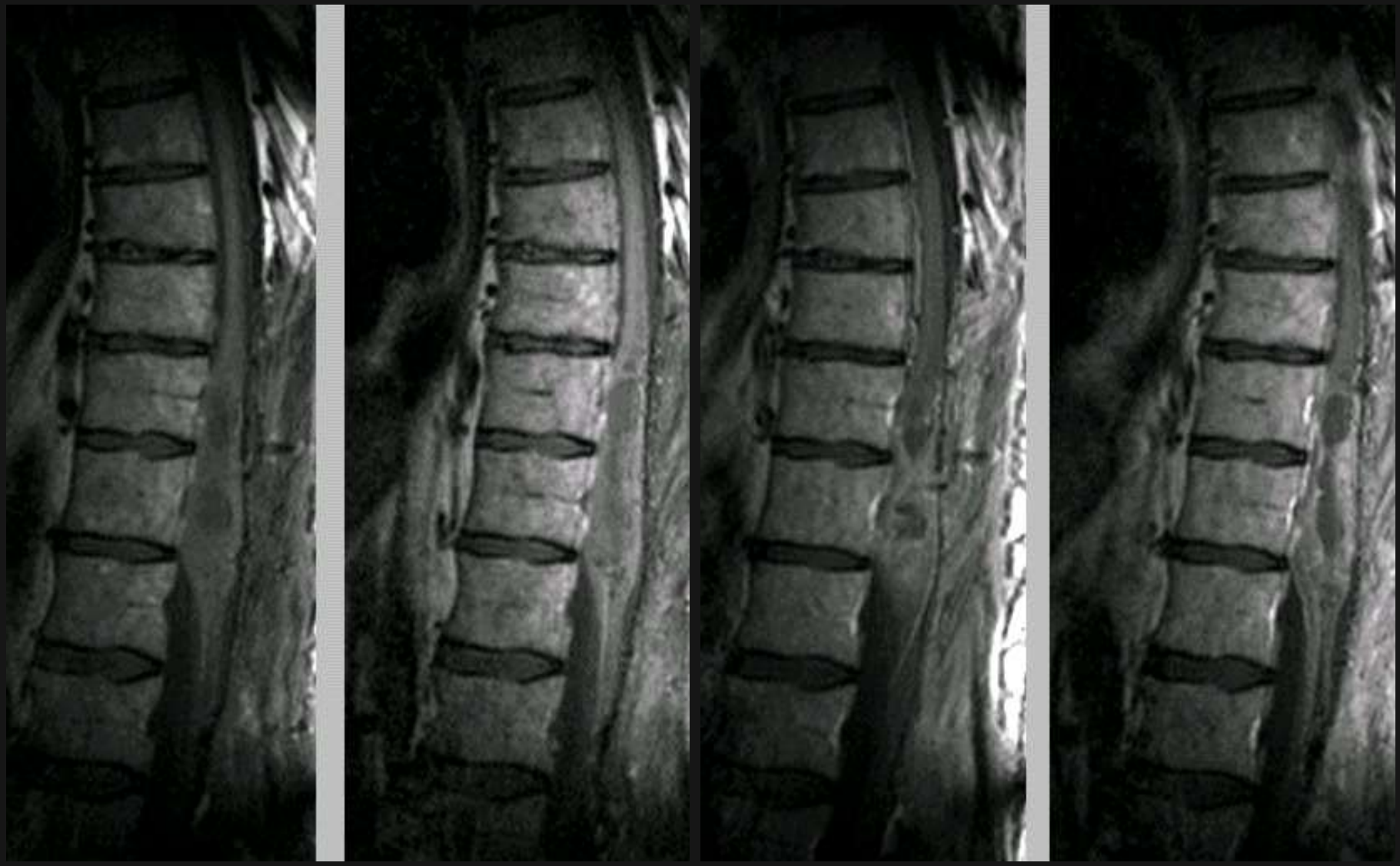
T1, enlarged cord from cranio-cervical j. to C7-D1 level with multiple cystic components. Note also a solid iso mass from the C5-6 and C6-7 levels.

T2, shows the cysts,nodules and slightly hypointense rim at upper and lower poles of the tumor (hemosiderin & ferritin deposits). Large associated intramedullary cyst in upper cervical cord and a bulbar cyst.

Gad, intense enhancement of nodule, no enhancement of cyst wall.

Case 4

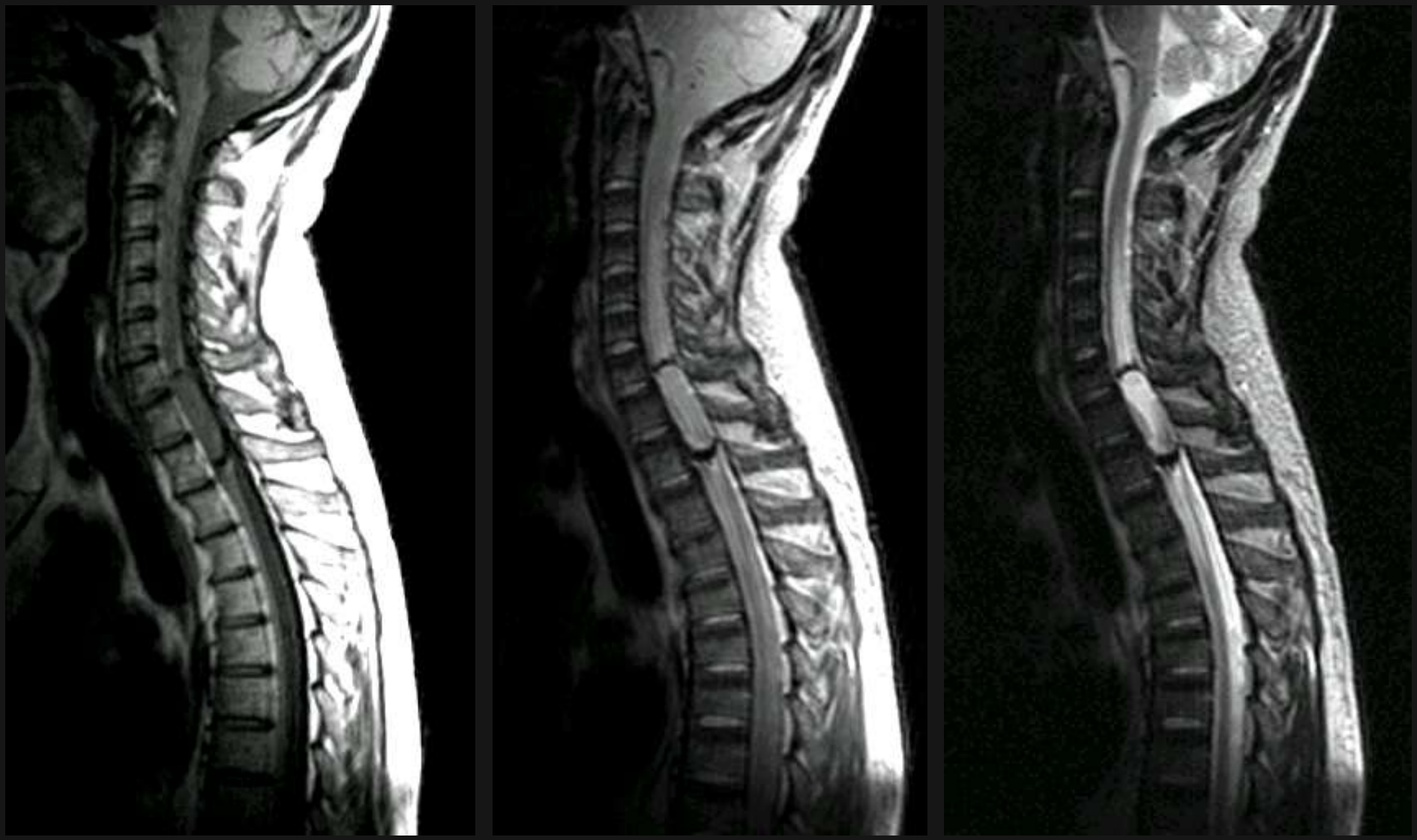
Post Op



T1, D10-L2 laminectomy. The lower dorsal cord & the conus are enlarged due to a partially cystic lesion. The solid components are slightly hyperintense.

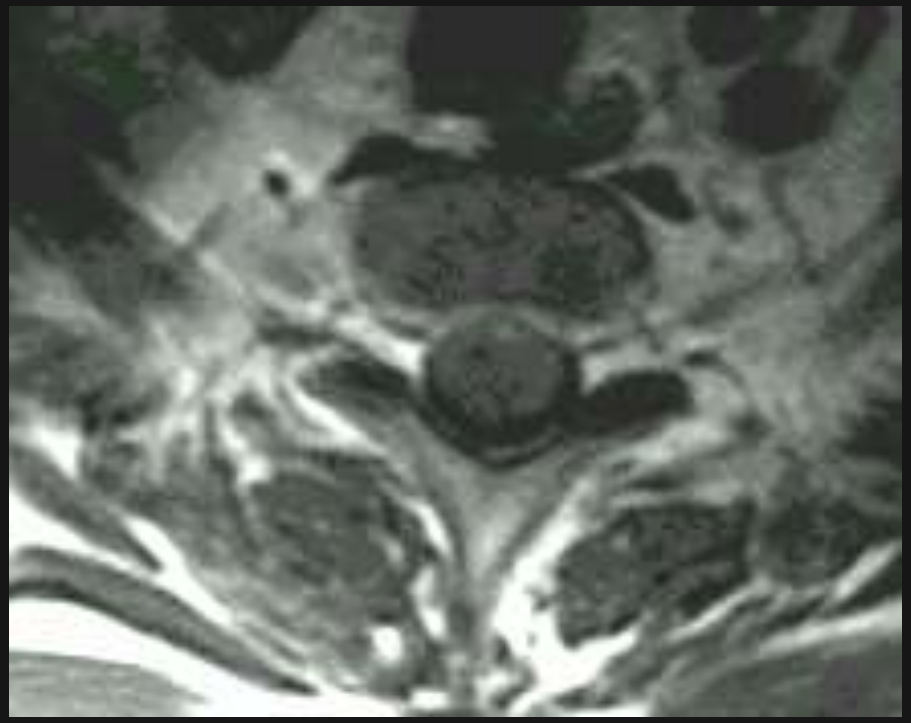
Gad, show heterogeneous intense enhancement in the tumor.

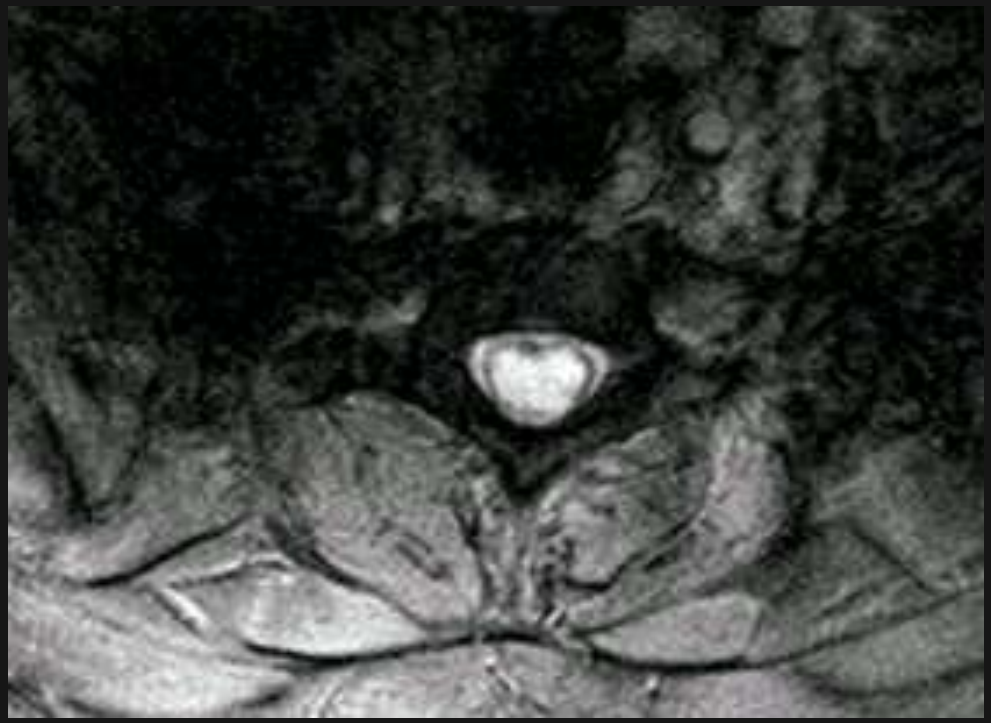
Case 5



T1, focal enlargement of cervical & dorsal cord at C7-D2 level. Note the hypointense capping above and below the tumor.

PD & T2, the tumor is hyper to the cord and the dark rim is better seen.

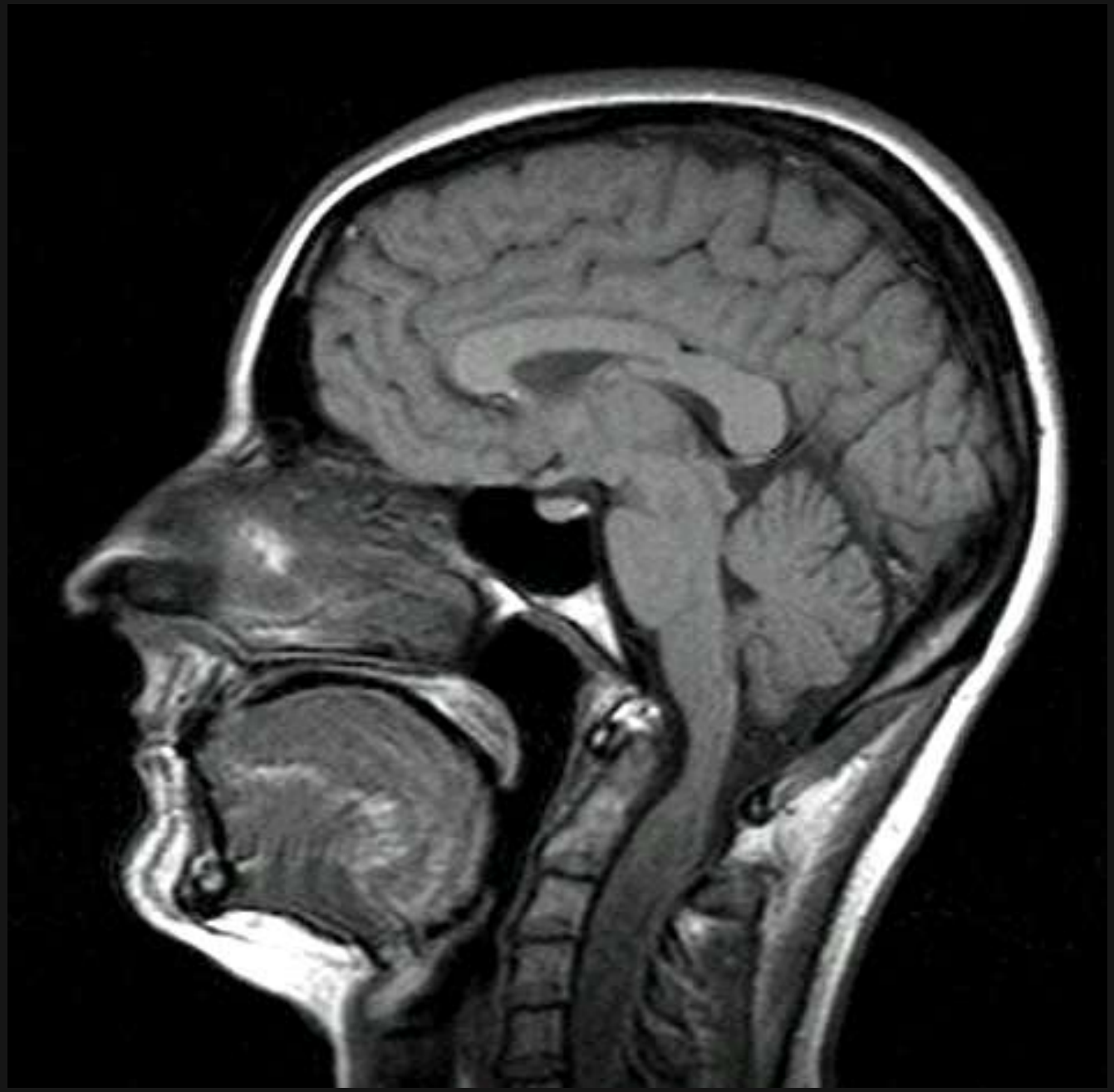




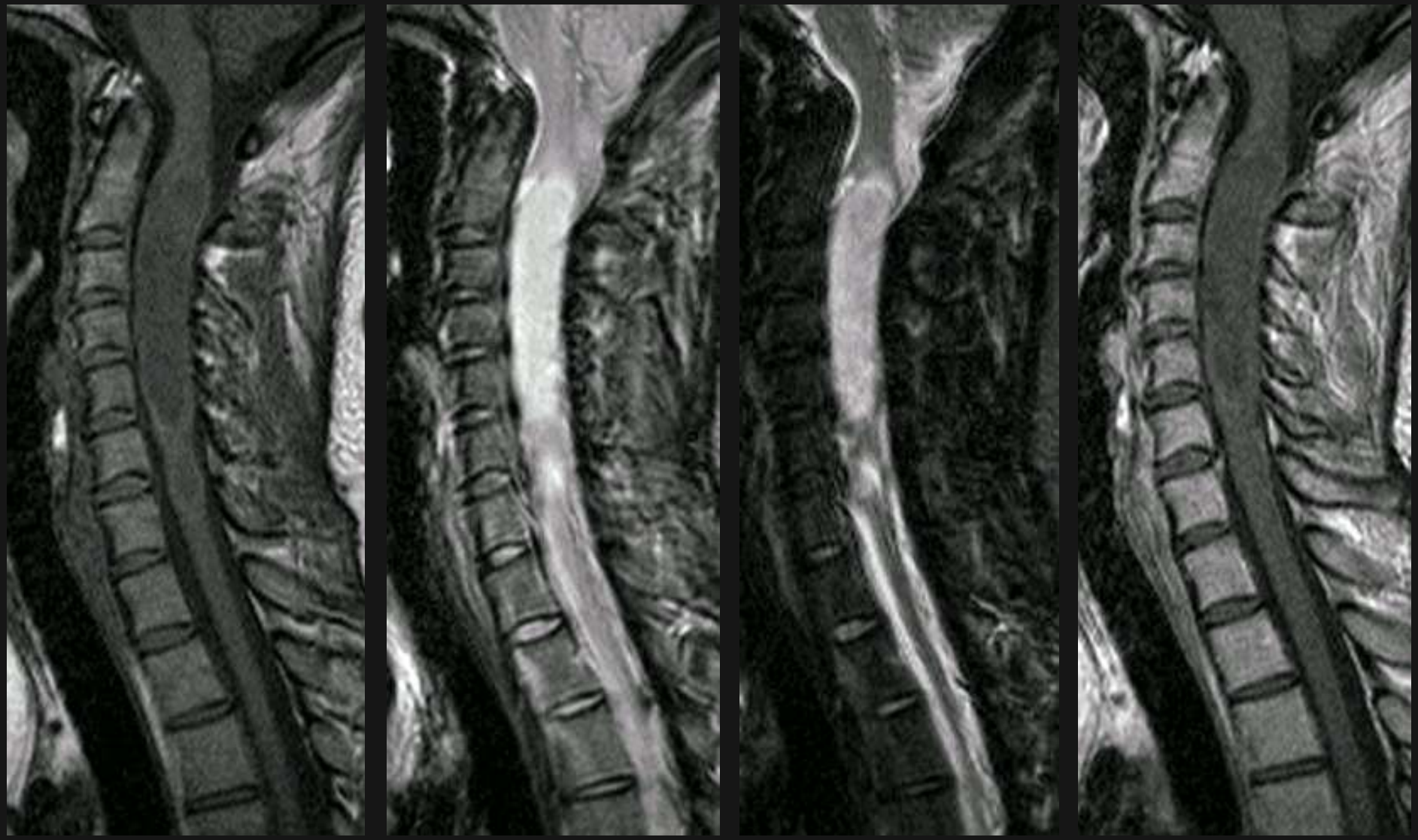
The enlarged cord fills the entire spinal canal

Case 6

Subependymal Ependymoma



T1, enlarged cervical cord starting at C1.



T1 PD T2 Gad

The cervical cord is diffusely enlarged from C2-7. The tumor is difficult to delineate and non enhancing with ill defined low areas in the enlarged cord.

Haemangioblastoma

Rich vascular tumors.

Usually lie eccentrically & 40% are cervical.

Solitary (80%) / multiple (von Hippel-Lindau disease).

Tumor nodules are small.

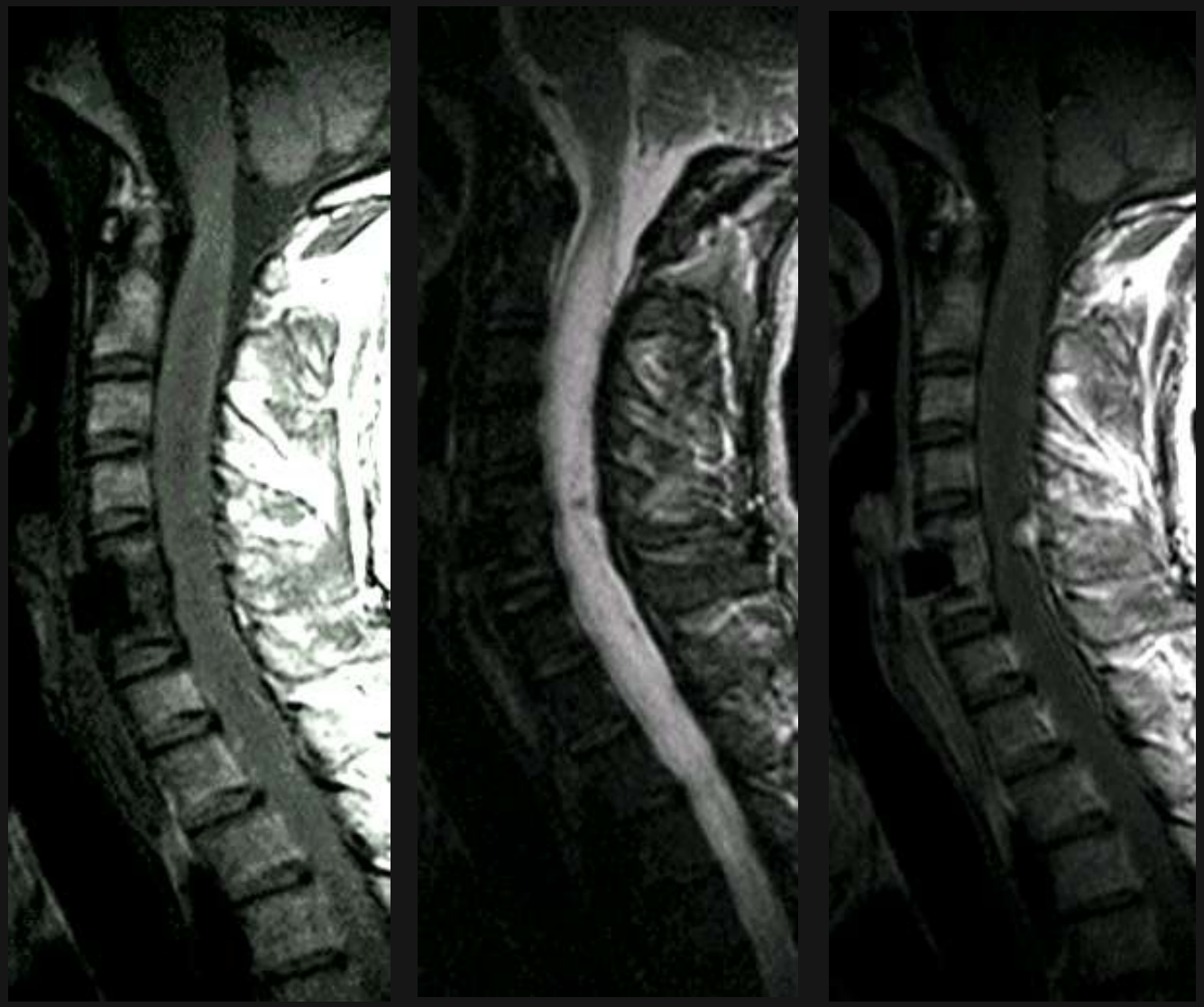
Typically associated with extensive hydrosyringomyelia.

When no cystic component present, extensive edema is usually found.

The association of a small nodule and extensive cord enlargement is highly suggestive of hemangioblastoma.

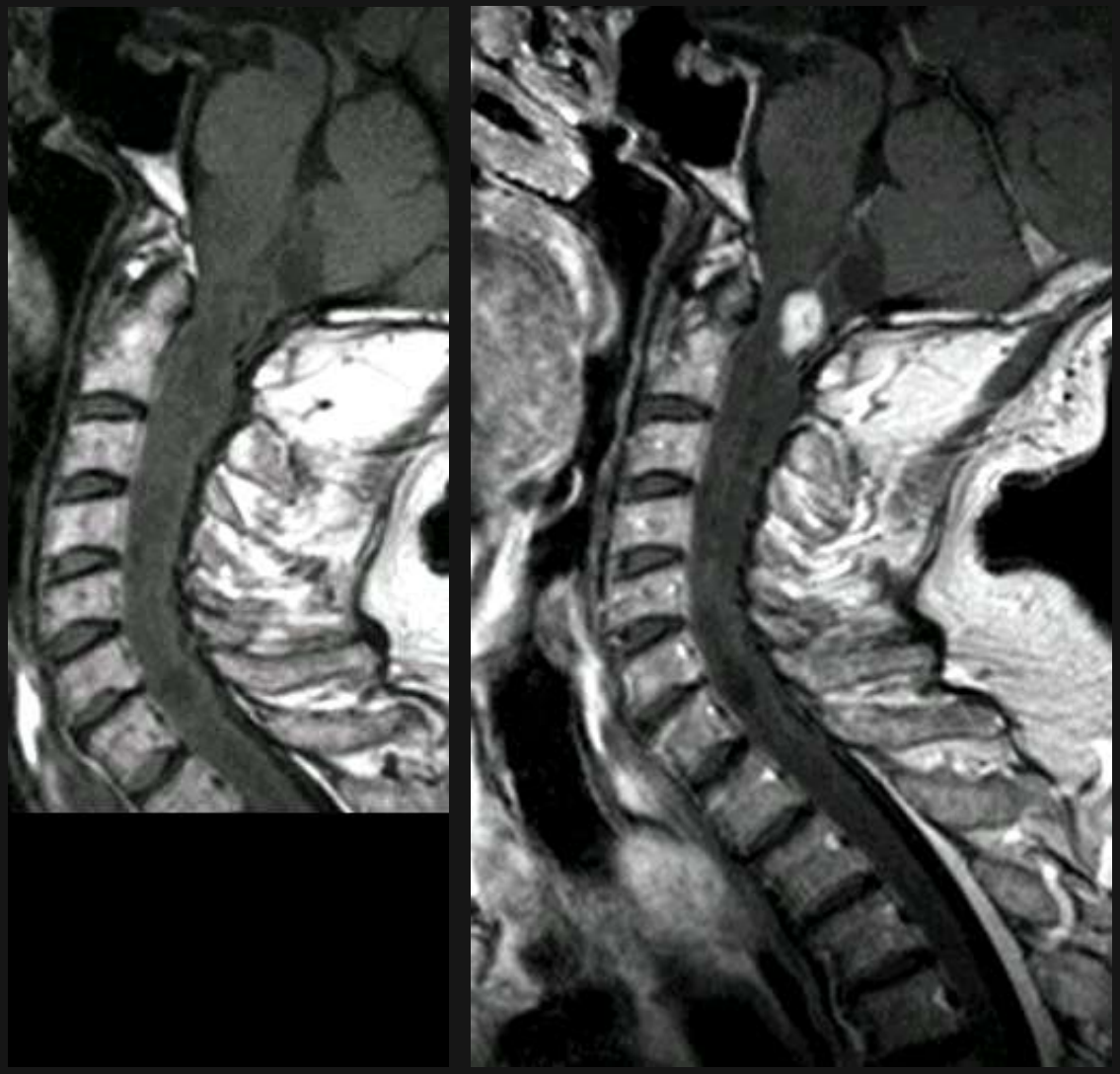
This appearance is 2ry to the subpial location of these tumors interferring with the venous drainage of the cord and therefore generating edema.

Case 1



T1, diffuse cord expansion from C1-D3 with heterogeneous low signal. Note post op. changes at C5-6 level, anterior vertebral fusion with a hypointense artificial graft).
T2, extensive high signal of entire cord. The C5-6 graft is hypo.
Gad, small enhancing nodule posteriorly at C5.

Case 2



T1, mass with enlarged medulla and cervico-dorsal cord to D2 level. Margins are ill defined and the lesion is heterogeneous iso-hypo. Note cystic component at C6-7 and at posterior medulla level.

Gad, enhancing nodule at C1. Cyst walls do not enhance.

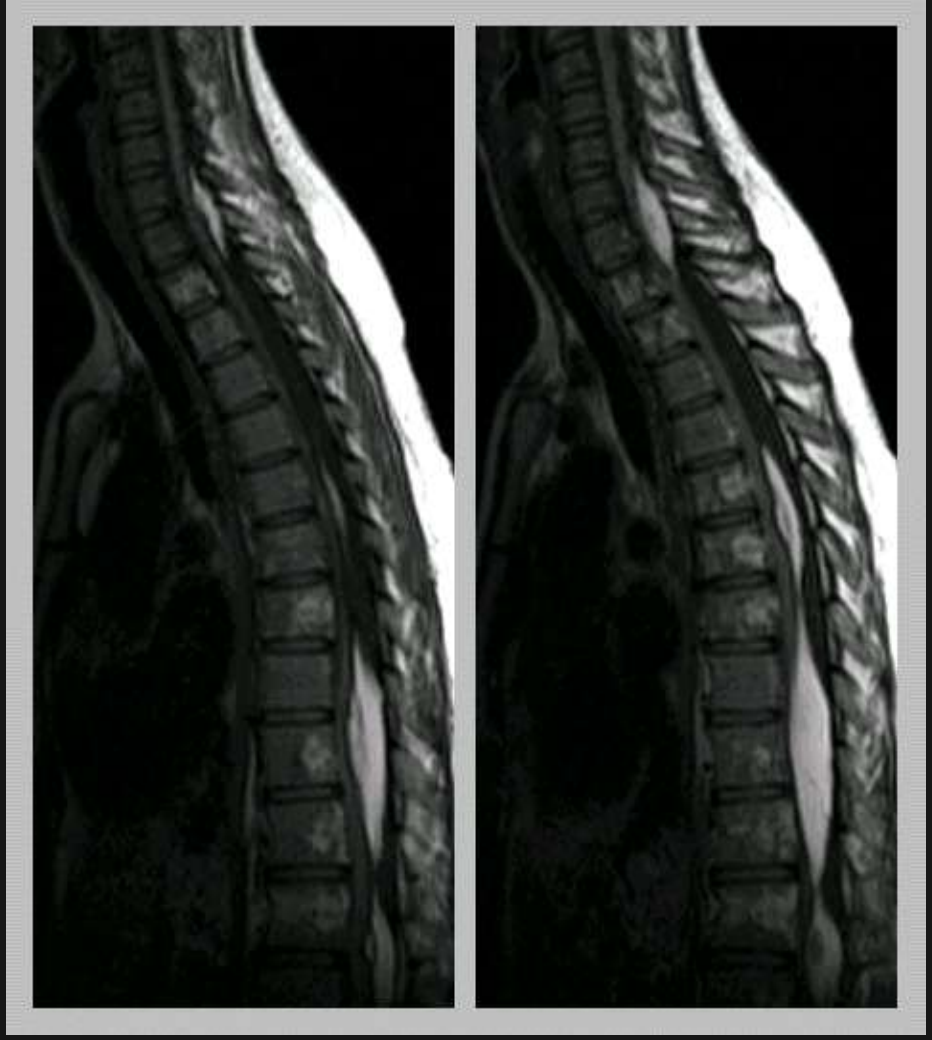
Lipoma

Relatively rare spinal cord tumors.

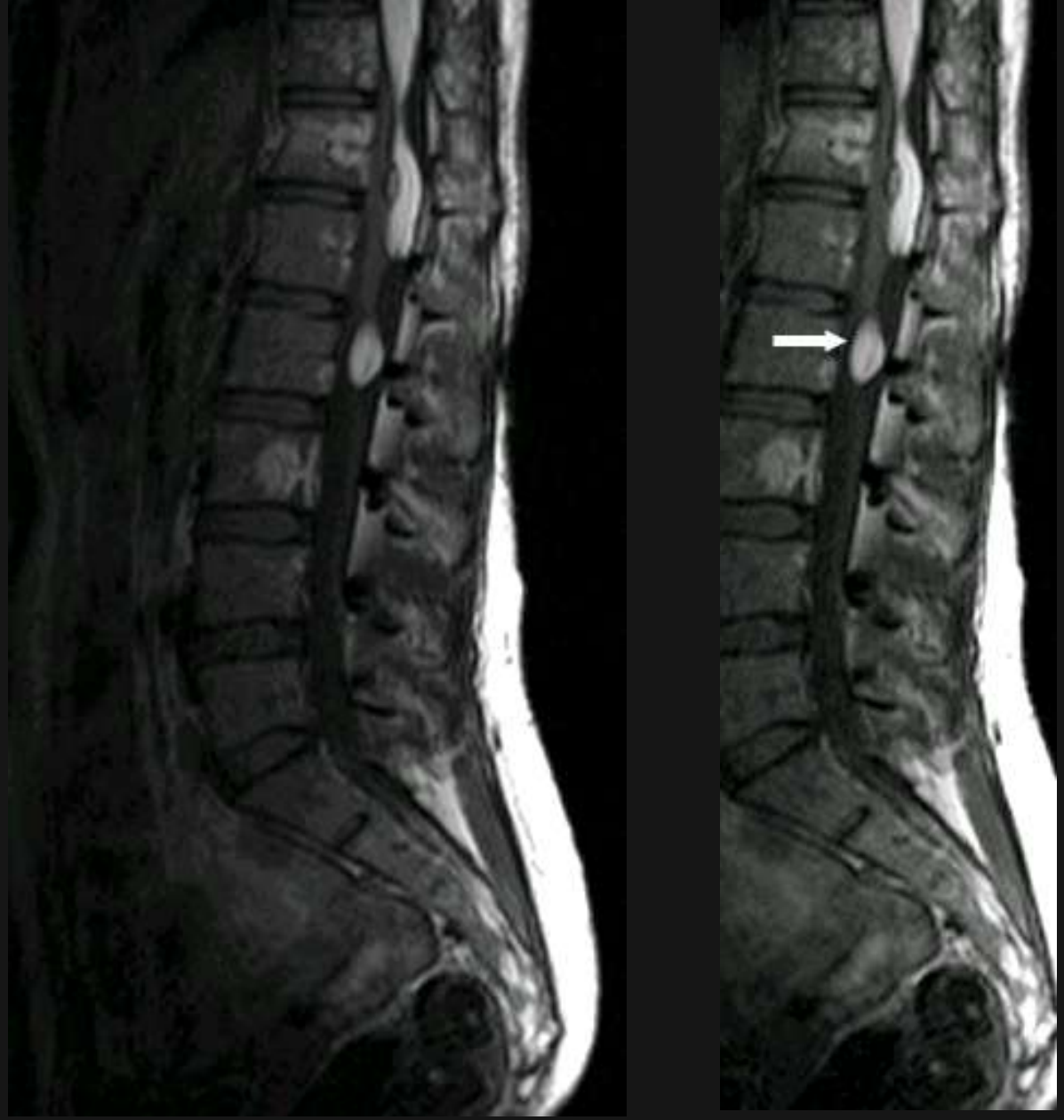
It is important to ddt true intramedullary lipoma from cauda equina lipomas or lipomas associated with dysraphism.

Typically hyperintense T1.

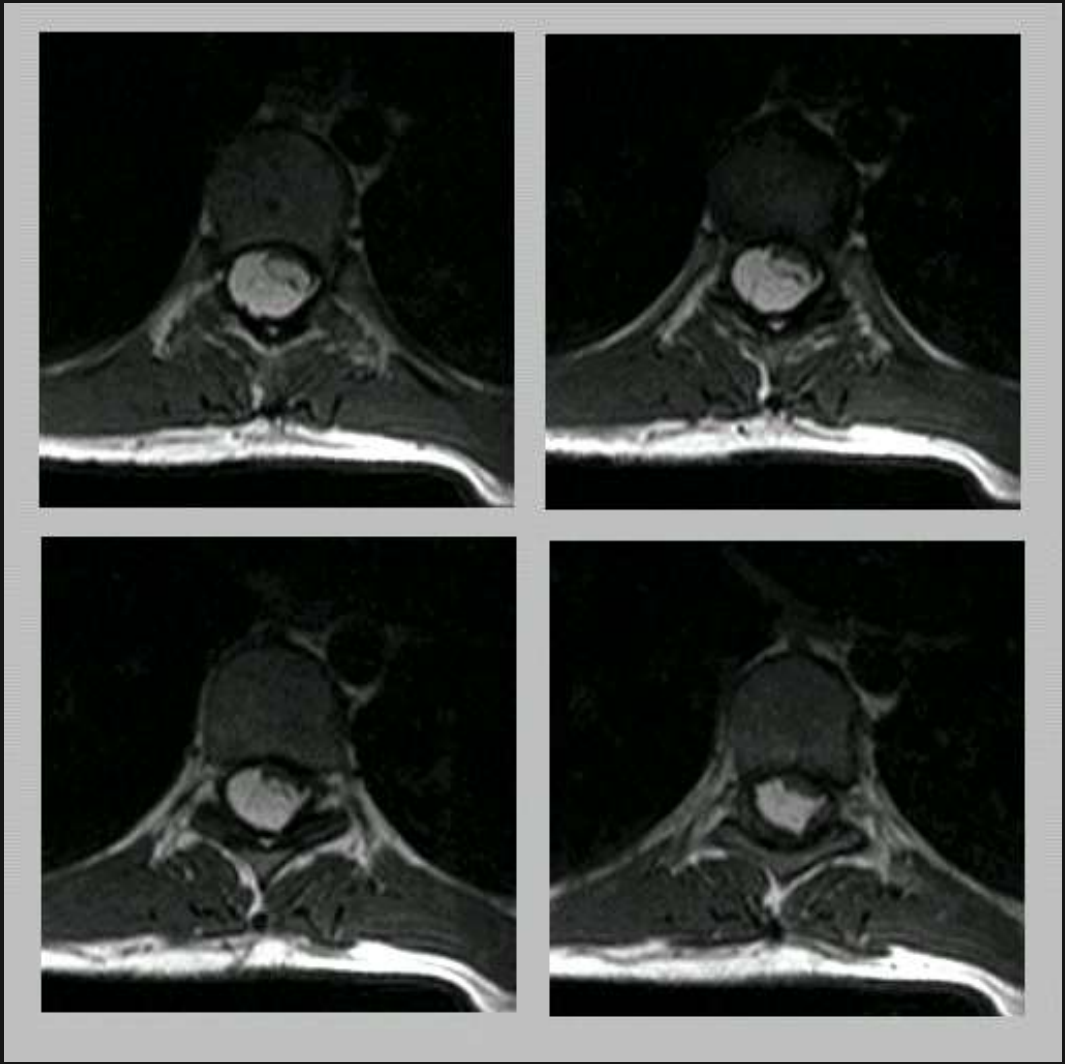
Case 1



Sagittal T1. Multiple lipomas are identified. At C7-T1, note the anterior displacement of the spinal cord. A large hourglass lipoma is seen with a smaller cephalad component at the level of T6-T7 communicating with a larger caudal component, extending from T9 to T11. An additional lipomatous lesion is seen at T12-L1 communicating with the more cephalad lesion



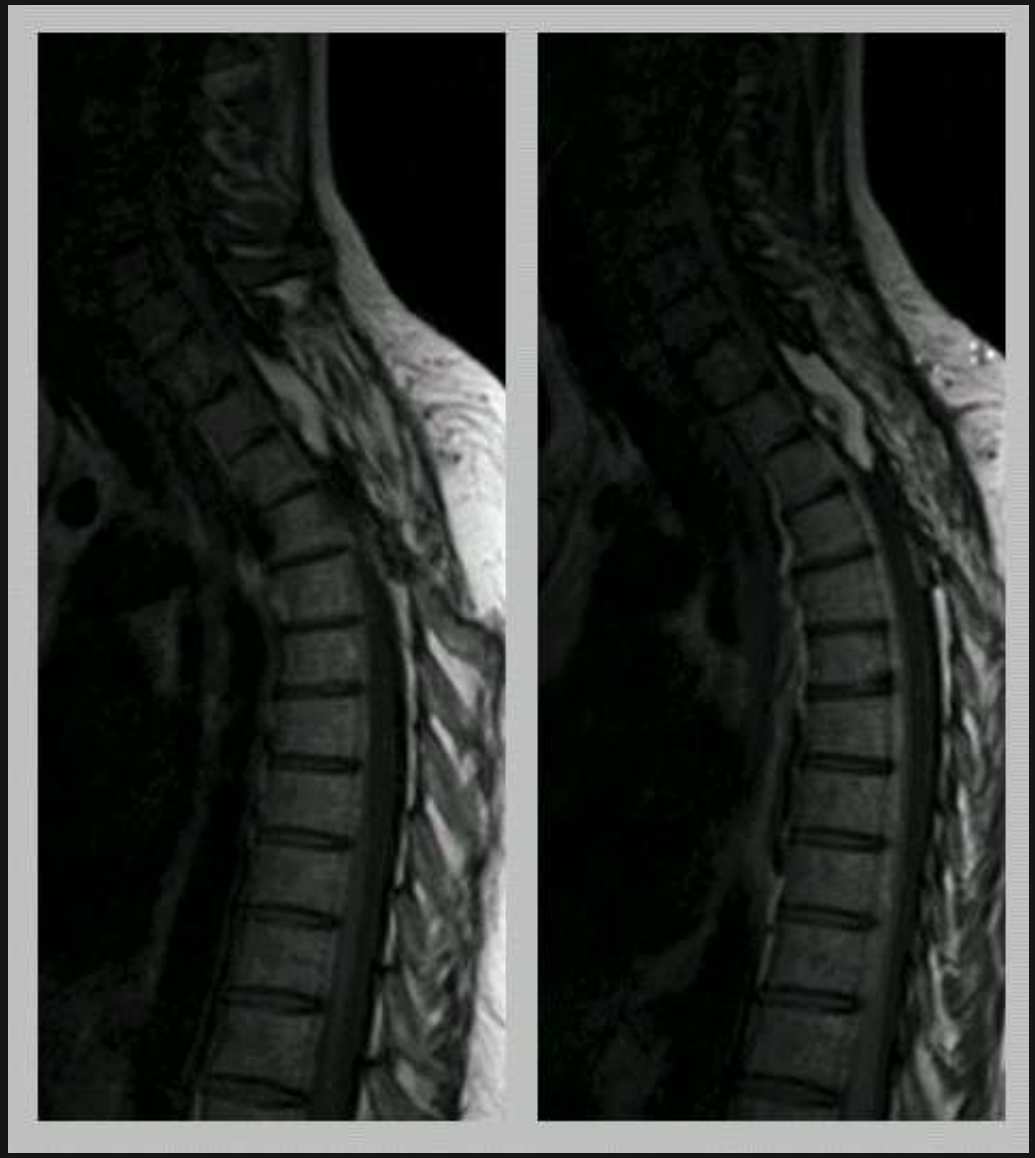
Sagittal T1. Lipoma at the T12-L1 level. An additional smaller lipoma is found at the L2 level



Axial T1 at the level of T9-T10 shows mass effect, and anterior and leftward displacement of the cord.

The lipoma is hyperintense on T1 and is mostly extramedullary, but does partially infiltrate the spinal cord

Case 2



Sagittal T1. At the T1-T3 there is a hyperintense apparently extramedullary mass lesion that displaces the spinal cord anteriorly

Cavernous haemangioma

(Cavernoma)

Vascular malformations that may remain clinically silent for a long period.

Represent 2.4% of all intramedullary tumors.

Usually are small and do not enlarge the spinal cord.

Spinal angiography is normal. On GE T2, the lesion appears of much lower intensity than on SE T2 due to magnetic susceptibility effects.

Intramedullary cavernomas usually easily recognized.

A reticulated appearance with areas of mixed signal intensity in both T1 & T2 / T2* is the most common finding.

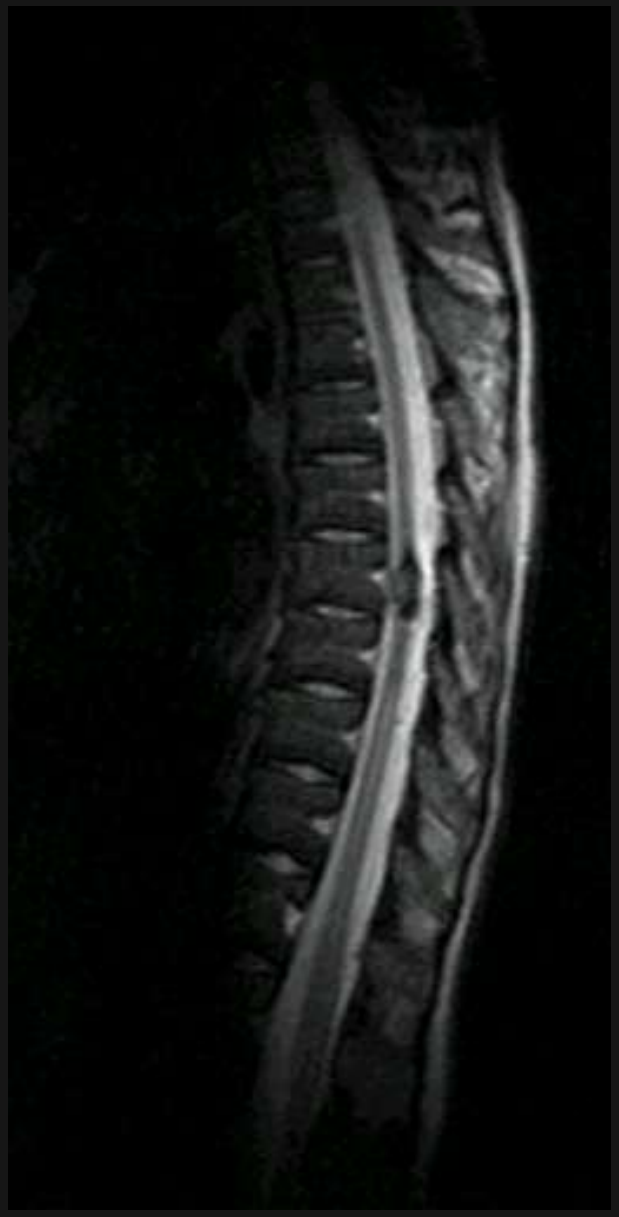
A prominent rim of decreased signal intensity is less commonly seen than in the brain.

Contrast enhancement may occur but is not common.

Often are multiple (congenital) although solitary lesions may also occur.

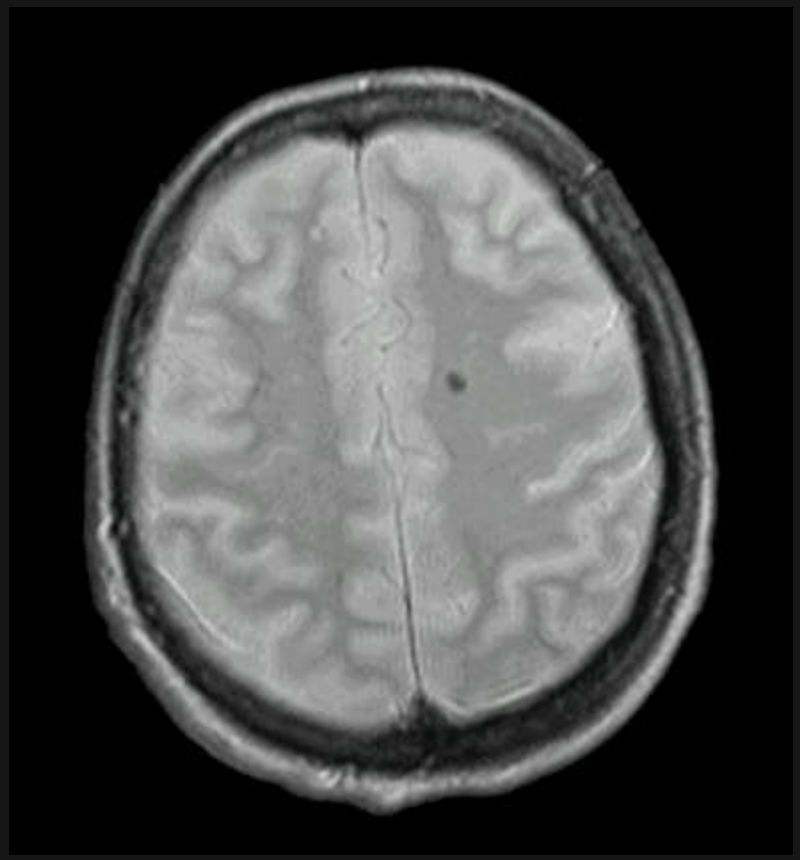
Cerebral MRI is recommended.

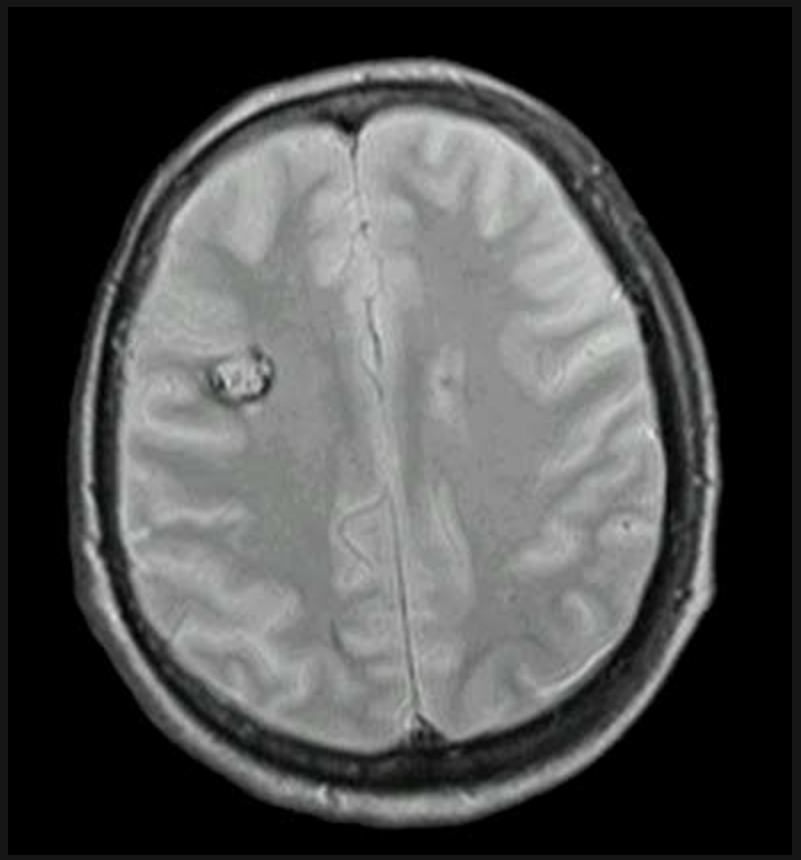
Case 1



Sagittal T2. A low signal intramedullary lesion is seen at the T8 level, with an isointense anterior exophytic component

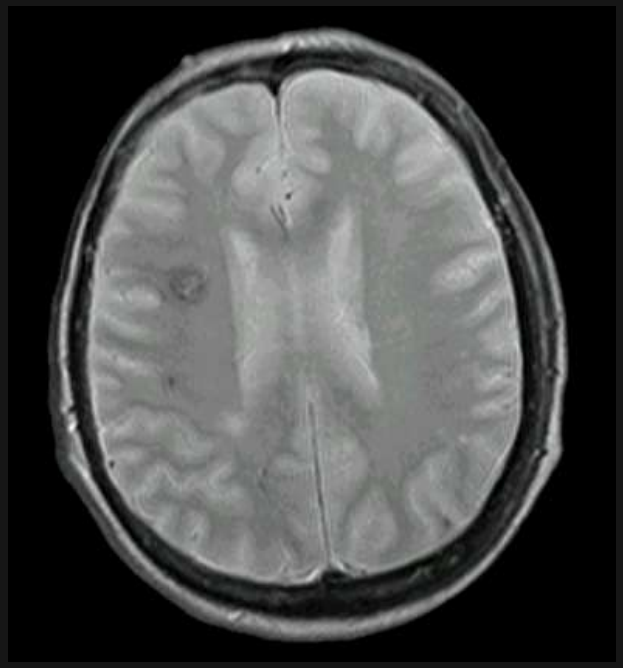
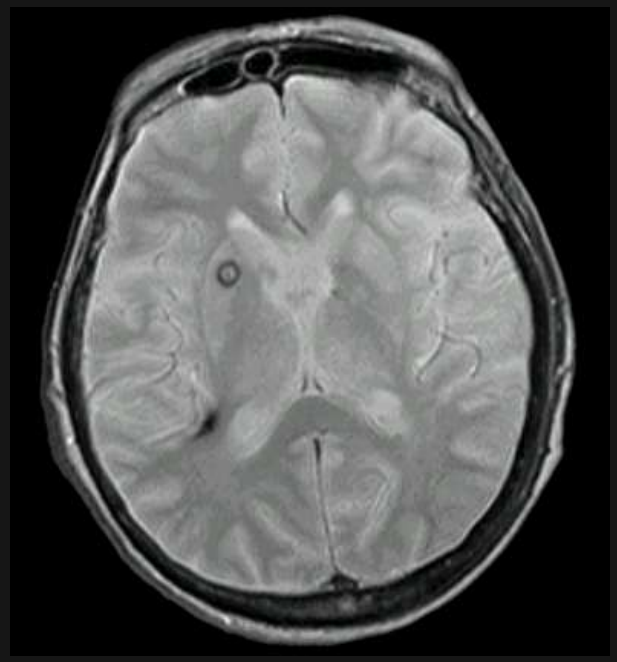
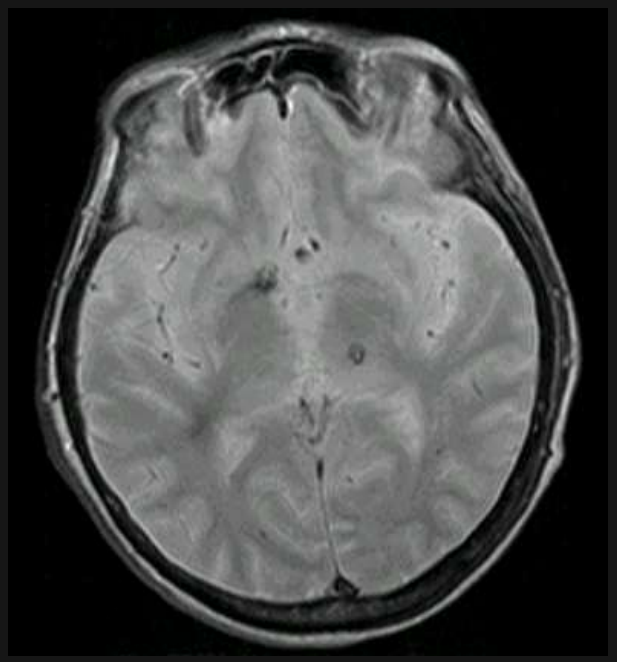
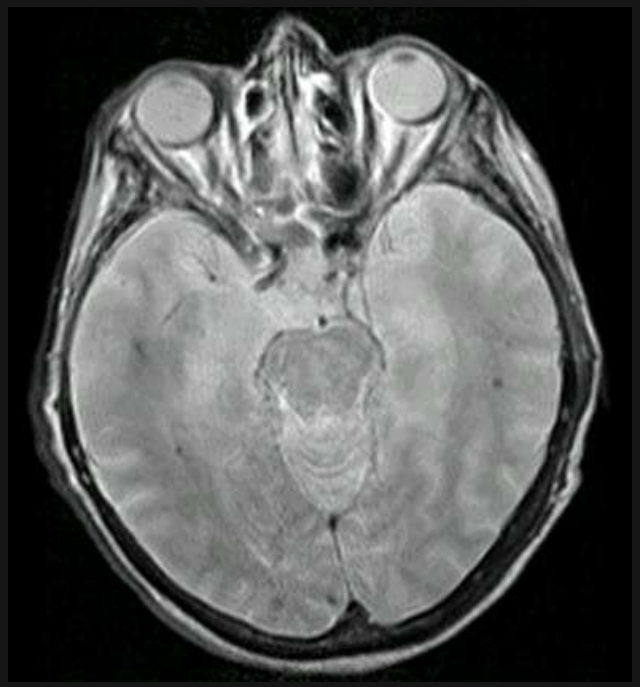
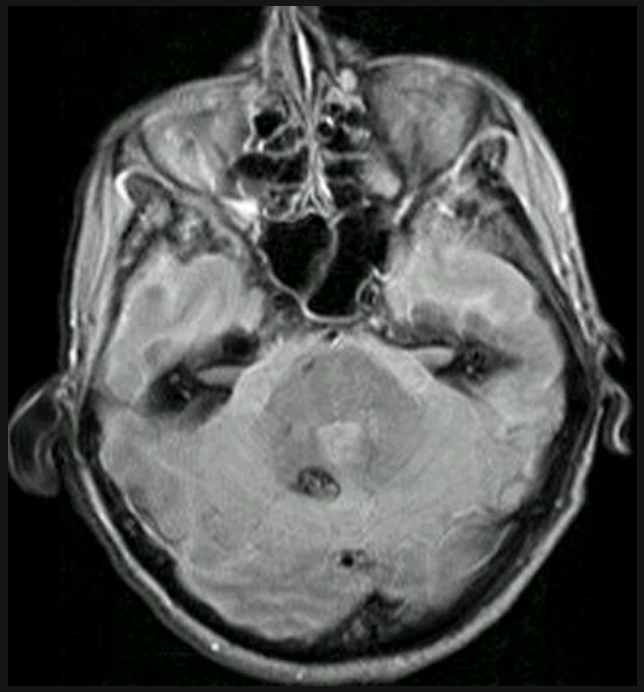
Case 2



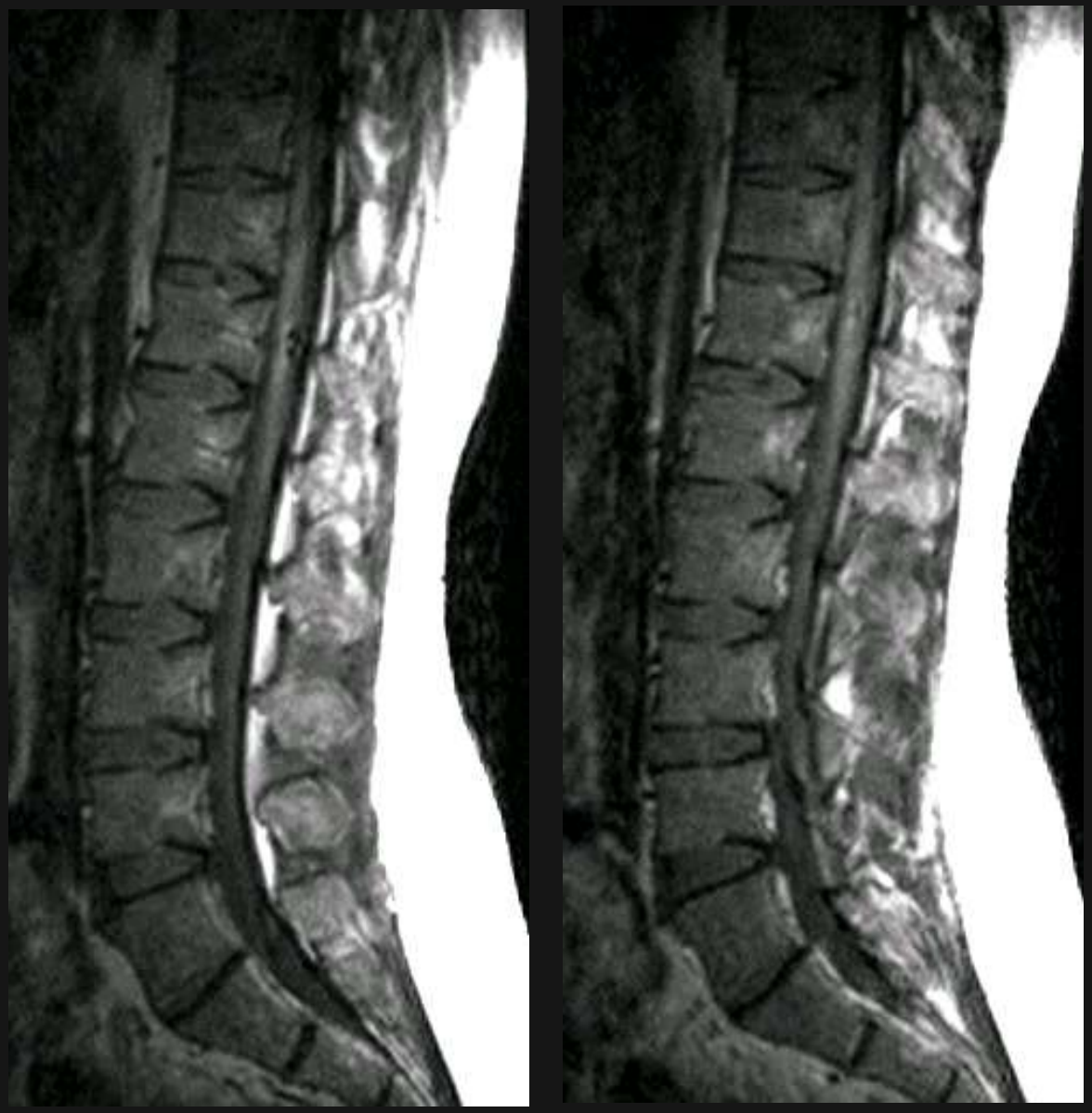


Axial T2WI: left frontal cavernoma

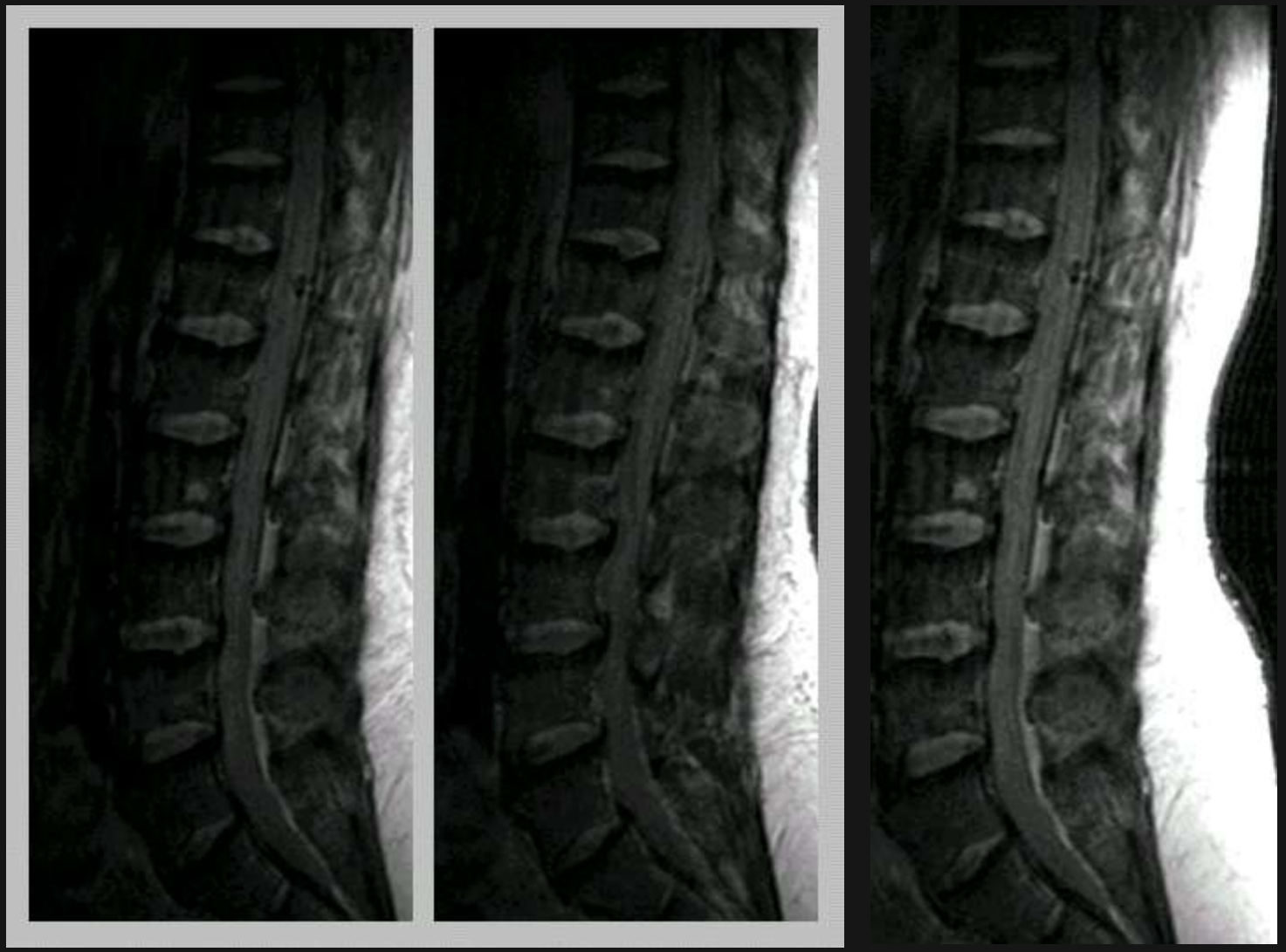
Axial T2WI: right frontal cavernoma

Case 3

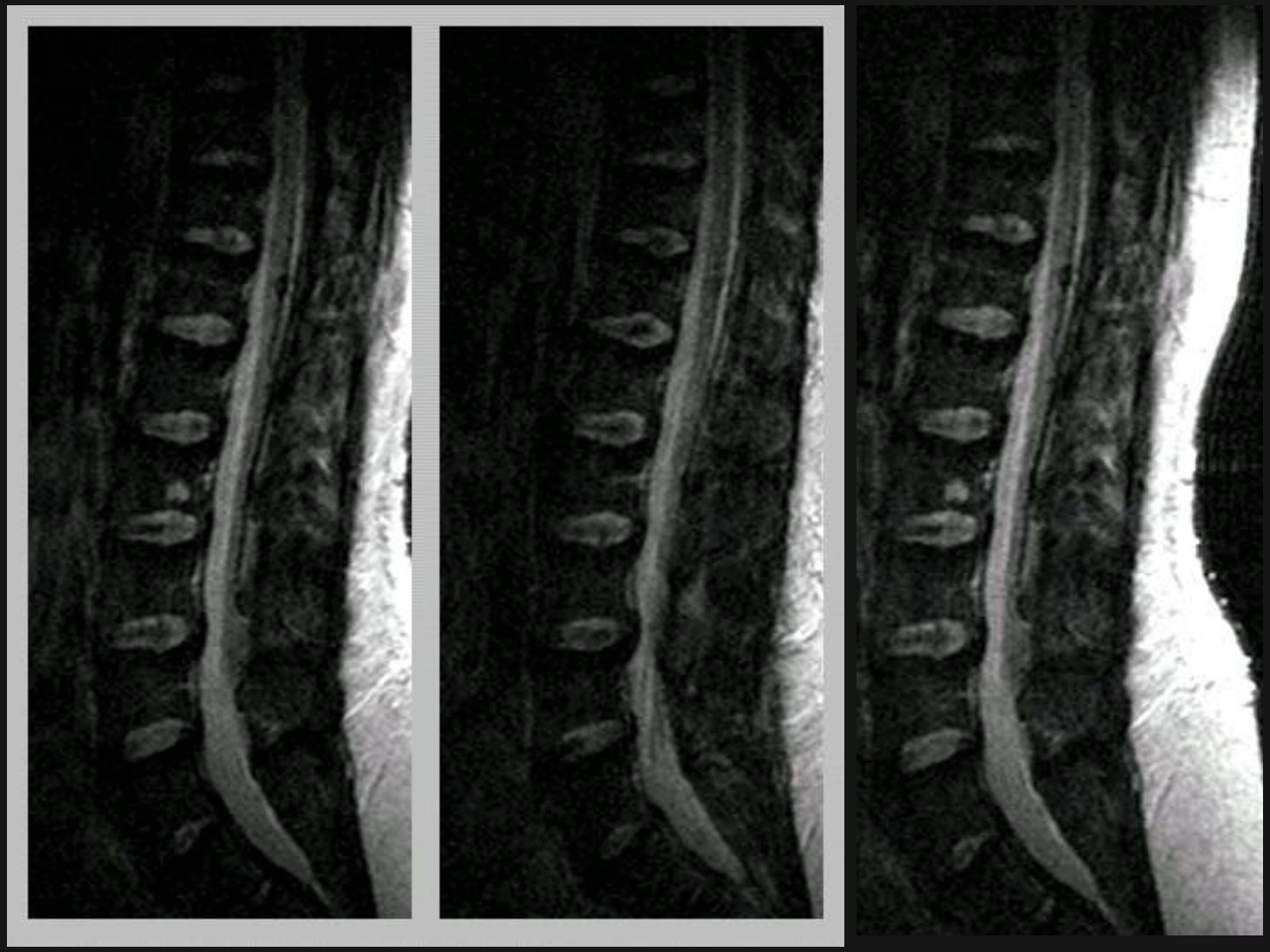


Sagittal T1. The lesion appears inhomogeneous with hypo- and hyperintense areas



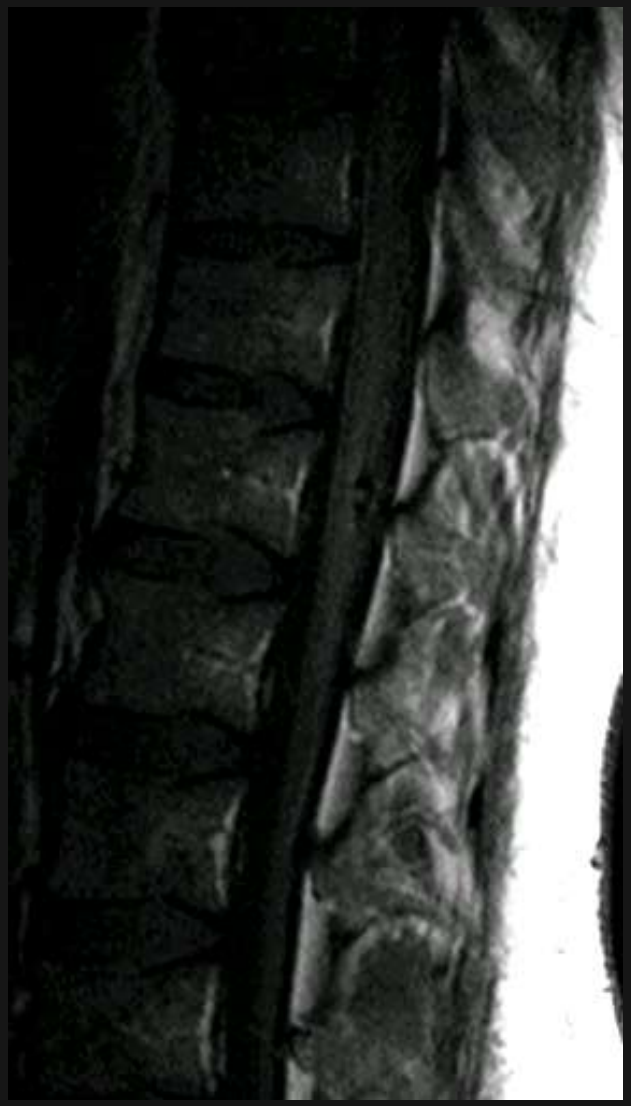
PD

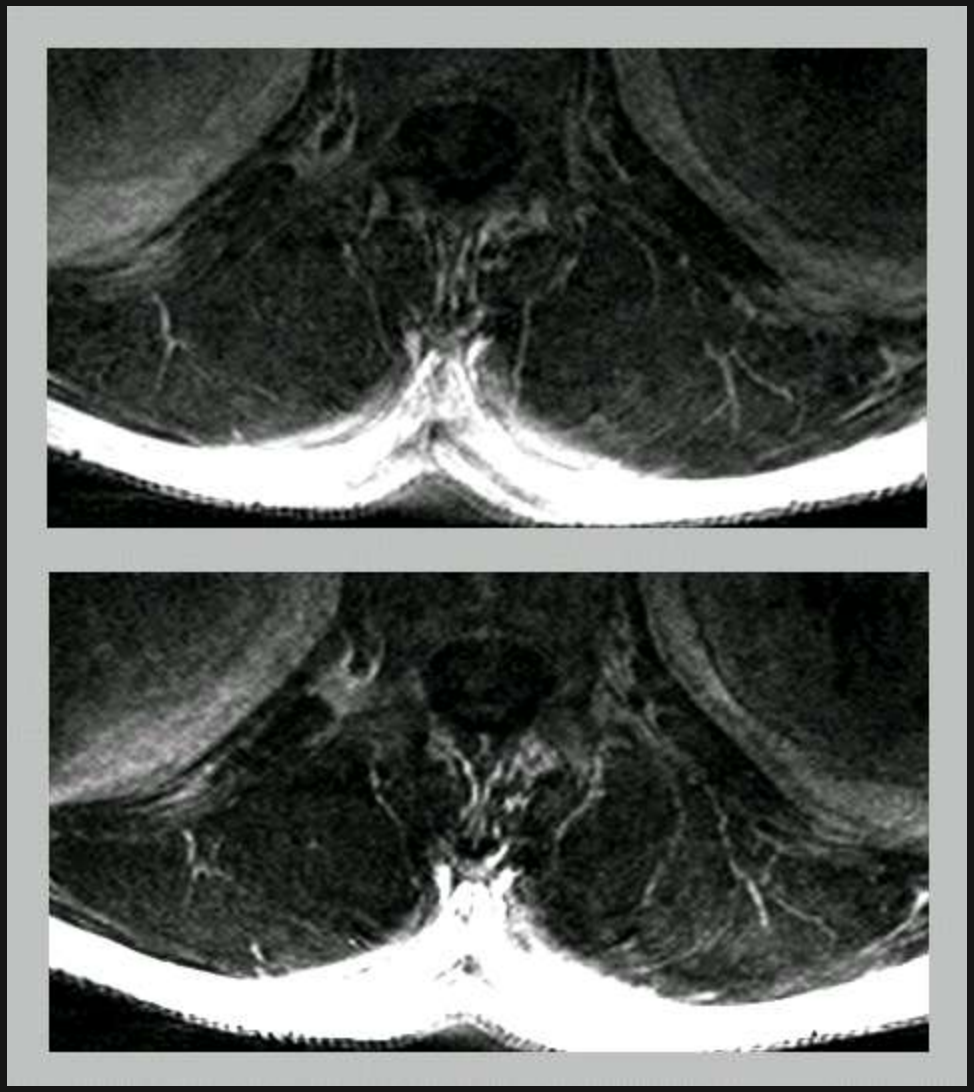
In the conus medullaris there is a small hypointense intramedullary lesion



T2

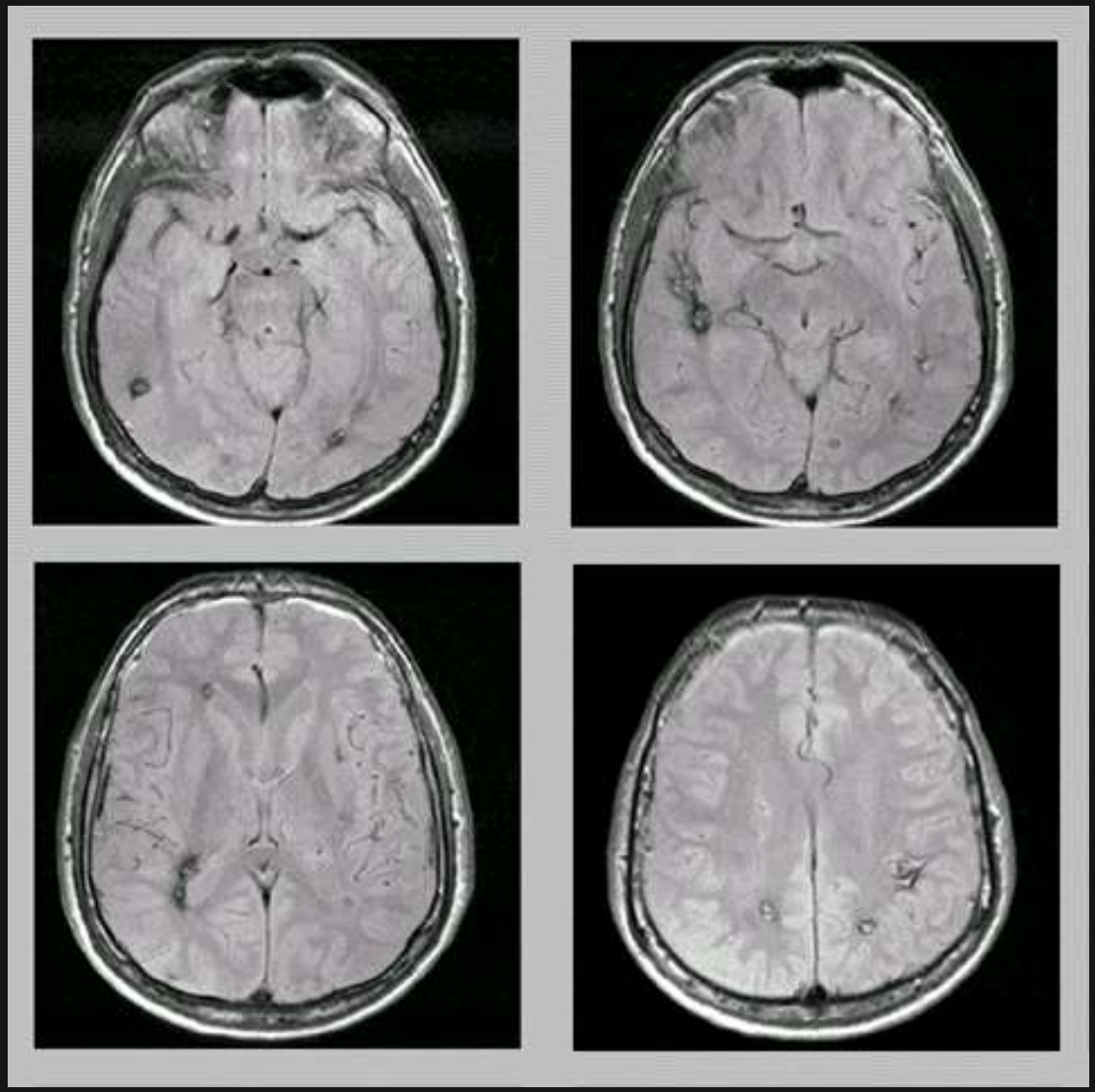
In the conus medullaris there is a small hypointense intramedullary lesion



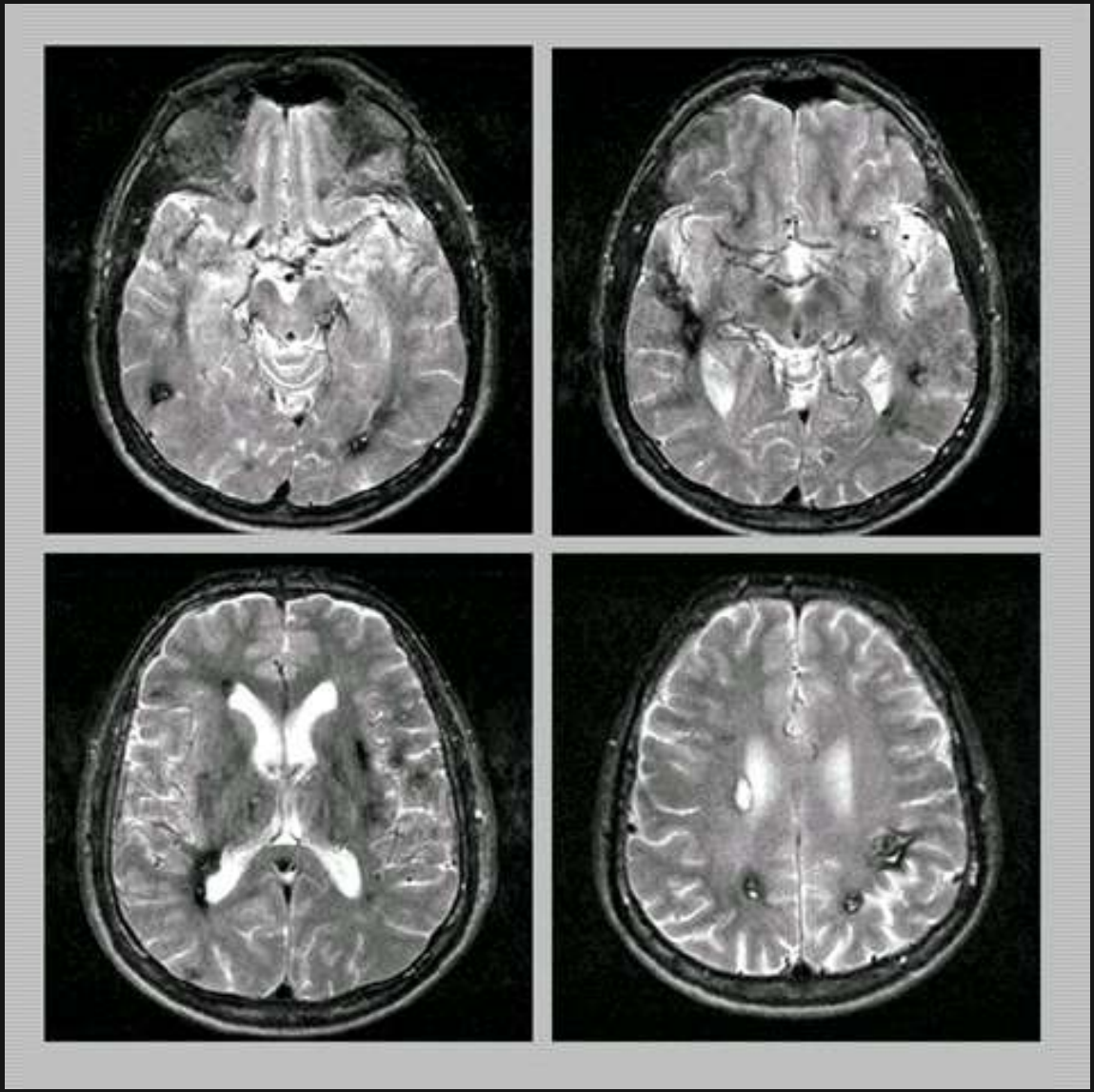


Sagittal Gd T1. No contrast enhancement visible.

Axial T1. The lesion appears intramedullary



PD. Multiple small inhomogeneous hypo-and hyperintense lesions are seen



T2. Multiple small inhomogeneous hypo-and hyperintense lesions are seen

Schwannoma

Originate from Schwann cells.

Always lie on the posterior nerve root.

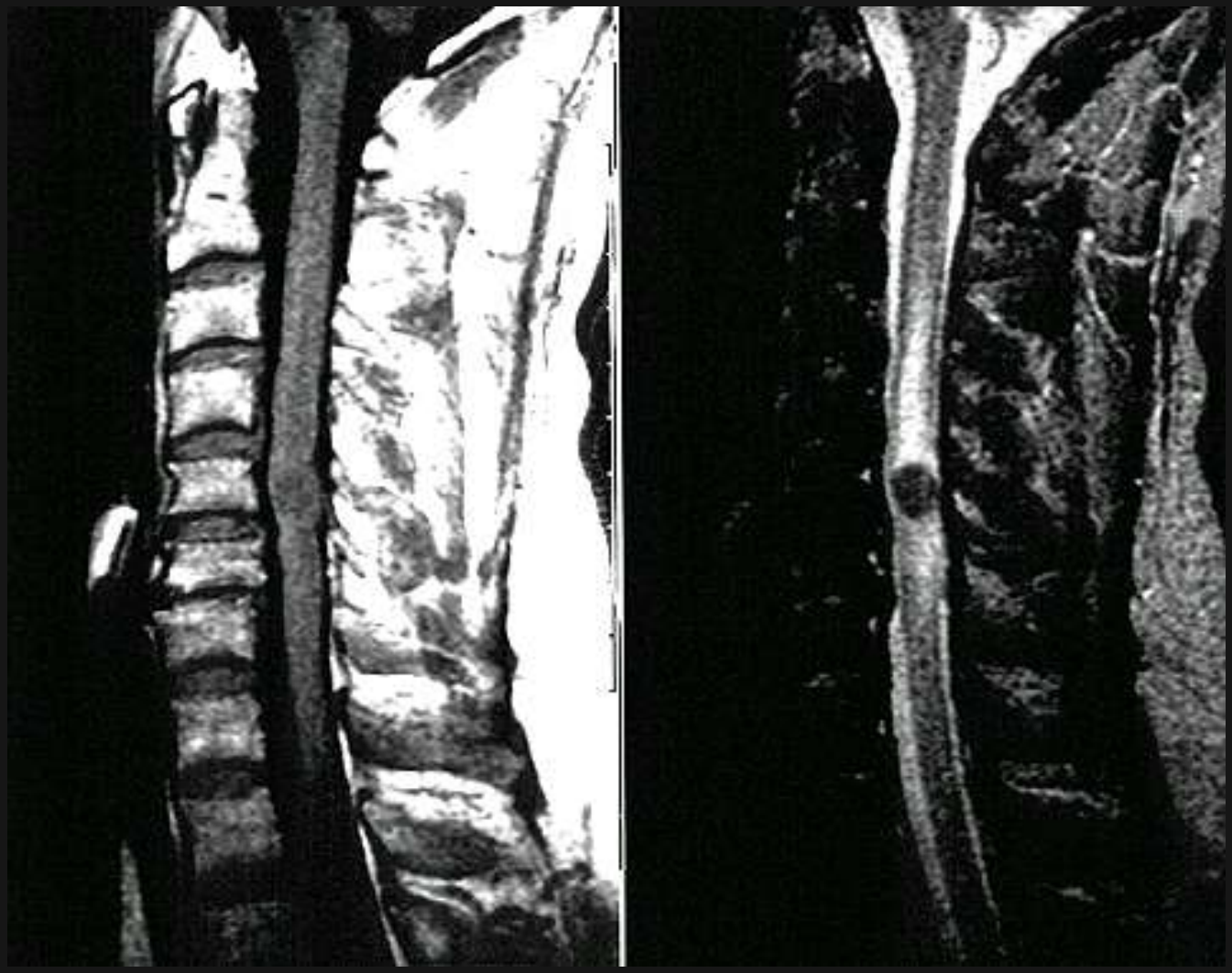
This explains why schwannomas classically are extramedullary and are responsible for spinal cord compression.

Less frequently, they may be both extra & intramedullary.

In very rare instances they may be strictly intramedullary.

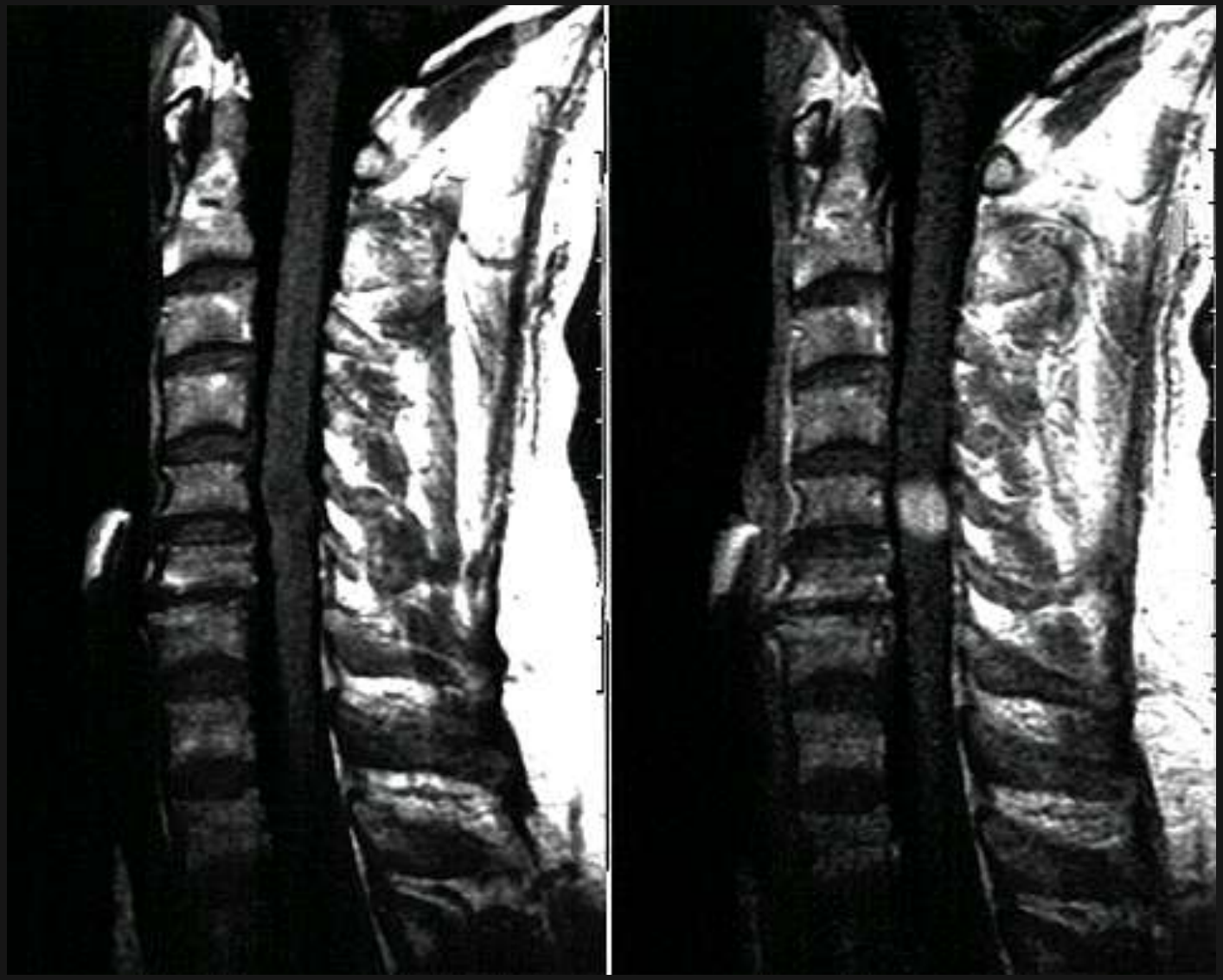
Pure intramedullary schwannomas are well-defined isointense lesions on T1 & T2 with homogeneous enhancement.

D.D. 2ries & hemangioblastomas.

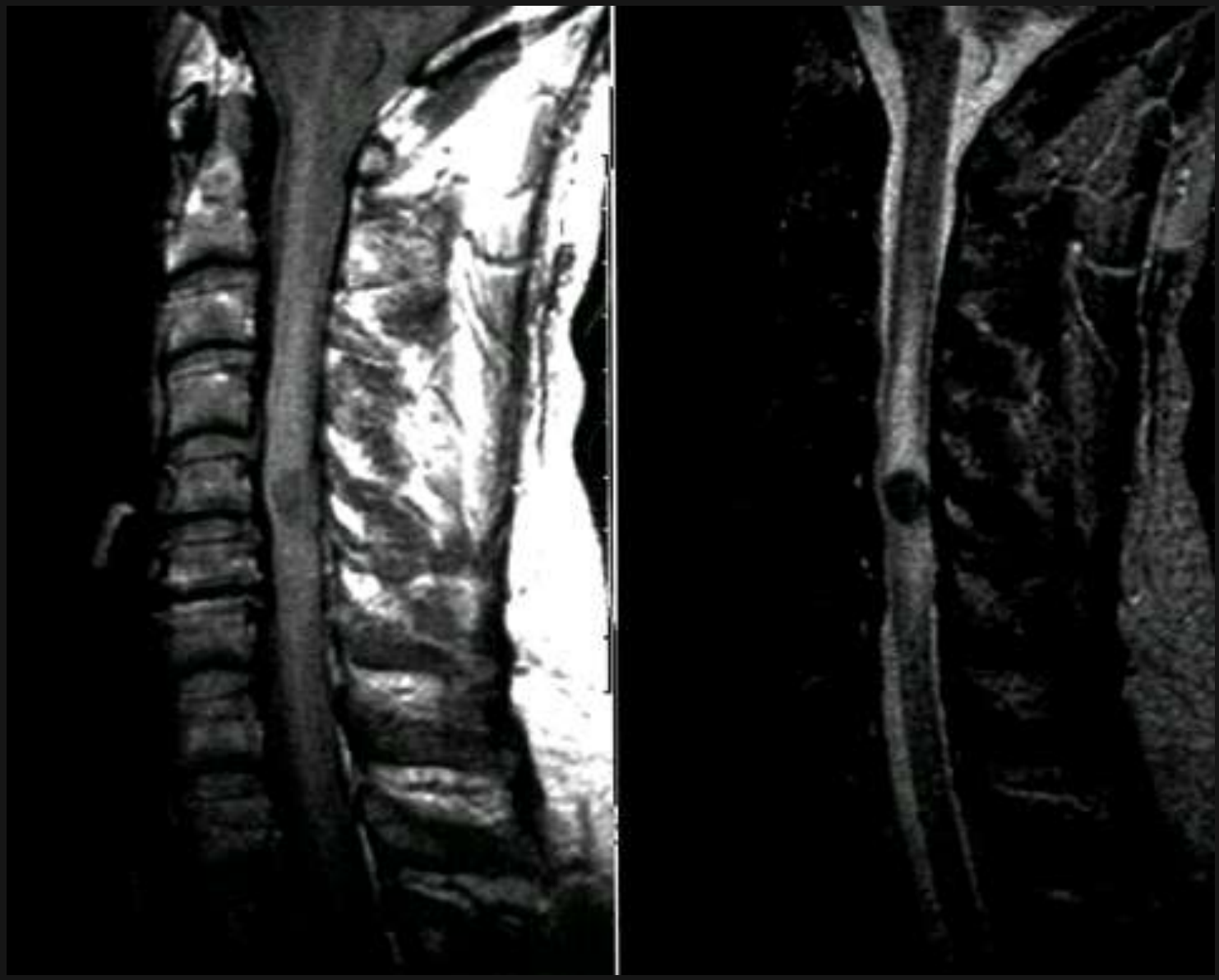


T1& T2

At the level of C5 a well-defined, slightly hypointense intramedullary lesion is seen on T1. The lesion is hypo on PD and markedly hypo on T2. The associated edema is best seen on T2 as hyper areas. The lesion enhances intensely and homogeneously after contrast



T1 & Gad



PD and T2WI

Epidermoid Cyst

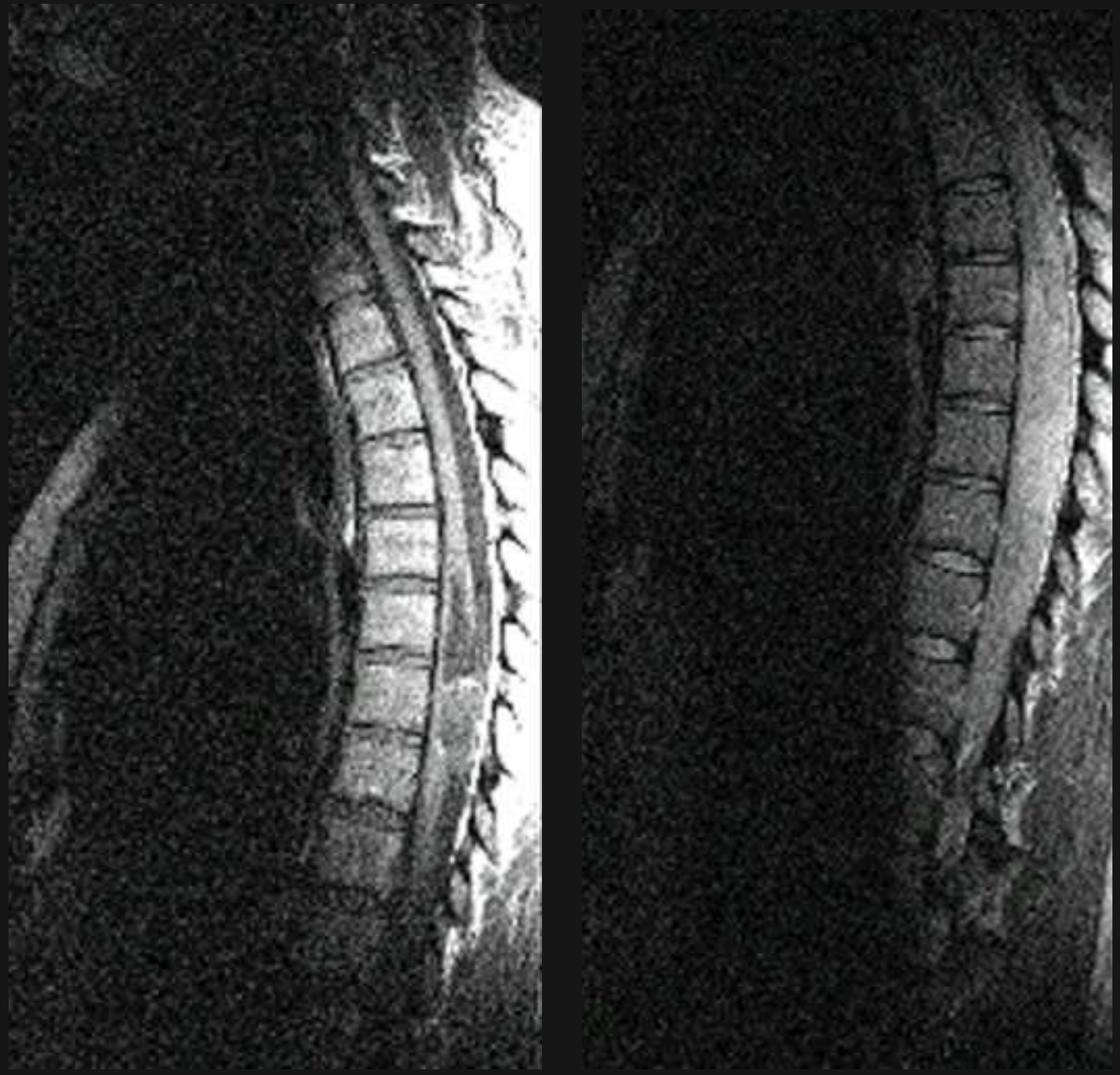
Epidermoid and dermoid cysts represent 3% of all spinal cord tumors.

They behave as true intramedullary tumors.

They are either congenital / iatrogenic lesions.

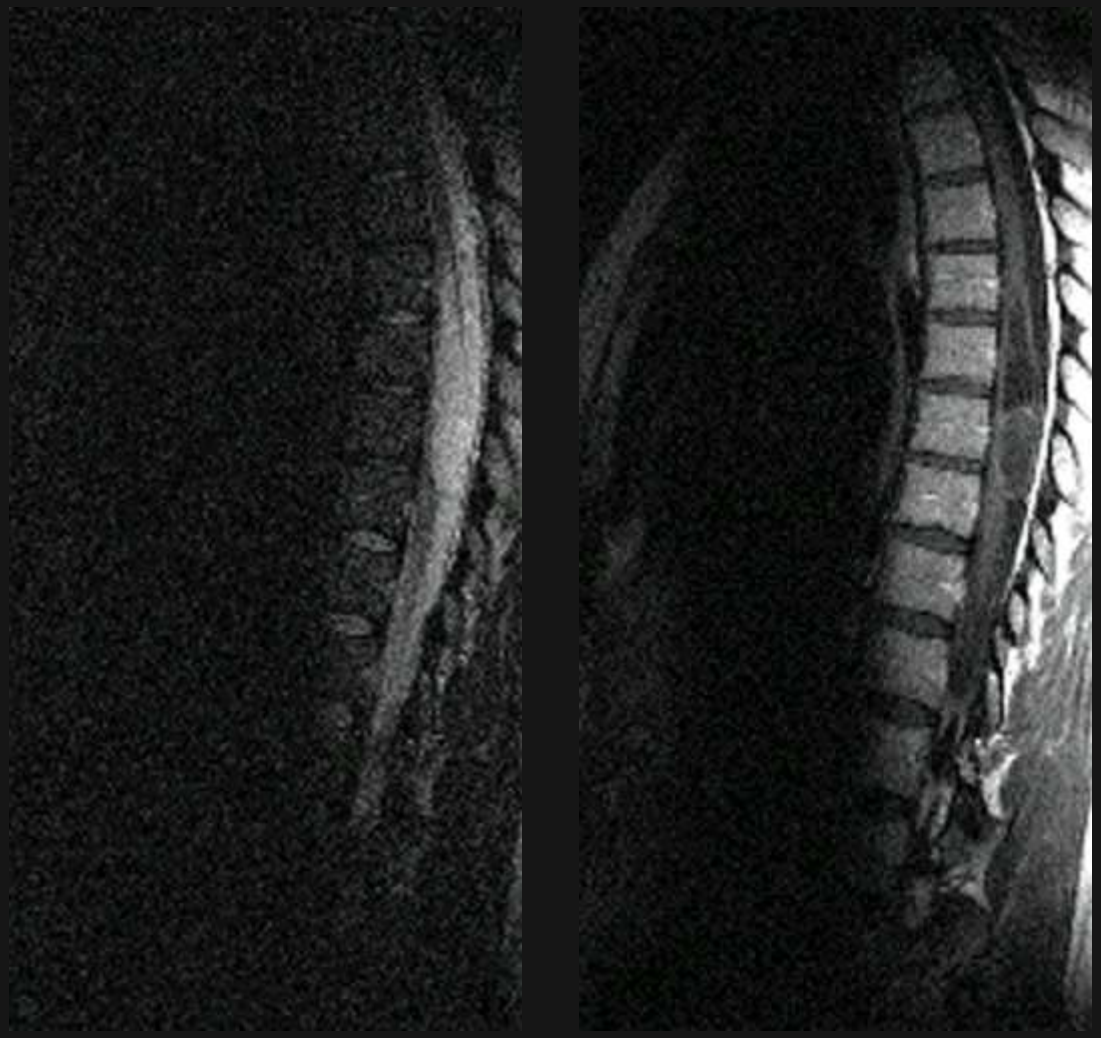
Epidermoid cysts are usually oval shaped mass lesions.

Variable signal behavior depending on the characteristics of the tumor components.



T1. Mid-thoracic cord enlargement. There is a slightly hypointense lesion with a partially hyperintense rim, with satellite cysts that have the same signal characteristics as CSF

Sagittal PD. The lesion is hyperintense to CSF



Sagittal T2. Hyperintense lesion.

Sagittal Gd T1. No contrast enhancement visible

D.D. of non tumoral spinal cord enlargement

Multiple sclerosis.

Sarcoidosis.

Tuberculoma.

Abscess.

Acute disseminated encephalomyelitis.

AVM, Dural fistulae.

Acute ischemic lesions.

Acute traumatic lesions.

Postradiotherapy myelopathy.

Hydrosyringomyelia.


Thank You