Andrology-Open Access

Sharma et al., Andrology (Los Angel) 2016, 5:1
DOI: 10.4172/2167-0250.1000158

Case Report Open Access

Arterio Venous Fistula (AVF) of Filum Terminale-MRI Diagnosis - A Case Report

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Rec date: April 18, 2016; **Acc date:** April 25, 2016; **Pub date:** May 2, 2016

Abstract

Arteriovenous malformation (AVM) of the spine can present with different symptomatology. This depends upon the region of involvement and with the background of underlying angioarchitectures. AVM occurrence at filum terminale needs special reference as it is not covered under any classifications. Arteriovenous fistula (AVF) can remain undiagnosed because of the location and the way of its presentation. Rodesch et al. has found as 3.2% prevalence in one of their series of arteriovenous shunts management. Selective Digital subtraction angiography (DSA) is required to find out the arterial feeder for its guidelines to the appropriate management. We present 42-years old male who presented with long standing low backache with numbness in both lower limbs. Contrast Magnetic Resonance Imaging (MRI) investigation of Lumbosacral spine diagnosed as a case of having arteriovenous fistula of filum terminale.

Keywords: AVM; Filum terminale; AVF; DSA; Contrast MRI; Lumbosacral spine

Introduction

Spinal AVMs are rare in occurrence as compared to the brain. The incidence is one tenth of the cranial entities. Matsumaru et al. has reported multifocal occurrence of AVMs [1]. The pathologies could not be diagnosed earlier in early stage because of the paucity of diagnostic armamentarium. In modern era the conclusion of the diagnosis can be made because of the availability of specialized investigations like DSA and MRI.

Case Report

42-years old male reported to orthopedic clinic with four years history of low backache. The pain was radiating to both the legs and used to be aggravated after exertion. Now for the last one year there was history of off and on numbness in both the lower legs. He had also complained some unexplainable sexual disturbances. There was also change of bladder (urinary incontinence) and bowel habits but all the investigations were normal. There was no neurological deficit. There was no relief after physiotherapy and symptomatic treatment. X-ray Lumbosacral spine was unremarkable (Figure 1).

There is no abnormality noticed in the vertebrae or the adjoining soft tissues except straightening of lumbar lordosis. All the blood investigations were within normal limits. The patient was subjected to plain MRI of Lumbosacral Spine and was further modified to contrast studies. MRI was performed on 1.5 T Philips Multiva MRI scanner. Plain MRI revealed a well-defined hyper intense lesion both in T1W and T2W in L3 vertebral body which got suppressed in STIR sequences. There was also some widening of the filum terminale at that level along with some flow voids (Figure 2).

Post contrast T1W fat saturated sequences have shown intense enhancement at that site. There was also a prominent draining vein around this enhancing lesion (Figure 3).

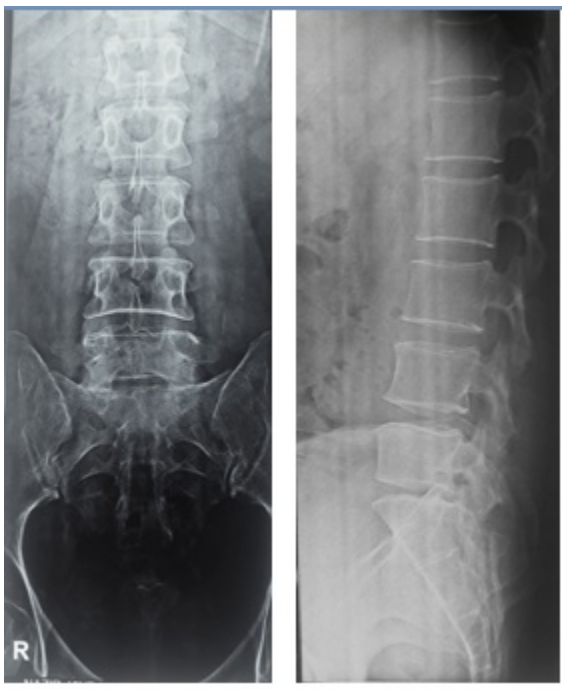

Figure 1: Plain X-ray lumbo-sacral spine (a) AP and (b) Lateral View.

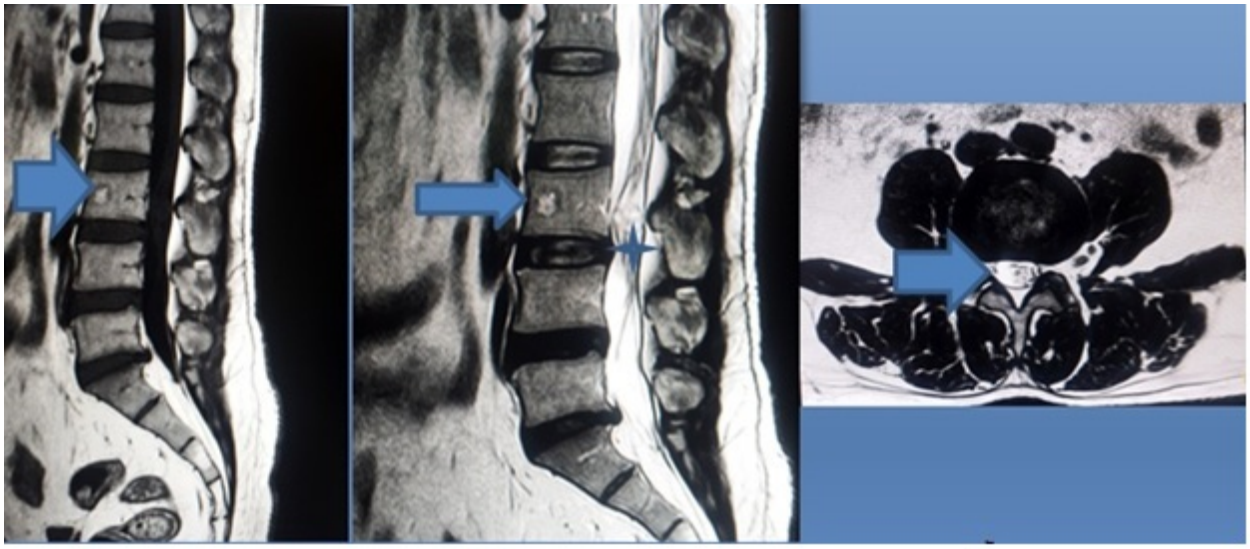

Figure 2: Non contrast MRI (a) T1W sagittal section shows a hyper intense lesion in L3 vertebra (wide blue arrow) without any changes in the spinal cord region. (b) T2W sagittal section shows hyper intense lesion at the same site (blue arrow) and another hyper intensity in the spinal canal with a few internal serpiginous hypo intensities (blue star). (c) T2W axial section at L3 vertebral level shows hyper intensity well contained within the dural space (wide horizontal blue arrow).

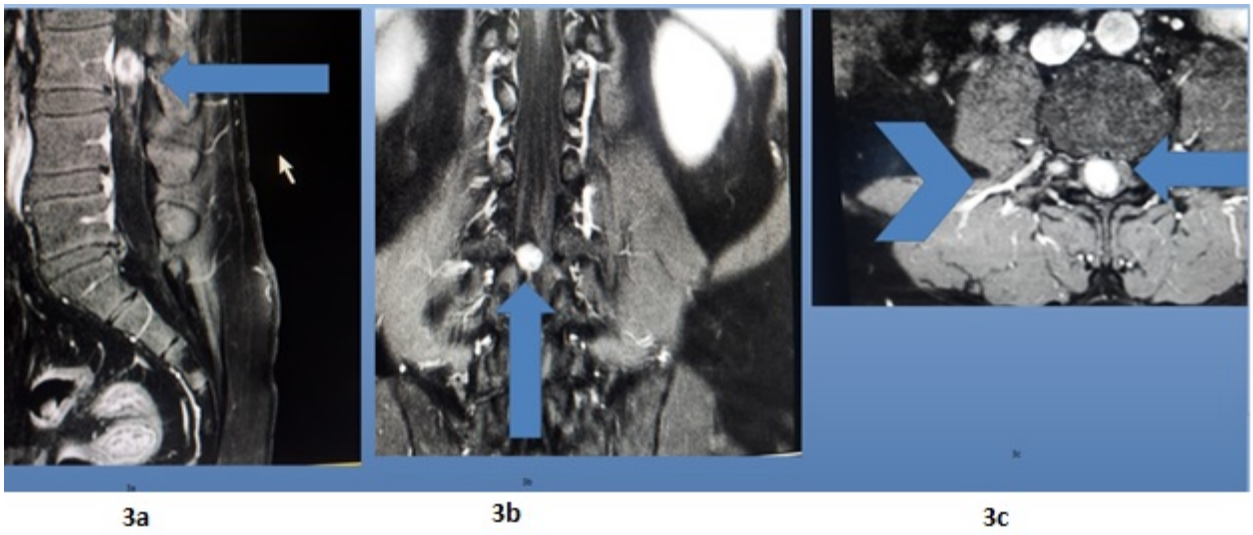

Figure 3: Contrast enhanced MRI. (a) Sagittal section T1W fat saturated image shows enhancing lesion in the spinal canal at the level of L3 vertebral body (horizontal blue arrow). (b) Coronal section showing the same lesion. (c) Axial section shows the same enhancing lesion slightly towards right side (horizontal blue arrow) with prominent draining dural vein (blue arrow head).

MR Myelography has shown the cut off region at the site of pathology (Figure 4). The working diagnosis of AV malformation of filum terminale was made. The patient was referred to the super specialized tertiary Centre of Neuroradiology and Neurosurgery. The patient underwent biplane angiographic studies by catheterizing all the thoracic, lumbar and bilateral internal iliac arteries under general anesthesia. The diagnosis of filum terminale AVF was confirmed by DSA and the interventional management has been planned.

Discussion

Spinal AVMs are slightly uncommon but are important for the management purpose as these produce plethora of symptomatology leading to considerable morbidity. The underlying cause for these symptoms is because of venous hypertension. Secondary AVMs can be there because of hemodynamic variations of the primary pathology. There can further be complications by thrombosis, hemorrhage and

local pressure symptoms. Filum terminale is the distal continuous part of the spinal cord which ends at L1-L2 intervertebral disc level. This is about 25 cm long. Dural sheath extends till S2 vertebral level after which it runs up to the dorsal tip of first coccyx vertebra as filum terminale externus. Filum terminale internus has got central canal in the upper part (Figure 5).

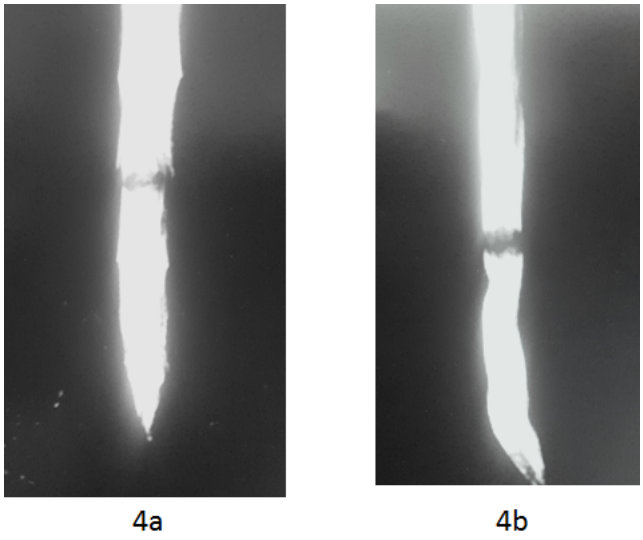

Figure 4: MR myelography. (a) Coronal section shows some cut off signal intensity at L3 vertebral level. (b) Sagittal section shows clear obliteration of dural space at the same level.

Harmeier in 1933 demonstrated the detailed anatomy of the filum terminale with central canal in its upper half. This is fibrous tissue filament along with some neurogenic tissue which stabilizes and keeps the spinal cord in the spinal canal [2]. The arterial supply of this part is from rediculomedullary and anterior spinal arterial branches. This may be the extension of the artery of Adamkiewicz [3]. Venous drainage is through extradural venous plexus in the sacrum to the central vein of the spinal cord which has got either side directional flow. There is no extra blood supply of the filum terminale as there are no nerve roots exiting from it. Jin et al. has reported the arterial blood supply from the lateral sacral artery [4].

There is single draining vein which continues from the tip to the conus medullaris. In our case contrast MRI has shown draining vein which is part of fistulous communication [5]. The other unique finding of our case was presence of vertebral hemangioma of L3 vertebra at the level where AVM was located. Rodesch et al. has found 3.5% incidence in their series of 155 patients [6,7]. Surgery remains as the first choice of treatment but endovascular emboliasation is the alternative treatment in some cases [6]. Surgical option is the choice when the feeder is single with long distance to the AVF otherwise endovascular is the choice for others where sacral and multiple feeder arteries are encountered [8].

Conclusion

AVFs of filum terminale are usually supplied by the single branch of anterior spinal artery and drained by single vein. This leads to the venous hypotension of the spinal cord and immediate management is warranted. These are treated by surgical approach with good outcome.

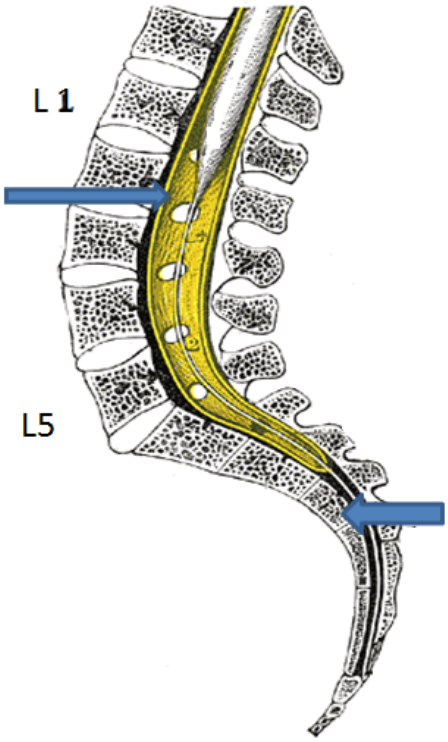

Figure 5: Diagrammatic presentation of the lower end of the spinal canal. Spinal cord ends at L1-L2 intervertebral disc level (long right horizontal blue arrow). Filum terminale externus (blue left wide horizontal arrow) starts at S2 level and adheres to the tip of coccyx on its dorsal aspect.

The patients who have progressive and long standing symptoms respond better by surgical approach. Clinical symptomatology and MRI play a great role in making the diagnosis and further management decision.

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