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Spinal dural arteriovenous fistulas, about 2 cases

K,bouaita.y,benotmane, fz,marfoua.a,meliani
Department of neurosurgery ,cherchell hospital

Abstract
Background : *spinal dural arteriovenous fistulas (SDAVFs), also known as type I spinal arteriovenous malformations, are the most common spinal vascular disorder. Diagnosis of an SDAVF isoften challenging because of its heterogeneous presentation that can mimic other neurologicaldisorders. A typical SDAVF is fed by a radiculararteryand drains into a medullary vein, leading toa dilated perimedullary venous plexus and spinalcord congestion. The classic clinical picture is thatof a progressive thoracic myelopathy. Surgical treatment of SDAVFs is safe and effective and leads to an improvement of neurologic symptoms in most patients. Surgical treatment of SDAVFs also provides long-term stability.*
Material and method: *from January to December 2021, 2 patients with diagnosis of SDAVF were treated in our Hospital, Patient characteristics, time from onset of symptoms to treatment, radiologic features, treatment-related complications, and functional outcome were analyzed.*
Results : *they are both male from 46and52 years old, the location of the fistula was in thoracic level, Myelopathic symptoms are reported in both cases and scaled with Aminoff-Logue scale scores. MRI/MRA showed medullar T2-hyperintensity, intramedullary contrast-enhancement and dilatation of perimedullar veins in various extensions; The angiography demonstrated the angioarchitecture of the DAVF .they both underwent surgical approach with no complication and a good outcomeis noticed by the improvement of the Aminoff-logue scale.*
Conclusion: *Surgery is a definitive treatment with stable long-term results in which procedure-related morbidity islow.*
Key words*: spinal dural arteriovenous fistulas; angiography , intramedullary, good outcomeis.*

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I. Introduction

spinal dural arteriovenous fistulas (SDAVFs) consist of an abnormal shunt between a dural artery branch and a radicular vein, leading to increased pressure in the venous system with consecutive venous congestion. Despite its rarity, SDAVF is the most common type of spinal vascular malformation. Patients often experience nonspecific symptoms. However, favorable outcome depends on the progression of neurologic deficits at the time of diagnosis, which makes early diagnosis preferable. Surgical disruption of the pathologic arteriovenous junction is considered to be a straightforward treatment modality for SDAVF.

II. Materials And Methods

from January to December 2021, 2 patients with diagnosis of SDAVF were treated in our Hospital.
SDAVFs were diagnosed with magnetic resonance imaging (MRI), magnetic resonance angiography, and spinal angiography. Patient characteristics on admission and during the treatment course, clinical presentation, duration of symptoms, radiologic features, and functional neurologic outcome were analyzed.
All patients underwent laminectomy in the predetermined location of the fistula. After opening the dura mater, surgical disconnection of the draining vein was performed by electrocoagulation.
Functional outcome was assessed and graded according to the Aminoff-Logue scale (ALS). A favorable functional outcome was defined as an improvement of clinical symptoms during follow-up

III. Results

Patient Characteristics
Patient characteristics, including age, gender, angiographic and radiologic findings, and clinical outcome, are summarized in Table 1.

Table 1 Patient characteristics	
Overall number	2
Male gender	2/2
Mean age (years)	49 years
Mean time from onset of symptoms to diagnosis/ treatment (months)	3,5
Location of the fistula	Thoracic
Favorable Outcome	2/2
Mean follow-up	6 months

Neurologic Symptoms

The most important neurologic symptoms at admission were gait disturbance, it was noticed in both patients, the first patient had spastic paraparesis with a bilateral Babinski, in addition, he also had urinary incontinence, the main Aminoff-Logue scale was 7(severe).

The second patient had spastic paraparesis and hypoesthesia in all mode, the main Aminoff-Logue scale was 4(moderate).

Radiologic Features

SDAVFs were located at the thoracic level in both patients.

For the first patient, the spinalMRI show serpentine signal flow voids and Centro medullar vasogenic oedema (hypersignal T2) in the dorsal level, the D5 artery was hypertrophied which suspected the emplacement of the fistula and which was confirmed by spinal angiography.

For the second patient, the fistula was located in the D8 level and confirmed with angiography, note that the D12 artery was hypertrophic and the serpentine signal voids was exaggerated in the D12 level which suspected a second fistula.

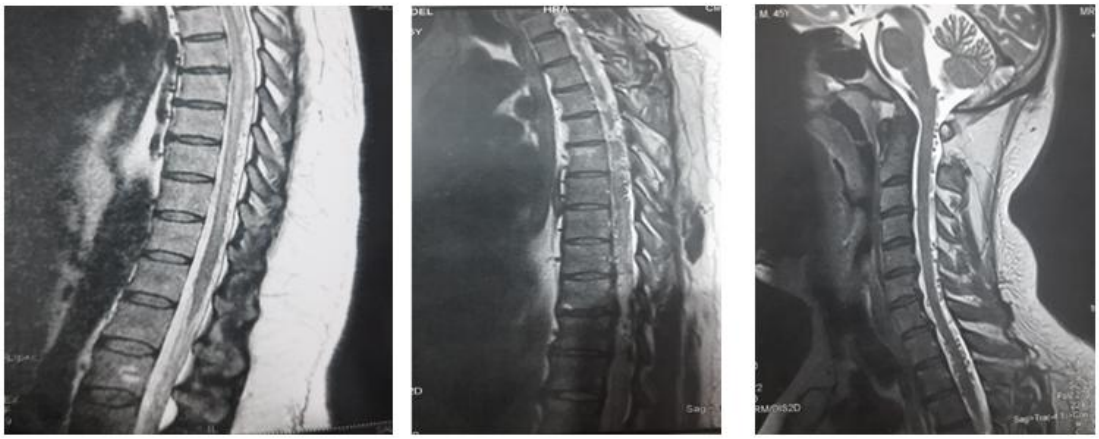

Fig1: Preoperative MRI shows congestive myelopathy and hypertrophic vessels in the dorsal subarachnoid space.

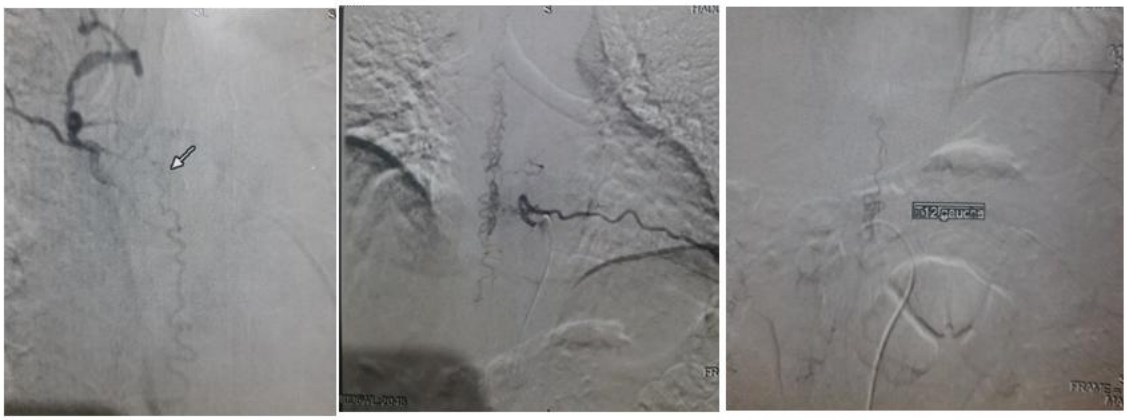

Fig2: Spinal angiography demonstrating the angioarchitecture of arteriovenous fistula, note the hypertrophic vessels at D12 level which suspected another SDAVF

Time to Treatment
The first patient presented an acute form of gait disturbance, the diagnosis as well as the surgical treatment was done within one month.
The Second Patient presented a progressive gait disturbance and hypoesthesia, the diagnosis as well as the and the surgical treatment was done within six month.

Surgical procedure
The patient is placed in a prone position and the level of incision is located with fluoroscopy, one-level laminectomy is preferredbecause it allows for easier watertight dura closure, the second patient underwent (D8 and D12) to confirm if there is a double SDAV fistula, The shunt is intradural, and most often seated on the posterior external side of the spinal dura mater at the level of the lower part of the vertebral pedicle.
Under microscopic magnification, dura mater is opened along the midline, while leaving the arachnoid intact, and dura tack-up sutures are applied to retract the dural edges.
The proximal portion of the arterialized vein is identified as it emerges from the dura. It is dissected free from the adjacent nerve roots and arachnoid adhesions, and the short, proximal segment is isolated.
The arterialized draining vein is then lifted away from the nerve root, coagulated with low power bipolar, and divided.
For the second patient, there was no double fistula, its probably the same fistula which communicate with perimedullar vessels, ICG would be useful to confirm it.

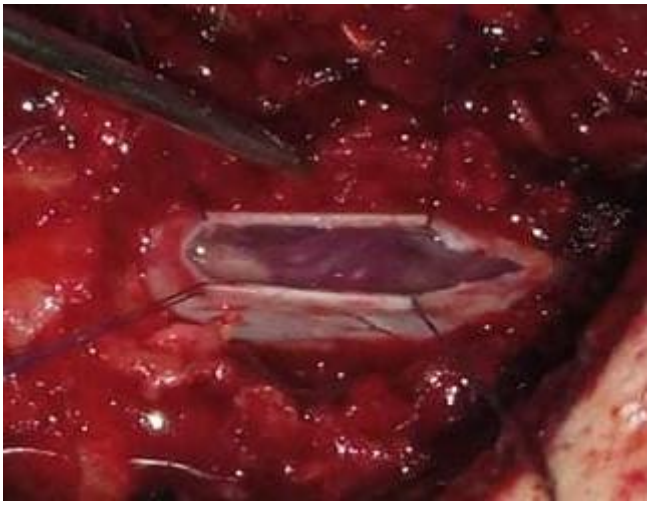

Fig3:: Peroperative view where we can see hypertrophic perimedullar vessels

Functional Neurologic Outcome
Postoperative complications, including wound infections or cerebrospinal fluid leaks with need for surgical intervention, were not observed in this two patients.
For the first patient, urinary function improved within few days and the gait disturbance improved as well few months later after functional rehabilitation (From ALS 7 to 2).
For the second patient, we noticed a slight improvement of gait disturbance and less marked sensitive troubles but longterm follow-up is necessary.

Radiologic Results

Figt4: postoperative MRI showing disappearance of flow voids and abnormal hyperintensity areas in the spinal cord.

Fig5: selective angiography the disappearance of the fistula and the regression of the sepiginous appearance, and of course the absence of recurrence.

IV. Discussion

SDAVFs often manifest with slow but progressive symptoms of myelopathy, Nonspecific symptoms with subtle onset are very common in patients with SDAVFs, which leads to a long time interval from onset of symptoms until diagnosis and subsequent treatment (1) , (2), our to patients were treated in a significantly short time which leaded to a good outcome.

Gait and sensory disturbances have been reported to be the most common early symptoms of myelopathy caused by SDAVFs (1), Both of these frequently observed neurologic symptoms in patients with SDAVFs were improved after surgical treatment, which is in accordance with the literature (3) , (4), (5).

Micturition problems also have been reported to occur in most patients with SDAVFs (1). In the present study, the micturition disturbances improved significantly after treatment.

SDAVFs were located mainly at the thoracic and lumbar levels (2, 6).

Laminectomy and arteriovenous fistula ligation is a safe and reliable approach for accessing and treating spinal dural arteriovenous fistulas (10), this is confirmed in our experience.

Double SDAVF are extremely rare. The vast majority of the reported double SDAVF in the literature has been detected synchronously within an area of equal or less than three vertebral levels. Thus, whenever the SDAVF is identified, further injections of the fistula-zone neighbored segmental arteries might be recommended. However, due to the extremely low incidence of double SDAVF a complete spinal DSA is not indicated (11). The case in our study should have been better explored and the preoperative ICG would be very useful to avoid a second laminectomy.

V. Conclusion:

The present data indicate that surgical treatment of SDAVFs is safe and effective and leads to an improvement of neurologic symptoms in most patients. The data also indicate that surgical treatment provides long-term stability after treatment. SDAVF should be included in the differential diagnosis of every patient presenting with progressive myelopathy to allow timely diagnosis.

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