CLINICAL CASE

Dural arteriovenous fistula causing spinal cord injury and vesicosphincteric dyssynergia

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Abstract Dural arteriovenous fistula is a rare pathology with neurologic repercussions. Its clinical suspicion is important, given that its outcome depends upon the speed with which treatment is established. Not a congenital vascular malformation, but rather of acquired etiology, the fistula is made up of a ball of small arterial vessels located in the thickness of the dura mater of the dural sac.

A 22-year-old man with an unremarkable past history came to the emergency service complaining of paresthesia in the left lower limb after a slight trauma 10 days before. Symptoms worsened after one month and a lumbar nuclear magnetic resonance scan revealed a high-flow paravertebral arteriovenous fistula with trajectory and inclusion into the lumbar canal from L1 to L3.

Fístula arteriovenosa dural, lesión medular y disinergia vesicoesfinteriana

Resumen La fistula arteriovenosa dural es una patología infrecuente con repercusión neuroológica cuya sospecha clínica es importante ya que su pronóstico depende de la rapidez con la que se instaure el tratamiento.

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Introduction

Arteriovenous fistulas with perimedullary venous drainage are characterized by the fact that this drainage is related only to the spinal cord. It is not a congenital vascular malformation, but rather is of acquired etiology, and is made up of a ball of small arterial vessels located in the thickness of the dura mater of the dural sac. The fistula is irrigated by the meningeal branch of one or 2 intercostal, lumbar, or sacral trunks and its pathologic repercussion is due to the fact that its drainage is carried out by the radiculomedullary vein that inverts its flow, emptying into the perimedullary venous plexus. Overloaded by the fistula, its entire tract is dilated until reaching the veins of the posterior fossa. All this produces venous ectasia in the spinal cord with edema and ischemia along its entire length up to the emptying level. This is caused by the absence of other radiculomedullary veins at a superior or inferior level that would alleviate this situation, thus explaining the long extension of the perimedullary venous ectasia. We present herein the clinical case of a spinal lesion secondary to a perimedullary fistula with sensory motor and urinary tract repercussions.

Case presentation

A 22-year-old man with an unremarkable past history came to the emergency department complaining of paresthesia in the left lower limb after a mild trauma 10 days earlier. A lumbar x-ray showed conserved disc spaces and he was referred to the Rehabilitation Service/Spinal Unit. The patient stated mild clinical urinary urgency, and increased pain in certain positions that ceased when he was at rest. There was no pain or motor or sensory deficit in the lower limbs. Bilateral Lasègue’s sign was negative and there was no sphincteric alteration.

One month later symptoms worsened and a lumbar NMR scan was ordered that showed a high-flow paravertebral arteriovenous fistula with trajectory and inclusion into the lumbar canal from L1 to L3 (figs. 1 and 2).

With this result, the patient was referred to the angiology and vascular surgery service, indicated for embolization of the spinal vascular malformation irrigated by the left L2-L3 lumbar artery, a very hypertrophic branch of the abdominal aorta that drained inside and outside the spinal canal. Canal varices corresponded to the posterolateral epidural plexus and were situated at the left margin and strongly pushed the dural sac toward the right.

A few weeks later the patient complained of worsening in relation to walking, lumbar pain, and lower limb pain. The clinical symptoms of his urinary incontinence and urinary urgency also became worse and he had difficulty initiating micturition and so was referred to the urology service. Urodynamic study showed a decrease in bladder capacity with uninhibited contractions at a volume of 50 cc and difficulty for sphincteric relaxation when attempting to

Figure 1 Lumbar NMR with result of paravertebral high-flow arteriovenous fistula with trajectory and inclusion into the lumbar canal from L1 to L3.

Figure 2 The fistulous process compressing the lumbar canal can be identified in this image.
urinate, resulting in the study diagnosis of hyper-reflexive overactive bladder with vesicospincteric dysynergia.

Abdominal ultrasound showed no alterations.

Treatment was begun with B3 agonists and alpha blockers, resulting in improved urinary incontinence and pollakiuria, with persistence of a certain resistance upon initiating micturition, but without presenting pathologic post-micturition residue.

Two new embolizations were needed to complete fistula treatment.

The patient is currently under strict periodic control. He is stable, has a spastic gait, lower limbs without steppage gait, and with discreet claudication of the left buttock.

**Discussion**

Neurogenic bladder can have a congenital or acquired origin. The most frequent causes of congenital origin are dysraphism, caudal regression syndrome, and more infrequently, malformations such as Arnold-Chiari syndrome or Klippel-Feil syndrome.

The most common causes of acquired neurogenic bladder are central or peripheral nervous system trauma and lesions secondary to postoperative or iatrogenic pathology.

Among the causes of postoperative neurogenic vesicospincteric dysfunction are injuries secondary to radical pelvic surgery and the sequelae from herniated disc surgery and radiotherapy.6-7

Diseases of the central or peripheral nervous system frequently produce dysynergia as well, and they include vascular, degenerative, demyelinating, and infectious pathologies, tumors, and cerebral palsy.6-7

Spinal cord vascular pathology is rare compared with cerebral vascular pathology, but its early identification is of great importance for minimizing residual damage. Spinal cord ischemic injuries can present as complete spinal cord severance or the less fulminant spinal cord compression.8

Among the non-ischemic vascular spinal cord pathologies are traumas that can develop an intra or extradural or intramedullary spinal hematoma causing an intrinsic or compressive spinal cord syndrome.

Arteriovenous malformations and dural fistulas also originate in the spinal cord. At times their architecture is complex and they can be acute due to a hemorrhagic process, or more commonly, manifest as a sub-acute and partially reversible process in relation to venous congestion processes or as a medullary claudication syndrome.

Nuclear magnetic resonance is diagnostically useful, but arteriography is the diagnostic study of choice for these vascular malfunctions. The best therapeutic option is selective embolization of the fistulous vascular ball up to its draining vein without reaching the perimedullary vein into which it empties.9 When embolization is not possible, the next option is selective surgery of the radiculomedullary vein that drains the fistula, sparing the rest of the dilated perimedullary veins that are the spinal cord’s only drain.10

**Ethical responsibilities**

Protection of persons and animals. The authors declare that the procedures followed conformed to the ethical standards of the responsible committee on human experimentation and were in accordance with the World Medical Association and the Declaration of Helsinki.

Data confidentiality. The authors declare they have followed the protocols of their work center in relation to the publication of patient data.

Right to privacy and informed consent. The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the corresponding author.

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**Conflict of interest**

The authors declare that there is no conflict of interest.

**References**


