



## Case Report

# Evolving magnetic resonance spinal cord trauma in child: from hemorrhage to intradural arachnoid cyst

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Acquired arachnoid cysts of the spinal cord are uncommon causes of spinal cord compression in the pediatric group. Meningitis, trauma and hemorrhage are considered to be causative or contributing factors. Interestingly, no spinal arachnoid cysts have been reported in patients after subarachnoid hemorrhage or meningitis, conditions expected to cause arachnoid scarring. We describe a child of 1 year and 10 months with thoracic spine trauma with crural paraplegia and anesthesia at level T5 submitted to serial magnetic resonance imagery at 5 days and 18 months, after trauma showing evolution from subarachnoid hemorrhage and adhesions of the arachnoid space to a posterior hypertensive thoracic intradural arachnoid cyst.

**Keywords:** arachnoid cyst; spinal trauma; spinal arachnoid cyst; child

## Introduction

Acquired arachnoid cysts of the spinal cord are uncommon causes of spinal cord compression in the pediatric group.<sup>1–5</sup> Previous spinal surgery, hemorrhage, inflammation and closed spinal trauma with hemorrhage have been suspected as causative of arachnoid cysts or diverticula of the spinal cord.<sup>2,6,7</sup> Interestingly, no spinal arachnoid cysts have been reported in patients after subarachnoid hemorrhage or meningitis, conditions expected to cause arachnoid scarring.<sup>8</sup>

Magnetic resonance (MR) of the spine is considered the best diagnostic procedure, showing the real anatomy of the cyst, the compression effect to spinal cord or nerve roots, allowing the comparison of the cerebrospinal fluid (CSF) and cyst contents.<sup>9</sup> We describe a child of 1 year and 10 months with thoracic spine trauma, with crural paraplegia and anesthesia at level T5 submitted to serial MR at 5 days and 18 months, with evolution after the trauma from hemorrhage and adhesions of the arachnoid space to a posterior thoracic intradural arachnoid cyst.

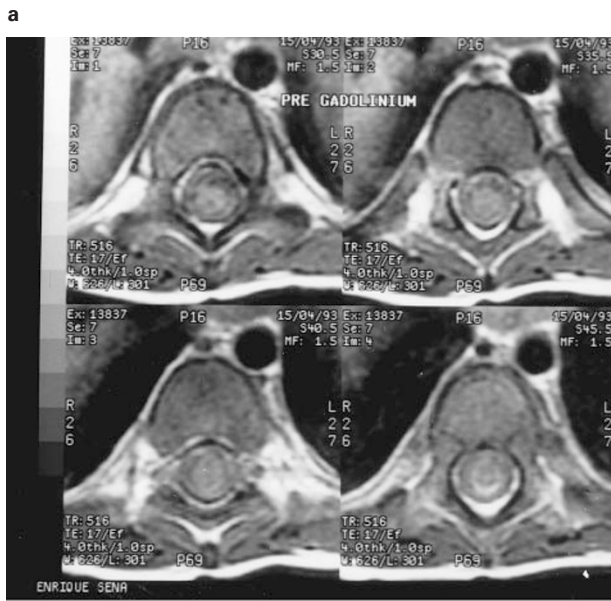
## Case report

A male child 1 year and 10 month-old presented with acute crural paraplegia after a car accident. Initial neurological examination revealed flaccid crural para-

plegia and hypoesthesia below segment T5. Plain X-ray and computerized tomography of the thoracic spine done on the first day after trauma were normal. Magnetic resonance done 5 days after trauma showed intraspinal hemorrhage, segmental myelomalacia restricted to levels T6–T10 and loculations of arachnoid filled with CSF at levels T6–T8 (Figure 1). Eighteen months after trauma, MR showed posterior arachnoid cyst extending from at C3–C6 level (Figure 2), with anterior displacement of the spinal cord. The child was submitted to shunt of the arachnoid cyst to the pleural space through a partial laminectomy C7–T1, with highly hypertensive CSF at surgery. At present the boy is 5 years old, being deambulator with crouch, and no new neurological deficit has developed.

## Discussion

Arachnoid cyst of the spinal cord can be perineural, extradural or intradural and rarely causes spinal cord compression.<sup>1–5</sup> Extradural spinal arachnoid cysts consist of an expanding lesion composed of an arachnoid protrusion which is thought to be either a congenital defect in dura or congenital area of weakness.<sup>9</sup> The cyst is usually posterior and often large, covering several vertebral segments, which may not communicate with the subarachnoid space. Most of these cysts are located in the lower thoracic or upper lumbar spine, enlarging the bony canal, and frequently producing a partial or complete CSF block at the level of the cyst.<sup>8</sup>



**Figure 1** Magnetic resonance 5 days after trauma showing in T1-weighted image hypersignal due to methaemoglobin at level T6–T10 (a), and myelomalacia with loculations of arachnoid filled with CSF at level T2–T8 (b). These findings are compatible with intraspinal hemorrhage with edema and obstruction of CSF circulation

Intradural arachnoid cysts are rare expanding lesions within the intraspinal canal and are usually located posterior to the spinal cord in 80–85% of patients, anterior in 9% and lateral in 6%, generally in the midline.<sup>9</sup> However, they may be laterally situated in the dentate ligament.<sup>6,10</sup> Intradural arachnoid cysts are more frequently located in the thoracic spine (70%) or thoracolumbar (12%), but they can also be lumbosacral (13%) and cervical (3%),<sup>6,11</sup> and seldom



**Figure 2** Magnetic resonance 18 months after trauma showing in T1-weighted posterior arachnoid cyst of the thoracic spinal dislodging anteriorly the spinal cord at C3–C6 level

produce bony changes in the spinal canal.<sup>3</sup> Spinal arachnoid cysts may occur at any age, but are most common in the second decade, and are more common in males by almost twofold.<sup>11</sup> Most intraspinal arachnoid cysts communicate with the subarachnoid space, and at histology consist of a normal arachnoid structure, occasionally with thickened fibrous tissue.<sup>2,10</sup>

Etiologies for arachnoid cysts are congenital and acquired. The latest include previous spinal surgery, hemorrhage, inflammation and closed spinal trauma as causative or cooperating with a pre-existing congenital arachnoid cyst,<sup>2,6,7</sup> with proliferation of arachnoid trabeculae, being the mechanism of cyst enlargement and the degree of communication with the subarachnoid space possibly related to a ball valve effect at the neck of the diverticulum or an osmotic pressure system.<sup>9,10</sup> In the pediatric group the most frequent etiology is congenital.<sup>8</sup>

The symptoms, when present, are due to pressure or traction on the spinal cord and nerve, with local diffuse or radicular pain, depending on its level and location. Dyaesthesiae and hypoalgesia are also common. Impairment of motor function, ranging from mild gait difficulty to spastic quadriparesis, has been observed in approximately half of the reported cases. Urinary complaints as initial symptoms are rare.<sup>3,5,6,11</sup> The clinical course is usually protracted, mimicking multiple sclerosis in some patients.<sup>2</sup>

In acquired arachnoid cystic meningitis, trauma and hemorrhage are considered to be causative or contributing factors, it being postulated that the proliferation of arachnoid trabeculae occurs from the septum posticum for the posteriorly-situated arachnoid cyst. Interestingly, no spinal arachnoid cysts have been reported in pediatric patients after subarachnoid hemorrhage or meningitis, conditions expected to cause arachnoid scarring.<sup>8</sup>

MR of the spine is considered the best diagnostic procedure, showing the real anatomy of the cyst, the compression effect to spinal cord or nerve roots. MR also allows comparison of the CSF with the cyst contents. MR has replaced myelography and computed tomography as the diagnostic measure of choice.<sup>2</sup>

The treatment of choice of spinal arachnoid cysts is surgical removal of as much of its wall as is safe or shunting procedures.<sup>5,6,11</sup> The general postoperative outcome for these procedures is good recovery in 87% of patients, and severe disability in 11%.<sup>9</sup>

In the present case the authors had the opportunity to observe the evolution from hemorrhage as causative of arachnoid adhesions to arachnoid cyst with hypertensive characteristics dislodging spinal cord anteriorly. The decision of surgery was based on radiological imaging and we did not wait until new neurological deficits developed in the superior limbs, which would have been a disaster for an already disabled child. Shunting technique was selected in this case, in spite of the removal of the cyst wall, in order to avoid instability that can occur with laminectomy at this age.

## Conclusion

We have described a rare case of a thoracic arachnoid cyst of the spinal cord, measured by magnetic resonance in a child of 1 year and 10 months, with trauma at level T5, evolving from hemorrhage and myelomalacia in the acute phase to a compressive

spinal arachnoid cyst 18 months post-trauma. Surgery consisted of shunt of the arachnoid cyst to the pleural space.

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