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**Short Note**

## Spinal Arachnoid Cysts: Clinical and Technical Study

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### Introduction

Spinal arachnoid cysts are rare lesions that account for nearly 1 % of all spinal lesions [1]. Despite the fact that these lesions are most generally asymptomatic, they may lead to neurologic manifestations by compression of the medulla, the cauda equine or nerve roots [2]. Spinal arachnoid cysts are surgically curable. Nevertheless, they have not been yet subject of deep studies, as most of the publications are single case reports. Through this paper, we report our experience in the field of treatment of spinal arachnoid cysts through the study of 13 patients.

### Methods

We report a retrospective study of 13 patients managed between 2010 and 2017 for a spinal arachnoid cyst. Post traumatic arachnoid cysts were not included in our study. All our patients had a spinal MRI. 3 of them had also a computed myelography. 12 patients underwent surgery through various approaches including cyst excision, cyst shunt or cyst punctures.

### Results

(Table 1) The mean age for our patients was 36 years, with extremes ranging between 4 and 69 years old. 10 of our patients were female gendered with a sex ratio female/male at 3, 33/1. All our patients were symptomatic. Walking difficulties are the most represented functional sign (69%), followed by sphincter disturbances (53%) and radicular pain (30%). Radicular or medullar claudicating and rachialgia were found in 3 cases (23%). Neurologic examination found par paresis in 9 cases (69%) and lower limb dysesthesia in 4 cases (30%).

On MRI (Figures 1 and 2), arachnoid cyst was solitary in 12 cases. Only one patient presented 2 lumbar arachnoid cysts. The location of the cyst was epidural in 11 cases and intramedullary in 2 cases. All the cysts were posterior or posterolateral. All cysts had cerebrospinal intensity on T1 and T2 weighted imaging.

The topography of the cysts was Thoracic in 8 cases, Lumbar in 4 cases and cervico-thoracic in one case.

12 patients underwent surgery. Only one patient was not surgically managed. It was about an 8 year-old girl that presented a weakness of lower limbs after being treated for scoliosis by a corset. Imaging showed a thoracic epidural arachnoid cyst. But after removal of the corset was noticed a significant improvement of the symptomatology.

10 patients had total cyst excision after laminectomy (Figure 3). A solitary dural defect was found in 10 patients and could be tightly closed. Multiple dural defects were found in one case and couldn't be closed. A shunt between the cystic cavity and subarachnoid space was performed for this patient.

**Table 1:** The mean age for our patients was 36 years, with extremes ranging between 4 and 69 years old.

Patient	Age	Medical history	Symptoms	Duration	Clinical Exam	Imagery	Treatment	Results	Follow up
1	6	No pathologic background	Walking difficulties and Sphincter control problems	1 year	Spastic walk	MRI: Dorsal epidural arachnoid cyst ranging from D4 to D9	D6, D7 and D8 Laminectomy	Improvement of the walking Better sphincteric control	6 months
					Vivacious lower limbs tendon reflexes	Myeloscan: early low cyst opacification	Cyst evacuation		
2	15	No pathologic background	Walking difficulties and Sphincter control problems	1 year	Vivacious lower limbs tendon reflexes	MRI: Dorsal epidural arachnoid cyst ranging from D5 to D9	Laminectomy from D5 to D9	Improvement of the walking Better sphincter control	8 months
							Cyst evacuation		
3	58	No pathologic background	Lombalgia	7 years	Flabby paraparesis	Intramedullar arachnoid cyst at the level of the medullary cone	D11-D12 Laminectomy	Improvement of the walking	2 months
			Lower Limbs weakness				Myelotomy		
4	41	Neuro fibromatosis	Lower limbs weakness and dysesthesia	5 days	Spastic paraparesis	Thoracic Scan: Large thoracic cyst enlarging the medullary canal from D5 to D12	Lombo peritoneal Shunt	No significant improvement	1 month
		Operated for scoliosis 20 years ago	Sphincter control problem						
5	46	No pathologic background	Walking difficulties with Lower limbs dysesthesia	2 years	Ataxic walk	MRI: posterior epidural arachnoid cyst ranging from D6 to D8	D6-D7-D8 Laminectomy	Walking improvement	7 months
			Intercostal neuralgia		Sensitive Level D7		Cyst removal		
6	50	Sarcoidosis	Dorso lombalgia	5 months	Normal	Epidural arachnoid cyst ranging from D12 to L3	L1-L2-L3 laminectomy	Less pain	13 months
							Cyst punction and removal		
7	31	Operated twice for an intradural arachnoid cyst	Lower limbs weakness	6 months	Lower Limbs pyramidal syndrom	Epidural arachnoid cyst ranging from D10 to L2	D10-L2 Laminectomy	Improvement	7 years
			Sphincter control problem		Thermoalgesic dysesthesia		Cathether between the cyst and the subdural space		
8	8	Cyphoscoliosis	Lower Limbs weakness	1 month	Lower Limbs Pyramidal Syndrom	Epidural arachnoid cyst laying on the cervicothoracic hinge	No surgery	Spontaneous improvement	2 years
9	4	No pathologic background	Progressive lower limbs weakness	3 years	Dorsiflexion deficit	Epidural arachnoid cyst on the level of L4	Laminectomy	No Follow up	
			Sphincter control problems				Cysts Removal		
10	69	Diabetes	Left lower limb paresthesia	1 and half a year	Absence of lower left limb tendon reflex	Intramedullar arachnoid cyst at the level of D11	D10-D11 Laminectomy	Clinic: walking improvement	1 year and a half
							Posterior myelotomy	MRI: disappear of the arachnoid cyst	
11	41	No pathologic background	Lombocruralgia	2 years	Radicular Left L1 hypoesthesia and deficit	Epidural arachnoid cyst on the level of L1	CSR evacuation	Improvement of the deficit but persistence of the hypoesthesia	1 year
			Radicular claudication				L1-L2 Laminectomy		
12	51	Diabetes	Dorsolombalgia	8 months	Upper right limb dysesthesia	Epidural arachnoid cyst on the level of D6 and D7	Cyst Removal	Improvement of the dysesthesia	1 year and a half
			Intercostal Nevralgia				Cyst removal	MRI : Cyst Removal	
12	51	Diabetes	Sphincter control problems	8 months	Upper right limb dysesthesia	Epidural arachnoid cyst on the level of D6 and D7	Breach closure		1 year and a half
			Sphincter control problems						



Figure 1: arachnoid cyst.



Figure 2: The location of the cyst was epidural in 11 cases and intramedullary in 2 cases.

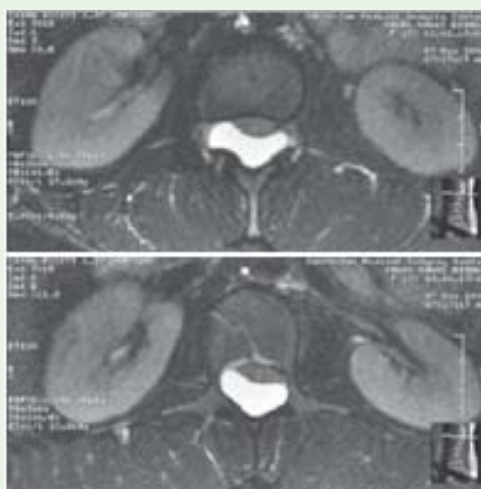


Figure 3: Cyst excision after laminectomy.

One patient had a giant arachnoid cyst enlarging foramina from D3 to D12. The option of lomboperitoneal shunt was preferred for this patient, but no clinical improvement could be obtained by this approach.

Postoperative course was uneventful for all patients except one who had meningitis managed with antibiotics.

The mean follow up was about 17 months. Improvement of initial symptomatology was noticed in 9 cases.

## Discussion

Spinal arachnoid cysts are rare lesions that occur inside the spinal canal, representing 1% of all spinal expansive processes [3]. Pathogenesis of these lesions is still subject of debate. Some studies considered intradural arachnoid cysts as sequels of chronic inflammation [1]. A defect of the dura and the herniation of the arachnoid tissue is supposed to be the main mechanism for the development of spinal epidural cysts [4]. A congenital etiology was also proposed by Perret [5]. He supposed arachnoid cysts would be the result of widening of the septum posticum. But none of these theories could make unanimity through neurosurgical committees as the origin of the onset of this defect is still not proved [6].

There is also still no consensus about classification for spinal arachnoid cysts. Nabors [7] proposed a classification in which he divided spinal cysts into three major categories: epidural meningeal cyst without nerve root fibers (type I), epidural meningeal cysts with neural fibers (type II, the so-called Tarlov cysts), and intradural meningeal cysts (type III).

In our series, epidural cysts were found in 84% of the cases and 16% were intramedullary, but non intradural extramedullary cysts were found.

To the best of our knowledge, this series is one of the largest in the purpose of arachnoid cysts after the ones of Netra [3,8].

This pathology seems to affect women with higher rates than men. Almost 60% of the patients reported in the series of Jae and Tokmak were female gendered [2,8].

In our series, 76% of the patients were female gendered, which is inconsistent with literature features. In previous studies concerning spinal arachnoid cysts, medical background had not been specified. But we do think that patient history is important to define, mainly when it is about spinal pathologies, even when not surgically managed. In fact, we had in our series two patients who were managed for cyphoscoliosis several years before the diagnosis of spinal arachnoid cysts. We can presume that spinal deformities can be incriminated as predisposing factor towards the development of spinal arachnoid cysts. On the other hand, we had also 2 patients followed for sarcoidosis and Neuro fibromatosis.

Multiple arachnoid cysts are rare and mainly reported in the childhood [9]. 12 of our patients had solitary cysts and only 4 years old girl had two extradural lumbar cysts with multiple dural defects discovered preoperative.

Initial symptomatology can be various depending on the level of neurologic compression. Paraparesis is the most reported symptom in the literature. Urinary disorders can also be noticed especially

if the sacral roots are affected. Sensitive deficits are rarely reported [9,10]. Weakness of the lower limbs was as well the most frequent in our series with a rate of 69%. Urinary disturbance was found in 53%. Dysesthesia was noticed in 30% of our patients.

MRI is the most accurate method for diagnosis and study of the spinal arachnoid cysts. CT scan can be useful to show indirect signs such as bone erosion or foraminal enlargement [2]. Myelography can precise in some cases the location of a communication between the cyst and the subarachnoid space [11].

Epidural location is the most common localization among spinal arachnoid cysts [12]. On the opposite, intradural extramedullary would be the rarest. Our findings are concordant with those of the literature, as 84% were epidural, 16% were intramedullary, but no one was intradural extramedullary.

Surgery is considered as the Gold Standard for treating symptomatic spinal arachnoid cysts [13,14]. The most reported approach has for principles, after laminectomy, the excision of the cyst and the tight closure of the dural breach. This is a classic approach that provided the best results [7]. Other techniques can be discussed in the cases in which excision of the cyst is not possible, or when the dural breach is too wide making tight closure tough. In these cases shunting and cyst puncture are reported with more controversial outcomes [1,14].

In our series, 12 patients underwent surgery. 10 patients had total cyst excision after laminectomy. A solitary dural defect was found in 10 patients, and was closed with the help of a plasty. Multiple dural defects were found in one case and couldn't be closed. A shunt between the cystic cavity and subarachnoid space was performed for that patient. One patient had a giant arachnoid cyst enlarging foramina from D3 to D12. A lumbo peritoneal shunt was performed for this patient.

The outcome varies depending on the width of the breach and therapeutic approaches. When a total excision with tight closure of the breach is performed, clinical evolution is satisfying and cyst recurrence is very rare [1,2]. All the patients that were managed through this technique in our series had a good outcome, with total or partial regression of the symptoms. Prognosis is worse when an excision of the cyst is not possible, or when the dural breach is too wide making tight closure tough. In our series, no significant improvement could be noticed for the patient who was operated through cyst shunting.

## Conclusion

Spinal arachnoid cyst is a rare but curable pathology. Cysts excision and dural defect closure seems to be the most efficient treatment for symptomatic cysts. More conservative approaches like shunt or puncture have worse outcomes and should be reserved for specific cases.

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