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Case Report

Solitary aneurysm of the filum terminale artery: A case report and review of the literature

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Received: 27 April 17 Accepted: 05 June 17 Published: 09 August 17

Abstract

Background: We report a rare case of aneurysmal dilatation of filum terminale artery after resection of filum terminal myxopapillary ependymoma.

Case Description: The authors report a rare aneurysmal dilatation of the filum terminale artery following removal of a filum terminal myxopapillary ependymoma in a 10-year-old male. The patient presented with 6-month history of increasing back pain without a focal neurological deficit. Magnetic resonance (MR) showed an intradural filum terminale lesion that was completely excised. Three months later, the MR again revealed a lesion involving the filum terminale. During the second surgery, however, an aneurysmal dilation of the filum artery was found, which was coagulated and resected. Following the secondary surgery, the patient's symptoms gradually resolved, and he remains intact.

Conclusion: Although rare, a true aneurysm after spinal surgery should be considered among the differential diagnostic consideration in the region of the filum terminale.

Key Words: Aneurysm, filum terminale, myxopapillary ependymoma, spinal cord

Access this article online
Website:
www.surgicalneurologyint.com
DOI:
10.4103/sni.sni_161_17
Quick Response Code:

INTRODUCTION

Aneurysms of spinal arteries arise from arteries inside the dural sac. They most typically involve the proximal intradural radiculomedullary or radiculopial arteries, and only rarely, the anterior or posterior spinal arteries. They are usually fusiform but may also be saccular in configuration. According to the literature review, aneurysm of the filum terminale artery is very rare, and this is the first report of an isolated filum terminale artery aneurysm after spinal myxopapillary ependymoma tumor.

CASE REPORT

A 10-year-old male, with a history of progressive low back pain for 6 months, underwent magnetic resonance imaging (MRI) of the lumbar spine showing an intradural mass filling the spinal canal from L2 to L5. The lesion was isointense on T1-weighted and hyperintense on T2-weighted images; it also markedly enhanced after gadolinium injection [Figure 1]. The patient had a laminectomy for gross total excision of the lesion which

How to cite this article: Ebrahimzadeh K, Bakhtevari MH, Hallajnejad M, Rezaei O. Solitary aneurysm of the filum terminale artery: A case report and review of the literature. Surg Neurol Int 2017;8:179.
http://surgicalneurologyint.com/Solitary-aneurysm-of-the-filum-terminale-artery:-A-case-report-and-review-of-the-literature/

proved to be an ependymoma (e.g., grayish tumor resected "en bloc").

However, 3 months later, the follow-up MR revealed an intradural mass at the L3 level newly accompanied by a signal void [Figure 2]. During the second surgery, there was no tumor but rather an aneurysm of the distal filum terminale artery [Figure 3]. It was completely coagulated and resected. The pathological examination revealed a true vascular aneurysm.

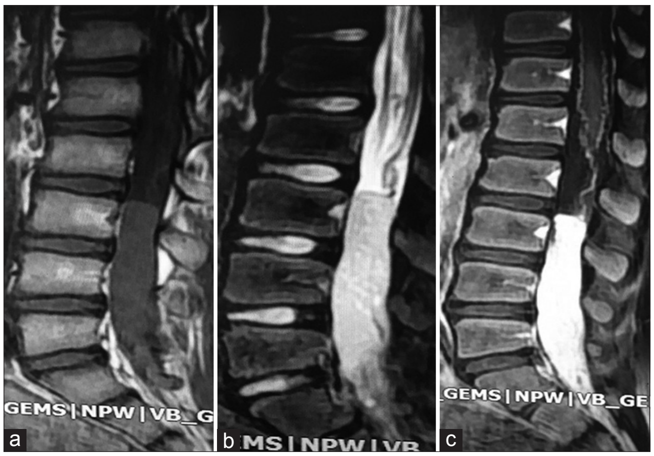

Figure 1: MRI showing intradural mass lesion that is isointense on sagittal T1-weighted (a), hyperintense on sagittal T2-weighted (b) and enhanced after gadolinium injection (c)

Figure 2: Follow-up imaging revealed a flow void lesion in the filum terminale region

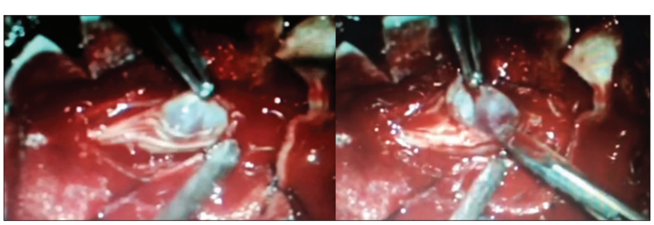

Figure 3: Intraoperative photograph of the filum terminale artery aneurysm

DISCUSSION

Literature review

According to the literature review, aneurysm of the filum terminale artery is very rare, and this is the first report of an isolated filum terminale artery aneurysm after spinal myxopapillary ependymoma tumor [Table 1].

This report focuses on the unique presentation of aneurysms involving the filum terminale artery following resection of a myxopapillary ependymoma.

The artery of the filum arises from the termination of the anterior spinal axis, either by trifurcation or from the proximal part of one of the two branches of the anastomotic ansa of the conus. At the level of the conus, the anterior spinal artery anastomoses with posterior spinal arteries. The artery travels in front of the filum and exhibits a rapidly diminishing caliber; rarely, it can be followed into the sacral canal.

Aneurysms are caused by a weakened blood vessel wall and can be an outcome of a hereditary condition or an acquired disease. Aneurysms can make a clot formation (thrombosis) and embolization.[4]

Spinal cord aneurysms usually have a dissecting etiology—the vessel is torn at the point where it traverses the dura, and the dissection propagates into the intradural (subarachnoid) segment of the vessel. Subarachnoid hemorrhage occurs when the dissection ruptures. However, if the dissection thrombosis, the outcome will depend on the availability of collateral support. When a dominant radiculomedullary artery (for example, Adamkiewicz) is occluded with no effective collaterals, symptoms of the anterior spinal cord infarct ensue (acute paraplegia, bowel, bladder, sexual dysfunction, pain and temperature sensory loss, sparing proprioception, and vibration). However, if effective radiculomedullary collaterals exist, the patient will likely do well.[1,2,4]

Another high yield etiology of these aneurysms are inherited connective tissue disorders and acquired vascular lesions (due to infections or inflammatory vasculopathies) which compromise the strength of the arterial wall, ultimately leading to aneurysm formation in the absence of a primary pathologic alteration of local hemodynamics.[1,2,4]

Spinal artery aneurysms are rare and uncommon lesions and they occur with spinal arteriovenous malformation in 20% of cases. Regarding spinal aneurysms, those patients who did bleed, approximately half had a recurrent episode, usually within 1 year.[3]

Anterior spinal artery aneurysms are rare and the result of hemodynamic anomalies; they are often associated with high flow vascular lesions. These may occur at all

Table 1: Literature review of 61 cases of isolated spinal artery aneurysm

Author	Age/Gender	Location
Echols, 1941	30/F	T6 anterior spinal Artery
Henson and Croft, 1956	51/M	C1-C2 posterior spinal artery
Kinal and Sejanovich, 1957	41/F	C7
Hopkins *et al*., 1966	27/M	C4 Radicular artery
Leech *et al*., 1976	25/F	T8 anterior spinal Artery
Garcia *et al*., 1979	34/F	Adamkiewicz artery
Thomson, 1980	66/F	C1-C2 anterior spinal artery
Yonas *et al*., 1980	42/F	cervical anterior spinal artery
Vincent FM., 1981	30/F	C1-C2 anterior spinal artery
Moore *et al*., 1982	30/F	C1-C2 Junction of vertebrospinal and anterior spinal arteries
Kito *et al*., 1983	37/F	T10 anterior spinal artery
Smith *et al*., 1986	29/M	T12 anterior spinal artery
Saunders *et al*., 1987	44/F	T1 anterior spinal artery
Goto *et al*., 1988	53/M	C2 posterior spinal artery
el Mahdi *et al*., 1989	17/F	Adamkiewicz artery from the left 10th intercostal artery
Handa *et al*., 1992	3/F	C2 posterior spinal artery
Bahar *et al*., 1993	40/M	C5-C6 anterior spinal artery
Yoong *et al*., 1993	55/F	C6-8 Radicular artery
Rengachary *et al*., 1993	50/F	T12 anterior spinal artery
Mohsenipour *et al*., 1994	59/F	T8 radicular artery
Vishteh *et al*., 1997	30/M	T12 artery of Adamkiewicz
Kawamura *et al*., 1999	42/M	C1-C2 anterior spinal artery
Taniura and Watanebe 2000	54/F	C5 anterior spinal artery
Chen *et al*., 2001	69/F 72/F	C1-C2 lateral spinal artery C1 lateral spinal artery
Yahiro *et al*., 2004	71/F	T5 anterior spinal artery
Berlis *et al*., 2005	62/F 48/M 69/F	Segmental artery in one case Adamkiewicz artery in 2 case

Contd...

Table 1: Contd...

Author	Age/Gender	Location
Massand *et al*., 2005	30/M 69/M 54/M 73/M	Adamkiewicz artery in one case L1 Radicular artery in one case Segmenta artery in one case T6 Radicular artery in one case
Kocak *et al*., 2006	54/F	C2 posterior spinal artery
Nemecek *et al*., 2006	55/M	T12 posterior spinal artery
Toyota *et al*., 2007	65/F	C2 anterior spinal artery
Klingler *et al*., 2009	46/F	C3 posterior spinal artery
Kurita *et al*., 2009	61/M	C1 lateral spinal artery
Pollock *et al*., 2009	55/F	anterior spinal artery
Karakama *et al*., 2010	51/M	C1 anterior spinal artery
Cavuşoğlu *et al*., 2010	27/F	C3 posterior spinal artery
Geibpraset *et al*., 2010	43/M	T4 posterior spinal artery
Lihoshi *et al*., 2011	60/F	T12 radiculomedullary artery
Takashima *et al*., 2012	84/M	C1 anterior spinal artery
Seerangan and Narayanan 2012	47/M	T8-T9 anterior spinal artery
Tanweer *et al*., 2012	67/F	T11 posterior spinal artery
Kim and Choi, 2012	52/M	Thoracic posterior spinal artery
Marovic *et al*., 2013	58/M	T4-T6 spinal radicular artery
Son *et al*., 2013	45/F	T12 Adamkiewicz artery
Yang, 2013	47/M	Cervical anterior spinal artery
Santana-Ramírez *et al*., 2013	1/F	C3-C6 anterior spinal artery
Van Es *et al*., 2013	62/F 68/M	L1 posterior spinal artery T4 posterior spinal artery
Gutierrez Romero *et al*., 2014	37/F 72/F	T3 anterior spinal artery T10 fusiform aneurysm in the intradural segment of a radiculopial artery

Contd...

Table 1: Contd...

Author	Age/ Gender	Location
Pahl *et al*., 2014	43/F	C1 anterior spinal artery
Hario *et al*., 2015	84/M	T12 posterior spinal artery
Sung *et al*., 2015	74/M	T1 radicular artery
Hill *et al*., 2016	53/M	T9 posterior spinal artery
Takata *et al*., 2016		posterior spinal artery

segments of the spinal artery, except at the bifurcation, and are often fusiform in morphology. Most are microaneurysms (smaller than 3 mm in diameter) and patients typically present with subarachnoid hemorrhage and/or signs of spinal cord compression.[6,7]

Spinal aneurysms differ from intracranial aneurysms in ways that affect their management. They seldom occur at branching points; rather, they develop along the course of an artery. The caliber of the spinal arteries is much smaller than that of intracranial arteries and they tend to be less affected by atherosclerosis.[8] Spinal aneurysms lack a clear neck and usually appear fusiform dilations.[7,8] Partial thrombosis of spinal aneurysms, a frequent finding during surgery, probably accounts for their becoming symptomatic.[5-8] The fusiform nature of these lesions makes clipping difficult and favors sacrificing the parent vessel. Endovascular techniques can be considered but the diagnosis of spinal cord aneurysm must be definitive before intervention. Aneurysms of the anterior spinal artery itself do not, however, appear to have a feasible endovascular solution. Recovery depends entirely on extent of damage caused by index hemorrhage.[8]

CONCLUSION

This case presents the rare finding of aneurysms of the filum terminale artery following resection of a myxopapillary ependymoma in a 10-year-old male. An aneurysm should be considered among the differential diagnostic considerations following tumor removal in this location. These lesions may spontaneously rupture definitive diagnosis and treatment (e.g., coagulation and resection) should be performed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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