Case Report

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

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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 dilatation 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

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...
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.

**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.

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.

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.

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.

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                          |
| Vishthe 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       | C1-C2 lateral spinal artery                   |
|                          | 72/F       | C1 lateral spinal artery                      |
| Yahiyo et al., 2004     | 71/F       | T5 anterior spinal artery                     |
| Berlis et al., 2005     | 62/F       | Segmental artery in one case Adamkiewicz artery |
|                         | 48/M       |                                              |
|                         | 69/F       | Segmental artery in two cases Adamkiewicz artery |

Table 1: Contd...

| Author                  | Age/Gender | Location                                      |
|-------------------------|------------|-----------------------------------------------|
| Massand et al., 2005    | 30/M       | Adamkiewicz artery in one case                |
|                         | 69/M       | L1 Radicular artery in one case               |
|                         | 54/M       | Segmena artery in one case                    |
|                         | 73/M       | 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                    |
| Lhoshi 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       | L1 posterior spinal artery                    |
|                         | 68/M       | T4 posterior spinal artery                    |
| Gutierrez Romero et al., 2014 | 37/F   | T3 anterior spinal artery                     |
|                         | 72/F       | T10 fusiform aneurysm in the intradural segment of a radiculopial artery |

Contd...
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]

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  |

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.

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Conflicts of interest

There are no conflicts of interest.

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