



Case Report

Ruptured posterior spinal artery aneurysm: intraoperative and histologic findings with appreciable thrombosis

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Abstract

BACKGROUND CONTEXT: Little is known on the natural course of ruptured spinal artery aneurysm, and a treatment strategy remains to be elucidated.

PURPOSE: This case report aims to describe a rare case of a posterior spinal artery aneurysm that showed progressive thrombosis following subarachnoid hemorrhage.

STUDY DESIGN: This is a case report and literature review.

METHODS: A 54-year-old man presented with subarachnoid hemorrhage due to posterior spinal artery aneurysm at the T10 level. The patient underwent surgery 19 days after onset.

RESULTS: Most of the aneurysm appeared unenhanced on intraoperative indocyanine green video angiography, and total resection was performed. Histologic examination confirmed spontaneous thrombosis of the lesion. A review of the literature identified 19 cases of ruptured posterior spinal artery aneurysm. Thrombosed aneurysm and thrombosed parent artery were observed in 7 (44%) of the 16 cases treated with surgical or endovascular interventions. In the three cases treated conservatively, fatal rebleeding in the acute stage was noted in one case, whereas the lesion disappeared spontaneously in the chronic stage without rebleeding in two cases.

CONCLUSIONS: Ruptured spinal artery aneurysms are prone to spontaneous thrombosis. The healing process of the lesion was well documented in the present case. Repeated angiographic follow-up offers a feasible alternative in the management of this fairly rare aneurysm. © 2016 Elsevier Inc. All rights reserved.

Introduction

Ruptured spinal artery aneurysm presenting with subarachnoid hemorrhage is rare. Little is known about the natural course of this entity, and controversy exists on treatment strategy. Prompt surgical resection or endovascular embolization of the aneurysm can prevent rebleeding [1–7]. Conversely, conservative management is known to lead to spontaneous disappearance of the lesion in selected patients [1,5,6]. Here, we report the case of a patient with a ruptured posterior spinal artery aneurysm who underwent surgical resection and showed

discrepancy between contrast enhancement on preoperative angiography and the results of intraoperative indocyanine green (ICG) video angiography.

Case presentation

A 54-year-old man presented with severe back pain and vomiting. Brain computed tomography did not show subarachnoid hemorrhage, and ureterolithiasis was suspected at another hospital. Six days after onset, the patient was re-evaluated because of persisting headaches and back pain. Spinal magnetic resonance imaging revealed subdural and subarachnoid hemorrhage focusing on thoracic segments, and the patient was transferred to our institution. On admission, no obvious neurologic deficit was observed except for neck stiffness. Spinal angiography on Day 7 after onset revealed a fusiform aneurysm on the radiculopial artery, fed by the T10 intercostal artery (Fig. 1, Left). The patient was managed

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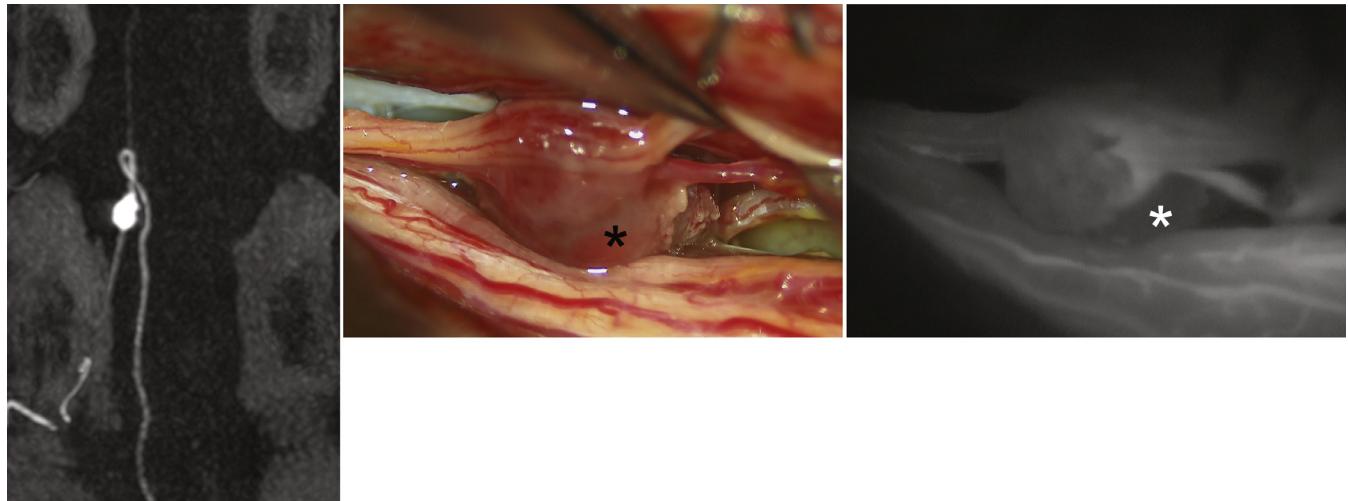


Fig. 1. Preoperative angiography (Left) shows a fusiform aneurysm on the radiculopial artery, fed by the T10 intercostal artery. An intraoperative photograph (Middle) and intraoperative indocyanine green (ICG) video angiography (Right) show the aneurysm. Most of the aneurysms show no enhancement (asterisks).

conservatively in the intensive care unit during the vaso-spasm period. On Day 19 after onset, the patient underwent direct surgery to prevent rebleeding. The ICG video angiography showed decreased contrast enhancement of the aneurysm compared with that on preoperative angiography, and most of the aneurysm was not enhanced (Fig. 1, Middle, Right). The radiculopial artery was divided and the aneurysm was resected. Histologic examination revealed thick organized thrombus formation within the aneurysm, resulting in significant luminal narrowing (Fig. 2). Postoperative angiography showed disappearance of the aneurysm, and the patient was discharged without neurologic deficits.

Discussion

In the present case, the discrepancy between preoperative angiographic and intraoperative ICG angiographic findings can be explained by progressive thrombosis of the aneurysm revealed on histologic examination. In patients with neuro-

vascular lesions, intraoperative angiography using intravenous administration of ICG (a near-infrared fluorescent dye) allows live imaging of blood flow of an aneurysm sac with a laser-fluorescence device attached to a surgical microscope [8]. To the best of our knowledge, this represents the first case in which spontaneous thrombosis was confirmed from intraoperative ICG and histologic findings. This result may reflect the healing process of ruptured spinal artery aneurysms.

To our knowledge, 19 patients with ruptured posterior spinal artery aneurysms diagnosed angiographically have been reported (Table) [1–7,9–16]. Of these, 16 patients, including the present case, were treated with surgical or endovascular interventions at varying times. In 7 (44%) of these 16 patients (Patients 3, 5, 7, 9, 10, 13, and 14), a thrombosed aneurysm and thrombosed parent artery were observed intraoperatively (no aneurysm was found in Patient 14, suggesting thrombosis). Of these seven patients, the time between symptom onset and treatment was consistently within 1 month (range: 1–26 days).

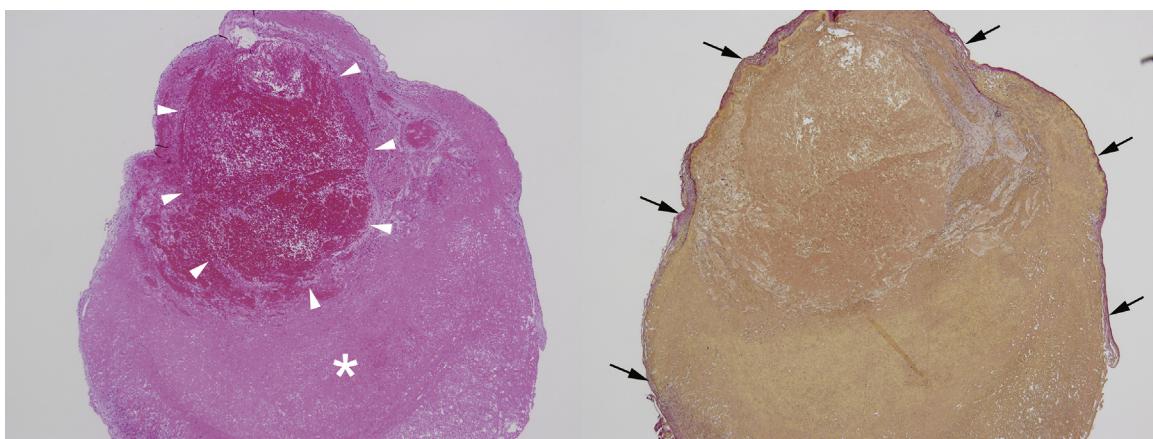


Fig. 2. Histologic examinations (Left: hematoxylin and eosin stain; Right: Elastica van Gieson stain) show thick organized thrombus formation (asterisk) within the aneurysmal wall (black arrows), resulting in luminal narrowing (white arrowheads). Original magnification $\times 200$.

Table

Reported cases of ruptured posterior spinal artery aneurysms diagnosed angiographically

Author (year)	Patient no.	Age/sex	Time between presentation to treatment	Treatment	Aneurysmal findings (follow-up)	Clinical outcome
Ronchetti et al. (2015) [7]	1	51/F	0 d	Resection	Angiographic occlusion (1 d)	Improved
Ronchetti et al. (2015) [7]	2	68/M	0 d	Endovascular	Angiographic occlusion (3 mo)	Improved
Goto et al. (1988) [9]	3	53/M	1 d	Resection	A thrombosed parent artery (intraoperative)	Stable
Massand et al. (2005) [10]	4	69/M	4 d	Resection	Angiographic occlusion (postoperative)	Improved
Geibprasert et al. (2010) [11]	5	43/M	4 d	Resection	Endoluminal thrombus (histology)	Improved
Kim and Choi (2012) [2]	6	52/M	6 d	Endovascular	Angiographic occlusion (4.5 mo)	Improved
Massand et al. (2005) [10]	7	54/M	12 d	Resection	A thrombosed aneurysm (intraoperative)	Improved
Johnson et al. (2014) [12]	8	Teenage	13 d	Resection	N/A	Improved
Caglar et al. (2005) [13]	9	74/F	Acute stage	Resection	A thrombosed aneurysm (histology)	Improved
Nemecek et al. (2006) [4]	10	55/M	Acute stage	Resection	Organizing thrombus (histology)	Stable
Tanweer et al. (2012) [14]	11	67/F	Acute stage	Endovascular	Angiographic occlusion (8 mo)	Stable
Shankar et al. (2012) [15]	12	72/F	Acute stage	Endovascular	Angiographic occlusion (2 wk)	Improved
The present case	13	54/M	19 d	Resection	A thrombosed aneurysm (ICG, histology)	Improved
Berlis et al. (2005) [1]	14	62/F	26 d	Resection	Aneurysm not found (intraoperative)	Improved
Van Es et al. (2013) [6]	15	62/F	33 d	Resection	Increased in size (12 d)	Improved
Handa et al. (1992) [16]	16	3/F	8 mo	Resection	N/A	Stable
Koçak et al. (2006) [3]	17	54/F	N/A	Conservative	Rebleed (0 d)	Died
Sato et al. (2012) [5]	18	67/F	N/A	Conservative	Angiographic occlusion (2 mo)	Improved
Van Es et al. (2013) [6]	19	68/M	N/A	Conservative	Unchanged (12 d), no bleeding (59 mo)	Improved

N/A, not applicable.

Among the three patients treated conservatively, fatal rebleeding in the acute stage was noted in one case (Patient 17), whereas the lesion was reported to have disappeared spontaneously without rebleeding in two cases (Patients 18 and 19) in the chronic stage (2 and 59 months). Although the small number of reported cases precludes meaningful statistical analysis, the accumulated clinical data suggest that posterior spinal artery aneurysms are prone to thrombosis, probably because of the narrow, winding nature of these vessels. Prompt surgical or endovascular interventions have been recommended by most authors, but the radiological and intraoperative findings in the present case also support the notion that repeated angiographic follow-up may represent a valid alternative in the management of this fairly rare aneurysm.

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