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CASE REPORT

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Isolated Dissecting Posterior Inferior Cerebellar Artery Aneurysm

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Dissecting aneurysms frequently involve the vertebral arteries and their branches, but those involving the posterior inferior cerebellar artery (PICA) and not vertebral artery at all are extremely rare. We present a case of an isolated dissecting aneurysm of the PICA without involvement of vertebral artery. A 54-year-old man presented with dizziness and headache. MR imaging of the brain showed a cerebellar infarction of the left PICA territory. MR angiographic and cerebral angiographic studies revealed a dissecting fusiform aneurysm involving the left proximal PICA. Subsequently, the patient underwent GDC embolization. A postembolization angiogram demonstrated complete obliteration of the aneurysm. In this report, the treatment modalities for this rare condition is described with review of the literature.

KEY WORDS : Dissecting aneurysm · Posterior inferior cerebellar artery · Embolization.

Introduction

The dissecting aneurysms of the pure posterior cerebellar artery (PICA) is very rare, and these typically arise at the origin of the PICA[1-4,9,14]. Nonetheless, the detection of these vascular lesions has been increased in recent years[3], therefore the diagnosis and proper treatment modalitiy for such lesions need to recognized. We have searched and refrieved 29 cases reported in the literature with the isolated PICA dissecting aneurysms.

The authors present an additional one case of dissecting PICA aneurysm presented with cerebellar infarction of the left PICA territory with a review of the clinical presentation, radiological findings, treatment modalities and outcome of this condition.

Case Report

A 54-year-old man without hypertension and diabetes mellitus visited on out-patient clinic due to dizziness and headache on February 26, 2004. On admission, the patient was alert and neurologically intact. For exclusion of the cerebral infarction or other vascular lesion, MR imaging and MR angiography were performed. MR imaging revealed a cerebellar infarction of the left PICA territory (Fig. 1). MR angiogram showed an aneurysm located at the proximal left posterior cerebellar artery. A cerebral angiography demonstrated a dissecting fusiform aneurysm involving the left proximal PICA (Fig. 2). The GDC embolization was performed for the dissecting aneurysm.

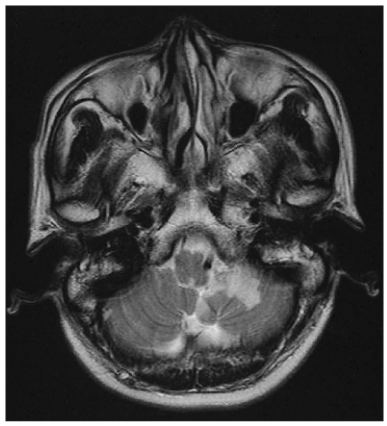

Fig. 1. Axial T2-weighted MR image on admission showing high-signal change on the left cerebellum of the posterior inferior cerebellar artery territory.

Under the local anesthesia, 6-Fr guiding catheter was advanced to the mid portion of the left vertebral artery. A distal tip of microcatehter (Prowler-10, Cordis) was advanced to the aneurysmal sac and 4mm×8cm sized GDC (2-D, Boston Scientific Co.) was inserted as first coil for occlusion test. However, it was too small to occlude the blood flow. Therefore,

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Fig. 2. Lateral view of vertebral angiogram demonstrating a fusiform dilatation of proximal posterior inferior cerebellar artery (PICA). Mild irregular contour of PICA origin is noted.

a larger coil (5mm×15cm, Matrix, Boston Scientific Co.) was inserted into the aneurysm; however, it was too long for embolization. So, 5mm×10cm sized GDC (2D) was used as a first coil. After the detachment of the first coil, blood flow of the left PICA was preserved (Fig. 3A). A 4mm×8cm sized GDC was placed as second coil and blood flow of left PICA was stopped. However, retrograde flow was seen through ipsilateral anterior inferior cerebellar artery (AICA) and superior cerebellar artery (SCA) (Fig. 3B), hence, the second coil was detached. The post embolization angiography showed complete occlusion of the left PICA. The postoperative course was uneventful and was discharged 3 days after postembolization.

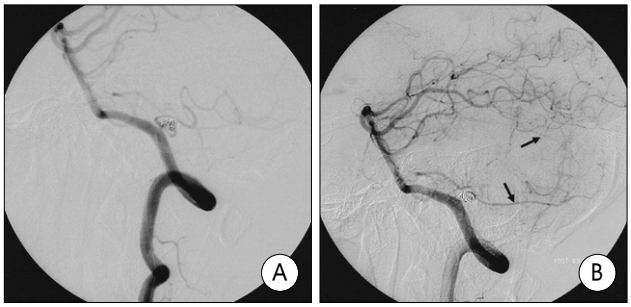

Fig. 3. A : After the detachment of the first coil, lateral view of vertebral angiogram showing well-preserved blood flow of the left parent artery. B : After placement of the second coil, vertebral angiogram showing complete obliteration of the aneurysm without filling of the parent artery. The patient revealed no abnormal neurological symptoms and signs for 30 minutes and retrograde flow (arrows) in angiograms is seen through ipsilateral anterior inferior cerebellar artery and superior cerebellar artery.

Discussion

True PICA aneurysms (those located exclusively along the course of the PICA) represent 0.5% to 2% of all intracranial aneurysms in large series[2]. Dissecting aneurysms of the PICA are far rarer and usually occur at the proximal part of the PICA. In review of the literature, the PICA dissecting aneurysms from the literature including our case are listed in Table 1. Most of published articles have been reported from oriental population. Age and sex, aneurysm site, clinical manifestation, treatment modalities, post treatment complications and outcome are further discussed.

Clinical characteristics

Males are affected more than females (M:F=17:13). Where as saccular intracranial aneurysms are presented more often in females, the PICA dissecting aneurysm is seen more often in male. With ages ranging from 22 to 68 years (mean 44.6), dissecting aneurysms of the PICA affect more older patients than other intracranial dissecting aneurysms of the posterior circulation (average age of 35.8)[2]. Interestingly, dissecting aneurysms of the PICA originated on the left side in 22 out of 28 cases (1 bilaterally)[19]. This may be due to the general tendency of the left vertebral artery to predominate as our patient.

In dissecting aneurysms of PICA, clinical symptoms are not specific and clinical examination does not usually allow for lesion localization due to the lack of pathgnomonic signs and symptoms. Nevertheless, the most frequent symptom is in location, especially occipital headache. Presentation is followed by nausea or vomiting, vertigo or dizziness, transient loss of consciousness or coma, and Wallenberg's syndrome.

Imaging diagnosis

Of the five PICA segments (anterior medullary, lateral medullary, tonsilomedullary, telovelotonsilar and cortical), predominant aneurysm location is proximal portion such as anterior or lateral medullary segments (23/30). Most common CT or MRI findings of are subarachnoid hemorrhage (SAH) (18/30) or infarction (6/30), and sometimes both (1/30). Four cases were associated with normal findings on CT, but either lumbar puncture suggested mild SAH, or clinical examination exhibited signs of vertebrobasilar insufficiency. In five of all six cases manifestating infarction, the dissecting portion was located at the origin or anterior medullary segment of PICA[9,15,16,25]. In one report[24], the dissecting portion was located at the tonsillomedullary segment. Among the eighteen cases manifestating SAH, the dissection involved in the lateral medullary segment in seven cases[1,3,8,10,14,20,23], in the anterior medullary segment portion in five cases[3,4,7,11,23,26], and in the tonsillohemispheric or telovelotonsillar segments in six cases[3,13,17,21,25]. Thus, dissecting aneurysms of the proximal PICA has tendency to cause infarctions while peripheral aneurysms tend to give rise to SAH.

MR angiography may reveal the aneurysm and angiography typically reveals an irregular aspect of the vessel lumen with a combination of narrowing and dilatation of the pathological PICA segment, named "pearl and string" sign. Although the golden standard diagnostic imaging study in the PICA dissecting aneurysm is the angiography, MRI also reveals double lumens. MRI which is a non-invasive image diagnosis modality should be the first investigative tool used

Table 1. Clinical summary of the reported cases of dissecting aneurysms of the posterior inferior cerebellar artery (PICA)

Case no.	Series (Reference no.)	Age (yr) /Sex	CT and MRI findings	Lesion side	Involved PICA segment	Treatment modalities	Complications	Outcome
1	Friedman et al., 1984 (5)	46/M	NA	Right	AM	Encased with Sundt clip grafts	None	Excellent
2	Ueki et al., 1987 (22)	47/F	Normal findings	Right	AM	Wrapping with muscle pieces	Wallenberg's syndrome	Fair
3	Komiya et al., 1988 (12)	37/M	Normal findings	Left	AM	Proximal clipping	None	Excellent
4	Yamaura et al., 1991 (25)	68/F	SAH	Left	TM	Clip entrapment, shunt placed	None	Excellent
5	Yamaura et al., 1991 (25)	47/M	Infarction	Left	AM	Shunt placed	None	Excellent
6	Yamaura et al., 1991 (25)	59/F	SAH	Left	TM	Clipping, shunt placed	None	Excellent
7	Nishino et al., 1991 (17)	51/F	SAH	Left	TVT	Trapping, resection	None	Excellent
8	Takahashi et al., 1992 (20)	22/F	SAH, IVH	Left	LM	Excision after trapping	None	Excellent
9	Hashimoto et al., 1992 (6)	57/M	Normal findings	Right	AM	OA to PICA anastomosis	Hemiparesis	Fair
10	Kopera et al., 1992 (13)	23/F	Hemorrhage	Left	TM	Trapping with two clips	None	Excellent
11	Nagahiro et al., 1993 (16)	31/M	Infarction	Left	AM	OA to PICA anastomosis	None	Excellent
12	Kawaguchi et al., 1993 (9)	29/M	Ischemia	Left	AM	Excision, OA to PICA anastomosis	None	Excellent
13	Mizushima et al., 1994 (15)	29/F	Infarction	Left	AM	Clipping	None	Excellent
14	Fransen et al., 1994 (4)	44/F	SAH	Left	AM	Resection, shunt placed	None	Excellent
15	Lefkowitz et al., 1996 (14)	45/F	SAH, IVH	Left	LM	Embolization	Dysmetria	Good
16	Tikkakoski et al., 1997 (21)	34/F	SAH	Left	TVT	Embolization	None	Excellent
17	Jafar et al., 1998 (7)	48/F	SAH	Right	AM	Encircling Sundt clip, wrapping	None	Excellent
18	Shinoda et al., 1998 (19)	47/M	Ischemia, SAH	Bilateral	AM	No treatment	–	Dead
19	Yamaura et al., 1999 (26)	63/M	SAH	Right	AM	Embolization	None	Excellent
20	Dinichert et al., 1999 (3)	63/M	SAH	Left	AM & LM	Wrapping with muscle pieces	Kinetic tremor, rebleeding	Death
21	Dinichert et al., 1999 (3)	28/M	Normal findings	Left	TM	Embolization	None	Excellent
22	Dinichert et al., 1999 (3)	33/F	SAH	Left	AM	Resection, shunt placed	Wallenberg's syndrome	Good
23	Kanou et al., 2000 (8)	52/M	SAH, IVH	Left	LM	Trapping, OA–PICA anastomosis	None	Good
24	Yamashita et al, 2001 (24)	34/M	Hemorrhagic infarction	Left	TM	Posterior fossa decompression	None	Good
25	Kim et al., 2001 (10)	58/F	SAH	Left	LM	Wrapping	None	Excellent
26	Ali et al., 2002 (1)	55/M	SAH	Left	LM	Trapping, OA–PICA anastomosis	Wound infection	Good
27	Wetjen et al., 2005 (23)	56/M	SAH	Left	LM	Clipping, wrapping with cotton	None	Excellent
28	Wetjen et al., 2005 (23)	49/M	SAH	Left	AM	Trapping, resection	None	Excellent
29	Kim et al., 2005 (11)	28/M	SAH	Left	AM	Embolization	None	Excellent
30	Present case	54/M	Infarction	Left	AM	Embolization	None	Excellent

NA : not available, SAH : subarachnoid hemorrhage, IVH : intraventricular hemorrhage, AM : anterior medullary segment, TM : tonsillomedullary segment, TVT : telovelotonsillar segment, LM : lateral medullary segment, PICA : posterior inferior cerebellar artery, OA : occipital artery

in involving possible dissecting aneurysms especially unruptured[2].

Treatment and outcome

Review of the cases shows that 20 (66.7%) patients underwent an operation for dissecting aneurysms : ten aneurysms were clipped (one with proximal clipping, four with trapping, five with trapping and resection of the diseased segment, and three with trapping and occipital artery to PICA anastomosis); five were wrapped (two with Sundt clips, two with muscle pieces, and one with cotton); and two had an occipital artery to PICA anastomosis with retrograde blood supply and disappearance of the dissecting aneurysm. Endovascular procedures with PICA occlusion was performed in six cases. Complications, unrelated to procedures, were reported in 21 cases (80.8%). In only one of six cases performed coil embolization, mild dysmetria was developed after procedure[14]. In two of five cases with wrapping, Wallenberg's syndrome[22] and kinetic tremor and rebleeding were noted[3]. Of ten cases underwent clipping with or without anastomosis, one Wallenberg's syndrome[3] and one wound infection[1] were noted. Of three cases with occipital artery to PICA anastomosis, one developed hemiparesis after the procedure[6].

Among the different therapeutic modalities, complication rates are similar except wrapping alone[3,22]. In the past, the mainstream of therapeutic method was trapping or anastomosis, but currently coil embolization has replaced these methods. Adequate management of dissecting PICA aneurysms requires careful review of the location, the presence of perforators, the extent of dissection, the collateral circulation available, and whether hemorrhage has occurred[1,10]. The recovery and survival of many patients after intentional occlusion of a major cerebellar artery is attributed to the adequacy of the collateral circulation. Often, the PICA can be sacrificed just

proximal to its cerebellar branches, because collateral blood flow can sometimes compensate for its loss. If angiographic findings reveal poor collateral blood flow or the patient is symptomatic on occlusion test, however, occipital artery to PICA anastomosis should be performed[1,8,11].

Most reviewed cases showed excellent or good outcome and prognosis (25/30). In six cases reported procedure-related complications, three cases recovered and had good outcome. Two patients died from massive bleeding, one[19] before any treatment could be initiated, and the other[3] from rebleeding of wrapped aneurysm.

Conclusion

In our case, proximal PICA coil embolization was performed and the patient had an excellent outcome with no procedure-related complications. If the patient has symptoms and signs on occlusion test or insufficient collateral blood flow on cerebral angiograms, trapping with occipital artery to PICA anastomosis (revascularization procedure) should be considered. It should also be emphasized that conservative management or wrapping alone are insufficient in protecting against rebleeding. Treatment of dissecting PICA aneurysms with isolation of diseased whole segment can be obtained with good clinical outcome.

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