CASE REPORT

J Korean Neurosurg Soc 38 : 231-233, 2005

Proximal Coil Occlusion for Dissecting Aneurysm of the Proximal Posterior Inferior Cerebellar Artery

Myoung Soo Kim, M.D.,[1] Su-Ok Seong, M.D.,[3] Hyun Koo Lee, M.D.[2]

Department of Neurosurgery,[1] Seoul Paik Hospital, Inje University College of Medicine, Seoul, Korea

Departments of Neurosurgery,[2] Diagnostic Radiology,[3] Cheongju Saint Mary's Hospital, Cheongju, Korea

Here we report a case of ruptured dissecting aneurysm of the posterior inferior cerebellar artery(PICA) treated with proximal PICA coil occlusion using an endovascular technique. A 28-year-old man presented with acute severe headache and vomiting followed by seizure. At admission, he was drowsy, with diplopia and right ankle hypesthesia. Computed tomographic scans demonstrated a subarachnoid hemorrhage. Cerebral angiography demonstrated a dissecting aneurysm of the left proximal PICA. One day after the bleeding episode, he was undergone proximal PICA coil occlusion using an endovascular technique. The patient's postoperative course was uneventful. The decision that led to the choice of treatment is discussed.

KEY WORDS : PICA · Dissecting aneurysm · Endovascular technique.

Introduction

Dissecting aneurysms of the PICA are rare, accounting for only 0.5% to 0.7% of all intracranial aneurysms[5,14]. The management of dissecting PICA aneurysms that cause subarachnoid hemorrhage is challenging and remains controversial problems. We describe a case of a dissecting proximal PICA aneurysm that was successfully treated with endovascular technique, and discuss the decision that led to the choice of treatment.

Case Report

A 28-year-old man presented with severe headache and vomiting followed by seizure. At admission, he was drowsy with diplopia and right ankle hypesthesia. A computed tomographic scan showed subarachnoid hemorrhage (Fig. 1). Cerebral angiography revealed a dissecting aneurysm of the left PICA, with involvement of the anterior medullary, lateral medullary, and tonsillomedullary segments. Fusiform dilatation started from the origin of the left PICA. Left vertebral angiography showed normal flow of left anterior inferior cerebellar artery(AICA). Right vertebral angiography revealed also normal flows of right AICA and right PICA (Fig. 2).

One day after the bleeding episode, he was undergone endovascular treatment. A microcatheter (Prowler® 14; Cordis Neurovascular, Inc., Miami, USA) was advanced to the dissecting aneurysm from the right femoral artery coaxially through a 6 French Envoy® guiding catheter (Cordis, Corp., Miami, USA). Endovascular occlusion of the aneurysm, particularly aiming occlusion of the dissected site, was performed using a 5mm × 10cm Matrix 3D coil (Target Therapeutics, Inc., Fremont, USA) and seven Guglielmi Detachable Coils (Target Therapeutics, Inc., Fremont, USA) with

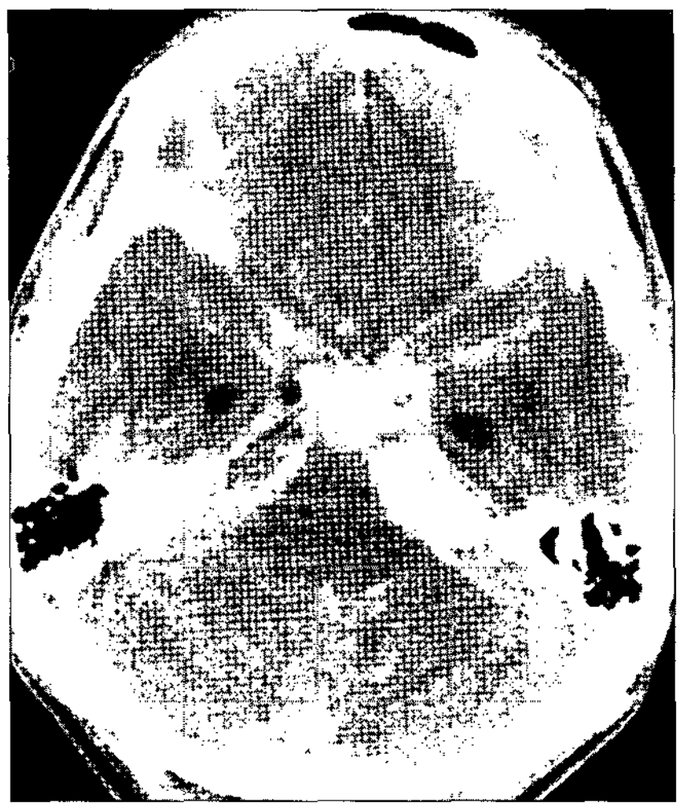

Fig. 1. Preoperative computed tomography scan showing thick blood in the left prepontine and cerebellopontine angle cisterns.

• Received : January 31, 2005 • Accepted : May 6, 2005

• Address for reprints : Myoung Soo Kim, M.D., Department of Neurosurgery, Seoul Paik Hospital, Inje University College of Medicine, 85 Jeo-dong 2-ga, Jung-gu, Seoul 100-032, Korea Tel : +82-2-2270-0032, Fax : +82-2-2270-0573, E-mail : hanibalkms@hanmail.net

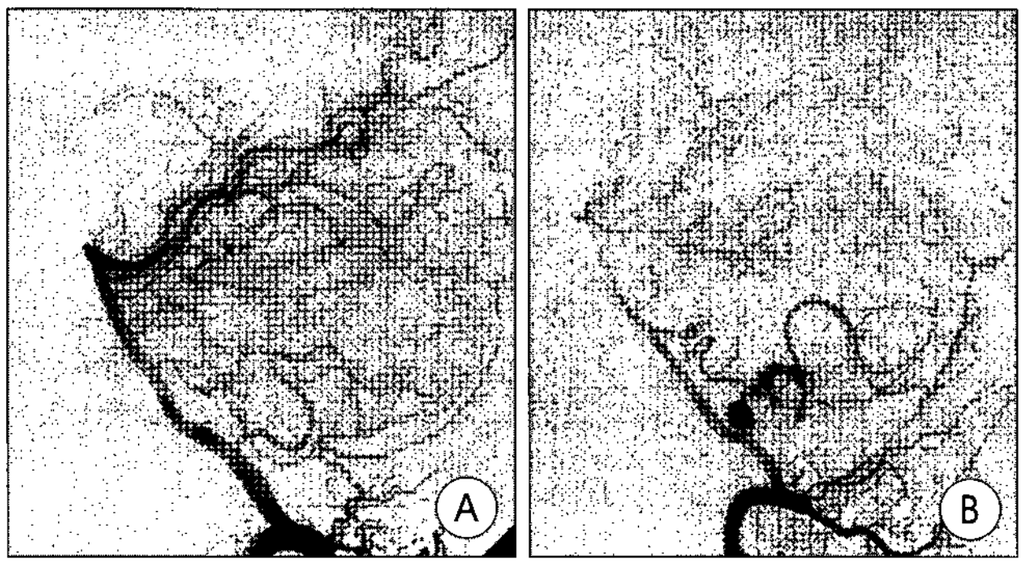

Fig. 2. A : Lateral view of right vertebral angiogram showing normal right anterior inferior cerebellar artery(AICA) and right posterior inferior cerebellar artery(PICA) flow. B : Lateral view of left vertebral angiogram showing an elongated pearl and string appearance on the proximal part of the left PICA with normal left AICA flow.

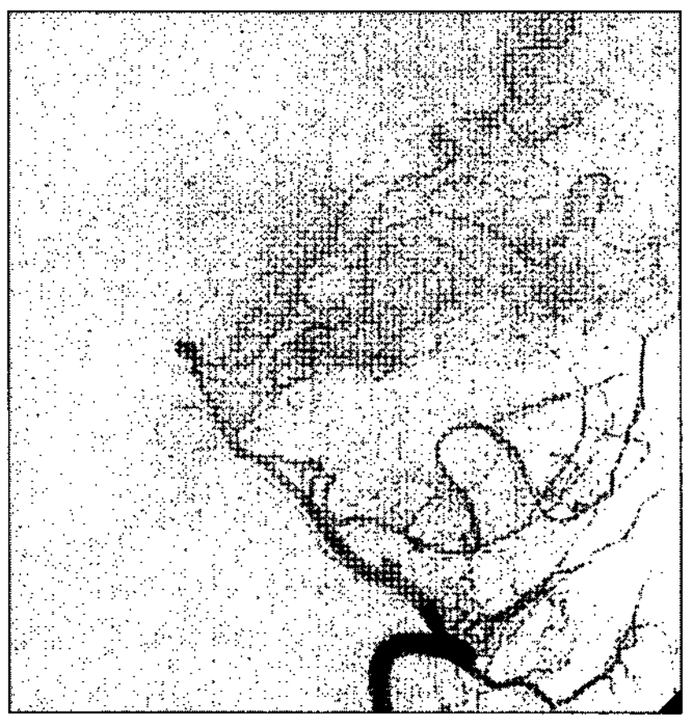

Fig. 3. Lateral view of left vertebral angiography 18days after the endovascular coiling, revealing complete obliteration of the dissecting aneurysm on the left posterior inferior cerebellar artery(PICA) and sufficient collateral flow in the distal PICA territory.

a total length of 50cm. Systemic anticoagulation was not given for fear of rebleeding. The patient's postoperative course was uneventful. And no other new clinical symptoms was developed. Left vertebral angiography 18days after the treatment revealed a complete obliteration of the dissecting aneurysm and good collateral flow in the left distal PICA territory (Fig. 3). At the time of discharge, about one month after the treatment, the patient had recovered completely except for mild right ankle hypesthesia.

Discussion

Treatment of proximal PICA dissections is challenging problem. Numerous anatomic variations in the vascular anatomy of this vessel, along with the presence of delicate proximal perforators, make a standardized approach difficult. Adequate management of these lesions requires consideration of the location, the perforators, the extent of dissection, the collateral circulation available, and whether hemorrhage has occurred[1,7].

Three options are available for treating dissecting fusiform aneurysms of the PICA. One is conservative treatment. Although this approach has been advocated for vertebral artery dissection, it is appropriate only for dissections that have not produced a subarachnoid hemorrhage[8]. The risk of rebleeding should be considered importantly in patients who have previous hemorrhage as the presenting symptom. And also conservative management is insufficient in protecting against rebleeding[10].

A second option is open surgery with wrapping, proximal clipping, trapping, or resection with end-to-end anastomosis, PICA to occipital artery anastomosis, or PICA reimplantation in the vertebral artery. A good clinical outcome and exclusion of the aneurysm can be obtained with obliteration or resection of the aneurysm[2]. In choosing the correct treatment for a specific lesion, knowledge of the anatomy of the PICA is of utmost importance[1,12]. Of the five segments of the artery, the first three-the anterior medullary, lateral medullary, and tonsillomedullary-give rise to critical brainstem perforators[11,13]. Because so many brainstem perforators originate in the first three segments of the PICA, open surgical exploration may be superior to endovascular sacrifice[6].

A third option is endovascular treatment[10]. Obliterating the PICA segment at the level of the dissecting aneurysm requires the absence of perforating branches at the level of this arterial segment and sufficient collateral supply to the distal PICA territory. In such situations, enovascular occlusion or trapping may be performed[2].

The decision whether an open surgical or endovascular approach is to be undertaken is dependent on a number of factors. The lateral medulla potentially receives its blood supply from multiple sources, including the vertebral artery, PICA, AICA, and basilar artery. Escourolle found no supply from the PICA to the medulla in 50% of patients[3]. However, this supply is primarily from the PICA alone in 31% of patients[9]. Ali et al[1] insisted that the optimal form of therapy in PICA dissection is trapping the diseased segment and revascularizing the PICA if the diseased area involves the first three segments of this vessel.

The recovery and survival of many patients after intentional occlusion of a major cerebellar artery is attributed to the adequacy of the collateral circulation. If the adjacent arteries are unusually small and the artery occluded is large, the collateral circulation is likely to be poor, creating an unfavorable and dangerous situation. Often the PICA can be sacrificed just proximal to its cerebellar branches, because collateral blood flow can sometimes compensate for its loss. Because the PICA may have adequate collateral flow from the opposite PICA or the ipsilateral AICA, revascularization is not always necessary, but it is difficult to determine the need for it before the occlusion[4]. In our patient, numerous collateral vessels from the ipsilateral extradural artery and both AICA had developed and could protect him from brainstem infarction.

Ali et al[1] proposed that all proximal PICA aneurysms should be treated with trapping and bypass. Unfortunately, a distal PICA bypass serves only to collateralize circulation to the hemispheric branch of the PICA and does nothing to compensate for any loss of perforators in the trapped segment of the PICA. A distal bypass also does little to compensate for perforators that might be devascularized by a trapping procedure or proximal occlusion. Therefore Ali et al's call for performing a PICA bypass in all proximal PICA dissections may not justifiable[1]. In our patient, dissection involved a long proximal segment of the PICA. In this situation, proximal revascularization is impossible because of long segment involvement, and distal revascularization is unnecessary because of good collateral circulation. Moreover, arterial spasm caused by mechanical irritation induced by brain retraction may render the collateral supply less effective. Therefore, we decided the proximal occlusion using endovascular treatment and a good outcome resulted.

Conclusion

We describe a patient who suffered from left PICA dissecting aneurysm and subarachnoid hemorrhage. He was successfully treated with endovascular proximal occlusion of the parent artery and no further ischemic injury occurred in the medulla.

• Acknowledgement
This work was supported in part by a Seoul Paik Hospital Research Grant.

References

1. Ali MJ, Bendok BR, Tawk RG, Getch CC, Batjer HH : Trapping and revascularization for a dissecting aneurysm of the proximal posteroinferior cerebellar artery : technical case report and review of the literature. **Neurosurgery 51** : 258-263, 2002
2. Dinichert A, Rufenacht DA, Tribolet N : Dissecting aneurysms of the posterior inferior cerebellar artery : report of four cases and review of the literature. **J Clin Neurosci 7** : 515-520, 2000
3. Escourolle R, Hauw JJ, Agopian PD, Trelles L : Bulbar infarcts. Vascular lesions in 26 observations. **J Neurol Sci 28** : 103-113, 1976
4. Horiuchi T, Tanaka Y, Hongo K, Nitta J, Kusano Y, Kobayashi S : Characteristics of distal posteroinferior cerebellar artery aneurysms. **Neurosurgery 53** : 589-596, 2003
5. Hudgins RJ, Day AL, Quisling RG, Rhoton AL Jr, Sypert GW, Garcia-Bengochea F : Aneurysms of the posterior inferior cerebellar artery. A clinical and anatomical analysis. **J Neurosurg 58** : 381-387, 1983
6. Jafar JJ, Kamiryo T, Chiles BW, Nelson PK : A dissecting aneurysm of the posteroinferior cerebellar artery : case report. **Neurosurgery 43** : 353-356, 1998
7. Kim JT, Kim HK : Multiple Dissecting Aneurysms of the PICA Trunk : Case Report. **J Korean Neurosurg Soc 30** : 66-72, 2001
8. Kitanaka C, Tanaka J, Kuwahara M, Teraoka A, Sasaki T, Takakura K, et al : Nonsurgical treatment of unruptured intracranial vertebral artery dissection with serial follow-up angiography. **J Neurosurg 80** : 667-674, 1994
9. Krayenbuhl H, Yasargil MG : Die vaskularen Erkrankungen im Gebiet der arteria vertebralis und arteria basilis : eine anatomische und pathologische. **Klinische und Neuroradiologishce Studie**. Thiime, Stutgart. 1957
10. Lefkowitz MA, Teitelbaum GP, Giannotta SL : Endovascular treatment of a dissecting posteroinferior cerebellar artery aneurysm : case report. **Neurosurgery 39** : 1036-1039, 1996
11. Lemole GM Jr, Henn J, Javedan S, Deshmukh V, Spetzler RF : Cerebral revascularization performed using posterior inferior cerebellar artery-posterior inferior cerebellar artery bypass. Report of four cases and literature review. **J Neurosurg 97** : 219-223, 2002
12. Lewis SB, Chang DJ, Peace DA, Lafrentz PJ, Day AL : Distal posterior inferior cerebellar artery aneurysms : clinical features and management. **J Neurosurg 97** : 756-766, 2002
13. Lister JR, Rhoton AL Jr, Matsushima T, Peace DA : Microsurgical anatomy of the posterior inferior cerebellar artery. **Neurosurgery 10** : 170-199, 1982
14. Pasqualin A, Da Pian R, Scienza R, Licata C : Posterior inferior cerebellar artery aneurysm in the fourth ventricle : acute surgical treatment. **Surg Neurol 16** : 448-451, 1981