Hiroshima J. Med. Sci.
Vol.38, No.1, 39～44, March, 1989
HIJM 38-7

Aneurysm of the Anterior Inferior Cerebellar Artery at the Internal Auditory Meatus: Case Report and Review of the Literature

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ABSTRACT

The authors present a case of a ruptured aneurysm of the anterior inferior cerebellar artery at the right internal auditory meatus, of which incidence is thought to be very rare. The patient experienced a sudden onset of headache, vomiting and tinnitus in the right side. Moderate peripheral facial palsy and hearing disturbance in the right appeared 2 weeks after the onset with diplopia. These symptoms improved to some extent after the successful neck clipping of this aneurysm.

Key words: *Cerebral aneurysm, Anterior inferior cerebellar artery, Internal auditory meatus*

Aneurysms of the anterior inferior cerebellar artery at the internal auditory meatus are rare and had been reported in 40 cases[1-18,20-33]. Of these cases, 37 had been treated surgically[1-3,5-11,13-16,18,20-33]. The symptoms of these aneurysms were mainly those of a cerebellopontine angle syndrome. They occurred either progressively and intermittently with mass sign[2,4,5,9,11,21,25,31,33], or abruptly with meningeal irritation resulting from subarachnoid hemorrhage[1,3,7,8,10,12-16,18,20,22-25,27-29,30-32]. The authors present such a case in which the ruptured aneurysm was successfully clipped. The clinical course and the surgical treatment are discussed in reviewing the literature.

CASE REPORT

This 64-year-old woman experienced a sudden onset of vomiting and tinnitus in the right, accompanied by headache on May 22, 1987. She was transferred to Futami Central Hospital 5 hours after the onset of these symptoms. Her past history included pyelonephritis 10 years previously.

On admission, she had tinnitus on the right side with mild neck stiffness. She also complained of a mild headache and frequent vomiting. Blood pressure was 152/100 mmHg and laboratory analysis revealed a hyperglycemia of 192 mg/dl. The plain X-ray film was normal, including the petrous bone and the internal auditory meatus. A computed tomography (CT) showed a hyperdensity area from the suprasellar cistern through the right ambient and cerebellopontine cisterns to the right quadrigeminal and supracerebellar cisterns. An area of mild hyperdensity was visible in the fourth ventricle but the ventricular system was not dilated (Fig. 1). Bilateral common carotid angiography demonstrated no abnormal findings. Right vertebral retrograde angiography revealed a saccular aneurysm measuring 4 mm in diameter at the right internal auditory meatus fed by the right anterior inferior cerebellar artery (AICA). The thickness of this AICA was relatively large when compared to that of the left side.

She became free of tinnitus on the next day after admission. Vomiting disappeared gradually, though head heaviness continued. On the 13th day, right peripheral facial paresis appeared and 2 days later right hearing disturbance was recognized. Right vertebral retrograde angiography was performed again on the 17th day. The size of the aneurysmal dome was slightly increased to 6 mm in diameter and contrasted more sharply at the right internal auditory meatus (Fig. 2). She noted diplopia when she rapidly moved her eye balls on the 20th day, though her eye movement was full objectively. The right 7th and 8th nerve palsies continued to a moderate degree.

On June 18, right suboccipital craniectomy was undertaken via a paramedian approach. After retracting the right cerebellar hemisphere and tearing the arachnoid membrane of the lateral pontomedullary and cerebellopontine angle cisterns, the

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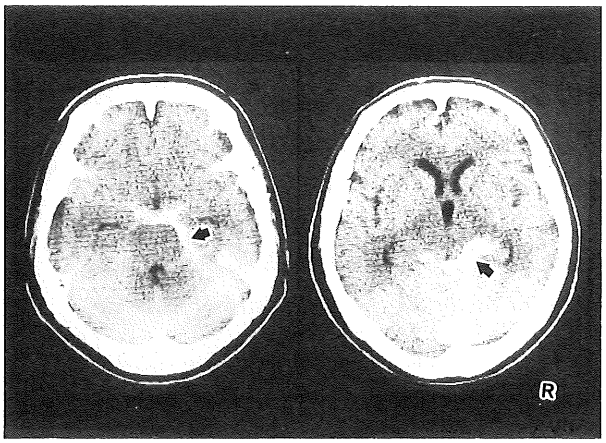

Fig. 1. CT reveals a hyper-dense area (arrow) around the right side of the midbrain.

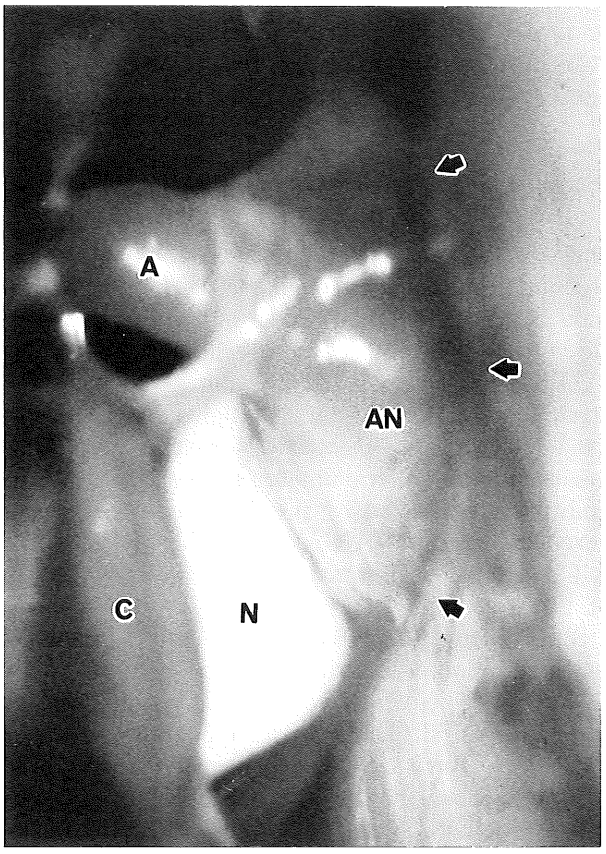

Fig. 3. Microscopic operative exposure shows an aneurysm (AN) buried in the internal auditory meatus (arrow), overlying the 7th and 8th nerve complex (N). A; anterior inferior cerebellar artery, C; cerebellum

7th and 8th nerve complex was identified. The AICA was located overlying these nerves at the internal auditory meatus and branched a recurrent perforating artery above the nerves. Almost the whole surface of the aneurysmal dome and a part of the AICA proximal to the aneurysm were buried in the internal auditory meatus (Fig. 3). The aneurysmal neck was slightly broad and tightly adhered to the surface of the nerves. An internal auditory artery was not found. In order to expose the

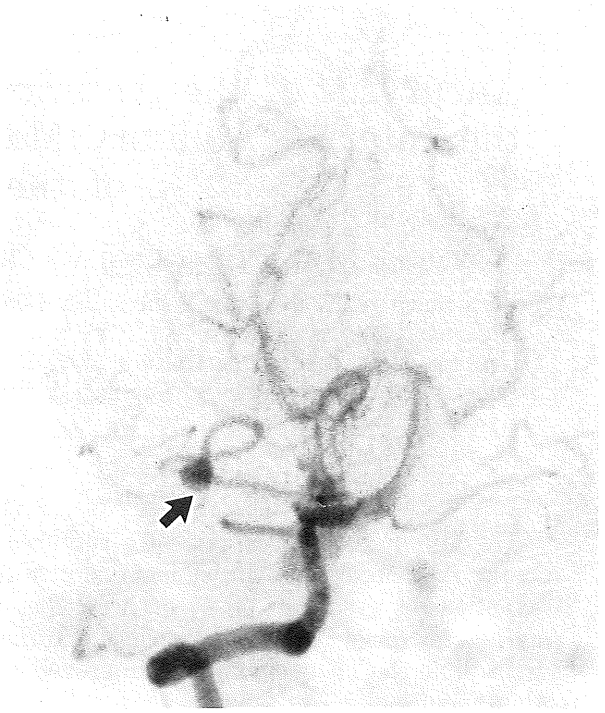

Fig. 2. Anteroposterior view of the vertebral arteriogram shows an aneurysm (arrow) at the right internal auditory meatus.

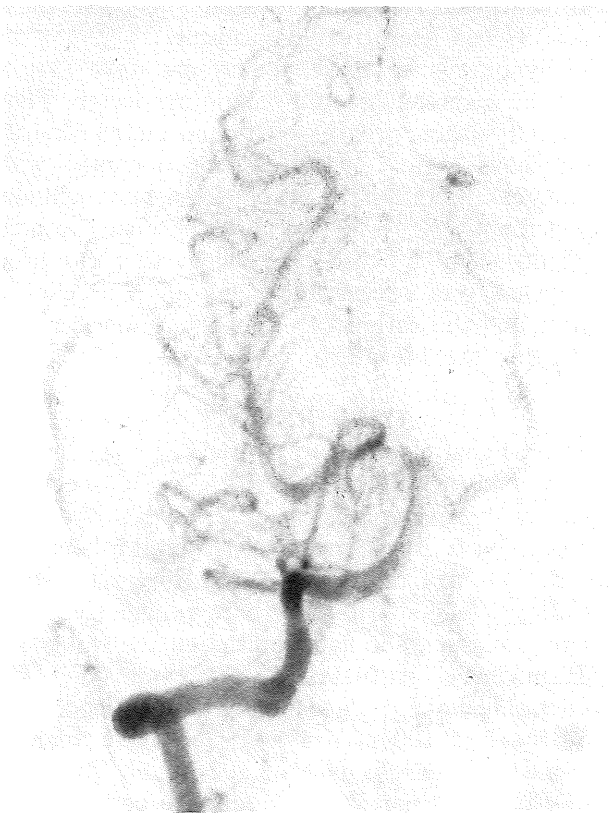

Fig. 4. Anteroposterior view of the vertebral arteriogram shows complete neck clipping of the aneurysm.

Table 1. Review of Surgically Treated Cases with the AICA Aneurysm at the Internal Auditory Meatus

Author (Year)	Sex	Age	Side	SAH[1)]	Neurological impairment			Operation		Outcome
					n.VII (preop./postop.)	n.VIII	Others	interval from last SAH (days)	Procedure	
Schwartz (1948)	F	27	L	Yes	+/—	+/—	n.V, Nystagmus, Ataxia, Positive Romberg's sign	83	Trapping	Excellent
Molina (1951)	F	30	R	YES	—/+→—	+/±		?	Clipping	Excellent
Poppen (1959)	M	35	L	No	—/?	+/?			Obliteration of AICA	?
	M	27	R	Yes	+/?	+/?	n.V, Ataxia, Blurred vision	more than 90	Obliteration of AICA	Fair (?)
	M	54	L	No	—/—	+/—			Obliteration of AICA	Good
Weibel et al (1967)	F	61	L	Yes	+/?	+/?	Diplopia, Dysphagia, Transient coma	31	Clipping	Death
Castaigne et al (1967)	F	62	L	Yes	+/+	+/+	Nystagmus, Unsteady gait	51	Obliteration of AICA	Poor
Glasscock (1969)	M	49	R	No	+/?	+/+ +	Crocodile tears		Clipping	Good
Hori et al (1971)	F	35	L	Yes	+/+ +→—	+/+ +	Nystagmus	43	Trapping	Good
Thierry et al (1971)	F	59	R	Yes	—/—	+/—		?	Clipping	Excellent
Malter et al (1972)	F	41	R	Yes	+/?	+/?	Confusion, n.VI, n.IX-n.XII, Papilledema	?	Obliteration of AICA	?
Benedetti et al (1975)	F	49	R	Yes	+/+ +	+/+ +		?	Clipping	Good
Higuchi et al (1978)	M	53	L	Yes	—/—	+/+ +		more than 18	Clipping	Good
Mori et al (1978)	M	48	R	No	—/—	+/+→±	Nystagmus		Coating	?
Johnson et al (1978)	M	54	R	Yes	+/—	—/+→±	Tic	1	Obliteration of AICA	Excellent
Takara et al (1980)	F	56	L	Yes	—/—	+/+ +	Nystagmus	more than 14	Wrapping	Good
Cantore et al (1982)	M	35	L	No	+/+ +→—	+/?	n.V, Nystagmus		Trapping	Excellent
Zlotnik et al (1982)	F	44	L	No	—/—	+/—	n.V, Adiadochokinesia, Nystagmus, Positive Romberg's sign		Clipping	Excellent
Nishimoto et al (1983)	F	48	L	Yes	—/—	+/—	Nystagmus	25	Clipping	Excellent
	F	63	R	Yes	+/+	+/+	Nystagmus	79	Neck ligation	?
Gács et al (1983)	F	59	L	Yes	—/?	—/?	Cerebellar signs	more than 7	Aneurysmal resection	Good
	F	28	R	Yes	—/—	—/—	Cerebellar and medullary symptoms	more than 7	Aneurysmal resection	Excellent
Nakagawa et al (1984)	F	40	L	Yes	—/+→—	+/—	Nystagmus	?	Clipping	Excellent
Santucci et al (1985)	F	54	L	Yes	+/—	—/—	Nystagmus, Positive Romberg's sign	?	Trapping	Good
Uede et al (1986)	M	51	R	No	+/±	+/+	Cerebellar signs		Clipping	Good
	F	42	R	Yes	+/—	+/+	n.VI	40	Clipping	Good
Nowak et al (1986)	F	63	R	Yes	—/—	+/+ +	Transient coma	2	Clipping	Good
Dalley et al (1986)	F	21	L	No	+/—	+/+			Trapping	Good
Inoue et al (1987)	F	43	R	Yes	—/+	+/+ +		1	Clipping	Good

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Table 1. Continue

Author (Year)	Sex	Age	Side	SAH[1)]	Neurological impairment			Operation		Outcome
					n.VII (preop./postop.)	n.VIII (preop./postop.)	Others	interval from last SAH (days)	Procedure	
Fukuya et al (1987)	M	60	L	Yes	—/—	+/—	Nystagmus, Unconsciousness	?	Clipping	Excellent
	F	72	L	Yes	+/+	+/+	n.V	?	Clipping	Good
Kaech et al (1987)	M	44	L	Yes	—/—	—/—	Transient coma, Caudal cranial nerve palsy, Hemiparesis, Cerebellar signs	30	Clipping	Good
Present case (1988)	F	64	R	Yes	+/±	+/+	Diplopia	27	Clipping	Good

1) SAH; subarachnoid hemorrhage

aneurysmal neck at the proximal side, it was necessary to remove the retrosuperior petrous bone around the internal auditory meatus with a diamond drill. Bleeding was seen from a tear of the aneurysmal dome when separating the dome from the nerve complex. Though temporary clips were placed on the AICA to trap the aneurysm, oozing continued in some degree. Fifteen minutes after trapping transient ventricular extrasystole appeared on the cardioscope for a few minutes. A bayonet clip was placed on the neck of the aneurysm and was coated with an adhesive agent to fix the tip of the clip to the petrous bone.

She awoke from the anesthesia smoothly and no new neurological deterioration was noted postoperatively. Diplopia disappeared and the facial palsy gradually improved to a degree of slight palsy. Hearing deteriorated when tested by an audiogram, though each component from P1 to P5 was seen on the auditory evoked potential. Postoperative vertebral angiography revealed complete clipping of the aneurysmal neck and good patency of the AICA (Fig. 4). Two months after the operation, she returned to her home with right hearing loss and mild peripheral facial paresis, being able to lead an independent life.

DISCUSSION

Aneurysms of the AICA at the internal auditory meatus are rare. Since the first report of Schwartz et al[28] in 1948, there have been only 40 cases in the world literature[1-18,20-33]. In 37 of these cases, surgical treatment was described. 33 of the operated cases including the present case consisted of 11 males and 22 females, indicating female predominance (Table 1). The mean age was 47.6 years with a range of 21 to 72 years. Laterality of the aneurysmal location was 15 on the right side and 18 on the left side, signifying almost equal occurrence. The onset of the symptoms was caused predominantly by subarachnoid hemorrhage seen in 25 (76%) and less frequently by mass effect seen in 8. In some cases the aneurysm was described to simulate an acoustic neurinoma preoperatively because of gradual or intermittent appearance of a cerebellopontine angle mass syndrome[2,3,5,11,31,33], enhanced mass on CT[5,21,31] and erosion of the internal auditory meatus[5,9,31,33]. Neurological symptoms were those of a cerebellopontine angle syndrome in both ruptured and nonruptured cases except for the signs of subarachnoid hemorrhage in ruptured case. The most common symptom was the 8th nerve disturbance seen in 28 cases (85%), the 7th nerve palsy in 17 (52%) and nystagmus in 12 (36%). The other symptoms were as follows: cerebellar signs in 8 (24%); 5th nerve palsy and disturbed consciousness in 5 (15%); diplopia including the 6th nerve palsy in 4; positive Romberg's sing and dysphagia in 3 cases.

As for surgical treatment of the aneurysm, the most common procedure was aneurysmal clipping or ligation. This was performed in 20 cases (61%) including aneurysmal resection in 2 cases. Aneurysmal trapping was performed in 5 cases (15%). Obliteration of the AICA was undertaken in 6 and coating or wrapping in 2 cases. The interval from the last subarachnoid hemorrhage to operation varied from 1 to the more than 90 days. When an aneurysm is treated surgically, attention must be paid to preserve the 7th and 8th nerve function. Preoperative impairment of the 8th nerve function improved postoperatively in only 8 out of 23 cases (35%), remained unchanged in 7 and deteriorated in 8 cases. On the other hand, the 7th nerve dysfunction improved in 11 out of 16 cases (69%), remained unchanged in 3 and deteriorated in 2 cases postoperatively. This suggests that the 8th nerve was more vulnerable than the 7th nerve even in cases where the aneurysm was located at the internal auditory meatus as seen in the presented case.

The anatomical relationship of the AICA and the 7th and 8th nerve complex is known to be various[19]. The technical difficulty of an aneurysmal neck clipping is considered to depend upon the location and degree of adherence of the aneurysmal neck with the internal auditory meatus and nerve complex. In the present case, it was neces-

sary to drill the posterior wall of the internal auditory meatus, since the neck and dome of the aneurysm were buried in the canal. There are 4 cases in the literature that describes a necessity to open the canal[13,14,31]. In a case where skull X-ray shows an enlargement of the internal auditory meatus, as reported in 7 cases[2,5,7,9,13,31,33], it would be better to expect before operation that the aneurysmal dome points to the canal. The authors also worked hard to separate the neck of the aneurysm which tightly adhered to the nerve complex at the canal. There was one reported case[29] in which the neck of the aneurysm could not be seen behind the nerve complex as it wrapped the dome. On the other hand, in one case[16] it was described that the aneurysmal dome faced the cerebellum opposite to the canal resulting in no symptoms about the 7th and 8th nerve.

In the present case, when the temporary clip was applied at the proximal and distal AICA around the aneurysm, ventricular extrasystole appeared on the electrocardiogram for a few minutes. Ischemia of the small branches into the pons being supplied by the AICA may be responsible for this transient extrasystole.

There were some cases[3,5,13,15,23] including the presented case where the 7th and 8th nerve disturbance appeared several days after subarachnoid hemorrhage due to the rupture of the aneurysm. The authors observed that the size of the aneurysm had increased slightly as shown by repeated cerebral angiography after the appearance of these symptoms. The compression of these nerve complexes by the increased aneurysm at the internal auditory meatus may possibly be implicated for development of the neurological symptoms.

(Received December 1, 1988)
(Accepted January 23, 1989)

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