Arq Neuro-Psiquiat (São Paulo) 47(1):61-71, 1989

ARTERIOVENOUS MALFORMATION IN THE CEREBELLOPONTINE ANGLE PRESENTING AS TRIGEMINAL NEURALGIA

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SUMMARY — A case of arteriovenous malformation of the left cerebellopontine angle causing symptoms of ipsilateral trigeminal neuralgia is reported. Pain relief followed microsurgical removal of the malformation. The authors review the literature on the subject.

Apresentação por nevralgia do trigêmeo de malformação arteriovenosa no ângulo pontocerebelar.

RESUMO — Registro de caso de malformação arteriovenosa no ângulo cerebelopontino esquerdo que determinava sintomatologia ipsilateral de nevralgia do trigêmeo. A remoção microcirúrgica da malformação foi seguida de remissão da dor. Os autores revêem a literatura acerca do assunto.

Arteriovenous malformations (AVM) of the posterior fossa are rare. This is particularly true for those located in the cerebellopontine angle in the brain stem. Among these, only a very small proportion causes trigeminal neuralgia, either as initial or as only symptom (Table 1). The successful treatment of such a rarity has prompted an extensive review of the literature and appears to justify this publication.

CASE REPORT

SH, an 18-year-old right-handed man was referred on May 21, 1979. He had been admitted to another hospital because of trigeminal neuralgia of three months duration, affecting the territory of the ophthalmic branch on the left side. A few days prior to admission he had started complaining about dizz ness, nausea and vomiting upon motion of his body or head. His gait had become unsteady. At admission the patient was in good general condition. Blood pressure was 110/70 mmHg, pulse rate, temperature and respiration were normal. There was a horizontal nystagmus on gaze to the left. Romberg's sign was positive without lateralization. The left hand was ataxic, the neck slightly stiff. Auscultation of the head revealed no bruit. The past history comprised learning difficulties at school and occasional generalized seizures following an episode diagnosed as «meningoencephalitis» at the age of 6. Brain scintillography and computerized tomography revealed changes compatible with the diagnosis of a lesion in the left cerebellopontine angle. Electronystagmography revealed disturbances in vestibular function on the left. EEG disclosed pathological potentials compatible with subcortical involvement. Vertebral angiography by transfemoral route showed an AVM arising from the anterior inferior cerebellar artery in the left cerebellopontine angle (Fig. 1).

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Operation — On May 23, 1979, the AVM was approached by suboccipital route with the patient in the sitting position. Following the opening of the cerebello-medullary cystern the lesion was promptly visualized. The supplying vessels were occluded by bipolar coagulation, divided, and the AVM gradually freed from the surface of the cerbellum and pons. Additional smaller feeding vessels were also coagulated and divided. During dissection a huge draining vein, extending upwards along the cerebellar surface, was clipped. Following this, the AVM gradually increased in volume because of the persistence of a small undetected feeding artery. This was also clipped, coagulated and divided, whereafter the lesion shrunk and was removed in one piece. Postoperative recovery was uneventful. Control angiography (Fig. 2) confirmed the complete removal of the malfunction. Trigeminal pain never recurred. There was only a transient numbness in the territory of the mandibular branch.

COMMENTS

The incidence of AVMs of the posterior fossa amounts to only about 6% to 7% of all intracranial AVMs [31,32]. Initial symptoms usually indicate a cerebellar or brain stem disease. Only very rarely does a patient present with trigeminal neuralgia. We were able to find only 18 such cases in the literature (Table 1). Eisenbrey and Hegarty [12] seem to be the first to have specifically described a case of trigeminal neuralgia associated with an AVM in the cerebellopontine angle. No treatment was performed. Olivecrona [35] mentioned a typical case of trigeminal neuralgia caused by an AVM in the cerebellopontine angle. Dereux et al.[9] described a case of AVM of the cerebellopontine angle without trigeminal neuralgia submitted only to surgical exploration. The first successful surgical removal of the cerebellopontine angle AVM was probabbly performed by Green and Vaughan (1972)[17]. More recently, Chou et al.[5], Drake [10], Matsumura et al.[31], and Solomon and Stein [51] described excellent surgical results.

Table 1 summarizes the cases reported in literature. Among the 18 cases of AVM in the cerebellopontine angle associated with trigeminal neuralgia, facial pain was the initial symptom in 12. In 7 of the 18 cases the left cerebellopontine angle was involved. The incidence was practically the same for both sexes. Almost all arteries of the posterior fossa may serve as feeding vessels for the AVMs of the cerebellopontine angle. The most commonly encountered feeding vessel is the AICA. Serial angiography remains the method of choice for studying AVMs of the posterior fossa and for demonstrating the effectiveness of surgical therapy. A case of spontaneous (angiographic) disappearance and reappearance of an AVM of the cerebellum and brain stem has also been recorded [38].

The natural history of AVMs of the posterior fossa is unclear. However, recent technical achievements support the view that total extirpation is the best treatment also for AVMs in this location. In cases of trigeminal neuralgia due to AVM in the cerebellopontine angle complete removal is curative. It remains a matter of speculation whether in such cases trigeminal neuralgia results from neurovascular compression or is due to ischemia of the trigeminal nucleus or root.

We extirpated the AVM by suboccipital route. In the cases in which the malformation is located on the rostral and ventral aspect of the cerebellum, Matsumura et al.[31] and Verbiest [55] recommend a suboccipital transtentorial approach. The view that excision of AVMs in the cerebellopontine angle and the brain stem is impossible or exceedingly dangerous can no longer be held.

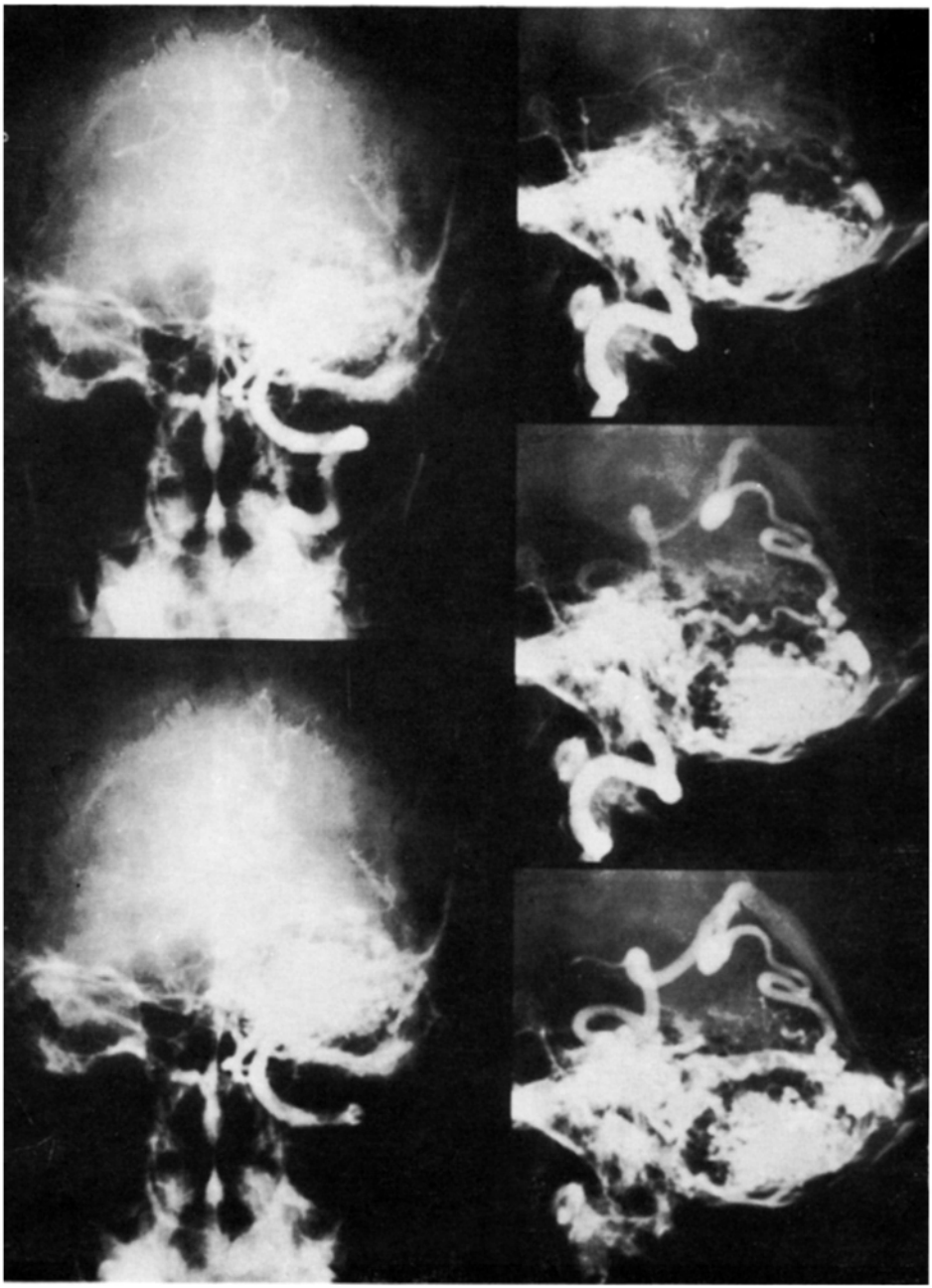
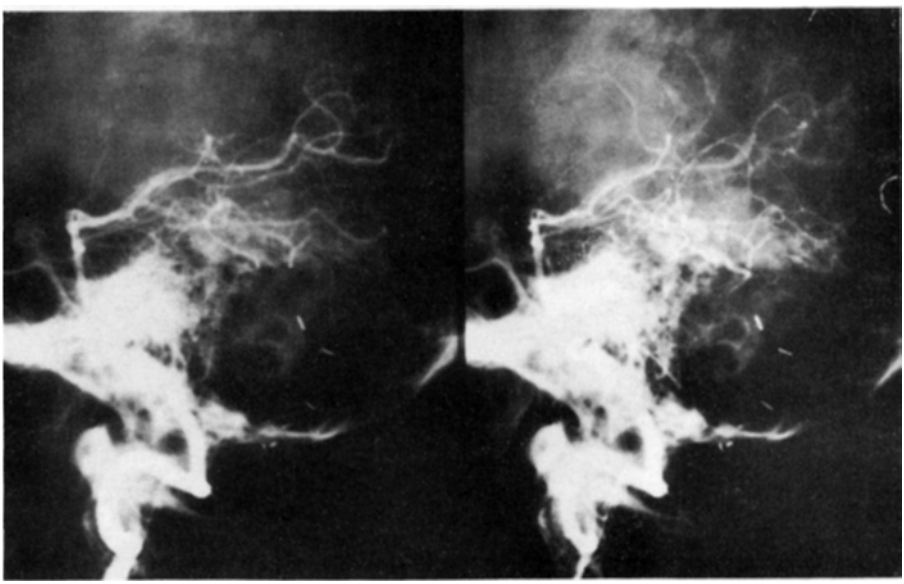


Fig. 1 — Preoperative vertebral and right carotid angiogram showing the arterial supply and venous drainage of the malformation.



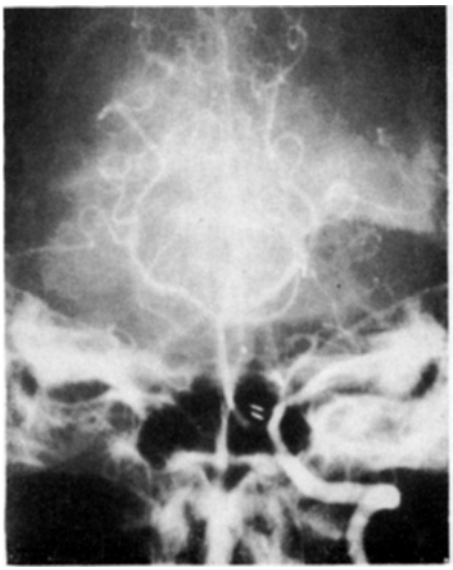


Fig. 2 — Postoperative vertebral angiogram confirming the complete removal of the malformation.

*Table 1 — Arteriovenous malformation in the cerebellopontine angle. * Trigeminal neuralgia (Trig. neural.) as the first symptom.*

Author	Case n°	Side	Sex	Age	Trig. neural.	Cerebell. sympt.	Cranial nerves and brain stem sympt.	Long tracts	Others	Feeding vessels	Therapy	Outcome
Bergstrand, Olivecrona, Tönnis, 1936	15	L	M	35	+	+	+	+	—	vertebral artery	extirpation	unchanged
Olivecrona, Riives, 1948	42	R	M	39	+	—	—	—	+	vertebral artery	tractotomy	good. ½ year later sudden death from hemorrhage
Petit-Dutaillis et al., 1953	Fig. 2	R	—	22	+	+	—	—	—		exploration	
Sebesteyn, 1955	—	R	M	55	+*	+	+	+	+	cerebellar arteries bilaterally	none	
Eisenbrey, Hegarty, 1956	—	R	F	30	+*	+	+	+	—	vertebral circulation	exploration	unchanged
Krayenbühl, Yasargil, 1957	1	R	M	48	+*	+	+	+	+	vertebral circulation	not operated	
Weersma, 1958	1	R	F	35	+*	—	—	—	—		unsuccesful surgery X-ray therapy	unchanged
Dereux et al., 1959	—	L	M	45	—	+	+	+	+	(no angiography)	coagulation and application of Gelfoam	improvement
Poppen, 1969	1 cas	R	—	—	—	+	+	+	+		proposed: ligation of the vertebral artery and decompression	
	2 cas	L	—	—	—	+	+	+	+			

Table 1 — Cont.

Author	Case nº	Side	Sex	Age	Trig. neural.	Cerebell. sympt.	Cranial nerves and brain stem sympt.	Long tracts	Others	Feeding vessels	Therapy	Outcome
Verbiest, 1961	5	L	M	23	+*	+	—	—	—	left superior and middle cerebellar and right superior cerebellar artery	removal combined infra- and supratentorial flap	neuralgia completely and permanently disappeared
Gardner, Sava, 1962	4A	R	F	73	+*	—	+	—	—		removal	immediate facial palsy, recovery in 3 months, TN relieved by alcohol injection
	5A	L	F	61	+	—	+	—	—		removal	TN had been relieved by previous root section cure of spasm
	6A	R	F	41	—	+	+	—	—		removal	cure of spasm
Giovanelli et al, 1963	5	L	M	45	+*	—	—	—	—	art. cer. med. left, art. cer. post left basilar art.		
	6	R	F	36	+*	—	—	—	—	basilar artery		
Morello, Borghi, 1963	2	—	M	33	—	+	+	+	—	basilar artery	exploration	
Perret, Nishioka, 1966	—	—	—	—	—	—	—	—	—		exploration	unhanged

Table 1 — Cont.

Author	Case nº	Side	Sex	Age	Trig. neural.	Cerebell. sympt.	Cranial nerves and brain stem sympt.	Long tracts	Others	Feeding vessels	Therapy	Outcome
Cecotto et al., 1968	1	L	M	57	+	—	+	+	+	infra- and supra-tentorial parieto, temp. occipital arteries	trigeminal roof sections (multiple)	complete trigeminal loss, otherwise unchanged
Johnson, Salmon, 1968	—	R	M	50	+*	+	+	+	+	post. cerebral art. meningeal arteries	none	
Schott et al., 1968	—	R	F	69	—	+	+	+	—			death probably from hemorrhage
Schott et al., 1970	—	R	F	26	—	—	+	—	—	middle cerebellar artery	extirpation	facial palsy
Signorelli et al., 1971	5	—	F	49	+*	+	—	—	+	sup. and post. inf. cerebellar arteries	extirpation	cure
Green, Vaughan, 1972	4	L	F	16	—	+	+	—	+	AICA and PICA	extirpation	full recovery following a VP-shunt, 1 year postoperatively
Drake, 1975	1	R	M	14	—	—	+	—	+	AICA	extirpation (2 steps)	normal life after VA-shunt
	2	R	F	28	—	+	+	—	+	AICA	extirpation	good
	4	L	F	43	—	—	+	+	—	PICA	extirpation (2 steps)	patient independent

Table 1 — Cont.

Author	Case nº	Side	Sex	Age	Trig. neural.	Cerebell. sympt.	Cranial nerves and brain stem sympt.	Long tracts	Others	Feeding vessels	Therapy	Outcome
Matsumura et al., 1977	3	R	F	32	—	—	—	—	+	right AICA and PICA	extirpation in 2 steps VP-shunt	5 years; slight rt VII nerve weakness full housework
	14	R	M	37	—	—	—	—	—	right AICA and sup. cerebellar art.	extirpation	1 year; full working capacity, deafness on the right
Pierry, Cameron, 1979	—	R	F	21	—	—	+	—	—	multiple feeding vessels	section of two arteries compresing the facial nerve	cure
Viale et al., 1981	1	L	F	31	—	+	+	+	+	ant. sup. cerebellar artery	extirpation	recovery
	2	L	F	48	—	—	+	+	+	anti. sup. cerebellar and circumferencial pontine artery	extirpation	recovery
	3	R	M	7	—	—	+	+	+	circ. pont., ant. sup., and inf. cerebell. art.	extirpation CSF-shunt	recovery
	4	R	M	12	+	—	—	—	—	AICA	extirpation	recovery
	5	L	M	12	—	—	—	+	+	ant. sup. cerebellar and circ. pont. art.	extirpation	recovery

Table 1 — Cont.

Author	Case nº	Side	Sex	Age	Trig. neural.	Cerebell. sympt.	Cranial nerves and brain stem sympt.	Long tracts	Others	Feeding vessels	Therapy	Outcome
Patil, 1982	—	R	M	65	—	—	—	—	—	sup. and post. inf. cerebellar arteries	extirpation (2 steps)	without deficit except for a facial palsy that appeared on the 3rd postoperative day
Inoue, Sato, 1983	1	R	F	56	—	+	+	+	+		extirpation	recovery
Kawano	1	L	F	61	+*	+	+	+	+			
et al., 1984	2	R	M	48	+*	—	—	—	—		extirpation	cure
Solomon et al., 1986	—	—	M	37	—	+	+	+	—	basilar artery	extirpation	ataxia worse
	—	L	M	25	—	+	+	—	—	AICA + PICA	extirpation	recovery
	—	R	F	22	—	+	+	+	—	AICA	extirpation	recovery

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