Subarachnoid hemorrhage from intracranial dissecting aneurysm

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Rupture of an intracranial dissecting aneurysm is a rare but dangerous event. The authors’ experience with 14 cases of these lesions on the vertebrobasilar circulation suggests that these aneurysms have typical angiographic silhouettes and that, at least in the vertebral artery, they are treatable by proximal arterial occlusion.

Key Words • dissecting aneurysm • angiography • subarachnoid hemorrhage • aneurysm surgery • vertebrobasilar system

Intracranial dissecting aneurysms are most often associated with completed stroke resulting from the arterial stenosis or occlusion, but without extravascular bleeding. Very few cases have been reported of dissecting aneurysms as the cause of subarachnoid hemorrhage (SAH) without major concomitant ischemic neurological deficit. This mode of presentation affords an opportunity for treatment of the dissection and to prevent further hemorrhage or neurological deficit. An awareness of the angiographic appearance of this form of dissection is important to avoid confusion of this entity with ruptured saccular aneurysms.

In this report, we summarize the cases of 14 patients with dissecting aneurysms who presented to our clinic with SAH. Eleven had been referred from other centers as ruptured saccular aneurysms of unusual appearance and another as a ruptured fusiform aneurysm.

Case Reports

Case 1

This 53-year-old woman had two episodes of sudden right-sided headache in the 2 weeks prior to admission. A diagnosis of hypertension had been made 3 years before, but she had been normotensive without medication for the past 18 months.

On admission to another hospital, the patient was found to have mild meningismus and a blood pressure of 200/110 mm Hg. Computerized tomography (CT) of the brain demonstrated no abnormalities, but cerebrospinal fluid (CSF) obtained at lumbar puncture demonstrated 400 red blood cells (RBC)/cu mm. Cerebral angiography demonstrated what was thought to be a saccular aneurysm of the right vertebral posterior inferior cerebellar artery (PICA) with distal spasm (Fig. 1 left). Antifibrinolytic treatment was begun, and she was transferred to our unit without neurological deficit.

First Operation. With the patient in the “park bench” position, the right vertebral artery and PICA were exposed through a suboccipital craniotomy. The segment of vertebral artery distal to the origin of the PICA was fusiform, enlarged, and purplish in color. The abnormal segment extended from the PICA to 3 mm proximal to the confluence of the vertebral arteries. A Heifetz clip was used to occlude the vertebral artery distal to the origin of the PICA.

The patient tolerated the procedure well, but 4 days later she suffered the sudden recurrence of a severe headache. On examination she was found to be mildly obtunded and dysarthric. Analysis of CSF obtained at lumbar puncture revealed 180,000 RBC/cu mm. Repeat angiography demonstrated that the enlargement of the vertebral artery had extended proximal to the PICA in spite of the clip, and the narrowed lumen of the distal right vertebral artery filled in retrograde fashion (Fig. 1 right).

Second Operation. On the 9th postoperative day, the suboccipital wound was reopened. The right cerebellopontine angle was found to be packed with fresh clot. The dissection had extended up to the vertebral-basilar junction. After it was seen that no small perforating arteries arose from the distal segment of the vertebral artery, the dissection was trapped by a small...
Scoville clip placed on the right vertebral artery just proximal to the basilar artery. The previously placed proximal clip was repositioned so as to be just distal to the origin of the PICA, and the newly dissected portion of the vertebral artery proximal to the PICA was snugly enclosed in a Sundt clip graft.

Postoperative Course. The patient was initially well but within a few hours developed a lateral brain-stem syndrome with a Horner's syndrome, diminished corneal reflex, sixth and seventh nerve palsies, diminished right gag reflex, and cerebellar incoordination, all on the right side. Repeat angiography revealed diffuse vasospasm but good filling of the right PICA. Whether the patient's lateral brain-stem stroke resulted from further dissection, trapping of an unseen penetrating artery, or cerebral vasospasm is speculative. She has had no recurrent hemorrhage in the 16 months after her second procedure and there has been gratifying recovery of her medullary syndrome. She has returned to her family and social activities. Both sixth and seventh nerve function is near normal but there is mild ataxia and right dysmetria.

Case 2

This 36-year-old mildly hypertensive woman had the sudden onset of occipital pain while kneeling in prayer at church. She ran from her pew into a side room where she lost consciousness. The patient's neurological examination was unremarkable except for a right subhyaloid hemorrhage concomitant with impaired vision and amnesia for the hour after her hemorrhage. A lumbar puncture revealed grossly bloody CSF, and angiography demonstrated an unusual aneurysmal bulging of the superior aspect of the left vertebral artery, without distal stenosis at the level of the PICA.

Operation. Through a left suboccipital craniectomy, the left vertebral artery was found to be normal until just beyond the PICA, where it became bluish-black and symmetrically swollen. Once dissected free from the clot which occupied the prepontine and medullary cisterns, the wall of the artery was found to be blister-thin. While monitoring the patient's spontaneous respiration, a short Heifetz clip was used to occlude the vertebral artery just distal to the PICA.

Postoperative Course. The patient's postoperative course was unremarkable, and she was discharged on the 6th day after surgery with a resolving visual deficit. Postoperative angiography showed that the aneurysm was obliterated by thrombosis.

Case 3

This 44-year-old Japanese woman awoke with a headache. Examination by her physician revealed only mild hypertension. The next day the patient suffered an SAH that resulted in coma. Repeat examination demonstrated left ambiopsy caused by a vitreous hemorrhage. Subarachnoid hemorrhage was seen in the posterior fossa on CT scanning, and CSF examination demonstrated 800 RBC/cu mm. Angiography revealed an area of stenosis beyond which there was fusiform dilatation of the right vertebral artery. The origin of the PICA appeared to be incorporated into the sac.

Operation. Through a right suboccipital craniectomy, the right vertebral artery was identified and found

![Fig. 1. Case 1. Left: Typical angiographic "pearl and string" sign of the right vertebral artery dissection. Right: The right vertebral artery has been occluded, and there is retrograde filling of the distal portion of the dissection before trapping.](image-url)
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to be swollen and bluish, the classical picture of a dissecting aneurysm. A Scoville clip was used to obliterate the right vertebral artery above the atlas proximal to its penetration of the dura.

Postoperative Course. The patient awoke with bilateral nystagmus and mild right seventh, eighth, ninth, and 10th cranial nerve paresis thought to be the result of retraction. These deficits all resolved quickly save for a right hearing loss. Postoperative angiography demonstrated retrograde filling of the right PICA by the left vertebral artery via a narrow channel through the thrombosed aneurysm. The patient has remained well for 2 years.

Case 4

This 56-year-old man with known hypertension suffered the sudden onset of severe pain in the back of his neck which diffused into an excruciating headache followed by unconsciousness. He recovered within 1 hour and was without neurological deficit. A CT scan demonstrated blood in the basal cisterns. An initial angiogram demonstrated a fusiform dilation of the right vertebral artery at the origin of the PICA and narrowing of the distal vertebral artery. A subsequent arteriogram showed resolution of the spasm but persistence of the fusiform aneurysm.

Operation. Through a right suboccipital craniectomy, the right PICA was found to arise from a thin-walled fusiform enlargement of the vertebral artery. A Heifetz clip was placed across the vertebral artery proximal to the dissection and the origin of the PICA.

Postoperative Course. The patient's neurological status remained completely intact. Angiography revealed that the vertebral artery was occluded by the Heifetz clip, the aneurysm was thrombosed, and the PICA filled in a retrograde direction by collateral vessels from the anterior inferior cerebellar artery (AICA).

Case 5

This 55-year-old man developed the sudden onset of headache followed by loss of consciousness from which he recovered fully. Angiography revealed a small fusiform aneurysm of the right vertebral artery just beyond the PICA, with distal narrowing which involved the vertebral and proximal basilar artery (Fig. 2 left). The patient was managed conservatively and 4 years later was reexamined and found to be neurologically intact. Angiography then demonstrated that the aneurysm had resolved, and that the right vertebral artery was now of normal caliber (Fig. 2 right).

Case 6

This 46-year-old woman with known hypertension suffered the sudden onset of headache and nausea followed by right hemiparesis and dysphasia. Her CSF was bloody. Angiography revealed a very narrow basilar artery, as if in spasm, and a peculiar aneurysm in the mid-basilar region projecting caudally (Fig. 3). Over the next week, the hemiparesis largely resolved, the patient being left with no more than a right pronator drift.

Operation. Through a left temporal bone flap, the tentorium was divided to expose the basilar artery. A tear occurred at the insertion of the vein of Labbé, but the bleeding stopped with packing. Between the AICA and the superior cerebellar artery, there was a reddish-purple soft pulsatile swelling in the wall of the basilar artery. The presence of a small perforating artery emanating from the mass precluded the use of a Sundt clip;

![Fig. 2. Case 5. Left: Angiogram showing a fusiform aneurysm of the right vertebral artery, with slight distal narrowing. Right: Four years later, the arterial caliber has returned to normal.](image-url)
therefore, the mass was reinforced circumferentially with cotton gauze.

**Postoperative Course.** After the procedure, the patient was drowsy but arousable with recurrent right hemiparesis. She seemed to be improving until 3 days after surgery when she suddenly developed fixed and dilated pupils bilaterally and then suffered a cardiac arrest. After resuscitation, the patient had no brainstem reflexes.

**Postmortem Examination.** At autopsy, there was bilateral symmetrical brain swelling attributed to the cardiac arrest. The anterior two-thirds of the left temporal lobe was swollen with intraparenchymal hemorrhage from venous infarction attributed to injury and thrombosis of the vein of Labbé. Transverse sections of the basilar artery demonstrated: 1) widespread patchy medial thickening associated with marked degeneration and replacement of muscle with loose connective tissue; 2) patchy degeneration of the internal elastic lamina; and 3) focal rupture of the intima with dissection of blood from the true lumen into the degenerated media which also showed mild patchy inflammatory reaction. It was thought that the temporal lobe swelling from venous infarction caused the patient’s death, as there appeared to be no recurrent bleeding or extension of the dissection.

**Case 7**

This 39-year-old woman suffered a rapidly intensifying headache followed by a loss of consciousness. She awoke with a “locked in” syndrome which abated in 1 hour, leaving only residual left inferior quadrantanopsia, bilateral lateral nystagmus, and limited upward gaze. On lumbar puncture, the CSF contained 1700 RBC/cu mm. Angiography revealed a diffuse narrowing of the basilar artery distal to the origin of the AICA, the string sign of a dissecting aneurysm. Because of the marked constriction of the basilar artery, anticoagulation therapy was begun. Three hours after the intravenous heparin was begun, the patient developed a left hemiplegia, dysarthria, and nasal regurgitation. Over the next 2 weeks, her hemiparesis partially resolved, but the left inferior quadrantopsia, nystagmus, and dysarthria persisted. Repeat cerebral angiography was refused by the patient.
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Case 8

This 63-year-old hypertensive man suffered the sudden onset of posterior neck pain and severe frontal headache while walking uphill on a golf course and had to lie down on the grass. In the emergency room, the sole finding was slight decrease in pain sensation in the left foot. His blood pressure was 145/90 mm Hg and his heart rate was regular at 80 beats/min with a normal electrocardiogram. He was discharged home with persistent neck pain, which was treated with aspirin but was unrelieved.

Three hours following the initial episode, while walking downstairs, a sudden exacerbation of his neck pain occurred. Shortly thereafter, he became unresponsive. Cardiopulmonary resuscitation restored his pulse and a blood pressure of 230/120 mm Hg. He remained in deep unresponsive coma with subhyaloid hemorrhages until his death 3 days later.

Postmortem Examination. Massive diffuse SAH was present, particularly in the posteroinferior fossa. There was a fusiform dilatation of the right vertebral artery with obvious hemorrhage in its wall. Sections of the aneurysm revealed an interruption of the internal elastic lamina with dissection of the hemotoma between the media and adventitia accompanied by aneurysmal dilatation of the vessel (Fig. 4). No other arterial disease process was apparent.

Case 9

This 38-year-old man had been hypertensive for 6 years, with a long history of headache. He noted the slow onset of stiffness in the left side of his neck, which became severe over 24 hours and radiated into the left temporal area. Four days later the pain worsened but he refused admission. Another exacerbation occurred on the 10th day but he did not return to the emergency room until the 12th day, when CSF analysis revealed xanthochromic fluid. Bilateral, nearly symmetrical, dissecting vertebral aneurysms were discovered at angiography (Fig. 5 upper left).

Operation. At suboccipital craniotomy, both aneurysms were exposed (Fig. 5 upper right) but staining from bleeding was found only on the left side where this larger sac seemed very thin-walled. No PICA could be found on the left and so the left vertebral was clipped just proximal to the dissection. It was decided not to treat the right aneurysm, as the posterior communicating arteries were small and the natural history of bland dissection without neurological deficit is ordinarily benign.

Postoperative Course. The patient’s postoperative course was uneventful and repeat angiograms showed the left vertebral artery to be completely occluded by thrombosis beyond the clip (Fig. 5 lower). The right aneurysm showed partial healing 6 months later when a control angiogram revealed restoration of normal vertebral artery caliber in the region of the proximal half of the original aneurysm.

Case 10

This 58-year-old non-hypertensive woman suffered a coma-producing SAH, but angiograms taken on the same day were interpreted as normal. Four days later, repeat studies revealed a small fusiform aneurysm on the distal vertebral artery between the origin of the PICA and the vertebral junction. Meanwhile, her consciousness improved to incoherent speech without focal deficit, but her condition was complicated by inappropriate antidiuretic hormone syndrome and progressive severe hydrocephalus. A ventriculoperitoneal (VP) shunt was placed on the 10th day after SAH. She then deteriorated to a decerebrate state with extensive severe arterial spasm, but improved moderately with volume expansion. At 4 weeks, because of recurrent hydrocephalus, the VP shunt was converted to a ventriculoatrial shunt, and she improved to a conscious, confused state. Angiography at 5 weeks showed significant resolution of the arterial spasm and occlusion of the right vertebral artery just beyond the fusiform dilatation of the aneurysm.

Operation. At 6 weeks, the patient was still considered to be at significant risk. Craniotomy and clip occlusion of the right vertebral artery just beyond the PICA was carried out uneventfully to trap the thin-walled sac. At discharge she had recovered completely except for some dysphagia which subsequently disappeared.

Case 11

This 43-year-old known hypertensive man suffered the sudden onset of persistent right parietal occipital headache without loss of consciousness. Two days later he had a coma-producing hemorrhage which resulted in respiratory arrest while playing cards. After resuscitation he quickly regained consciousness but with bilateral partial sixth nerve palsies and loss of hearing on the right.

The initial angiograms on the day following SAH were thought to show right vertebral vasospasm (Fig. 6 left). One week later repeat studies showed a sausage-like swelling in the mid-portion of the vertebral artery intracranially with persistent narrowing of the vessel proximally and distally (Fig. 6 center). A dissection as well as vertebral spasm were considered likely at this time. Further angiography 2 weeks after SAH showed that the sausage-like swelling had enlarged considerably with a new saccula protruding from its most distal portion beyond which the distal narrowing persisted (Fig. 6 right). The right PICA was tiny but there was a large anastomotic branch from the AICA. At the time of operation 24 days after SAH, the patient had only a slight left sixth nerve weakness.

Operation. Right suboccipital craniectomy revealed the vertebral artery to be normal intracranially for about 1 cm before narrowing to about half its normal caliber for about 1 cm, although this portion of the wall appeared to be normal. The artery then dilated consider-
ably and became a fusiform sausage-shaped mass with a discolored purplish wall and surrounding arachnoid staining, but no clot. A small artery arose from the vertebral artery just before it ballooned, which may have been a miniature PICA. It was possible to separate this vessel and a filament of the 12th nerve away from the mass so as to apply a clip just beyond the origin of the arterial branch but just at the origin of the aneurysm. The postoperative course was uneventful, and angiography at 6 weeks showed the aneurysm to have been completely obliterated by thrombosis.

Case 12

This 42-year-old normotensive woman suddenly collapsed and became unconscious just after arising from bed in the morning. She apparently recovered within a few minutes but then had three “seizures” and was found to have bilateral sixth nerve palsies. A CT scan showed blood in the posterior fossa cisterns. Initial angiography 9 days later was unrevealing, although the right vertebral study was not performed due to technical difficulties. The patient was readmitted 6 weeks later when right vertebral angiography showed what appeared to be a saccular aneurysm in the anteroposterior view, with a loculus at its apex. The lateral view was more suggestive of a dissection with a narrowed distal segment of the right vertebral artery just beyond the fusiform dilatation.

Operation. At craniotomy, the typical thin fusiform swelling of the vertebral artery began about 1 cm above

![Images of angiograms showing ruptured left vertebral artery dissection and postoperative anteroposterior view demonstrating complete thrombosis of the left aneurysm beyond the clip.]

**Fig. 5. Case 9.** Upper Left: Angiogram showing the ruptured left vertebral artery dissection. Upper Right: Operative exposure of the bilateral vertebral dissections showing subadventitial discoloration of the left dissection. Lower: Angiograms showing the intact right vertebral artery dissection in lateral view (left) and the postoperative anteroposterior view (right) demonstrating complete thrombosis of the left aneurysm beyond the clip.
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its intracranial entry, and the apex of the aneurysm was densely adherent to the dura laterally, with old blood staining. In spite of separating the aneurysm from its bed in the medulla medially, the origin of an enlarged PICA could not be seen and it was presumed to arise from the uppermost aspect of the aneurysm. Clip occlusion of this vertebral artery just below the swelling and, of course, proximal to the PICA was without immediate sequelae and her postoperative course was uneventful. Repeat studies showed the aneurysm to be completely obliterated by thrombosis. The distal segment of the right vertebral artery filled retrogradely with the PICA arising from its distal end.

Case 13

This 46-year-old man, who was known to be severely hypertensive, awoke with left-sided neck pain, occipital headache, and nausea. This discomfort persisted and 1 week later he suffered the sudden onset of vertigo such that he could not stand but had to lie on the floor. There was no increase of his head pain. Both this and another similar episode subsided in a few minutes. The persisting headache was only investigated 3 weeks later. The CSF was clear but angiography revealed a fusiform dilatation of the right PICA just beyond its origin.

Operation. Seven weeks after the hemorrhage, the typical purplish-red 1-cm swelling of the PICA, beginning at its origin, was separated from the stained medulla and vertebral artery as well as the hypoglossal nerve, and encased in two narrow Sundt clip grafts to preserve a large perforating vessel arising from its midportion. The postoperative course was uneventful but repeat angiography was not performed.

Case 14

This 58-year-old non-hypertensive man awoke with global headache after sleeping on the couch with his neck in an awkward position. Two days later, the headache increased and he was unable to get out of bed. Now his neck was stiff, and the CSF was bloodstained. Angiography revealed a small fusiform enlargement on the distal tortuous left vertebral artery near the vertebrobasilar junction, but without a string sign.

Operation. Sixteen days after the ictus, a typical fusiform dissection was exposed by a suboccipital approach and treated by proximal vertebral artery occlusion beyond the origin of PICA and one other large medullary branch. His postoperative course was uneventful but no control angiogram was performed.

Discussion

Symptomatology

Subarachnoid hemorrhage is an atypical presentation of an intracranial dissecting aneurysm. The Appendix outlines 11 other cases of ruptured intracranial dissecting aneurysms that have appeared in the literature since 1915. Other cases of dissecting intracranial aneurysm with bloody CSF have been reported, but in each of these cases the hemorrhage could be attributed to head trauma, or hemorrhagic infarction in the presence of anticoagulant agents, and did not represent hemorrhage from the dissected vessel. It is interesting to note that although bland dissecting aneurysms most commonly involve the carotid or middle cerebral arteries, 20 of the 25 reported cases of dissection that presented with hemorrhage have involved the arteries of the posterior fossa.
Some dissecting aneurysms seem to have a progressive course. A total of 52 cases of intracranial dissecting aneurysms have been reported.2,11,40 These lesions are usually manifested as rapidly evolving strokes. Dissecting aneurysms have been cited as a cause of infantile hemiplegia23,33,39 and hemiparesis in adolescence.4,13,14,17,18,30,34 Severe headache, which heralds the dissection, may precede neurological deficits by days or weeks.4,16,26,36,38,39 Occasionally, the stroke is not complete at its onset but proceeds in a stuttering fashion.16,37 In our Case 1, progression of the dissection was positively documented at the second operation.

In this series, where it could be ascertained, the onset was with neck pain in five patients, appropriately lateralized posterior headache in one, and occipital pain in another. In nine patients, the bleeding was ultimately coma-producing.

Angiographic Findings

Angiography in our patients demonstrated a widening followed by a constrictive narrowing of the artery, the “pearl and string” sign.23 This appearance has been mistaken for a saccular aneurysm with concomitant spasm.49 Complete occlusion of the artery with a terminal rosette,21,27,29,36 smooth profound narrowing of the artery,23 or a double density,9,20 are other radiological signs that have been described on angiograms of patients with intracranial dissection. In our Case 11, repeated angiography allowed visualization of the evolution of a ruptured vertebral dissection (Fig. 6).

Pathogenesis

The dissection of intracranial vessels usually takes place between the internal elastica and media.40 However, in intracranial dissecting aneurysms which become manifest as SAH, the dissection plane is through the media of the artery into and through the adventitia.

The etiology of most dissecting aneurysms remains obscure, although dissections have been associated with syphilis,34 polyarteritis nodosa,10 fibromuscular dysplasia,24 mucoid degeneration of the media,16,26,37 and migraine.9,31,32 Dissecting aneurysms have been reported following trauma9,8,12,20,29 or surgical manipulation.3,4

In our clinic, iatrogenic dissections have resulted from the use of the Drake tourniquet,7 a snare used to occlude cerebral arteries for the treatment of intracranial aneurysms. The dissection in these cases presumably stemmed from direct trauma to the arterial walls during practice occlusion with the snare in the operating room. After reviewing his own three cases, Wolman39 proposed that the dissection resulted from the rupture of an intramural aneurysm into the wall of the artery, and this etiology has been verified in one case.19 It appears that the dissection usually results from the diversion of the arterial stream into a weakened area in the arterial wall. The cause of the weakening either in the intima or media is usually nonspecific, but it may occasionally result from one of the etiologies mentioned above. It is of note that nine of our 14 patients were hypertensive.

Treatment

Dissecting aneurysms that result in a sudden complete stroke are, at present, beyond treatment. Patients who present with transient cerebral ischemia or strokes in evolution could conceivably be aided by revascularization procedures. This is illustrated by one patient with a complete middle cerebral artery occlusion from a dissecting aneurysm, who remained asymptomatic for 12 years because of retrograde filling of the occluded vessel through a natural collateral supply.29

Therapeutic intervention should be considered for those patients who present with SAH, since this situation is dangerous. Although some vessels will heal spontaneously (Case 5), a review of the literature reveals that the dissection can progress, as it did in our Cases 1 and 11. In six of the 11 previously reported cases and in one of ours, this form of cerebral hemorrhage was fatal. The Hunterian approach of ligating the artery proximal to the aneurysm to decrease the pressure and flow within the aneurysm in order to promote thrombosis15 has been advocated by others.23,35,40 While this is quite appropriate for the vertebral artery, it would be dangerous for the basilar, middle, or anterior cerebral arteries unless good collateral supply was known to exist or could be created with bypass surgery. It is interesting that all our patients had involvement of the posterior circulation arteries (the vertebral artery in 11, the PICA in one, and the basilar artery in two).

Vertebral artery occlusion appears to have been successful in all of the nine cases operated on where the dissection involved this vessel. However, in Case 1, the dissection progressed despite proximal vessel ligation but, after trapping, a brain-stem syndrome resolved to a degree that the patient was functional. In three of the nine vertebral artery occlusions, the clip was placed proximal to the PICA without deficit. The PICA filled retrogradely in two of them: through the partially thrombosed aneurysm in one, and through a high origin just beyond the distal segment of the thrombosed aneurysm in the other. In the third patient, filling of the PICA was through a collateral vessel from the AICA. Our other experience7 with unilateral vertebral artery occlusion for saccular or giant aneurysms arising from this vessel suggests that one vertebral artery can be occluded intracranially with relative safety providing that the other exists, is of reasonable size, and joins to fill the basilar artery. All 13 such occlusions to date have had good results, as did three patients in whom giant aneurysms on the vertebral artery were trapped distal to the PICA. Trapping of the PICA inadvertently after intraoperative spontaneous rupture of another vertebral aneurysm resulted in a fatal medullary infarction.

Both of the patients with ruptured basilar dissections had poor results. The patient in Case 7 had pontine infarction as a result of extension of the dissection,
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perhaps due to anticoagulation therapy. The attempt at reinforcement of the basilar arterial wall in Case 6 was futile since, in retrospect, the reaction from gauze would have needed weeks to provide any fibrous restraint. This patient's death seemed to be related to the hemorrhagic mass of temporal infarction from the injury to the vein of Labbé. Although the dissection was extensive, it did not appear to have extended. Plastic encasement might have been more reasonable, or application of a snugly fitting clip graft if the segment had been free of intact branches, as seen in Case 13 with a PICA dissection.

What is not known to any degree is the natural history of ruptured intracranial arterial dissections. Case 5 is the only recorded case of apparent spontaneous healing. Although the few previously reported cases suggest a morbid outcome, they may not be representative of the disease. Even so, for the majority of these lesions that seem to occur on the vertebral artery, proximal arterial occlusion appears to be safe and successful in producing obliterative thrombosis of the dissected segment. More of the natural history needs to be known before it can be stated whether such radical surgical treatment is always indicated.

Acknowledgments

We are grateful to Dr. John Kaufman and Dr. Joseph Gilbert of the Division of Neuropathology for the pathological studies on Cases 6 and 8, to Dr. G. G. Ferguson for inclusion of Cases 10 and 14, and to Dr. Quentin J. Durward for his assistance in gathering case reports.

APPENDIX

Previously Reported Cases of SAH Associated With Dissecting Aneurysms

2. Ramsey and Mosquera (1948): This 47-year-old man had hemiplegia and loss of consciousness following 2 weeks of occipital headache. Autopsy demonstrated SAH, with a 1-cm dissection of the right middle cerebral artery, 3 cm from the origin at the internal carotid artery. The dissection was through the media, which demonstrated cystic degeneration.
3. Crompton (1965). Autopsy case of a dissecting aneurysm of the right vertebral artery between the confluence of the vertebral arteries and the PICA. The lumina of the vertebral artery and PICA were patent. No clinical data were given.
4. Gherardi and Lee (1967): This 26-year-old known hypertensive woman presented with headache, coma, and bloody CSF. Autopsy demonstrated dissection of the right anterior cerebral artery between the adventitia and muscular coat. There was nonspecific perivascular inflammation with scattered eosinophils, fibrinoid necrosis, and polymorphonuclear nodosa.
5. Kunze and Schiefer (1971). This 34-year-old man presented with headache, right hemiparesis, loss of consciousness, and bloody CSF. Angiography revealed a dissecting aneurysm of the left middle cerebral artery. Autopsy confirmed the presence of a dissecting aneurysm, with the lamina elastica interna separated from the media.
6. Yonas, et al. (1977): This 42-year-old woman had a 1-week history of severe occipital headache. Angiography demonstrated a dissecting aneurysm of the right vertebral artery proximal to the dissection. She died postoperatively from abdominal hemorrhage. Autopsy revealed a 15-mm dissection between the right PICA and the confluence of the vertebral arteries, separating the media from the adventitia.
7. Waga, et al. (1978): This 53-year-old man had a 3-day history of headache and bloody CSF. Angiography demonstrated a dissecting aneurysm between the confluence of the vertebral arteries and the right PICA. The right vertebral artery was ligated proximal to the dissection, and there was further difficulty in the 4 months after surgery.
8. Alexander, et al. (1979): This 89-year-old man had a history of progressive dementia and bloody CSF. Radiographic studies demonstrated an avascular prepontine mass. Autopsy revealed a hematoma between the internal elastic lamina and adventitia at the vertebrobasilar junction. The media was fragmented by the hematoma. Superficial hemosiderosis of the brain and spinal cord indicated multiple prior SAH's.
9. Senter and Sarwar (1982): This 45-year-old man presented with headache, neck pain, and falling to the left, following several days of suboccipital and left ear pain. Angiography revealed a dissecting aneurysm of the left vertebral artery, which was treated by proximal vertebral artery ligation and wrapping of the aneurysm.
10. Adams, et al. (1982): This 39-year-old woman had the sudden onset of headache, then developed a left pontine syndrome 48 hours later, with bloody CSF. A small pyramidal mid-basilar artery aneurysm was seen at angiography and was verified as a ruptured dissection after death 2 days later.
11. Adams, et al. (1982): This 75-year-old woman suddenly experienced excruciating headache and vomiting. A CT scan showed blood in the left Sylvian aqueduct, and angiography disclosed a tapering stenosis of the left internal carotid artery 1 cm proximal to its intracranial bifurcation, distal to which was an aneurysmal dilatation. Left internal carotid artery ligation was followed on the 4th day by right hemiparesis and aphasia, from which she partially recovered.

References

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Manuscript received June 2, 1983.
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