Traumatic pericallosal aneurysm in a patient with no major trauma

Case report

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The case of a young woman who developed a traumatic distal anterior cerebral artery ("pericallosal") aneurysm from a roller-coaster ride is described. She presented with a subarachnoid hemorrhage (SAH) restricted to the interhemispheric fissure. The initial angiogram was normal but repeat angiography at 8 days revealed the aneurysm. After craniotomy and clipping the patient made a satisfactory recovery. This is the only reported case of a traumatic aneurysm arising under circumstances not usually considered as trauma. It raises questions about the pathophysiology of the formation of such aneurysms and suggests that traumatic pericallosal aneurysms should be considered in SAH of unknown etiology. This case provides further evidence that repeat angiography occasionally helps reveal an aneurysm when the initial study fails to do so.

Key Words • aneurysm, traumatic • subarachnoid hemorrhage • anterior cerebral artery

Intracranial aneurysms caused by trauma are rare. Traumatic aneurysms have been described in various locations in the intracranial and extracranial circulation. The distal anterior cerebral artery ("pericallosal") is a well-known location for traumatic aneurysms, probably because of the unique relationship of the artery with the edge of the falx. Such aneurysms have generally been reported after major head injuries. We recently encountered a patient who developed a pericallosal aneurysm without any history of major trauma. Her aneurysm was thought to arise due to a roller-coaster ride. The case and its implications as well as relevant literature are discussed.

Case Report

This 32-year-old woman had been previously healthy and had not suffered any trauma until she rode five roller-coasters at an amusement park. The fifth subjected her to a three-story near free-fall followed by four complete upside-down loops. After the fall and the first loop, she felt a sudden severe headache and lost consciousness for the remainder of the ride. She then became drowsy and confused, and complained of a severe headache. She had no focal neurological deficit.

Examination. An initial computerized tomography scan revealed a subarachnoid hemorrhage (SAH) localized at the interhemispheric fissure, but complete angiography performed within 16 hours of ictus was unremarkable (Fig. 1 left). The patient was admitted for observation. Angiography was repeated on the 8th day after presentation and disclosed a left distal anterior cerebral artery aneurysm (Fig. 1 right). By this time the patient was neurologically intact.

Operation. On Day 10 the aneurysm was approached surgically and found to be located exactly at the point where the artery crossed the inferior edge of the falx. There was a small intraparenchymal clot on the lateral surface of the aneurysm where it was imbedded into the cingulate gyrus. The aneurysm lay along a straight segment of the vessel with no branching points nearby. When the anatomy of the aneurysm was surgically exposed, a diagnosis of traumatic aneurysm was made. Clipping proceeded uneventfully. The patient made a satisfactory recovery. Postoperative angiography confirmed obliteration of the aneurysm (Fig. 2).

Discussion

We have presented a case of SAH that occurred during a roller-coaster ride in a previously healthy person. The etiology of the hemorrhage was initially unclear, but the aneurysm was discovered upon repeat angiography. We have no doubt about the traumatic origin of the aneurysm because of its unique location away from any branching points and adjacent to the falx edge. After extensively questioning the patient and...
her family and finding no history of significant trauma, we concluded that her trauma had to be one of the roller-coaster rides she took on the day of her ictus. The last ride during which she lost consciousness is the most likely culprit. We found it interesting that evidence of vessel injury, which most likely occurred due to movement of the artery against the falcial edge during the ride, did not appear on the early angiogram. The aneurysm, albeit small, appeared 8 days later.

Over 40 traumatic anterior cerebral artery aneurysms have been described in the literature. Direct trauma to the vessel from iatrogenic or penetrating injuries has been described in rare cases. However, by far the most common cause is indirect trauma due to motor-vehicle accidents or falls. These patients usually have significant associated evidence of trauma such as skull fractures, mass lesions of the brain, and systemic injuries. Fleischer, et al., described one case of a football injury accompanied by no loss of consciousness or other associated injuries, where a traumatic pericallosal aneurysm was discovered. There are no reports in the literature of a “traumatic” aneurysm arising in a patient lacking any history or physical evidence of trauma at presentation. In this regard our case is quite unique.

Our case also raises the question of why a relatively mild trauma caused by a roller-coaster ride would lead to aneurysm formation when severe injuries sustained in falls and road accidents rarely do so. Discussions in the literature unanimously agree that compression of the artery against a stationary falcial edge by shearing forces, causing a brain shift, is responsible for the for-
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formation of such aneurysms. It is possible that the rare trauma victim sustaining such an aneurysm has an inherent and rare anatomical predisposition to this disorder. Adhesions to the edge of the falx were noted by Nakstad, et al., in their three cases. A pre-existing adhesion to the falcial edge could be a catalyst for aneurysm formation. By the time such aneurysms come to surgery, distortions in the anatomy from the associated hemorrage may not allow the surgeon to appreciate such adhesions. In our case, the entire interhemispheric fissure had extensive early adhesions secondary to the 10-day-old hemorrhage. Thus, the pathophysiology of formation of such aneurysms remains speculative at best.

The majority of traumatic pericallosal aneurysms are discovered late (up to 9 weeks) after trauma. A number of reports have demonstrated significant enlargement of these aneurysms on serial angiograms, and its incidence in the literature varies between 5% and 24%. The role of repeat angiography in these patients is controversial. It is clear, however, that repeat angiography does reveal a small percentage of aneurysms that initial studies fail to demonstrate. Our case is a reminder that traumatic pericallosal aneurysms should be included in the differential diagnosis of SAH of unknown etiology, especially if the hemorrhage is restricted to the interhemispheric fissure. Our experience provides additional evidence that repeat angiography in such cases may be beneficial.

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References


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