

Intracranial traumatic pseudoaneurysm

Traumatic intracranial aneurysms are rare, occurring in fewer than 1% of patients with intracranial aneurysms.

see also Extracranial traumatic pseudoaneurysm.

Etiology

They can occur following blunt or Penetrating intracranial injury and are more common in the pediatric population. Traumatic aneurysms can be categorized histologically as true, false, or mixed, with false aneurysms being the most common. These aneurysms can present in a variety of ways, but are typically associated with an acute episode of delayed intracranial hemorrhage with an average time from initial trauma to aneurysm hemorrhage of approximately 21 days. The mortality rate for patients harboring these aneurysms may be as high as 50%. Prompt diagnosis based on arteriography and aggressive surgical management are associated with better outcome than conservative treatment.

Larson et al., describe a classification scheme for traumatic aneurysms based on their anatomical location and conclude that 1) posttraumatic aneurysm must be considered in patients with acute neurological deterioration following closed head injury; 2) they can occur following mild closed head injury; 3) they occur more commonly in children than in adults; and 4) surgical clipping and/or endovascular occlusion is the definitive treatment ¹⁾.

Reports documenting use of flow diverter to treat traumatic intracranial PSAs are few and lack long-term follow-up ²⁾.

Case series

2018

Retrospective review of 8 intracranial traumatic PSAs in 7 patients treated using only PED placement. Patients were followed clinically and angiographically for at least 6 months in the University of Kansas City Medical Center, Medical College of Wisconsin, Milwaukee and the Barnes-Jewish Hospital Mallinckrodt Institute of Radiology St. Louis.

Seven patients with a mean age of 37 years were treated for 8 intracranial pseudo-aneurysms between 2011-2015. Six aneurysms were the result of blunt trauma; 2 were from iatrogenic injury during transsphenoidal surgery. Mean clinical and angiographic follow-up in surviving patients was 15.2 months. In patients with angiographic follow-up, complete occlusion was achieved in all but one patient, who demonstrated near-complete occlusion. No ischemic events or stent-related stenosis were observed. One patient developed a carotid-cavernous fistula after PED, which was successfully retreated with placement of a second PED. There were two mortalities. One was due to suspected microwire perforation remote from the target aneurysm resulting in SAH/IPH. The other was due to a traumatic SDH and brainstem hemorrhage from an unrelated fall during follow-up interval.

Use of PED for treatment of intracerebral PSAs following trauma or iatrogenic injury showed good persistent occlusion, and acceptable complication rate for this high-risk pathology. Risks of this procedure and necessary antiplatelet therapy require appropriate patient selection. Larger prospective studies are warranted ³⁾.

2015

There were a total of 8 patients who were treated with traumatic intracranial pseudoaneurysms between April 1980 and January 2009. Medical charts and the imaging studies were reviewed for analysis. The outcome was measured with [modified Rankin Scale](#) (mRS) score at 6 months after treatment.

All 8 patients were male and the mean age was 25 years old. Six of those were located at the cavernous segment of the internal carotid artery (ICA) and the other 2 was located at the M2 segment of middle cerebral artery. The causes of trauma were car accidents in 6, penetrating injury through the orbit in 1, and slip down injury in 1 patient. Massive epistaxis or hematemesis occurred in all patients with a pseudoaneurysm at the cavernous and ophthalmic segment of the ICA. All 6 patients of the cavernous and ophthalmic ICA group showed favorable outcome of mRS 0 to 1. The outcome of patients with middle cerebral artery pseudoaneurysm was mRS 2 to 3.

Upon prompt diagnosis and proper treatment planning, it is possible to achieve favorable outcome in these patients. Lesions located at the cavernous segment of the ICA favored endovascular treatment while those at the middle cerebral artery favored surgical treatment ⁴⁾.

Case reports

Traumatic intracranial pseudoaneurysm is a rare complication of blunt trauma. It is even more rare when it presents as epistaxis. Massive epistaxis of a ruptured intracranial internal carotid artery pseudoaneurysm is a major cause of mortality, which requires emergency intervention. We report a case of traumatic intracranial internal carotid artery pseudoaneurysm secondary to skull base fracture, which presented with delayed onset of epistaxis. This was successfully treated by primary endovascular coil embolization. We discuss endovascular treatment options and review the literature.

¹⁾
Larson PS, Reisner A, Morassutti DJ, Abdulhadi B, Harpring JE. Traumatic intracranial aneurysms. *Neurosurg Focus*. 2000 Jan 15;8(1):e4. Review. PubMed PMID: 16906700.

²⁾ , ³⁾
Sami MT, Gattozzi DA, Soliman HM, Reeves AR, Moran CJ, Camarata PJ, Ebersole KC. Use of Pipeline™ embolization device for the treatment of traumatic intracranial pseudoaneurysms: Case series and review of cases from literature. *Clin Neurol Neurosurg*. 2018 Apr 14;169:154-160. doi: 10.1016/j.clineuro.2018.04.012. [Epub ahead of print] PubMed PMID: 29698879.

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