# Pseudoaneurysm

- Delayed Deep Femoral Artery Injury Secondary to Migrated Lesser Trochanter Fragment After Intertrochanteric Fracture Fixation: A Case Report and Updated Literature Review
- Use of N-hexyl Cyanoacrylate Monomers for the Treatment of Intra- and Extracranial Arteriovenous Malformations: A Single-Center Experience
- Progressive thrombosis and involution of a pediatric giant middle cerebral artery pseudoaneurysm following superficial temporal artery-to-middle cerebral artery bypass: illustrative case
- 7T MR Angiography for Distinguishing Small Intracranial Aneurysms from Variant Anatomy: Protocols and Impact
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- How I do it? Microsurgical treatment of traumatic anterior cerebral artery pseudoaneurysm with cerebrospinal fluid rhinorrhea
- The Spectrum of Vascular Injuries Secondary to Traumatic Brain Injury: A Single-Center Study Based on Digital Subtraction Angiography
- Life-Threatening Massive Epistaxis because of Ruptured Pseudo-aneurysm of Petrous Internal Carotid Artery and its Treatment with High-Flow Bypass

While both blister aneurysms and pseudoaneurysms involve abnormalities in the arterial wall, they have different causes, characteristics, and treatment strategies. Blister aneurysms are typically small, fragile lesions in the brain's arteries, whereas pseudoaneurysms often result from trauma or surgical procedures and involve a breach in the arterial wall. Both conditions can be serious and require appropriate medical evaluation and intervention.

Fusiform aneurysms are a type of true aneurysm characterized by uniform dilation of an artery's wall, while pseudoaneurysms are false aneurysms that result from an injury or breach in the arterial wall. These conditions have distinct causes, characteristics, and treatment approaches, and they should not be confused with each other.

## Etiology

This occurs because bleeding into the weakened wall splits the wall.

They are a particular danger in Marfan syndrome.

Children presenting after trauma with headache, seizures, hemiplegia and coma may have an intracranial dissecting aneurysm. Specific angiographic findings provide confirmation of this diagnosis. The dissection occurs subintimally and differs clinically and pathologically from dissecting aneurysms of extracranial arteries. The course in children beyond infancy is catastrophic, justifying

consideration of potentially life saving surgical intervention <sup>1)</sup>.

trauma (dissection or laceration):

In a brachial plexus injury: Progressive deficit is usually due to vascular injuries (pseudoaneurysm, A-V fistula, or expansile clot); these should be explored immediately.

Stroke risk due to carotid artery blunt injury 44 %.

It is an indication for neurosurgical intervention in gunshot wound to the brachial plexus.

iatrogenic (dissection, laceration or puncture), e.g. arterial catheterization (accounts for most cases in this category).

see Internal carotid artery injury after transsphenoidal approach.

biopsy, surgery

spontaneous dissection

fibromuscular dysplasia (dissection)

mycotic aneurysm (inflammatory digestion of the vessel wall)

myocardial infarction (left ventricular false aneurysm)

regional inflammatory process

acute pancreatitis

chronic pancreatitis

vessel injury/erosion due to a tumour: relatively uncommon

vasculitides

Behcet syndrome

giant cell arteritis

Takayasu arteritis

systemic lupus erythematosus

polyarteritis nodosa

penetrating atherosclerotic ulcer

They can involve any arterial segment or even a cardiac chamber. Examples include

aortic pseudoaneurysm: traumatic aortic pseudoaneurysm

femoral artery pseudoaneurysm: relatively common site due to femoral punctures

carotid artery pseudoaneurysm

visceral arterial pseudoaneurysm

hepatic arterial pseudoaneurysm

gastroduodenal arterial pseudoaneurysm

splenic arterial pseudoaneurysm

renal arterial pseudoaneurysm

peripheral arterial (limb) pseudoaneurysm

left ventricular pseudoaneurysm

brachiocephalic artery pseudoaneurysm

#### Diagnosis

Some of the imaging features may be dependent on location.

Ultrasound

Due to the turbulent forward and backward flow, a characteristic yin-yang sign may be seen on colour flow while a "to and fro" pattern may be seen with pulsed Doppler.

#### СТ

hypodense (non-contrated) or hyperdense (contrast-enhanced) smooth walled sac adjacent to an artery, usually with a communication.

In view of the aggressive natural history of posterior circulation traumatic intracranial aneurysm TICA, deSouza et al., recommend that CTA of the head and neck vessels be performed for cases presenting with post-traumatic disproportionate cisternal and or third or fourth ventricular SAH. In the event of initial CTA being negative, repeat CTA and if negative DSA should be performed between 5 to 7 days, with a low threshold for further repeat at 10 days if a traumatic dissection is still suspected. Close monitoring for hydrocephalus and vasospasm is required during hospital admission and significant therapy input is likely to be required post discharge from acute care <sup>2)</sup>.

### Posterior inferior cerebellar artery dissecting aneurysm

see Posterior inferior cerebellar artery dissecting aneurysm.

### **Common carotid artery pseudoaneurysm**

Common carotid artery pseudoaneurysm.

### Internal carotid artery pseudoaneurysm

see Internal carotid artery pseudoaneurysm.

#### Middle cerebral artery pseudoaneurysm

Middle cerebral artery pseudoaneurysm.

### Superficial temporal artery pseudoaneurysm

see Superficial temporal artery pseudoaneurysm.

### Traumatic pseudoaneurysm

Traumatic pseudoaneurysm.

### Posterior communicating artery pseudoaneurysm

see Posterior communicating artery pseudoaneurysm.

### Treatment

With the advances in techniques and materials, endovascular treatment has been an alternative to surgery for the treatment of intracranial pseudoaneurysms. Endovascular procedures include coiling, stent-assisted coiling, occlusion of the parent artery with or without aneurysm, and flow diversion.

Since the availability of endovascular treatment and the advantage of intraprocedural

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anticoagulation, an endovascular strategy has become the mainstay of their therapy. But in some cases selective aneurysm obliteration by the endovascular approach is impossible or associated with an unacceptable risk of morbidity. This is particularly true when the IDA is a blood blister-like aneurysm or when dissection affects peripheral branches of the internal carotid artery.

The literature dealing with surgical treatment of IDAs in the anterior circulation is heterogeneous, and formulation of general recommendations concerning the surgical strategy remains difficult. The aim of a study was to conduct a systematic review of the current knowledge on incidence, pathogenesis, clinical presentation, and diagnostic procedures with a special emphasis on the surgical treatment of intracranial dissections of anterior circulation <sup>3)</sup>.

False aneurysms, also known as a pseudoaneurysm, requires all three layers of the arterial wall wall to be disrupted, and integrity of the vessel is only maintained by associated hematoma or surrounding connective tissue <sup>4</sup>.

In true aneurysms, the adventitia is preserved.

Direct communication of blood flow exists between the vessel lumen and the aneurysm lumen through the hole in the arterial wall. The risk of rupture is higher than that of a true aneurysm of comparable size due to poor support of the aneurysm wall and thus false aneurysms generally require treatment.

The extracranial vertebral artery are traditionally believed to be more vulnerable to trauma than intracranial vessels owing to their relatively exposed location within the cervical vertebrae. However, a review demonstrates PICA to be the most common vessel involved, in 54 % of cases <sup>5)</sup>.

Almost one third of cases were in patients aged under 16. The higher proportion of traumatic aneurysms in children may be due to the paediatric cervical spine and craniocervical junction being relatively mobile, exposing vessels to stretching and shearing forces. The overall young age of presentation across this review (mean age 24) and the male preponderance (75 %) <sup>6)</sup> also reflects the higher incidence of trauma in young males.

#### **Case reports**

A female patient in her sixties presented after a fall without evidence of vascular injury on imaging. However, after one week, repeat imaging due to an abrupt change in mental status revealed a ruptured pseudoaneurysm, which was treated with a combination of coil embolization and open surgical evacuation of associated intracranial hematoma. This case illustrates the importance of continued surveillance beyond the acute traumatic period to identify late-onset complications in trauma patients requiring emergent treatment <sup>7)</sup>.

Missing a Blood Blister-Like Aneurysm in the Setting of Aneurysmal Subarachnoid Hemorrhage in a Patient Harboring Multiple Aneurysms<sup>8)</sup>

A 73-year-old woman presented with a disturbance of consciousness. Computed tomography showed diffuse subarachnoid hemorrhage, which was observed to be particularly dense in the interhemispheric fissure. Three-Dimensional Rotational Angiography showed a tiny and conical bulge on the distal bifurcation of the azygos trunk. Follow-up digital subtraction angiography performed on day 4 showed enlargement of the aneurysm, and a BLA arising at the azygos bifurcation was diagnosed. Stent-assisted coiling (SAC) was performed using a low-profile visualized intraluminal support (LVIS) Jr. stent, which was implanted from the left pericallosal artery to the azygos trunk. Follow-up angiography showed that the aneurysm thrombosed gradually and reached complete occlusion 90 days after onset.

Conclusion: SAC for a BLA at the distal bifurcation of an azygos ACA might be an effective treatment option leading to early complete occlusion, but thrombus formation as an intraoperative complication should be noted in the BLA at the bifurcation or the peripheral artery, as in the present case <sup>9</sup>.

A 42-year-old man with a history of sudden onset of severe headache followed by consciousness disturbance was brought to our hospital. Radiological examinations revealed subarachnoid hemorrhage, associated with rupture of a left vertebral artery dissecting aneurysm. Initially, internal trapping was attempted via the ipsilateral vertebral artery. However, the microcatheter could not be navigated through the true lumen to the distal side of the vertebral artery. Subsequently, therefore, the guiding catheter was placed in the right vertebral artery, and the microcatheter was retrogradely navigated successfully through the lesion to the proximal side of the left vertebral artery. Finally, the lesion was completely embolized with electrodetachable coils without complications. However, the patient died after the operation because of deterioration of the general condition. The postmortem examination revealed how an intimal flap had interfered with the antegrade navigation of the microcatheter in the lesion. The present case showed that endovascular treatment for a vertebral artery dissecting aneurysm via the contralateral vertebral artery may be a useful option in cases where antegrade navigation of the microcatheter via the ipsilateral vertebral artery is found to be difficult <sup>10</sup>.

Full-endoscopic Transforaminal lumbar endoscopic discectomy is based on a puncture technique using a guide needle to reach the target area of the foramen via a percutaneous posterolateral/lateral approach. It may correlate with specific approach-related complications, as exiting nerve root injury.

Panagiotopoulos et al., report the first case of pseudoaneurysm of the lumbar segmental artery secondary to a transforaminal full-endoscopic surgery in the treatment of a lumbar disc herniation. A 39-year-old man underwent left L4-L5 full-endoscopic transforaminal lumbar discectomy for a herniated disc. Three hours after surgery, he experienced acute progressive abdominal pain. An abdomen CT scan showed contrast extravasation in the left paraspinal compartment at L4 vertebral body level. The selective left lumbar angiogram revealed a pseudoaneurysm of a side branch of the left lumbar segmental artery, which was treated by endovascular coiling. The patient made a rapid postoperative recovery without further complications and was discharged 4 days later. This report identifies a rare complication of transforaminal full-endoscopic surgery in the treatment of a herniated lumbar disc. This is the first case of pseudoaneurysm formation of the lumbar artery following a full-endoscopic transforaminal lumbar discectomy <sup>11</sup>.

1)

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