

## Case Report

# Dissecting Aneurysm of the Carotid Artery after a Minor Neck Trauma in a Child: A Case Report

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### ABSTRACT

A case of dissecting aneurysm in a 5-year-old girl without a pre-existing predisposing factor is presented. Her clinical presentation in spite of being typical, did not progress to severe deficit. The diagnosis was achieved by 2D and 3D-TOF MRI studies after the

indirect indications of the CT studies after the accident. This case study emphasizes the possible presentations in children. This diagnosis in the pediatric age-group is difficult and is probably the reason for the very few cases reported.

KEYWORDS: carotid dissection, neck trauma, pediatric age

### INTRODUCTION

Trauma is the most common cause of dissecting aneurysms (DA) of the extracranial internal carotid artery (ICA). Clinically proven cases are rare with none of the usual symptoms, like sudden onset, being specific. Neck pain, ear pain and headache or pain on neck movement may suggest cervical ICA dissection. In adults, cystic medial necrosis is the most frequent histopathological finding. In children however, predisposing factors are fibromuscular dysplasia, Marfan's syndrome, etc.

### CASE REPORT

A five-year-old female was pushed down from her bicycle by a smaller child. Minutes after the incident, her parents found her somewhat confused with her right side appearing to be weaker. Although there were no apparent bruises, the parents were alarmed and rushed her to the local hospital. Right hemiparesis, more pronounced for the arm, was confirmed. The vital signs were normal. CT head, approximately four hours after the injury, was ordered and reported as normal. Meanwhile, the child began to regain full consciousness. She was kept under observation during the night and was transferred to our unit the next morning.

On admission, her general condition was stable. Neurologically, her right hemiparesis was evident with power grade 3 to 4/5 for the upper limb and 4/5 for the lower with no gross changes in muscle tone. Her deep tendon reflexes were uniformly brisk and symmetrically equal. Plantars were down-going on both sides and no changes in pinprick and touch sensation was detected. Her

mother noticed before her admission a slight, tender swelling below the external auditory meatus. Another CT of the head, done approximately fifteen hours after the fall clearly showed three discrete recent ischemic lesions in the region of the left basal ganglia (Fig. 1). Bone windows of both CT examinations and plain radiographs of the head demonstrated no skull fracture. For the next 14 days, the patient remained hospitalized and the motor deficit began to improve. On follow-up one month later, her weakness had improved significantly; her gait had returned to normal, however, there remained a mild but clearly detectable weakness of the upper limb (4/5).

The possibility of a dissection of the cervical carotid artery (CCA) was a high priority in our differential diagnosis. The very unusual course of disease evolution, however, including almost immediate improvement in the general condition of the child and a steady though a slow recovery of the impaired functions, prompted us to refrain from conducting an arteriography initially. She returned to school and other than the noticeable weakness in her right arm, presented no other changes. One month after the accident a magnetic resonance imaging (MRI) and a magnetic resonance angiography (MRA) were done. T1W axial imaging (Fig. 2) showed high signal intensity in the previously demonstrated ischemic areas involving left basal ganglia, and was interpreted as compatible with a partial hemorrhagic transformation due to reperfusion. There was a minimal mass effect. A slice through the petrous portion of the internal carotid artery (ICA) clearly

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Fig. 1: CT scan done 15 hours after the injury showing three discrete ischemic lesions in the left basal ganglia.



Fig. 2: T1W axial MRI one month after the injury with areas of high signal intensity in the area of the ischemia in the left basal ganglia.



Fig. 3: MRI axial through the skull base – petrous bone showing the ICA with narrowing of lumen and high signal around, denoting subintimal clot.



Fig. 4: 2D-TOF MRI showing a long narrow segment of the ICA, reaching the intrapetrous portion (unfortunately with some artifacts)



Fig. 5: 3D-TOF MRI of extracranial arteries showing a somewhat narrowed left ICA



Fig. 6: 3D-TOF MRI of intracranial arteries showing similar changes of the left petrous ICA.

showed narrow arterial lumen and a high signal around denoting a subintimal clot (Fig. 3). Two-dimensional time-of-flight (2D-TOF) MRA, though not completely artifact-free (Fig. 4), revealed a long narrow segment of the left ICA, extending from just above the bifurcation cephalad to the intracavernous portion of the artery. None of the major intracranial branches of the ICA were occluded.

Two months later, her neurological condition revealed minimal weakness in the upper limb only. In order to assess possible changes in the caliber of the ICA, and/or of the intracerebral circulation, another MRI and MRA was obtained three months after the trauma. Three distinct ischemic lesions involving the head of the left nucleus caudatus and lentiform nucleus were noticed. A 3D-TOF MRA of superior quality

demonstrated fully patent, but still somewhat narrow, extra and intracranial portions of the left ICA (Fig. 5 and 6). As on the previous MRA, the recent one also showed no pseudo-aneurysm.

## DISCUSSION

Cervical ICA dissections usually start above the bifurcation ending at or proximal to the petrous portion of the artery. Dissections that occur within the petrous canal are rare. Giedke *et al*<sup>[1]</sup> found only one in their review of the 29 cases from the literature.

Adults with cervical ICA dissection may be normal, have only minor symptoms (e.g. headache, neck pain) or have severe neurologic deficit<sup>[2]</sup>. With children beyond infancy, the clinical picture is catastrophic in most of the cases. In the report of Nass *et al*<sup>[3]</sup>, 81% of 16 patients died and 50% presented

with a history of trauma. Manz *et al*<sup>[4]</sup> also found 76% mortality rate in 20 pediatric cases where the ICA was involved in 52% of the cases. Interestingly, prognosis in pediatric patients with ICA dissection is much worse than simple occlusive disease, where a recovery rate of up to 90% could be expected.

Transfemoral arteriography remains the gold standard in diagnosis of cervical ICA dissections with double arterial lumen sign accepted as typical. The advent of MRI and MRA in clinical practice, for the first time, provided the possibility to visualize the clot surrounding the ICA thus avoiding the necessity of catheterization, which carries a small but definite risk.

Treatment of the dissecting aneurysms of the ICA remains controversial. Pozati *et al*<sup>[5]</sup> believe that a three week period of anticoagulation or anti-platelet aggregation therapy is indicated in order to prevent thromboembolic phenomena. In our case, the early frank low attenuation in the basal ganglia, which is associated with later hemorrhagic transformation of the initially ischemic lesion<sup>[6]</sup>, was a warning not to resort to anticoagulation. This attitude proved to be prudent when we discovered at the MRI, one month after the trauma, signs of partial reperfusion.

## CONCLUSION

Any trauma to the neck, even the minor one, in a child with neurologic deficit of acute onset should

raise the possibility of a dissecting aneurysm of the ICA. In stable cases, a supportive treatment with close monitoring of disease evolution is probably the better choice. MRI and MRA may permit a non-invasive diagnosis of dissecting aneurysms of the ICA and their sequelae.

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