

Unilateral Oculomotor Nerve Dysfunction Induced by Ruptured Anterior Communicating Artery Aneurysm along with Isolated Intraventricular Hemorrhage in a Trauma Patient

Saeed Oraee-Yazdani ^{1*}, Maryam Golmohammadi ¹, Mohammadhossein Akhlaghpasand ¹, Voorya Nooranipour ², Maryam Oraee-Yazdani ¹, Ali-Reza Zali ¹, Esmail Fakharian ²

¹ Functional Neurosurgery Research Center, Shohada Tajrish Comprehensive Neurosurgical Center of Excellence, Shahid Beheshti University of Medical Sciences, Tehran, Iran

² Trauma Research Center, Kashan University of Medical Sciences, Kashan, Iran

* **Corresponding Author:** Saeed Oraee-Yazdani, Functional Neurosurgery Research Center, Shohada Tajrish Comprehensive Neurosurgical Center of Excellence, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Email: saeed.o.yazdani@gmail.com

Received February 04, 2020; **Accepted** October 02, 2020; **Online Published** October 03, 2020

Abstract

Background: Many signs in relation to vascular events and consequent loss of consciousness could be easily incorrectly explained (unclear) in a setting of trauma, especially when these events are a result of the car accident. Third cranial nerve palsy widely occurs due to internal carotid and posterior communicating artery aneurysm. An anterior communicating (ACOM) aneurysm is a rare reason that could lead to oculomotor dysfunction. ACOM ruptured aneurysm may present with sub arachnoid hemorrhage (SAH) and intraventricular hemorrhage (IVH) but isolated IVH is a rare finding for ACOM ruptured aneurysm.

Case Description: A 56-year-old male presented to the hospital emergency department because of trauma after a car accident. He was unconscious with left-sided dilated pupil and ptosis with a brain CT indicating IVH. Brain CT angiography that performed two weeks after the accident revealed ACOM aneurysm. The patient underwent craniotomy and clipping the aneurysm. He was discharged, after completing the period of the following treatment. A combination of neuropathic agents and opioids helped to control pain. These analgesic included amitriptyline, gabapentin, pregabalin, tramadol and morphine in various regimens. Paracetamol and ibuprofen were also used.

Conclusion: This report is a unique case of synchronization of third cranial nerve palsy and isolated IVH without SAH due to ACOM aneurysm. In addition, it could be interesting to re-emphasize the need for a comprehensive assessment of traumatic patients for finding some primary pathologies, which could result in an accident.

Keywords: Third nerve palsy, Anterior communicating artery aneurysm, Intraventricular hemorrhage, Subarachnoid hemorrhage, Car accident.

Introduction

Third cranial nerve palsy generally occurs due to internal carotid and posterior communicating artery aneurysm. Aneurysms originating from the basilar artery and superior cerebellar artery have also been reported with third nerve palsy.^{1,2} Though, the posterior communicating artery is the most common involved artery in third nerve paresis. An anterior communicating (ACOM) aneurysm is a rare reason that could lead to oculomotor dysfunction. Although, ACOM aneurysm and oculomotor nerve paresis, as an uncommon occurrence, is the most general site of sub arachnoid hemorrhage (SAH), which accounts for 40% of aneurysm-related SAHs.³ Furthermore, the ACOM ruptured aneurysm may present with intraventricular hemorrhage (IVH) and SAH but isolated IVH is a rare finding.⁴ In the present article, we introduce a case of unilateral oculomotor

nerve palsy and ACOM aneurysm along with an isolated IVH that was admitted to the hospital because of head trauma after a car accident.

Case presentation

A 56-year-old male admitted to the hospital emergency department because of trauma after a car accident. The patient had been well until the day of admission when he while driving alone, his vehicle rolled over. At the time of admission, the patient reportedly had blunt head trauma and was not conscious (Glasgow coma scale of 7). The emergency medical service responders intubated him and he was immobilized with a cervical collar. Based on past history, he had no hypertension, diabetes mellitus and tobacco addiction. She (or he) had no known allergies.

On examination in the emergency department, vital signs

were stable. There were not any abrasions or other evidence of accidents on his head and neck. The patient was opening his right eye with painful stimulation but had ptosis of the left eye with nonreactive mydriasis (Figure-1, A, B). Auscultation of lungs was clear. The abdomen was soft and not distended without rebound tenderness and guarding. There were fair and symmetric pulses in the upper and lower extremities. Based on laboratory tests, hematocrit, electrolytes, BUN/Cr, liver and renal functions were normal. Also, electrocardiogram was normal. Radiographs of chest, abdomen and pelvic showed no pleural effusion, evidence of perforation and fractures. Brain CT-scan that was performed soon after admission showed IVH in lateral ventricles without any evidence of hematoma, pneumocephaly, contusion, hydrocephalus or SAH (Figure-1, C). Additionally, there was no evidence of orbital fracture in CT (data not shown). The patient was treated with the diagnosis

of diffused axonal injury due to head trauma for 2 weeks and in this period of time, the GCS of the patient improved to 8 and tracheostomy was conducted. After 2 weeks, the patient was consulted with our department and we request to perform brain-CT angiography with suspicion of vascular disorder. CT-angiography revealed a saccular ACOM aneurysm measuring 6mm×8mm (Figure-1, D, E). The patient underwent pterional craniotomy. After dissection, a saccular superoposteriorly projected ACOM aneurysm was observed, which had a small clot located around, especially at the dome of the aneurysm. The clipping was performed using a 5 mm curve Yasargil aneurysmal clip (Aesculap, USA). No clinical vasospasm was detected after surgery. The process of weaning from the ventilator was performed during one week and the patient discharged 14 days later with a minimally conscious state and spontaneous breathing.

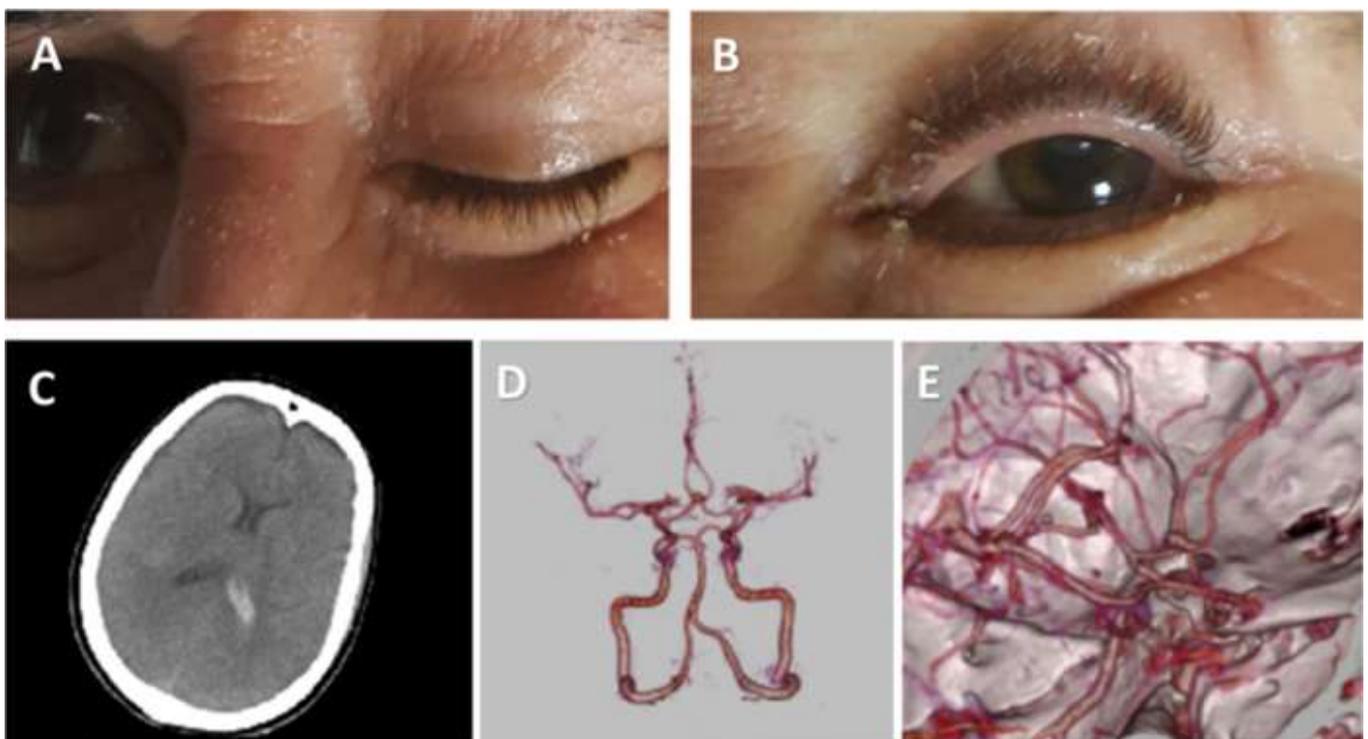


Figure-1. Clinical photograph showing left ptosis and left dilated pupil of the patient (A, B). Brain CT showed Intraventricular hemorrhage in left occipital horn (C) and CT angiography revealed Acom aneurysm with superoposterior projection (D, E).

Discussion

Many signs related to vascular events and consequent loss of consciousness could be easily incorrectly explained in a setting of trauma, especially when these events are a result of a car accident. In the present case who has been admitted to **the emergency department because of trauma the patient's** condition and lack of consciousness distract the doctors from

the underlying disease. However, when the patient becomes stable, the evaluation for the second time raised suspicion of an aneurysm that results in a car accident, oculomotor nerve palsy and IVH.

Oculomotor nerve palsy can be a result of infarction, hemorrhage, tumors, demyelination, trauma, inflammation and cerebral aneurysm.⁵ The most frequent cause of isolated

third nerve palsy with pupillary involvement is compression by an enlarging intracranial aneurysm. The posterior communicating artery, internal carotid artery, posterior cerebral artery and basilar artery are common involving arteries in oculomotor nerve palsy secondary to an aneurysm.^{1,2} The possible outlined mechanisms include: increased intracranial pressure, direct compression of the third nerve which is not anatomically practical for ACOM aneurysm, subarachnoid clot and oculomotor nerve ischemia. Moreover, ACOM aneurysm can produce third nerve paresis as a rare finding.⁶⁻⁸ Balossier *et al.*, demonstrated that this paresis resulted from compression of the nerve generated by an interpeduncular hematoma associated with ACOM aneurysm.⁹ White *et al.*, described a rare case of an isolated oculomotor palsy in a patient who experienced SAH from an ACOM aneurysm.⁸ Aiba *et al.*, indicated that SAH with elevated intracranial pressure due to ACOM aneurysm may have caused the oculomotor nerve paresis.¹⁰

Ruptured cerebral aneurysms with no evidence of SAH are extremely rare, just a few studies represented this phenomenon. Thai *et al.*, demonstrated a 1.6% incidence of aneurysmal rupture with IVH and/or IVH without SAH and also indicated that ruptured aneurysm without SAH may have a multifactorial cause related to the timing of CT imaging, physiological parameters, or location of the aneurysm.⁴

Conclusions

This report is a unique case of synchronization of third cranial nerve palsy and isolated IVH without SAH due to ACOM aneurysm. In addition, it can be interesting to re-emphasize the need for a comprehensive assessment of traumatic patients for finding some primary pathologies, which could result in an accident.

Acknowledgments

None.

Authors' Contribution

S.O.Y: Study design and case presentation; Maryam Golmohammadi & M.A: Writing manuscript; M.O.Y: Review Article; V.N: Data gathering and image preparation; EF & AZ: Supervision.

Conflict of Interests

The authors declared no potential conflict of interests with respect to the research, authorship, and/or publication of this article.

Funding/Support

The authors received no financial funding or support for the research.

References

1. Fujiwara S, Fujii K, Nishio S, Matsushima T, Fukui M. Oculomotor nerve palsy in patients with cerebral aneurysms. *Neurosurg Rev.* 1989;12(2):123-132. doi:10.1007/BF01741485
2. Kassis SZ, Jouanneau E, Tahon FB, Salkine F, Perrin G, Turjman F. Recovery of third nerve palsy after endovascular treatment of posterior communicating artery aneurysms. *World Neurosurg.* 2010;73(1):11-16; discussion e2. doi:10.1016/j.surneu.2009.03.042
3. Inagawa T. Site of ruptured intracranial saccular aneurysms in patients in Izumo City, Japan. *Cerebrovasc Dis.* 2010;30(1):72-84. doi:10.1159/000314623
4. Thai Q-A, Raza SM, Pradilla G, Tamargo RJ. Aneurysmal rupture without subarachnoid hemorrhage: case series and literature review. *Neurosurgery.* 2005;57(2):225-229. doi:10.1227/01.NEU.0000166535.59056.FA
5. Woodruff MM, Edlow JA. Evaluation of third nerve palsy in the emergency department. *J Emerg Med.* 2008;35(3):239-246. doi:10.1016/j.jemermed.2007.04.020
6. Fairbanks C, White JB. Oculomotor nerve palsy in the setting of an anterior cerebral A2 segment aneurysm. *J Neurointerv Surg.* 2011;3(1):74-76. doi:10.1136/jnis.2010.002964
7. Kang SD. Ruptured anterior communicating artery aneurysm causing bilateral oculomotor nerve palsy: a case report. *J Korean Med Sci.* 2007;22(1):173-176. doi:10.3346/jkms.2007.22.1.173
8. White JB, Layton KF, Cloft HJ. Isolated third nerve palsy associated with a ruptured anterior communicating artery aneurysm. *Neurocrit Care.* 2007;7(3):260-262. doi:10.1007/s12028-007-0054-4
9. Balossier A, Postelnicu A, Khouri S, Emery E, Derlon J-M. Third nerve palsy induced by a ruptured anterior communicating artery aneurysm. *Br J Neurosurg.* 2012;26(5):770-772. doi:10.3109/02688697.2012.665516
10. Aiba T, Fukuda M. Unilateral oculomotor nerve paresis associated with anterior communicating artery aneurysm rupture--two case reports. *Neurol Med Chir (Tokyo).* 2003;43(10):484-487. doi:10.2176/nmc.43.484