



IN-HOSPITAL REBLEEDING FOLLOWING PERIMESENCEPHALIC SUBARACHNOID HEMORRHAGE

¹Tigran Petrosyan, MD, ¹Georgios Mantziaris, MD, ¹Georgios Arealis, MD, ²Eftychios Archontakis, MD,
¹*Stylianios Pikiis, MD, MSc

¹Department of Neurosurgery, "Korgialenio Benakio" Red Cross Hospital of Athens, Athens, Greece.

²Department of Interventional Neuroradiology, "Korgialenio Benakio" Red Cross Hospital of Athens, Athens, Greece.

*Corresponding Author: Dr. Stylianios Pikiis

Department of Neurosurgery, "Korgialenio Benakio" Red Cross Hospital of Athens, Athens, Greece.

Article Received on 24/08/2018

Article Revised on 13/09/2018

Article Accepted on 04/10/2018

ABSTRACT

Perimesencephalic subarachnoid hemorrhage is a variant of subarachnoid hemorrhage of unknown etiology and generally good prognosis. In-hospital rebleeding is an extremely rare but potentially lethal complication of perimesencephalic subarachnoid hemorrhage. We report on a 77-year-old female with a history of hypertension and anticoagulant use due to atrial fibrillation who was admitted to the Neurosurgery department due to World Federation of Neurological Surgeons Grade I subarachnoid hemorrhage. Head, Non Contrast Computerized Tomography (NCCT) scan revealed a perimesencephalic bleeding pattern. Cerebral Magnetic Resonance (MR) Imaging and MR Angiography did not reveal any abnormalities. Within hours of admission, the patient experienced rapid neurologic deterioration and was intubated. Repeat head NCCT scan demonstrated rebleeding. Cerebral Digital Subtraction Angiography revealed active contrast extravasation from the right Anterior Inferior Cerebellar Artery. Glubran embolization was performed and an external ventricular drain was then placed. However, the patient succumbed to her disease two weeks later. Early rebleeding is an extremely rare, but potentially lethal complication of perimesencephalic subarachnoid hemorrhage. Development of new neurologic symptoms should alert the physician about the possibility of rebleeding. Moreover, patients and their families should be informed about the very low probability of rebleeding and poor outcome.

KEYWORDS: Perimesencephalic; Subarachnoid hemorrhage; Rebleeding; In-hospital.

INTRODUCTION

Non-aneurysmal, perimesencephalic subarachnoid hemorrhage (PMSAH) is a benign variant of subarachnoid hemorrhage of unknown etiology and generally good prognosis.^[1] It is a diagnosis of exclusion, usually defined using the Rinkel et al.^[2] head, non-contrast, computerized tomography (NCCT) scan criteria and a negative cerebral angiographic study.^[1,2]

Rebleeding during hospitalization for PMSAH has been rarely described.^[3-6] We report on a 77-year old female patient who presented with PMSAH and suffered of two episodes of image documented rebleeding within 24 hours of admission. Cerebral Digital Subtraction Angiography obtained during rebleeding was significant for contrast extravasation from the right Anterior Inferior Cerebellar Artery (AICA). To the best of our knowledge, this is the fifth case of recurrent bleeding during hospitalization for PMSAH reported.

CASE REPORT

A 77-year-old, obese female with a history of hypertension and warfarin use for atrial fibrillation

presented to the Neurosurgery emergency room due to sudden onset, increasing in severity headache of two hours duration. She reported two episodes of vomiting and mild neck pain. Other than nuchal rigidity physical examination was unremarkable (World Federation of Neurological Surgeons Grade I). The patient denied any history of head trauma. Admission head, non-contrast, computerized tomography (NCCT) scan revealed PMSAH (fig 1A,B). Her INR was 1.96. The patient was admitted in the Neurosurgery department and anticoagulant reversal agents were administered. Brain Magnetic Resonance (MR) Image and MR Angiography did not reveal any abnormalities (fig 1C). Approximately twelve hours post-ictus the patient was intubated due to rapid neurologic deterioration. Urgent, head, NCCT scan was significant for rebleeding (fig 1D). Cerebral Digital Subtraction Angiography (DSA) followed, which demonstrated contrast extravasation from the right AICA (fig 2A,B). Coil embolization of the bleeding artery was unsuccessful thus, occlusion of the right AICA using undiluted Glubran was done (fig 1C) and an external ventricular drain was placed. The patient was transferred to the Intensive Care Unit for further management.

However, she succumbed to her disease fourteen days following the initial bleeding. Autopsy was declined by the family of the patient.

Figure 1:

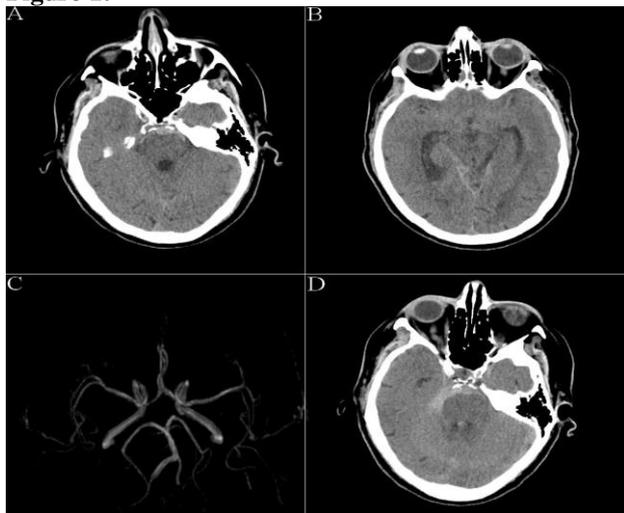


Figure 1: (A,B) Axial, non-contrast enhanced, head, computerized tomography (CT) scan demonstrating perimesencephalic subarachnoid haemorrhage, (C) Brain, Magnetic Resonance Angiography did not reveal any vascular abnormalities, (D) Axial, non-contrast enhanced, head, CT scan significant for rebleeding.

Figure 2:

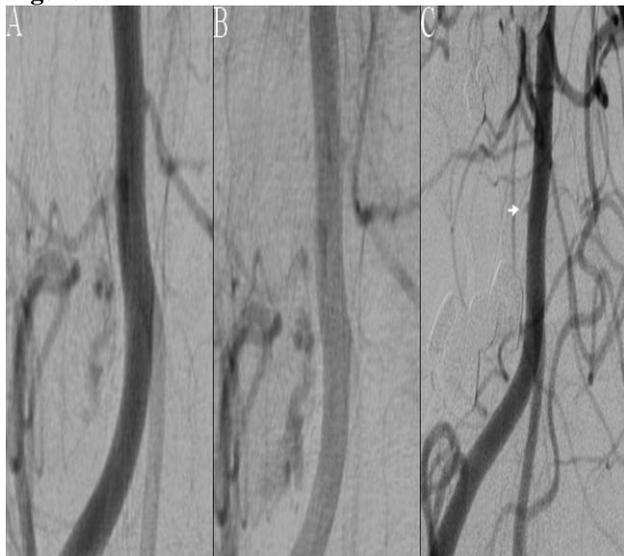


Figure 2: (A,B) Right, Vertebral artery anterior-posterior Digital Subtraction Angiography (DSA) demonstrating active contrast extravasation from the Right Anterior Inferior Cerebellar Artery (AICA), (C) Right, vertebral artery, anterior-posterior, following undiluted, Glubran embolization demonstrating right AICA occlusion (arrow).

DISCUSSION

We report on the rare case of a 77-year-old female who suffered of fatal, in-hospital rebleeding hours after

presenting with PMSAH. Including the case presented here there have been only five cases of rebleeding during the acute phase of PMSAH reported. Of these, the first patient experienced two episodes of rebleeding within the first 24 hours of PMSAH presentation for which no bleeding source was identified after extensive workup.^[3] In the second patient, a dysplastic basilar artery terminus was diagnosed by CT angiography^[4] and in the third patient, aneurysmal SAH was suggested on NCCT scan obtained after the second hemorrhage.^[5] The fourth patient experienced rebleeding five days after the index event and three days after initiation of carbasalate sodium and intravenous heparin for an acute coronary syndrome.^[6] This patient had an 8mm right middle cerebral artery aneurysm which could not be definitely excluded neither as the source of initial nor as the source of the second bleeding.^[6] Our patient suffered of at least two episodes of rebleeding documented by non-contrast, head, CT scan and cerebral DSA respectively. However, despite the fact that the right AICA was definitely documented as the bleeding source, no underlying vessel pathology was identified on DSA. Subsequently, the etiology of PMSAH and recurrent bleeding in our patient is unclear with two different scenarios possible: First, the patient may have suffered rupture of a right AICA blister aneurysm. Transient elevation of intracranial pressure resulted in aneurysmal thrombosis thus, bleeding stopped leading to PMSAH presentation. The aneurysm remained undetected on MR angiography only to rebleed hours after the index event. Active bleeding during cerebral DSA did not allow identification of the aneurysm. Second, our patient suffered from multiple cardiovascular risk factors thus spontaneous AICA bleeding occurred in the context of generalized angiopathy. Blood in the subarachnoid space may have then caused immediate, local AICA vasospasm halting the bleeding and leading to PMSAH presentation. Reversal of vasospasm then occurred causing rebleeding.

PMSAH is diagnosed by non-contrast, computerized tomography (CT) scan of the head using the criteria defined by Rinkel *et al* as: (1) center of the hemorrhage located immediately anterior to the midbrain, with or without extension of blood to the anterior part of the ambient cistern or to the basal part of the sylvian fissure; (2) no complete filling of the anterior inter-hemispheric fissure and no extension to the lateral sylvian fissure, except for minute amounts of blood; (3) absence of frank intraventricular hemorrhage.^[2] Head NCCT scan should be followed by a cerebral angiographic study which if negative is diagnostic for PMSAH.^[1,2] CT angiography is a non-invasive, cost effective, highly sensitive, and specific, diagnostic modality to rule out aneurysms in patients presenting with PMSAH.^[3,7] MR angiography has comparable sensitivity and slightly lower specificity to CT angiography in the diagnosis of intracranial aneurysms. However, due to higher costs compared to CT angiography, need for patient transport, and less wide availability, MR angiography should be considered as the primary diagnostic tool only in patients with PMSAH

and documented iodinated contrast agent allergy, severe renal impairment or who have undergone previous coiling.^[8] At the time of admission of our patient, due to local institutional constraints in performing CT angiography, MR angiography was preferred as the initial diagnostic cerebral angiographic study.

In conclusion, we report on a patient who suffered from two documented episodes of recurrent bleeding during the acute phase of PMSAH. Early rebleeding following PMSAH presentation is associated with dismal prognosis. Thus, in the patient admitted in the hospital due to PMSAH, increasing in severity headache or a change in neurologic examination should raise the suspicion of rebleeding and drive utilization of appropriate image studies. Moreover, patients with PMSAH and their families should be counseled about the very low probability of rebleeding and poor outcome.

Disclosure Statement

The authors report no financial support and no conflicts of interest.

REFERENCES

1. Kapadia A, Schweizer TA, Spears J, et al. Nonaneurysmal perimesencephalic subarachnoid hemorrhage: diagnosis, pathophysiology, clinical characteristics, and long-term outcome. *World neurosurgery*, 2014 Dec 31; 82(6): 1131-43.
2. Rinkel GJ, Wijdicks EF, Vermeulen M, et al. Nonaneurysmal perimesencephalic subarachnoid hemorrhage: CT and MR patterns that differ from aneurysmal rupture. *American journal of neuroradiology*, 1991 Sep 1; 12(5): 829-34.
3. Kauw F, Velthuis BK, Kizilates U, van der Schaaf IC, Rinkel GJ, Vergouwen MD. Recurrent Bleeding After Perimesencephalic Hemorrhage. *World neurosurgery*, 2017 Dec 1; 108: 990-e17.
4. Andaluz N, Zuccarello M. Yield of further diagnostic work-up of cryptogenic subarachnoid hemorrhage based on bleeding patterns on computed tomographic scans. *Neurosurgery*, 2008 May 1; 62(5): 1040-7.
5. İldan F, Tuna M, Erman T, et al. Prognosis and prognostic factors in nonaneurysmal perimesencephalic hemorrhage: a follow-up study in 29 patients. *Surgical neurology*, 2002 Mar 1; 57(3): 160-5.
6. Van der Worp HB, Fonville S, Ramos LM, et al. Recurrent perimesencephalic subarachnoid hemorrhage during antithrombotic therapy. *Neurocritical care.*, 2009 Apr 1; 10(2): 209.
7. Cruz JP, Sarma D, De Tilly LN. Perimesencephalic subarachnoid hemorrhage: when to stop imaging?. *Emergency radiology.*, 2011 Jun 1; 18(3): 197-202.
8. Sailer AM, Wagemans BA, Nelemans PJ, de Graaf R, van Zwam WH. Diagnosing intracranial aneurysms with MR angiography: systematic review and meta-analysis. *Stroke*. 2013 Jan 1; STROKEAHA-113.