

Acute Neurological Deterioration In a 19-Year-Old Woman: Emergency Recognition of a Complex Frontal Hemorrhage Secondary to the Rupture of a Pericallosal Artery Aneurysm

Zuccon William¹, Zito Antonio², Astorri Silvia³, Gualdoni Livio⁴, Fioravanti Antonio⁵
Acquistapace Giulia¹.

1Emergency Department, 2Neurology and Stroke Unit, ASST Crema – Ospedale Maggiore, Crema, Italy.

3Radiology Unit, ASST Crema – Ospedale Maggiore, Crema, Italy.

4Anesthesiology and Intensive Care Unit, ASST Crema – Ospedale Maggiore, Crema, Italy.

5Neurosurgical Unit, ASST Cremona – Ospedale Maggiore, Cremona, Italy.

wzuccon@libero.it

doi: <https://doi.org/10.37745/bjmas.0613>

Published September 24, 2026

Citation: William Z., Antonio Z., Silvia A., Livio G., Antonio F., Giulia A. (2026) Acute Neurological Deterioration In a 19-Year-Old Woman: Emergency Recognition of a Complex Frontal Hemorrhage Secondary to the Rupture of a Pericallosal Artery Aneurysm, *British Journal of Multidisciplinary and Advanced Studies*,7(5),13-20

Abstract: Rupture of a pericallosal artery aneurysm is a rare but highly time-dependent condition, responsible for acute neurological deterioration and significant morbidity. Pericallosal aneurysms account for less than 9% of intracranial aneurysms and approximately 4% of ruptured aneurysms, with a reported mortality ranging between 6.5% and 6.8% in treated cases and a high incidence of complications such as vasospasm and hydrocephalus. We present the case of a 19-year-old woman who, upon awakening in the morning, developed sudden nuchal headache, nausea, loss of consciousness, and subsequent mental status deterioration with aphasia, leftward gaze deviation with left anisocoria and afinalistic limb movements. Multidisciplinary emergency management enabled rapid diagnosis of frontal intraparenchymal hemorrhage, bilateral subarachnoid hemorrhage and tetra-ventricular hemorrhage. The patient was stabilized, intubated and transferred to the referral neurosurgical center within two hours of arrival. This case highlights the importance of early recognition, prompt imaging and coordinated emergency management to reduce mortality and morbidity.

Keywords: Pericallosal artery aneurysm, subarachnoid hemorrhage, neurological emergency.

INTRODUCTION

Pericallosal artery aneurysms represent a rare subset of aneurysms of the anterior cerebral artery (ACA), typically located in the distal segments of the ACA along the pericallosal course. Despite their low frequency, rupture of a pericallosal artery aneurysm constitutes an acute neurological emergency of high clinical complexity, characterized by rapid deterioration of consciousness, a substantial risk of intraparenchymal and intraventricular hemorrhage and significant morbidity related to vascular complications and involvement of the medial frontal structures (1,2).

The clinical presentation is often dramatic, as sudden headache, loss of consciousness, focal neurological deficits and altered mental status may mimic other neurological emergencies such as subarachnoid hemorrhage from more common aneurysms, epileptic seizures, acute encephalopathies, or structural lesions of the frontal lobe. Timely diagnosis is therefore essential and requires a multidisciplinary approach involving emergency physician, neurologist, anesthesiologist - intensivist and neurosurgeon, with the aim of rapidly stabilizing the patient while maintaining adequate blood pressure values, performing advanced imaging and ensuring transfer to a specialized center as quickly as possible (3).

Initial management of these cases is highly time-dependent, as the first hours after symptom onset represent a critical window in which the risk of re-rupture is maximal and prognosis can be significantly influenced by the speed of clinical decision making. Neuroprotective strategies, airway control, hemodynamic stabilization, and the use of medications aimed at reducing intracranial pressure or early bleeding risk are fundamental components of early treatment (4).

In this report, we describe the case of a 19-year-old woman who developed acute neurological deterioration upon awakening, presenting with a severe and rapidly evolving clinical picture. The diagnosis of ruptured pericallosal artery aneurysm was obtained through brain CT and contrast-enhanced angioCT and emergency management was conducted in a coordinated and multidisciplinary manner, allowing transfer to the referral neurosurgical center within two hours of arrival in the Emergency Department. This case provides an opportunity to discuss the clinical, pathophysiological and management features of this rare condition, highlighting the critical aspects of early diagnosis and initial treatment.

CLINICAL CASE

A 19-year-old woman with no relevant medical history or drug allergies developed sudden nuchal headache, nausea and loss of consciousness upon awakening. After partial recovery of alertness, she exhibited progressive mental status deterioration with altered sensorium, aphasia, leftward gaze deviation with left anisocoria and limb rigidity with afinalistic movements. On evaluation, her GCS was 9 (Eye Opening: 3 – Verbal Response: 1 – Motor Response: 5), with inability to answer simple questions and localization to pain, stable vital signs and no evident trauma. Blood tests were within normal limits except for mild hypokalemia (Potassium: 3.31 mmol/L) and hyperglycemia (Glucose: 203 mg/dL). Arterial blood gas analysis showed mild compensated metabolic acidosis (pH 7.345 - HCO_3^- 21 mmol/L - BE -4.4), globally nonspecific findings but likely consistent with acute stress and probable cerebral hypoperfusion. Toxicology screening was negative. EEG revealed no epileptiform abnormalities, indicating diffuse cerebral distress, nonspecific but consistent with acute injury. Due to agitation and neurological deterioration, and in preparation for brain CT and contrast enhanced angioCT, sedation was performed with Midazolam 2 mg and Ketamine 50 mg. CT imaging showed a right frontal intraparenchymal hemorrhage associated with bilateral frontal subarachnoid hemorrhage and tetraventricular hemorrhage (**Fig. 1**), outlining a complex hemorrhagic pattern compatible with an acute vascular lesion (**Fig. 2**).

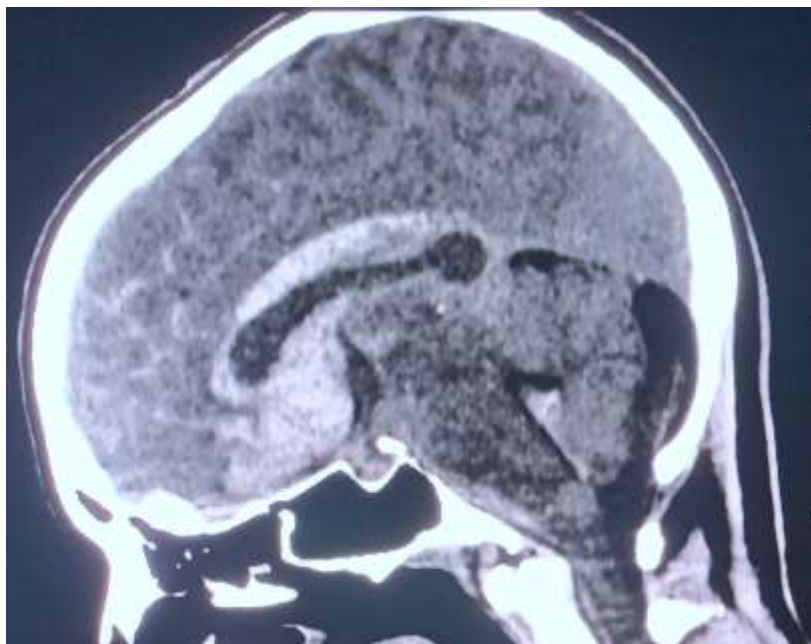


Fig. 1: Simultaneous involvement of the intraparenchymal, subarachnoid and ventricular spaces.

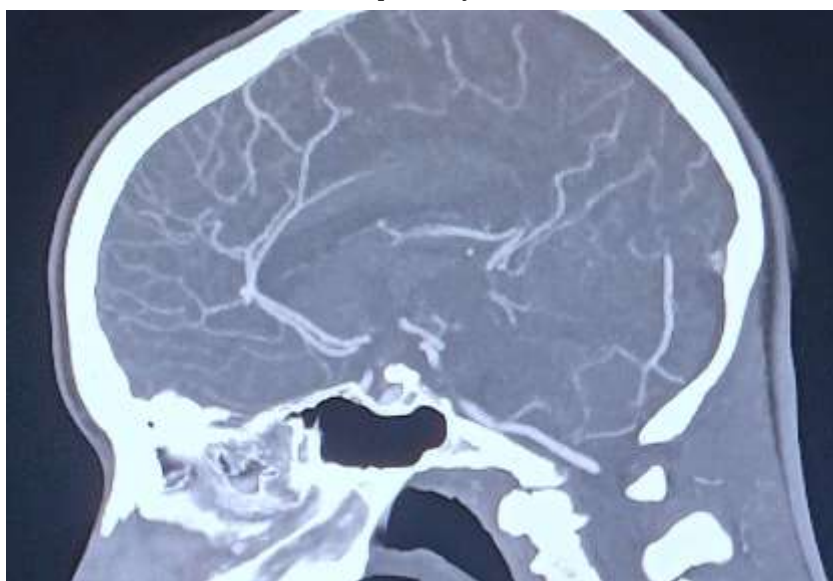


Fig. 2: Irregularity and focal contrast enhancement involving the distal branches of the anterior cerebral artery.

Given the progressive neurological decline and risk of airway compromise, orotracheal intubation was performed using Midazolam 3 mg, Propofol 50 mg, Fentanyl 100 mcg and Rocuronium 60 mg, and the left radial artery was cannulated. Meanwhile, therapy with Tranexamic Acid 1 g and Mannitol 200 ml was administered, and blood pressure was maintained within target limits. Following stabilization, within 2 hours of Emergency Department arrival, the patient was safely transferred to the referral neurosurgical center after coordinated management involving emergency physician, neurologist, radiologist, intensivist, neurosurgeon and the operating room team. The patient subsequently underwent neurosurgical treatment and was successfully extubated within

24 hours, maintaining satisfactory clinical stability.

DISCUSSION

Pericallosal artery aneurysms represent a subset of aneurysms of the anterior cerebral artery (ACA). They occur predominantly in females (approximately 70%) and have a mean age of presentation of around 50 years (5). They account for about 9% of all intracranial aneurysms, and rupture is reported in approximately 4% of cases, with a reported mortality ranging between 6.5% and 6.8% in treated cases. Beyond acute hydrocephalus, the most frequent complication is post-hemorrhagic vasospasm, observed in 56.5% of cases and capable of causing secondary cerebral ischemia (6). The 19-year-old patient described in this report represents an exceptionally early presentation compared with epidemiological data reported in the literature (7).

From an anatomical and pathophysiological perspective, the pericallosal artery is the main distal branch of the anterior cerebral artery, a vascular district characterized by anatomical variability and bifurcations with acute angles (8). It courses along the superior surface of the corpus callosum, following its curvature, and supplies the medial frontal lobes and paracallosal structures. In classical anatomical definitions, the pericallosal artery continues the ACA trajectory after the origin of the callosomarginal artery. Because the callosomarginal artery may be hypoplastic or absent, modern angiographic definitions identify the pericallosal artery as the ACA segment that, starting from the anterior communicating artery, follows the margin of the corpus callosum in the A2–A3 segments, making it equivalent to the concept of 'distal ACA'. Aneurysm formation is typically favored by hemodynamic patterns associated with acute vessel angles, hypertension and hemodynamic stress, congenital arterial wall abnormalities, and genetic predisposition, while rupture usually results in frontal hemorrhage, interhemispheric hemorrhage, and/or intraventricular bleeding (9).

When pericallosal artery aneurysms rupture, they generate a typical and violent clinical picture due to blood distribution within the interhemispheric fissure and anterior cisterns (10). Symptoms are characterized by hyperacute onset with rapid neurological compromise and include:

- sudden thunderclap headache, reaching maximal intensity within seconds, caused by acute meningeal distension and irritation of dural nociceptors;
- loss of consciousness, immediate or within minutes, due to abrupt intracranial pressure elevation, reduced global cerebral blood flow, and the rapid 'jet' of blood reaching anterior and superior cisterns where structures regulating arousal are located;
- focal deficits such as aphasia and gaze deviation, consistent with the anatomical location of the aneurysm, due to irritative involvement of medial frontal areas or mass effect from interhemispheric blood, altering executive functions, language and ocular control;
- seizure-like movements, which do not represent true epileptic seizures but result from acute cortical dysfunction caused by blood irritation, transient hypoperfusion and abrupt intracranial pressure rise;
- rapid neurological deterioration, with possible acute hydrocephalus and early vasospasm, quickly leading to coma, respiratory instability, need for orotracheal intubation and risk of herniation.

Laboratory findings showed mild hypokalemia (3.31 mmol/L), an aspecific finding likely related to acute stress, while hyperglycemia (203 mg/dL) represents a physiological stress response frequently observed in cerebral hemorrhage and may serve as a marker of severity (11). Elevated glucose levels are associated with worse neurological outcomes because they promote tissue acidosis, perihematomal edema, and amplification of the inflammatory cascade. In acute cerebral injury, hyperglycemia favors anaerobic glucose metabolism, resulting in lactate production and increased tissue acidosis; the acidic environment reduces neuronal survival and amplifies secondary ischemic injury around the hematoma (12).

In acute cerebral hemorrhage, immediate CT imaging is the fastest and most reliable diagnostic tool for identifying the underlying vascular lesion. Its high sensitivity for detecting fresh blood allows rapid definition of the location, extent, and distribution of hemorrhage. However, when bleeding extends across multiple compartments, the hematoma mass may obscure small vascular structures, making visualization of distal vessels difficult and complicating differential diagnosis with other causes such as arteriovenous malformations (13).

In the context of acute aneurysmal rupture, initial management includes airway stabilization, necessary when consciousness is impaired, to ensure adequate oxygenation during diagnostic procedures and transfer. Hemodynamic control is essential to avoid hypotension, which compromises cerebral perfusion and hypertensive peaks, which may trigger further bleeding. Neuroprotective measures aim to limit secondary injury by preventing early re-rupture, maintaining normothermia and normotension, optimizing metabolic control, reducing the risk of hydrocephalus and preventing seizures. Rapid transfer to a neurosurgical center is crucial to ensure timely surgical intervention, which is essential for intracranial pressure control and stabilization of the neurological condition. Early intervention is a key factor in preventing clinical deterioration and improving outcomes (14). A critical temporal window exists in aneurysmal rupture, involving the stabilization phase and initial diagnostic pathway. The first 2–3 hours are decisive for reducing mortality and morbidity, as this interval concentrates the most immediate complications, including respiratory instability, neurological deterioration and re-rupture risk, which peaks within the first 6 hours. The goal during this phase is rapid clinical stabilization to allow safe access to the operating room. Definitive aneurysm treatment should ideally be performed within 24 hours, as excessively early intervention in an unstable patient increases mortality and intraoperative complications (15).

Treatment choice depends primarily on aneurysm morphology, accessibility of the distal ACA segment and the patient's clinical condition at diagnosis. Microsurgical clipping is described as an effective option due to the possibility of direct exposure of the aneurysm neck and safe management of the parent vessel, with favorable outcomes (16). Endovascular techniques may be more challenging due to distal segment tortuosity and anatomical variability of the pericallosal district (17). In the present case, microsurgical clipping of the aneurysm was performed, an approach described in the literature as particularly effective for excluding distal ACA aneurysms and associated with a low recurrence risk. External ventricular drainage, indicated in cases of intraventricular hemorrhage or acute hydrocephalus secondary to aneurysm rupture, allows immediate intracranial pressure control, facilitates clinical stabilization, and represents an essential complementary intervention. In all cases, therapeutic choice must be individualized, as indicated by systematic reviews, based on rupture risk,

anatomical characteristics and technical availability of the treating center (18–19).

CONCLUSION

Rupture of a pericallosal artery aneurysm is a rare, highly time-dependent condition of considerable clinical complexity, characterized by sudden neurological deterioration and an extremely narrow therapeutic window.

Pericallosal aneurysm rupture produces a hyperacute clinical picture in which the interhemispheric distribution of blood explains the frequent involvement of fronto-medial functions, while the abrupt rise in intracranial pressure and meningeal irritation account for the dramatic symptoms and rapid patient instability.

Sudden headache associated with altered consciousness must be regarded as an absolute red flag: in the absence of trauma, this clinical presentation should always raise suspicion for aneurysmal rupture until proven otherwise. Early recognition of this symptom pattern is essential to avoid diagnostic delays that increase the risk of re-rupture and worsen prognosis.

CT remains the essential diagnostic cornerstone, guiding the need for urgent angioCT, enabling rapid identification of hemorrhage, providing immediate assessment of severity, and allowing prompt initiation of the therapeutic pathway, an element that is decisive for prognosis in acute bleeding, and subsequently directing neurosurgical management.

Transfer within 2 hours of Emergency Department arrival is fully aligned with international recommendations for the management of aneurysmal hemorrhage and was a key factor in improving survival and reducing morbidity.

Prognosis critically depends on how rapidly the patient is recognized, stabilized, and transferred to a neurosurgical center, and this case demonstrates how timely Emergency Department management can significantly influence survival and neurological outcome.

Multidisciplinary management proved decisive, as coordinated teamwork ensured effective stabilization, airway protection, hemodynamic control, and prevention of early complications. Administration of neuroprotective therapy is appropriate in the pre-surgical phase, contributing to reducing the risk of re-rupture, controlling edema, and limiting intracranial pressure elevation.

In conclusion, this case highlights how awareness of rare clinical presentations, the ability to promptly recognize warning signs, and immediate activation of a multidisciplinary pathway are fundamental to ensuring effective, life-saving management. Emergency Department personnel must be prepared to identify and rapidly treat these conditions, as every minute can significantly influence patient outcome.

REFERENCES

1. Aguiar P, Estevao IA, Pacheco CC, Maldaun M, Oliveira C. Distal anterior cerebral artery (pericallosal artery) aneurysms: report of 19 cases and literature review. *Turk Neurosurg* 2017; 27: 725-31 - DOI:10.5137/1019-5149.JTN.17412-16.2
2. Badejo OA, Adeolu AA. Pericallosal artery aneurysm – Case report, literature review and management outcome. *Int J Surg Case Rep* 2020; 68:32-35 - DOI:10.1016/j.ijscr.2020.02.022
3. Nirvana IW, Putra MB, Lauren C, Mote Y, Kencana S. Ruptured Pericallosal Artery Aneurysm: A Case Report. *Caspian J Neurol Sci* 2025; 11:95 - DOI:10.32598/CJNS.11.40.474.3
4. Treggiari MM, Rabinstein AA, Busl KM, Cailor MM, Citerio G, Deem S, Diringer M, Fox E, Livesay S, Sheth KN, Suarez J, Tjoumakaris S. Guidelines for the Neurocritical Care Management of Aneurysmal Subarachnoid Hemorrhage. *Neurocrit Care* 2023; 39:1–28 - DOI:10.1007/s12028-023-01713-5
5. Badary A, Alrefaie K, Azab MA, Almealay YF, Alibraheemi MQ, Awuah WA, Hernandez – Hernandez A, Alrubaye SN, Ansari NM, Tanrikulu L and Atallah O. Pericallosal artery aneurysms: an evidence - based analysis of clinical presentations, therapeutic approaches, and outcome. *Neurosurg Rev* 2025; 48:348 - DOI:10.1007/s10143-025-03500-6
6. Souza JVA, Zicarelli CAM, Pereira VGB, Afornali S. Pericallosal Artery Aneurysm: systematic review. *J Bras Neurocir* 2020; 31:216-223
7. Rhoton AL Jr. The supratentorial arteries. *Neurosurgery* 2002; 51 Suppl 4
8. Kakou M, Destrieux C, Velut S. Microanatomy of the pericallosal arterial complex. *J Neurosurg* 2000; 93:667-75 - DOI:10.3171/jns.2000.93.4.0667
9. Nagaraj A, Majmundar N, Jumah F, Raju B, Nanda A, Interhemispheric Approach for Clipping of a Pericallosal Artery Aneurysm: 2-Dimensional Operative Video. *World Neurosurg* 2022; 161:90 - DOI:10.1016/j.wneu.2022.01.093
10. Hoh BL, Ko NU, Amin-Hanjani S, Chou SHY, Cruz-Flores S, Dangayach NS, Derdeyn CP, Du R, Hänggi D, Hets SW, Ifejika NL, Johnson R, Keigher KM, Leslie-Mazwi TM, Lucke-Wold B, Rabinstein AA, Robicsek SA, Stapleton CJ, Suarez JI, Tjoumakaris SI, Welch BG. Guideline for the Management of Patients With Aneurysmal Subarachnoid Hemorrhage. *Stroke*. 2023; 54:314 - DOI:10.1161/STR.0000000000000436
11. Capes SE, Hunt D, Malmberg K, Pathak P, Gerstein HC. Stress hyperglycemia and prognosis of stroke in nondiabetic and diabetic patients: a systematic overview. *Stroke* 2001; 32:2426–32 - DOI:10.1161/hs1001.096194
12. Krzyt ND, Biessels GJ, Devries JH, et al. Hyperglycemia in acute ischemic stroke: pathophysiology and clinical management. *Nat Rev Neurol* 2010; 6:145–55 - DOI:10.1038/nrneurol.2009.231
13. Agid R, Lee SK, Willinsky RA, Farb R, terBrugge KG. Acute subarachnoid hemorrhage: using 64-slice multidetector CT angiography to 'triage' patients treatment. *Neuroradiology* 2006; 48:787-94 - DOI:10.1007/s00234-006-0129-5
14. Lawton MT, Vates GE. Subarachnoid Hemorrhage. *N Engl J Med*. 2017; 377:257–266 - DOI:10.1056/NEJMcp1605827
15. Connolly Jr ES, Rabinstein AA, Carhuapoma JR, Derdeyn CP, Dion J, Higashida RT, Hoh BL, Kirkness CJ, Naidech AM, Ogilvy CS, Patel AB, Thompson BG, Vespa P. Guidelines for the management of aneurysmal subarachnoid hemorrhage. *Stroke* 2012; 43:1711–37 - DOI:10.1161/STR.0b013e3182587839.

16. Kiyofuji S, Sora S, Graffeo CS, Perry A, Link MJ. Anterior interhemispheric approach for clipping of subcallosal distal anterior cerebral artery aneurysms: case series and technical notes. *Neurosurg Rev* 2020; 43:801–06 - DOI:10.1007/s10143-019-01126-z
17. Menovsky T, van Rooij WJJ, Sluzewski M, Wijnalda D. Coiling of ruptured pericallosal artery aneurysms. *Neurosurgery* 2002; 50:11–4 – DOI:10.1097/00006123-200201000-00003
18. Dinc C, Iplikcioglu AC, Bikmaz K. Distal anterior cerebral artery aneurysms: report of 26 cases. *Neurol Med Chir* 2006; 46:575–80 - DOI:10.2176/nmc.46.575
19. Arslan A, Istemen I. Surgical Strategies for Distal Anterior Cerebral Artery Aneurysms. *Haydarpasa Numune Med J* 2022; 62: 248-252 - DOI:10.14744/hnhj.2020.18894

DECLARATION

The Authors transfer the ownership of the copyright to the *British Journal of Multidisciplinary and Advanced Studies* in the event that the present work is published in the same journal. They declare that the article is original, has not been submitted to other journals for publication, and has not been previously published. They further affirm that the research described was conducted in accordance with the Helsinki Declaration and with the principles governing clinical research and the protection of patient data.

AUTHORS' CONTRIBUTION

- Z.W.: Planned the study, performed the literature search and drafted the report.
- Z.A. and A.S. and G.L.: Contributed and supported the preparation of the manuscript.
- F.A.: Contributed to the overall development of the report .
- Z.W. And A.G.: Performed the final revision before delivery.

All authors have reviewed the final report and approved the manuscript for submission.

CONFLICT OF INTEREST

This work has no financial support by the creator or other sources.

None of the authors have any conflicts of interest to disclose.

ETHICAL CONSIDERATIONS

Support for this work has been entirely provided by Institutional and / or Departmental sources. Participants' data will be provided after approval by the Related Author and the Health Management of the Major Hospital, Crema.

ADDRESS FOR CORRESPONDENCE AND REPRINT REQUESTS

dr. William Zuccon

Major Hospital, Crema, Italy

Email: w.zuccon@asst-crema.it