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CASE REPORT **OPEN ACCESS**

A CASE REPORT: INTRACEREBRAL AND INTRAVENTRICULAR HEMORRHAGE DUE TO RUPTURE OF ANEURYSM IN THE MIDDLE CEREBRAL ARTERY

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ABSTRACT

Background: Intracerebral hemorrhage (ICH) and intraventricular hemorrhage (IVH) caused by aneurysm rupture without subarachnoid hemorrhage (SAH) is a rare condition, with a prevalence of 1.6%.
Case: A 40-year-old male presented with a sudden headache, vomiting, and generalized seizures lasting one day. Initially conscious, he later developed recurrent seizures and transient decreased consciousness. He had a history of smoking and uncontrolled hypertension. Neurological examination showed normal motor function and positive neck stiffness. Head CT revealed ICH and IVH without SAH. The patient underwent ventriculoperitoneal (VP) shunt placement. Six months later, follow-up CT showed a hyperdense lesion in the inferolateral right frontal lobe. Digital subtraction angiography (DSA) identified a saccular aneurysm in the right middle cerebral artery (MCA), M1 segment. Endovascular coiling was performed.
Discussion: The patient's symptoms resembled SAHs, including thunderclap headache, vomiting, and decreased consciousness. However, initial CT showed only ICH and IVH without SAH, possibly due to the timing of imaging. Secondary ICH and IVH can result from aneurysm rupture and parenchymal hemorrhage near the ventricles. Seizures may contribute to aneurysm rupture and consciousness loss. Risk factors such as hypertension, smoking, and age were present. DSA confirmed the aneurysm as the bleeding source. Endovascular coiling was done to prevent rebleeding.
Conclusion: Prompt diagnosis using CT and DSA is critical to identify aneurysm-related hemorrhage and guide effective treatment, improving patient outcomes.

Keywords: aneurysm, coiling, DSA, ICH, IVH

Introduction

Intracerebral hemorrhage (ICH) and intraventricular hemorrhage (IVH) are serious and potentially fatal neurological conditions. Based on their etiology, ICH and IVH are classified as secondary or primary. Secondary ICH caused by aneurysms accounts for approximately 10–20% of cases. The middle cerebral artery (MCA) is one of the common sites for aneurysm formation, with a prevalence of around 30%. Among ruptured MCA aneurysms, 30–37.5% lead to ICH, with the hematoma occupying the intracranial space.[1,2] IVH is usually secondary, resulting from parenchymal hemorrhage adjacent to the ventricles or subarachnoid hemorrhage (SAH). Primary IVH without evidence of SAH is extremely rare, with a prevalence of only 3% among all intracranial hemorrhages.[3]

Case Report

A 40-year-old male patient presented with a sudden onset of headache accompanied by vomiting. The patient also experienced a generalized seizure,

characterized by upward eye deviation and rigidity of the arms and legs, lasting approximately 5 minutes, with a frequency of three episodes. There was a transient loss of consciousness, and upon regaining consciousness, the patient was unable to recognize close family members. The patient had a history of uncontrolled hypertension, with an emergency department blood pressure reading of 169/116 mmHg, and a smoking habit. Motor examination was within normal limits, but positive nuchal rigidity was noted. A non-contrast head CT scan revealed intraparenchymal hemorrhage in the right frontotemporal lobe and intraventricular hemorrhage (Figure 1). The patient underwent a ventriculoperitoneal (VP) shunt placement and was subsequently discharged after completing inpatient treatment. Six months later, a follow-up head CT scan showed a hyperdense lesion in the inferolateral region of the right frontal lobe. The patient then underwent Digital Subtraction Angiography (DSA), which revealed an aneurysm in the M1 segment of the right middle cerebral artery (MCA), measuring 5.0 × 2.7 mm with a 1.1 mm neck diameter. The patient subsequently underwent coiling treatment (Figure 2).

a

b

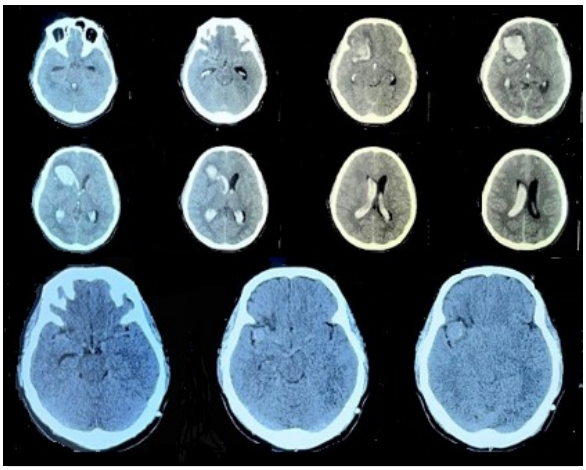

Figure 1. Head CT scan without contrast: (a) before VP shunt, (b) six months after VP shunt

Figure 2. Cerebral Digital Subtraction Angiography. The left image showed an aneurysm of the medial anterior cerebral artery (➡) and the correct image showed a post-coiling

Discussion

The patient exhibited symptoms suggestive of subarachnoid hemorrhage (SAH), including loss of consciousness, sudden severe headache (thunderclap headache), and vomiting. In theory, the sudden onset of thunderclap headache is the leading symptom of SAH and is often accompanied by loss of consciousness and vomiting.[4–6] However, the head CT scan did not show any evidence of SAH; instead, it revealed intracerebral hemorrhage (ICH) and intraventricular hemorrhage (IVH). Headache onset in ICH is more often progressive than in SAH. A delayed CT scan may lead to a false-negative result for SAH, as the sensitivity of CT imaging decreases over time.[7] If SAH is suspected, immediate brain imaging should be performed to confirm the diagnosis. A head CT scan combined with CT angiography is recommended in the early phase, specifically within the first 24 hours, to accurately diagnose SAH and detect intracranial aneurysms.[8] The patient came to the emergency room after 1 day of experiencing symptoms.

In general, the clinical symptoms of ICH reflect the acute neurological condition caused by blood accumulation within brain tissue. Symptoms of increased intracranial pressure in ICH may include headache, decreased consciousness, and vomiting.[9] Secondary (non-hypertensive) causes of ICH include arteriovenous malformations, aneurysm rupture, brain tumors, cerebral amyloid angiopathy, blood disorders, vasculitis, misuse of thrombolytics, and anticoagulants.[10] Spontaneous (non-traumatic) ICH results from chronic and progressive small vessel disease, primarily caused by chronic hypertension and cerebral amyloid angiopathy. Chronic hypertension leads to degenerative changes in small perforating arteries, increasing the risk of rupture and deep hemorrhage, which may extend into the ventricles.[8,11,12]

The patient underwent VP shunt placement, and six months later, a follow-up CT scan revealed a hyperdense lesion in the frontal lobe region, suspected to be either a cavernoma or a saccular aneurysm. This finding led to the indication for Digital Subtraction Angiography (DSA). An aneurysm is a dilation of a blood vessel that occurs at a weakened area along the arterial circulation in the brain.[13] DSA is a gold standard diagnostic modality for detecting macrovascular causes and characterizing intracranial aneurysms due to its excellent spatial and temporal resolution. Among patients with ICH, aneurysms account for approximately 7% of cases within the 33% of hemorrhagic patients.[14,15] DSA provides a clear visualization of cerebral blood vessel vascularization, as well as real-time imaging of hemodynamic status, blood flow, and cerebral circulation.[14]Additionally, DSA has a very low risk of severe neurological, systemic, and local complications,

occurring in less than 1% of cases, and requires specialized neurointerventional expertise.[16] The DSA results in this patient revealed an aneurysm in the right middle cerebral artery (MCA). The MCA is the most commonly affected pathological blood vessel in the brain.[2,17] The most frequently involved branch of the MCA in aneurysm formation is the M1 segment, consistent with this patient's DSA findings.[2] Aneurysms are a common etiology of SAH.[18]

The rupture of an aneurysm causing intracerebral hemorrhage (ICH) and/or intraventricular hemorrhage (IVH) without evidence of subarachnoid hemorrhage (SAH) is rare, with a prevalence of only 1.6% of patients presenting with ICH and/or IVH due to aneurysmal rupture. However, in some cases, ICH and IVH occur secondarily due to the location of the aneurysm in the cerebral arteries.[7] In this patient, a 40-year-old male with a history of uncontrolled hypertension and smoking, the development of a cerebral aneurysm is consistent with epidemiological data, as aneurysms can occur at any age but are most commonly seen between the ages of 30 and 60, with a higher prevalence in men. Spontaneous intracranial hemorrhages caused by hypertension are frequently found in the hemispheric/lobar regions, aligning with this patient's CT scan findings. Hypertension-induced ICH results from damage to small blood vessels in the brain, making them more prone to rupture. Under normal physiological conditions, cerebral arteries maintain an autoregulatory system: when systemic blood pressure increases, cerebral vessels undergo vasoconstriction, and when systemic blood pressure decreases, cerebral vessels dilate, ensuring a constant blood flow to the brain. However, when systemic blood pressure remains elevated for months or years, persistent vasoconstriction leads to the degeneration of the muscular layer of cerebral blood vessels, making their diameter less adaptable to changes. In chronic hypertension, arterioles undergo degenerative changes, weakening the vessel walls and forming microaneurysms.[12]

Aneurysms are often caused by congenital weakness in the arterial wall that has been present since birth. However, they can also result from atherosclerosis (plaque buildup) and other risk factors that increase the likelihood of aneurysm formation, including hypertension, advanced age, smoking, a genetic predisposition to aneurysms, cerebral arteriosclerosis, head trauma, estrogen deficiency, substance abuse, and excessive alcohol consumption.[19] These factors contribute to an increased risk of blood vessel rupture, leading to intracerebral hemorrhage.[2,13] Aneurysms are more commonly found intracranially because intracranial arterial walls are thinner. The aneurysmal wall consists only of the intimal and adventitial layers, along with interposed fibrohyalin tissue in varying amounts.[18]

Cerebral aneurysms are classified into three types:

1. Saccular aneurysms are the most common subtype. These aneurysms typically form at arterial bifurcations or trifurcations due to vessel wall weakness. They account for approximately one-third of all MCA aneurysm cases.
2. Fusiform aneurysms involve dilation along all sides of the artery.
3. Mycotic aneurysms result from infections that weaken the arterial wall.

Saccular aneurysms are further classified based on size:

a. Small: ≤ 5 mm
b. Medium: 6 mm – 14 mm
c. Large: 15 mm – 25 mm
d. Giant: ≥ 25 mm

Smaller saccular aneurysms have a lower risk of rupture.[17,20] The patient's DSA results revealed a medium-sized saccular aneurysm (5.0 mm × 2.7 mm). Additionally, the patient had several risk factors, including uncontrolled hypertension, smoking, and advanced age, which contributed to aneurysm rupture and subsequent intracerebral hemorrhage.

The patient exhibited seizure symptoms, which a cerebral aneurysm can cause. Recurrent seizures may trigger aneurysm rupture, making seizures a potential warning sign of an impending rupture. However, seizures associated with aneurysm rupture are rare, with a prevalence of less than 10%.[13] Seizures are often accompanied by loss of consciousness, which was also observed in this patient. The degree of consciousness impairment varies based on the frequency and severity of intracranial hemorrhage, depending on the location and overall size of the bleeding. In at least 60% of cases, loss of consciousness occurs, with two-thirds of these patients falling into a coma. This condition is associated with ventricular hemorrhage and a large hematoma volume, both of which were present in this patient.[13,21] Intraventricular hemorrhage (IVH) refers to bleeding within the ventricular system and is often associated with intracerebral hemorrhage (ICH). Risk factors for IVH include hypertension, coagulopathy, and acidosis.[22]

The patient underwent coiling, a procedure aimed at preventing recurrent bleeding.[23] The general indications for the endovascular coiling technique include hemorrhage caused by a ruptured aneurysm, unruptured intracranial aneurysms, and high-risk surgical patients, such as elderly individuals or those with complicating factors. Other indications include posterior circulation aneurysms and cavernous segment internal carotid artery aneurysms. Meanwhile, relative contraindications for coiling include challenging vascular anatomy, such as tortuous blood vessels, significant atherosclerosis, or other abnormalities that affect arterial access, such as severe stenosis due to atherosclerosis, coagulation disorders, and active bacterial infections.[15,18,23–26]

Conclusion

ICH and IVH are severe neurological conditions that can be fatal, with causes that can be either primary or secondary. Aneurysm in the MCA is one of the primary causes of secondary ICH. However, cases of ICH and IVH without SAH findings due to aneurysm rupture are sporadic and often result from delayed diagnostics, such as CT scans, leading to false-negative SAH results. In this case, a 40-year-old male patient with a history of uncontrolled hypertension and smoking presented with symptoms such as a sudden-onset headache, vomiting, and seizures, ultimately diagnosed as ICH and IVH. A CT scan of the head revealed bleeding in the frontotemporal lobe and ventricles.

Further investigation through DSA identified an aneurysm in the MCA, which was subsequently treated with a coiling procedure. DSA is the gold standard diagnostic procedure for detecting intracranial aneurysms, offering high accuracy with a low risk of complications. The primary risk factors in this patient hypertension, smoking, and advancing age contributed to the development of cerebral aneurysms. The seizures experienced by the patient also served as an important indicator, as they can trigger aneurysm rupture, further justifying endovascular intervention. The coiling procedure successfully prevented recurrent hemorrhage, highlighting the importance of early detection and proper aneurysm management. Prompt diagnosis using CT scan and DSA is essential in determining the cause of intracranial bleeding and guiding the appropriate therapeutic approach.

References

1. Li Z, Hu Q, Zhao L, et al. Case Report: Ruptured Middle Cerebral Artery Aneurysm With Intrasylvian Hematoma Successfully Treated by Coil Embolization and Minimally Invasive Puncture and Drainage. Front Neurol; 2021. 12:10-13. DOI: 10.3389/fneur.2021.646990
2. Navarro-Orozco D, Sánchez-Manso JC. Neuroanatomy, Middle Cerebral Artery. StatPearls. 2023. Retrieved on December 21, 2024. Available from: https://www.ncbi.nlm.nih.gov/books/NBK526002/
3. Kim SS, Go KO, Park H, et al. Solitary Intraventricular Hemorrhage Without Subarachnoid Hemorrhage Due to Aneurysmal Rupture: a Case Report. J Cerebrovasc Endovasc Neurosurg; 2019. 21(1):18-23. DOI: 10.7461/jcen.2019.21.1.18
4. Tartarin H, Morotti A, Van Etten ES, et al. Uncommon Causes of Nontraumatic Intracerebral Hemorrhage. Stroke; 2024. 55(5):1416-1427. DOI: 10.1161/STROKEAHA.123.043917
5. Lawton, M. T., & Vates, G. E. Subarachnoid Hemorrhage. The New England journal of medicine; 2017. 377(3):257–266. DOI: 10.1056/NEJMcp1605827
6. Ziu E, Suheb MZK, Mesfin FB. Subarachnoid Hemorrhage. StatPearls. 2023. Retrieved on December 23, 2024. Available from: https://www.ncbi.nlm.nih.gov/books/NBK441958/
7. Li G, Zhu X, Zhang Y, Zhao J, Gao X, Hou K. Aneurysmal Isolated Intracerebral Hemorrhage and/or Intraventricular Hemorrhage Without Subarachnoid Hemorrhage: A Rare and Perplexing Scenario in Neurosurgical Practice. Chinese Neurosurg J; 2016. 2(1):1-5. DOI: 10.1186/s41016-016-0041-8
8. Schaefer PW, Edjlali M. Nontraumatic Intracranial Hemorrhage. J Tn State Med Assoc; 2024. 43(7):243-245. DOI: 10.1007/978-3-031-50675-8_5
9. Nabila NF, Fauzi A Al, Subagyo S. Gejala Pada Lokasi Perdarahan Intraserebral Yang Berbeda Pada Pasien Dewasa Muda Di Rsud Dr Soetomo Surabaya. J Kedokt Syiah Kuala; 2019. 19(1):15-21. DOI: 10.24815/jks.v19i1.18046
10. Ibrahim R, Lalenoh DC, Laihad ML. Penanganan Pasien Perdarahan Intraserebral di Ruang Rawat Intensif. E-CliniC; 2021. 9(1):8-14. DOI: 10.35790/ecl.v9i1.31705
11. Hillal A, Ullberg T, Ramgren B, Wassélius J. Computed Tomography in Acute Intracerebral Hemorrhage: Neuroimaging Predictors of Hematoma Expansion and Outcome. Insights Imaging; 2022. 13(1):1-16. DOI: 10.1186/s13244-022-01309-1
12. Yunus M, Jhonet A, Fitriyani, Fatabuana AO. Hubungan Antara Hipertensi Dengan Letak dan Jenis Perdarahan Intrakranial Spontan pada Pemeriksaan CT Scan Kepala. J Trop Med Issues; 2021. 1(1):44-51. DOI: 10.37776/zked.v14i2.1533
13. Jersey AM, Foster DM. Cerebral Aneurysm. Man Neuroanesthesia Essentials; 2023. 3:281-282. DOI: 10.1201/9781315154367-35
14. Diana Jacob L. Interpretasi Digital Subtraction Angiography pada Stroke Hemoragik. Comserva J Penelit dan Pengabdi Masy; 2024. 4(2):324-332. DOI: 10.59141/comserva.v4i2.1354
15. Pierot L, Barbe C, Thierry A, et al. Patient and Aneurysm Factors Associated With Aneurysm Recanalization After Coiling. J Neurointerv Surg; 2022. 14(11):1096-1101. DOI: 10.1136/neurintsurg-2021-017972
16. Mkhize NN, Mngomezulu VM, Buthelezi TE. Accuracy of CT Angiography For Detecting Ruptured Intracranial Aneurysms. South African J Radiol; 2023. 27(1):1-6. DOI: 10.4102/SAJR.V27I1.2636
17. Faluk M, Das JM, Jesus O De. Saccular Aneurysm. StatPearls. 2024. Retrieved on December 23, 2024. Available from: https://www.ncbi.nlm.nih.gov/books/NBK557867/

18. Justitia I, Putri SA. Laporan Kasus: Perdarahan Subaraknoid Akibat Ruptur Aneurisma Intrakranial. Continuing Medical Education FK UMS; 2022. 479-487. DOI:10.1016/S0002-8703(43)90006-7
19. Alexandrov A V. Aneurisma Otak. (Balaji Krishnaiah, ed.). Pusat Ilmu Kesehatan Universitas Tennessee; 2023.
20. Koutsothanasis GA, Sampath R. Berry Aneurysm. StatPearls. 2022. Retrieved on December 23, 2024. Available from: https://www.ncbi.nlm.nih.gov/books/NBK557480/
21. Joshi NK, Okuda Y. Intracranial Hemorrhage. Simwars Simul Case B Emerg Med; 2015. 2(1):159-163. DOI: 10.1017/CBO9781107111011.039
22. Sadewo W, Amelia L, Tobing HG, Nugroho SW, Ichwan S, Ashari S. Luaran Perdarahan Intraventrikel Yang Dilakukan Operasi Di Departemen Bedah Saraf RSUPN Dr. Cipto Mangunkusumo. Maj Kedokt Neurosains Perhimpun Dr Spes Saraf Indones; 2017. 35(1). DOI: 10.52386/neurona.v35i1.45
23. Kojima I, Okuyama T, Ishige S, et al. Intracerebral Hemorrhage Due to a Rete Middle Cerebral Artery-Related Rupture of a Distal Lenticulostriate Artery Aneurysm: Two case reports. Interdiscip Neurosurg Adv Tech Case Manag; 2021. 25(March):101205. DOI: 10.1016/j.inat.2021.101205
24. Anggraini D, Nurwahyuni A. Analisis Utilisasi Tindakan Cliping dan Coiling dalam Pengelolaan Sub Arakhnoid Hemoragik (SAH) Sebelum dan Sesudah PMK 3 Tahun 2023 di RSPON Mahar Mardjono. Cahaya Mandalika. 2023.
25. Javed K, Das JM. Neuroanatomy, Anterior Choroidal Arteries. StatPearls. 2023. Retrieved on December 21, 2024. Available from: https://www.ncbi.nlm.nih.gov/books/NBK538189/
26. Majeed H, Ahmad F. Mycotic aneurysm. In: Aneurysms of the Popliteal Artery. Springer; 2023. 10:369–377. doi:10.1007/978-3-030-49687-6_29