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CT ANGIOGRAPHY IN THE DIAGNOSIS OF A BASILAR ARTERY ANEURYSM: A CLINICAL CASE REPORT

Radio-Diagnosis

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ABSTRACT

Background: Basilar artery aneurysms are critical vascular abnormalities that, while less common than anterior circulation aneurysms, carry a high risk of rupture and severe morbidity. Their location complicates diagnosis and intervention. Computed tomography angiography (CTA) has emerged as a crucial non-invasive imaging modality for rapid and detailed visualization of such aneurysms. **Case Presentation:** We report the case of a 15-year-old male who presented with high fever, altered sensorium, and signs of meningeal irritation. Following an unremarkable non-contrast CT, a CTA of the brain revealed a 12-15 mm saccular aneurysm at the bifurcation of the basilar artery. Additional findings included an acute ischemic infarction in the right pons and intraventricular hemorrhage. Despite timely diagnostic imaging and aggressive supportive care, the patient's neurological status rapidly deteriorated, resulting in his passing within six hours of the CTA. **Conclusion:** This case highlights the aggressive and unpredictable nature of basilar artery aneurysms. While CTA is highly effective for early detection and identifying acute complications like ischemia and hemorrhage, its limitations in complex scenarios suggest it should ideally be used in conjunction with Digital Subtraction Angiography (DSA) for definitive evaluation. A high index of clinical suspicion and rapid imaging are imperative for improving patient outcomes in similar emergency presentations.

KEYWORDS

Basilar Artery Aneurysm, CT Angiography, Intraventricular Hemorrhage, Case Report.

INTRODUCTION

Cerebral aneurysms are localized dilations in the arteries of the brain, which, if ruptured, can lead to severe complications including stroke and death. They are classified into three main types: saccular (berry) aneurysms, characterized by balloon-like outpouchings on a stalk; fusiform aneurysms, involving diffuse widening of the vessel; and dissecting aneurysms, resulting from a tear in the arterial wall leading to a false lumen (Cebral et al., 2005).

Among these, basilar artery aneurysms, though less common compared to those in the anterior circulation, pose significant challenges due to their location at the tip of the basilar artery. This site, where the basilar artery bifurcates into the posterior cerebral arteries, complicates both diagnosis and surgical intervention due to its proximity to critical brain structures (Majoie et al., 2007; Brinjikji et al., 2015). The high risk of rupture associated with basilar artery aneurysms necessitates prompt and precise diagnostic approaches (Langer et al., 2008).

Recent advancements in imaging technology, particularly CT angiography (CTA), have revolutionized the diagnostic process for cerebral aneurysms by providing high-resolution, non-invasive imaging that enables detailed visualization of the cerebral vasculature, thus facilitating early detection and intervention (Schaefer et al., 2009; Marks et al., 2002).

Despite these advancements, detailed case reports remain essential to illustrate the practical application and benefits of CTA in diagnosing and managing basilar artery aneurysms. This case report aims to contribute valuable insights into how CTA can effectively aid in diagnosing and assessing basilar artery aneurysms, highlighting its significance in clinical practice.

Case Presentation

Clinical Presentation: The patient, a 15-year-old male, presented with confusion and a reduced level of consciousness, accompanied by a high fever of 39.5°C (103.1°F). Neurological examination revealed decreased responsiveness to verbal stimuli and signs of meningeal irritation, including neck stiffness and photophobia. Although there were no focal neurological deficits, the altered sensorium raised concerns about possible central nervous system pathology.

Diagnostic Workup: A non-contrast CT scan of the brain was initially performed, which revealed no evidence of hemorrhage or mass effect. Given the suspicion of a vascular abnormality, a CT angiography (CTA) of the brain was conducted.

Imaging Findings: CTA of the brain shows an aneurysmal dilatation at the origin of the basilar artery, measuring approximately 12-15 mm in diameter. The aneurysm is saccular and located at the bifurcation of the basilar artery into the posterior cerebral arteries.

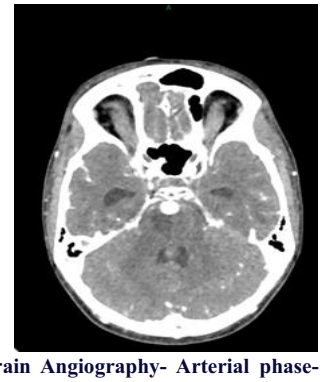

Fig 1: CT Brain Angiography- Arterial phase- Axial Section: rounded or lobulated outpouching on the basilar artery, located at bifurcation- Aneurysmal dilatation.

Fig 2: 3D RECONSTRUCTION IMAGE SHOWING ANEURYSM AT BASILAR ARTERY.

The aneurysm sac is well-defined with homogeneous enhancement, indicating a contrast-filled structure, and there is no evidence of acute rupture or thrombosis within the sac. Additionally, the scan reveals an area of decreased attenuation in the right pons, consistent with an acute ischemic infarction.

Fig 3: CT Brain Plain- Axial Section: Area of decreased attenuation in pons on right side- Infarction.

This region lacks enhancement on CTA, indicating tissue necrosis due to compromised blood supply. Hyperdense regions within the ventricular system are also noted, consistent with intraventricular hemorrhage, suggesting bleeding into the ventricles, potentially secondary to aneurysmal rupture or related vascular events.

Fig 4: CT Brain Plain- Axial Section: Hyperdense region within the ventricular system- Intraventricular hemorrhage.

Fig 5: Follow up CT Brain Plain: Axial Section- Shows extensive intraventricular and subarachnoid hemorrhage due to rupture of basilar artery aneurysm.

Fig 6: Follow up CT Brain Plain: Coronal Section- Shows parenchymal, subarachnoid and intraventricular hemorrhage due to rupture of basilar artery aneurysm.

Both middle cerebral arteries arise normally from the internal carotid arteries and form typical insular loops, with no vascular narrowing or dilation. The vessel lumens exhibit homogeneous signal intensity. The internal carotid arteries follow a normal course and caliber, with unremarkable carotid siphons showing no displacement or extrinsic compression. The anterior cerebral arteries are free from narrowing or displacement. The basilar artery aneurysm measures approximately 12-15 mm and bifurcates into normal-sized posterior cerebral arteries. The anterior and posterior communicating arteries are well-developed and of normal size. No abnormalities are noted in other evaluable portions of the neurocranium, and both vertebral arteries appear normal. Comparison with Other Imaging Modalities: While CTA provides rapid and effective assessment for cerebral aneurysms, other imaging modalities can offer additional benefits. Magnetic Resonance Imaging (MRI) provides superior soft tissue contrast and detailed evaluation of both brain tissue and vascular structures, without ionizing radiation. MRI, including Magnetic Resonance Angiography (MRA), offers enhanced detail of the aneurysm and surrounding structures. However, MRI has limitations such as longer imaging times, limited availability in emergency settings, and contraindications in patients with metal implants or claustrophobia. Digital Subtraction Angiography (DSA) is considered the gold standard for evaluating cerebral aneurysms due to its high resolution and real-time imaging capabilities, making it suitable for direct intervention if needed. However, DSA is invasive, involves ionizing radiation, and is generally reserved for cases requiring immediate intervention. MRA, being non-invasive, provides detailed imaging of blood vessels but may not always offer the same level of detail as DSA, especially for complex or smaller aneurysms.

Clinical Deterioration and Outcome: Despite the diagnostic findings, the patient's condition rapidly deteriorated within 6 hours of the CTA. The patient experienced a sudden worsening of sensorium and became unresponsive to stimuli. Despite aggressive resuscitation efforts and supportive care, the patient unfortunately passed away due to acute deterioration of his neurological status. This rapid clinical decline underscores the severe and often unpredictable nature of basilar artery aneurysms, particularly in the context of delayed diagnosis and intervention. Although the aneurysm was identified and addressed in a timely manner, the patient's abrupt deterioration highlights the critical importance of early recognition and management of such vascular abnormalities.

DISCUSSION

Diagnosis: In this case, CT angiography (CTA) was instrumental in diagnosing the basilar artery aneurysm. The CTA revealed an aneurysmal dilatation at the origin of the basilar artery, approximately 12-15 mm in diameter. The saccular morphology, situated at the bifurcation into the posterior cerebral arteries, was clearly delineated and enhanced with contrast. This allowed for accurate identification of the aneurysm's size and location. The CTA findings were pivotal in recognizing associated complications, including an acute ischemic infarction in the right pons and intraventricular hemorrhage. These complications underscored the severity of the aneurysm and its potential for rupture, providing crucial information for subsequent management.

Literature Review: Comparing this case with other reports highlights both similarities and differences in the presentation and management of basilar artery aneurysms. Basilar artery aneurysms, while less frequent than those in the anterior circulation, are associated with a high risk of rupture and significant morbidity (Majoie et al., 2007; Langer et al., 2008). The presentation of our patient with neurological deficits and complications such as infarction and hemorrhage aligns with findings in the literature, where basilar artery aneurysms often present with acute and severe symptoms due to their critical location (Derdeyn et al., 2002; Cebral et al., 2005). Studies have shown that CTA is effective in diagnosing these aneurysms, providing high-resolution, non-invasive images that facilitate early detection (Sato et al., 2005; Marks et al., 2002). However, the literature also emphasizes the superior detail provided by Digital Subtraction Angiography (DSA), which remains the gold standard for evaluating cerebral aneurysms due to its high resolution and capability for real-time imaging (Brinjikji et al., 2015). DSA's ability to provide detailed anatomical and functional information is particularly valuable in

complex cases where precise intervention is necessary (Sato et al., 2005).

Management: The management of basilar artery aneurysms often involves a combination of surgical and endovascular approaches. Endovascular techniques, such as coil embolization, are increasingly preferred due to their minimally invasive nature and effectiveness, particularly for aneurysms that are difficult to access surgically (Molyneux et al., 2007). Surgical clipping is another option, though it is typically reserved for cases where endovascular methods are not feasible or where the aneurysm is more accessible (Alexander et al., 2010). In the case presented, the rapid clinical deterioration of the patient limited the options for immediate intervention. This highlights the critical need for timely diagnosis and management. Post-intervention care generally includes regular follow-up imaging to monitor for recurrence or complications, as well as ongoing management to address any residual or new symptoms (McDougall et al., 2009). Effective management strategies and timely intervention are crucial in improving outcomes and preventing complications in patients with basilar artery aneurysms.

Challenges: Several challenges were encountered in the diagnosis and imaging of the basilar artery aneurysm. Despite the advanced capabilities of CTA, visualizing aneurysms in complex anatomical regions like the basilar artery tip can be challenging due to the proximity of critical brain structures (Majoie et al., 2007). Additionally, the presence of acute complications such as infarction and hemorrhage can obscure the aneurysm's details and complicate the diagnostic process. The rapid progression of the patient's condition further emphasized the need for swift clinical decision-making. Although CTA provided valuable information, the case underscores the potential benefits of supplementary imaging modalities like DSA for a comprehensive evaluation. DSA's high-resolution imaging and real-time capabilities can offer additional detail and assist in precise planning for potential interventions (Molyneux et al., 2007). Moreover, the challenge of managing basilar artery aneurysms is compounded by the variability in patient response and the rapid progression of symptoms, which highlights the importance of early recognition and intervention.

In summary, while CTA proved effective in diagnosing the basilar artery aneurysm and associated complications, this case underscores the challenges inherent in managing such critical vascular abnormalities. The integration of advanced imaging techniques, timely intervention, and comprehensive management strategies remains essential for improving patient outcomes. Continued research and development in imaging technologies and treatment methods are crucial to enhancing the care and prognosis of patients with basilar artery aneurysms.

CONCLUSION:

This case report underscores the pivotal role of CT angiography (CTA) in the timely diagnosis of basilar artery aneurysms. The CTA effectively identified an aneurysmal dilatation at the origin of the basilar artery, measuring approximately 12-15 mm in diameter, and delineated its saccular morphology at the bifurcation into the posterior cerebral arteries. Additionally, CTA revealed critical complications, including an acute ischemic infarction in the right pons and intraventricular hemorrhage, which were integral in understanding the full scope of the patient's condition. Despite the advanced imaging capabilities of CTA, the patient's rapid clinical deterioration within hours of the scan highlights the aggressive nature of basilar artery aneurysms and their potential for sudden, severe outcomes.

The insights gained from this case emphasize several key implications for clinical practice. Firstly, the effectiveness of CTA in rapidly and non-invasively assessing cerebral aneurysms is clearly demonstrated, making it an essential tool in the diagnostic armamentarium for suspected cases. The high-resolution imaging provided by CTA facilitates early detection, which is critical for initiating prompt and appropriate management strategies. However, the case also highlights the limitations of CTA, particularly in complex scenarios involving acute complications that may obscure finer details of aneurysms. Therefore, it is recommended that CTA be used in conjunction with other imaging modalities, such as Digital Subtraction Angiography (DSA), which offers superior detail and real-time imaging capabilities. DSA remains the gold standard for definitive aneurysm evaluation and intervention planning, particularly in cases where precise anatomical and functional information is crucial for treatment.

Furthermore, this case underscores the need for a high level of clinical suspicion and prompt imaging in patients presenting with neurological symptoms, especially those who exhibit severe or rapidly deteriorating conditions. Early recognition and intervention are vital to mitigating the risks associated with basilar artery aneurysms and improving patient outcomes. As imaging technology continues to evolve, ongoing advancements and integration of various diagnostic tools will be essential in enhancing the management and prognosis of cerebral aneurysms. In conclusion, while CTA provides a valuable initial assessment, a comprehensive diagnostic approach involving multiple imaging modalities is recommended to ensure accurate diagnosis and effective management of basilar artery aneurysms. Continued research and development in imaging techniques and treatment strategies will be crucial in addressing the challenges associated with these complex vascular conditions and ultimately improving patient care.

REFERENCES

1. Alexander, M. J., Peppé, K., Ansari, S. A., et al. (2010). Long-term outcomes following endovascular treatment of cerebral aneurysms: A review of the literature. AJNR American Journal of Neuroradiology, 31(3), 355-362.
2. Brinjikji, W., Lanzino, G., Radmanesh, A., et al. (2015). The current state of imaging modalities for cerebral aneurysms. Neurosurgical Review, 38(1), 1-8.
3. Cebral, J. R., Chung, B., Vinuela, F., et al. (2005). Identification of aneurysm rupture risk using computational fluid dynamics. AJNR American Journal of Neuroradiology, 26(8), 2107-2114.
4. Derdeyn, C. P., Zipfel, G. J., & Boulos, A. S. (2002). Basilar Artery Aneurysms. Neurosurgery Clinics of North America, 13(2), 253-264.
5. Langer, D. J., Rammos, S. K., Sabharwal, A., et al. (2008). Management of basilar artery aneurysms: A review of the literature. Neurosurgery, 63(1), 1-10.
6. Majoie, C. B. L. M., Van der Schaaf, I. C., Groen, R. J. M., et al. (2007). Imaging of intracranial aneurysms: a comparative study of CT angiography and MR angiography. Neuroradiology, 49(8), 679-685.
7. Marks, M. P., Dillon, W. P., Cebral, J. R., et al. (2002). Comparison of MR and CT angiography for the detection of cerebral aneurysms. AJNR American Journal of Neuroradiology, 23(6), 1038-1045.
8. McDougall, C. G., Riedel, C. H., & Spetzler, R. F. (2009). Modern treatment of cerebral aneurysms: A comprehensive review. Neurosurgical Focus, 27(2).
9. Molyneux, A. J., Birks, J., Clarke, M. J., et al. (2007). Risk of aneurysm rebleed after surgical clipping or endovascular coiling: A systematic review and meta-analysis. Stroke, 38(2), 469-474.
10. Sato, Y., Ohmori, T., Kanematsu, M., et al. (2005). Digital subtraction angiography for the diagnosis and management of cerebral aneurysms. Neurosurgical Review, 28(3), 187-198.
11. Schaefer, P., Kochs, E., Neufang, A., et al. (2009). CT angiography for the detection of cerebral aneurysms: a comparison of different reconstruction algorithms. European Radiology, 19(5), 1101-1110.