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The Neck Arteriovenous Malformations that May Rupture Anytime

Her An Yırtılabilen Boyun Arteriovenöz Malformasyonları

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ABSTRACT

This case illustrates the rare incidence of arteriovenous malformations (AVMs) of the head and neck in an adult male, possibly caused by the preceding trauma. A 30-year-old male with a chief complaint of headache worsened over the past day a sudden expansion of swelling over the back of the neck. The swelling was preceded by trauma to the neck two years ago. The contrast-enhanced computed tomography scan and computed tomography angiography of the head and neck concluded right neck AVM with aneurysms and contained hematoma. He was suggested for digital subtraction angiography and embolisation. Preceding trauma over the region was believed to have caused the neck swelling, and the ruptured aneurysm presented with a sudden onset of severe pain. It may progress to devastating complications if it is not treated in a timely manner.

Keywords: Arteriovenous malformations, trauma, head and neck

ÖZ

Bu olgu, yetişkin bir erkekte baş ve boyun arteriovenöz malformasyonlarının (AVM) nadir görülen bir insidansını göstermektedir; bu durum muhtemelen önceki travmadan kaynaklanmaktadır. Baş ağrısı şikâyeti olan 30 yaşında bir erkek hastanın, son bir günde boynunun arkasında aniden büyüyen şişlik kötüleşti. Şişlik, iki yıl önce boyun travmasından önce oluşmuştur. Kontrastlı bilgisayarlı tomografi taraması ve baş ve boyun bilgisayarlı tomografi anjiyografisi, sağ boyun AVM'sinin anevrizmalı olduğu ve hematom içerdiği sonucuna varmıştır. Hastaya dijital subtraksiyon anjiyografisi ve embolizasyon önerilmiştir. Boyun şişmesine, bölgedeki önceki travmanın neden olduğu düşünülmüş ve yırtılmış anevrizma, ani başlayan şiddetli bir ağrı ile ortaya çıkmıştır. Zamanında tedavi edilmezse yıkıcı komplikasyonlara ilerleyebilir.

Anahtar Sözcükler: Arteriovenöz malformasyonlar, travma, baş ve boyun

INTRODUCTION

Arteriovenous malformation (AVM) is a vascular malformation with direct communications of feeding arteries and draining veins without intervening normal capillaries. AVM is usually congenital, but trauma is also a frequent cause. AVM of the head and neck is a rare vascular anomaly, and extracranial AVM is particularly aggressive in a localised manner, which progresses to an expansive mass. AVM would further progress to complications such as pain, ulceration, severe disfigurement, rupture, and cardiac volume overload.

CASE REPORT

A 30-year-old male presented with a chief complaint of a headache which worsened over the past day. He also complained of swelling over the back of the neck (Figure 1) for the past two years, which has remained the size of an apple but suddenly enlarged significantly over the course of a day. The swelling was preceded by trauma to the neck two years ago. He described the mechanism of the fall as a direct hit to his neck while he was in a supine position. However, over the past day, he noted a sudden enlargement of the mass, which was not provoked by any repeating or new trauma. Clinically,

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the patient was in pain and distress. His blood pressure (BP) upon arrival was 178/109 mmHg, with a pulse rate of 98 beats/min. He was not hypoxic. There was swelling over the right posterior region of the neck that expanded to the occipital region and crossed the midline, measuring 13 x 15 cm with a smooth surface. The mass was non-mobile, firm on palpation, and pulsating. There were bruits. No neurological deficit was noted on his physical examination. Bedside ultrasound revealed a heterogeneous mass with turbulent blood flow. The contrast-enhanced computed tomography scan (Figure 2) and computed tomography angiography (CTA) (Figure 3) of the head and neck showed a large right posterior cervical lesion measuring 10 x 9 x 11 cm (AP x W x CC)—revealing the presence of mass effect on the adjacent right parotid gland, right carotid, and perivertebral space. Multiple nidi with a dilated feeding artery are seen arising from the right external carotid artery and, to a lesser extent, from the right vertebral artery and the occipital branches of the left external carotid artery. Three aneurysms were seen within, with the largest measuring 4.6 x 8.2 cm, and contained hematoma was noted, along with bony erosion of the right occipital, petrous, and mastoid part of the right temporal bone. The scan concluded he had a right neck AVM with aneurysms and containing hematoma. He was suggested for digital subtraction angiography and embolisation. However, the patient was not agreeable to treatment.

Figure 1. The mass arises from the posterior neck and extends to the occipital region.

DISCUSSION

Abnormal connections between arteries and veins form an AVM. The prevalence of AVM is 1 in 100,000 people (1). Most AVMs are congenital. However, up to 20% present with a history of trauma (2). AVMs are commonly located in the central nervous system. Extracranial AVMs are rare and mainly located in the head and neck (3). The most common cause of arteriovenous communications between cervical region blood vessels is trauma, as seen in this patient (4).

Most of the AVMs are asymptomatic, and only 12% of them are symptomatic (5). AVMs might become more symptomatic over the years (6).

The International Society for the Study of Vascular Anomalies has divided vascular malformations into high-flow and low-flow lesions. High-flow lesions are defined as an abnormal connection between artery and vein without an intervening capillary bed, whereas low-flow lesions consist of a dilated vein and lymphatic vessels (7-9). Sudden enlargement of AVMs may happen in response to trauma, extremely high BP or hormonal changes during puberty, or pregnancy (7,8). The patient had developed an AVM after a fall, and the AVM rapidly increased in size for a day without sustaining any new trauma. His BP was noted to be high upon arrival. Therefore, we suspected, the aneurysm rupture was mainly precipitated by the high BP.

The natural course of AVM can be divided into four stages (I-IV)

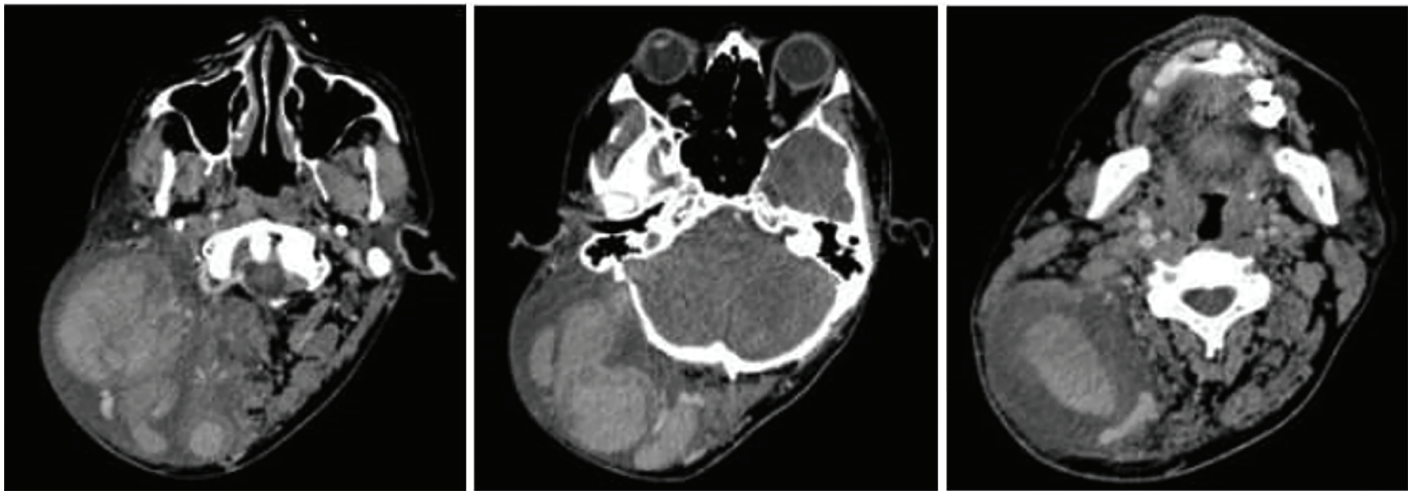

Figure 2. CECT shows right neck AVM with aneurysm containing hematoma.

CECT: Contrast-enhanced computed tomography, AVM: Arteriovenous malformation.

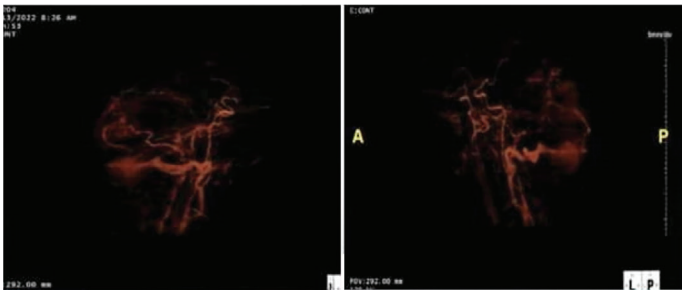

Figure 3. Shows CT angiography with the 3D reconstruction of the right neck AVM.

CT: Computed tomography, AVM: Arteriovenous malformation, 3D: Three-dimensional.

based on the Schobinger system, which includes quiescence, expansion, destruction, and decompensation (10). The four stages of AVM progression are well demonstrated in this patient based on his history and clinical findings.

Clinical examination can suggest the diagnosis of AVMs, but vascular imaging is necessary to confirm the clinical diagnosis. Magnetic resonance imaging is the imaging modality for diagnosing AVMs. It helps visualise the central nidus and feeder arteries, thereby aiding in planning the management of malformations (11). The patient underwent CTA, which showed multiple dilated feeding arteries from the right external carotid artery to a lesser extent, from the right vertebral and occipital branches of the left external carotid artery. Three aneurysms were seen with hematoma—bony erosion of the right occipital, and the petrous and mastoid parts of the right temporal bone. Most of the time, the high-flow lesion showed destructive skeletal changes, and changes in bone density were found in his CTA (7).

The treatment options for AVM are affected by specific flow characteristics. High-flow lesions are often treated with complete embolisation, excision, or a mixture of both (9).

On the other hand, untreated AVM lesions, as illustrated in this case, may cause devastating complications and significant morbidity due to rapid expansile growth. The mortality rate can be up to 15% (5).

Preceding trauma over the region was believed to have caused the neck swelling, and the ruptured aneurysm was presented as a sudden onset of severe pain. It may progress to devastating complications if it is not treated in time.

CONCLUSION

The case illustrates the rare occurrence of AVM of the head and neck in an adult male, possibly caused by the preceding trauma.

Ethics

Informed Consent: Verbal informed consent was obtained from the patient after a full explanation of the study and its purpose. Due to logistical constraints, written consent could not be obtained despite multiple attempts. The authors affirm that the patient understood and agreed to the publication of anonymized information, and that all procedures adhered to the ethical standards of the Declaration of Helsinki and relevant institutional guidelines.

Acknowledgement

The authors declared that this case was previously presented at the EMAS Tripartite Conference 2022.

Footnotes

Authorship Contributions

Surgical and Medical Practices: H.C.O., M.D.M., H.Y.C., Y.C.Y., Z.Z.L., Concept: H.C.O., M.D.M., H.Y.C., Y.C.Y., Z.Z.L., Design: H.C.O., M.D.M., H.Y.C., Y.C.Y., Z.Z.L., Data Collection or Processing: H.C.O., M.D.M., H.Y.C., Y.C.Y., Z.Z.L., Analysis or Interpretation: H.C.O., M.D.M., H.Y.C., Y.C.Y., Z.Z.L., Literature Search: H.C.O., M.D.M., H.Y.C., Y.C.Y., Z.Z.L., Writing: H.C.O., M.D.M., H.Y.C., Y.C.Y., Z.Z.L.

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