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Case Report

A rare case report of spontaneous thrombosis in unruptured giant intracranial aneurysm ☆,☆☆

Argirina Ghassani, MD, Achmad Firdaus Sani, MD, Dedy Kurniawan, MD*

Department Neurology, Faculty of Medicine, Airlangga University, Mayjen Prof. Dr. Moestopo Street 6-… , Surabaya, East Java, 60286, Indonesia

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ABSTRACT

Unruptured giant intracranial aneurysms (GIAs) are characterized by their size, which exceeds 25 mm, and these conditions account for approximately 5% of all aneurysm cases. Furthermore, it typically develops in women during the fifth to seventh decade of life. Compared to small aneurysms, which cause subarachnoid hemorrhage, GIAs can manifest as masses or ischemic effects caused by thromboembolism. An elderly female patient, aged 67, was admitted to the hospital with a primary complaint of sudden facial sensory loss on the left side and vomiting. There was also a history of double vision accompanied by left ocular movement disturbance and gradually developed localized headache on the left side. Furthermore, a contrast head magnetic resonance angiography (MRA) revealed the presence of a high-flow giant aneurysm, measuring 30.7 × 31.8 × 27.2 mm in the cavernous segment of the left internal carotid artery (ICA). Cerebral angiography showed the absence of flow on the left ICA due to total occlusion. After cerebral angiography, the patient remained conscious but exhibited some neurological deficits, which were identical to the initial symptoms observed during hospitalization. Cases of spontaneous thrombosis in GIA are extremely rare. However, radiological examination, particularly angiography, can be used to diagnose spontaneous thrombosis in unruptured GIAs to ensure that the patient receives the right treatment.

Introduction

Unruptured giant intracranial aneurysms (GIAs) are characterized by their size, which exceeds 25 mm [1]. Furthermore, it accounts for 5% of aneurysm cases [1] and is commonly found in women in their fifth to seventh decade of life [2]. Compared to smaller aneurysms that manifest as subarachnoid hemorrhage, GIAs can present with mass or ischemic effects. Ischemia can develop from thromboembolism, which occurs in 17%-33% of cases [3]. Several aspects of Virchow's triad have been shown to be closely associated with vascular

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* Corresponding author.
E-mail address: achmad-f-s@fk.unair.ac.id (A.F. Sani).
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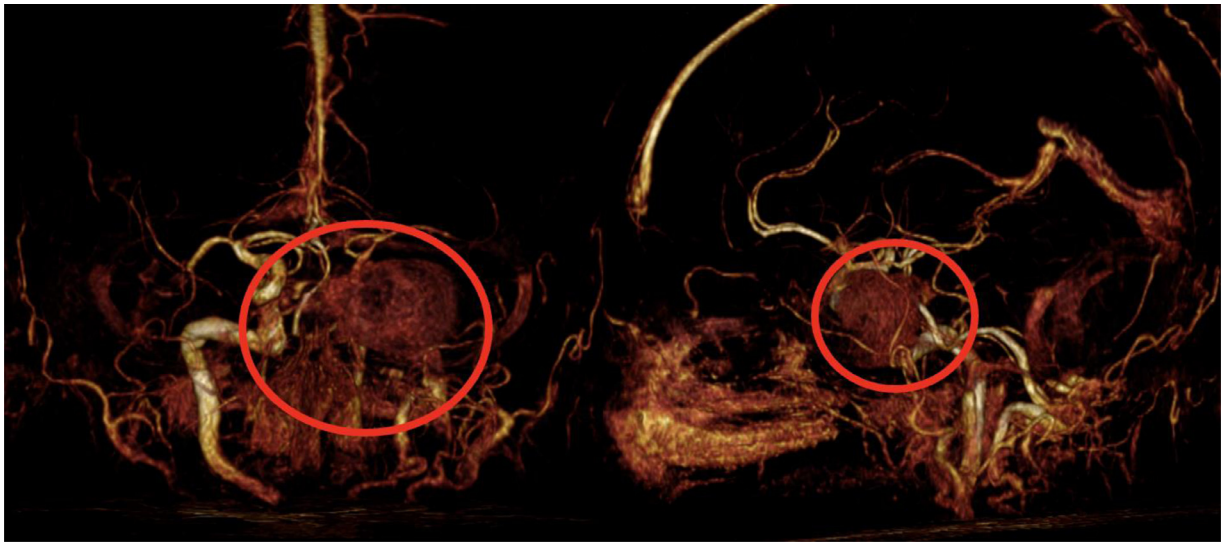

Fig. 1 – Head MRA 3D TOF coronal and sagittal plane on 3 months before admission revealed giant aneurysm left ICA on C4 segment.

thrombosis, including stasis, hypercoagulability, and endothelial lesions [4]. Some cases of spontaneous thrombosis in unruptured GIAs have also been reported, with varying degrees of severity [5]. The clinical manifestation of GIAs can be gradual or sudden, depending on the size, location, and perifocal edema caused by the condition [6]. Therefore, this case report presents an unruptured GIA that manifests as spontaneous thrombosis.

Case report

An elderly female patient, aged 67, was admitted to the hospital with a primary complaint of sudden facial sensory loss on the left side and vomiting. The patient reported a previous history of double vision accompanied by left ocular movement disturbance and gradually worsening localized headache on the left side.

Clinical examination revealed that there was no history of hypertension, hyperdyslipidemia, hyperuricemia, head injury, or any use of antiplatelet, anticoagulant, other medications, or sexual aphrodisiacs. Furthermore, physical examinations showed a blood pressure of 143/85 mm Hg and a Glasgow Coma Scale of E4V5M6. Several neurological deficits were also observed, such as left ocular disturbance, left pupil mydriasis, left facial hypoesthesia, and right central facial palsy, but there was no weakness in the body.

Three months before the current admission, the patient had contrast head magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA). The head MRA 3D TOF coronal and sagittal plane showed a giant aneurysm on the C4 segment of the left ICA, as shown in Fig. 1. The head MRI T1 contrast axial plane also produced similar findings on the cavernous segment of the left ICA, as shown in Fig. 2A. Furthermore, the head MRA axial and coronal plane revealed a giant aneurysm on the left ICA with a size of 30.7 × 31.8 × 27.2

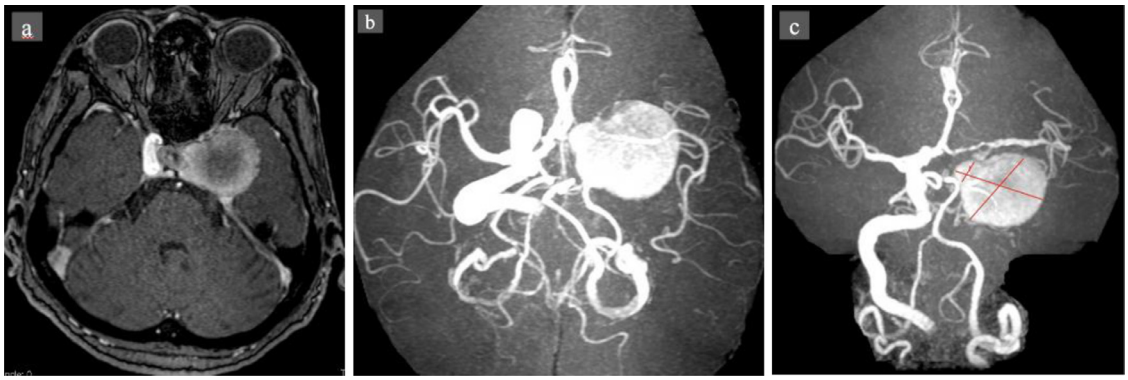

Fig. 2 – Head MRI MRA 3 months before admission. (A) Head MRI T1 contrast axial plane revealed a giant aneurysm on the cavernous segment of the left ICA. (B, C) Head MRA axial and coronal plane revealed a giant aneurysm on the left ICA with a size of 30.7 x 31.8 x 27.2 mm high flow.

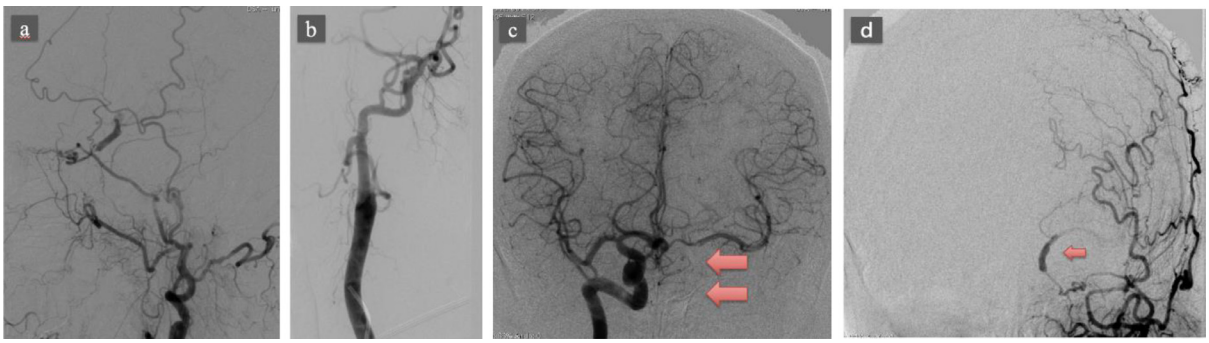

Fig. 3 – Digital cerebral angiography on current admission. Angiography (A, B) revealed no flow on the left ICA, (C) total occlusion was obtained on the left ICA, and (D) retrograde flow was seen from the left ophthalmic artery to the supraclinoid left ICA via cross-filling of left middle meningeal artery.

mm high flow, as shown in Figs. 2B and C. No fracture line, thrombus, or intraparenchymal hemorrhage was found, and the laboratory results indicated normal levels.

On current admission, an urgent cerebral angiography was carried out to evaluate the patient's condition. The results revealed the absence of blood flow on the left ICA, as shown in Figs. 3A and B. A total occlusion was observed on the left ICA (Fig. 3C), while a retrograde flow from the left ophthalmic artery to the supraclinoid left ICA through the cross-filling of the left middle meningeal artery was seen after left carotid artery injection (Fig. 3D).

The patient remained conscious following the procedure but showed neurological deficits, including left ocular disturbance, left pupil mydriasis, left facial hypoesthesia, and right central facial palsy, with no weakness in the body. The patient was then discharged home and prescribed aspirin 325 mg, with plans for flow diversion of the giant left cavernous ICA aneurysm in the long-term follow-up. This case presentation highlighted the detection of a giant aneurysm 3 months before admission, which was subsequently found to be thrombosed on admission.

Discussion

The natural history of GIAs can be observed through 3 different events, namely spontaneous thrombosis, rupture causing a subarachnoid hemorrhage, and growth leading to a mass effect [7]. In this present case, the condition exhibited spontaneous thrombosis, as indicated by both MRA imaging and cerebral angiography. Previous MRA had identified a giant aneurysm in the cavernous segment of the left ICA, measuring 30.7 × 31.8 × 27.2 mm with high flow. Furthermore, a follow-up cerebral angiography after 2 months revealed the absence of flow on the left ICA, with total occlusion. Based on existing theory, spontaneous thrombosis was common in GIA but complete intraluminal thrombosis was rare and occurred mainly in giant cerebral aneurysms (13%-20% of cases) [8]. Several cohort studies reported recanalization rates of approximately 50% in cases of thrombosis in unruptured aneurysms [9].

The dome-to-neck aspect ratio (AR) is an important risk factor for spontaneous thrombosis in aneurysms, particularly GIAs, as it is caused by low shear rate (SR) and suppression of pulsatile flow, which creates a procoagulant and proinflammatory microenvironment at aneurysm wall [8]. Furthermore, spontaneous or iatrogenic endovascular events causing recanalization of the parent artery or proximal occlusion have been reported to be associated with spontaneous thrombosis in unruptured giant aneurysms [10]. The reason behind this phenomenon was attributed to the damage inflicted on the endothelium due to the hemodynamic stress on the aneurysm wall [3,11]. Several aspects of Virchow's triad, including stasis, hypercoagulability, and endothelial lesions, were closely related to vascular thrombosis [4]. A hypothesis was proposed that the main mechanism of thrombosis in aneurysms was associated with flow stasis related to the induced cascade, the angle of aneurysm, and intraluminal flow stasis [4].

Although spontaneous thrombosis can occur in patients with GIA, it does not necessarily guarantee complete clinical improvement, as the thrombosed aneurysm can still progress in various ways, including growth, stabilization, rupture, and recanalization [12]. This indicates that the terms "complete" or "spontaneous" cure must be used cautiously until the natural history of thrombotic aneurysm is clearly understood [13]. Spontaneous clinical improvement of a ruptured aneurysm was suggested if 3 conditions were present, namely the disappearance of the aneurysm with patency of parent artery and without spasm, good clinical neurologic outcome, and absence of cerebral infarction on brain imaging [14]. These improvements can be observed during a follow-up intracranial angiography, performed at least 3 months after subarachnoid hemorrhage [13]. Although the 3 conditions were met in this present case except for the subarachnoid hemorrhage condition, intensive observation was still needed [15]. Several therapeutic options are available for GIA, including antiplatelet or anticoagulant therapy, conservative therapy [6], interventions, and surgery [2].

At present, there is no agreement on the conclusive therapeutic approach for managing unruptured intracranial aneurysms that experience spontaneous thrombosis [16]. However, a recent literature review suggested that antiplatelet therapy could be used safely for the treatment of unruptured thrombosed aneurysms associated with decreased aneurysmal growth rate and wall inflammation [17]. Therapeutic decisions for medium and large unruptured aneurysms should

be made irrespective of the presence or absence of thrombosis [1].

Conclusion

The occurrence of spontaneous thrombosis in unruptured GIA is a rare condition. Although a definite spontaneous resolution mechanism is unavailable, radiological examination, particularly angiography can rule out other spontaneous thromboses caused by large unruptured intracranial aneurysm. This method helps to facilitate the administration of appropriate therapies to the patient.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Consent statement

The publication of this case report was authorized by a family member of the patient through written informed consent.

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Patient consent

Written informed consent for the publication of this case report was obtained from a relative of the patient.

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