



## Case Report

# A case that encapsulates the challenges of being a neurosurgeon in war-torn countries: Perspectives from Iraq

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## ABSTRACT

**Background:** The provision of healthcare services in Iraq has been negatively affected by a lack of resources, strained healthcare infrastructure, and low patient socioeconomic status. This paper describes a case of multiple intracranial aneurysms (MIAs) that highlight the challenges of practicing vascular neurosurgery in Iraq.

**Case Description:** A 57-year-old female presented with sudden-onset severe headache, photophobia, and drowsiness and was diagnosed with subarachnoid hemorrhage in the basal cistern. Despite international guidelines recommending urgent treatment for suspected ruptured intracranial aneurysms, the patient's healthcare team in Babylon advised against a CT angiogram (CTA). The patient's family took responsibility for transferring her to a private facility for a CTA, which showed four aneurysms. Due to financial constraints, the family opted for open surgery, during which a ruptured aneurysm was found and successfully managed. The remaining two aneurysms were monitored with serial follow-up imaging.

**Conclusion:** The case highlights the challenges of practicing vascular neurosurgery in Iraq and the impact of financial constraints on the management of MIA. It emphasizes the need for increased resources and expertise in the country's healthcare system to provide optimal care for patients with life-threatening conditions.

**Keywords:** Intracranial aneurysm, Iraq, Low- and middle-income countries, Vascular neurosurgery

## INTRODUCTION

Despite the rich history of civilization and knowledge originating in Mesopotamia, encompassing modern-day Iraq, the recent history and circumstances of the region have come to affect the provision of healthcare services negatively.<sup>[1]</sup> According to the region's current state, many issues have risen, including a lack of resources, strained healthcare infrastructure, and low patient socioeconomic status. All of which can majorly affect the diagnosis and treatment of life-threatening conditions. This paper describes a case of multiple intracranial aneurysms (MIA) that showcase the challenges of practicing vascular neurosurgery in Iraq.

## CASE PRESENTATION

A 57-year-old female presented with sudden-onset severe headache, photophobia, and drowsiness to the emergency department in a hospital located in Babylon, Iraq. The initial non-contrast

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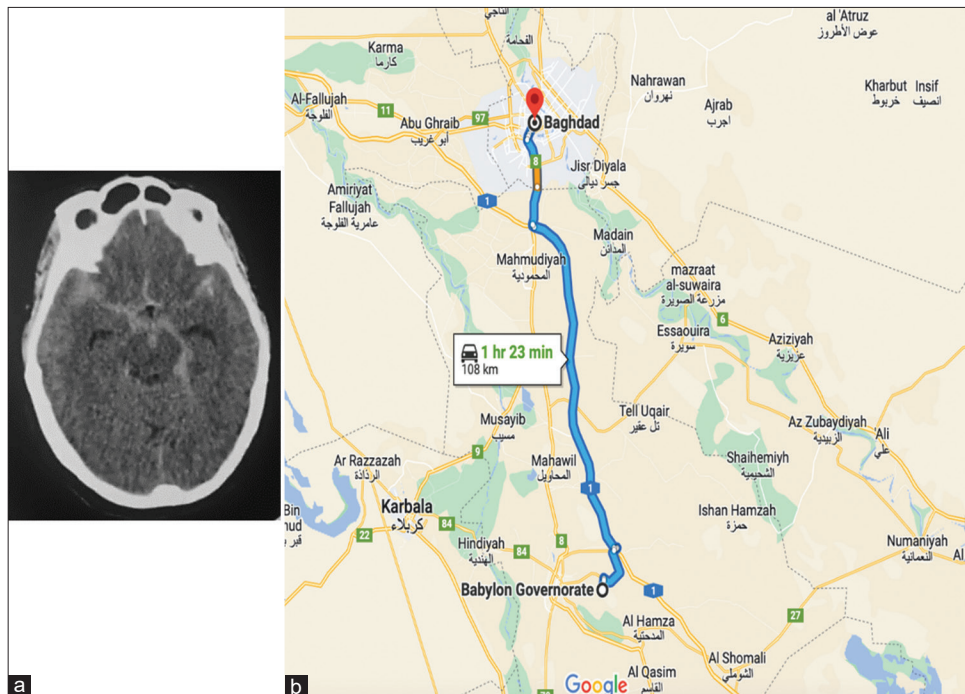
computed tomography (CT) scan showed subarachnoid hemorrhage (SAH) in the basal cistern [Figure 1]. The patient was admitted to the neurology ward for observation and symptomatic management, after which her relatives approached our team for a second opinion. We advised the patient's family to conduct a CT angiogram (CTA); the patient's healthcare team informed the family that CTA would be harmful to the patient within two weeks of presentation and would not provide conclusive results. This statement contradicts the international guidelines, which recommend urgent treatment for suspected ruptured intracranial aneurysms, and indicates CTA as the investigation of choice for cases of SAH due to aneurysmal rupture.<sup>[3]</sup> However, it is essential to note that those guidelines are not considered standard guidelines in the Iraqi health system and transfer.

Following this, based on our request, the patient's family took the responsibility on themselves to transfer the patient, and a CTA was conducted in a nearby private facility. This should not be a usual instant where the family takes responsibility for taking steps in the management of a potentially life-threatening case such as SAH. In addition, more patient transfer in a nonambulance or hospital-supervised facility has its risks. Moreover, the report of the CTA showed that it was negative for any aneurysm and any other vascular malformation. This finding was a disastrous part of this case, as it will show in further investigations.

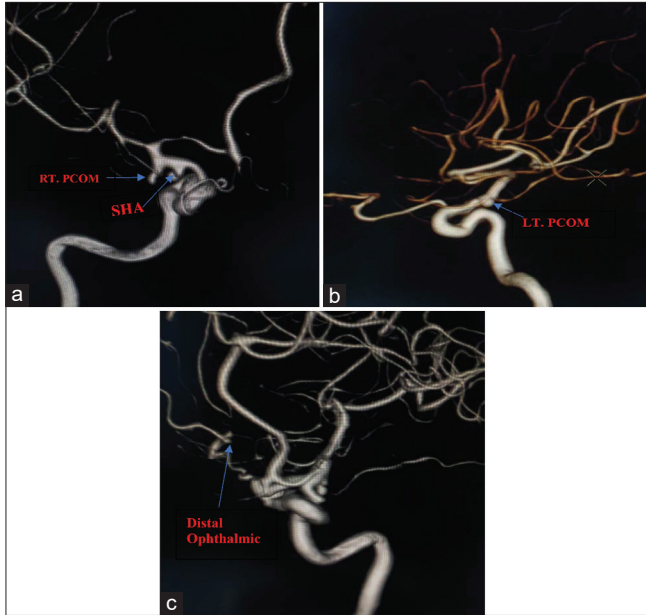
The patient and the family had two options: stay at home based on the imaging findings or travel a 140-mile trip from Babylon to Baghdad to reach our neurovascular center (Baghdad Neurosurgery Teaching Hospital) through a personal, non-equipped vehicle [Figure 1]. The family chose the latter option and arrived at our center. After an initial assessment of the patient and revision of the investigations, we decided to conduct a diagnostic catheter angiography, which surprisingly revealed not one but four aneurysms. Those aneurysms included aneurysms in the right posterior communicating artery (PCoMA), superior hypophyseal artery, intraorbital ophthalmic arteries, and left PCoMA [Figure 2].

Due to the lack of medical insurance in Iraq and the high financial burden for endovascular treatment that can be applied in such cases of multiple aneurysms, the family decided that they could not afford such costly intervention. As a result, the only viable option left was to do open surgery. Hence, we opt to target the tandem right PCoMA aneurysm, the adjacent superior hypophyseal aneurysm, based on the location of SAH in the initial CT where we suspect the rupture has occurred on the right side [Figure 1].

A right pterional approach was performed, and the right Sylvian fissure was retracted to expose and dissect the supraclinoid internal carotid artery; we started by clipping the right PCoMA aneurysm due to the presence of a



**Figure 1:** (a) A non-contrast computed tomography scan showing scan axial section showed subarachnoid hemorrhage in the basal cistern with no predominant clue for the location of the ruptured aneurysm. (b) A mapping illustration showing the distance between Babylon and Baghdad with the time needed to reach the destination in a personal vehicle.



**Figure 2:** 3D angiogram showing (a) right posterior communicating artery and right superior hypophyseal artery aneurysms. (b) Left posterior communicating artery aneurysm. (c) Right intraorbital ophthalmic artery aneurysm.

daughter cyst, and there was an ipsilateral vasospasm of A1 and M1 portions of the anterior and middle cerebral arteries, respectively, on the angiography making it our initial target. However, after clipping, we were convinced that the PComA aneurysm was not the ruptured one. While trying to explore the adjacent right hypophyseal aneurysm, we encountered a huge intraoperative rupture from it that was managed promptly by applying a pilot clip followed by a dissection of the neck. Then, we secured the aneurysmal neck with a permanent clip. The rest of the surgery went uneventful, with no subsequent operative or postoperative complications.

For the remaining two aneurysms, we decided on a watchful follow-up as a next step, with serial follow-up imaging every three months. Both aneurysms were asymptomatic and stable in size and shape at 18 months of follow-up.

## DISCUSSION

SAH due to aneurysmal rupture is a life-threatening medical condition worldwide responsible for 33% of emergency department mortalities. The outcome of such cases can be drastically impacted by early, intensive, and expert management. According to the American Heart Association guidelines on managing aneurysmal SAH, a non-contrast head CT scan remains the cornerstone of the diagnosis of SAH. In cases of diffuse SAH pattern due to suspected aneurysmal rupture, there is a necessity to conduct a CTA, which can be followed by two- and three-dimensional

cerebral angiography. The management options of such cases depend on multiple variable factors, including the aneurysm site, size, number, comorbidities, and availability of equipment and expertise. The decision is ideally made by an experienced cerebrovascular surgeon and an endovascular specialist based on the initial diagnostic angiogram findings.<sup>[3,4]</sup>

Although Babylon was considered a region where medicine was well-established and explored during the era of Mesopotamia,<sup>[5]</sup> the excellence of medical knowledge and access in Iraq can be observed as recently as the 1980s, when it peaked and was a regional destination for healthcare and training.<sup>[2]</sup> However, this status was not consistent, and the healthcare systems in Iraq had huge drawbacks during the war and conflict in the region's recent history. Now, scant financial resources limit the medical training of qualified physicians, availability of diagnostic equipment, and provision of preventative and therapeutic interventions.<sup>[1]</sup> All of the mentioned factors can increase the burden on physicians in Iraq and are potentially the origin of the many challenges physicians face, and neurosurgeons specifically.

Our case represents an excellent example of the multitude of challenges neurosurgeons encounter in Iraq, including the lack of medical history information for a patient suffering from MIA with an apparent yet undiagnosed vasculopathy. It is also encountered in the initial facility's refusal to conduct a CTA and the second facility's misinterpretation of the conducted study, indicating the limitations of medical training and strain on the healthcare system. In addition, this instance highlights the burden resulting from the lack of standard set guidelines in managing such critical and high-risk medical conditions. It is important to note that there are no formal neuroradiology training programs in Iraq, hence the unfortunate contribution to this patient's course.

Further, associated issues which the patients can face include the prevalence of low socioeconomic status and poverty in such locations. Only 2–10% of the population can access diagnostic CTA when needed. Nevertheless, cerebrovascular diseases represented the leading cause of mortality in the region.<sup>[1]</sup> On the other hand, the financial burden encountered by the patient can be observed during the transfer in a non-equipped personal car to reach the vascular center in Baghdad, which is considered a hazardous step for a patient with such a life-threatening condition, the inaccessibility of the endovascular line of management which is known as the best treatment plan for a high-risk case with multiple aneurysms. Moreover, the unavailability of medical insurance in Iraq has led to an increasing number of poor patient outcomes in similar scenarios where there is a potential increased risk of morbidity and mortality.

Despite all the challenges, this patient, in particular, was lucky enough to be treated with no complications. However, as far as we know, 50% of ruptured intracranial aneurysms are prone to a second rupture within the 1<sup>st</sup> month, which can be associated with high rates of deaths.<sup>[3]</sup> It is also essential to consider if a patient had a similar presentation. Still, the family had not taken the same decisions as in the case in our example or could not travel that distance; the outcome is more likely to be dismal.

Based on the above, a series of sequential challenges face the management of such critical ruptured aneurysm cases in Iraq. Of those nuances, reduced funding, lack of resources, strained healthcare system, lack of training, unregulated and unset national guidelines, and prevalent poverty, patients suffer prolonged and convoluted disease courses as observed. These challenges should be addressed and highlighted. Management guidelines should be followed to strive for a better healthcare system that can cover treatment plans for typical patients and offer the needed management for life-threatening and urgent medical conditions. Knowledge about such circumstances is of critical importance to local neurosurgeons everywhere to understand how the management of such cases differs from region to region and from time to time.

## CONCLUSION

This case exhibits various challenges facing vascular neurosurgeons in Iraq. The lack of resources and training and the prevalence of poverty in the country lead to missed diagnoses and poor management in high-risk cases, often leading to increased morbidity and mortality. We attempt to shed light on such important topics and cases to stimulate progress toward improved healthcare provision in Iraq.

## Ethical approval

The research/study complied with the Helsinki Declaration of 1964.

## Declaration of patient consent

Patient's consent not required as patient's identity is not disclosed or compromised.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

## Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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