

## Successful Intravenous Thrombolysis for A Common Carotid Artery Dissection Stroke Revealing Takayasu's Arteritis: A Case Report from Cameroon

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## Abstract

*Takayasu's arteritis is an inflammatory disease of large vessels, mainly the aorta and its branches. It is rare in persons of African descent and infrequently reveals itself by stroke and even more rarely causes arterial dissection.*

*We report the case of a 26-year-old lady, who suffered a left total middle cerebral artery (MCA) stroke caused by an extracranial carotid artery dissection. She met 4 out of 6 criteria of the 1990 American College of Rheumatology for Takayasu's arteritis. She successfully underwent intravenous (IV) thrombolysis using Tenecteplase and was subsequently started on steroids and methotrexate. After three months of follow-up, she was functionally independent with a modified Rankin score (mRs) of +1 and had no signs of active Takayasu's disease. This report adds to the data on acute reperfusion therapy in ischemic stroke due to Takayasu's arteritis and represents to the best of our knowledge the first reported case of successful IV thrombolysis in Cameroon.*

**Keywords:** Takayasu Arteritis, Carotid Artery Dissection, Stroke, Thrombolysis, Cameroon.

## Introduction

Takayasu's arteritis (TA) is an inflammatory disease of large vessels affecting mainly the aorta and its major branches. It is a rare disease with a worldwide incidence of 0.5-3 cases per million per year [1]. TA occurs mainly in women less than 40 years and is more prevalent in Asia. Its incidence in sub-Saharan Africa is not well known. Stroke is a described complication of TA due to inflammation and stenosis of the supraaortic vessels. However, carotid artery dissection is not a classical feature of the disease [2]. There are currently no recommendations pertaining to acute reperfusion therapy in stroke patients with TA [3]. The risk of hemorrhage secondary to IV thrombolysis is expected to be high [4], especially in the context of arterial dissection. We report the case of a 26-year-old lady who presented with an acute ischemic stroke due to a dissection of the left common carotid artery which was successfully thrombolysed. She was subsequently diagnosed with TA. To the best of our knowledge, this is the first report of IV thrombolysis from Cameroon in the literature.

## Case Presentation

Mrs. E.K.G., a 26-year-old right-handed lady presented at the emergency department following a sudden onset of right-sided complete motor deficit with total loss of speech. Both symptoms occurred at 6 a.m., 2 hours before her admission while she was studying for an examination to hold on the same day. There were no complaints of headaches, vomiting, visual loss, or abnormal movements. She had a past history of a transient rise in her blood pressure 3 years ago which was resolved without medical treatment. She also reported chronic non-specific headaches and a 10kg unintentional weight loss the year before her admission for which no etiology was found despite several medical consultations. She had no vascular risk factors. Her medical history was remarkable for primary infertility for which she was followed up at the gynecological unit. On admission, her blood pressure was markedly asymmetric (136/76mmHg on the right arm vs 89/63mmHg on the left). Her pulse rate was at 98bpm on the right arm but no radial or humeral pulse could be palpated on the left side and she had a normal body mass index (BMI) of 22.7kg/m<sup>2</sup>. The patient was conscious, and presented a non-fluent aphasia and right proportional hemiplegia (muscle strength 0/5 according to the medical research council classification). She didn't have Horner's syndrome and cardiac and carotid artery auscultation as well as the rest of the

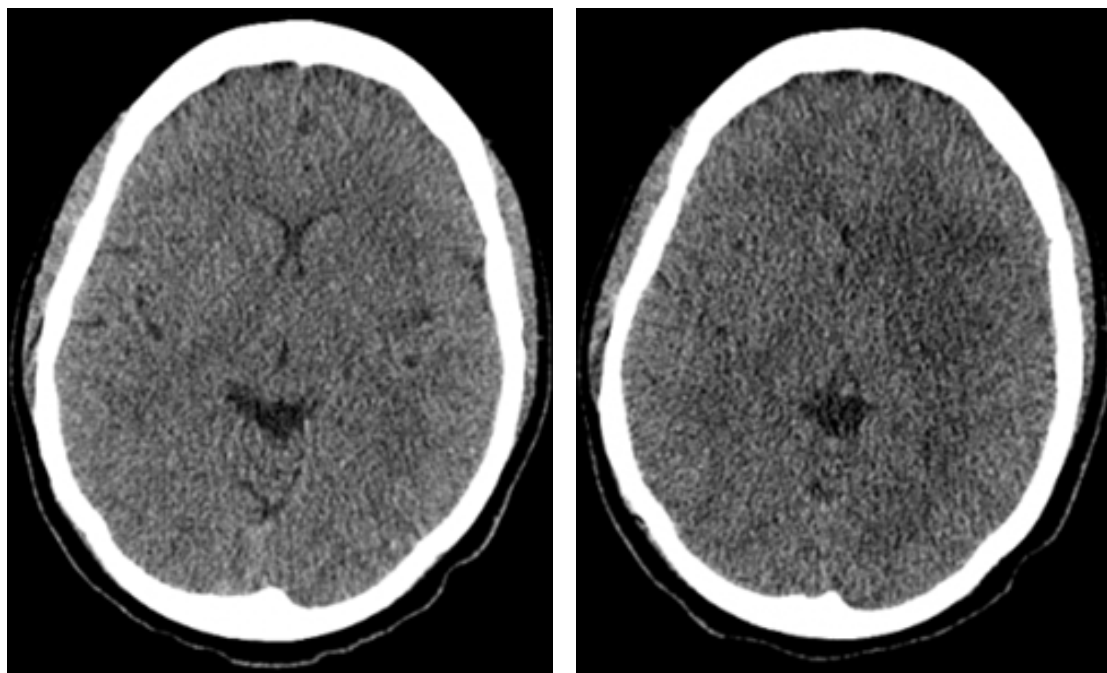
physical examination were unremarkable. A stroke due to a dissection of cervical arteries was initially suspected considering the sudden onset motor deficit in the context of blood pressure asymmetry in a young female. Her initial NIHSS (National Institutes of Health Stroke Scale) score was 15.

A normal cerebral CT scan ruled out hemorrhagic stroke. Neither CT perfusion sequences nor brain MRI were done as they are unavailable in our center. Doppler ultrasonography of the neck vessels revealed a dilated left common carotid artery within which an intimal flap was visibly associated with an extensive parietal thrombus, all in favour of a thrombosed dissection of the common carotid artery. Circumferential stenosis of the left sub-clavian artery and acceleration of blood flow in the left vertebral artery was also noted. A CT angiography of the head and neck vessels confirmed the above findings. Additionally, it revealed marked thickening of the walls of the aortic arch and the descending aorta (Figure 3). The vertebral and internal carotid arteries as well as all intracranial arteries were of normal caliber. An acute ischemic stroke due to a dissection of a common carotid artery was therefore retained as the diagnosis. The decision to thrombolysed was made at 2 hours 30 minutes following the event. Door-to-needle time was however prolonged by 152 minutes due to the untimely unavailability of Alteplase in most centers and pharmacies of the city. Tenecteplase was obtained from a health center of a foreign embassy and 6000UI was administered as a single IV bolus at exactly 4hours 30minutes following the event. Four hours 35 minutes following IV thrombolysis, the patient could utter a few words, and move her right arm on the bed and her right leg against gravity thus dropping her NIHSS score to 11. A control cerebral CT performed 24 hours after thrombolysis showed patches of ischemic lesions the territories of both superficial and deep branches of the left middle cerebral artery with no signs of hemorrhagic transformation (Figure 1). Electrocardiogram and transthoracic cardiac ultrasonography (completed with injection of intravenous microbubbles) did not reveal any congenital or acquired abnormalities that could suggest a cardioembolic origin of her stroke. Her biological work-up was remarkable for a chronic inflammatory syndrome with an erythrocyte sedimentation rate (ESR) at 100mm at the first hour, C-reactive protein (CRP) (Hb at 9.8g/dl) and a moderate microcytic hypochromic anemia at 9.8g/dl. Antinuclear antibodies were positive at 1/80 but anti DNA antibodies, anti-ENA and antiphospholipid antibodies (specifically anticardiolipin and Beta-2 glyco-

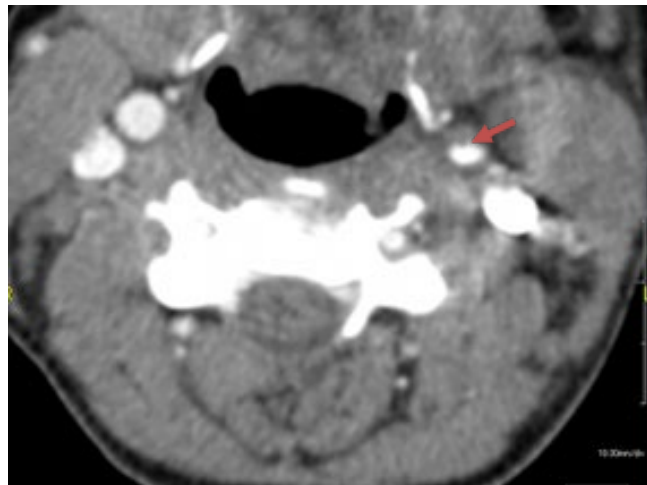
protein 1 antibodies as well as lupus anticoagulant) were all negative. Serologies for HIV, syphilis, hepatitis B and C were equally negative. Lipid profile, uric acid, serum electrolytes, ultrasensitive thyroid stimulating hormone liver enzymes, fasting blood sugar and glycated hemoglobin were all within normal limits. The diagnosis of Takayasu's arteritis complicated with a left common carotid artery dissection and an ipsilateral total sylvian artery stroke was maintained. The patient indeed met 4 out of 6 criteria of the American College of Rheumatology (ACR) 1990 for TA [5].

Anticoagulant therapy with rivaroxaban at 20mg daily was delayed till day 7 of hospitalization considering the size of the brain lesion. On day 9, the patient could walk with a crutch. She was discharged on day 10 with an NIHSS score of 10. Oral prednisone at 1mg/kg/day was initiated at discharge as well as methotrexate at 0.3mg/kg/week after consultation with an internist, coupled with calcium and folic acid supplementation as well as pantoprazole for prevention of a gastric ulcer. Recommendations for a low salt, hypocaloric and hyperprotein diet were also given to the patient. Two weeks later (24 days after thrombolysis) significantly at her first hospital appointment after discharge, there was a marked functional improvement as the patient could walk the three-story stair case leading to her house. Verbal expression was equally improved. Her NIHSS score was 6 with an mRS of +3. At the

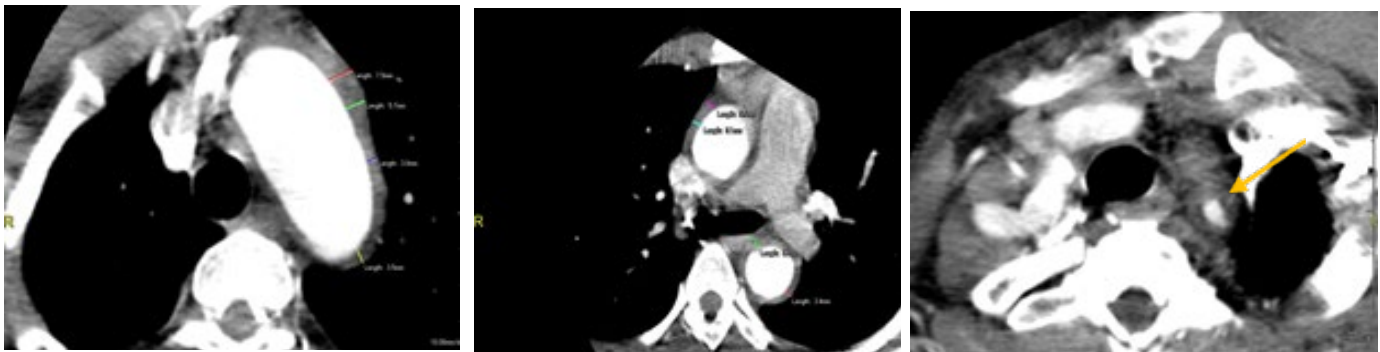
three months follow up visit, the patient's NIHSS score was 2 and she could carry out most of her routine activities with an mRS score of +1. Oral prednisone was progressively tapered to 20mg daily, three months after initiation. At this point Rivaroxaban was switched to aspirine. The BP was still asymmetric (83/60mmHg vs 126/78mmHg on the left and right arms respectively) and the radial and humeral pulses absent on the left. Control ESR was at 14mm at the first hour and CRP < 6mg/l and there was no new ischemic event recorded. A control Doppler ultrasound of the neck vessels still showed a circumferential stenosis of the left subclavian artery and accelerated velocities. The abdominal aorta was of normal caliber. All of this was in favor of a stable TA according to the National Institute of Health (NIH) criteria [6]. Follow-up was thereafter rendered difficult because of irregularities in the patient's hospital visits. She presented five months after initiation of steroids with signs of Cushing syndrome (a 5kg weight gain with moon face appearance, skin thinning and lightening. Her blood pressure was mildly raised but still asymmetric (right arm 135/99mmHg; left arm 99/66mmHg). A progressive decrease in her steroid doses over a period of 3 months was proposed by an endocrinologist followed by an adrenal gland function test. At this visit she still presented a 4/5 right arm motor deficit but with no signs of a new ischemic event. Her CRP was still < 6mg/l; ESR at 10mm at the first hour with a normal hemoglobin level at 14g/dl.



**Figure 1:** Cerebral CT scan A (Left): H2 showing attenuation of the lentiform nucleus and temporal gyral effacement suggestive of an early hyperacute ischemic stroke; B (Right): H24 after IV thrombolysis revealing a left frontotemporal cortical and subcortical hypodensity indicating a left middle cerebral artery stroke.



**Figure 2:** CT angiography of the neck vessels showing a narrowed eccentric lumen surrounded by a crescent shaped mural thrombus indicating a left common carotid artery dissection (red arrow).



**Figure 3:** CT angiography of the aorta and subclavian arteries: A and B) showing an asymmetric non-contrast-enhanced circumferential thickening of the walls of the aortic arch and the descending aorta; C) Symmetric nonenhanced circumferential thickening of the walls of the left subclavian artery (yellow arrow).

**Table 1: ACR diagnostic criteria for TA**

• Age at onset $\leq 40$ years.
• Vascular claudication of the left arm.
• Decreased brachial artery pulse.
• Systolic blood pressure difference $> 10$ mmHg between arms.
• Presence of vascular bruits over subclavian artery and abdomen.
• Arteriographic abnormality: stenosis or occlusion of the aorta or its main branches not due to atherosclerosis or fibromuscular dysplasia
NB: The presence of $\geq 3$ criteria has a sensitivity of 90.5% and specificity of 97.8% [5]

## Discussion

This case presents multiple interests and challenges. First, it adds to the literature on TA in Africa. TA is classically considered rare in persons of African descent. [7] and its epidemiology is not known in sSA as most data come from Tunisia and South Africa [1]. A few cases have been reported from Kenya and Senegal. Aminde et al reported in 2016 the first Cameroonian case of TA in a 30-year-old

female who presented with a four-year history of progressive ipsilateral left upper and lower limb weakness on exertion [7]. Doppler ultrasonography showed a significant reduction of abdominal aortic lumen, and occlusion of left carotid, subclavian, axillary, and vertebral arteries. There was also the involvement of the brachial, ophthalmic, and radial arteries. Kamdem et al. reported a second case in 2018 in a 32-year-old male Cameroonian who suffered multiple cerebral infarctions [8]. The patient was unfortunately lost to follow-up. The peculiarity of this third case from Cameroon is the presence of a common carotid artery dissection which subsequently induced an ischemic stroke. Arterial dissection in general is a rare complication of TA resulting from extensive inflammation of the vessel wall. Chinese researchers reported a 0.87% prevalence of aortic dissection in a population of 1,154 patients with TA [9]. Carotid artery dissection is quite rare. A single-center retrospective study in the USA identified cervical artery dissection in only one out of 79 (1.3%) patients who were follow-up for TA [10]. In this study, arterial dissection was the least common of all the extracranial complications of TA. A more recent review reported a similar prevalence (1.4%) of Takayasu arteritis amongst 215 patients with spontaneous cervicocranial dissection [11]. Gerald and Herath both reported cases of internal carotid artery dissection in patients with Takayasu's arteritis resulting in MCA stroke in 2012 and



2017 respectively [12-13]. Two cases of common carotid artery dissection in Takayasu arteritis were reported by Hao and Fong in 2016 and 2021 respectively [2,14]. None of these patients had signs of an acute cerebrovascular event. Hence, our case appears to be the first report of a common carotid artery dissection leading to an acute ischemic stroke in a patient with TA. Stroke is a relatively frequent complication of TA occurring in 6.7% of patients according to a recent large retrospective study from South Korea [15]. Two main mechanisms have been proposed: hemodynamic hypoperfusion at the occlusive phase generally causes watershed strokes [16] and more commonly, a thromboembolic mechanism due to clots formed from the inflammatory process [17]. Most of these patients in the latter group have extracranial or intracranial artery stenosis [16]. In our case, an artery-to-artery embolism is most probable but rather resulting from the mobilization of a clot at the dissection site of the common carotid artery than a direct consequence of the vessel wall inflammation. This represents an uncommon mechanism of stroke in TA.

Acute management of ischemic stroke in TA is equally challenging. There are to-date, no clear recommendations for acute reperfusion therapy as only a few reports indicating strategies for acute stroke management in TA are available [3]. Some authors do not recommend intravenous (IV) thrombolysis in TA because of an increased risk of bleeding [4]. On the other hand, some have reported recurrent stroke after IV thrombolysis in TA patients explained by extracranial clots [18-19]. Though several cases of successful IV thrombolysis (usually followed by endovascular treatment) are available [3, 20, 21] none of these were in the setting of arterial dissection. More so, the cases reported by Caso (2002) [22], Gerald (2012) [12], Herath (2017) [13] and Fang (2021) [14] of patients with carotid artery dissection revealing TA, did not receive IV thrombolysis. Arterial dissection increases the risk of bleeding following IV thrombolysis and was initially mentioned as a contraindication to rtPA. Recent data have however shown its efficacy and safety [23]. To the best of our knowledge, this is the first case of a safely and efficiently administered IV thrombolysis in a patient with carotid artery dissection stroke and Takayasu arteritis. There were no signs of intracranial bleeding on the control brain CT scan of our patient 24hours after thrombolysis. At three months the patient was functionally independent with an mRS score of +1. This case vignette, therefore, adds to the scanty literature on acute reperfusion therapy in TA in different clinical scenarios.

This case also appears to be the first report of successful thrombolysis in acute ischemic stroke from Cameroon. As in many sub-Saharan African countries, thrombolysis is not systematically available in stroke units in Cameroon. This could be explained by the high cost and scarcity of tPA in the context where patients and their families are the main bearers of the cost of health care. Also, stroke patients generally arrive at health facilities out of the stroke window. Mapoure et al. reported the mean delay from the onset of symptoms suggestive of stroke and the initial consultation of  $47.36 \pm 18.48$  hours in a tertiary health facility in Cameroon in 2014 (24).

## Conclusion

This case adds to the literature on Takayasu arteritis in sub-Saharan Africa. It should therefore be screened for in young patients with ischemic stroke and equally in those with cervical artery dissection. IV thrombolysis appears safe and efficient in TA even in the context of common carotid artery dissection. Thrombolysis for acute stroke is therefore feasible in Cameroon and should be made available to improve the management of stroke patients.

## Declarations

### Consent for publication

The patient signed an informed consent form agreeing to publication of the manuscript.

### Competing interest

The authors have no competing interests.

### Authors' contributions

ESC, BDD, MA KD, LG, ED, NR, HNTK received the patient and did the initial management of the patient. ESC and MA wrote the first draft of the case report. LN, LNN, MMK, FD, SA, NC, YF, GYT and AKN discussed the case in a multicentre clinical staff meeting, critically reviewed the initial draft and approved the final version of the manuscript.

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