# Case 16

## *Caso 16*

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## CASE

Male patient, 60 years of age, admitted to the emergency room drowsy, hemiplegic to the right, and with central right facial paralysis, aphasic, and in Glasgow 10 (RO2/RV2/RM6). He was found unconscious at home, in the morning early hours, by the family, who did not know when he began to present these clinical manifestations. He has a previous history of coronary heart disease, smoking (40 years-pack), and bipolar disorder in treatment. Brain computed tomography (CT) was performed without intravenous contrast.

What is the most likely diagnosis and best conduct on the basis of the clinical data and images?

a. ischemic cerebrovascular accident (CVAi) – hospitalization in the intensive care unit and initiation of thrombolysis with r-tPa;
b. transient ischemic attack (TIA) - observation in the emergency room and waiting for spontaneous resolution of neurologic deficits;
c. ischemic cerebrovascular accident (CVAi) – hospitalization in the intensive care unit and neurological exam in series;
d. hemorrhagic cerebrovascular accident (CVSh) – forward to surgical emergency treatment for clot aspiration and bleeding control.

## ANALYSIS OF IMAGES

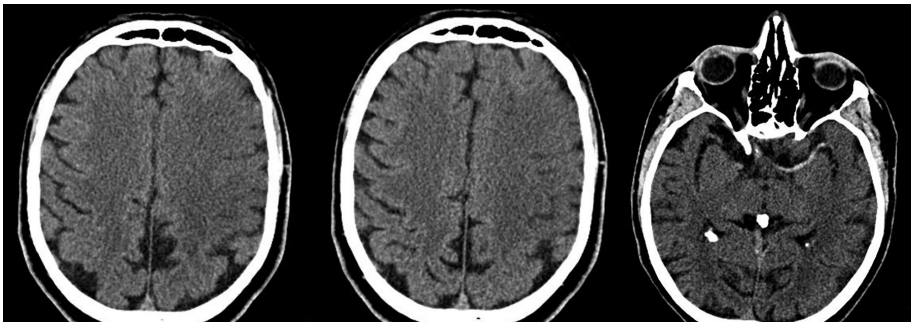

**Figure 1** - CT of skull without an intravenous contrasting medium.

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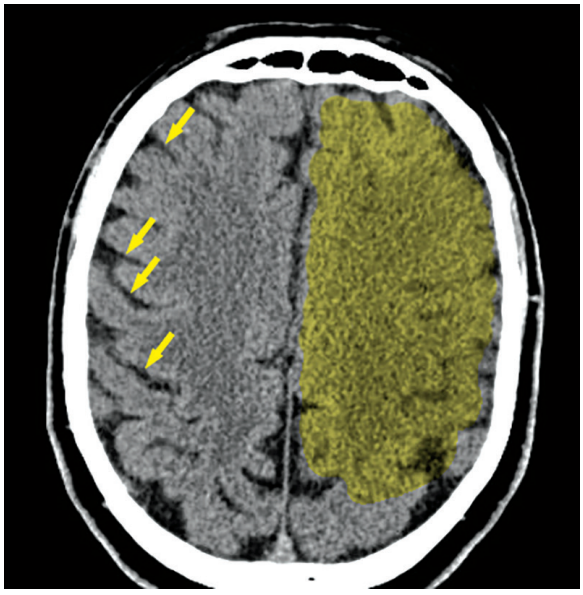


**Figure 2** - Extensive hypodense area in the frontal, left parietal, and temporal brain lobes (yellow shaded), associated with the deletion of intergiral adjacent grooves, as well as loss of distinction between the grey and white matter - tomographic signals compatible with the recent ischemic cardiovascular accident in the ipsilateral middle cerebral artery territory. Right cerebral hemisphere showing features within the limits of normality. In this hemisphere, it is evidenced (yellow arrows) the distinction between the grey and white substances.

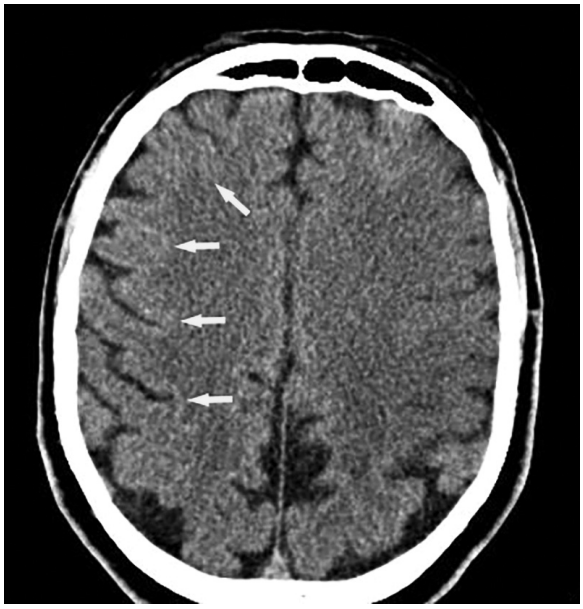


**Figure 3** - Right cerebral hemisphere with features within the limits of normality. In this hemisphere, spins and intergiral grooves are highlighted (yellow arrows), as opposed to the left hemisphere, where there is the deletion of grooves and spins.

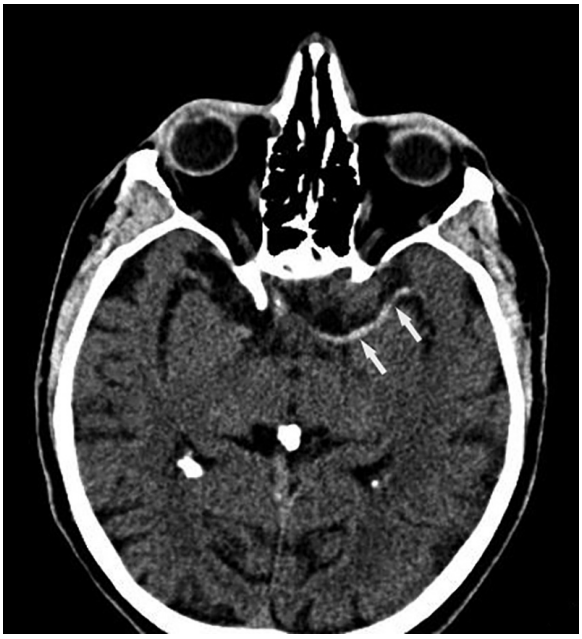


**Figure 4** - Hyperdense left middle cerebral artery in all its extension ("sign of hyperdense artery"), from the middle line to the deep area in the ipsilateral frontal-temporal region, as pointed by the yellow arrows.

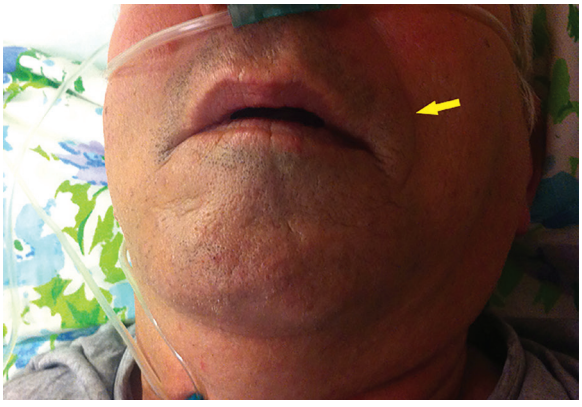


**Figure 5** - The absence of a nasolabial groove to the right is observed (present to the left - yellow arrow), highlighting a contralateral lesion in the area responsible for the facial motor function.

## DIAGNOSIS

Visualization of the "hyperdense artery signs" and cerebral edema on CT (indicating vascular occlusion) associated with exuberant focal neurological deficits strongly suggests the diagnosis of CVAi. The determination of time of episode evolution (critical interval), beginning with the installation of the neurological picture, is essential for the choosing the treatment.

If the interval is less than four and a half hours, thrombolysis with r-tPa (recombinant tissue plasminogen activator) is indicated. An unknown or > four and a half hours critical interval, as in the case presented, contraindicates thrombolysis, and therefore, it is appropriate to establish clinical measures of support and constant monitoring of the neurological picture.

The transient ischemic attacks (TIAs) are small foci of temporary interruption of cerebral perfusion without tissue death (infarction) of the irrigation area, as it occurs in CVAi. The area of hypodensity, loss of distinction between the grey and white masses, and erasure of spins and grooves are findings that are very suggestive of a heart attack.

The hemorrhagic CVA (CVAh) presents itself in the CT as a hyperdense area (blood accumulation), it can be surrounded by a hypodense halo, consisting of serous fluid leaked from the clot and associated with vasogenic edema. In cases of abundant bleeding, the pathological process can provoke a mass effect on the surrounding structures, including a contralateral deviation of the midline.

## DISCUSSION OF THE CASE

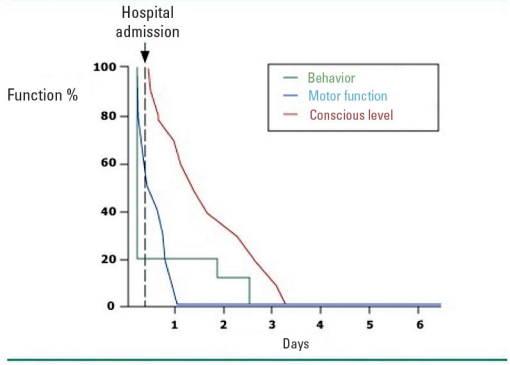
CVAs present an annual incidence of 108 cases per 100 thousand inhabitants in Brazil and are a serious phenomenon that often leads to death or functional incapacity. In Brazil, the mortality rate revolves around 18.5 and 30.9%, at 30 days and 12 months after the event, respectively.

Among the main risk factors are: hypertension, atherosclerosis, carotid stenosis, smoking, cardiac arrhythmias (notably atrial fibrillation), diabetes mellitus, hyperlipidemia, sickle cell disease, obesity, and excess of abdominal fat.

Clots, which when reaching the cerebral circulation cause obstruction and tissue death, may come from various sites; the main ones being atherosclerotic plaques (mainly those located at the base of the aorta and bifurcation of carotid arteries), and from the heart (thrombi form in chambers with dyskinesia and arrhythmic heartbeat) and stenotic or mechanical heart valves.

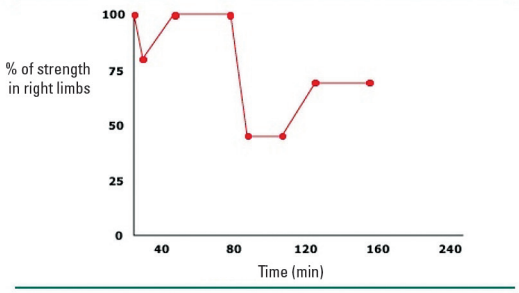
The clinical manifestations of patients who have suffered CVAs vary according to the event site, with lasting focal deficits (> 24 h) and, commonly, lowering of the consciousness level. The middle cerebral arteries (MCAs) are involved in about 2/3 of CVAi cases. The M main stem occlusion in MCAs causes devastating damage with a heart attack in most of the ipsilateral hemisphere – as seen in the case presented. The classic framework of MCA occlusion is characterized by hemiparesis and hemiplegia of contralateral limbs and face, hemianopia or contralateral quadrantanopsia, aphasia (involvement of the left hemisphere), dichromacy contralateral, or hemineglligence and spatial disorientation (right hemisphere involvement) depending on the patient's cerebral dominance. In general, the deficits are permanent.

It should be noted that the clinical manifestations of CVAh without treatment usually deteriorate in a short span of time, as opposed to CVAi, which tends to stabilize after the fifth day of evolution, the maximum phase of cerebral edema (Figures 6 and 7).




Schematic representation of a rapid degeneration of the neurological status, represented by behavioral alteration (green), unilateral motor function (blue), and conscious level (red) in a patient with intraparenchymatous hemorrhage.

**Figure 6** - Evolution of the neurological picture in a situation of intracranial hemorrhage.




The evolution of the weakness clinical picture in a patient who suffered ischemic CVA reveals symptoms fluctuations, which are sometimes normal sometimes worsen. This symptoms progression is said to be 'in zig-zag'.

**Figure 7** - Evolution of the neurological picture in a situation of cerebral ischemia.

The main strategy for avoiding the occurrence of ischemic CVAs is prevention, which should be focused on these known modifiable risk factors: re-

duction of cholesterolemia, control of blood glucose and blood pressure, and effective anticoagulation in cases of cardiac and dyskinesias and presence of mechanical valves.

Conducting preventive endarterectomy (by an experienced surgeon) is indicated for patients up to 75 years old with asymptomatic carotid stenosis of 70% or more. Under these conditions, the procedure reduces the risk of CVAi by half in five years.

## RELEVANT ASPECTS

- the ischemic CVA is a serious phenomenon, of high incidence in Brazil and worldwide that often leads to death or functional incapacity;
- it is important to make the correct distinction between TIA, CVAi, and CVAh, which have very distinct prognoses and treatments. To accomplish this, the imaging method of choice is the CT without an intravenous contrasting medium;
- some of the main risk factors are: systemic hypertension, atherosclerosis, smoking, cardiac arrhythmias (notably atrial fibrillation), diabetes mellitus, obesity, and excess of abdominal fat;
- the determination of the time of episode evolution (critical interval), which begins with the installation of the neurological picture, is essential for choosing the appropriate treatment. A critical interval of < four and a half hours indicates thrombolysis with r-tPa (recombinant tissue plasminogen activator), whereas a critical unknown or > four and a half hours interval contraindicates thrombolysis;
- the prevention of CVAi should be focused on the reduction of cholesterolemia, control of blood glucose and blood pressure, and effective anticoagulation in cases of cardiac and dyskinesias and presence of mechanical valves;
- the preventive endarterectomy is indicated for patients up to 75 years old with asymptomatic carotid stenosis of 70% or more. Under these conditions, the procedure reduces the risk of CVAi by half in five years.

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