

# From Pitfall to Misdiagnosis and Life-threatening Treatment

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## ABSTRACT

*Sixty-four-section multidetector computed tomography angiography (64-SMCTA) is increasingly used for screening and surgical planning of ruptured intracranial aneurysms due to its high sensitivity and positivity and it is less invasive than digital subtraction angiography (DSA). Combination of both is the best tool when diagnosis is inconclusive. Sometimes the use of 64-SMCTA alone may cause interpretation pitfall and unnecessary life-threatening treatment. This case report is about 64-SMCTA interpretation pitfall, a false positive result that occasioned surgery for clipping an intracranial aneurysm which was not found during surgical procedure. The patient survived the life-threatening surgery and she has been doing well over the last two years. A perceptual error and lack of conspicuity due to some limitations of the scanner to disclose a normal anatomic variant were responsible for this false positive. Whenever 64-SMCTA renders inconspicuous images, this result must be seen as inconclusive and hence a meticulous differential diagnosis and DSA are required before any surgical planning.*

**Keywords:** False positive, intracranial aneurysm, intra-arterial digital subtraction angiography, 64-section multidetector CT angiography

# De las Trampas de los Falsos Positivos a los Diagnósticos Equivocados y los Tratamientos que Amenazan la Vida

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## RESUMEN

*La angiografía mediante tomografía axial computadorizada con multidetectores de 64 secciones (64-SMCTA) se usa cada vez más para el tamizaje y el planeamiento quirúrgico de la ruptura de aneurismas intracraneales, debido a su alta sensibilidad y positividad, y a que es menos invasiva que la angiografía de sustracción digital (ASD). La combinación de ambas es la mejor herramienta cuando el diagnóstico es inconcluso. A veces el uso de 64-SMCTA solo, puede causar una interpretación falsamente positiva, llevando así a un tratamiento innecesario que ponga en peligro la vida del paciente. Este reporte de caso trata de una trampa de la interpretación con 64-SMCTA – un resultado falsamente positivo que ocasionó una cirugía para pinzar un aneurisma intracraneal que no se encontró durante el procedimiento quirúrgico. La paciente sobrevivió la riesgosa cirugía, y le ha ido bien en los últimos dos años. Un error de percepción y falta de clara visibilidad a causa de algunas limitaciones del escáner para revelar variantes anatómicas normales, fueron los responsables del falso positivo, es decir, de la falsa alarma. Cuando el 64-SMCTA produce imágenes no suficientemente precisas, el resultado debe considerarse inconcluso, y se requiere entonces un meticuloso diagnóstico diferencial y DSA antes de proseguir a una planificación quirúrgica.*

**Palabras claves:** Falso positivo, aneurisma intracraneal, angiografía de sustracción digital intra-arterial, angiografía mediante tomografía axial computadorizada con multidetectores de 64 secciones

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## INTRODUCTION

Sixty-four-section multidetector computed tomography angiography (64-SMCTA) is popular in the diagnosis of ruptured intracranial aneurysms because of its high sensitivity, positivity and being less invasive than digital subtraction angiography

[DSA] (1, 2). Some authors prefer the use of 64-SMCTA alone as an initial evaluation of intracranial aneurysm (2, 3). Combination of 64-SMCTA and DSA is the most sensitive technique when diagnosis is inconclusive (4, 5). Sixty-four-section multidetector computed tomography angiography may lead to interpretation pitfalls because of some parameters of the scanner that affect quality of imaging [conspicuity] (6). Errors in the interpretation of 64-SMCTA when used to detect intracranial aneurysms may lead to misdiagnosis and dangerous treatment options. We present the case of a patient who underwent unnecessary surgery for clipping an intracranial aneurysm based on a false positive 64-SMCTA finding.

### CASE REPORT

A 21-year old female patient was hospitalized with intense headaches and nuchal rigidity in November 2009 at University Hospital of Sancti Spiritus Camilo Cienfuegos. Ancillary blood tests were normal. A cranial CT failed to show blood in the subarachnoid space and a lumbar puncture was performed. The cerebrospinal flow was xanthochromic with high levels of proteins but with glucose slightly diminished. A subarachnoid haemorrhage (SAH) was diagnosed. The patient was referred to a hospital in Havana. In that hospital, a 64-SMCTA was performed and an aneurysm at the right middle cerebral artery was diagnosed (Fig. 1). Based on this diagnosis and symp-

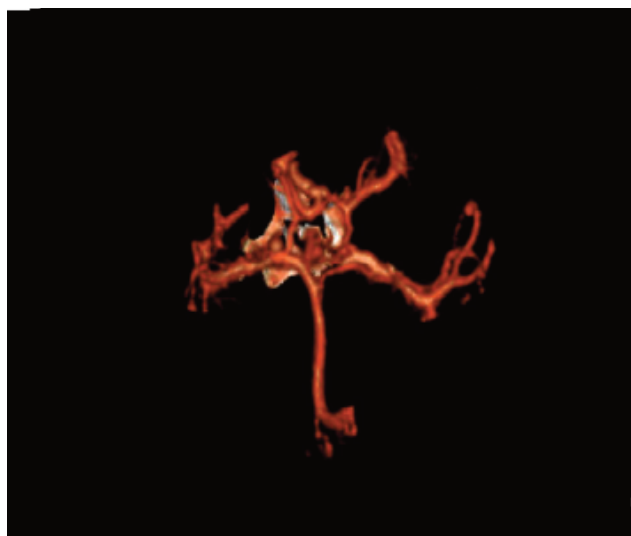


Figure: Sixty-four-section multidetector computed tomography angiography (64-SMCTA) image found at the right middle cerebral artery.

oms and signs of SAH, the surgical procedure was performed. During the surgical intervention, no aneurysm was found. The patient did well after operation and was discharged with a diagnosis of non-aneurysmal SAH. In January 2010, the patient started complaining of intense headache and lower limbs weakness. She was hospitalized again in Sancti Spiritus Uni-

versity Hospital. Neurological examination, including fundoscopic examination, was normal. Laboratory blood tests and CT scan were also normal. After seven days with symptomatic treatment, the patient was discharged with a diagnosis of headache due to non-aneurysmal SAH. The patient has been doing well in the follow-up period since 2010.

### DISCUSSION

One spherical image of 10 millimetres in size resembling an aneurysm at the right middle cerebral artery level was found on 64-SMCTA (Fig. 1). Although the image was inconspicuous, this finding and the presence of symptoms and signs of SAH led surgeons to diagnose a right middle cerebral artery aneurysm and schedule it for surgical clipping. The 64-SMCTA can render inconspicuous images which are inconclusive findings and not sufficient for surgical planning (7) even in the presence of symptoms and signs of SAH. Errors in the interpretation of routine brain imaging, used as screening tool, can be categorized as either perceptual or cognitive. In the index case, the interpretation pitfall was perceptual in nature, aided by the specificity of the CTA in the presence of blood products surrounding one small, normal, over-projecting anatomic variant into the subarachnoid space adjacent to the bone. Some parameters of the multidetector CT scanner affected the quality of images such as the minimal distance between two points of any object to detect them as independent images (spatial resolution) and the ability of the scanner to identify thin differences into the tissue composition and the relation between diagnostic features (signal) with its environment (noise). These parameters and artifacts were involved altogether with the presence of blood products in the subarachnoid space where there might have been a normal anatomic variant interpreted as a pathologic condition (8). In this situation, a meticulous differential diagnosis and a DSA could have helped ensure correct interpretation and adequate treatment (nonsurgical). We have not found any articles with a similar 64-SMCTA result that led to life-threatening treatment.

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