

Transesophageal Echocardiogram as a Diagnostic Tool for Cardioembolic Cerebrovascular Event Secondary to Thrombus into Valsalva Sinus Aneurysm

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Abstract

Transesophageal echocardiogram as a diagnostic tool for cardioembolic cerebrovascular event secondary to thrombus into Valsalva sinus aneurysm. This is a case report of a 54-years-old female with a history of systemic arterial hypertension treated with enalapril 20 mg and amlodipine 5 mg both once daily. She was admitted 15 days ago in a Hospital Center of Bogotá for having presented sudden loss of consciousness followed by complex focal seizure episodes. She presented with motor and sensory aphasia and left hemiparesis, atrial fibrillation was documented in electrocardiogram and an ischemic cardiovascular event was documented in a brain computer tomography. A cardioembolic event due atrial fibrillation was considered and for that reason the patient was referred to the Shaio Clinic Foundation for a transesophageal echocardiography, finding in the aortic root to the posterior aspect a mass with cystic appearance, trabeculated, with dynamic flow and inside it the presence of thrombus, with an aortic valve sclerosis with mild insufficiency, without stenosis, The patient was remitted for a multidisciplinary management by cardiology, neurology and cardiovascular surgery. During the hospitalization, a chest angiography was performed, reporting multilobed dilatation of the non-coronary Valsalva sinus with a mobile thrombus inside. On the 22nd day of admission surgical correction of the aneurysm was performed through aortotomy, locating an orifice that feeds it below the commissure. The coronary and right coronary valves without communication with the right atrium with a Dacron patch. During the postoperative period she presented signs of low cardiac output and myoclonus the patient was managed with inotropes, levosimendan and levetiracetam, 48 hours after surgery she was extubated and 12 days after surgery she is discharged without complications.

Keywords: Stroke; Thrombus; Valsalva sinus aneurysm

Introduction

A transesophageal echocardiogram is an alternative way to perform an echocardiogram. Specialized probe containing an ultrasound transducer at its tip is passed into the patient's esophagus. This allows image and Doppler evaluation which can be recorded. Before inserting the probe, mild to moderate sedation is induced in the patient to ease the discomfort and to decrease the gag reflex, thus making the ultrasound probe easier to pass into the esophagus. It would help in the diagnostic processes. The advantage is usually clearer images, especially of structures that are difficult to view transthoracically. It helps to detect and quantify the disease preoperatively as well as to assess the results of surgery immediately after the procedure.

Case Report

This is a case report of a 54-years-old female with a history of systemic arterial hypertension treated with enalapril 20 mg and amlodipine 5 mg both once daily. She was admitted 15 days ago in a Hospital Center of Bogotá for having presented sudden loss of consciousness followed by complex focal seizure episodes. She presented with motor and sensory aphasia and left hemiparesis, atrial fibrillation was documented in electrocardiogram and an ischemic

cardiovascular event was documented in a brain computer tomography. A cardioembolic event due atrial fibrillation was considered and for that reason the patient was referred to our institution for a transesophageal echocardiography, finding in the aortic root to the posterior aspect a mass with cystic appearance, trabeculated, with dynamic flow and inside it the presence of thrombus, with an aortic valve sclerosis with mild insufficiency, without stenosis, mitral valve of rheumatic aspect with mild insufficiency, severe concentric hypertrophy of the left ventricle with mild generalized hypokinesia and mild systolic dysfunction with an ejection fraction of 48%, severe left atrial dilatation without thrombi, rest of valves were normal, a diffuse pericardial effusion of 80 ml without hemodynamic repercussion was documented, it was established that the patient presented an ischemic acute Cerebrovascular event in the right frontotemporal region originated by thrombus formed in high flow trabecular mass located in aortic root (Figure 1). The patient was remitted multidisciplinary management by cardiology, neurology and cardiovascular surgery. During the hospitalization, a chest angiography was performed, reporting multilobed dilatation of the non-coronary Valsalva sinus with a mobile thrombus inside. On the 22nd day of admission surgical correction of the aneurysm was performed through aortotomy, locating an orifice that feeds it below the commissure. the coronary and right coronary valves without communication with the right atrium with a Dacron

patch. During the postoperative period she presented signs of low cardiac output and myoclonus the patient was managed with inotropes, levosimendan and levetiracetam, 48 hours after surgery she was extubated and 12 days after surgery she is discharged without complications and without presenting new neurological additional alterations. The result of the anatomopathological study confirmed the preliminary diagnosis by images, dense fibro-connective tissue was found, with sclerosis without inflammatory compromise and the presence of hemosiderophages due to old hemorrhage (Figure 2).

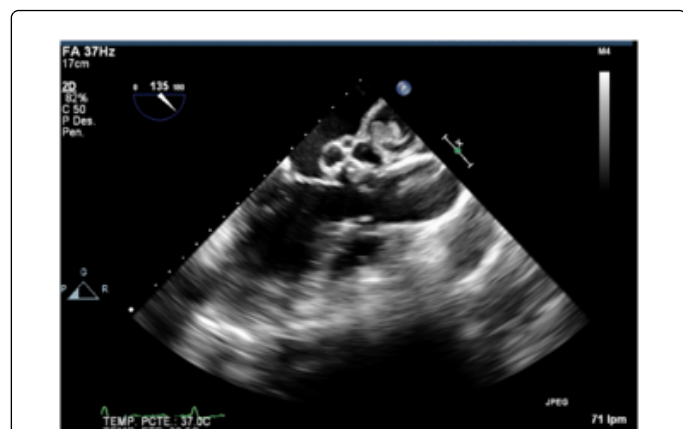


Figure 1: Mid-esophageal long axis view, a trabeculated, cystic aspect mass with flow is observed associated with right coronary Valsalva sinus (RCVS), a thrombus well organized with high embolic potential emerging from RCVS is pointed with the arrow (performed with an iE33 Philips ultrasound machine).

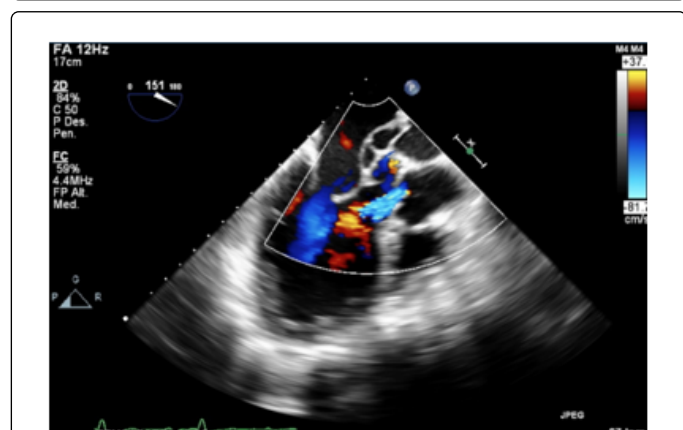


Figure 2: Mid-esophageal long axis view, a trabeculated, cystic aspect mass with flow is observed associated with right coronary Valsalva sinus (RCVS), a mild aortic valve insufficiency is associated (performed with a iE33 Philips ultrasound machine).

Discussion

Stroke is defined as an episode of neurological dysfunction (in brain, retina or spinal cord) presumed to be caused by ischemia or hemorrhage that persists for more than 24 hours or until death without has been able to perform studies necessary to classify it in any of the following groups: ischemic, intracerebral hemorrhage, subarachnoid

hemorrhage, cerebral vein thrombosis, in addition to presentations that do not have acute symptoms such as silent infarcts of the central nervous system and silent cerebral hemorrhages [1]. The transient cerebral ischemic attack was defined in 2009 as brief episodes of neurological dysfunction due to focal cerebral ischemia not associated with permanent infarction [2].

According to world statistics of the World Health Organization, cardiovascular diseases (CVD) were the first cause of mortality in 2015 with 17.6 million deaths worldwide, with cerebrovascular events the second cause of mortality with 6.2 million deaths 53.3 and 46.7% respectively [3].

In the United States of America, the estimated prevalence of cardiovascular diseases is more than 85 million people (1 of every 3 habitants if the totally of 80 million of hypertensive patients are included), of these 15.5 million have coronary heart disease and 6.6 million patients with stroke. Among the different ethnic groups non-Hispanic whites have a prevalence of 11.1% of cardiovascular disease, African Americans 10.3% and Latinos 7.8%, with a prevalence of any type stroke of 2.3%, 4% and 2.4% respective. The prevalence in the general population of stroke in the US during the years 2009-2012 according to NHANES were 2.6%; 2.7% according the 2013 BRFSS (CDC). In USA 610 thousand new events/year and 185 thousand recurring events/year 7% were produced. Over the total of documented stroke 80% are ischemic, 10% intracranial hemorrhages and 3% subarachnoid hemorrhages, 6% to 28% of the population have presented silent ischemia, increasing the incidence with age and 2.3% transient ischemic attacks [4].

In Colombia the prevalence of stroke during 1984 to 2002 were between 0.1% and 1.9%, the majority of them were ischemic, prevalence in 2014 among women were 0.15% for an incidence of 7.75 cases per 100 thousand women and men the prevalence was 0.17% and the incidence of 17.08 cases per 100 thousand men; hemorrhagic stroke had a prevalence among women of 0.05% with an incidence of 7.58 per 100 thousand habitants and among men a prevalence of 0.06% and an incidence of 9.08 per 100 thousand habitants [5].

The TOAST trial considered 5 etiologic subgroups of ischemic stroke:

- 1) Large arteries.
- 2) Cardio-embolism.
- 3) Small arteries occlusion (lacunar).
- 4) Stroke of another determined etiology.
- 5) Cryptogenic stroke due 2 or more identified cause [6].

30% to 40% of cardioembolic stroke has a cryptogenic origin, 15% to 40% of those has cardioembolic origin [7]. The TOAST study identifies high-risk sources of cardio embolism such as the presence of mechanical valvular prostheses, mitral stenosis and concomitant atrial fibrillation, isolated atrial fibrillation, thrombi in the left atrium and atrium, sick sinus syndrome, recent minor myocardial infarction within 4 weeks, thrombi in the left ventricle, dilated cardiomyopathy, left ventricular akinesia, atrial myxoma, infectious endocarditis and medium-risk sources such as mitral valve prolapse, mitral ring calcification, mitral stenosis without atrial fibrillation, spontaneous echo contrast in the left atrium, aneurysm of the interatrial septum, permeable foramen ovale, biological valvular prosthesis, non-bacterial thrombotic endocarditis, heart failure, hypochondrial segment in left ventricle and myocardial infarction greater than 4 weeks and less than

6 months [6] Among the possible causes of ischemic cardioembolic stroke atrial fibrillation (AF) is especially important because is fully identified as an independent risk factor that increases mortality twice in women and 1.5 times in men, increasing up to 5 times the probability of stroke. AF was by documented between 20% to 30% before or after an ischemic stroke [8,9], with a global prevalence in 2010 estimated in 20.9 million men and 12.6 million women and with an estimated incidence in 2010 of 2.7 million new cases in men and 2 million new cases in women [10,11]. However, in this particular case the presence of thrombi in the left atrium or in the left atrium was discarded using in the transesophageal echocardiogram but identifying a multilobulated dilation of the non-coronary Valsalva sinus with thrombus inside it an uncommon case reported in the literature.

The Valsalva sinus aneurysm (VSA) is a rare finding present among 0.14% to 0.35% of the patients undergoing to cardiac surgery [11,12] with a prevalence of 0.09% in the general population [13] in autopsies series 7 cases were reported among 8138 patients [14]. VSA is defined as a dilation between the aortic root ring and the sino-tubular Groove, VSA could be acquired or congenital, among the acquired causes are infections such as syphilis [15], bacterial endocarditis, tuberculous or even fungal endocarditis or thoracic trauma [13,16,17] Congenital causes are secondary to weakness of the elastic lamina in its junction with the middle aorta and fibrous ring, is frequently associated with Marfan syndrome, Ehlers-Danlos syndrome or other connective tissue defects, as well as Takayasu arteritis or Behcet's disease [13].

Aneurysms of the sinus of Valsalva have been associated with defects of the interventricular septum (30% of patients), aortic insufficiency (20% to 30%), bicuspid aorta (10%) [11,18,19]. Embryologically, aneurysms develop with a blind diverticulum secondary to pressure forces on the aorta, potentiated by congenital connective tissue defects [15,16]; congenital defects are usually small, with projections similar to fingers or diverticula that emerge from the lower portion of the sinus; acquired aneurysm are larger with an appearance of diffuse dilations of the sinus as in syphilitic aneurysms or irregular cavities communicating with the sinuses as in aneurysms that complicate valvular endocarditis or in those that produce dissection [17]. With respect to the anatomical location most are in the right coronary sinus (72%), noncoronary sinus 22% and 6% left coronary sinus [16], most sinus aneurysms rupture drain to the right ventricle followed by right atrium [16,17]. When VSA are diagnosed could present with rupture or not. Most of the ruptures of VSA occurs in patients between 20 and 40 years old, the initial clinical presentation is varied from asymptomatic patient to serious symptoms, there is no specific symptoms due to this pathology, the diagnosis is performed using imaging studies. The most frequent symptom is dyspnea, follow be substernal chest pain and abdominal pain. The most frequent clinical sign is a continuous murmur [16,17], VSA could simulate acute myocardial infarction [20], endocarditis on the tricuspid valve [21]. the treatment of the Valsalva aneurysms will depend on its location, risk of complications and individual risk of the patient, the surgical approach describing a low mortality with survival of 94% in 10 years, 90% at 15 years [22] with a mortality early 1.9% [23].

Conclusion

Most of the ruptures of VSA occurs in patients between 20 and 40 years old, the initial clinical presentation is varied from asymptomatic patient to serious symptoms, there is no specific symptoms due to this pathology, the diagnosis is performed using imaging studies. The most

frequent symptom is dyspnea, follow be substernal chest pain and abdominal pain. The most frequent clinical sign is a continuous murmur, VSA could simulate acute myocardial infarction, endocarditis on the tricuspid valve. the treatment of the Valsalva aneurysms will depend on its location, risk of complications and individual risk of the patient, the surgical approach describing a low mortality with survival of 94% in 10 years, 90% at 15 years with a mortality early 1.9%.

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