

CLINICAL CASE

THROMBOSIS OF MECHANICAL AORTIC VALVE

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Abstract

Obstruction of mechanical aortic valve is a rare but serious complication associated with a high mortality rate that frequently follows thrombosis – due to regional clotting or, less often, due to endocarditis. Thrombosis of mechanical heart valve depends on certain factors such as lifestyle, coagulation status, valve position, presence of atrial fibrillation and ventricular dysfunction. 70-year-old patient is admitted to the On-Call Department for moderate-severe dyspnea with progressive onset over the last month with a history of a prior aortic valve replacement. An echocardiogram reveals a dysfunctional metallic aortic prosthesis. He undergoes a surgical intervention for mechanical valve replacement with iterative median sternotomy and a meticulous dissection of the pleuro-pericardial adhesions. Post operative evolution in the ICU is followed by SIRS. The patient goes into a GCS 4 coma and the neurological examination presumes a recent stroke.

Keywords: thrombosis, aortic valve

Introduction

Obstruction of mechanical aortic valve is a rare but serious complication associated with a high mortality rate that frequently follows thrombosis – due to regional clotting or, less often, due to endocarditis. Thrombosis of mechanical heart valve depends on certain factors such as lifestyle, coagulation status, valve position, presence of atrial fibrillation and ventricular dysfunction. Thrombosis often emerges late after valve replacement due to inappropriate anticoagulation. Aortic valve thrombosis incidence is $\leq 0.2\%$ per year and is more frequent on mechanical prostheses [1,2].

Opinions vary regarding the elective treatment – surgical or fibrinolytic therapy – in the management of thrombosis of mechanical heart valve [3]. Thrombolysis is recommended

for patients with NYHA III/IV class heart failure, unaffected by chronic/recurrent thrombosis (due to inadequate thrombolytic therapy), small-sized thrombus (<0.8 sq cm) with too high peri-operative surgical risk (comorbidities) to undergo surgery. Surgical therapy includes valve replacement or open-heart thrombectomy. Because of recurrent thrombosis after thrombectomy (in approx. 40% of the cases [4]), replacement of the obstructed aortic valve is preferred [5].

Case Workup

70-year-old patient is admitted to the On-Call Department for moderate-severe dyspnea with progressive onset over the last month. He has a history of a prior aortic valve replacement (in

2008) with an ATS no.25 mechanical prosthesis and aorto-coronary by-pass (with inverted internal saphenous graft) on the right coronary artery.

Physical examination reveals the following: accessory muscle inspiration, intercostal and supraclavicular wheezing, bilateral vesicular breath, fine crackles at the lungs bases. There is a rhythmical cardiac beat, tachycardia (HR \approx 100 bpm), BP = 110/50 mm Hg, 3/6 grade mitral systolic murmur, no jugular turgescence, moderate lower limb edema, bilateral peripheral pulse.

An echocardiogram reveals a dysfunctional metallic aortic prosthesis (limited opening and incomplete closure) that leads to a tight stenosis (maximal gradient – 80 mm Hg) and severe regurgitation (gr. III). The patient also has grade II mitral regurgitation, dilated left atrium, diastolic left ventricle dysfunction, severe secondary pulmonary hypertension with PAPs=90 mm Hg, EF= 50-55%. The ECG shows a sinus rhythm with a HR of 100 bpm, QRS axis at 30 degrees, no end phase alterations. Chest X-ray reveals a light cardiomegaly and lung opacities at the bases, with expansive tendency.

Coronary catheterization shows: patent left coronary artery (LCA). 80% stenosis of the right coronary artery (RCA) II, with competitive inflow on RCA III, patent venous by-pass for RCA. On admittance, the patient's INR is 1.59, Hgb= 10.8, cardiac enzymes within the limits.

He undergoes a surgical intervention for mechanical valve replacement with iterative median sternotomy and a meticulous dissection of the pleuro-pericardial adhesions. After systemic heparin administration, recess creation and cannulation, the by-pass circuit is turned on and antegrade cardioplegic agent is administered. A transverse aortotomy and necessary sectioning of the venous graft on the RCA III is performed. The obstructed aortic mechanical valve is excised and an ATS no. 23 mechanical prosthetic valve is inserted on the previously wired circular patch. A double strand Prolene 4.0 aortic suture and reimplantation of the venous graft on the RCA III into the Ascending Aorta are performed.

Post operative evolution in the ICU is followed by SIRS. The patient goes into a GCS 4 coma and the neurological examination

presumes a recent stroke. Cerebral CT shows native hypodense lesions within the cortical-subcortical layer in the right upper frontal cortex due to subacute ischemia; another hypodense lesion in the left occipital cortex, suggestive for a chronic lesion is present. The patient receives I.V. anticoagulant therapy, antiplatelet therapy, neurotrophic agent, piracetam and B complex vitamins, the evolution being favorable: he recovers from the deficit, is conscious and cooperative at discharge, with no residual motor deficit, OTE.

On cardiovascular examination: post-OP – mixed cardiogenic and hypovolemic shock with severe arterial hypotension, LDH increasing to 14.5 mmol/l, with the necessity of increasing the inotropic and vasopressive support up to 12 mcg/kg/min of Dobutamine, 1200 ng/kg/min Noradrenaline and 600 ng/kg/min Adrenaline. TEE shows and EF=25-30%, grade III mitral regurgitation, grade II tricuspid regurgitation, hypokinetic inferoapical LV and IVS, no pericardial effusion. Day 1 at the ICU: pulseless electrical, cardiac arrest resuscitated for 10 minutes (chest compressions and Adrenaline) with subsequent return to DDD pacing rhythm – HR=90 bpm. Post-critical TEE shows an EF of 50%, significant LVH with hypertrophic band in LVET, aortic valve with normal activity, grade II-III mitral regurgitation and maintained global systolic performance of the RV. Post-critically LDH increased up to 23 mmol/l, with a subsequent gradual decrease. The hemodynamics were stabilized with 7 mcg/kg/min of Dobutamine and 3000 ng/kg/min of Noradrenaline, LDH values normalized on the 2nd day of the ICU.

Coronary catheterization performed on Day 1 on the ICU confirmed the presence of the venous graft on the RCA and revealed normokinesis of the two hemi-arches, with no aortic regurgitation and paravalvular leak. ECG shows a grade III AV block with DDD stimulation at 80-110 bpm. The patient is maintained in a latency status using Dobutamine and Noradrenaline until his 5th ICU day, with subsequent hemodynamic stability. He is successfully discharged on day 11, not before placing a DDDR permanent pacemaker. After this episode the patient got a residual heart failure with a BNP value of 798 ng/ml.

The post-OP renal management consisted of hemodiafiltration as a hemodynamic and respiratory adjuvant. The patient developed renal failure that gradually improved under CVVHDF. He also developed ischemic liver failure with important cytolysis and altered synthesis function which improved when leaving the ICU. Severe thrombocytopenia (63.000/cmm) which gradually evolved to thrombocytosis (570.000/cmm) was also present.

The patient returns on the ward with a favorable evolution and daily wound management.

Discussions

Thrombosis of mechanical valve is the most serious thromboembolic complication with a high mortality rate, thus preventive anticoagulant therapy is recommended for life. An inefficient or a lack of anticoagulant therapy, even for a short period of time, have been proved to increase to overall risk of thrombosis of the cardiac valve. In this particular case, the patient did not interrupt the anticoagulant therapy and had constant effective INR values (measured at 1 month interval), but had an INR of 1.59 on admission [6]. Hence our suggestion that a more frequent monitorization (for example 1 every week) would decrease the risk for valvular thrombosis [7].

Thrombosis of aortic valve frequently leads to sudden cardiac death. Generally, these patients' clinical status is progressively deteriorating, opening a window for diagnosis and specific treatment, the surgical risk remaining acceptable even in patients with a severely altered clinical status.

Conclusions

Thrombosis of mechanical aortic valve is a medical and surgical emergency with a high

mortality rate. Transesophageal echography plays a major role in the diagnostic process and gives pertinent information regarding the choice of the elective treatment.

Optimal management depends on the size and localization of the thrombus, NYHA class, presence or absence of an embolus, the availability of a surgical team and the possible contraindications of the therapeutical choice.

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