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Case report

Bicuspid aortic stenosis, mechanical valve thrombosis and pregnancy – case report

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Abstract Aortic stenosis (AS) carries a high pregnancy risk. In women of childbearing age the main cause of AS is congenital bicuspid aortic valve. Women with moderate to severe obstruction should be advised to delay conception until relief of AS (balloon valvulotomy or surgery). Pregnant women with mechanical prosthetic heart valves have the increased risk for thromboembolic events. We report a case of women with severe bicuspid aortic stenosis who delayed pregnancy until aortic valve replacement. In early pregnancy she had nonobstructive prosthetic valve thrombosis. The patient was successfully treated with unfractioned heparin (UFH). In the case we presented a right decision that was made in planning the pregnancy in patient with severe symptomatic AS. Also, our case is a good example of the successful use of UFH in a pregnant women with nonobstructive mechanical valve thrombosis according to 2018 ESC Guidelines for the management of cardiovascular diseases during pregnancy.

Key words bicuspid aortic stenosis, mechanical valve, thrombosis, pregnancy

Introduction

Congenital and acquired valvular heart diseases are important causes of maternal and fetal morbidity and mortality.

Aortic stenosis (AS) carries a high pregnancy risk and high risk of complications- increase in gradient, heart failure, arrhythmias, aortic dilatation and dissection, pre-term birth, intrauterine growth retardation, and low birth weight.[1,2]In women of childbearing age the main cause of AS is congenital bicuspid aortic valve. Women with mild stenosis and normal left ventricular (LV) systolic function can carry pregnancy to term without complications, but women with moderate to severe obstruction should be advised to delay conception until relief of AS (balloon valvulotomy or surgery).[3]In pregnant women with mechanical prosthetic heart valves one of the most important changes is the increased risk for thromboembolic events.[4]Physiological changes in pharmacokinetics of drugs make adjustments of anticoagulant drugs doses very important. In order to prevent these complications adequate anticoagulation is very important.

We present a case of a women with severe bicuspid aortic valve stenosis planning pregnancy. After the aortic valve replacement with mechanical arteficial valve at 10 weeks of gestation, she had valve thrombosis which was successfully treated with parenteral anticoagulant therapy.

Case report

A 35-year-old female with a history of severe bicuspid aortic valve stenosis is presented. At the age of 6 surgical aortic commissurotomy was performed. Echo exam after the intervention showed peak gradient (PG) across the valve of 18mmHg. Due to restenosis (PG 98mmHg) it was repeated at the age of 12. After the 25th year of age she was planning marriage and children, but symptoms repeated again. At the age of 28, due to severe symptomatic aortic stenosis (NYHA II, pressure gradient across the aortic valve 104mmHg (peak)/ 64mmHg (mean) (PG/MPG) aortic regurgitation (AR) 1-2+, mitral valve prolapse with mitral regurgitation (MR) 1-2+, ventricular arrhythmias, prosthetic mechanical aortic valve (St. Jude No 19) was implanted with patch plastica of aortic ostium and ascendent aorta. Postoperative course was without complications; echocardiogram showed good function of prosthetic valve with PG/MPG 30/18mmHg.

The patient became pregnant at the age of 35 in October 2014. In the second month of pregnancy she began to feel exertional fatigue on effort and during climbing the stairs. Echocardiography exam showed nearly the same findings as found during previous Echo examination. Complaints progressed. At that time she was receiving low molecular weight heparin (LMWH) instead of oral anticoagulant (OAC) therapy with acenocumarol. Repeated echo exam in December showed elevated gradients across artificial valve (PG/MPG 85/50mmHg,

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AVA 0.9cm2). She was admitted to Obstetrics and gynecology Clinic for control. Pregnancy was without other complications. Due to thrombosis of prosthetic aortic valve (repeated echo – PG/MPG 102/64mmHg) she was transferred to Cardiology clinic.

She was admitted to our department on the 30th of December. At admission,she was in NYHA class II, without signs of heart failure. Heart rhythm was regular, the prosthetic valve heart sounds were not diminished, 2-3/6 systolic murmur was heard at aortic area, blood pressure was 120/70mmHg, pulse rate was 112 beats/min, normal body temperature (36.4° C). The electrocardiogram showed sinus tachycardia. Blood tests showed mild hypochromic anemia, BNP was normal.

All signs indicated nonobstructive aortic valve thrombosis. Our heart team (cardiologist, cardiac surgeon, gynecologist) after detailed analysis and informing the patient and her family, decided to treat patient with continuous infusion of unfractionated heparin (UFH) and to monitor aPTT close. Several days later, gradient over valve began to decrease, the patient was feeling better. Serial echo exams showed smaller (still elevated for this type of valve) gradients. These findings were confirmed on trans-oesophageal echocardiography. Fetal echocardiography showed normal gestation, as gynecological controls. At the middle of March when she was switched to OAC therapy with acenocumarol and when the lowest gradient was 54/29mmHg she was discharged. At the beginning of the IX month of pregnancy, in June 2015. she was admitted to Obstetrics and gynecology clinic, for switching to UFH. After that, she underwent an elective cesarean section and delivered a healthy baby. After delivery OAC (acenocumarol) was started. Both mother and baby were discharged from hospital in a good clinical condition.[5] Control echocardiogram in October 2018. showed pressure gradient across the aortic valve 66/39mmHg (PG/MPG), AR 1+, MR 1-2+, normal dimensions of heart structures, good LV systolic function. The same regimen for the first several weeks of pregnancy was used in our patient but without strict control of anti Xa which resulted in non-obstructive valve thrombosis. According to the guidelines for non-obstructive mechanical prosthetic valve thrombosis without previous adequate anticoagulant therapy[6] we optimized anticoagulant therapy with UFH. This resulted in decreasing pressure gradient across the prosthetic valve. Pregnancy was well terminated and healthy baby was born by caesarean delivery. In the follow up period of 4 years both mother and the baby are well. In the follow up period of 4 years she is in NYHA class II, on OAC therapy, INR in therapeutic range.

Discussion

In young women the main cause of AS in developed countries is bicuspid aortic valve. Between the first and second trimesters of pregnancy[7] in pts with AS increased CO causes an increase in transvalvular gradient of about 50%, which increases the risk of maternal and fetal complications.[8,9,10] Maternal cardiac morbidity is related to the baseline severity of AS and symptoms.[1] Sometimes in patients with severe AS, pregnancy is well tolerated if prior exercise tolerance was normal. Women with bicuspid aortic valve have alow-risk of aortic dissection if the aortic diameters <50mm so, pregnancy should be avoided when the aorta diameter is >50mm.[11] In these patients obstetric complications are not rare: pre-term birth, intrauterine growth retardation, low birth weight, miscarriages, fetal death, the risk of genetic transmission of LV outflow tract malformations (which causes the need for fetal echocardiography).[1,2] If patient is asymptomatic exercise testing is recommended to evaluate exercise tolerance, BP response, arrhythmias.[11]

Having all this in mind (symptoms, signs of severe AS, desire of pregnancy) doctors, together with the patient, made the proper decision – operation - aortic valve replacement (AVR) first, before the pregnancy.

But, also, both women and doctors should know that pregnancy in women with prosthetic valves is associated with increased maternal risk and the risk for the baby. In women with a mechanical heart valve it might be associated with a high risk for maternal and fetal complications: mother mortality in 1-4% and other complications in up to 40% cases.[12] That is the reason why women with the family, before planning pregnancy, should be informed in detail. Women also, before planning pregnancy, if prosthetic valve is unavoidable because of valve disease, according to the 2017 ESC/EACTS guidelines,[6] may choose biological valve. For this type of valve three months after the operation OAC therapy is not necessary, but they carry risk of the rapid occurrence of structural valve deterioration. I.e. a bioprosthesis is recommended according to the desire of the informed patient (Class I, level C).

Hemodynamically, women with well-functioning mechanical prostheses tolerate pregnancy well, but the need for anticoagulation raises a risk of valve thrombosis, and hemorrhagic complications, as well as of offspring complications.[13,14,15,16] OACs cross the placenta. Their use in the first trimester can result in embryopathy in 0.6–10% of cases.[14,17,18] UFH and LMWH do not cross the placenta and do not have these complications. The risk depends on the anticoagulation regimen, used during pregnancy and the quality of anticoagulation control.

When the diagnosis of pregnancy is made in women with mechanical prosthetic valve, the change of anti-coagulation regimen should be implemented in the hospital. According to the guidelines[6,11,19,20,21] continuation of OACs should be considered during the first trimester, if the warfarin dose required for therapeutic anticoagulation is <5 mg/day (or acenocoumarol<2 mg/day), after patient has been informed and consented. In patients with a required warfarin dose of >5 mg/day (or acenocoumarol >2mg/day), OAC should be discontinued between weeks 6 and 12 and replaced by adjusted-dose of UFH (a PTT ≥2× control; in high risk patients applied as intravenous infusion) or LMWH twice a day (with dose adjustment according to the weight and target anti-Xa level 4–6 hours' post-dose 0.8–1.2 U/mL, assessed weekly).[22,23,24] Guidelines recommend OACS during the second and third trimesters until the 36th week. Then OAC should be discontinued and dose-adjusted UFH (a PTT ≥2× control) or adjusted-dose LMWH (target anti-Xa level 4–6 hours post-dose 0.8-1.2 U/mL) started at the

36th week of gestation. If delivery starts while on OACs, caesarean delivery is indicated.[6]

In the case we presented a right decision that was made in planning the pregnancy in patient with severe symptomatic AS. Also, our case is a good example of the successful use of UFH in a pregnant women with no nobstructive mechanical valve thrombosis.

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Sažetak

Bikuspidna aortna stenoza, tromboza mehaničke valvule i trudnoća – prikaz slučaja

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Aortna stenoza (AS) ima visok rizik tokom trudnoće. Glavni uzrok AS u mlađem dobu je kongenitalna bikuspidn a aortna valvula. Ženama sa umerenom do teškom AS treba savetovati da odlože trudnoću do rešavanja AS (balon valvulotomijom ili hirurškom zamenom zalistka). Trudnice sa mehaničkim veštačkim srčanim zaliscima imaju povećani rizik od trombo-embolijskih komplikacija. Prikazujemo slučaj pacijentkinje sa teškom bikuspidnom aortnom stenozom, koja je odložila trudnoću do zamene aortnog zalistka veštačkim. U ranoj trudnoći imala je neopstruktivnu trombozu veštačke mehaničke aortne valvule. Pacijentkinja je uspešno lečena nefrakcioniranim heparinom. Ovajslučaj je prikaz pravilne odluke o planiranju trudnoće kod pacijentkinje sa teškom simptomatskom AS. Takođe, naš slučaj je dobar primer uspešne primenene frakcioniranog heparina kod trudnice sa neopstruktivnom trombozom mehaničke veštačke aortne valvule prema 2018 ESC vodiču za lečenje kardiovaskularnih bolesti tokom trudnoće.

Ključne reči: *bikuspidna aortna stenoza, mehanička valvula, tromboza, trudnoća*