A case of Turner's syndrome, factor 5 Leiden, and fibrinogen deficiency associated with congenital aortic stenosis complicated by aortic aneurysm and aortic regurgitation

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SOUHRN

Kombinace Turnerova syndromu, leidenské mutace (mutace faktoru V Leiden) a deficitu fibrinogenu 1 se vyskytuje velmi vzácně. Modifikovaná Bentallova operace představuje proveditelný způsob řešení aneurysmat aorty a dvojcípých aortálních chlopní u Turnerova syndromu s cílem omezit na minimum rizika spojená s vysoce rizikovými chirurgickými výkony.
V této kazuistice podrobně popisujeme úspěšné provedení Bentallovy operace u pacienta s Turnerovým syndromem komplikovaným aneurysmatem aorty, dvojcípou aortální chlopní, mutací faktoru V Leiden a deficitem fibrinogenu 1.

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ABSTRACT

The combination of Turner's syndrome, factor 5 Leiden and fibrinogen 1 deficiency is extremely rare. The modified Bentall procedure is a viable option for the management of aortic aneurysms and bicuspid aortic valves in Turner's syndrome to minimise the risks associated with high-risk surgical interventions.
We report details of the successful implementation of the Bentall operation in a patient with Turner's syndrome complicated by aortic aneurysm, bicuspid aorta, factor 5 Leiden and fibrinogen deficiency.

Introduction

The association of Turner's syndrome with haemophilia A is well known and inherited, but the combined presence of factor 5 Leiden and fibrinogen deficiency is unexpected and extremely rare. Furthermore, bicuspid aortic valves are frequently seen in patients with Turner's syndrome and these patients are more likely to have additional cardiovascular anomalies including aortic arch defects.[1]

In this case report, we present a successful Bentall operation in a patient with Turner's syndrome, with aortic aneurysm, bicuspid aorta, factor 5 Leiden and fibrinogen deficiency.

Case report

A 38-year-old woman was admitted to our clinic with a diagnosis of congenital aortic stenosis and bicuspid aortic valve. She presented with complaints of shortness of breath, fatigue, and palpitations. On physical examination, lung sounds were normal, heart sounds were regular, there was 3/6 systolic souffle in the aorta, spread to the carotids, systolic trill +, mild to moderate diastolic souffle with listening, blood pressure 135/70 mmHg, liver was normal, peripheral pulses were taken, there was no oedema. CT thorax and coronary angiography showed a 5cm ascending aorta and bicuspid valve stenosis. Echocardiography confirmed severe symptomatic aortic stenosis (gradient 96 mmHg), moderate aortic insufficiency, bicuspid aorta, dilatation of ascending aorta (45 mm). She has a history of multiple miscarriages and 8 pregnancy losses. The last pregnancy loss was 3 months ago when she was 8 weeks old.

Bentall operation was recommended to the patient and after the information was given, the patient's consent was obtained and the operation preparations were started. For preoperative patient evaluation, a consulta-

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tion was requested from the haematology clinic for a decrease in complete blood count (cbc) laboratory values. Haematology performed genetic testing due to chronic low haematology lab values and previous multiple miscarriage pregnancies. As a result of consultation, mosaic monosomy X, fibrinogen deficiency, and factor 5 Leiden homozygote were observed. Four units of fibrinogen and 1 unit of factor 7 were ordered to be prepared for the patient from haematology preoperatively. Two units of fibrinogen were to be given before cardiopulmonary bypass and it was recommended to give 2 units again after cardiopulmonary bypass if necessary.

In the surgical procedure of the patient, a median sternotomy was performed under general anaesthesia after staining and covering with sterile drapes. When appropriate ACT was achieved, unicaval cannulation of the aorta was performed. Cross clamp was placed. Cardio-pulmonary bypass was started. Cardiac arrest was achieved with antegrade blood cardioplegia. Aortotomy was performed and the aortic valve was accessed. The aortic valve was bicuspid and the leaflets were highly calcified. Valve leaflets were resected. The annulus of the aortic valve was measured and the aortotomy was opened to include the noncoronary cusp because implantation of a biological valve would be difficult (Nicks Procedure). This part was enlarged by placing a pericardial patch. The valve annulus was then reinforced with Teflon felt 5/0 prolene. No. 23 biological Edwards PERIMOUNT valve was continuously sutured to No. 30 vascular graft with 4 and 5/0 prolene. Then, 18 valve sutures placed in the aortic root were passed through the graft and the distal part of the valve and graft were anastomosed to the aorta. No bleeding from the root was observed by bleeding control. First left and then right coronary buttons were implanted to the vascular graft. Then the proximal aorta was anastomosed to the native ascending aorta with Teflon felt support. The cross clamp was removed (65 min). The heart worked spontaneously. CPB was discontinued when appropriate haemodynamics was achieved. The patient was transferred to intensive care unit in a stable condition.

Discussion

Bicuspid aortic valve (BAV) is among the most prevalent congenital heart anomalies, affecting approximately 1% of the general population.[1] In the context of congenital heart diseases, Turner's syndrome, a genetic condition characterized by the partial or complete absence of one X chromosome in females, is notable for its high incidence of BAV.[2] Furthermore, patients with Turner's syndrome often present with a mosaic chromosomal complement, and the degree of mosaicism can exhibit tissue-specific variation.[2]

The case presented here demonstrates a patient with Turner's syndrome who displayed a constellation of complex medical conditions. These included BAV, aortic stenosis, aortic aneurysm, factor 5 Leiden homozygosity, and fibrinogen deficiency. The co-occurrence of these conditions is exceedingly rare, and the implications of this unique combination merit discussion.

BAV is frequently associated with aortic root and ascending aorta dilatation, and the prevalence of aortic dilatation tends to increase with age.[3] Given the complexity of this patient's presentation, the surgical management approach selected was the modified Bentall procedure. This procedure offers a comprehensive solution for both the ascending aortic aneurysm and the aortic valve pathology.

One critical aspect of this case was the patient's coagulation disorders, specifically factor 5 Leiden homozygosity and fibrinogen deficiency. Patients with mechanical heart valves are often maintained on long-term anticoagulation therapy, usually involving vitamin K antagonists. However, due to the coagulation concerns in this case, the decision was made to implant a biological valve instead of a mechanical one. This choice was based on the assessment of clot formation risks in patients with factor 5 Leiden and fibrinogen coagulation disorders.[4]

The management of coagulopathy in cardiac surgery, particularly on cardiopulmonary bypass (CPB), presents challenges. Coagulopathy is often associated with acquired hyperfibrinogenaemia. In this case, the patient's coagulopathy was addressed through the administration of cryoprecipitate during the surgical procedure. Notably, cryoprecipitate is favoured over purified fibrinogen concentrate (FC) due to its inclusion of additional clotting factors, rendering it more effective in managing coagulopathy following prolonged CPB.[5]

In summary, the simultaneous presence of Turner's syndrome, factor 5 Leiden homozygosity, and fibrinogen deficiency is an extraordinarily rare occurrence. The use of Bentall procedure to address the patient's complex congenital heart defects, coupled with her coagulation disorders, presents a significant medical challenge. The case underscores the importance of a multidisciplinary approach and meticulous perioperative management, emphasizing the need for close postoperative monitoring and follow-up care.

Conflict of interest
There was no conflict of interest.

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Informed consent
The authors confirm that written consent for publication of this case report has been obtained from the patient.

References

1. Braverman AC, Cheng A. The bicuspid aortic valve and associated aortic disease. In: Otto CM, Bonow RO, eds. Valvular Heart Disease (5th ed.). Saunders/Elsevier, 2021.
2. Ferguson-Smith MA. Karyotype-Phenotype Correlations in Gonadal Dysgenesis and Their Bearing on the Pathogenesis of Malformations. J Med Genet 1965;2:142–155.
3. Verma S, Siu SC. Aortic Dilatation in Patients with Bicuspid Aortic Valve. N Engl J Med 2014;370:1920–1929.
4. Cannegieter SC, Rosendaal FR, Briët E. Thromboembolic and Bleeding Complications in Patients with Mechanical Heart Valve Prostheses. Circulation 1994;89:635–641.
5. Bartoszko J, Martinez-Perez S, Callum J, Karkouti K. Impact of Cardiopulmonary Bypass Duration on Efficacy of Fibrinogen Replacement with Cryoprecipitate Compared with Fibrinogen Concentrate: A Post Hoc Analysis of the Fibrinogen Replenishment in Surgery (FIBRES) Randomized Controlled Trial. Br J Anaesth 2022;129:294–307.