Case Report

Thrombocytosis following splenectomy and aortic valve replacement for idiopathic thrombocytopaenic purpura with bicuspid aortic valve

Address for correspondence:
Dr. Sarika Katiyar, Department of Anaesthesiology and Critical Care, Bhopal Memorial Hospital, and Research Centre, Bhopal - 462 038, Madhya Pradesh, India.
E-mail: sarikaakatiyar@gmail.com

Access this article online

Website: www.ijaweb.org

DOI: 10.4103/0019-5049.162990

Quick response code

Sarika Katiyar, Payal Kamlesh Ganjsinghani, Rajnish Kumar Jain

Department of Anaesthesiology and Critical Care, Bhopal Memorial Hospital and Research Centre, Bhopal, Madhya Pradesh, India

ABSTRACT

Idiopathic thrombocytopaenic purpura (ITP) patients are at high risk for complications during and after cardiac surgeries involving cardiopulmonary bypass. The main clinical problem of primary ITP is an increased risk of bleeding although bleeding may not always be present. More recently, thrombosis has become appreciated as another potential complication of the procedure. We report a 22-year-old female patient with ITP with bicuspid aortic valve and splenomegaly, who underwent uncomplicated aortic valve replacement and splenectomy simultaneously. She was readmitted with chest pain due to coronary thrombosis following splenectomy which made the management difficult. We describe our experience in managing this patient who presented with thrombotic complication rather than bleeding in post-operative period and the challenges met in maintaining appropriate anticoagulation for aortic valve replacement as well as thrombosis, post-splenectomy

Key words: Cardiac surgery, Idiopathic thrombocytopenic purpura, splenectomy, thrombosis

INTRODUCTION

Immunological thrombocytopaenia, previously referred to as 'idiopathic thrombocytopaenic purpura' (ITP) is a common haematological disorder which involves immune-mediated platelet destruction and impaired platelet production. The main clinical problem of primary ITP is an increased risk of bleeding although bleeding symptoms may not always be present. Concomitantly, the ITP patients also present an increased risk of thrombosis and atherosclerosis related to the presence of haemostatic factors and chronic steroid therapy. We describe our experience of management in a patient of ITP who underwent aortic valve replacement and splenectomy.

CASE REPORT

A 22-year-old female presented with a history of menorrhagia for 1½ years, breathlessness (New York Heart Association [NYHA] – Class III), generalised weakness and easy fatigability for 1-year. She had history of admission with similar complaints previously. Investigations revealed a haemoglobin of 9.0 g/dl, platelet count of 25,000/mm^3; rest of the investigations were normal.On next day, the platelet count was 40,000/mm^3. Peripheral blood smear revealed dimorphic anaemia with thrombocytopaenia. A two-dimensional (2D) echocardiogram revealed ejection fraction of 60% with severe aortic valve stenosis and a bicuspid aortic valve with mild pulmonary stenosis and a normal aortic root. The peak systolic gradient across the aortic valve and mean systolic gradient were 93 mmHg and 59 mmHg respectively. She was started on tablet benzathine penicillin, furosemide/spironolactone (50 mg) and followed up by a haematologist and gynaecologist for further workup. She was diagnosed to have idiopathic

How to cite this article: Katiyar S, Ganjsinghani PK, Jain RK. Thrombocytosis following splenectomy and aortic valve replacement for idiopathic thrombocytopaenic purpura with bicuspid aortic valve. Indian J Anaesth 2015;59:503-6.

thrombocytopaenic purpura and was advised tablet prednisolone and splenectomy. The plan was to taper tablet prednisolone and stop it a week before surgery along with a cover of triple vaccine 2 weeks before surgery. The patient had conceived 6 months later and was advised for medical termination of pregnancy by gynaecologist due to high risk to both mother and baby.

6 months later the patient developed symptoms of breathlessness (NYHA – Class III) and menorrhagia again and was admitted. Her investigations revealed haemoglobin of 11.7 g% and platelet count of 1.65 lac/mm^3. She was planned for aortic valve replacement and splenectomy 1-month later. Four random donor platelets, 4 fresh frozen plasma, 2 packed red blood cells (RBC's) were reserved for surgery. Intraoperatively a right internal jugular vein (IJV) central line, left radial arterial line and 2 wide bore peripheral venous accesses (16 gauge in each hand) were secured. Induction was performed using 0.5 mg/kg intravenous (I.V) midazolam, 10 μg/kg fentanyl, 2 mg/kg thiopentone and intubation facilitated with vecuronium 0.1 mg/kg. Maintenance was done with oxygen and air along with intermittent boluses of morphine, fentanyl and vecuronium on cardiopulmonary bypass (CPB) pump. Anterograde cardioplegia was given directly through coronary ostia and retrograde through the coronary sinus. Total CPB time was 110 min. Intraoperatively, one packed RBC was transfused and during weaning off from CPB pump, the patient fibrillated once for which internal defibrillation was performed with 10 J of DC shock. After the closure of sternum, splenectomy was performed which lasted for 1½ h. The patient was extubated 4 h after shifting to the intensive care unit on the same day. The post-operative investigations revealed haemoglobin of 11.0 g%, platelet count 1.73 lakhs/mm^3 and an INR 1.32 and other investigation were normal. On post-operative day 4, platelet counts increased to 5.60 lac/mm^3 and INR to 2.43. She was started on injection heparin 2500 U I.V QID and tablet warfarin 2.5 mg/5 mg OD according to INR. Heparin was stopped 4 days later and antibiotics cover was continued. INR on next day was 2.27 and patient was stable, mobilised well and got discharged 7 days later. At midnight, patient was brought again with complaints of severe retrosternal chest pain and mild breathlessness (NYHA – Class II). Electrocardiography revealed ST segment depression with T wave inversion in inferior leads and ST elevation in anterolateral leads. 2D-echo revealed an EF of 35%, normal functioning prosthetic valve and regional wall motion abnormality in left anterior descending coronary artery territory and was suspected to have developed anterolateral wall myocardial infarction. She was shifted to critical care unit where symptomatic treatment was started with oxygen support, nitroglycerin infusion and morphine IV boluses with intermittent BiPAP support. CT angiography (coronary angiography) revealed thrombus in the left middle cerebral artery territory and suspicion of mild laceration/dissection at the aortic root. Hence, she was not started on heparin and coronary reperfusion was not planned. The investigation on same day revealed haemoglobin of 8.8 g/dl, total lymphocyte count 20,800 cells/mm^3, platelet count 14.96 lakhs/mm^3, INR 2.52; platelet count increased to 18.09 lakhs/mm^3 by next day. Creatine phosphokinase (CPK) trends were 44–8550–4302 IU/L and CPK-MB, 22–986–411 IU/L at 8 hourly intervals. The patient developed hypotension and tachycardia next day and under ultrasonography guidance, right IJV central line and right femoral arterial lines were inserted. Vasopressors, dopamine and adrenaline, were started and were gradually weaned after 2 days. Target INR was maintained between 2 and 3 after the patient was haemodynamically stable. She was posted for an elective coronary angiography and standby angioplasty if needed next day. Her coronary angiography revealed single vessel disease for which medical treatment was continued. Platelet count gradually decreased from 10.93 to 10.5 lac/mm^3. Her treatment included antibiotics, diuretics and warfarin 5 mg and later, tablet clopidogrel, aspirin, hydroxyurea 500 mg and ivabradine.

The patient was shifted to ward 10 days later but had fever spikes on and off. Pus discharge was observed from the sternal area and antibiotics were started based on culture and sensitivity. The patient was discharged 5 days later with continuation of oral medications mentioned above.

DISCUSSION

ITP is characterised by an abnormally low platelet count due to unknown cause. It is characterised by decreased circulating platelet count and decreased platelet survival. In ITP, IgG antiplatelet autoantibodies are produced against the platelet glycoprotein IIb/IIIa or GPIb/IX in about 75% of patients causing both platelet destruction and inhibition of thrombopoiesis[1] The main problem in patients with ITP is an increased risk of bleeding although bleeding symptoms may not always be present. Bleeding after CPB surgery is common

with about 7% of patients requiring re-operation to control bleeding.[2] Preoperative thrombocytopaenia, CPB induced thrombocytopaenia[3] as well as platelet dysfunction and postoperative anticoagulation are expected to increase risk of pericardial effusion and cardiac tamponade, which may occur in early as well as late (5-7 days after surgery) postoperative periods.[4-6] Therefore, assessing the magnitude of bleeding risk in ITP patients is an important consideration in managing such cases. Traditional frontline treatment, including corticosteroids and IV immunoglobulin (IVIG) are effective and typically cause transient elevations in platelet counts. Second- and third-line therapies, including rituximab, splenectomy, thrombopoietin receptor agonists-A and immune suppressants are often successful and may cause a long-term increase in the platelet counts.[7] Patients with asymptomatic mild or moderate thrombocytopaenia can be followed up with no treatment as platelet counts >50,000/mm^3 are usually not associated with clinically important bleeding; such patients can safely undergo invasive procedures.[8] Glucocorticoid treatment usually produces a significant response in about 70% of patients; relapses are common when the glucocorticoid dosage is reduced. Platelet transfusion is useful in instances of severe haemorrhage, although it may be short acting.[9]

As far as simultaneous open heart surgery and splenectomy is concerned, several studies have reported this combination as highly invasive, associated with complications such as bleeding, and effective only transiently.[10,11] Platelet count reportedly increases excessively after a splenectomy, making management of anticoagulation therapy following valve replacement difficult.[12] But other numerous studies have reported that this combination was effective in more than 70% of cases and was effective for a long period of time free of oral corticosteroid administration.

Initially, platelet count remained stable after prednisolone therapy, but dropped to 30,000/mm^3 during her conception period and thus she was advised medical termination of pregnancy and cardiac surgery. The present patient had an uneventful intraoperative course and there was no difficulty in obtaining surgical haemostasis. In the post-operative period also, the patient did not have much bleeding. Rather, the patient was readmitted with chest pain and echo findings suggestive of myocardial ischaemia.

An increased risk of vascular complications involving both the venous and arterial sides of the circulation may result from splenectomy. A vascular complication is defined here as any condition that causes narrowing or occlusion of a blood vessel. This can be a consequence of *in situ* thrombosis, thromboembolism, vascular smooth muscle remodelling, vasospasm, or atherosclerosis.[13] The risk of thromboembolic events and pulmonary arterial hypertension varies greatly depending on the underlying condition for which the splenectomy is performed and whether or not the condition is associated with on-going intravascular haemolysis. Thromboembolic complications have been most frequently reported after splenectomy in thalassemia intermedia.[13] In addition, rapidly progressive multi-infarct dementia and acute coronary syndrome have been observed in a series of patients with ITP and previous splenectomy.[14,15]

Vascular events after splenectomy are likely multifactorial, probably resulting from some combination of hypercoagulability, platelet activation, disturbance and activation of the endothelium, and altered lipid profiles. The absence of the extremely sensitive filter may permit particulate matter and damaged cells to persist in the bloodstream, therefore perturbing and activating the vascular endothelium leading to a shift in vascular homeostasis toward enhanced coagulation. There is limited evidence that splenectomy, irrespective of the indication, increases platelet count,[16] haemoglobin concentration,[17] plasma cholesterol,[18] leucocyte count[19] and C-reactive protein levels.[20] Each of these elevations is associated with increased risk of arteriothrombosis[21,22] which is a highly unfavourable prothrombotic state.

Thus, this patient had a prothrombotic state after splenectomy leading to coronary artery thrombosis and manifesting as chest pain. She was put on hydroxyurea which is one of the drugs of choice for thrombocytosis. Ivabradine was also provided as an antianginal drug. The rest of the management was symptomatic, and warfarin was continued and titrated to maintain the INR in the therapeutic range of 2–3.

CONCLUSION

The case report and management emphasizes on post-splenectomy thrombosis and its complications in ITP patients. Thrombocytosis manifesting subsequently can be medically managed with drug therapy. Further evidences focusing on management

of thrombotic complications in ITP patients, post-splenectomy are awaited.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. McMillan R. The pathogenesis of chronic immune (idiopathic) thrombocytopenic purpura. Semin Hematol 2000;37 1 Suppl 1:5-9.
2. Shander A. Financial and clinical outcomes associated with surgical bleeding complications. Surgery 2007;142 4 Suppl:S20-5.
3. Weerasinghe A, Taylor KM. The platelet in cardiopulmonary bypass. Ann Thorac Surg 1998;66:2145-52.
4. Ofori-Krakye SK, Tyberg TI, Geha AS, Hammond GL, Cohen LS, Langou RA. Late cardiac tamponade after open heart surgery: Incidence, role of anticoagulants in its pathogenesis and its relationship to the postpericardiotomy syndrome. Circulation 1981;63:1323-8.
5. Stevenson LW, Child JS, Laks H, Kern L. Incidence and significance of early pericardial effusions after cardiac surgery. Am J Cardiol 1984;54:848-51.
6. Choudhury M, Pal N, Kiran U. Open heart surgery for cyanotic heart disease in a child with immune thrombocytopenic purpura: A case report. Indian J Anaesth 2007;51:541-5.
7. Provan D, Stasi R, Newland AC, Blanchette VS, Bolton-Maggs P, Bussel JB, *et al*. International consensus report on the investigation and management of primary immune thrombocytopenia. Blood 2010;115:168-86.
8. Lacey JV, Penner JA. Management of idiopathic thrombocytopenic purpura in the adult. Semin Thromb Hemost 1977;3:160-74.
9. Carr JM, Kruskall MS, Kaye JA, Robinson SH. Efficacy of platelet transfusions in immune thrombocytopenia. Am J Med 1986;80:1051-4.
10. Terada Y, Ino T, Wanibuchi Y, Takagi H, Shimoyama Y, Furuta S. A case of CABG in a patient with chronic idiopathic thrombocytopenic purpura. J Jpn Assoc Thorac Surg 1990;38:150-3.
11. Sunami H, Nawa S, Nakata T, Hirata S, Yoshitomi I, Miyachi Y, *et al*. A case of double-valve replacement in a patient with idiopathic thrombocytopenic purpura. Kyobu Geka 1993;46:486-8.
12. Hirose H, Shiono M, Orime Y, Yagi S, Yamamoto T, Okumara H, *et al*. A case of aortic valve replacement in patient with chronic idiopathic thrombocytopenic purpura. Jpn J Cardiovasc Surg 2000;29:400-3.
13. Crary SE, Buchanan GR. Vascular complications after splenectomy for hematologic disorders. Blood 2009;114:2861-8.
14. Ahn YS, Horstman LL, Jy W, Jimenez JJ, Bowen B. Vascular dementia in patients with immune thrombocytopenic purpura. Thromb Res 2002;107:337-44.
15. Ozner MD, Ahn YS, Horstman LL, Jy W, Kolodny L, Myerburg RJ. Chronic platelet activation and acute coronary syndrome in 13 middle-aged patients. Clin Appl Thromb Hemost 1997;3:46-53.
16. Boxer MA, Braun J, Ellman L. Thromboembolic risk of postsplenectomy thrombocytosis. Arch Surg 1978;113:808-9.
17. Visudhiphan S, Ketsa-Ard K, Piankijagum A, Tumliang S. Blood coagulation and platelet profiles in persistent post-splenectomy thrombocytosis. The relationship to thromboembolism. Biomed Pharmacother 1985;39:264-71.
18. Gagnon DR, Zhang TJ, Brand FN, Kannel WB. Hematocrit and the risk of cardiovascular disease – The Framingham study: A 34-year follow-up. Am Heart J 1994;127:674-82.
19. Wilson PW, D'Agostino RB, Levy D, Belanger AM, Silbershatz H, Kannel WB. Prediction of coronary heart disease using risk factor categories. Circulation 1998;97:1837-47.
20. Bassuk SS, Rifai N, Ridker PM. High-sensitivity C-reactive protein: Clinical importance. Curr Probl Cardiol 2004;29:439-93.
21. Vannucchi AM, Barbui T. Thrombocytosis and thrombosis. Hematology Am Soc Hematol Educ Program 2007;1363-70.
22. Coller BS. Leukocytosis and ischemic vascular disease morbidity and mortality: Is it time to intervene? Arterioscler Thromb Vasc Biol 2005;25:658-70.