COLD AGGLUTININS AND CARDIAC SURGEY: A CASE REPORT

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Abstract

Cold agglutinins (CA) are autoantibodies whose clinical significance depends upon titer and thermal amplitude. Patients, which undergo cardio-pulmonary bypass and especially hypothermic cardioplegia myocardial protection, represent a challenge regarding operative management, as tissue temperature should be maintained above the threshold of agglutination. We report on a case in which the presence of CA was discovered during elective aortic valve replacement surgery, and managed with normothermic cardiopulmonary bypass and continuous retrograde warm blood cardioplegia administration.

INTRODUCTION

Cold agglutinins (CA) are IgM autoantibodies that react against I-antigens on the surface of erythrocytes. CA may be idiopathic, or more frequently, secondary to infective or neoplasic/lymphoproliferative disorders, among others.[1-5]

Systemic hypothermia and hypothermic cardioplegia delivery (usually 1-8ºC) is prone to induce CA related hemagglutination which can result in intracoronary thrombosis, incomplete cardioplegic delivery and high pressures within the circuit.

As the evidence regarding CA during cardiac surgery is mainly derived from case reports, management strategies remain controversial.

We report on a patient with accidental finding of cold agglutinin during elective aortic valve replacement surgery.

CASE REPORT

An 82-year-old female was admitted to our hospital with the diagnosis of severe aortic stenosis. Patient's anamnesis was unremarkable regarding frequent cold agglutinin disease associated findings: no history of hemolytic anemia, hemoglubinuria, acrocyanosis, livedo reticularis, previous infection or proliferative disorder was noted.

Anesthesia, cannulation and extracorporeal circulation were performed in the usual manner. An activated clotting time superior to 400 seconds was achieved with heparin (3mg/kg). The patient was cooled to a core temperature of 34ºC and myocardial protection was achieved with anterograde cold blood cardioplegia (Buckberg type with a 4:1 blood to BBRAUN™ crystalloid solution) after cross-clamping the aorta.

During administration of anterograde cardioplegia macroscopic precipitates, suggestive of agglutination, were visible within the cardioplegia circuit. This prompted immediate cessation of the anterograde cardioplegia administration; consultation of the imunohemotherapy service; and opening of the ascending aorta for further inspection. As agglutination was limited to the cardioplegia circuit, which was cooled to 4ºC, a temperature related agglutination phenomena was suspected and retrograde (via coronary sinus cathether) warm blood cardioplegia was initiated in order to wash-out any agglutination debris and provide further myocardial protection. Additionally, the patient was re-warmed and careful attention was paid to the temperature of the operating room and of the perfusions being administrated.

Aortic valve replacement was achieved with a St Jude Medical Trifecta™ GT™ 21-mm bioprosthesis (St. Jude Medical, Inc., St. Paul, MN, USA), performed with interrupted sutures in supra-annular position. The lowest core temperature registered was 34ºC. Intra-operative transesophageal echocardiography reveled no significant findings.

Immediate post-operative period was uneventful. No significant coagulopathy or chest drainage was noted. Blood transfusion and iron and eritrophoetin

supplementation were necessary due to mild hemolysis. The nadir of hemoglobin concentration was 7.4 g/dL. Maximum lactase dehydrogenase and bilirubin concentration were 375 U/L and 0,76 mg/dL respectively.

The patient was discharged from the hospital on postoperative day 12, with no evidence of active hemolysis.

Although the primary cause of CA in this patient was not made clear by the investigation that followed, the patient was ambulatory and clinically asymptomatic at 12 months follow-up.

DISCUSSION

Clinical significance of CA depends upon titer and the temperature below which antibody activation occurs. Low-titer CA (about 1:16) can be found in the sera of healthy individuals.[5] Evidence suggests that patients with low--titer and very low temperature reacting antibodies may undergo operation without changing management plan.

Patients with high-titer, high-temperature reacting CA undergoing routine CPB represent a challenge regarding operative management as tissue temperature should be maintained above the threshold of agglutination. Normothermic CBP with several myocardial protection techniques have been described, including intermittent cross-clamping, ventricular fibrillation, cold crystalloid cardioplegia and warm blood cardioplegia.[1-2,4-7]

Plasmapherisis and high dose immune globulin have been reported as effective methods of titer reduction. The former, however, is associated with large volume shifts, risk of infection and altered hemostasis and should be reserved for patients undergoing planned deep hypothermic arrest.[5-6]

The rationale regarding the choice of myocardial protection presented in this case rests in the evidence available in the literature. Patients with high titers CA represent a group in which warm cardioplegic myocardial protection may be indicated. Although still controversial, studies suggest that warm cardioplegia may be as effective as hypothermic cardioplegia regarding myocardial protection.[4]

Continuous cardioplegia infusion is beneficial in the sense that maintains tissue perfusion and prevents microvascular clotting by continuous washout.

Even though the peri-operative course of this patient was rather uneventful, adequate clinical follow-up and primary cause investigation are of utmost importance as may present prognostic implications.

CONCLUSION

CA are rarely of clinical importance, however, during cardiac surgery may represent origin of important complications. Pre-operative elaboration of a patient--oriented strategy is ideal to avoid CA related phenomena.

We report on a successful approach to CA using normothermic CPB and continuous warm blood cardioplegia.

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