Proposal for bail-out procedures - Cardiac general

Efficacy of autovaccination therapy on post-coronary artery bypass grafting methicillin-resistant Staphylococcus aureus mediastinitis

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Abstract

We report a case of mediastinitis successfully treated with autovaccine therapy, once conventional surgical and medical therapies had failed.

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1. Introduction

Post operative mediastinitis after open heart surgery is an infrequent but, potentially, a devastating complication with high morbidity, prolonged hospitalization, increased costs, as well as increased mortality [1, 2].

Mediastinitis generally presents days to weeks after cardiac surgery, and requires surgical drainage or debridement for cure. The use of postoperative continuous mediastinal irrigation or rotational muscle flaps to manage the wounds remains controversial [1, 2]. The purpose of this report was to describe a case of mediastinitis successfully treated with autovaccine therapy, once conventional therapies had failed.

2. Case report

The patient was a 65-year-old male who was admitted to the cardiology department on November 2001 for angina. A control coronary angiography was performed: 90\% stenosis of the left main coronary artery and 85\% stenosis of the right coronary artery were recognized. Urgent triple CABG was performed with left internal mammary artery and saphenous vein. Intravenous administration of a ceftazidime (2 g/dl) was administered intravenously for two days after surgery. The postoperative course was complicated by two episodes of ventricular fibrillation solved with internal defibrillation. On day ten, fever and sternal separation with serous discharges from the wound were noted. On day 13, the patient underwent surgery for debridement of the mediastinum and irrigation with continuous lavage with the povidone-iodine at the concentration of 5\%. The omental flap was not possible to use for previous gastrectomy. The sternum was closed with metal wires with a Robicsek technique. Vancomycin hydrochloride (2.0 g/day) and gentamycin (350 mg/day) were administered. Wound discharges detected a methicillin resistant Staphylococcus aureus (MRSA). On day 24, MRSA was still detected in discharges from the mediastinal drainage. The general condition got worse and the patient presented a respiratory distress which necessitated the need for mechanical ventilation. The antibiotic therapy administered was teicoplanin (400 mg/day), but without improvement on the 32nd day. So we decided to apply a method widely used in cases of non-antibiotic responsive bacterial infections: autovaccination therapy [2, 3]. Autovaccination is widely used in our hospital [4, 5] and is manufactured on the diseasing causing micro-organism isolated from the infected tissue or organ. The subcultured micro-organism, MRSA, was used to prepare a specific autovaccine as described in detail in De Vito et al. [4]. Briefly, the micro-organisms were grown for 24 h in standard Triple Sugar Iron Agar (BD Diagnostic Systems, NJ, USA). After we suspended the micro-organisms in 10 ml of sterile pyrogen-free NaCl (B. Braun, Melsungen, FRG), we added 0.05 ml of formaldehyde (analytical grade, Roth, Karlsruhe, FRG) and incubated for 72 h at 37°C. The resulting autovaccine was then split into five portions. Starting from a McFarland of three (10^{-6} MRSA per ml) we diluted in sterile pyrogen-free NaCl (B. Braun, Melsungen, FRG) and prepared the fifth dose of the initial cycle and three booster doses. After we prepared the other four doses of the cycle starting from the McFarland of three adding 1.0 ml of sterile pyrogen-free NaCl and so on. Then all the preparations were assessed for sterility under both

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aerobic and anaerobic culture conditions for seven days. The autovaccine was administered without any adjuvant per i.m. starting from the most diluted portion every 2–3 days over a period of two weeks and administered by the owner. We observed an improvement in general condition, and a possibility to wean from the mechanical ventilation, and reduction of WBC and PCR. After the two weeks’ treatment no booster dose was administered as the schedule requested [4], because of complete remission of the patient’s clinical conditions. No MRSA was detected by culture in discharges from the mediastinal drains.

3. Discussion

Postoperative mediastinitis still causes substantial morbidity and mortality after heart surgery. In literature the average incidence of postoperative mediastinitis was 1.5%, ranging from 0.5 to 5%, with a mortality rate adding up to 20%. For these reasons mediastinitis represents a severe complication after cardiac surgery, in which the therapeutic strategies are not standardized and depending on surgeon decision-making [1, 2].

Our report describes for the first time the use of autovaccination therapy in cardiac surgery. Autovaccination was regularly performed in human medicine at the beginning of the 20th century [5, 6]. However, since that time, with the exception of some eastern-European countries, the use of autovaccination therapy steadily decreased. Today, autogenous vaccines or autovaccines are commonly used in veterinary medicine to treat chronic infectious disease or as a therapeutic and preventive treatment of diseases occurring in human patients with immunodeficiency acquired syndrome or with cancer [6–8].

The mechanism by which the autovaccine influences the course of disease or effector mechanisms of the immune system involved in eradicating the causative agent are poorly investigated [5]. Nolte et al. reported the use of autovaccines to treat metritis infection in a group of dairy cows. The authors observed a significant decrease in CD4+ cells paralleled by an increase in T-cells expressing the γδ-T-cell receptor in the peripheral blood of the treated animals [6]. The same findings are reported by Gorochov et al. who reported that, as in patients with human immunodeficiency virus infection, autovaccination induces selection and expansion of T-cell clones [7].

Autovaccines provide a number of advantages: firstly, they can be manufactured and distributed usually without the need of governmental approval. Secondly, in contrast to preventive vaccines, autovaccines can be used to treat an ongoing infection and can be, therefore, considered to be therapeutic vaccines. Thirdly, autogenous vaccines are strain specific which permits to treat infectious diseases causing bacteria for which no classical preventive vaccine is yet available [6].

We therefore conclude that administration of an autovaccine leads to the activation of immunologic effector mechanisms which contribute to recovery of the patient, and this practice can help in the management of the mediastinitis.

After three years of follow-up the patient is still in good health without recurrence of inflammation.

References