

## Case Report

# Multidrug-Resistant *Acinetobacter baumannii* mediastinitis

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### Abstract

**Introduction:** Mediastinitis remains one of the most serious complications of cardiac surgery. The reported incidence is 1–4%, while the related mortality varies from 10–47%.

**Case Presentation:** A patient with triple vessel disease (TVD) was hospitalized at our clinic for coronary artery bypass graft (CABG) surgery. The preoperative examination results were normal. We performed standard CABG under extracorporeal circulation. The patient had a favorable postoperative course. On the fifth postoperative day, the wound showed seropurulent drainage. The treatment of the patient’s wound continued with open dressing, negative wound pressure device, debridement, minimal muscle plasticity, and total bilateral muscle pectoral flap plasticity. The infecting microorganism was identified as multidrug-resistant *Acinetobacter baumani*, and systemic antibiotic therapy was initiated. The patient had “per seclum closure” of the wound after all these efforts. The wound healed completely 2 months after discharge, and the patient was in good health.

**Conclusions:** Mediastinitis is associated with high mortality and high financial and human costs. The occurrence of this high-risk complication can be prevented through constant vigilance at every step from admission to discharge.

**Key words:** mediastinitis; multidrug-resistant; *Acinetobacter baumannii*; tigecycline.

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### Introduction

Mediastinitis is one of the most serious complications of standard cardiac surgery. It has a reported incidence of 1–4% [1,2]. The most common causes of mediastinitis are bacterial infections and post-invasive cardiac surgery, such as deep sternal wound infection (DSWI). Pastene *et al.* found that DSWI occurs in 0.5–2.2% of invasive cardiac surgery cases. In such cases, the infection involves the sternal bones, mediastinum, heart, and surrounding structures [3]. *Staphylococcus* is among the most frequent pathogens, but other Gram-negative are not excluded. Multidrug-resistant *Acinetobacter* (MDR-A) is one of the most problematic pathogens in treating patients [3-5]. Due to the anatomical structures in this anatomical region, mediastinitis is associated with high mortality that varies from 10-47% of cases [2]. Of course, the management of acute mediastinitis is quite complex. It depends on the pathogen, and accompanying pathologies such as diabetes or obesity, age, smoking, etc.

We aim to present a case of acute mediastinitis after post-invasive cardiac surgery caused by multidrug-resistant *Acinetobacter baumani*.

### Case presentation

A 65-year-old man with three-vessel coronary artery disease, stable angina, diabetes mellitus type 1, and arterial hypertension was referred to our clinic for a bypass surgery. The patient was a smoker, with a body mass index of 30.4 kg/m<sup>2</sup>. The preoperative routine laboratory protocol results were within the normal range. Surgery was performed using cardiopulmonary bypass (coronary artery bypass graft -CABG) × 2: left internal mammary artery (LIMA)-left anterior descending artery (LAD); great saphenous vein (VSM)-intermediate artery (IM) without any exceptional events. The cardiopulmonary and ischemic times were 58 and 39 min, respectively. The patient’s postoperative progress was normal. The total drainage volume was 400 mL. Cefazoline 3gr/day was used as a prophylactic therapy, which was continued routinely after the surgery. On postoperative day 4, purulent drainage was

observed from the wound, and the patient was febrile. The sternum was stable. The antibiotic therapy was changed to imipenem, ciprofloxacin, and metronidazole. On day 5, the re-opening of the wound revealed excessive purulent secretions. We performed computed tomography with intravenous contrast that showed small amount of pericardial collection. The wound was treated using the open-dressing technique for several days until it was clean and exhibited good granulation. The patient underwent a wound revision procedure. Wound culture during the intervention identified the causative pathogen as multidrug-resistant *Acinetobacter* (MDR-A). We use VITEK-2 Biomeriux as a microbial method of identification. Four days later, the patient developed a fever, and drainage from the wound recurred. We reopened the distal part of the wound and restarted open-dressing medications for approximately 2 weeks. Negative pressure wound therapy (NPWT) was administered every 3–4 days for two weeks.

The patient underwent surgery for a third time for bilateral pectoralis muscle plasticity. We removed all the wires and prepared both sides of the pectoralis muscles to the middle clavicular line, separating the muscles from the thoracic wall and subcutaneous tissue. Growth of the culture material presented the same strain. One week later, the patient presented the same history of wound drainage. Under these conditions, we reopened the distal two-thirds of the wound, reimplanted the NPWT, and changed the antibiotic therapy to tigecycline 100mg/day. The NPWT was discontinued after 2 weeks, and the wound was left to close “per secundum.” The wound was treated locally with povidone-iodine betadine. The patient was discharged from the hospital and was medicated daily at a regional hospital. Finally, the wound was closed completely, and the patient was in good health at the latest 4-month follow-up.

## Discussion

The most important risk factors of mediastinitis are obesity, chronic obstructive pulmonary disease, and diabetes. Abu-Omar *et al.* presented an expert document on mediastinitis, in which all risk factors were divided into preoperative, intraoperative, and postoperative [6]. Sang *et al.* suggested that the preoperative hospital stay length was strongly related to a significant increase in mediastinitis incidence. With every 15% increase in the risk of mediastinitis, preoperative hospital stay increases by one week [7]. Our patient had diabetes and obesity. The microbial etiology of sternal wound infections varies and is

complex. The infection is usually polymicrobial, either aerobic or anaerobic [1,3-5]. The wound culture of our patient revealed MDR-A infection. This strain was previously isolated in a few cases from our presentations. *Acinetobacter baumannii* is often transmitted to patients owing to persistence on environmental surfaces and transient colonization of the hands of healthcare workers. *Acinetobacter spp.* is one of the extremely drug-resistant (XDR) hospital strains. Therefore, antibiotic resistance is one of the most important determinants of clinical outcomes of *Acinetobacter* infections [1,6]. We changed the antibiotic therapy from ciprofloxacin plus imipenem to tigecycline 100 mg/day according to sensitivity. Tigecycline is an antibiotic selected for severe infections, particularly for MDR pathogens [8].

In addition to antibiotics, wound treatments such as drainage, open dressing, debridement, and direct rewiring or the use of tissue flaps are part of the conventional treatment. NPWT was first used in the 90s and is now a routine treatment approach. Although mediastinitis is as old as sternotomy, the treatment approach between NPWT and conventional treatment remains debatable [5].

From a 10-year experience, Poncelet *et al.* reported that an early aggressive approach to mediastinitis, including mediastinal lavage, sternal edge debridement, and rewiring significantly improved primary closure success rates and decreased the rate of autologous tissue formation [9]. Tewarie *et al.* reported that the pectoralis millimeter flap procedure can be accomplished earlier, is safe, and provides satisfactory clinical and esthetic results. This justifies the invasive nature of the bilateral pectoralis millimeter flap procedure and suggests its application as a primary approach in younger (< 70-year-old) patients without sternal bone necrosis. To our knowledge, Pan *et al.* presented one of the largest and most recent retrospective studies. A total of 565 patients with deep sternal wound infections were included [9,10].

Deniz *et al.* referred to NPWT as a safe and reliable option for mediastinitis, with excellent survival and low failure rates compared to conventional treatments. The 90-day mortality was significantly lower in the NPWT group than in the conventional treatment group (8.5% vs. 23.2%,  $p < 0.05$ ). Treatment failure was observed in both NPWT and conventional treatment groups (2.1% and 4.7%, respectively) [11].

The AMSTERDAM classification is most commonly used for constructing treatment strategies for mediastinitis. This classification is based on sternal stability, sternal bone viability, and stock. However, the

most appropriate surgical approach for the treatment of mediastinitis remains debatable. The primary goal is to close the wound. Despite a lack of evidence, many institutions currently prefer NPWT for the treatment of mediastinitis. NPWT is recommended either as a destination or bridge before the final surgical closure of the wound. Muscle or omental flaps may be considered in cases of sternal instability or insufficient bone stock [5,6,11,12]. The pectoralis major muscle flap is the most commonly used.

## Conclusions

Mediastinitis is a massive postoperative complication of cardiac surgery that should not be forgotten. We must remain aware at every step before, during, and after the intervention to achieve the final surgical goal and save financial and human resources.

## Authors' contributions

Selman Dumani conceived of the presented idea and contributed to the final version of the manuscript. Edmond Puca contributed to the design of the research, to the analysis of the results and to the writing of the manuscript. Eral Likaj contributed to the final version of the manuscript. Stavri Llazo contributed to the final version of the manuscript. Edlira Rruci contributed to the final version of the manuscript. Vera Beca contributed to the final version of the manuscript. Ali Refatllari verified the analytical methods and contributed to the final version of the manuscript. Arben Baboci verified the analytical methods and contributed to the final version of the manuscript. All authors discussed the results and contributed to the final manuscript. All authors read and approved the final version of the manuscript.

## Consent for publication

Written informed consent was obtained from the patient.

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