

CASE REPORT

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Daptomycin as a possible new treatment option for surgical management of Methicillin-Resistant *Staphylococcus aureus* sternal wound infection after cardiac surgery

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Abstract

We present a case of a 77-year old female who had undergone a coronary artery bypass grafting with an aortic valve replacement and developed three month later a Methicillin-Resistant *Staphylococcus aureus* (MRSA) sternal wound infection which was successful treated with Daptomycin combined with vacuum-assisted closure (VAC).

Introduction

Sternal wound infection is a severe complication in cardiac surgery despite continuing efforts to improve perioperative conditions. This complication is often associated with significant morbidity and mortality rates of up to 45% [1], with prolonged hospitalization [2] and additional surgical procedures, as well as prolonged antibiotic therapy and its inherent high costs [3]. The most common conventional treatments involve surgical revision, open dressing, closed mediastinal irrigation, debridement, complete sternectomy, or reconstruction with omental or muscleflaps [4]. With the increase of MRSA infection, the accompanying antibiotic therapy has received more attention for treatment of sternal wound infections after cardiac surgery.

Case Report

A 77-year-old female was admitted with coronary artery disease and severe aortic stenosis to the Department of Cardiac Surgery of the University Hospital of Goettingen, Germany in July of 2007. A coronary artery bypass grafting (left anterior descending artery was revascularized by the left internal mammarian artery) and an aortic valve replacement (Cryolife O'Brien® 23 mm,

biological) were performed. After an uneventful operation and postoperative course, the patient was discharged home. Three month after discharge, at the initial postoperative visit, physical examination revealed an unstable sternum with purulent drainage (MRSA-positive) from the distal portion of the incision. Subsequently, the patient was hospitalized and started on wide broad spectrum antibiotics (Clindamycin and Rifampicin) in combination with local antiseptic washings. She was urgently taken to the operating room for wound debridement. Once the incision was reopened, frank pus was noted. The wound was irrigated and the sternum was realigned. Her general condition recovered and two months after the operation, the patient was discharged home.

One month following this, the patient returned with purulent drainage forming in the distal wound, necessitating hospital readmission with intravenous antibiotics (Vancomycin 500 mg/d, for 10 days). Given the prior presentation of an unstable sternum, we elected to remove three sternal wires. A vacuum-assisted closure (VAC) was placed along with Alginat to promote secondary wound healing. On the 26th postoperative day, the patient was discharged home with instructions to return for clinic three-times-per-week for wound care.

One month following this, eight months since the initial surgery, the wound was not fully healed. Although there was some evidence of secondary degree healing, it

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Figure 1 Postoperative sternal wound infection eight months since the initial surgery. The remaining two sternal wires were removed. After removing sternal wires, reapplication of VAC therapy was initiated.



Figure 2 The wound eventually healed with no residual fistula or infection of MRSA, twenty-one months since the initial surgery.

was felt the patient would benefit from removing the remaining two sternal wires. Therefore, each sternal wire was removed, the wound was widely debrided of infected tissues, and a VAC was placed the entire length of the incision (Figure 1). This resulted in further wound healing and the patient was again discharged home with wound care.

In March 2009, twenty months since the initial surgery, the patient presented with yet another sternal wound dehiscence. When the wound was probed, a fistula was noted to the mediastinum. She readmitted to the hospital and brought to the operating room for wound irrigation with VAC placement. Bacterial cultures obtained intraoperatively grew MRSA and the antibiogram presented resistance to several conventional antibiotics but displayed sensitivity to the new antibiotic drug Daptomycin (Cubicin®, Novartis Pharma GmbH, Germany). Daptomycin (4 mg/kg/day) was administered and total duration of application was ten days. The wound eventually healed with no residual fistula or infection of MRSA (Figure 2) and she was discharged on the 18th postoperative day. A follow-up visit in May 2010 in our ambulance revealed no indication of bacterial colonization in latest microbiological tests. The patient is free of pain and able to function well in daily life.

Discussion

The incidence of sternal wound infection after cardiac surgery is reported to be 0.4-5% [5] and *Staphylococcus aureus* is the most common pathogen isolated from sternal wound infections after cardiac surgery as well as from bacteraemic blood cultures [6]. An increasing trend in antibiotic resistance, with the appearance of progressively more cases of MRSA strain infections have been shown in epidemiological studies [6,3]. Sternal infection with *S. aureus* is associated with high morbidity and mortality and carries a worse prognosis than that of other aetiologies [7].

Vancomycin remains the reference standard for the treatment of systemic infection caused by methicillin resistant *Staphylococcus aureus* (MRSA). However, there are many reasons for clinical failure of Vancomycin [8,9], therefore the need for alternative therapies that target MRSA has become apparent. One alternative is Linezolid, because it has been shown that this antibiotic drug in retrospective evaluations of complicated skin and soft-tissue infections (SSTIs) caused by MRSA, compared with Vancomycin, is associated with significantly higher clinical cure rates and reduced lengths of hospitalization [10,11]. Despite the apparent advantages of Linezolid in the treatment of MRSA infections, concerns about safety and costs of therapy often limit its use.

Daptomycin is a lipopeptide drug with bactericidal activity against MRSA in a concentration-dependent manner [12]. The difference between Daptomycin and standard therapy in the treatment of MRSA infections was up to now not statistically significant, however Daptomycin has already been proven to be effective in the treatment of bacteremia and endocarditis caused by MRSA and several case reports about its effectiveness in the field of cardiac surgery exist in the literature [13-17]. Based on these observations, Daptomycin may offer a possible new treatment option for surgical management of MRSA sternal wound infection after cardiac surgery combined with surgical therapy.

In our case the patient was re-submitted to our hospital with generalized colonization and infection with MRSA. Standard therapy concerning antibiotic treatment has failed to eradicate the MRSA, so that we decided for an alternative antimicrobial strategy in the form of Daptomycin application. However, its longterm efficacy in cardiac surgery should be further evaluated in a controlled setting.

Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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Authors' contributions

AP and JS had helped with surgical techniques, performed data, analysis, statistics, graphics, and wrote the paper. TT, CB, AE, SM, MF and CW helped with data interpretation and helped to draft the manuscript. FS co-wrote the manuscript and added important comments to the paper. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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