Infected endocarditis caused by Panton-Valentine leukocidin producing Methicillin-susceptible Staphylococcus aureus: first reported case in United Kingdom

Chathuri Gunasekera1,2, Ian Gould1,3, Marjory Greig1
1Aberdeen Royal Infirmary, Aberdeen, United Kingdom. 2University of Colombo, Colombo, Sri Lanka. 3University of Aberdeen, Aberdeen, United Kingdom

Introduction

Staphylococcus aureus (SA) is a well known cause of soft tissue infections, bacteraemia and infective endocarditis (IE). In industrialised countries SA is a leading cause of IE. Panton-Valentine leukocidin (PVL) is a bacteriophage-associated, bi-component cytotoxin produced by community acquired SA strains, contributing to its virulence. PVL production of SA is often linked to acute and recurrent soft tissue infections. IE caused by PVL producing MSSA has never been reported in the United Kingdom. Here we present a case of IE caused by PVL producing MSSA in a diabetic patient who had heart failure due to aortic stenosis.

Case report

A 63 year old female diagnosed with diabetes mellitus, decompensated heart failure due to severe aortic stenosis and atrial fibrillation with left ventricular systolic dysfunction was admitted to the Cardiothoracic Surgical ward of Aberdeen Royal Infirmary for a routine aortic valve replacement surgery. In a recent Cardiology admission for diuretics and revision of oral hypoglycaemic therapy, she developed cellulitis around a cannula site. This was treated with oral flucloxacillin without sending microbiological specimens.

A preoperative transthoracic echocardiography showed calcified aortic valve leaflets but no obvious vegetations. Coronary angiography revealed no significant coronary artery disease.

The patient was afebrile and not very unwell. Her inflammatory markers were normal. During surgery the native aortic valve with calcified leaflets were shown to bear numerous vegetations on the ventricular side of each leaflet. All leaflets were excised and sent to Microbiology for culture. Aortic valve replacement was done with a bioprostheses.

Direct microscopy and primary culture of the aortic valve were negative. Enrichment culture yielded SA. This isolate was methicillin-sensitive and penicillin-resistant. The isolate was sent to the Scottish Microbiology Reference Laboratories, Glasgow to check for genes responsible for production of toxins (Figure 1). pvl PCR was positive. The spa-type of the isolate was 1149 and inferred clonal complex was CC45. Two sets of blood cultures taken post operatively yielded no growth.

Figure 1: Genetic characteristics of the SA isolate:

<table>
<thead>
<tr>
<th>pvl PCR</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>nuc PCR</td>
<td>Positive</td>
</tr>
<tr>
<td>mecA PCR</td>
<td>Negative</td>
</tr>
<tr>
<td>musPA PCR</td>
<td>Negative</td>
</tr>
<tr>
<td>eto PCR</td>
<td>Negative</td>
</tr>
<tr>
<td>etb PCR</td>
<td>Negative</td>
</tr>
<tr>
<td>spa-type</td>
<td>1149</td>
</tr>
<tr>
<td>Inferred Clonal Complex</td>
<td>CC45</td>
</tr>
</tbody>
</table>

The patient was subsequently treated for IE. Intravenous flucloxacillin and oral rifampicin were given for 6 weeks. Two postoperative trans-thoracic echocardiographies showed no obvious vegetations and the tissue atrial valve was functioning well. On discharge she was well, apyrexial and had a sinus rhythm; chest wound was well healed and her blood sugar levels and inflammatory markers were within normal limits.

Discussion

SA is a leading cause of bacterial IE, its resulting mortality remaining high despite the improved diagnostics and therapeutics. This may be attributed to the numerous virulence factors of this organism, which includes an array of toxins. An epidemiological shift in microbiological aetiology from streptococci to staphylococci has been observed in IE, due to various factors, such as increasing elderly population, intravenous drug usage, prosthetic valves etc..

The diagnosis of IE was not straightforward in this case. It was arrived at only during surgery. Here, the Duke’s criteria which are specific but not very sensitive could not be fulfilled.

Hypothetically, the earlier cannula site infection may have led to bacteraemia and subsequently resulted in IE.

PVL, a bi-component cytotoxin, is associated with community acquisition and is involved in evading/destroying host defenses, hence a major virulence factor of SA. It usually gives rise to acute skin/soft tissue infections which may be recurrent. The pathological role of PVL-producing MSSA in IE is not fully understood and in this case it was unusually non-aggressive. To the best of our knowledge, this is the first report of IE caused by PVL producing MSSA, in the western world.

References: