Patterns of bacteraemia before and after an incident episode of *Staphylococcus aureus* bacteraemia: A population-based study

Jesper Smit[1,2], Lena Mortensen[1], Mette Søgaard[2], Henrik Carl Schønheyder[1]

[1]Department of Clinical Microbiology, Aalborg University Hospital, Denmark and [2]Department of Clinical Epidemiology, Aarhus University Hospital, Denmark

Introduction and aims

Staphylococcus aureus is a leading cause of bacteraemia in patients of all age groups, and the impact on morbidity and mortality is significant. For decades ***S. aureus*** bacteraemia (SAB) has been studied rigorously with emphasis on features that distinguish SAB from other types of bacteremia. However, little is known about how often SAB forms part of a trajectory with both SAB and other types of bacteraemia. To investigate this issue we have analyzed all bloodstream infections (BSI) diagnosed during a 16-year period, 1997-2012, in a population-based setting.

Methods

Prospective recording of BSI has been undertaken in North Denmark Region since 1992 (0.65 million inhabitants in 2012). Each episode was defined by the date of the first positive blood culture, and a successive episode was determined by the interval between positive cultures: ≥30 days for homologous agents and ≥3 days for heterologous agents. We retrieved data from the years 1994-2012 using the first 3 years to exclude patients with SAB before the study period (n=30). An incident episode of BSI, SAB included, was defined by no previous bloodstream infection of any kind from 1997 onwards.

The North Denmark Bacteraemia Database

Since 1992, all patients with bacteraemia in the North Denmark Region have been prospectively registered in the North Denmark Bacteraemia Database[1]. The main variables include the date of sampling of the first positive blood culture, place of acquisition, focus of infection, microbiological species, antibiogram and empirical antimicrobial therapy. By linkage with other medical registries the database provides a valuable platform for research projects regarding risk factors, therapy and prognosis of bacteraemia.

[1]Schønheyder HC, Søgaard M. Existing data sources for clinical epidemiology: The North Denmark Bacteremia Research Database. Clin Epidemiol 2010;2:171-178.

Conclusion

SAB is often preceded and followed by blood stream infections with other aetiologic agents. In order to preclude bias, information on the entire pattern of bacteraemia within a window relevant to the particular study should be taken into account.

Results

14.796 patients had a total of 18.377 bloodstream infections (Table 1). ***S. aureus*** was a causative agent in 2.440 cases (13.3%). Two thousands and two of the 2.440 cases (82.0%) were incident with ***S. aureus*** either being a sole pathogen (1857; 92.8%) or present in polymicrobial blood culture (145; 7.2%). Non-incident cases amounted to 17.9 % (n=438).

A total of 207 incident SAB cases (207/2002: 10.3%) were followed by another type of BSI with a median interval of 72 days [IQR 22-518 days]. Conversely, 221 cases of SAB occurred subsequently to another type of BSI (median interval 132 days [IQR 39-585 days]). The distributions of etiologic agents for BSIs prior to and after incident episodes of SAB are displayed in Figure 1 and 2.

Table 1. Incident and non-incident episodes of SAB according to mono- or polymicrobial aetiology.

SAB / Total	Incident	Proportion SAB (column)	Non-incident*	Proportion SAB (column)	Total
Monomicrobial	1857 / 13.381 (13.9%)	92.8%	394 / 2947 (13.4%)	90.0%	2251 / 16.328 (13.8%)
Polymicrobial	145 / 1.415 (10.2%)	7.2%	44 / 634 (6.9%)	10.0%	189 / 2049 (9.2%)
Total	2002 / 14.796 (13.5%)	100%	438 / 3.581 (12.2%)	100%	2440 /18.377 (13.3%)

Data are presented as number (%) of episodes.

* Patients with any type of bacteremia prior to the 1st episode of SAB.

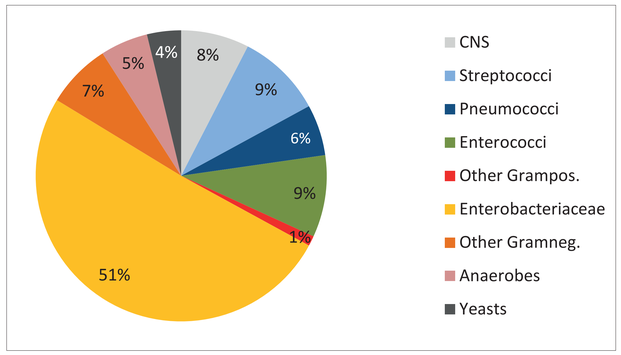

Figure 1. Pathogens in bacteraemia with other aetiologic agents prior to a 1st episode of SAB.

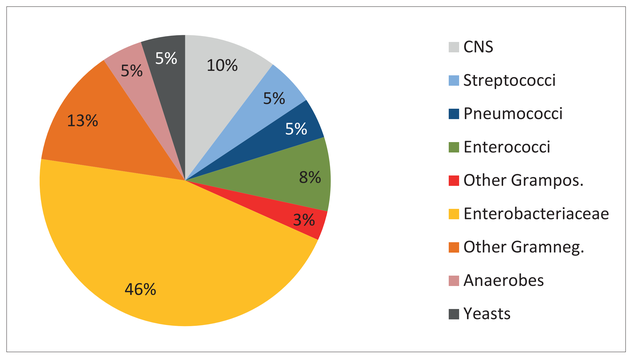

Figure 2. Pathogens in bacteraemia with other aetiologic agents following a 1st episode of SAB.

Correspondence: Jesper Smit, jesm@rn.dk

AALBORG UNIVERSITY HOSPITAL

NORTH DENMARK REGION

Department of Clinical Epidemiology