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Rifampicin-resistant *Staphylococcus epidermidis* implant-associated bone and joint infections: high rate of multidrug-resistance and treatment failure – a retrospective cohort study

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Introduction

- *S. epidermidis* is a leading pathogen in implant-associated bone and joint infections (IA-BJI)
- Rifampicin remains a cornerstone of therapy
- Clinical impact of rifampicin-resistant (Rifa-R) *S. epidermidis* in IA-BJI remains poorly defined

Objective

To assess the impact of rifampicin resistance in *S. epidermidis* on treatment strategies and clinical outcomes in IA-BJI.

Methodes

- Single center retrospective cohort study between 10/2013 and 12/2020
- 203 consecutive patients with IA-BJI due to *S. epidermidis*
- 28 (14%) patients with IA-BJI due to Rifa-R *S. epidermidis*

Definitions applied:

- Multidrug-resistant (MDR) *S. epidermidis*:
  Non-susceptibility to at least four antibiotic classes.
- Treatment failure:
  - Infection-related follow-up surgery
  - Change in antibiotic regimen
  - Death due to IA-BJI

Results

Baseline characteristics

Table 1: Baseline characteristics of total cohort

	Total (n = 203)
Age in years, median [IQR]	66 [52 - 76]
Male sex, n (%)	118 (58)
Charlson Score median [IQR]	1 [0 - 2]
Type of infection, n (%)	
Prosthetic joint infection	73 (36)
Fractur-related infection	66 (33)
Spinal implant infection	45 (22)
Other implant-infection*	19 (9)

Other IA-BJI include: 7 craniotomy/craniectomy-associated osteomyelitis of the skull and skull base, 6 arthrodesis-associated BJI, 4 jaw osteomyelitis, 1 corrective osteotomy and 1 small-implant-associated infection

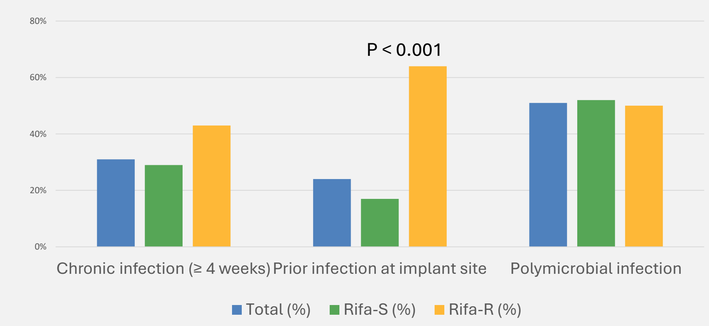

Fig. 1: Infection characteristics overall and among subgroups

Resistances among *S. epidermidis* isolates

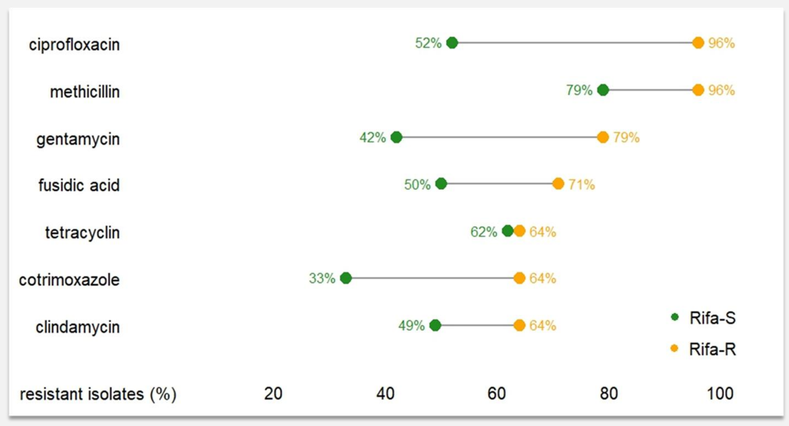

Fig. 2: Proportion of resistant isolates among subgroups

Rifampicin resistance in *S. epidermidis* isolates was strongly associated with **multidrug resistance**.
Rifa-R 93% (26/28); **Rifa-S 49%** (85/175) p < 0.001

Antibiotic therapy

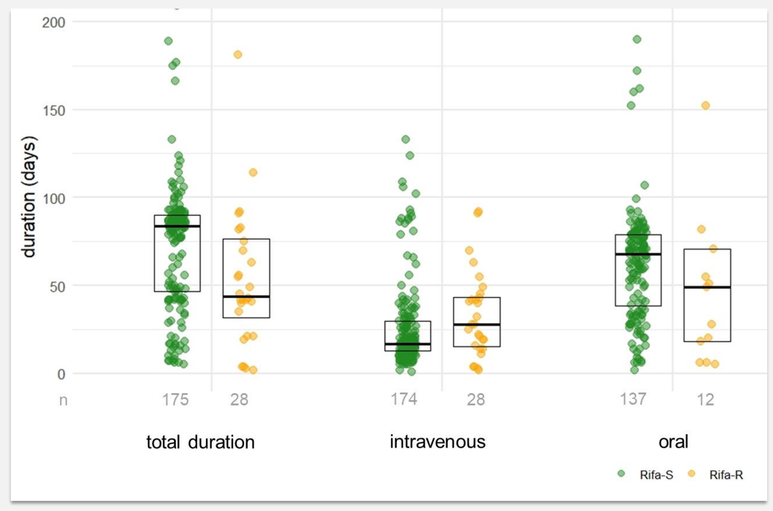

Fig. 3: Duration of antibiotic therapy overall and stratified by mode of application.

Only a minority of patients with rifampicin resistant *S. epidermidis* **achieved oral step-down** therapy.
Rifa-R 43% (12/28); **Rifa-S 78%** (137/175), **p < 0.001**

Surgical treatment strategies

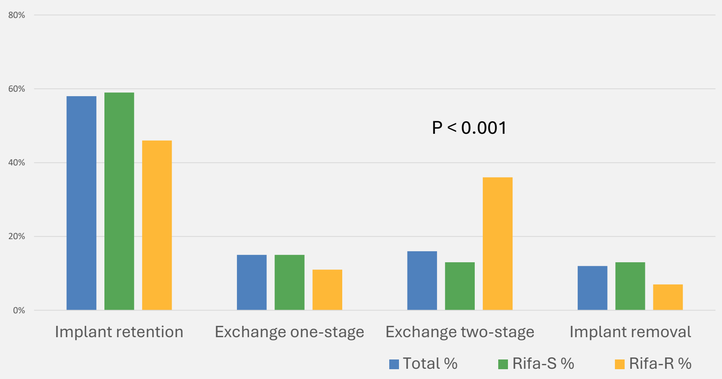

Fig. 4: Surgical treatment strategy chosen

Two-stage implant exchange was more commonly performed in rifampicin-resistant cases.
Rifa-R 36% (10/28); **Rifa-S 13%** (22/175), **p = 0.004**

Treatment failure was significantly higher in patients with Rifa-R isolates.
Rifa-R: 54% (15/28); **Rifa-S: 29%** (52/175)
p = 0.017

Conclusion

- Rifampicin resistance in *S. epidermidis* was strongly associated with methicillin- and multidrug resistance
- Patients with rifampicin-resistant S. epidermidis experienced high treatment failure rates
- Currently available oral treatment options for MDR *S. epidermidis* are limited
- New treatment options for these difficult-to treat pathogens are urgently needed

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