

Polymicrobial Orthopaedic Implant-Associated Infections Are More Common Than Expected: A Multicentre Brazilian Cohort Study

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1. INTRODUCTION

- Orthopaedic implant-associated infections (OIAI) are a growing clinical challenge, with substantial morbidity and healthcare cost.
- Polymicrobial infections from heterogeneous biofilms and can complicate microbiological diagnosis and treatment.
- The diagnostic yield of deep tissue cultures versus implant sonication remains clinically relevant and still debated.

2. OBJECTIVE

To compare deep tissue culture and sonication fluid culture in the microbiological characterization of orthopaedic implant-associated infections, including fracture-related infection (FRI), periprosthetic joint infection (PJI), and chronic osteomyelitis, with emphasis on polymicrobial infections and antimicrobial susceptibility patterns.

3. MATERIALS & METHODS

- Multicentre Brazilian cohort.
- Intraoperative sampling with deep tissue culture plus implant sonication.
- Microbial identification by MALDI-TOF MS.
- Antimicrobial susceptibility testing and statistical analysis.



210
patients



246
OIAI episodes



446
microorganisms

CLINICAL SUBGROUPS



164
FRI



70
PJI



14
Chronic
osteomyelitis

4. KEY FINDINGS

POLYMICROBIAL INFECTIONS

36.6%

More than one-third of OIAI episodes were polymicrobial in this multicentre Brazilian cohort.



MICROBIOLOGICAL PROFILE



- Monomicrobial 49.1%
- Polymicrobial 36.6%
- Culture-negative 14.3%

MICROBIOLOGICAL PATTERNS



Gram-negative bacilli were more frequent in polymicrobial infections: 37.7% vs 25.8% ($p=0.033$).



Staphylococcus aureus predominated in monomicrobial infections ($p<0.001$).



Acinetobacter and *Streptococcus* spp. were more frequent in polymicrobial infections.

ANTIMICROBIAL RESISTANCE

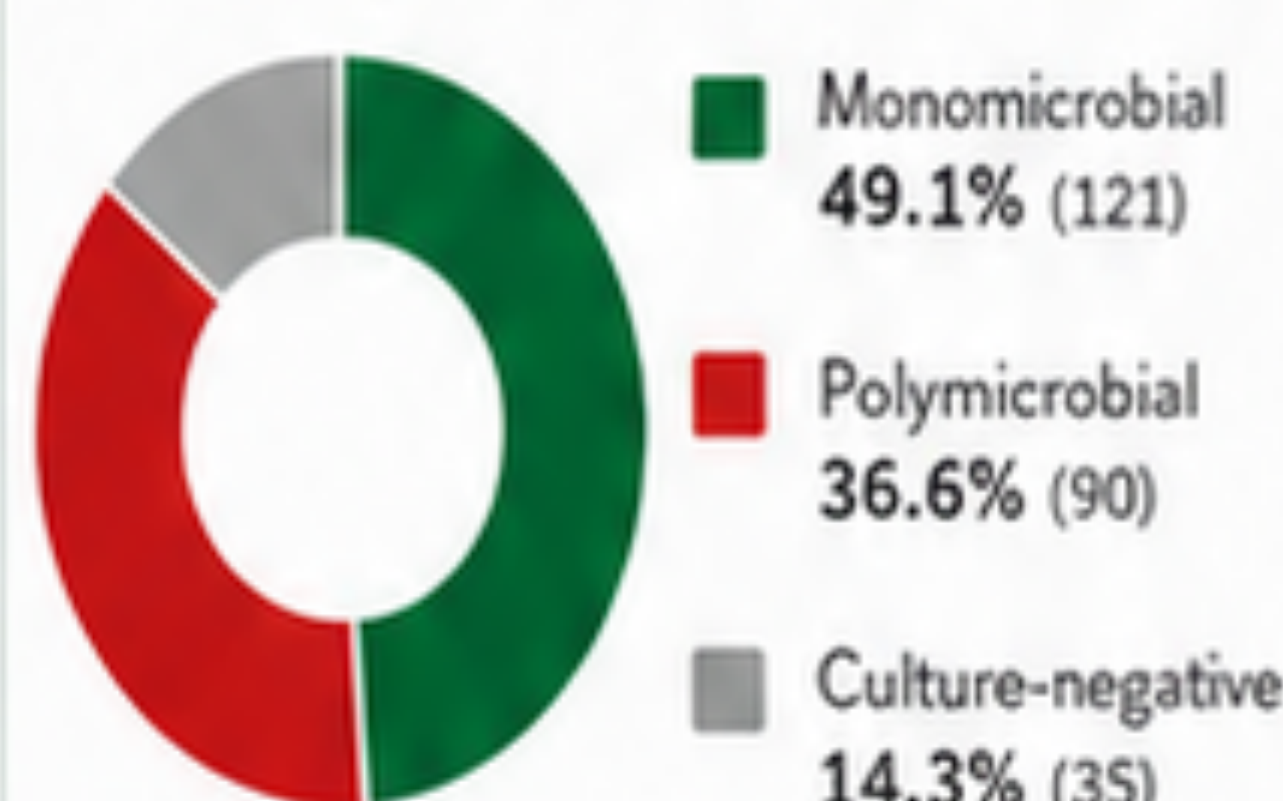


Enterobacteriaceae showed **70%** resistance to ertapenem.

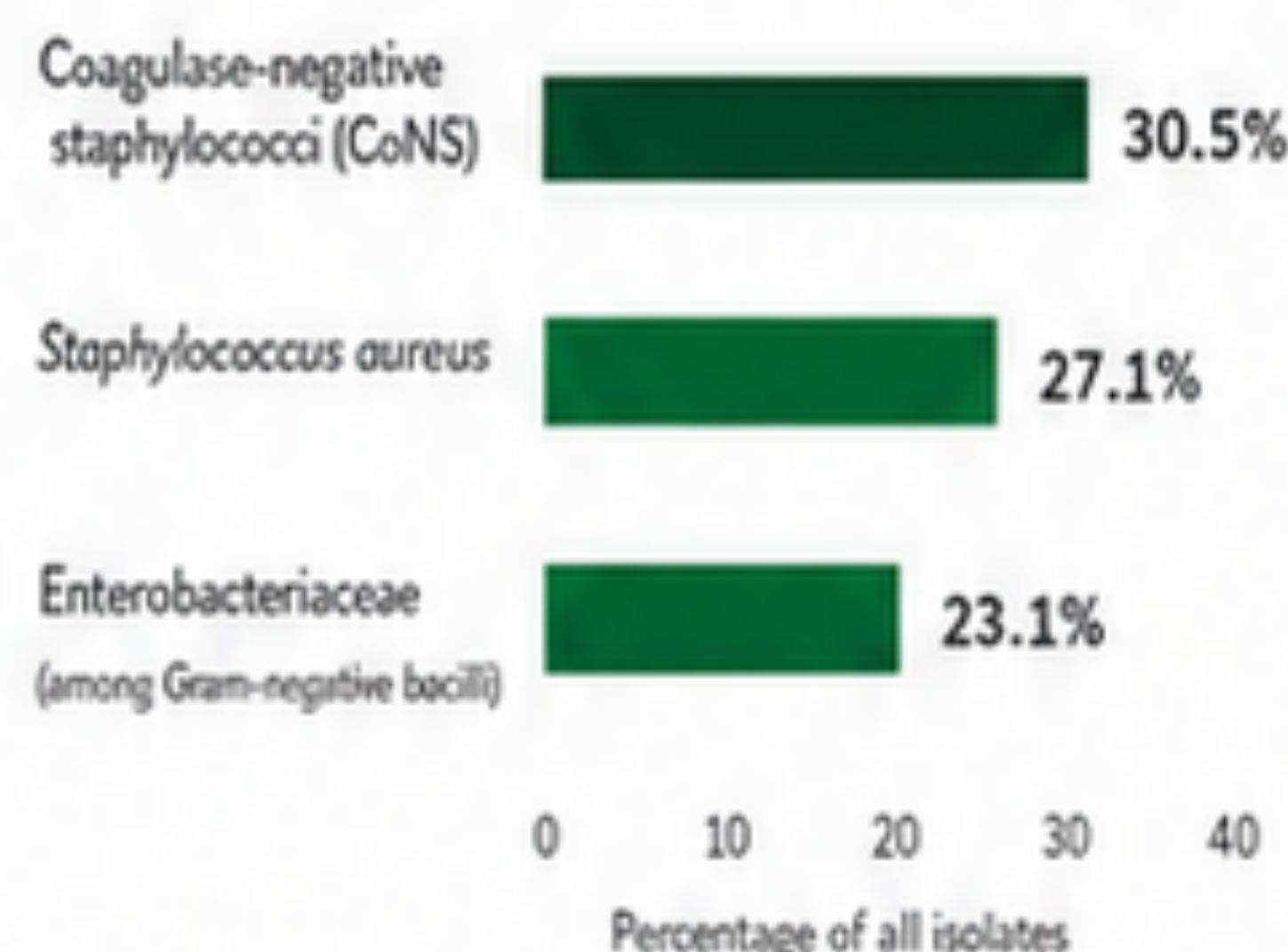


5. RESULTS

A) MICROBIOLOGICAL PROFILE (n=246 episodes)



B) MOST FREQUENT MICROORGANISMS (among isolated)



C) ANTIMICROBIAL SUSCEPTIBILITY HIGHLIGHTS

2.0%

Resistance to linezolid in *S. aureus*

6.0%

Resistance to trimethoprim-sulfamethoxazole in *S. aureus*

92%

Vancomycin susceptibility in CoNS

70%

Resistance to ertapenem in Enterobacterales

D) INTERPRETATION

	High rate of polymicrobial infections	Nearly half of OIAI episodes were polymicrobial (36.6%).
	Gram-positive cocci predominate overall	CoNS and <i>S. aureus</i> were the most frequent isolates.
	Gram-negative bacilli enriched in polymicrobial episodes	Higher proportion in polymicrobial infections (37.7% vs 25.8%; $p=0.033$).
	Combined culture strategy optimizes diagnosis	Deep tissue plus sonication culture improved microbiological characterization.

6. DISCUSSION



Polymicrobial OIAI appears more common than often assumed.



The microbiological profile differs between monomicrobial and polymicrobial episodes.



Resistant Gram-negative organisms warrant therapeutic attention.



Combined deep tissue and sonication culture may improve diagnostic characterization and support antimicrobial planning.

7. CONCLUSION



Polymicrobial orthopaedic implant-associated infections were frequent in this multicentre Brazilian cohort and showed a distinct microbiological profile. Gram-positive cocci predominated overall, whereas Gram-negative bacilli were more common in polymicrobial episodes and showed relevant ertapenem resistance. Combined deep tissue and sonication cultures optimize microbiological characterization and may support better therapeutic decision-making.

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TAKE-HOME MESSAGE:

Do not underestimate polymicrobial OIAI: combined tissue plus sonication culture provides a more complete microbiological picture.

