

### Infections ostéo-articulaires sur matériel à *Pseudomonas aeruginosa* : expérience d'un centre de référence français

# Implant-associated *P. aeruginosa* bone and joint infections: experience in a regional reference center in france

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et la région Auvergne-Rhône-Alpes du mercredi 5 juin 2019 au vendredi 7 juin 2019



#### Déclaration d'intérêts de 2014 à 2018

- Intérêts financiers : Aucun
- Liens durables ou permanents : Aucun
- Interventions ponctuelles : DebioPharm, MSD, Gilead, MaaT Pharma, Pfizer, Sanofi-Aventis, Bonesupport
- Intérêts indirects : Aucun



#### **IMPLANT-ASSOCIATED BONE AND JOINT INFECTIONS**



Incidence	PJI	Fracture-fixation devices	
	Hip: 1%	Overall: 5-10%	
	Shoulder: 2%	Closed fractures: 1-2%	
	Elbow: 9%	Open fractures: 30%	

- Internal device
- Biofilm
- Different gradients of growth and metabolic activity
- Resistance to antibiotics and immune system



Adapted from: Zimmerli, W., A. Trampuz, and P.E. Ochsner, *Prosthetic-joint infections*. N Engl J Med, 2004. **351**(16): p. 1645-54.

**Pathogenesis** 

**Sample Selection** 

Etiology



Conclusions

#### **IMPLANT-ASSOCIATED BONE AND JOINT INFECTIONS**

#### Research Question: subpopulation infected with P. aeruginosa





#### Sample Selection and statistical analysis

- Retrospective cohort study in the French reference center for osteoarticular infections CRIOAc Lyon; <u>http://www.crioac-lyon.fr</u>
- Inclusion of <u>all patients with P. aeruginosa implant-associated infection</u> managed in our institution between 2011 and 2018
- At least one positive sample with P. aeruginosa in culture from deep perioperative samples was required
- Risk factors for treatment failures using Kaplan-Meier curves and univariate and multivariate cox analysis



#### DEFINITIONS

Criteria (1/2)

Operational Classification	Type of BJI	Characteristics			
	Acute hematogenous	Infection with a duration of symptoms of 3 weeks or less after an uneventful postoperative period			
	Early postinterventional	Infection that manifests within 1 month after an invasive procedure such as surgery or arthrocentesis			
	Chronic	Infection with symptoms that persist for more than 3 weeks, beyond the early postinterventional period			
	Any type of velopes of	implent eccepted infection including.			
Treatment Failure	Any type of relapse of implant-associated infection including:				
	persistence (new surgery with a second finding of the same P. aeruginosa),				
	superinfection (either new surgery or joint tap with isolation of another organism(s)), or				
	any other cause of relapse such as the need for a subsequent surgery				





#### DEFINITIONS

### Criteria (2/2)





#### **Demographics & Clinical Features**

- Whole population: n=90
- Median follow up of: 20 months [IQR 9 36,5]
- Number of patients with a treatment failure: n=23 (25.6%)
  - P. aeruginosa persistence: n=7 (7.8%)
  - Superinfection: **n=16 (17.8%)**



#### **Demographics & Clinical Features**

	Whole			a
Characteristics	population (n=90)	Failure (n=23)	Remission (n=67)	p°
Age in years (median, IQR)	60 (47-72)	61 (43-74)	59 (47-72)	0.9
Male sex (n <i>,</i> %)	56 (62)	17 (74)	39 (58)	0.18
BMI ≥30 (n <i>,</i> %)	24 (28)	6 (29)	18 (29)	1
Active smoking (n, %)	29 (35)	10 (44)	19 (32)	0.34
Score ASA > 2 (n, %)	30 (34)	8 (35)	22 (33)	0.9
Score Charlson > 4 (n, %)	24 (27)	7 (30)	17 (25)	0.64
Previous infection at the same site (n, %)	19 (21)	6 (26)	13 (19)	0.5
Prosthesis (n, %)	30 (33)	7 (30)	23 (34)	0.73
Age of implant in days (median, IQR)	47 (21.7-247.5)	40 (21-222)	63 (26-798)	0.29
Type of infection (n, %)				
acute	56 (62)	14 (61)	42 (63)	
sub-acute	8 (9)	2 (9)	6 (9)	0.98
chronic	26 (29)	7 (30)	19 (28)	
Polymicrobial infection (n, %)	66 (73)	18 (78)	48 (71)	0.54

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Sample Selection

#### Antimicrobial resistance



BJI due to P. aeruginosa ciprofloxacinresistant

Introduction



#### **Clinical management**



#### **Clinical management**

Kaplan-Meier curves showing the probability of treatment failure depending on surgical and medical management



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Kaplan-Meier curves showing the probability of treatment failure depending on surgical and medical management



#### **Clinical management**

Multivariate Cox analysis that includes significant determinants for failure identified in the univariate analysis.

Determinant	HR	95%CI	p
Optimal surgical treatment*	0.32	0.11-0.98	0.045
IV effective treatment of at least 3 weeks*	0.15	0.004-0.054	0.003
ciprofloxacin for at least 3 months*	0.23	0.07-0.75	0.015

Note. HR, Hazard ratio; 95%CI, 95% confidence interval.

\* after exclusion of the 5 patients who eventually received suppressive antimicrobial therapy

#### Conclusions

- P. aeruginosa implant-associated BJI is <u>one of the most difficult-to-treat</u> implant-associated BJI, with the surgical strategy having a strong impact on the prognosis
- Conclusions obtained with others Enterobacteriaceae are <u>not completely</u> <u>transposable</u>

An effective initial IV antibiotic treatment for at least 3 weeks seems to be required, followed by oral ciprofloxacin for a total duration of 3 months

Crucial need to <u>take into account the microorganism (and its drug</u> <u>susceptibility)</u> responsible for implant-associated BJI, and <u>adapt the type of</u> <u>antibiotic treatment and its duration</u>



# Lyon BJI Study group

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