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BACKGROUND: Metachronous periprosthetic joint infections (PJIs) represent a clinically relevant but under-recognized entity in patients with multiple arthroplasties. They are defined as new infectious episodes affecting a different prosthetic joint after a symptom-free interval. This study aimed to analyze demographic risk factors, anatomical distribution, and microbiological patterns of metachronous PJIs.

MATERIALS AND METHODS: A retrospective study was conducted including 102 cases of acute PJI treated between 1992 and 2024. Within the metachronous cohort, time interval, anatomical distribution, and microbiological characteristics were analyzed. Metachronous infections were classified into three anatomical categories relative to the primary infected site (1)infections in the same limb, (2) infections in the contralateral lower limb, and (3) infections involving both lower and upper limbs.

RESULTS:

The most commonly affected joint was the hip in group 1 (7 patients, 70%) and the knee in group 2 (9 patients, 69.2%). (Figure 1) The single group 3 patient had an elbow infection.

The mean interval between infections in the metachronous group was 70.4 months.

Rheumatoid arthritis ($p = 0.03$) and immunosuppression ($p = 0.02$) were independently associated with metachronous infection (Table 1 and 2)

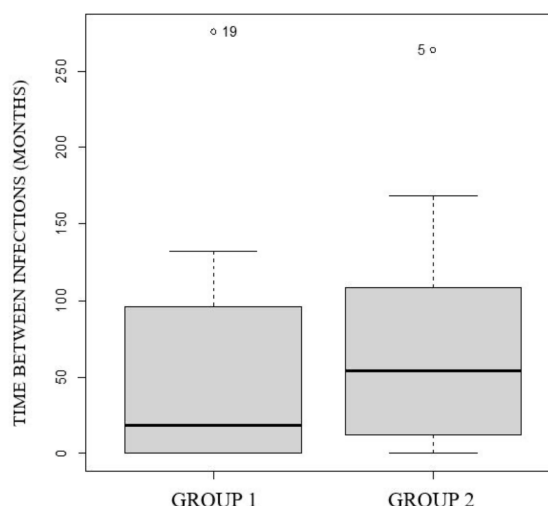
Primary infections were mainly caused by low-virulence organisms, whereas metachronous infections showed greater microbiological diversity and a higher prevalence of resistant pathogens. In 73.9% of cases, the causative microorganism differed between episodes.

Table 1. Demographic data and risk factors.

Variable	Metachronous PJI	Single PJI	p-value
Patients, n	24	78	
Sex, H:M (%)	12:12 (50:50)	40:44 (47.62:52.38)	0.83
Mean follow-up (months, SD)	97 (84.63)	170 (135.43)	0.51
Mean age 1st infection (years, SD)	65.38 (11.35)	66.27 (12.40)	0.74
Mean age 2nd infection (years, SD)	69.67 (11.13)	-	
Mean BMI (kg/m ² , SD)	29.98 (6.33)	29.02 (5.66)	0.52
History of neoplasia, n (%)	4 (16.67)	8 (9.52)	0.33
Rheumatoid arthritis, n (%)	4 (16.67)	2 (2.38)	0.07
Immunosuppression, n (%)	2 (8.33)	4 (4.76)	0.04
Diabetes, n (%)	7 (29.17)	22 (26.19)	0.77
Renal failure, n (%)	3 (12.5)	5 (5.95)	0.28

Table 2. Multivariate analysis of factors associated with metachronous multiple PJI.

Variable	Adjusted OR	95% CI	p - value
Rheumatoid arthritis	3.38	1.06-8.83	0.03
Diabetes	0.84	0.26 – 2.96	0.78
Age (years)	1.01	0.96 – 1.05	0.78
BMI	0.95	0.87 – 1.04	0.31
Immunosuppression	6.05	1.32-7.36	0.02
Renal failure	0.39	0.07 – 2.67	0.31
Neoplasia	0.33	0.08 – 1.60	0.14
Sex (female)	1.65	0.56 – 5.14	0.37



CONCLUSIONS: Metachronous PJIs are predominantly caused by new infectious events rather than relapse. Patients with rheumatoid arthritis or immunosuppression appear to be at increased risk. These findings support the need for prolonged follow-up, early diagnostic evaluation in suspected bacteremia, and individualized prophylactic strategies in high-risk populations.

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