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RESEARCH NOTE

Treatment of acute post-surgical infection of joint arthroplasty

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ABSTRACT

The best antibiotic regimen for acute prosthetic joint infection, treated without removal of the implant, has not been well-defined. This study describes the use of a protocol based on oral rifampicin combinations to treat 47 cases that were followed prospectively for a 2-year period. The regimen used most commonly was levofloxacin 500 mg/24 h plus rifampicin 600 mg/24 h for a mean duration of 2.7 ± 1 months. The cure rate was 76.9%, and the only independent risk-factor associated with treatment failure was infection caused by methicillin-resistant *Staphylococcus aureus* or *Enterococcus* spp. (OR 17.6, p 0.003). Overall, the results suggested that use of oral antibiotics, including rifampicin, for 2–3 months was a good treatment option.

Keywords Acute prosthetic joint infection, antibiotic regimen, levofloxacin, rifampicin, treatment

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Acute post-surgical prosthetic infection can be treated successfully by open debridément and prolonged intravenous antimicrobial therapy. However, it has not yet been established which

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antibiotic, or combination of antibiotics, is the most appropriate choice, or for how long treatment should be administered. This study presents the results of a treatment protocol based on open debridément and leaving the prosthesis in place. In addition, independent variables associated with treatment failure are analysed.

Acute deep post-surgical infection was considered when infection appeared within the first 3 months after arthroplasty and the patient had inflammatory signs, increased levels of C-reactive protein, and yielded pathogenic microorganisms from deep samples, and/or pus was present. Once samples were taken, treatment with a broad-spectrum parenteral antibiotic was commenced, with treatment modified subsequently according to the organism's antibiogram, giving priority to oral combinations containing rifampicin. Oral dosages of levofloxacin, clindamycin and rifampicin were 500 mg/24 h, 300 mg/8 h and 600 mg/24 h, respectively. The intravenous dosage of teicoplanin was 10 mg/kg/24 h. Antibiotic treatment was continued until resolution of clinical signs and normalisation of CRP levels (< 1 mg/dL).

Patients were followed for a minimum of 24 months. Outcome was evaluated according to the following definitions: (i) *cured*, when the patient was asymptomatic, the prosthesis was functioning well, and the CRP level was < 1 mg/mL, or when the patient developed a non-septic complication that required prosthesis replacement and cultures of deep tissues were negative; (ii) *failure*, when inflammatory signs and high CRP levels remained during treatment, or reappeared after completing treatment; and (iii) *non-evaluable*, when the patient died before treatment was completed.

Statistical analysis was performed using SPSS software (SPSS Inc., Chicago, IL, USA). For univariate analyses, categorical variables were compared using the chi-square test or Fisher's exact test, and quantitative variables were compared using the Students *t*-test or ANOVA. A logistic regression model was used to identify independent variables associated with treatment failure. Variables included in the statistical analysis were age, co-morbidity, type of prosthesis, route of administration and duration of antimicrobial treatment, and the aetiological agent. Statistical significance was defined as a two-tailed p value < 0.05.

During the study period, 47 patients were investigated. The mean age (SD) was 76.1 (10) years, 23 patients were male and 24 were female. Twenty-one cases involved a hemiarthroplasty (HA), 11 involved a total hip arthroplasty (THA), and 15 involved a total knee arthroplasty (TKA). The mean time from arthroplasty to the diagnosis of infection was 25.7 (16.8) days. Eight patients (seven HA and one THA) died within a few days of being diagnosed and were thus non-evaluable.

The mean (SD) duration of antimicrobial treatment was 2.7 (1) months, with 30 patients treated by the oral route and nine treated intravenously. Outcome according to the type of implant and aetiology is summarised in Table 1. The duration and efficacy of the three antimicrobial regimens used most frequently are shown in Table 2. The duration of antibiotic treatment was similar for all microorganisms.

Table 1. Patient outcome according to aetiological agent and type of implant

	Hemiarthroplasty (n = 21)		Total hip arthroplasty (n = 11)		Total knee arthroplasty (n = 15)	
Microorganism	**Evaluable[a]**	**Cured (%)**	**Evaluable[a]**	**Cured (%)**	**Evaluable[a]**	**Cured (%)**
Gram-positive cocci	10	8 (80)	9	8 (88.9)	12	6 (50)
Staphylococcus aureus	4	4 (100)	1	1 (100)	6	2 (33.3)
Methicillin-susceptible	3	3 (100)	1	1 (100)	3	2 (75)
Methicillin-resistant	1	1	–	–	3	0
Coagulase-negative staphylococci	3	3 (100)	6	6 (100)	5	3 (60)
Methicillin-susceptible	–	–	3	3	2	1 (50)
Methicillin-resistant	3	3	3	3	3	2 (75)
Streptococcus viridans	1	1 (100)[b]	1	1 (100)	1	1 (100)
Enterococcus spp.	2	0 (0)	1	0 (0)	–	–
Gram-negative bacilli	3	3 (100)[c]	–	–	1	1 (100)
Culture-negative	1	1 (100)	1	1 (100)	2	2 (100)[b]
Total	14	12 (85.7)	10	9 (90)	15	9 (60)

[a]Patients who completed antimicrobial therapy.
[b]One patient developed an aseptic loosening after 24 months.
[c]One patient had a prosthesis luxation after 6 months and cultures were negative.