URF PUBLISHERS
connect with research world

Medical & Clinical Case Reports Journal

https://urfpublishers.com/journal/case-reports

Research Article

Association Between Osteoarthrosis and Bacterial-Induced Joint Erythema-Swelling: Efficacy of Antimicrobial

Chaoqun Zhang*

Department of Osteoarticular Sports and Trauma Surgery, The Affiliated First Hospital of Fuyang Normal University, China

***Corresponding author:** Chaoqun Zhang, Department of Osteoarticular Sports and Trauma Surgery, The Affiliated First Hospital of Fuyang Normal University, China

A B S T R A C T

This retrospective study explored the association between osteoarthrosis and bacterial-induced joint erythema-swelling and evaluated antimicrobial nursing interventions in 60 patients with osteoarthrosis. Patients were divided into bacterial erythema-swelling group (n=28, with positive bacterial culture and joint redness/swelling) and non-bacterial erythema-swelling group (n=32, with erythema-swelling but negative cultures), with each group split into intervention (bacterial: n=15; non-bacterial: n=17) and control (bacterial: n=13; non-bacterial: n=15) subgroups. Intervention subgroups received antimicrobial nursing (bacterial-targeted disinfection, erythema-swelling monitoring, antimicrobial stewardship), while controls received routine care. Primary outcomes included correlation between osteoarthrosis severity (Kellgren-Lawrence grade) and bacterial-induced erythema-swelling duration and post-intervention resolution rate at 3 weeks. Secondary outcomes included C-reactive protein (CRP) levels, joint temperature difference (°C) and recurrence rate at 2 months. Results showed significant positive correlation between Kellgren-Lawrence grade and erythema-swelling duration in bacterial group (r=0.74, p<0.01). Intervention subgroups had higher resolution rate (bacterial: 80.0% vs 38.5%; non-bacterial: 76.5% vs 46.7%, p<0.05). Antimicrobial nursing effectively resolves bacterial-induced joint erythema-swelling in osteoarthrosis patients, particularly those with severe disease.

Keywords: Osteoarthrosis; Erythema-swelling; Antimicrobial stewardship; Kellgren-lawrence grade

Introduction

Bacterial-induced joint erythema-swelling is a distinct subtype of inflammatory presentation in osteoarthrosis, accounting for 30-40% of acute flares in severe cases[1]. Pathogens like Staphylococcus aureus and Streptococcus spp. colonize damaged joint tissues, triggering neutrophilic infiltration and cytokine release that manifest as redness, warmth and swelling[2]. This condition accelerates cartilage degradation and increases joint deformity risk, yet lacks targeted nursing protocols[3]. This study investigates the osteoarthrosis-bacterial erythema-swelling association and evaluates antimicrobial interventions.

Methods

Study design and participants

Retrospective analysis of 60 patients with radiographically confirmed osteoarthrosis (knee: 45 cases, hip: 15 cases). Inclusion criteria: age 50-85 years; Kellgren-Lawrence grade I-IV; acute joint erythema-swelling (≥2/3 criteria: redness, warmth, swelling, pain). Bacterial group defined as positive joint fluid/tissue culture (≥10³ CFU/mL); non-bacterial group as negative cultures with sterile inflammation. Exclusion criteria: crystal arthropathy, septic arthritis and recent intra-articular injections.

Grouping & interventions

Control subgroups: Routine care (cold therapy, pain management).

Intervention subgroups: Added antimicrobial interventions:

- **Bacterial-targeted disinfection:** Chlorhexidine 2% skin decontamination (3x/day) and aseptic dressing changes for weeping joints.
- **Erythema-swelling monitoring:** Daily tracking of redness diameter, swelling circumference and temperature (infrared thermometer).
- **Antimicrobial stewardship:** Timely specimen collection for culture, antibiotic administration education and adherence monitoring.
- **Joint protection:** Immobilization with sterile splints during acute phase, gradual mobilization as symptoms resolve.

Outcome measures

- **Primary:** Correlation between Kellgren-Lawrence grade and initial erythema-swelling duration; 3-week resolution rate (≥70% symptom reduction).
- **Secondary:** CRP (mg/L), joint temperature difference (affected vs contralateral), 2-month recurrence rate.

Statistical analysis

SPSS 26.0 used for Pearson correlation, χ^2 tests and independent t-tests. $p < 0.05$ was significant.

Results

Osteoarthrosis-bacterial erythema-swelling relationship and baseline data

Significant positive correlation between Kellgren-Lawrence grade and erythema-swelling duration in bacterial group (r=0.74, p<0.01). Bacterial group had higher initial inflammatory markers **(Table 1)**.

Table 1: Baseline Characteristics.

Characteristics	Bacterial Erythema-Swelling Group (n=28)	Non-Bacterial Erythema-Swelling Group (n=32)	p-value
Age (years, x̄±s)	66.8±9.1	64.2±8.3	0.27
Male gender, n(%)	16(57.1)	18(56.3)	0.94
Affected joint (knee/hip)	21(75.0)/7(25.0)	24(75.0)/8(25.0)	0.98
Kellgren-Lawrence grade (x̄±s)	3.4±0.8	2.2±0.7	<0.001
Staphylococcus aureus positive, n(%)	17(60.7)	0(0.0)	<0.001
Initial erythema duration (days, x̄±s)	8.7±3.2	5.3±2.1	<0.001
Initial CRP (mg/L, x̄±s)	68.5±21.3	32.6±14.5	<0.001
Joint temperature difference (°C, x̄±s)	2.8±0.9	1.5±0.6	<0.001

Primary outcome

- **Severity association:** Each 1-grade increase in Kellgren-Lawrence grade correlated with 2.3-day longer erythema-swelling duration in bacterial group (p<0.001).
- **Intervention effect:** Intervention subgroups showed higher resolution rate **(Table 2)**.

Table 2: 3-Week Erythema-Swelling Resolution Rate.

Group	Intervention	Control	p-value
Bacterial Group (n=28)	12/15(80.0%)	5/13(38.5%)	0.019
Non-Bacterial Group (n=32)	13/17(76.5%)	7/15(46.7%)	0.043

Secondary outcomes

Intervention subgroups demonstrated significant improvements in all secondary measures **(Table 3)**.

Table 3: Secondary Outcomes at 3 Weeks and 2 Months.

Outcome	Bacterial Group	Non-Bacterial Group	p-value (intervention effect)
CRP (mg/L, x̄±s)	Intervention: 18.2±7.5	Intervention: 15.3±6.8	<0.001
	Control: 42.6±12.8	Control: 25.7±9.4	-
Temperature difference (°C)	Intervention: 0.8±0.4	Intervention: 0.6±0.3	<0.001
	Control: 1.9±0.7	Control: 1.2±0.5	-
2-Month recurrence rate	Intervention: 13.3%	Intervention: 11.8%	0.031
	Control: 53.8%	Control: 40.0%	-

Discussion

This study confirms severe osteoarthrosis correlates with prolonged bacterial-induced erythema-swelling, as damaged cartilage and synovium provide a nidus for bacterial persistence[4]. The 54.5% higher Kellgren-Lawrence grade in bacterial group aligns with evidence that bacterial lipopolysaccharides upregulate matrix metalloproteinases, worsening joint damage[5].

Antimicrobial nursing resolved symptoms primarily through targeted disinfection, which reduced bacterial load by 60% in weeping joints[6]. Daily monitoring enabled early escalation, while stewardship ensured appropriate antibiotic use-critical for preventing resistance in recurrent cases[7]. Notably, non-bacterial group intervention benefits suggest antimicrobial measures address subclinical colonization[8].

Limitations include reliance on culture results (misses fastidious organisms) and small sample size. Future studies should use PCR for bacterial detection.

Conclusion

Osteoarthrosis severity strongly correlates with duration of bacterial-induced joint erythema-swelling. Antimicrobial nursing interventions effectively resolve symptoms, reduce inflammation and prevent recurrence. These strategies are essential for managing bacterial-driven flares in osteoarthrosis.

References

1. Nelson CL, Allen KD, Golightly YM. Musculoskeletal infections in older adults: diagnosis and management. J Am Geriatr Soc 2020;68(1):174-182.

2. Zhang C, Li S, Liu Y, et al. Association between oral microbiota and knee osteoarthritis: a cross-sectional study. Front Cell Infect Microbiol 2022;12:966686.

3. Hunter DJ, Bierma-Zeinstra SM. Osteoarthritis. Lancet 2019;393(10182):1745-1759.

4. Goldring MB, Goldring SR. Osteoarthritis. J Cell Physiol 2007;213(3):626-634.

5. Scher JU, Sczesnak A, Longman RS, et al. The gut microbiota in rheumatoid arthritis. Genome Med 2013;5(10):89.

6. Berbari EF, Kanj SS, Kowalski TJ, et al. 2015 Infectious Diseases Society of America (IDSA) clinical practice guidelines for the diagnosis and treatment of native vertebral osteomyelitis in adults. Clin Infect Dis 2015;61(6):26-46.

7. Centers for Disease Control and Prevention (CDC). Core elements of outpatient antibiotic stewardship. MMWR Morb Mortal Wkly Rep 2016;65(No. RR-6):1-12.

8. Osmon DR, Berbari EF, Berendt AR, et al. Diagnosis and management of prosthetic joint infection: clinical practice guidelines by the Infectious Diseases Society of America. Clin Infect Dis 2013;56(1):e1-e25.