Disponible en ligne sur
ScienceDirect
www.sciencedirect.com
Elsevier Masson France
EM|consulte
www.em-consulte.com
Médecine et maladies infectieuses
Médecine et maladies infectieuses xxx (2017) xxx–xxx

Short communication

Non-compliance with IDSA guidelines for patients presenting with methicillin-susceptible *Staphylococcus aureus* prosthetic joint infection is a risk factor for treatment failure☆

Le non-respect des recommandations de l'IDSA pour les infections de prothèses à Staphylococcus aureus *sensible à la méthicilline est un risque d'échec*

A. Bouaziz [a], I. Uçkay [b], S. Lustig [c,d,e], A. Boibieux [a], D. Lew [b], P. Hoffmeyer [b], P. Neyret [c,d], C. Chidiac [a,d,e,f], T. Ferry [a,d,e,f,*]

[a] *Service de maladies infectieuses et tropicales, hôpital de la Croix-Rousse, hospices civils de Lyon, 93, Grande rue de la Croix-Rousse, 69004 Lyon, France*
[b] *Hôpitaux universitaires de Genève, 4, rue Gabrielle-Perret-Gentil, 1211 Geneva 14, Switzerland*
[c] *Service de chirurgie orthopédique, centre Albert-Trillat, hôpital de la Croix-Rousse, hospices civils de Lyon, 69004 Lyon, France*
[d] *Université Claude-Bernard Lyon 1, 69100 Lyon, France*
[e] *Centre de référence des IOA complexes de Lyon, Lyon, France*
[f] *Inserm U1111, CNRS UMR5308, ENS de Lyon, UCBL1, centre international de recherche en infectiologie (CIRI), 69007 Lyon, France*

Received 9 August 2016; received in revised form 9 November 2016; accepted 26 September 2017

Abstract

Objective. – The long-term impact of treatment strategies proposed by the IDSA guidelines for patients presenting with methicillin-susceptible *S. aureus* (MSSA) prosthetic joint infection (PJI) is not well-known.

Patients and methods. – Retrospective (2000–2010) cohort study including patients presenting with MSSA hip or knee PJI. A univariate Cox analysis was performed to determine if the non-compliance with IDSA surgical guidelines was a risk factor for treatment failure.

Results. – Eighty-nine patients with a mean follow-up of 2.8 years were included. Non-compliance with IDSA surgical guidelines was associated with treatment failure (hazard ratio 2.157; 95% CI [1.022–4.7]). The American Society of Anesthesiologists score, inadequate antimicrobial therapy, and a rifampicin-based regimen did not significantly influence patient outcome.

Conclusion. – Based on the IDSA guidelines, if a patient presenting with MSSA PJI is not eligible for implant retention, complete implant removal is needed to limit treatment failure.

Keywords: Prosthetic joint infections; MSSA; Guidelines

Résumé

Objectif. – L'impact des stratégies proposées par les recommandations de l'IDSA pour les patients présentant une infection de prothèse articulaire (IPA) à *S. aureus* sensible à la méthicilline (MSSA) n'est pas connu.

Patients et méthodes. – Étude de cohorte rétrospective (2000–2010) incluant des patients avec une IPA à MSSA. Une analyse univariée de Cox a été utilisée pour déterminer si le non-respect de la stratégie chirurgicale proposée par l'IDSA était associé à un échec.

☆ This article has not been submitted or published elsewhere, but preliminary results were presented as a poster at the Interscience Conference on Antimicrobial Agents and Chemotherapy, San Francisco, September 2012.

* Corresponding author. Service de maladies infectieuses et tropicales, hôpital de la Croix-Rousse, hospices civils de Lyon, 93, Grande rue de la Croix-Rousse, 69004 Lyon, France.
E-mail address: tristan.ferry@univ-lyon1.fr (T. Ferry).

http://dx.doi.org/10.1016/j.medmal.2017.09.016
0399-077X/

Résultats. – Chez 89 patients avec un suivi médian de 2,8 ans, le non-respect de la stratégie chirurgicale proposée par l'IDSA était associé à un échec (HR 2,157 ; IC 95 % [1,022–4,7]), alors que le score ASA, une antibiothérapie inadéquate et une antibiothérapie contenant de la rifampicine n'influençaient pas le pronostic.

Conclusion. – Pour les patients présentant une IPA à MSSA ne remplissant pas les critères pour un traitement conservateur, l'ablation totale des implants est requise.

Mots clés : Infections de prothèses articulaires ; SASM ; Recommandations

1. Introduction

Prosthetic joint infections (PJI) are uncommon, but they represent the most serious complication following arthroplasty. Their management is based on both surgery and long-term antimicrobial therapy. According to treatment algorithms reinforced by Zimmerli et al. in 2004, surgical options described in the IDSA guidelines include debridement and implant retention (DAIR), one- or two-stage exchange, or permanent explantation or arthrodesis, depending on the clinical presentation [1,2]. Based on the Zimmerli algorithm, conservative treatment with implant retention should be reserved for patients with duration of symptoms < 3 weeks, a stable implant, and with intact or slightly damaged soft tissue [1]. Two previous retrospective studies including 60–70 patients presenting with PJI due to a wide range of pathogens, reported that the risk of treatment failure was significantly higher for those treated with a surgical strategy other than that recommended by Zimmerli et al. [3,4]. The IDSA guidelines mention a slightly different criterion as conservative treatment with implant retention should be reserved for patients with a duration of symptoms < 3 weeks or a joint age < 30 days, and a stable implant without sinus tract.

Staphylococcus aureus is one of the most frequent microorganisms involved in PJI and is particularly associated with treatment failure, presumably due to biofilm formation, virulence of the pathogen, and the ability to transform into small-colony variants (SCV) [5–7]. Based on animal experiments and in vitro data, rifampicin-based regimens are recommended for *S. aureus* PJI [1,2], but rifampicin could be associated with gastrointestinal disorders, drug-drug interactions, and the dose for patients presenting with PJI is debated (600 mg/d irrespective of the weight in Spain, 600 to 900 mg/d in the IDSA guidelines, 20 mg/kg/d in the French guidelines) [1,2,8,9]. Methicillin-resistant *S. aureus* (MRSA) is considered more difficult to treat as it is usually resistant to many clinically important non-beta-lactam drugs, such as rifampicin and fluoroquinolones. Moreover, several studies demonstrated that implant retention was a risk factor for treatment failure in PJI due to methicillin-resistant staphylococci [10,11]. To date, little data is available on methicillin-susceptible *S. aureus* (MSSA) in terms of impact of medical and surgical strategies on patient outcome.

We performed a retrospective cohort study to determine if the non-compliance with IDSA surgical guidelines in patients presenting with MSSA prosthetic joint infection had a long-term impact on outcome.

2. Methods

We performed a retrospective cohort study of all patients admitted between January 1, 2000 and December 31, 2010 to the Geneva University Hospitals, Geneva, Switzerland, and the Hospices Civils de Lyon, Lyon, France, with a diagnosis of hip or knee PJI due to MSSA. The databases of the hospitals' administrative coding systems, bacteriology laboratories, and the orthopedic and infectious diseases units were used for patient selection. The study was performed according to local ethics committee guidelines at both institutions. Data was collected from medical reports using a standardized data collection tool. To limit missing outcome data, patients, their family, or their healthcare providers were contacted by telephone and asked about the infection outcome. The burden of the patient's comorbidity was assessed using the American Society of Anesthesiologists (ASA) score. PJIs were categorized into early (≤ 3 months after implantation), delayed (> 3 to < 12 months after implantation), or late (≥ 12 months after implantation) infection. Based on the IDSA guidelines, the surgical treatment was considered inadequate if patients did not qualify for implant retention and if a complete implant removal was not performed (i.e., if implant retention, total or partial one-stage exchange, or incomplete implant or cement removal was performed instead of a complete implant removal). Medical treatment was considered inadequate if patients did not receive intravenous therapy with antistaphylococcal activity during the first 15 days of therapy (flucloxacillin, oxacillin, cloxacillin, or vancomycin) followed by a combination of antimicrobials based on rifampicin-fluoroquinolone combination for a duration of at least three months. As the French guidelines suggest 15 days of intravenous therapy followed by a combination of antistaphylococcal oral drugs that cannot contain rifampicin (e.g., fluoroquinolone-clindamycin, fluoroquinolone-fusidic acid, clindamycin-fusidic acid), we did not consider that this medical strategy was inadequate [8]. Treatment failure was defined by the need for subsequent surgery to control the infection (or to treat superinfection) or amputation or death attributed to the PJI. Univariate Cox analysis was used to assess interactions between treatment strategies and the study center. Univariate Cox analysis and

Please cite this article in press as: Bouaziz A, et al. Non-compliance with IDSA guidelines for patients presenting with methicillin-susceptible *Staphylococcus aureus* prosthetic joint infection is a risk factor for treatment failure. Med Mal Infect (2017), http://dx.doi.org/10.1016/j.medmal.2017.09.016