82e CONGRÈS

11-12 OCTOBRE 2019

SALLE 14 - LE COUVENT DES JACOBINS
20 PLACE SAINT-ANNE - 35000 RENNES

SOCIÉTÉ DE RHUMATOLOGIE DE L'OUEST

« Bouillon de Culture »

Pour une meilleure compréhension et un meilleur diagnostic de l'arthrite septique sur articulation native

CRIOGO – Centres de référence pour les infections ostéo-articulaires complexes du Grand Ouest

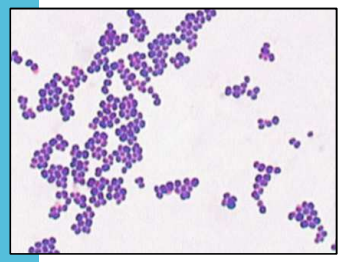
numecan – nutrition • métabolismes • cancer

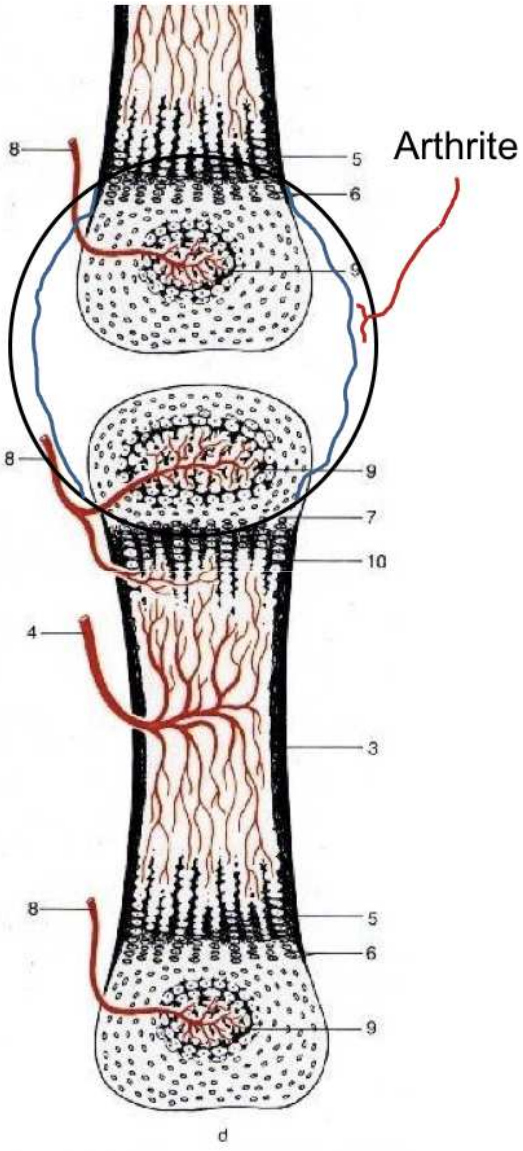
Instituts thématiques – Inserm – Institut national de la santé et de la recherche médicale

U-1241 Unité CIMIAD

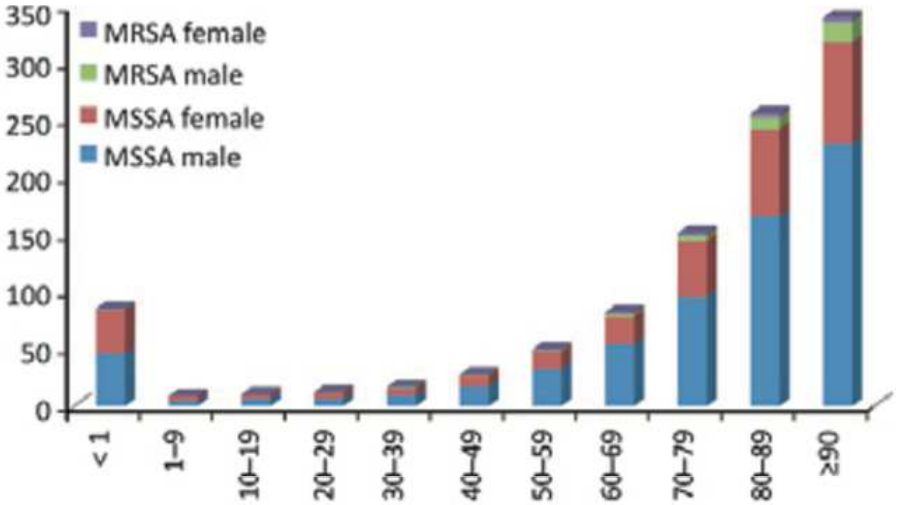
CHU Rennes – PÔLE LOCOMOTEUR – SERVICE DE RHUMATOLOGIE – Professeur Aleth Perdriger

Dr Guillaume COIFFIER
Praticien Hospitalier
Service de Rhumatologie
CHU RENNES

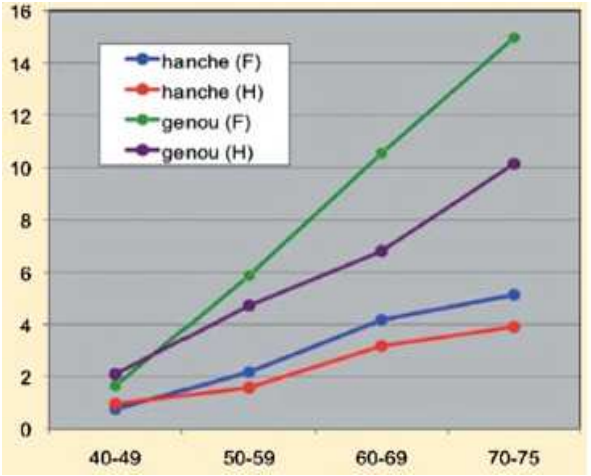




Pourquoi l'arthrite septique ?



Incidence IOA à *S.aureus*



Prévalence Arthrose

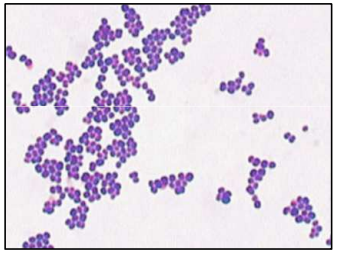
Histoire naturelle de l'arthrite septique ?

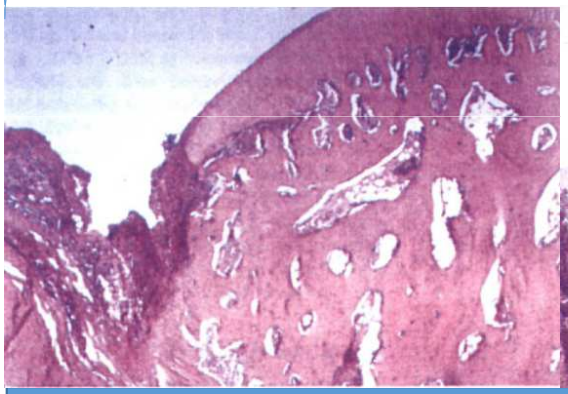
Phase pré-arthritique

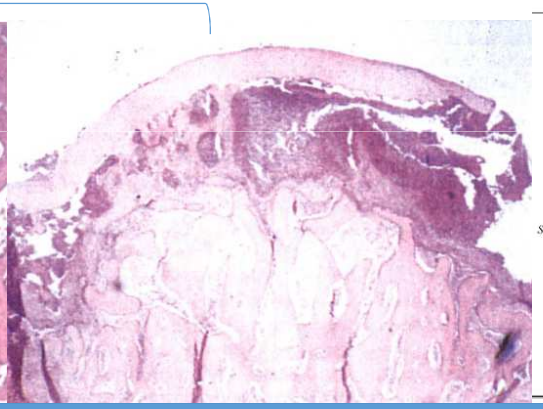
Phase congestive

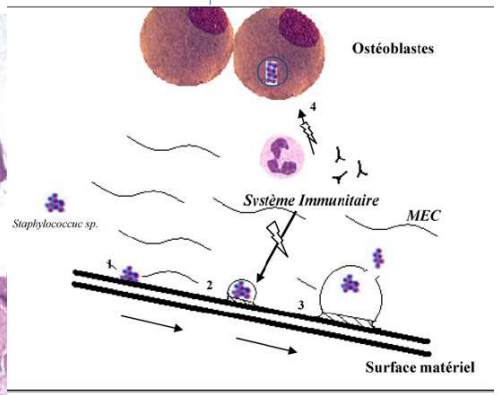
Phase synoviale

Phase de « persistance »





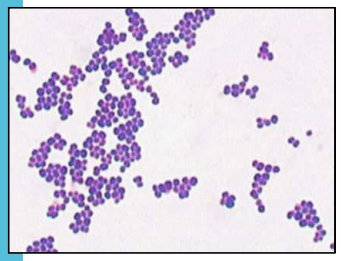




< J0 **J5** **J15** **J45**

Un polymorphisme clinique pour une même bactérie : exemple du S.aureus…
« De la bombe nucléaire à la guerre de tranchée »

Phase pré-arthritique



SOFA score	**0**	**1**	**2**	**3**	**4**
Respiratoire PaO2/FiO2	400 *Sa02 > 95% AA*	301-400 *Sa02 > 91% AA*	201-300 *Sa02 < 90% AA*	101-200	< 100
Coagulation Plaquettes	> 150	101-150	51-100	21-50	< 20
Hépatique Bilirubine	< 20	20-32	33-101	102-204	> 204
Cardiovasculaire PAM	> 70 mmHg	< 70 mmHg	Dopamine < 5	Dopamine 5-15	Dopamine > 15
Neurologique Glasgow	15	13-14	10-12	6-9	< 6
Rénale Créatinine Diurèse	< 110	110-170	171-299	300-440 < 500 mL/j	440 < 200 mL/j

SOFA 2 fébrile
= Sepsis

Phase pré-arthritique

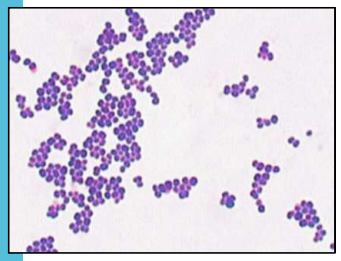
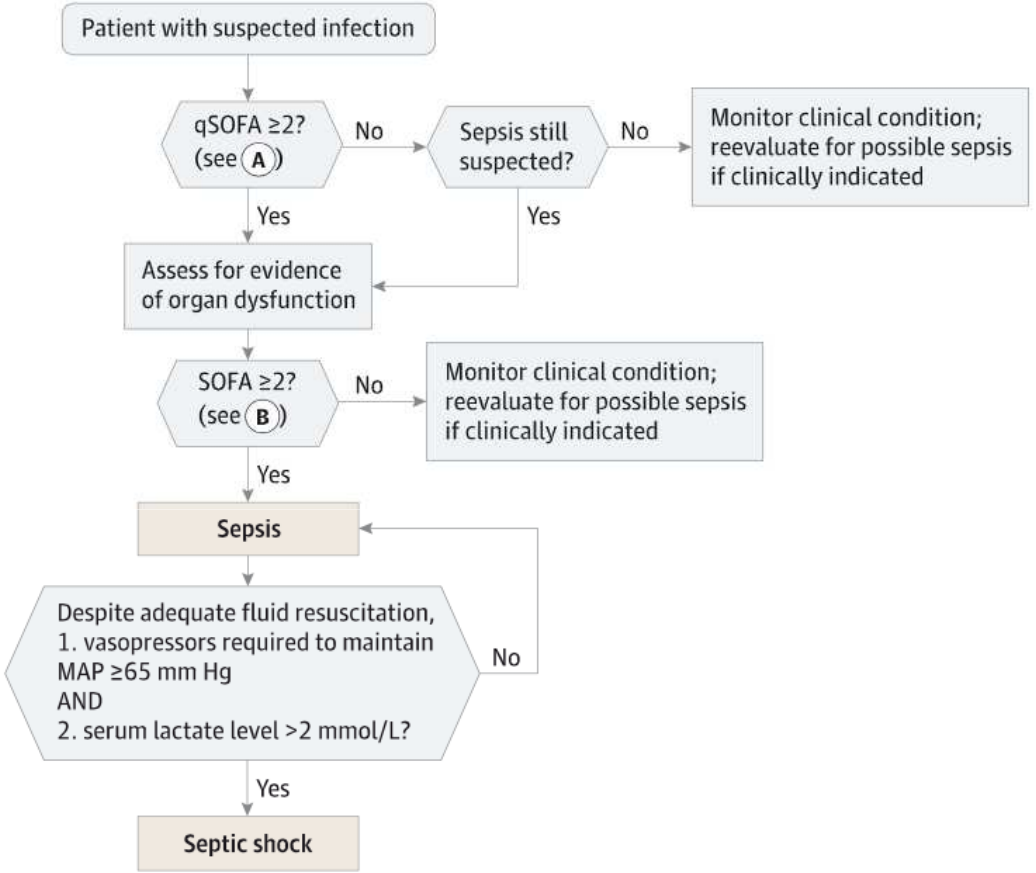


Figure. Operationalization of Clinical Criteria Identifying Patients With Sepsis and Septic Shock



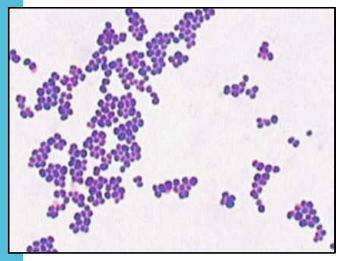
Quick-SOFA
- FR > 22/min
- Troubles de la vigilence
- PAS < 100 mmHg

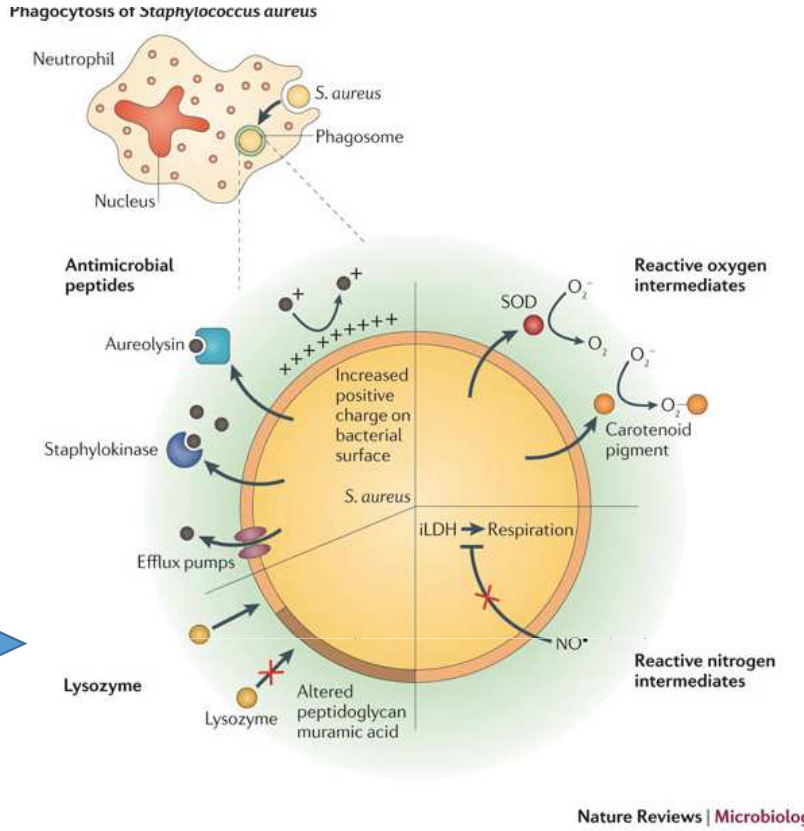
SOFA > 2
- SaO2 < 90% AA
- Glasgow < 12
- PAM < 70 mmHg malgré remplissage
- BT > 33
- Plq < 100
- Créat > 170

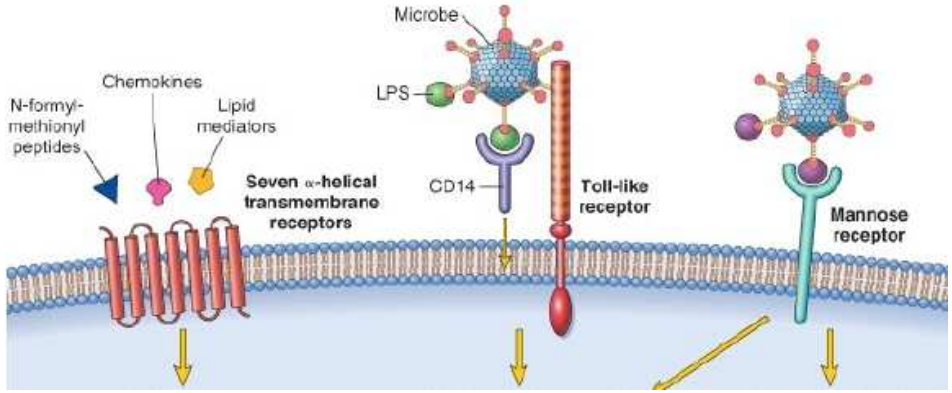
Lactates > 2 mmol/L

Singer M. JAMA 2016;315:801-10.

Phase pré-arthritique







PAMPs => TLR 2 et 6

IL-1β => Source de production de métaloprostéases (MMP) action catabolique chondrocytaire

TNF-a => Action ostéoclaste par production RANK-Ligand

IL-6 => Activation complément/Opsonisation

IL-12 / INF-γ => Activité Phagocytaire

Mécanisme de résistance aux peptides antimicrobiens de défense de l'hôte

- Expression gène *dltA-D*

Catalyse l'introduction de la D-alanine dans les acides teichoïques de la paroi cellulaire,

- Expression gène *mprF*

Modification du phosphatidylglycérol membranaire par la L-lysine,

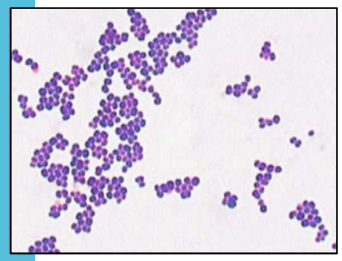
- Production de Staphylokinase ou Aureolysin

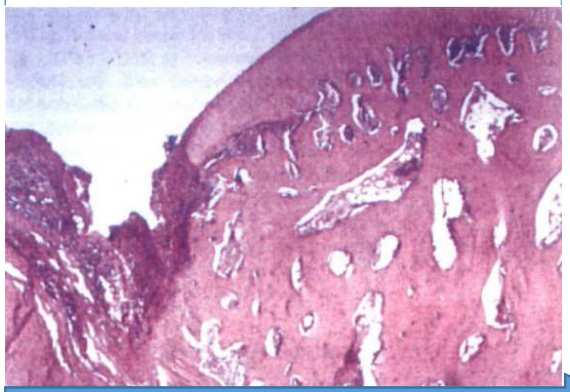
Capacité de lier les défensines humaines, neutralisant ainsi leurs propriétés bactériolytiques

Monoarthrite aigue ± fébrile

Phase congestive = Phase diagnostique !

Phase pré-arthritique | Phase congestive





< J0 | J5 | J15

Fort Inoculum bactérien Pus (acide)	**Drainage** **Antibiothérapie bactéricide sans risque de mutant résistant**
Synoviale hypervascularisée Spongieux hypervascularisé Œdème cartilage	Antibiothérapie actif en milieu acide Diffusion osseuse moyenne
Drainage B-lactamine *Glycopeptide/Lipopeptide*	

- Ponction articulaire (culture positive > 80% des cas)
- Hémoculture (positive 30-50% des cas)

Si négatifs que faire ?

Arthrite septique à culture négative (notamment antibiothérapie préalable)

ou

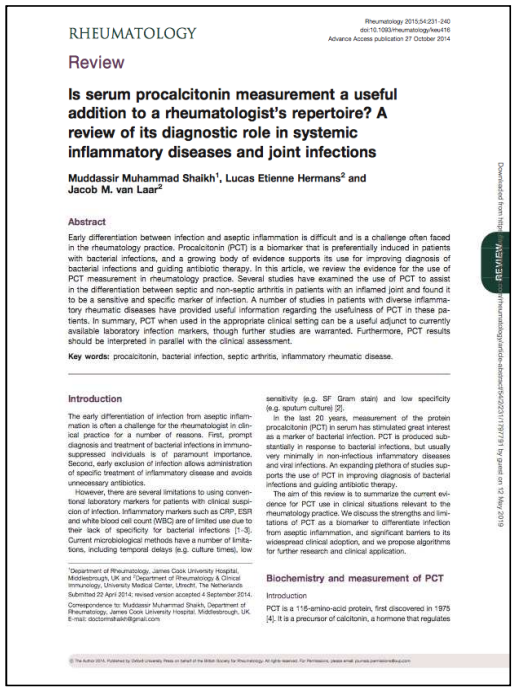
autre diagnostic d'arthrite aigue

=

Intérêt biomarqueur

Quel Biomarqueur sanguin ?

CRP… ce n'est pas un marqueur d'infection !



RHEUMATOLOGY

Rheumatology 2015;54:231–240
doi:10.1093/rheumatology/keu416
Advance Access publication 27 October 2014

Review

Is serum procalcitonin measurement a useful addition to a rheumatologist's repertoire? A review of its diagnostic role in systemic inflammatory diseases and joint infections

Muddassir Muhammad Shaikh[1], Lucas Etienne Hermans[2] and Jacob M. van Laar[2]

Abstract

Early differentiation between infection and aseptic inflammation is difficult and is a challenge often faced in the rheumatology practice. Procalcitonin (PCT) is a biomarker that is preferentially induced in patients with bacterial infections, and a growing body of evidence supports its use for improving diagnosis of bacterial infections and guiding antibiotic therapy. In this article, we review the evidence for the use of PCT measurement in rheumatology practice. Several studies have examined the use of PCT to assist in the differentiation between septic and non-septic arthritis in patients with an inflamed joint and found it to be a sensitive and specific marker of infection. A number of studies in patients with diverse inflammatory rheumatic diseases have provided useful information regarding the usefulness of PCT in these patients. In summary, PCT when used in the appropriate clinical setting can be a useful adjunct to currently available laboratory infection markers, though further studies are warranted. Furthermore, PCT results should be interpreted in parallel with the clinical assessment.

Key words: procalcitonin, bacterial infection, septic arthritis, inflammatory rheumatic disease.

Introduction

The early differentiation of infection from aseptic inflammation is often a challenge for the rheumatologist in clinical practice for a number of reasons. First, prompt diagnosis and treatment of bacterial infections in immunosuppressed individuals is of paramount importance. Second, early exclusion of infection allows administration of specific treatment of inflammatory disease and avoids unnecessary antibiotics.

However, there are several limitations to using conventional laboratory markers for patients with clinical suspicion of infection. Inflammatory markers such as CRP, ESR and white blood cell count (WBC) are of limited use due to their lack of specificity for bacterial infections [1–3]. Current microbiological methods have a number of limitations, including temporal delays (e.g. culture times), low sensitivity (e.g. SF Gram stain) and low specificity (e.g. sputum culture) [2].

In the last 20 years, measurement of the protein procalcitonin (PCT) in serum has stimulated great interest as a marker of bacterial infection. PCT is produced substantially in response to bacterial infections, but usually very minimally in non-infectious inflammatory diseases and viral infections. An expanding plethora of studies supports the use of PCT in improving diagnosis of bacterial infections and guiding antibiotic therapy.

The aim of this review is to summarize the current evidence for PCT use in clinical situations relevant to the rheumatology practice. We discuss the strengths and limitations of PCT as a biomarker to differentiate infection from aseptic inflammation, and significant barriers to its widespread clinical adoption, and we propose algorithms for further research and clinical application.

Biochemistry and measurement of PCT

Introduction

PCT is a 116-amino-acid protein, first discovered in 1975 [4]. It is a precursor of calcitonin, a hormone that regulates

[1]Department of Rheumatology, James Cook University Hospital, Middlesbrough, UK and [2]Department of Rheumatology & Clinical Immunology, University Medical Center, Utrecht, The Netherlands.

Submitted 22 April 2014; revised version accepted 4 September 2014.

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REVIEW

CRP > 50 mg/L (Se 100 %, Sp 40 %, LR - < 0,1)

Shaikh MM. Rheumatology (Oxford). 2015;54:231-40.

Cohorte SYNOLACTATE

(253 arthrites < 30 jours) (10 % arthrites septique, 45 % arthrite métaboliques, 45 % arthrite aigue associée RIC)

AUC 0.743

CRP 188.3 mg/L [88.8-288.6] vs 76.7 mg/L [29.8-132.5], $p < 0.001$

CRP > 50 mg/L Se 88%, Sp 38,7%, LR+ 1.44, LR- 0,31

Berthoud O. Joint Bone Spine. Under Review.

Quel Biomarqueur sanguin ?

Procalcitonine (PCT)… n'a de valeur que si positive !

American Journal of Emergency Medicine

Diagnostics

Serum procalcitonin levels as a diagnostic marker for septic arthritis: A meta-analysis

Jingyi Zhao [a], Shufeng Zhang [b], Lei Zhang [c], Xianhui Dong [d], Jianhui Li [e], Ying Wang [f], Yinhui Yao [f,*]

ARTICLE INFO

ABSTRACT

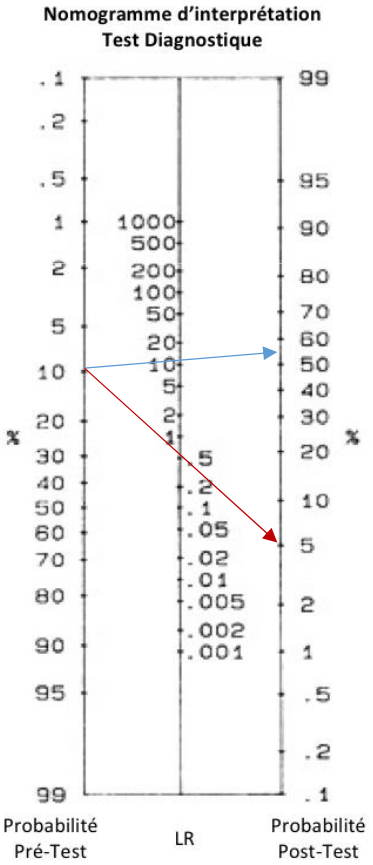
1. Introduction

10 études (9 adultes + 1 enfant)

PCT > 0.5 ng/mL

AUC	0.82	(95% CI, 0.78-0.85)
Se	0.54	(95% CI, 0.41-0.66)
Sp	0.95	(95% CI, 0.87-0.98)
LR+	10.97	(95% CI, 4.65-25.9)
LR-	0.49	(95% CI, 0.38-0.62)

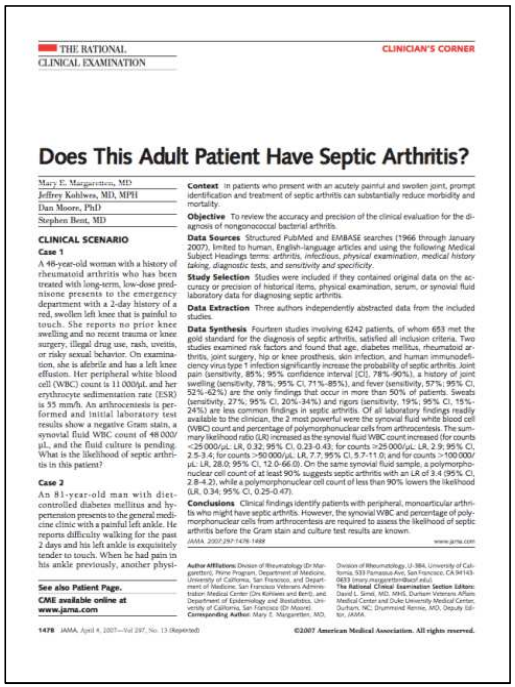
Zhao J. Am J Emerg Med. 2017;35(8):1166-71.



Quel Biomarqueur synovial ?

Cytologie synoviale…

plus le liquide est cellulaire, plus il est à risque septique !



THE RATIONAL CLINICAL EXAMINATION — CLINICIAN'S CORNER

Does This Adult Patient Have Septic Arthritis?

Mary E. Margaretten, MD; Jeffrey Kohlwes, MD, MPH; Dan Moore, PhD; Stephen Bent, MD

CLINICAL SCENARIO

Case 1

A 46-year-old woman with a history of rheumatoid arthritis who has been treated with long-term, low-dose prednisone presents to the emergency department with a 2-day history of a red, swollen left knee that is painful to touch. She reports no prior knee swelling and no recent trauma or knee surgery, illegal drug use, rash, uveitis, or risky sexual behavior. On examination, she is afebrile and has a left knee effusion. Her peripheral white blood cell (WBC) count is 11 000/μL and her erythrocyte sedimentation rate (ESR) is 55 mm/h. An arthrocentesis is performed and initial laboratory test results show a negative Gram stain, a synovial fluid WBC count of 48 000/μL, and the fluid culture is pending. What is the likelihood of septic arthritis in this patient?

Case 2

An 81-year-old man with diet-controlled diabetes mellitus and hypertension presents to the general medicine clinic with a painful left ankle. He reports difficulty walking for the past 2 days and his left ankle is exquisitely tender to touch. When he had pain in his ankle previously, another physi-

See also Patient Page.

CME available online at www.jama.com

Context In patients who present with an acutely painful and swollen joint, prompt identification and treatment of septic arthritis can substantially reduce morbidity and mortality.

Objective To review the accuracy and precision of the clinical evaluation for the diagnosis of nongonococcal bacterial arthritis.

Data Sources Structured PubMed and EMBASE searches (1966 through January 2007), limited to human, English-language articles and using the following Medical Subject Headings terms: *arthritis, infectious, physical examination, medical history taking, diagnostic tests,* and *sensitivity and specificity*.

Study Selection Studies were included if they contained original data on the accuracy or precision of historical items, physical examination, serum, or synovial fluid laboratory data for diagnosing septic arthritis.

Data Extraction Three authors independently abstracted data from the included studies.

Data Synthesis Fourteen studies involving 6242 patients, of whom 653 met the gold standard for the diagnosis of septic arthritis, satisfied all inclusion criteria. Two studies examined risk factors and found that age, diabetes mellitus, rheumatoid arthritis, joint surgery, hip or knee prosthesis, skin infection, and human immunodeficiency virus type 1 infection significantly increase the probability of septic arthritis. Joint pain (sensitivity, 85%; 95% confidence interval [CI], 78%-90%), a history of joint swelling (sensitivity, 78%; 95% CI, 71%-85%), and fever (sensitivity, 57%; 95% CI, 52%-62%) are the only findings that occur in more than 50% of patients. Sweats (sensitivity, 27%; 95% CI, 20%-34%) and rigors (sensitivity, 19%; 95% CI, 15%-24%) are less common findings in septic arthritis. Of all laboratory findings readily available to the clinician, the 2 most powerful were the synovial fluid white blood cell (WBC) count and percentage of polymorphonuclear cells from arthrocentesis. The summary likelihood ratio (LR) increased as the synovial fluid WBC count increased (for counts <25 000/μL: LR, 0.32; 95% CI, 0.23-0.43; for counts >25 000/μL: LR, 2.9; 95% CI, 2.5-3.4; for counts >50 000/μL: LR, 7.7; 95% CI, 5.7-11.0; and for counts >100 000/μL: LR, 28.0; 95% CI, 12.0-66.0). On the same synovial fluid sample, a polymorphonuclear cell count of at least 90% suggests septic arthritis with an LR of 3.4 (95% CI, 2.8-4.2), while a polymorphonuclear cell count of less than 90% lowers the likelihood (LR, 0.34; 95% CI, 0.25-0.47).

Conclusions Clinical findings identify patients with peripheral, monoarticular arthritis who might have septic arthritis. However, the synovial WBC and percentage of polymorphonuclear cells from arthrocentesis are required to assess the likelihood of septic arthritis before the Gram stain and culture test results are known.

JAMA. 2007;297:1478-1488 www.jama.com

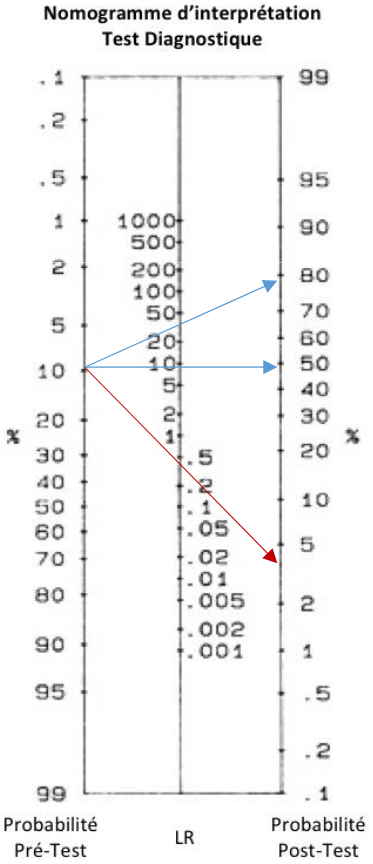
Author Affiliations: Division of Rheumatology (Dr Margaretten), Mono Program, Department of Medicine, University of California, San Francisco, and Department of Medicine, San Francisco Veterans Administration Medical Center (Drs Kohlwes and Bent); and Department of Epidemiology and Biostatistics, University of California, San Francisco (Dr Moore). **Corresponding Author:** Mary E. Margaretten, MD, Division of Rheumatology, UI-384, University of California, 533 Parnassus Ave, San Francisco, CA 94143-0833 (mary.margaretten@ucsf.edu).

Pool 5 études de cohorte entre 1979 et 1998
6242 arthrites dont 653 arthrites septiques (10,5 %)

Eléments nucléés liquide synovial

> 100000/mm^3	LR+ 28.0 (95% CI, 12.0-66)
> 50000/mm^3	LR+ 7,7 (95% CI, 5.7-11.0)
> 25000/mm^3	LR+ 2,9 (95% CI, 2,5-3,4)
	LR- 0.32 (95% CI, 0.23-0.43)

Margaretten ME. JAMA. 2007;297:1478-88.



Quel Biomarqueur synovial ?

… surtout s'il n'y a pas de cristaux !

Original article

Combining cytology and microcrystal detection in nonpurulent joint fluid benefits the diagnosis of septic arthritis

Marine Ferreyra, Guillaume Coiffier, Jean-David Albert, Claire David, Aleth Perdriger, Pascal Guggenbuhl

ARTICLE INFO

ABSTRACT

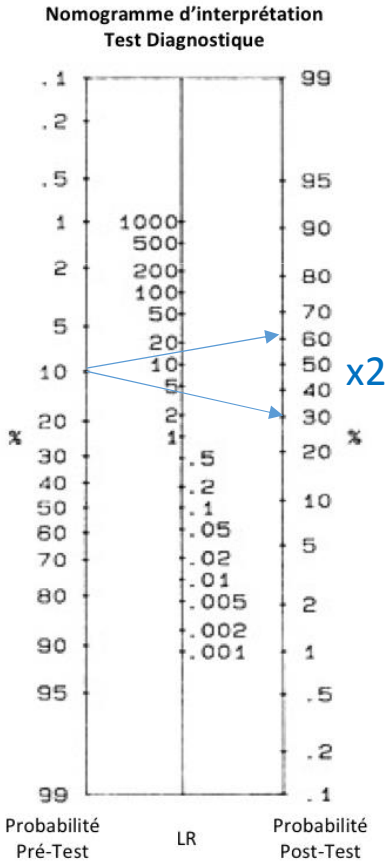
1. Introduction

Table 2
Performance of cytological markers alone or combined with microcrystal detection for diagnosing septic arthritis.

	Se (%)	Sp (%)	LR+	LR−
Leukocyte count (/mm³)				
>50,000	53.60	91.70	5.76	–
>70,000	39.30	95.60	8.93	–
<20,000	92.30	70.60	–	0.11
Percentage of neutrophils				
>90	71.40	79.70	3.52	–
>95	50.00	89.00	4.55	–
<80	96.20	56.90	–	0.07
Neutrophil count (/mm³)				
>50,000	50.00	94.40	8.93	–
<15,000	92.30	77.00	–	0.1
Combinations of criteria				
>50,000/mm³ leukocytes and no Cry	53.60	95.10	10.94	–
>90% Nph and no Cry	67.90	92.80	8.28	–
>95% Nph and no Cry	50.00	95.60	11.36	–
>50,000/mm³ Nph and no Cry	35.70	96.70	10.82	–

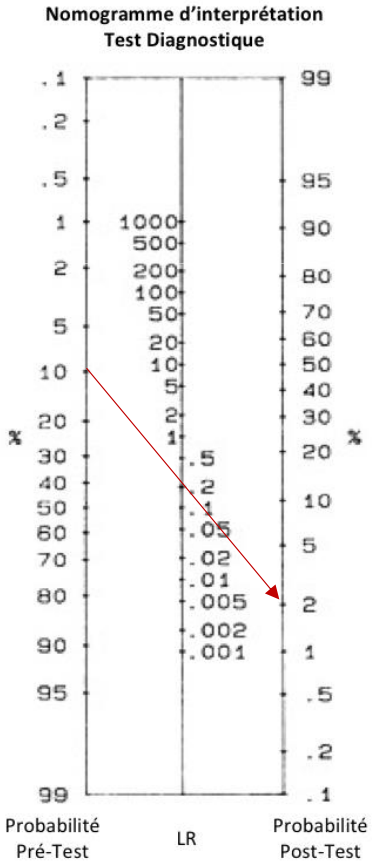
Se: sensitivity; Sp: specificity; LR+: positive likelihood ratio; LR−: negative likelihood ratio; Nph: neutrophils; Cry: microcrystals.

Ferreyra M. Joint Bone Spine. 2017;84(:65-70.



PCT synoviale ? … Match nul !

	Pas de différence significative entre arthrite septique 0,22 ng/mL (<0,008-1,31) (n=11) et arthrite métabolique 0,09 ng/mL (<0,08-0,88) (n=13). *Martinot M. Clin Exp Rheumatol. 2005;23(3):303-10.*
	Pas de différence significative entre arthrites septiques (n=8), arthrite rhumatoïde (n=18) et arthrose (n=12) *Streit G. Joint Bone Spine. 2008;75(2):238-9.*
	AUC à 0.824 taux ≥ 4,5 ng/mL, LR+ 9,0 taux < 0,5 ng/mL, LR+ 2.2 et LR- 0.21 *NB: groupe septique (n=26) n'était pas homogène (8 infections sur prothèse et 18 AS natives)* *Saeed K. Infection. 2013:41(4):845-9.*
	AUC à 0,951 taux ≥ 2 ng/mL, LR+ 17,1 taux < 0,5 ng/mL LR+ 14.5 et LR- 0.14 *Wang C. Exp Ther Med. 2014;8(4):1075-80.*



Lactate et Glucose… Pas parfait, mais intéressent !

Lactates AUC 0,864[1] et 0,901[2] Sp > 95% pour Seuil ≥ 10 mmol/L

Glucose AUC 0,701[1] et 0,960[3] Sp > 90 % pour Seuil < 1.8 mmol/L

En revanche, il n'y a pas de seuil permettant d'exclure une arthrite septique pour le lactate et le glucose.

[1]*Lenski M. Acta Orthop Belg. 2014;80:18-25.*
[2]*Lenski M. Clin Biochem. 2014;47:49-55.*
[3]*Omar M. J Bone Joint Surg Am. 2014;96:2032-7.*

Cohorte SYNOLACTATE

(253 arthrites < 30 jours) (10 % arthrites septique, 45 % arthrite métaboliques, 45 % arthrite aigue associée RIC)

Lactate AUC 0,795, Seuil ≥ 10 mmol/L LR+ 41.6

Glucose AUC 0.833, Seuil < 1,8 mmol/L LR+ 15.6

Ratio Lactate/Glucose, Seuil > 5 LR+ 27.0

Berthoud O. Joint Bone Spine. Under Review.

Quel Biomarqueur synovial ?

L. *P.Guggenbuhlus*

D. *P.Guggenbuhlus*

D-Lactate est l'énantiomère du L-Lactate.
Synthèse uniquement par procaryotes

966 Eur. J. Clin. Microbiol. Infect. Dis.

Determination of D-Lactate Concentration for Rapid Diagnosis of Bacterial Infections of Body Fluids

M.A. Marcos[1], J. Vila[1]*, J. Gratacos[2], M.A. Brancos[2], M.T. Jimenez de Anta[1]

The value of determining D-lactate concentrations in body fluids for the rapid diagnosis of bacterial infections was investigated. A total of 336 body fluid samples were analyzed: 208 ascitic fluids, 57 synovial fluids, 40 cerebrospinal fluids and 32 pleural fluids. Using a cut-off value of 0.05 mM, the overall sensitivity was 0.96 and the specificity was 0.88. Therefore, the measurement of D-lactate concentration in body fluids offers a rapid (2-hour) and useful method of differentiating between infectious and non-infectious body fluid diseases.

The purpose of the clinical microbiology laboratory is to provide the clinician with information concerning the presence or absence of a microbial agent that may be involved in an infectious disease process, as rapidly and accurately as possible.

Many microbial detection and identification methods have been investigated in an effort to provide rapid results with accuracy. However, some of these methods have not gained wide acceptance, either because of a lack of sensitivity and specificity or because the procedure is too cumbersome for routine use in a clinical laboratory. Many tests for the rapid diagnosis of bacterial body fluid infections have been introduced, some of which have been used to evaluate the measurement of L-lactate levels (1). Elevated levels of L-lactic acid in cerebrospinal (2, 3), synovial (4, 5), ascitic (6–8) and pleural (9) fluids have been associated with the presence of bacterial infections at these sites. However, L-lactic acidosis can be produced by a wide range of non-infectious causes (10).

D-lactic acid is a specific metabolite of lower forms of life (11) and, when found in normally sterile body fluids, indicates bacterial invasion or absorption from a site containing a high density of bacteria (12).

The purpose of the present study was to evaluate the usefulness of determining the concentration of D-lactate in several body fluids for the detection of bacterial infections.

Materials and Methods. A total of 336 body fluid samples submitted to the Clinical Microbiology Laboratory were obtained from 310 patients attending the Hospital Clinic of Barcelona. An aliquot of each sample was cultured in blood agar, chocolate blood agar, CDC agar and thioglycolate broth. The rest of the sample was rapidly diluted with 1 volume of 7 % perchloric acid, mixed and centrifuged at 2,500 rpm for 20 min. The supernatant was used to determine the concentration of D-lactate following the method described by Smith et al. (13), with slight modifications.

Lactate in the presence of NAD^+ and lactate dehydrogenase is oxidized to pyruvate. The NADH formed in this reaction is measured spectophotometrically at 340 nm and serves as a measure of the lactate concentration. The equilibrium of the reaction normally lies far to the left. However, by trapping pyruvate with hydrazine, the equilibrium can be shifted to the right. The reaction mixture contained 0.2 ml of previously treated sample, 0.8 ml of glycine buffer pH 9.2 (0.6 M glycine, 0.5 M hydrazine and 1.3 mg/ml of NAD) and 0.01 ml of a solution of 5 mg/ml D-lactate dehydrogenase (Boehringer Mannheim, FRG.). The mixture was incubated at 35 °C for 1 h and the absorbance at 340 nm was determined with a 8452A diode array spectrophotometer (Hewlett-Packard, USA). Individual sample blanks contained the sample and buffer glycine. Simultaneous samples with known amounts of D-lactate were also tested to produce a standard curve.

The sensitivity, specificity and positive and negative predictive values were calculated as follows: sensitivity = TP/(TP+FN); specificity = TN/ (TN+FP); positive predictive value = TP/(TP+FP) and negative predictive value = TN/(TN+FN), where TP is true positive, TN is true negative, FP is false-positive and FN is false-negative.

Results and Discussion. A total of 336 body fluid samples were analyzed: 208 samples of ascitic fluid, 57 of synovial fluid, 40 of cerebrospinal fluid and 32 of pleural fluid. The concentration of D-lactate in infected fluids was equal to or greater than 0.05 mM, whereas in the majority of noninfected fluids it was less than or equal to 0.02 mM.

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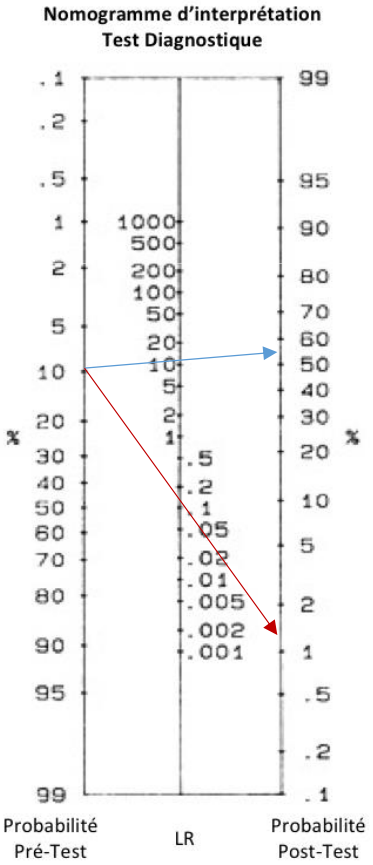
Cohorte 57 arthrites (10 arthrites septiques)

Seuil > 0,05 mmol/L,

Se = 90%, Sp = 87 %

LR+ = 11.5

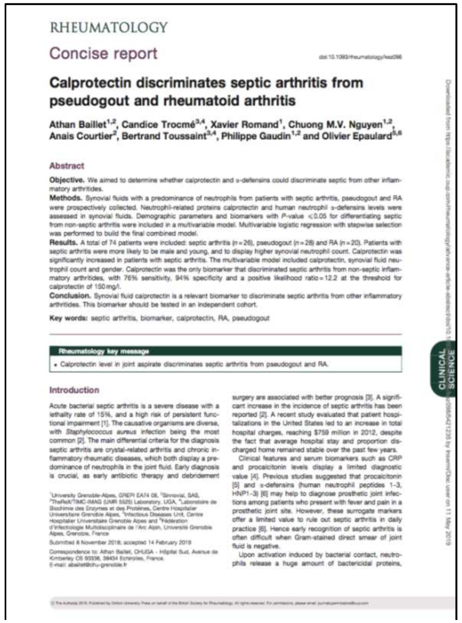
LR- = 0.14



Marcos MA. Eur J Clin Microbiol Infect Dis. 1991;10:966-9.

Letter to the Editor

Comparison of several biomarkers (MMP-2, MMP-9, the MMP-9 inhibitor TIMP-1, CTX-II, calprotectin, and COMP) in the synovial fluid and serum of patients with and without septic arthritis



RHEUMATOLOGY

Concise report

Calprotectin discriminates septic arthritis from pseudogout and rheumatoid arthritis

Athan Baillet, Candice Trocmé, Xavier Romand, Chuong M.V. Nguyen, Anaïs Courtier, Bertrand Toussaint, Philippe Gaudin and Olivier Epaulard

Quel Biomarqueur synovial ?

Calprotectine ?

AUC 0,720,

Seuil de 854 µg/mL

Se 73%, Sp 67 %

LR+2,2

Couderc M. Joint Bone Spine. 2019;86:261-2.

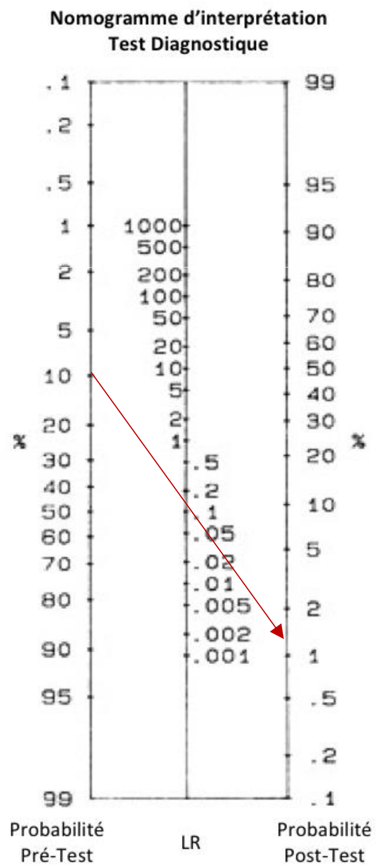
AUC 0.877,

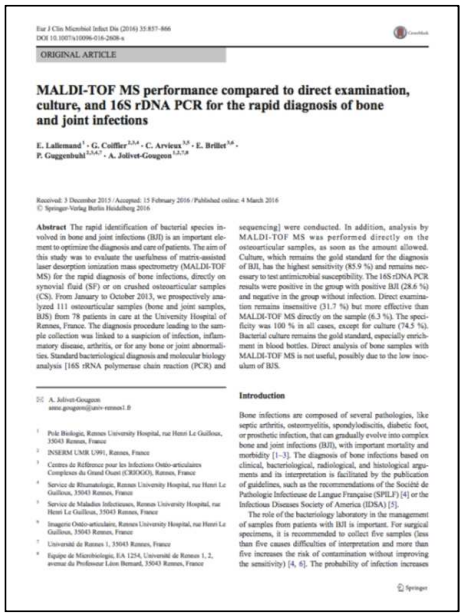
Se 76%, Sp 94%

LR+= 12.2 seuil > 150 mg/L

LR- = 0.09 seuil < 52 mg/L

Baillet A. Rheumatology. 2019;58:1644-8.





Eur J Clin Microbiol Infect Dis (2016) 35:857–866
DOI 10.1007/s10096-016-2608-x

ORIGINAL ARTICLE

MALDI-TOF MS performance compared to direct examination, culture, and 16S rDNA PCR for the rapid diagnosis of bone and joint infections

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Abstract The rapid identification of bacterial species involved in bone and joint infections (BJI) is an important element to optimize the diagnosis and cure of patients. The aim of this study was to evaluate the usefulness of matrix-assisted laser desorption ionization mass spectrometry (MALDI-TOF MS) for the rapid diagnosis of bone infections, directly on synovial fluid (SF) or on crushed osteoarticular samples (CS). From January to October 2013, we prospectively analyzed 111 osteoarticular samples (bone and joint samples, BJS) from 78 patients in care at the University Hospital of Rennes, France. The diagnosis procedure leading to the sample collection was linked to a suspicion of infection, inflammatory disease, arthritis, or for any bone or joint abnormalities. Standard bacteriological diagnosis and molecular biology analysis [16S rRNA polymerase chain reaction (PCR) and sequencing] were conducted. In addition, analysis by MALDI-TOF MS was performed directly on the osteoarticular samples, as soon as the amount allowed. Culture, which remains the gold standard for the diagnosis of BJI, has the highest sensitivity (85.9 %) and remains necessary to test antimicrobial susceptibility. The 16S rDNA PCR results were positive in the group with positive BJI (28.6 %) and negative in the group without infection. Direct examination remains insensitive (31.7 %) but more effective than MALDI-TOF MS directly on the sample (6.3 %). The specificity was 100 % in all cases, except for culture (74.5 %). Bacterial culture remains the gold standard, especially enrichment in blood bottles. Direct analysis of bone samples with MALDI-TOF MS is not useful, possibly due to the low inoculum of BJS.

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Introduction

Bone infections are composed of several pathologies, like septic arthritis, osteomyelitis, spondylodiscitis, diabetic foot, or prosthetic infection, that can gradually evolve into complex bone and joint infections (BJI), with important mortality and morbidity [1–3]. The diagnosis of bone infections based on clinical, bacteriological, radiological, and histological arguments and its interpretation is facilitated by the application of guidelines, such as the recommendations of the Société de Pathologie Infectieuse de Langue Française (SPILF) [4] or the Infectious Diseases Society of America (IDSA) [5].

The role of the bacteriology laboratory in the management of samples from patients with BJI is important. For surgical specimens, it is recommended to collect five samples (less than five causes difficulties of interpretation and more than five increases the risk of contamination without improving the sensitivity) [4, 6]. The probability of infection increases

Clinical Rheumatology
https://doi.org/10.1007/s10067-019-04492-7

ORIGINAL ARTICLE

Broad-range 16 s rDNA PCR in synovial fluid does not improve the diagnostic performance of septic arthritis in native joints in adults: cross-sectional single-center study in 95 patients

G. Coiffier[1,2] · C. David[3] · P. Gauthier[3] · H. Le Bars[3] · P. Guggenbuhl[1,2] · A. Jolivet-Gougeon[2,3] · J. D. Albert[1,2]

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Abstract
Objective To evaluate the diagnostic performance of bacterial identification by broad-range polymerase chain reaction (PCR) of ribosomal DNA (rDNA) 16 s (16S rDNA PCR) for the diagnosis of septic arthritis on native joints.
Methods Patients with acute mono or oligoarthritis who underwent synovial fluid puncture and prospective follow-up allowing definitive diagnosis (septic arthritis, crystal related disease, chronic inflammatory arthritis, undifferentiated arthritis) were recruited in this single-center study. Systematic analysis of synovial fluid included leukocytes count, search for urate and pyrophosphate crystals with polarized light microscopy, direct bacteriological examination (gram staining), bacteriological culture, and 16S rDNA PCR.
Results Ninety-five patients were included, 34 of which (35.8%) had septic arthritis. Nineteen (20.0%) patients had received probabilistic antibiotic therapy prior to joint puncture. Gram + cocci infection accounted for 79.4% of septic arthritis, of which nearly half (47.1%) was caused by *Staphylococcus aureus*. Eight (23.5%) septic arthritis patients had a 16S rDNA PCR positive in the synovial fluid with an AUC of 0.618 (95% CI, 0.493–0.742), a sensitivity of 0.24 (95% CI, 0.12–0.40), and a specificity of 1.00 (95% CI 0.94–1.00). The diagnostic performance of 16S rDNA PCR was lower than that of direct examination (AUC at 0.691, CI 95%, 0.570–0.812), blood cultures (AUC at 0.727, CI 95%, 0.610–0.844), and culture (0.925, CI 95%, 0.856–0.994) for the diagnosis of septic arthritis. There was no difference in the positivity of 16S rDNA PCR according to previous exposure to antibiotics.
Conclusions 16 s rDNA PCR in the synovial fluid does not improve the diagnostic performance of septic arthritis on native adult joints, particularly for Gram-positive cocci infections.

Keywords 16S rDNA PCR · Septic arthritis · Synovial fluid

Introduction

Septic arthritis is a diagnostic and therapeutic medical emergency due to excess mortality (2% at 1 month, approximately 10% at 1 year) and the frequency of joint functional sequelae (approximately 50%), requiring antibiotic therapy adapted to the microorganism involved [1–3]. The incidence of septic arthritis in native joints is increasing, particularly in subjects over 75 years of age [4], a population also exposed to crystal related arthritis, its main differential diagnosis [5].

Microbiological culture of joint fluid is considered the reference technique for bacterial identification. However, the sensitivity of this method varies from 67 to 87% for bacterial identification in septic arthritis cases [6–8]. The failure of conventional microbiological diagnosis techniques could be explained by the initiation of prior antibiotic therapy and the presence of slow-growing or non-cultivable bacteria on usual media [9].

Since the late 2000s, numerous publications [10–15] have reported the use of a new molecular biology technique, the broad-range polymerase chain reaction (PCR) targeting genes

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s10067-019-04492-7) contains supplementary material, which is available to authorized users.

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Quel Biomarqueur synovial ?

DNAr 16S, PCR universelle… mais souvent absente !

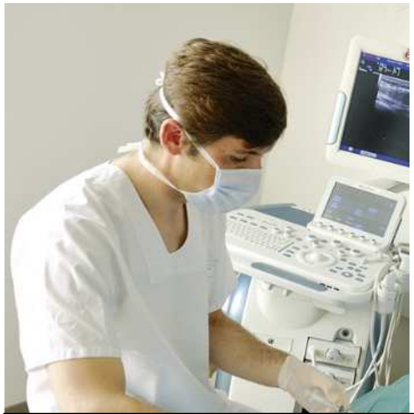
	AUC	Sensitivity	Specificity	LR+	LR −
Direct examination	0.691 (0.570–0.812)	0.38 (0.24–0.55)	1.00 (0.94–1.00)	+∞	0.62
Synovial fluid culture	0.925 (0.856–0.994)	0.88 (0.73–0.95)	0.97 (0.89–0.99)	26.9	0.12
16S rDNA PCR	0.618 (0.493–0.742)	0.24 (0.12–0.40)	1.00 (0.94–1.00)	+∞	0.77
Blood culture	0.727 (0.610–0.844)	0.47 (0.31–0.63)	0.98 (0.91–0.99)	28.7	0.54

Lallemand E. Eur J Clin Microbiol Infect Dis. 2016;35:857-66.

	Culture	Direct examination (Gram staining)	16S rDNA PCR on sample	MALDI-TOF MS on sample
Sensitivity	85.9	31.3	29.6	7.4
Specificity	74.5	100	100	100
PPV	82.1	100	100	100
NPV	79.5	51.6	67.2	60.9
AUC	0.849	0.593	0.648	0.532
Number of samples	111	111	66	66

Coiffier G. Clin Rheumatol. 2019;38:1985-92.

Quel Biomarqueur synovial ?



Joint Bone Spine 83 (2016) 318–323

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Original article

A novel method for a fast diagnosis of septic arthritis using mid infrared and deported spectroscopy

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ABSTRACT

Objective: To assess the ability of mid infrared deported spectroscopy to discriminate synovial fluids samples of septic arthritis patients from other causes of joint effusion.
Methods: Synovial fluids obtained from patients with clinically suspected arthritis were collected, analysed and classified according to standard diagnostic procedures as septic or non-septic. A spectroscopic analysis on synovial fluid samples was then performed using a coiled optical fiber made with chalcogenide glass. After a factorial analysis of the normalized spectra and the computation of a Fisher test used to select the most relevant components, a logistic regression model was fitted, allowing to attribute a score between 0 – non-septic –, and 1 – septic.
Results: In a first phase, we analysed the synovial fluids from 122 different synovial fluids including 6 septic arthritis among arthritis of various origins. Septic synovial fluids were identified with a sensitivity of 95.8% and a specificity of 93.9% and an AUROC of 0.977. The analysis of an independent set of samples (n = 42, including two septic arthritis) gave similar values.
Conclusions: Our data strongly supports the interest of mid infrared deported spectroscopy, which could be used potentially at point of care, for a rapid and easy diagnosis of septic arthritis. Now, the precision of the diagnosis must be evaluated through a multicentric study on a larger panel of patients.

1. Introduction

Septic arthritis is frequently suspected in front of a patient exhibiting an acute arthritis, especially when associated with fever. The rapid development of definitive functional consequences of the septic arthritis, related to the joint destruction, together with the risk of systemic bacterial dissemination explain that septic arthritis is a therapeutic emergency. The only way to avoid functional consequences is to treat early by using as soon as possible high dosage parenteral antibiotherapy and joint draining by iterative arthrocentesis or arthroscopy. Delayed diagnosis and treatment are associated with cartilage damage, and poor functional prognosis [1–3].

Septic arthritis diagnosis relies on microscopic and bacteriological analysis of synovial fluid obtained by arthrocentesis. Direct microscopic examination, which can be made within a few hours, looks for sodium urate (gout) and calcium pyrophosphate crystals (chondrocalcinosis) and for bacteria after Gram staining. However, Gram staining has shown low sensitivity and low negative predictive value for the diagnosis of septic arthritis, because of low bacterial concentration in synovial fluid at the beginning of infection [3]. Definitive results of the bacteriological cultures may be

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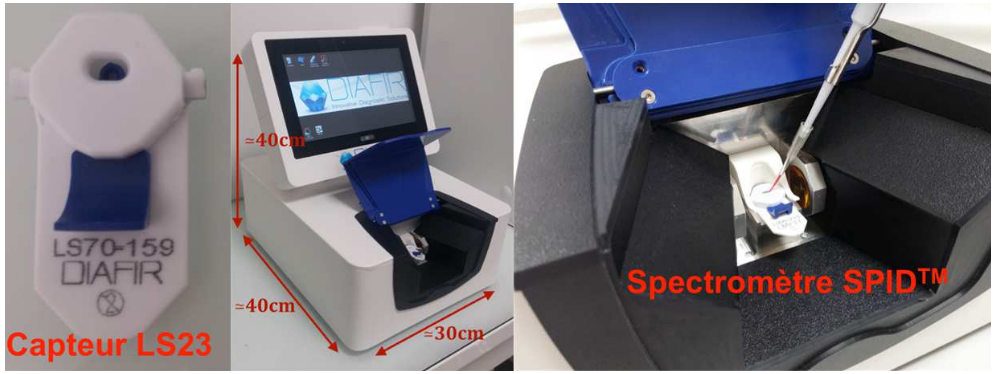
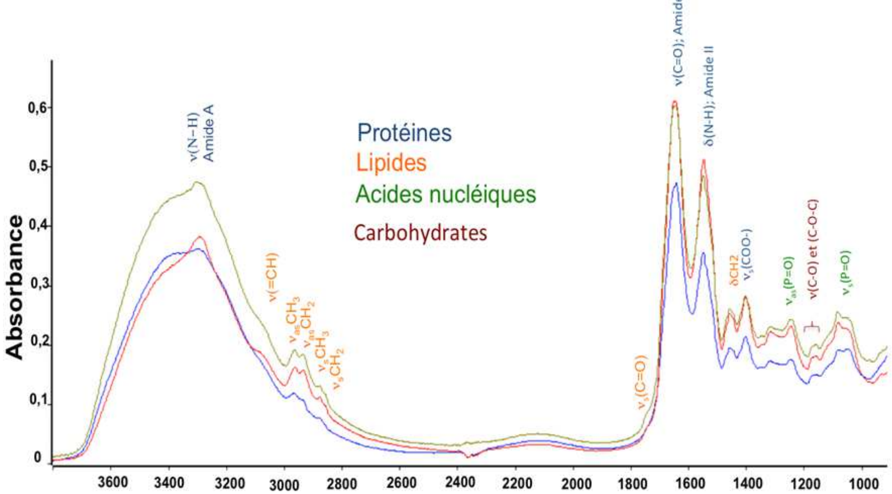
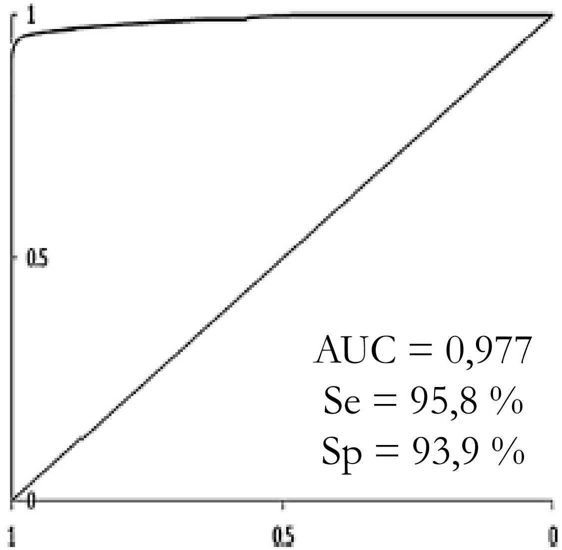
http://dx.doi.org/10.1016/j.jbspin.2015.05.009





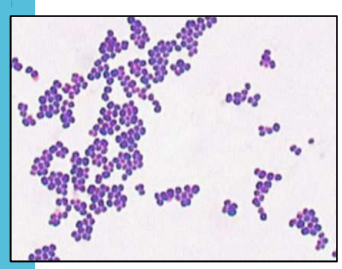


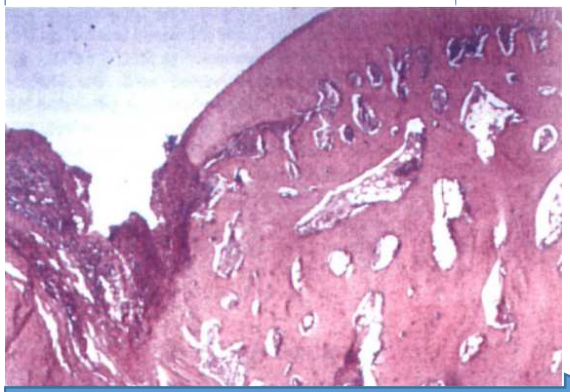
AUC = 0,977
Se = 95,8 %
Sp = 93,9 %

Albert JD. Joint Bone Spine. 2016;83:318-23.

Drainage au cours de l'arthrite septique ?

Phase pré-arthritique Phase congestive

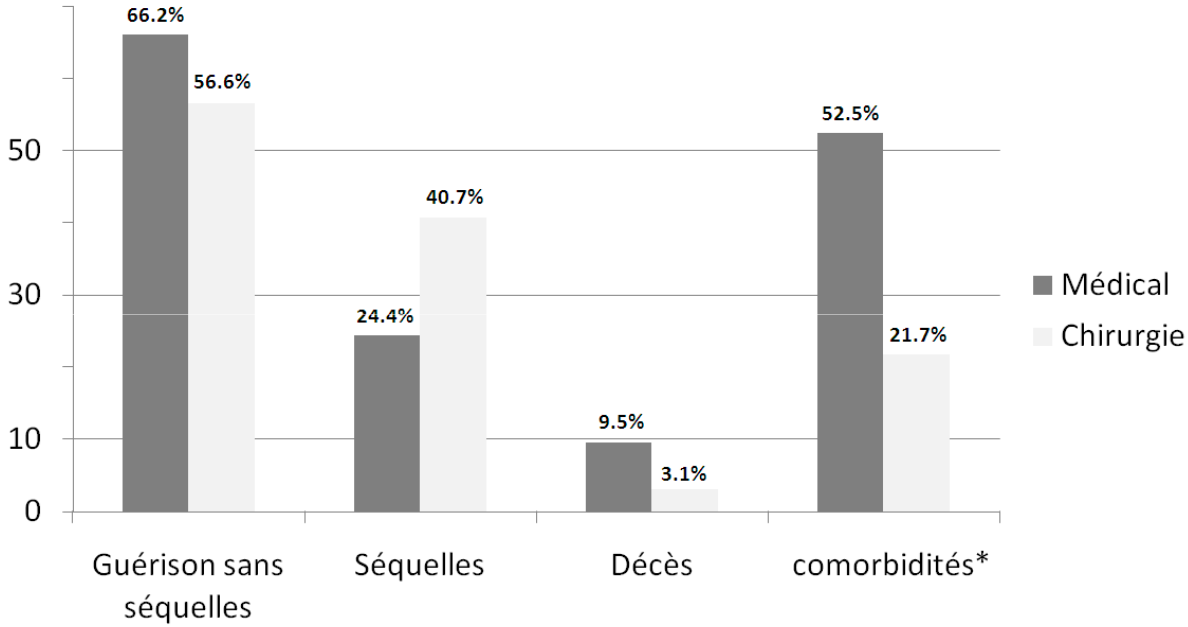




J5 J15

Fort Inoculum bactérien Pus (acide)	**Drainage** **Antibiothérapie bactéricide sans risque de mutant résistant**
Synoviale hypervascularisée Spongieux hypervascularisé Œdème cartilage	Antibiothérapie actif en milieu acide Diffusion osseuse moyenne
Drainage B-lactamine *Glycopeptide/Lipopeptide*	

Chirurgie ou Ponction itérative ?



** Comorbidités = PR (15.8%), Diabète (9.5%), Immunosuppresseur (7.1%), Alcool/Cirrhose (6.25%), IRC (3%)*

Broy SB. Clin Rheum Dis 1986;12:501-22.

Chirurgie au cours de l'arthrite septique : moins de sequelles ?

Journal of Infection 77 (2018) 47–53

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Native septic arthritis is not an immediate surgical emergency☆

Nicolas Lauper[a,1], Marie Davat[a,1], Ergys Gjika[a,c], Camillo Müller[a,c], Wilson Belaieff[a], Didier Pittet[b,d], Benjamin A. Lipsky[b,e], Didier Hannouche[a], Ilker Uçkay[a,b,d,*]

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SUMMARY

Summary: Acute native joint septic arthritis is generally considered a surgical emergency, requiring drainage within hours, including during night, weekend or holiday shifts. However, there are few data supporting the need for the disruption caused by this degree of urgency.

Methods: We performed a retrospective review of all adult patients seen in our medical center from 1997–2015 with culture-proven septic arthritis and noted the epidemiology of sequelae, and their possible associations with a delay in surgical drainage.

Results: Of 204 septic arthritis episodes, 46 (23%) involved interdigital hand and foot joints. Large joints involved included the knee (n = 67), shoulder (48), hip (22), ankle (8), acromio-clavicular (5), elbow (4), wrist (3), and sterno-clavicular (1) regions. All patients underwent surgical drainage of the joint and received targeted systemic antibiotic therapy. Sequelae of varying severity occurred in 83 patients (41%): recurrences (n = 15); secondary arthrosis (30); persistent pain (9); Girdlestone procedure (9); arthrodesis (9); amputation (8); stiffness (8); and Chronic Regional Pain Syndrome (2). By multivariate Cox regression analysis factors did not predict sequelae included: age; treatment with systemic corticosteroids; pre-existing clinical or radiological arthropathy; total duration of antibiotic therapy; type of joint; and, number of surgical interventions. Similarly, there was no association of sequelae with the number of days of pre-hospitalization joint symptoms (hazard ratio 1.0, 95% confidence interval 0.99–1.01) or hours spent in the emergency department (HR 1.0, 0.0–1.2). Notably, patients who had joint lavage within 6 h of presentation had similar functional outcomes as those with lavage done at 6–12 h, 12–24 h, or > 24 h after presentation.

Conclusions: Our data suggest that for native septic arthritis, in the absence of clinical sepsis immediate joint drainage does not appear to reduce the risk of sequelae compared with delayed drainage.

Introduction

Acute native joint septic arthritis is typically considered a medical emergency, requiring urgent surgical intervention to help reduce cartilage damage and to preserve good long-term joint function.[1–11] Both surgeons and physicians are taught that they should ensure joint drainage is performed within hours after hospital admission, even in the absence of clinical evidence of sepsis or during night, weekend or holiday shifts. Emergent surgical treatment of patients with septic arthritis, independent of the time elapsed between the onset of symptoms and admission, may actually be detrimental, especially for elderly bedridden patients. Furthermore, mobilizing the specialists to properly drain a septic joint can be time-consuming and costly. Although this recommendation has been widely and repeatedly made in the surgical literature, there are few data supporting the need for urgent surgical lavage of a septic joint.[2,3]

In a previously published study of antibiotic treatment of septic arthritis,[5] we found that the incidence of long-term adverse sequelae of this infection was 26%. By regression analysis we found no

☆ The material presented in the paper has not been previously published, nor has it been submitted elsewhere for publication. The data presented are the work of all authors listed. None of the authors have any conflict of interest or financial interest in connection with this work. All authors have seen, approved, and contributed to the manuscript. There was no funding for this study.

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[1] Equal contribution as first authors.

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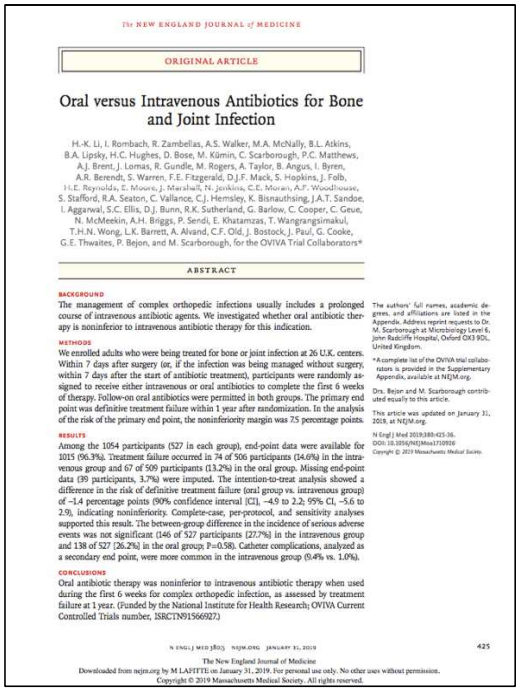
Factors associated with sequelae after native joint septic arthritis (Cox regression analysis).

n = 204	Univariate analysis Hazard ratio (95% confidence interval)	Multivariate analysis Hazard ratio (95% confidence interval)
Pre-hospital delay until-surgery	1.0 (1.0–1.0)	1.0 (1.0–1.0)
- duration > 7 days compared to ≤ 7 days	1.0 (0.6–1.5)	-
Delay admission to surgery	1.0 (0.9–1.1)	-
> 3 days compared to ≤ 3 days	1.1 (0.7–1.8)	-
Delay admission to surgery	1.0 (0.9–1.1)	1.0 (0.9–1.2)
- ≤ 6 h	-	0.9 (0.4–1.8)
- > 6 h to ≤ 12 h	-	0.9 (0.4–2.1)
- > 12 h to ≤ 24 h	-	0.8 (0.5–1.4)

Lauper N. J Infection 2018;77:47-53.

Faut-il toujours initier une antibiothérapie IV ?



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Oral versus Intravenous Antibiotics for Bone and Joint Infection

H.-K. Li, I. Rombach, R. Zambellas, A.S. Walker, M.A. McNally, B.L. Atkins, B.A. Lipsky, H.C. Hughes, D. Bose, M. Kümin, C. Scarborough, P.C. Matthews, A.J. Brent, J. Lomas, R. Gundle, M. Rogers, A. Taylor, B. Angus, I. Byren, A.R. Berendt, S. Warren, F.E. Fitzgerald, D.J.F. Mack, S. Hopkins, J. Folb, H.E. Reynolds, E. Moore, J. Marshall, N. Jenkins, C.E. Moran, A.T. Woodhouse, S. Stafford, R.A. Seaton, C. Vallance, C.J. Hemsley, K. Bisnauthsing, J.A.T. Sandoe, I. Aggarwal, S.C. Ellis, D.J. Bunn, R.K. Sutherland, G. Barlow, C. Cooper, C. Geue, N. McMeekin, A.H. Briggs, P. Sendi, E. Khatamzas, T. Wangrangsimakul, T.H.N. Wong, L.K. Barrett, A. Alvand, C.F. Old, J. Bostock, J. Paul, G. Cooke, G.E. Thwaites, P. Bejon, and M. Scarborough, for the OVIVA Trial Collaborators*

ABSTRACT

BACKGROUND
The management of complex orthopedic infections usually includes a prolonged course of intravenous antibiotic agents. We investigated whether oral antibiotic therapy is noninferior to intravenous antibiotic therapy for this indication.

METHODS
We enrolled adults who were being treated for bone or joint infection at 26 U.K. centers. Within 7 days after surgery (or, if the infection was being managed without surgery, within 7 days after the start of antibiotic treatment), participants were randomly assigned to receive either intravenous or oral antibiotics to complete the first 6 weeks of therapy. Follow-on oral antibiotics were permitted in both groups. The primary end point was definitive treatment failure within 1 year after randomization. In the analysis of the risk of the primary end point, the noninferiority margin was 7.5 percentage points.

RESULTS
Among the 1054 participants (527 in each group), end-point data were available for 1015 (96.3%). Treatment failure occurred in 74 of 506 participants (14.6%) in the intravenous group and 67 of 509 participants (13.2%) in the oral group. Missing end-point data (39 participants, 3.7%) were imputed. The intention-to-treat analysis showed a difference in the risk of definitive treatment failure (oral group vs. intravenous group) of −1.4 percentage points (90% confidence interval [CI], −4.9 to 2.2; 95% CI, −5.6 to 2.9), indicating noninferiority. Complete-case, per-protocol, and sensitivity analyses supported this result. The between-group difference in the incidence of serious adverse events was not significant (146 of 527 participants [27.7%] in the intravenous group and 138 of 527 [26.2%] in the oral group; P=0.58). Catheter complications, analyzed as a secondary end point, were more common in the intravenous group (9.4% vs. 1.0%).

CONCLUSIONS
Oral antibiotic therapy was noninferior to intravenous antibiotic therapy when used during the first 6 weeks for complex orthopedic infection, as assessed by treatment failure at 1 year. (Funded by the National Institute for Health Research; OVIVA Current Controlled Trials number, ISRCTN91566927.)

The authors' full names, academic degrees, and affiliations are listed in the Appendix. Address reprint requests to Dr. M. Scarborough at Microbiology Level 6, John Radcliffe Hospital, Oxford OX3 9DL, United Kingdom.

*A complete list of the OVIVA trial collaborators is provided in the Supplementary Appendix, available at NEJM.org.

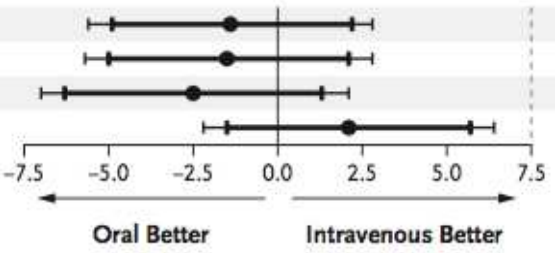
Drs. Bejon and M. Scarborough contributed equally to this article.

This article was updated on January 31, 2019, at NEJM.org.

N Engl J Med 2019;380:425-36.
DOI: 10.1056/NEJMoa1710926

✗ Non

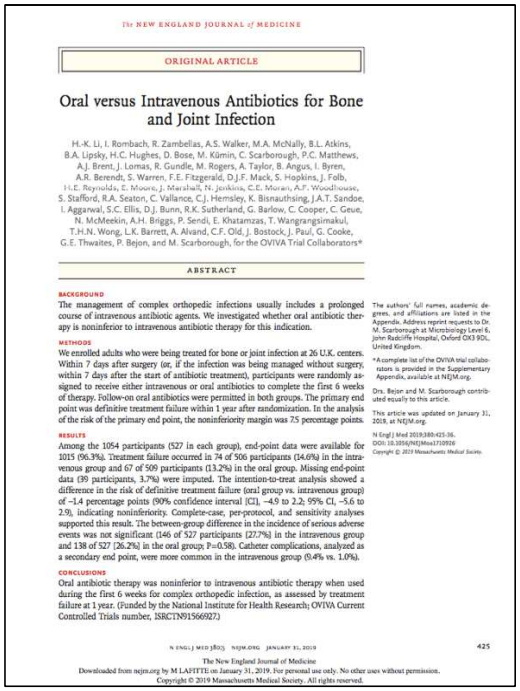
Subgroup	Oral Group	Intravenous Group	Risk Difference (90% CI; 95% CI)
	patients with treatment failure/ total no. of participants		
Intention-to-treat population	70.0/527	77.3/527	−1.4 (−4.9 to 2.2; −5.6 to 2.9)
Modified intention-to-treat population	67/509	74/506	−1.5 (−5.0 to 2.1; −5.7 to 2.8)
Per-protocol population	61/466	69/443	−2.5 (−6.3 to 1.3; −7.0 to 2.1)
Worst-case sensitivity analysis	85/527	74/527	2.1 (−1.5 to 5.7; −2.2 to 6.4)



Li HK. N Engl J Med. 2019;380:425-36.

Faut-il toujours initier une antibiothérapie IV ?

Sauf que…



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

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The authors' full names, academic degrees, and affiliations are listed in the Appendix. Address reprint requests to Dr. M. Scarborough at Microbiology Level 6, John Radcliffe Hospital, Oxford OX3 9DU, United Kingdom.

*A complete list of the OVIVA trial collaborators is provided in the Supplementary Appendix, available at NEJM.org.

Drs. Bejon and M. Scarborough contributed equally to this article.

This article was updated on January 31, 2019, at NEJM.org.

N Engl J Med 2019;380:425-36.
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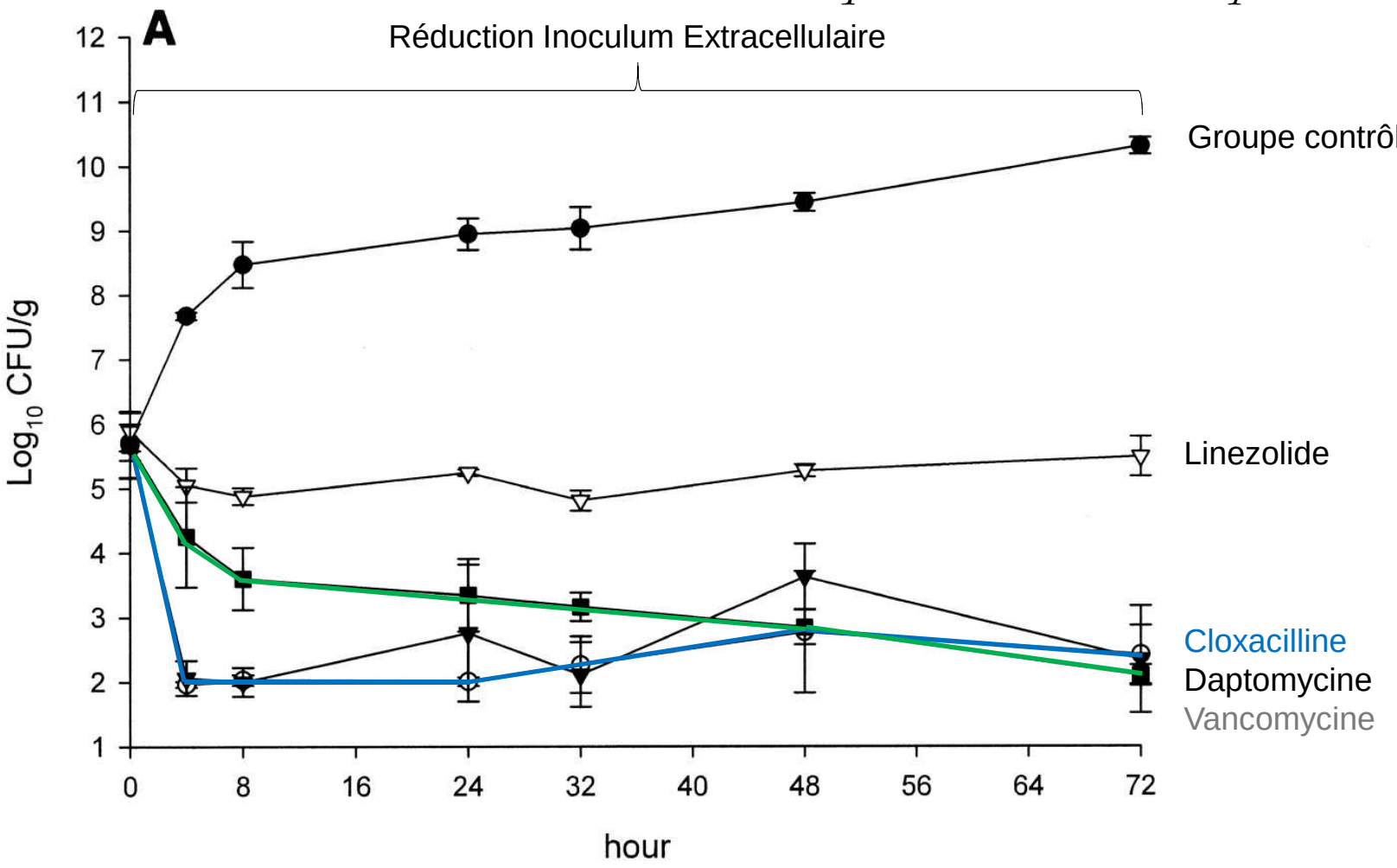
Critères d'exclusion

1) Bactériémie à *Staphylococcus aureus*
2) Endocardite bactérienne,
3) Toute autre infection concomitante nécessitant une antibiothérapie intraveineuse prolongée (ex. infection médiastinale ou infection du SNC)
4) Une infection pour laquelle il n'y avait pas de choix d'antibiotiques (par exemple, lorsque les organismes étaient seulement sensibles aux antibiotiques IV).
5) Choc septique ou sepsis sévère
6) Preuves cliniques, histologiques ou microbiologiques de mycobactéries, champignons, étiologie parasitaire ou virale de l'infection

Li HK. N Engl J Med. 2019;380:425-36.

Pourquoi une antibiothérapie bactéricide ?

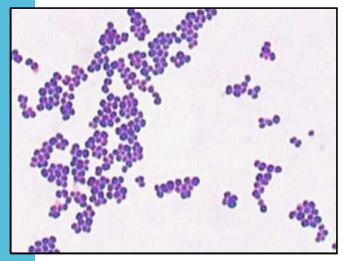


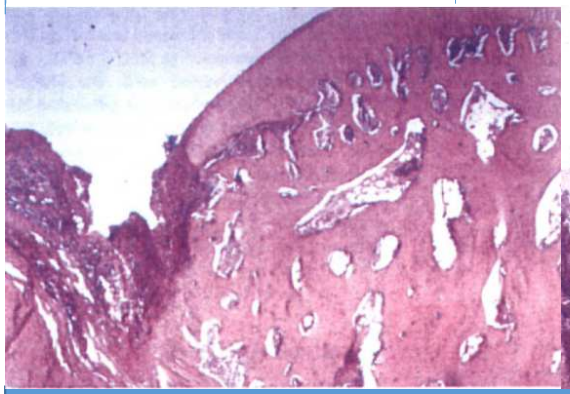
LaPlante KL. Antimicrob Agents Chemother. 2004;48(12):4665-72.

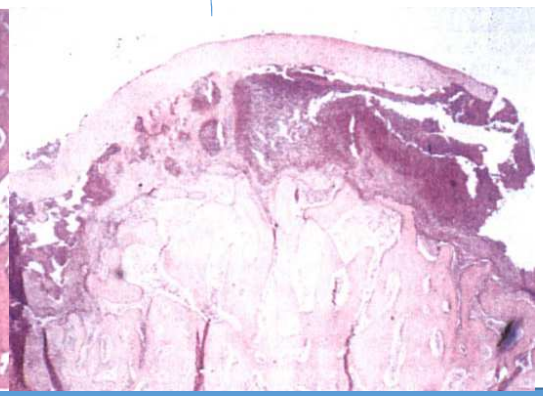
Phase pré-arthritique

Phase congestive

Phase synoviale







< J0

J5

J15

J45

Fort Inoculum bactérien Pus (acide)	**Drainage** **Antibiothérapie bactéricide sans risque de mutant résistant**	Diminution inoculum bactérien	**Antibiothérapie à bonne diffusion tissulaire et osseuse**
Synoviale hypervascularisée Spongieux hypervascularisé Œdème cartilage	Antibiothérapie actif en milieu acide Diffusion osseuse moyenne	Synovite proliférative Moindre vascularisation Dissection sous-chondrale Chondromalacie Erosion osseuse Biofilm dès J15	
Drainage B-lactamine *Glycopeptide/Lipopeptide*		Synovectomie Relai vers Rifampicine et/ou FQ	

Evolution de la synovite infectieuse ?

Joint Bone Spine 84 (2017) 599–604

Available online at ScienceDirect www.sciencedirect.com

Elsevier Masson France EM|consulte www.em-consulte.com/en

Original article

Ultrasound abnormalities in septic arthritis are associated with functional outcomes

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Keywords:
Septic arthritis
Ultrasonography
Synovitis
Doppler signal
Functional outcome

ABSTRACT

Objectives: To describe the ultrasound abnormalities seen in septic arthritis and to assess their associations with clinical, biological, and radiological outcomes.

Methods: We prospectively included 34 patients with septic arthritis of a native joint (knee, n = 19; shoulder, n = 6; hip, n = 4; ankle, n = 3; or wrist, n = 2). Ultrasonography was performed to record synovial-membrane thickness and vascularity, joint effusion, and abnormalities of adjacent soft tissues, at baseline then 4 days, 2 weeks, and 3 months later. Motion-range limitation of the affected joint was evaluated after 3 months. Radiography was performed at inclusion and after 3 months.

Results: Mean age was 63.7 ± 17.8 years. After 3 months, 20 (58.8%) patients had motion-range limitation with worsening of the total radiological score ($P < 0.001$). The proportion of patients with synovitis was very high initially (96.4% at baseline, 96.3% after 4 days, and 100% after 2 weeks) then diminished to 77.8% after 3 months ($P = 0.051$). Synovial-membrane thickness was significantly higher after 4 days and 2 weeks compared to baseline (median, +17.3% and +20%, respectively; $P = 0.015$) and was significantly lower after 3 months compared to the earlier time points (median, −31.5%, $P = 0.015$). A positive Doppler signal was common at baseline (n = 18, 64.3%) then significantly less so after 3 months (n = 7, 25.9%; $P = 0.04$). An unchanged or higher Doppler grade after 2 weeks compared to baseline was associated with motion-range limitation at last follow-up ($P = 0.033$).

Conclusion: We report the first study on ultrasound evidence of synovitis, joint effusion, and soft tissue alterations at baseline and over time in patients with septic arthritis. Persistent synovitis and joint effusion 3 months after starting antibiotic therapy was not associated with treatment failure. However, Doppler signal changes over the first 2 weeks were associated with the 3-month functional outcome.

1. Introduction

Septic arthritis is a severe life- and function-threatening condition with a 1-year mortality rate of up to 10% and residual functional impairments in 30 to 50% of cases [1–3]. The incidence of septic arthritis is low, with only 4–10 new diagnoses per 10,000 population in Europe. Imaging studies contribute crucially to the optimal management of septic arthritis, thereby diminishing the risk of permanent functional loss. At present, magnetic resonance imaging (MRI) is the most informative method. Thus, MRI assesses the severity of the synovitis and can detect a joint effusion, bone and/or cartilage destruction, an abscess, and/or bone edema. MRI had 75% specificity and nearly 100% sensitivity for diagnosing concomitant abscess formation, cellulitis, or myositis [4,5]. No sign is diagnostic, however, and even the joint effusion may be lacking, particularly in small joints [6]. The signs most closely associated with treatment efficacy in several studies were the size of the joint effusion and the presence of an abscess. Synovial-membrane thickening, cellulitis, and bone edema may persist even after eradication of the infection [7]. Disadvantages of MRI are high cost and limited availability on an emergency basis in some settings.

Ultrasonography of the bone and joints has been developing at a fast pace in recent years. Rheumatologists now receive training in ultrasonography, which has become an integral part of their diagnostic armamentarium. Ultrasonography is currently used in the management of septic arthritis to confirm the presence of a joint

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Table 3
Changes in the ultrasound appearance of the synovial membrane over the 3-month follow-up.

	Baseline	Day 4	Week 2	Month 3
Assessable ultrasound scans	28/34	27/34	31/34	27/34
Synovitis	27 (96.4)	26 (96.3)	31 (100)	21 (77.8)
Intraindividual change in thickness		17.3(−1 to +228)*	20(−20 to +200)*	−31.5(−83.7 to +27.5)*
Number of assessable cases		*n* = 22	*n* = 23	*n* = 22
Doppler	18 (64.3)	18 (66.7)	19 (61.3)	7 (25.9)**
Grade 1	6	6	10	3
Grade 2	11	8	7	3
Grade 3	1	4	2	1
Intraindividual decrease in Doppler grade		6 (26)	9 (31)	14 (56)
Number of assessable cases		*n* = 23	*n* = 29	*n* = 25

The data are *n* (%) for categorical data and median (interquartile range) for the intraindividual change in synovial membrane thickness in the assessable patients.
* $P < 0.02$.
** $P < 0.05$.

Table 4
Changes in the other ultrasound parameters over the 3-month follow-up.

	Baseline	Day 4	Week 2	Month 3
Number of assessable ultrasound scans	28/34	27/34	31/34	27/34
Joint effusion	26 (92.8)	24 (88.9)	25 (80.6)	15 (55.6) **
Joint cavity loculation	6 (21.4)	6 (22.2)	6 (19.4)	0
Erosions	5 (17.9)	4 (14.8)	10 (32.3)	14 (51.8)
Cellulitis	0	1 (3.7)	0	0
Muscle abscess	3 (10.7)	2 (7.4)	5 (16)	1 (3.7)

The data for categorical variables are *n* (%).
** $P < 0.05$.

Gaigneux E. Joint Bone Spine. 2017;84:599-604.

Skeletal Radiology (2019) 48:259–266
https://doi.org/10.1007/s00256-018-3023-4

SCIENTIFIC ARTICLE

MRI findings for unilateral sternoclavicular arthritis: differentiation between infectious arthritis and spondyloarthritis

Byeong Seong Kang[1] · Hyun Seok Shim[1] · Woon Jung Kwon[1] · Soyeoun Lim[1] · Gyeong Min Park[1] · Tae Young Lee[1] · Minseo Bang[1]

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Abstract

Objectives To analyze and identify magnetic resonance imaging (MRI) and clinical findings for the differentiation between infectious arthritis and spondyloarthritis in patients with unilateral sternoclavicular arthritis.

Materials and methods We retrospectively collected and evaluated the magnetic resonance (MR) images of 21 patients diagnosed with unilateral sternoclavicular arthritis, including 12 with infection and nine with spondyloarthritis, between 2004 and 2017. Capsular distension, extracapsular fluid collection, periarticular muscle edema, the prevalence and distribution of bone marrow edema, and the prevalence and size of bone erosions were assessed on the MR images. Clinical data were also reviewed.

Results Capsular distension was more prominent in patients with infectious arthritis than those with spondyloarthritis ($p = 0.002$); extracapsular fluid collection and periarticular muscle edema were also more common in infectious arthritis than spondyloarthritis ($p < 0.001$, respectively); moreover, bone erosions were larger in infectious arthritis than spondyloarthritis ($p = 0.023$). Other findings significantly associated with infectious arthritis included advanced age ($p = 0.007$), an elevated C-reactive protein (CRP) level ($p = 0.001$), and erythrocyte sedimentation rate (ESR) ($p < 0.001$). The prevalence and distribution of bone marrow edema and the prevalence of bone erosions on MRI, the white blood cell count, and sex showed no significant differences between the two groups.

Conclusions Capsular distension, extracapsular fluid collection, periarticular muscle edema, and the size of bone erosions on MRI, as well as the age, CRP level, and ESR of patients, could be helpful for differentiating infectious arthritis from spondyloarthritis involving the sternoclavicular joint.

Keywords Arthritis, infectious · Magnetic resonance imaging · Spondyloarthritis · Sternoclavicular joint

Introduction

The sternoclavicular joint is the diarthrodial articulation between the axial and appendicular skeletons. It is susceptible to the same disease processes that occur in joints, including degenerative arthritis, infection, and subluxation [1]. Moreover, it is a commonly involved site in patients with spondyloarthritis [2–5]. Although symmetrical involvement is seen in the majority of patients with spondyloarthritis, unilateral involvement of the sternoclavicular joint has been noted in the early stages of ankylosing spondylitis, psoriatic arthritis, and reactive arthritis [2].

Differentiation between infectious arthritis and spondyloarthritis involving the sternoclavicular joint is very important for the selection of appropriate therapeutic approaches. Prompt diagnosis and treatment are crucial because untreated infection may lead to life-threatening consequences such as mediastinitis or empyema [1, 6, 7].

To our knowledge, no studies have attempted to differentiate between infectious arthritis and spondyloarthritis involving the sternoclavicular joint using magnetic resonance imaging (MRI). Accordingly, we designed the present study to analyze and identify MRI and clinical findings for the differentiation between infectious arthritis and spondyloarthritis in patients with unilateral sternoclavicular arthritis.

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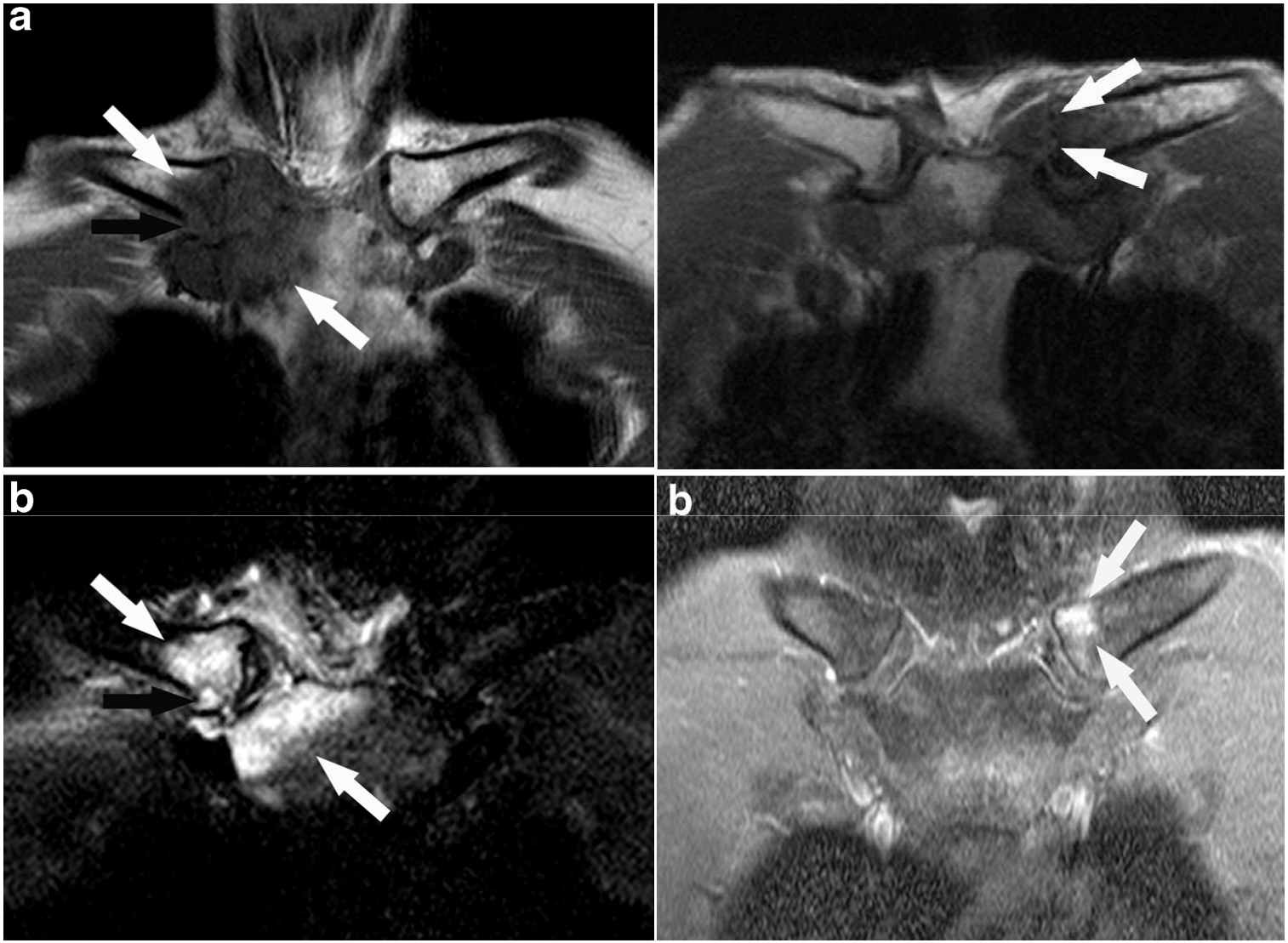

Kang BS. Skeletal Radiol. 2019;48(2):259-66.

Histologie de la synovite infectieuse ?

Clinical Rheumatology (2018) 37:2241–2249
https://doi.org/10.1007/s10067-018-4160-9

ORIGINAL ARTICLE

Ultrasound-guided synovial biopsy improves diagnosis of septic arthritis in acute arthritis without enough analyzable synovial fluid: a retrospective analysis of 176 arthritis from a French rheumatology department

Guillaume Coiffier[1,2] · Marine Ferreyra[3] · Jean-David Albert[1,2] · Nathalie Stock[4] · Anne Jolivet-Gougeon[2,5] · Math Perdriger[1] · Pascal Guggenbuhl[1,2]

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Abstract
To assess the diagnostic value of ultrasound-guided (US-guided) synovial biopsy in routine clinical practice in cases of acute and chronic arthritis. A retrospective, single-center study of US-guided synovial biopsies between 2003 and 2013. The clinical, laboratory, radiographic, synovial fluid, and histological and bacteriological results of synovial biopsies were analyzed. Arthritis was classified according to disease duration < 6 weeks (AA) or ≥ 6 weeks (CA). Synovial biopsy success rate was defined by the rate of capsular and/or synovial tissue analyzed. The diagnostic efficiency was defined by synovial biopsy success rate multiplied by the clinical utility (validation of a diagnostic hypothesis leading to a specific therapy). One hundred seventy-six US-guided synovial biopsies (51 AA and 125 CA) were analyzed. Synovial biopsy success rate was 82.4%. The diagnostic efficiency was 19.9%. Among the acute arthritis cases, 11 were septic. Only three patients had a positive biopsy culture while the synovial fluid puncture was of insufficient quantity to allow bacteriological analysis. The perivascular infiltration of neutrophils (PMN) had a sensitivity of 81.8%, a specificity of 84.2%, and a positive likelihood ratio of 5.2 for the septic arthritis diagnosis. Among the chronic arthritis cases, no case of pyogenic septic arthritis was found. No histological lesions, examined separately, were specific to a type of chronic inflammatory joint disease. US-guided synovial biopsies remain relevant for the diagnosis of septic arthritis, in cases of acute arthritis when joint aspiration is not possible.

Keywords Arthritis · Diagnosis · Synovial biopsy · Ultrasound

Highlights
- A total of 82.4% of US-guided synovial biopsies were able to analyze capsular and/or synovial tissue.
- US-guided synovial biopsies seem to be useful for the diagnosis of septic arthritis when joint aspiration is not possible or in the absence of synovial fluid.
- The perivascular infiltration of neutrophils had a positive likelihood ratio of 5.2 to the pyogenic septic arthritis.

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s10067-018-4160-9) contains supplementary material, which is available to authorized users.

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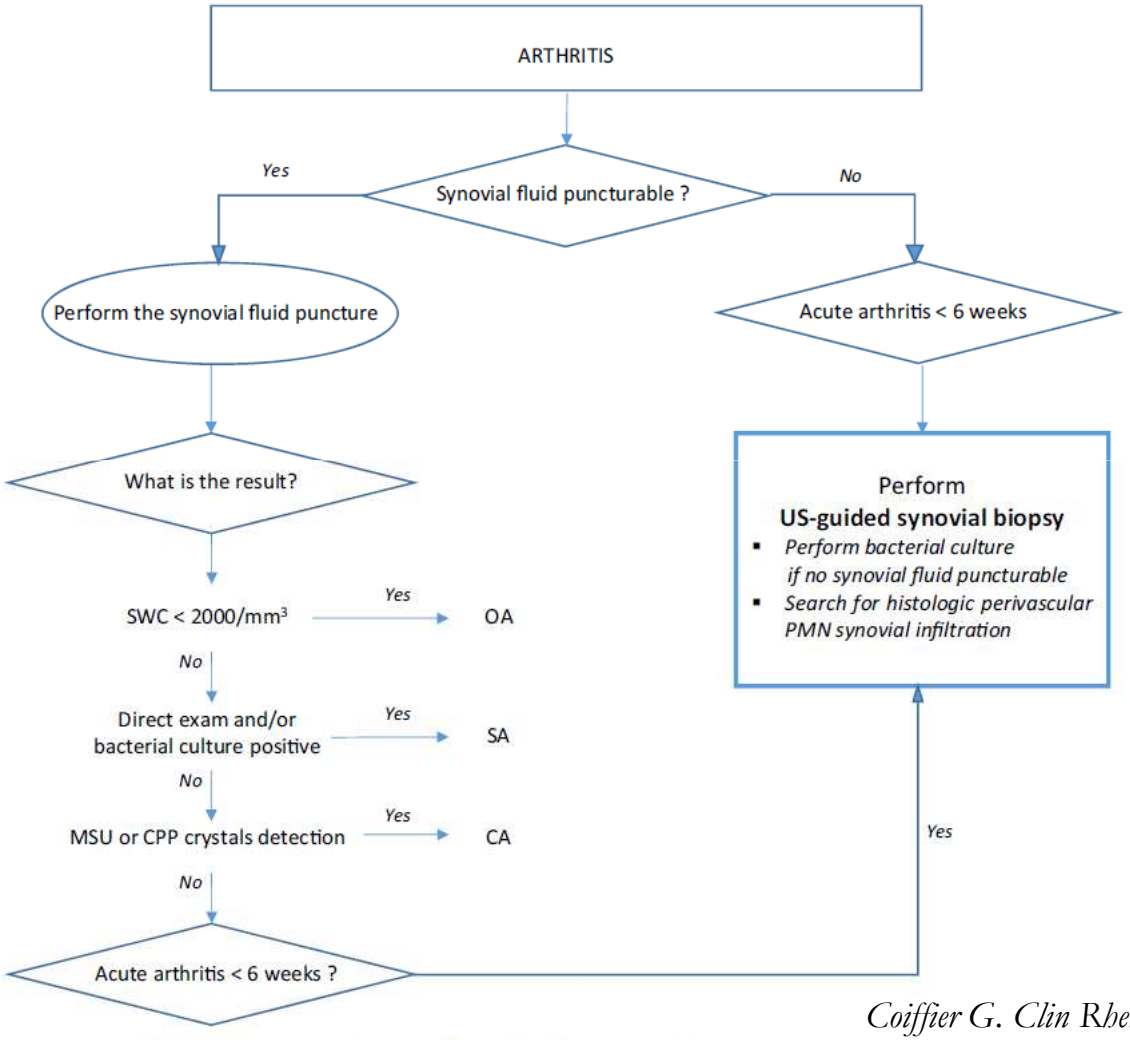


OA: Osteoarthritis, SA: Septic Arthritis, CA: Crystal Arthropathy

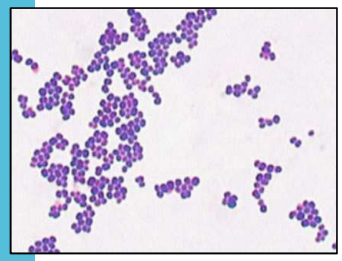
Coiffier G. Clin Rheumatol. 2018;37:2241-9.

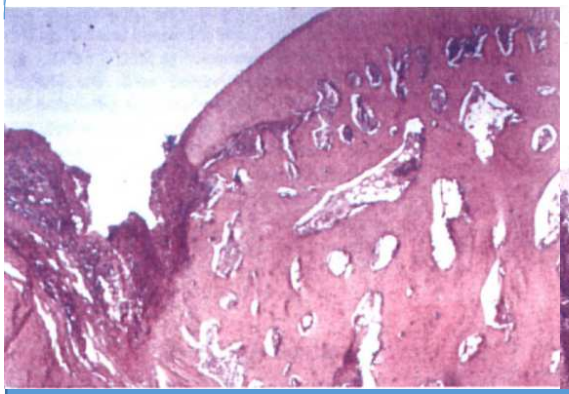
Phase pré-arthritique

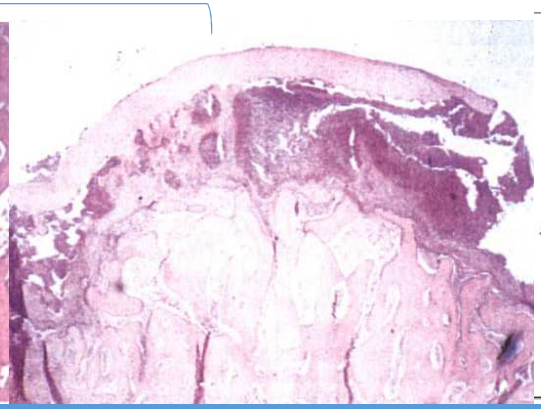
Phase congestive

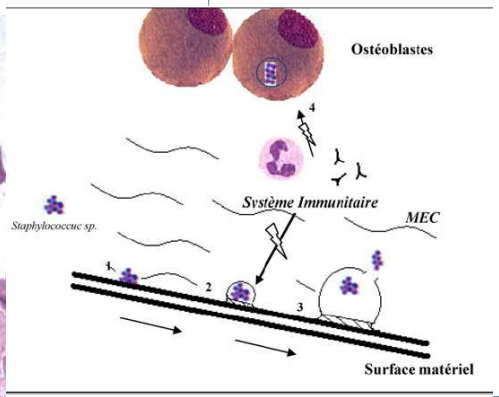
Phase synoviale

Phase de « persistance »







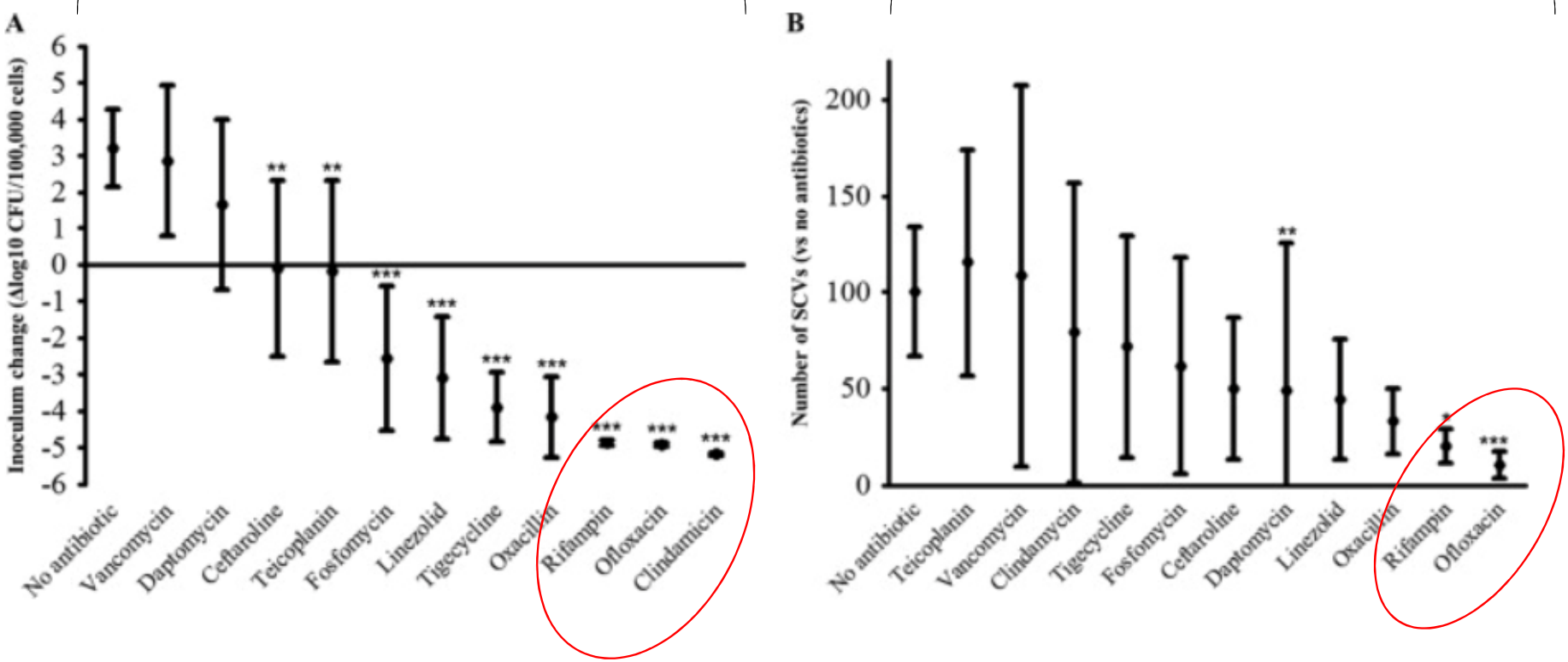


< J0 **J5** **J15** **J45**

Fort Inoculum bactérien Pus (acide)	**Drainage** **Antibiothérapie bactéricide sans risque de mutant résistant**	Diminution inoculum bactérien	**Antibiothérapie à bonne diffusion tissulaire et osseuse**	Destruction ostéo-articulaire Sequestre ostéo-chondral Small Colony Variants Internalisation Ostéoblastique Biofilm	**Antibiothérapie à bonne diffusion tissulaire et osseuse** **Activité intracellulaire** **Activité en phase stationnaire**
Synoviale hypervascularisée Spongieux hypervascularisé Œdème cartilage	Antibiothérapie actif en milieu acide Diffusion osseuse moyenne	Synovite proliférative Moindre vascularisation Dissection sous-chondrale Chondromalacie Erosion osseuse Biofilm dès J15			
Drainage B-lactamine *Glycopeptide/Lipopeptide*		Synovectomie Relai vers Rifampicine et/ou FQ		Arthroplastie Relai vers **Rifampicine** (Gram +) et/ou FQ (avec RIF ou Gram -)	

Réduction Inoculum Intraostéoblastique

Nombre de SCV



Valour F. Antimicrob Agents Chemother. 2015;59:2029-36.

Dimanche 8 Décembre 2019

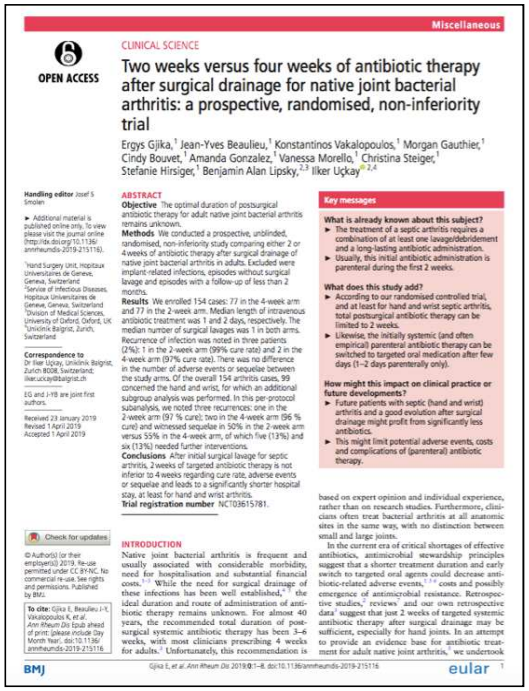
15:55 **Actualisation des recommandations françaises pour le diagnostic et la prise en charge des arthrites septiques sur articulation native**

M. Couderc *(Clermont-Ferrand)*, G. Bart *(Nantes)*, /. pour le Groupe SFR sur les infections ostéoarticulaires

société française de rhumatologie

Espèce bactérienne	Antibiotique IV en première intention	Antibiotique PO en relai	Antibiotique en cas de contre-indication
SAMS	cloxa- ou oxacilline ou cefazoline	Rifampicine + Ofloxacine ou Levofloxacine Clindamycine + Ofloxacine ou Levofloxacine	Avis infectiologique Choix parmi *Daptomycine* *Rifampicine + autres (Clindamycine, cotrimoxazole, cyclines, linézolide)*
SARM	Vancomycine ou Teicoplanine	Rifampicine + Ofloxacine ou Levofloxacine Clindamycine + Ofloxacine ou Levofloxacine	
Streptocoques non entérocoque	Amoxicilline	Amoxicilline	Clindamycine ou Fluoroquinolone anti streptococcique (Levofloxacine)
Enterocoques	Amoxicilline + Gentamicine	Amoxicilline	Avis infectiologique *Vancomycine + gentamicine*** *Daptomycine + gentamicine*
Entérobactéries hors *P.aeruginosa*	Cefotaxime Ceftriaxone Cefepime pour les entérobactéries du groupe 3	Ofloxacine ou lévofloxacine en monothérapie (si la souche est sensible à l'acide nalidixique) Avis infectiologique si entérobactérie résistante	Avis infectiologique
Pseudomonas aeruginosa	Ceftazidime + Amikacine	Ciprofloxacine	Avis infectiologique
Anaérobies	Amoxicilline si sensible Ou Metronidazole	Clindamycine ou amoxicilline	Avis infectiologique
Neisseria gonorrheae	Ceftriaxone ou Cefotaxime	Ofloxacine ou Levofloxacine	Ofloxacine ou Levofloxacine

Combien de temps Docteur les antibiotiques ?



Miscellaneous

OPEN ACCESS

CLINICAL SCIENCE

Two weeks versus four weeks of antibiotic therapy after surgical drainage for native joint bacterial arthritis: a prospective, randomised, non-inferiority trial

Ergys Gjika,[1] Jean-Yves Beaulieu,[1] Konstantinos Vakalopoulos,[1] Morgan Gauthier,[1] Cindy Bouvet,[1] Amanda Gonzalez,[1] Vanessa Morello,[1] Christina Steiger,[1] Stefanie Hirsiger,[1] Benjamin Alan Lipsky,[2,3] Ilker Uçkay[1,2,4]

Handling editor Josef S Smolen

► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/annrheumdis-2019-215116).

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EG and J-YB are joint first authors.

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ABSTRACT

Objective The optimal duration of postsurgical antibiotic therapy for adult native joint bacterial arthritis remains unknown.

Methods We conducted a prospective, unblinded, randomised, non-inferiority study comparing either 2 or 4 weeks of antibiotic therapy after surgical drainage of native joint bacterial arthritis in adults. Excluded were implant-related infections, episodes without surgical lavage and episodes with a follow-up of less than 2 months.

Results We enrolled 154 cases: 77 in the 4-week arm and 77 in the 2-week arm. Median length of intravenous antibiotic treatment was 1 and 2 days, respectively. The median number of surgical lavages was 1 in both arms. Recurrence of infection was noted in three patients (2%): 1 in the 2-week arm (99% cure rate) and 2 in the 4-week arm (97% cure rate). There was no difference in the number of adverse events or sequelae between the study arms. Of the overall 154 arthritis cases, 99 concerned the hand and wrist, for which an additional subgroup analysis was performed. In this per-protocol subanalysis, we noted three recurrences: one in the 2-week arm (97 % cure); two in the 4-week arm (96 % cure) and witnessed sequelae in 50% in the 2-week arm versus 55% in the 4-week arm, of which five (13%) and six (13%) needed further interventions.

Conclusions After initial surgical lavage for septic arthritis, 2 weeks of targeted antibiotic therapy is not inferior to 4 weeks regarding cure rate, adverse events or sequelae and leads to a significantly shorter hospital stay, at least for hand and wrist arthritis.

Trial registration number NCT03615781.

Key messages

What is already known about this subject?
- The treatment of a septic arthritis requires a combination of at least one lavage/debridement and a long-lasting antibiotic administration.
- Usually, this initial antibiotic administration is parenteral during the first 2 weeks.

What does this study add?
- According to our randomised controlled trial, and at least for hand and wrist septic arthritis, total postsurgical antibiotic therapy can be limited to 2 weeks.
- Likewise, the initially systemic (and often empirical) parenteral antibiotic therapy can be switched to targeted oral medication after few days (1–2 days parenterally only).

How might this impact on clinical practice or future developments?
- Future patients with septic (hand and wrist) arthritis and a good evolution after surgical drainage might profit from significantly less antibiotics.
- This might limit potential adverse events, costs and complications of (parenteral) antibiotic therapy.

INTRODUCTION

Native joint bacterial arthritis is frequent and usually associated with considerable morbidity, need for hospitalisation and substantial financial costs.[1–3] While the need for surgical drainage of these infections has been well established,[4–6] the ideal duration and route of administration of antibiotic therapy remains unknown. For almost 40 years, the recommended total duration of postsurgical systemic antibiotic therapy has been 3–6 weeks, with most clinicians prescribing 4 weeks for adults.[7] Unfortunately, this recommendation is based on expert opinion and individual experience, rather than on research studies. Furthermore, clinicians often treat bacterial arthritis at all anatomic sites in the same way, with no distinction between small and large joints.

In the current era of critical shortages of effective antibiotics, antimicrobial stewardship principles suggest that a shorter treatment duration and early switch to targeted oral agents could decrease antibiotic-related adverse events,[8–11] costs and possibly emergence of antimicrobial resistance. Retrospective studies,[12] reviews[13] and our own retrospective data[7] suggest that just 2 weeks of targeted systemic antibiotic therapy after surgical drainage may be sufficient, especially for hand joints. In an attempt to provide an evidence base for antibiotic treatment for adult native joint arthritis,[7] we undertook

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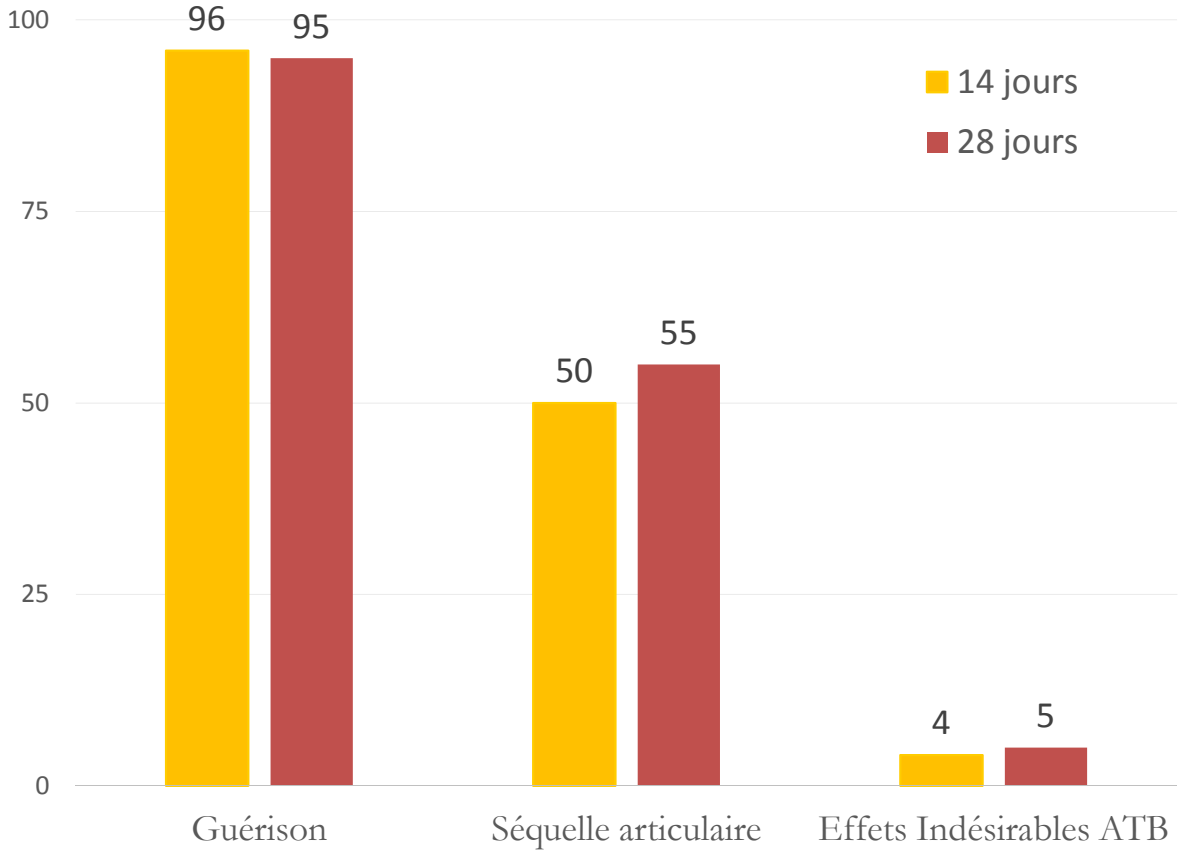

Gjika E. Ann Rheum Dis. 2019;78:1114-21.

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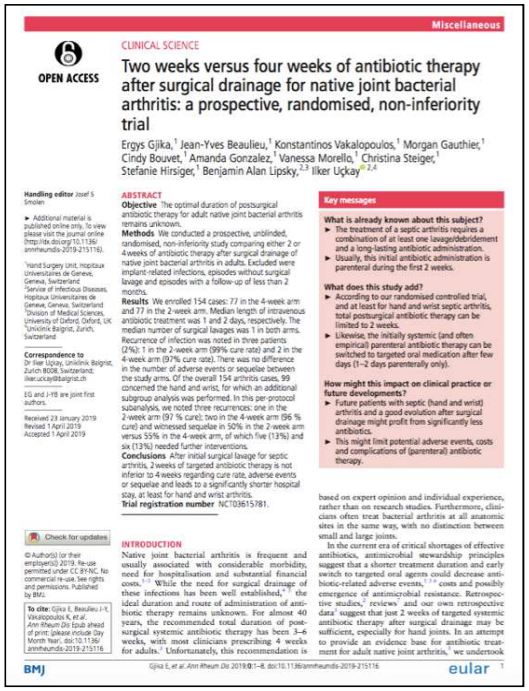
Sauf que…



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- 100 % patients drainage/synovectomie chirurgical
- 127 (81%) petites articulations (95 doigts, 28 MTP, 4 poignets)

  29 (19%) moyennes/grosses articulations (14 genoux, 7 épaules, 5 chevilles, 2 coudes, 1 hanche)
- 96 (61%) inoculations directs (morsures/griffures, post-traumatiques)

  6 (4%) hémocultures positives

Gjika E. Ann Rheum Dis. 2019;78:1114-21.

Combien de temps Docteur les antibiotiques ?

. 3 à 6 semaines (selon bactérie, rapidité de l'évolution, stade de prise en charge)

. 7 jours pour *Neisseria sp.*

Etude SHASAR (3 *vs* 6 semaines d'antibiotiques) (PHRC national)

Lundi 9 Décembre 2019

16:30 - 17:30 | Infections ostéo-articulaires

Session scientifique

Salle 5

16:30 O.84 **Y'a-t-il un intérêt à l'ensemencement systématique d'un flacon d'hémoculture au lit du malade pour le diagnostic microbiologique d'arthrite septique ? Etude transversale monocentrique sur 224 arthrites aigues**

O. Berthoud *(Rennes)*, G. Coiffier *(Rennes)*, C. Goussault *(Rennes)*, J.-D. Albert *(Rennes)*, C. Bendavid *(Rennes)*, A. Jolivet-Gougeon *(Rennes)*, P. Guggenbuhl *(Rennes)*

16:40 O.85 **Pose de prothèse de genou (PTG) ou de hanche (PTH) après ou au cours d'une arthrite septique : analyse rétrospective de 53 cas pris en charge dans un Centre de Référence des Infections Ostéo-Articulaires Complexes (CRIOAC)**

E. PORTIER *(Paris)*, V. Zeller *(Paris)*, S. Godot *(Paris)*, Y. Kerroumi *(Paris)*, B. Heym *(Paris)*, V. Meyssonnier *(Paris)*, C. Béal *(Paris)*, S. Marmor *(Paris)*, P. Chazerain *(Paris)*

16:50 O.86 **Intérêt du TEP-scanner dans le bilan d'extension septique des endocardites infectieuses : Focus sur les atteintes musculosquelettiques**

B. Hugues *(Créteil)*, B. Emsen *(Créteil)*, J. Ternacle *(Créteil)*, A. Moussafeur *(Créteil)*, X. Chevalier *(Créteil)*, R. Lepeule *(Créteil)*, R. Huguet *(Créteil)*, A. Fiore *(Créteil)*, M. Abulizi *(Créteil)*, F. Eymard *(Créteil)*

17:00 O.87 **L'infiltration intra-articulaire de corticoïdes est-elle délétère au cours d'une arthrite de Lyme ? Etude rétrospective multicentrique sur 52 patients**

C. Corre *(Rennes)*, **G. Coiffier *(Rennes)***, M. Ferreyra *(Vannes)*, B. Le Goff *(Nantes)*, X. Guenoc *(Saint-Brieuc)*, J.-D. Albert *(Rennes)*

17:10 O.88 **Diagnostic et prise en charge thérapeutique des bursites septiques : à propos de 246 cas**

K. NGUYEN *(Lille)*, P. Coquerelle *(Beuvry)*, H. Migaud *(Lille)*, E. Senneville *(Tourcoing)*, E. Houvenagel *(Lomme)*, R. M. Flipo *(Lille)*, B. Cortet *(Lille)*

17:20 O.89 **Place de l'échographie cardiaque dans la prise en charge d'une infection ostéo-articulaire bactérienne sans matériel**

M. BEAUFRERE *(Caen)*, J. Michon *(Caen)*, R. Verdon *(Caen)*, E. Fiaux *(Rouen)*, V. Rasoldier *(Rouen)*, M. Etienne *(Rouen)*, C. Marcelli *(Caen)*, O. Vittecoq *(Rouen)*, G. Avenel *(Rouen)*