

Infections du Site Opératoire après Instrumentation Rachidienne. Aspects Chirurgicaux.

Pr Cédric BARREY, MD, PhD
Eurico FREITAS OLIM, MD

Service de Neurochirurgie C et Chirurgie du Rachis
Centre Interrégional de Référence des IOA Complexes
Hôpital Neurologique P Wertheimer, Hospices Civils de LYON

CONTEXTE

➤ ISO: Complication fréquente (1 – 10%)

Eur Spine J

Table 4 Causes of 30-day reoperation

n = 175/10680 (1,6%)

Causes of reoperation	Number of cases (%)	Interval from index surgery to reoperation, average days $\pm$ SD (range)
SSI*	65 (37.1)	15.9 $\pm$ 6.3 (3–30)
Hematoma	41 (24.0)	3.8 $\pm$ 5.2 (0–19)
PS malpositioning	18 (10.2)	12.8 $\pm$ 8.0 (4–29)
Inadequate decompression	11 (6.2)	13.7 $\pm$ 9.5 (2–27)
Bone graft dislodgement		
Thoracolumbar	6 (3.4)	6.3 $\pm$ 5.2 (0–14)
Anterior cervical	5 (2.8)	8.6 $\pm$ 8.0 (1–22)
Anterior cervical plate-related trouble	3 (1.7)	21.0 $\pm$ 10.5 (9–29)
Inadequate O-C2 angle	3 (1.7)	6.6 $\pm$ 7.0 (0–14)
Recurrent lumbar hernia	3 (1.7)	10.3 $\pm$ 5.1 (6–16)

**SSI Surgical Site Infection*

A multi-center study of reoperations within 30 days of spine surgery

Takayoshi Shimizu¹ · Shunsuke Fujibayashi¹ · Mitsuru Takemoto¹ · Bungo Otsuki^{1,2} · Hiroaki Kimura¹ · Masato Ota³ · Akira Kusuba⁴ · Youngwoo Kim⁵ · Tsunemitsu Soeda⁶ · Kei Watanabe⁷ · Takeshi Sakamoto⁷ · Akira Uchikoshi⁸ · Naoya Tsubouchi⁹ · Shuichi Matsuda¹

ISO: 1^{ère} cause de réintervention dans le premier mois post-opératoire

Eur Spine J

Received: 22 April 2015 / Revised: 4 July 2015 / Accepted: 5 July 2015

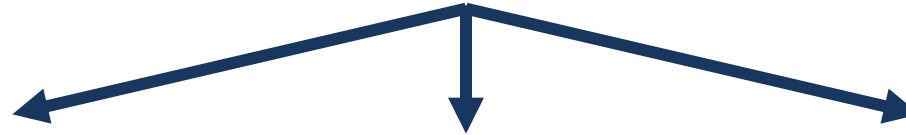
CONTEXTE

- ISO: Complication fréquente (1 – 10%)
- Progrès (FDR mieux connus et dépistés)
- Coût médico-économique
- Spécificités:
 - Risque neurologique en cas d'instabilité
 - Risque pseudarthrose et complication mécanique
 - Variabilité des situations (voie d'abord, matériel...)



D'après Ferry et al, Gerometta et al, Hegde et al, Lazennec et al, Pull te Gunne et al , Weinstein et al

FACTEURS de RISQUE



Patient

- Age > 65 ans
- **Diabète** RRx2
- Obésité
- Tabac
- Alcool

Procédure

- Durée chirurgie
- Pertes sanguines
- **Matériel** RRx8
- **Postérieure** RRx2
- Etendue du montage
- Indications

Microbiologie

- Staph aureus
- Autres cocci G+
- BGN
- BMR
- Polymicrobienne
- *ATBprophylaxie*

D'après Abdul-Jabbar et al, Collins et al, Fang et al, Ferry et al, Gerometta et al, Hegde et al, Lazennec et al, Pull te Gunne et al, Weinstein et al, Wimmer et al

Facteurs liés à la procédure

Spine (Phila Pa 1976). 2012 Jul 1;37(15):1340-5. doi: 10.1097/BRS.0b013e318246a53a.

Surgical site infection in spinal surgery: description of surgical and patient-based risk factors for postoperative infection using administrative claims data.

Abdul-Jabbar A, Takemoto S, Weber MH, Hu SS, Mummaneni PV, Deviren V, Ames CP, Chou D, Weinstein PR, Burch S, Berven SH.

Department of Orthopaedic Surgery, University of California, San Francisco, CA 94143, USA. amir.abdul-jabbar@ucsf.edu

n=6628 chir.

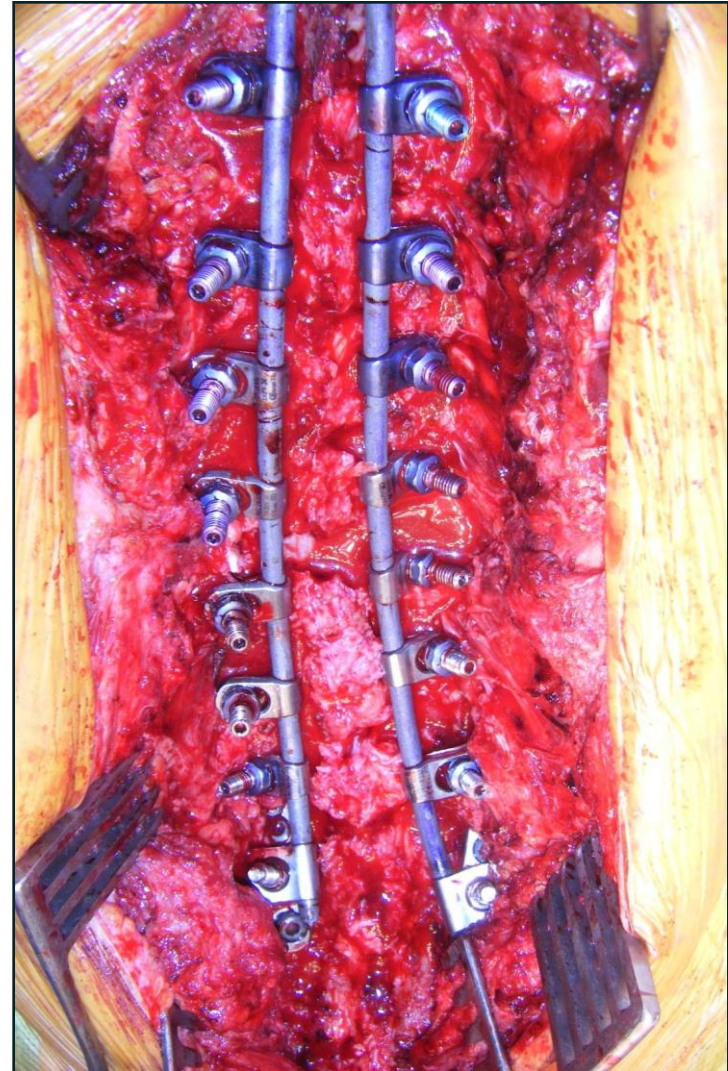
193 ISO (2.9%)

[2005-2010]

Risk Factor	Odds Ratio	95% CI	P
Bone/CT neoplasm	5.61	1.87–16.81	0.002
>12 levels	2.48	1.31–4.69	0.005
8–12 levels	2.09	1.37–3.12	0.001
Sacrum/pelvis	2.04	1.32–3.07	0.001
Coronary artery disease	1.48	0.92–2.37	0.103
Diabetes mellitus	1.42	0.93–2.18	0.108
Thoracic spine	1.36	0.94–1.97	0.102
Single level	0.44	0.20–0.94	0.042
Anterior approach	0.04	0.01–0.27	0.001
CI indicates confidence interval; CT, connective tissue.			



Chirurgie à risque: chirurgie postérieure instrumentée étendue



Extension au sacrum

- Fréquente
 - Pathologie dégénérative
 - Déformations
- Proximité avec le périnée
- Cicatrice « malmenée »
 - Appui en position assise/allongée
 - Orthèse
- Incontinence

Risk Factor	Odds Ratio	95% CI	P
Sacrum/pelvis	2.04	1.32–3.07	0.001



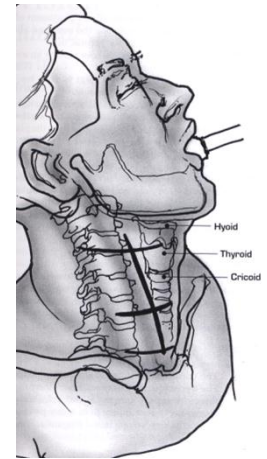
Risque de contamination directe / flore périnéale



Orthèse avec appui sacré

Risque faible

➤ Chirurgie cervicale antérieure (ACDF)

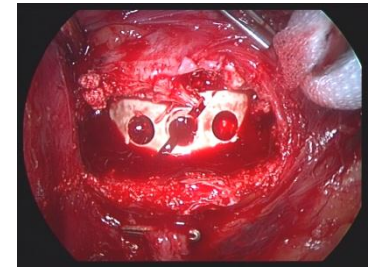


[World Neurosurg. 2014 Dec;82\(6\):1380-7. doi: 10.1016/j.wneu.2013.09.022. Epub 2013 Sep 18.](#)

Surgical complications of anterior cervical discectomy and fusion for cervical degenerative disk disease: a single surgeon's experience of 1,576 patients.

[Nanda A¹, Sharma M², Sonig A², Ambekar S², Bollam P².](#)

patients. Hoarseness was seen in 1.2% (n = 19) of our patients. A total of 0.88% (n = 14) of the patients had worsening of myelopathy/radiculopathy in the immediate postoperative period. Superficial wound infection occurred in 0.2% (n = 3) of our patients. Postoperative neck hematoma was seen in 0.1% (n = 2), recurrent laryngeal nerve palsy in 0.1% (n = 2), esophageal tear



➤ Chirurgie lombaire antérieure/latérale

[Eur Spine J. 2015 Feb 27. \[Epub ahead of print\]](#)

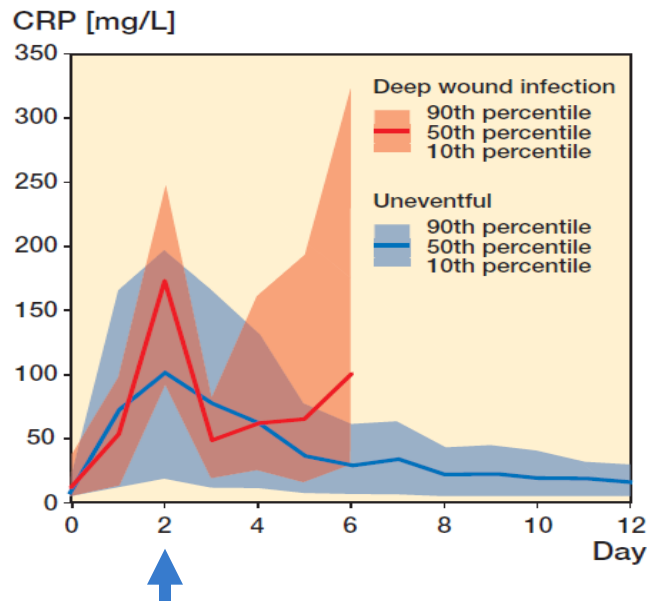
Visceral, vascular, and wound complications following over 13,000 lateral interbody fusions: a survey study and literature review.

[Uribe JS¹, Deukmedjian AR.](#)

RESULTS: Between 2003 and 2013, 13,004 patients were treated with MIS-LIF by the 40 surgeons who responded to the survey. Of those patients, 0.08 % experienced a visceral complication (bowel injury), 0.10 % experienced a vascular injury, 0.27 % experienced a superficial wound infection, and 0.14 % experienced a deep wound infection.

DEMARCHE DIAGNOSTIQUE

- Aucun signe spécifique
- Δ^{ic} Souvent évident en postopératoire immédiat
 - Signes généraux: Fièvre, frissons
 - Signes locaux: Ecoulement (signe le + fréquent)
 - Syndrome inflammatoire évolutif (CRP)

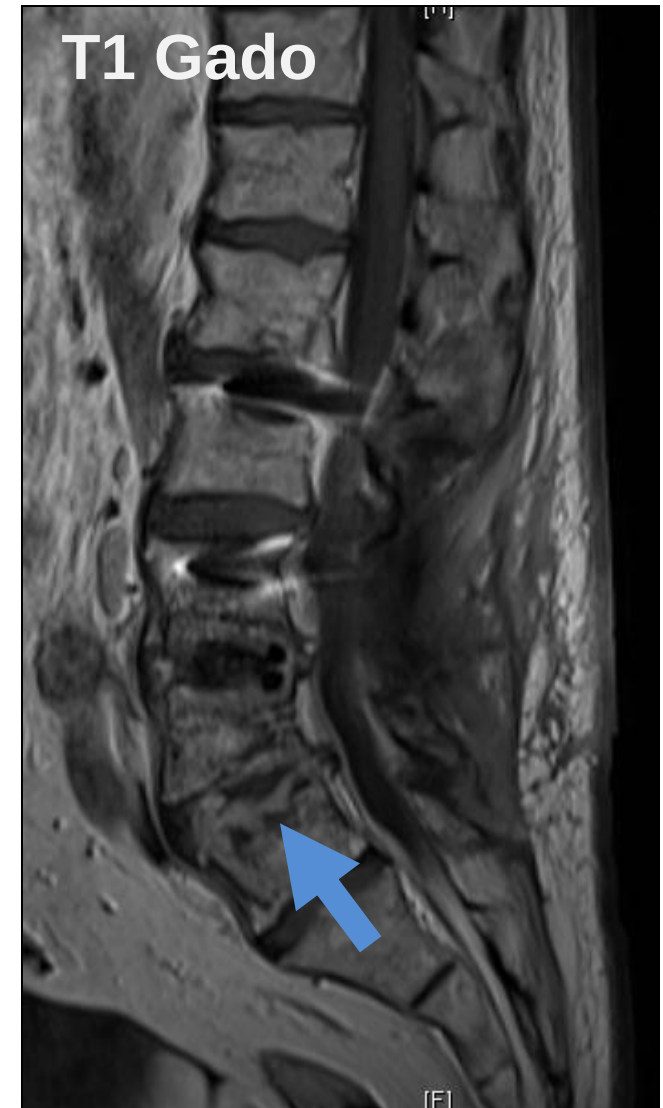
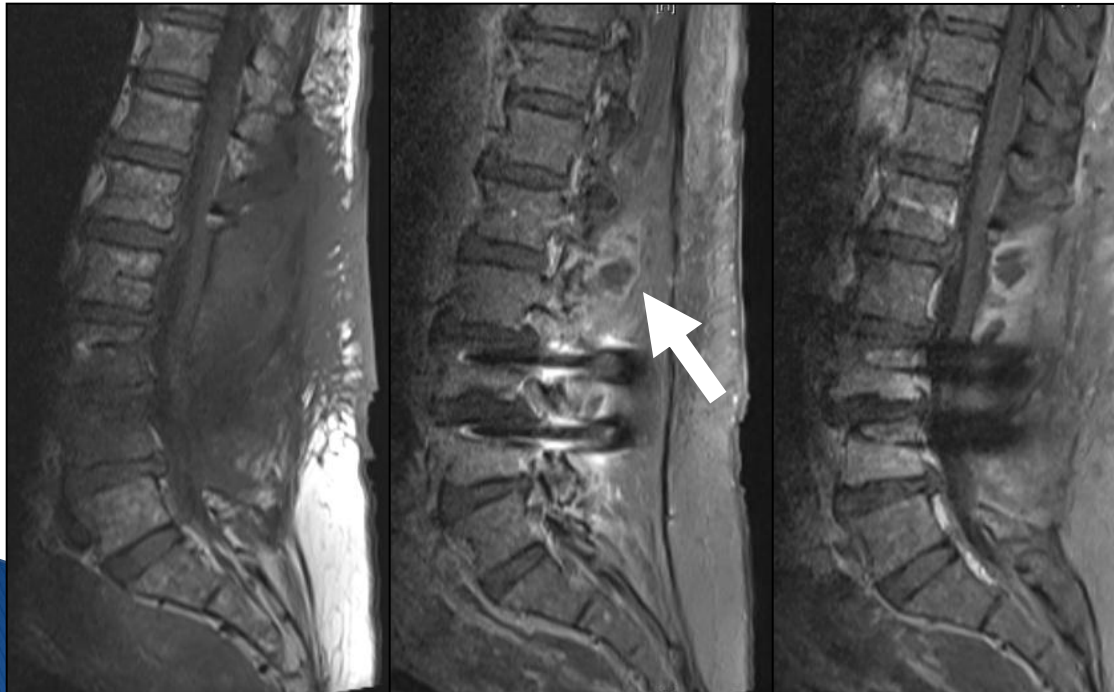


CRP: Pic à J2

C-reactive protein levels for early detection of postoperative infection after fracture surgery in 787 patients

M Neumaier and M Scherer, Acta Orthop 2015

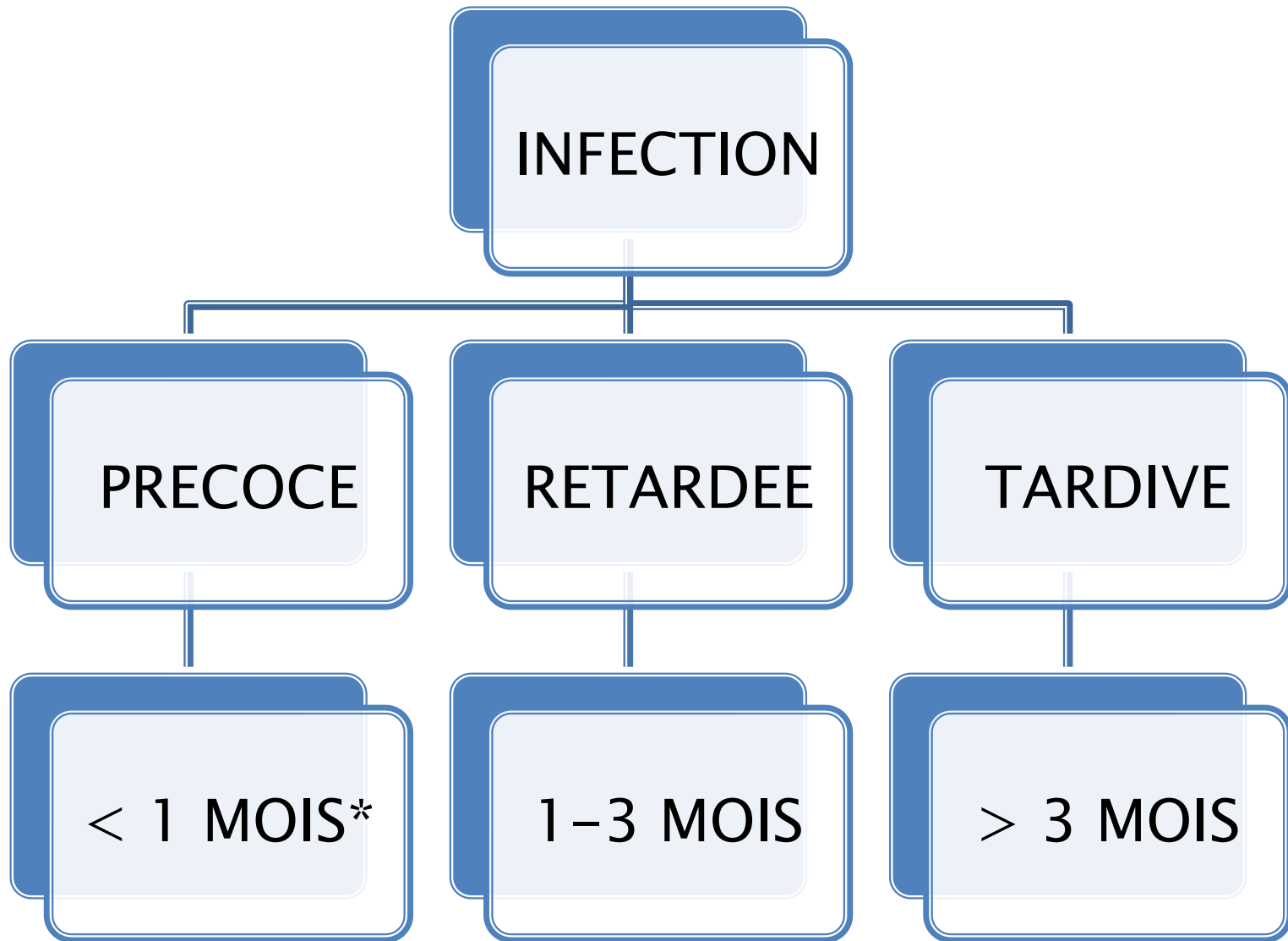
- ▶ Imagerie (peu d'intérêt en aigu)
 - Inflammation locale post-op
 - Artéfacts liés au matériel
 - TDM/IRM: collection/abcès
 - RX: matériel



DIAGNOSTIC BACTERIOLOGIQUE

- Essentiel: IDENTIFICATION précise des germes
- PLV superficiels (peu de valeur)
- Hémocultures
- Ponction-biopsie sous scanner

➤ **PRELEVEMENTS PROFONDS AU BO (au moins 5)**



* Délai variant entre 3 sem et 3 mois

Caractériser l'ISO

- ▶ Superficielle / profonde (aponévrose) ?
- ▶ Précoce / tardive ?
- ▶ Rachis instrumenté / NON instrumenté ?
- ▶ Germe(s) en cause ?



Stratégie thérapeutique

Chinese Medical Journal 2013;126 (20)

Management of postoperative **instrumented** spinal wound infection

FANG Xiu-tong, and Kirkham B. Wood

n=41 ISO / 851 patients, soit 4,9%

Table 1. Patients demographic data (*n* (%))

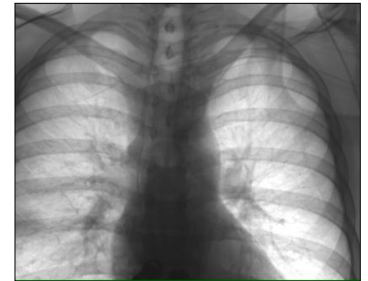
Groups	Incidence of infection
Acute infection	33 (3.9) [*]
Superficial infection	5 (0.6) [†]
Deep infection	28 (3.3) [†]
Delayed infection	8 (1.0) [*]
Superficial infection	1 (0.1) [†]
Deep infection	7 (0.9) [†]
<i>P</i> values	<0.05

Infection précoce profonde:
70% ISO (*n=28/41*)

STRATEGIE THERAPEUTIQUE

Principes généraux

- ATB adaptée aux PLV profonds (IV puis relais par voie orale)
- Prise en charge chirurgicale
 1. Lavage–parage **systématique** du foyer opératoire
 2. Instrumentation
 - Matériel laissé en place
 - Remplacement en 1 temps
 - Ablation partielle/complète
 - Ablation temporaire/définitive

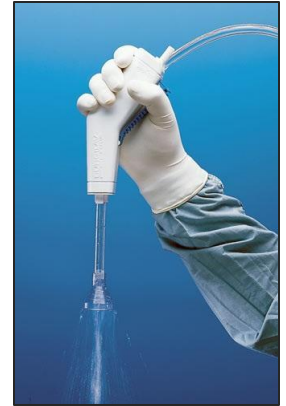


Pic-line



INFECTION PRECOCE (<1 mois)

- ▶ Reprise au bloc opératoire sous AG^{ale}
- ▶ Débridement – lavage – parage
- ▶ PLV bactério. multiples (au moins 5 PLV profonds)
- ▶ **Le matériel NETTOYE est LAISSE EN PLACE*** + + +
- ▶ Fermeture sur drainages multiples et aspiratifs



** Sauf mobilisation évidente*

Chinese Medical Journal 2013;126 (20)

Management of postoperative **instrumented** spinal wound infection

FANG Xiu-tong, and Kirkham B. Wood

n=41 ISO / 851 patients, soit 4,9%**Table 1.** Patients demographic data (*n* (%))

Groups	Incidence of infection	Instrumentation reserved
Acute infection	33 (3.9) [*]	32 (96.9) [‡] Rétention 97%
Superficial infection	5 (0.6) [†]	5
Deep infection	28 (3.3) [†]	27
Delayed infection	8 (1.0) [*]	1 (12.5) [‡]
Superficial infection	1 (0.1) [†]	1
Deep infection	7 (0.9) [†]	0 Ablation 100%
<i>P</i> values	<0.05	<0.01

*Correlation is significant between acute infection and delayed infection.

†Correlation is significant between superficial infection and deep infection.

Preservation of Spinal Instrumentation After Development of Postoperative Bacterial Infections in Patients Undergoing Spinal Arthrodesis

Ahmed, Raheel MD, PhD^{*}; Greenlee, Jeremy D.W. MD^{*}; Traynelis, Vincent C. MD[†]

Journal of Spinal Disorders & Techniques:
August 2012 - Volume 25 - Issue 6 - p 299–302
doi: 10.1097/BSD.0b013e31821fbf72
Original Articles

Abstract

Study Design: This is a retrospective review.

Objective: The purpose of this study is to evaluate the efficacy of medical and surgical management of postoperative infections after the placement of spinal instrumentation in the context of retaining the instrumentation.

Methods: Of 854 consecutive patients who had undergone spinal instrumentation by the senior author, 17 patients were identified who developed postoperative infections, 16 of which were treated by the senior author.

Results: All patients underwent surgical debridement and received antimicrobial therapy in consultation with the infectious diseases consultants. Spinal instrumentation was preserved in all cases. Two patients had clinical and radiologic evidence of nonunion and later underwent a staged instrumentation revision procedure. Eradication of the infection was successful in all patients. The mean follow-up period was 2.1 years (range, 12 mo to 4.5 y).

Conclusions: A combination of aggressive surgical debridement with microbial-guided pharmacotherapy enabled infection cure in all patients with postoperative bacterial infections after spinal instrumentation. Adjunct measures including the use of wound vacuum devices and long-term suppressive antimicrobial therapy were also used in high-risk patients. These results show that postoperative bacterial infections in the setting of spinal instrumentation can be successfully treated without removing titanium alloy instrumentation.

Eradication Infection 100%
2 ans de recul
17 ISO (2%) / 854 Chir.

Success 100%

Evidence-based management of deep wound infection after spinal instrumentation

Journal of **clinical**
neuroscience

February 2015 Volume 22, Issue 2,

[Rishi R. Lall](#), [Albert P. Wong](#), [Rohan R. Lall](#), [Cort D. Lawton](#), [Zachary A. Smith](#), [Nader S. Dahdaleh](#) 

Department of Neurosurgery, Northwestern University Feinberg School of Medicine, 676 N. St. Clair, Suite 22
Chicago, IL 60611, USA

Abstract

In this study, evidence-based medicine is used to assess optimal surgical and medical management of patients with post-operative deep wound infection following spinal instrumentation. A computerized literature search of the PubMed database was performed. Twenty pertinent studies were identified. Studies were separated into publications addressing instrumentation retention *versus* removal and publications addressing antibiotic therapy regimen. The findings were classified based on level of evidence (I–III) and findings were summarized into evidentiary tables. No level I or II evidence was identified. With regards to surgical management **five studies support instrumentation retention in the setting of early deep infection.** In contrast, for delayed infection, the evidence favors removal of instrumentation at the time of initial debridement. Surgeons should be aware that for deformity patients, even if solid fusion is observed, removal of instrumentation may be associated with significant loss of correction. A course of intravenous antibiotics followed by long-term oral suppressive therapy should be pursued if instrumentation is retained. A shorter treatment course may be appropriate if hardware is removed.

OPTIONS A EVALUER (1)

Absence de niveaux de preuve

- ▶ Irrigation-lavage
- ▶ « Second-look » systém. en cas d'infection sévère
- ▶ VAC thérapie

- *Staph / BMR*
- *Tissus nécrotiques et purulents +++*
- *Persistance/Récidive de l'écoulement*
- *Patient reste fébrile > 48H*

[Spine J. 2013 Aug 24. pii: S1529-9430\(13\)00715-8. doi: 10.1016/j.spinee.2013.06.040. \[Epub ahead of print\]](#)

Negative pressure wound therapy (NPWT) for spinal wounds: a systematic review.

[Ousey KJ](#), [Atkinson RA](#), [Williamson JB](#), [Lui S](#).

CONCLUSIONS: Published reports are limited to small retrospective and case studies, with no reports of NPWT being used as a prophylactic treatment. Larger prospective RCTs of NPWT are needed to support the current evidence that it is effective in treating spinal wound complications. In addition, future studies



OPTIONS A EVALUER (2)

► ATB locale: Poudre de vancomycine



[Spine J.](#) 2015 Jan 27. pii: S1529-9430(15)00079-0. doi: 10.1016/j.spinee.2015.01.030. [Epub ahead of print]

Intrasite Vancomycin Powder for the Prevention of Surgical Site Infection in Spine Surgery: A Systematic Literature Review.

[Kang DG](#)¹, [Holekamp TF](#)², [Wagner SC](#)³, [Lehman RA Jr](#)⁴.

⊕ Author information

Abstract

BACKGROUND CONTEXT: Deep surgical site infections (SSIs) following spinal surgery are a significant burden to the patient, patient's family and the healthcare system. Due to increasing pressures to reduce SSIs and control costs, some spine surgeons have begun placing lyophilized vancomycin powder directly into the surgical wound at the conclusion of the procedure. However, the literature supporting this practice remains limited.

PURPOSE: To review the current literature examining the use of prophylactic intrasite vancomycin powder to control SSIs in spinal surgery, and determine if any standard recommendations can be made.

STUDY DESIGN/SETTING: Systematic review.

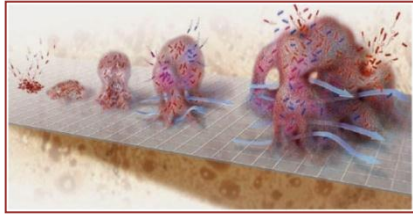
METHODS: Ovid MEDLINE and PubMed were searched to identify English language articles.

RESULTS: No current guidelines are available for the use of intrasite vancomycin powder in preventing surgical site infections, and no standard dosage for the drug exists. Based on the limited literature currently available, there appears to be a protective effect of intrasite vancomycin powder on the incidence of SS without evidence of significant risk of side effects, but the evidence is limited. However, case reports do exist describing systemic side effects following intrasite vancomycin powder during spine surgery.

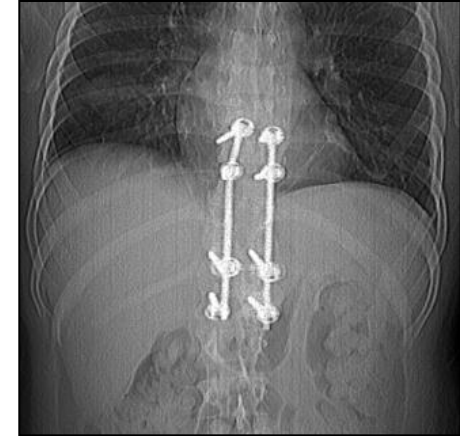
CONCLUSIONS: The interpretation of the available evidence supporting the use of intrasite vancomycin powder in surgical wounds is limited, and its extrapolation should be performed with caution. Despite the lack of significant high-quality evidence available in the literature, many surgeons have adopted this practice; anecdotally it continues to provide protection from infection without apparent significant risk of side effects.

INFECTION TARDIVE

Biofilm



**ABLATION DE
L'INSTRUMENTATION**



- ▶ Situation idéale: 
 - Rachis stable et consolidé
 - Ablation matériel facile
- ▶ Situations délicates: 
 - Rachis instable/non consolidé
 - Longue instrumentation
 - Matériel difficile d'accès



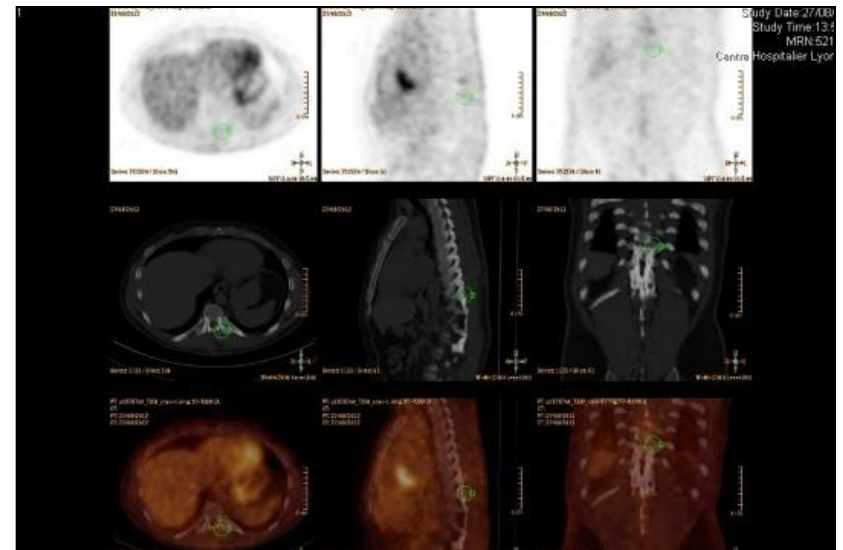
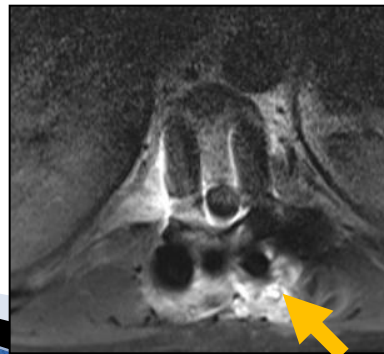
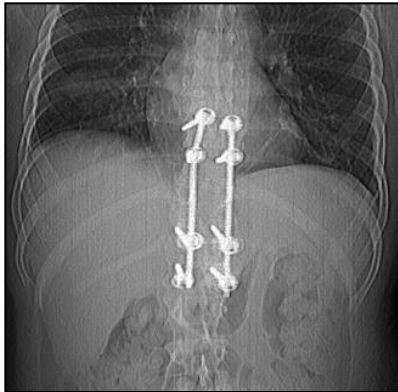
Evidence-based management of deep wound infection after spinal instrumentation

[Rishi R. Lall](#), [Albert P. Wong](#), [Rohan R. Lall](#), [Cort D. Lawton](#), [Zachary A. Smith](#), [Nader S. Dahdaleh](#)
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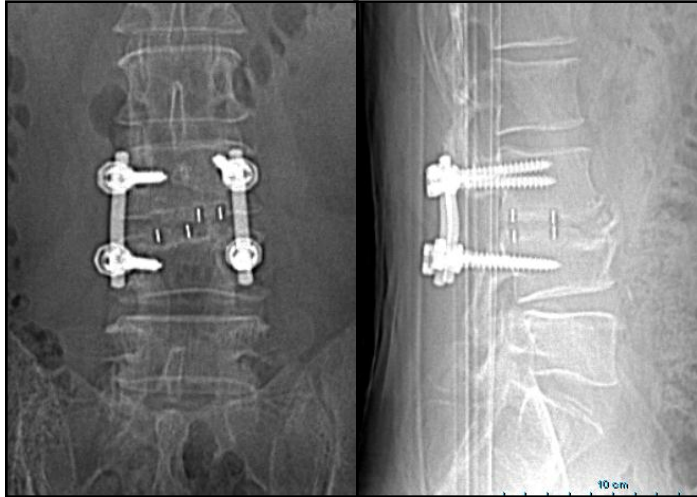
Chirurgie il y a 15 ans (fracture rachis)

Tableau septique

Hemoc + à Staph Meti-S



Arthrodèse L3L4 en 2006



Matériel difficile d'accès

Reprise en 2016:

- Extension d'arthrodèse
- PLIF L4L5
- **PLVs positifs à propioni**



Ablation des cages par lombotomie

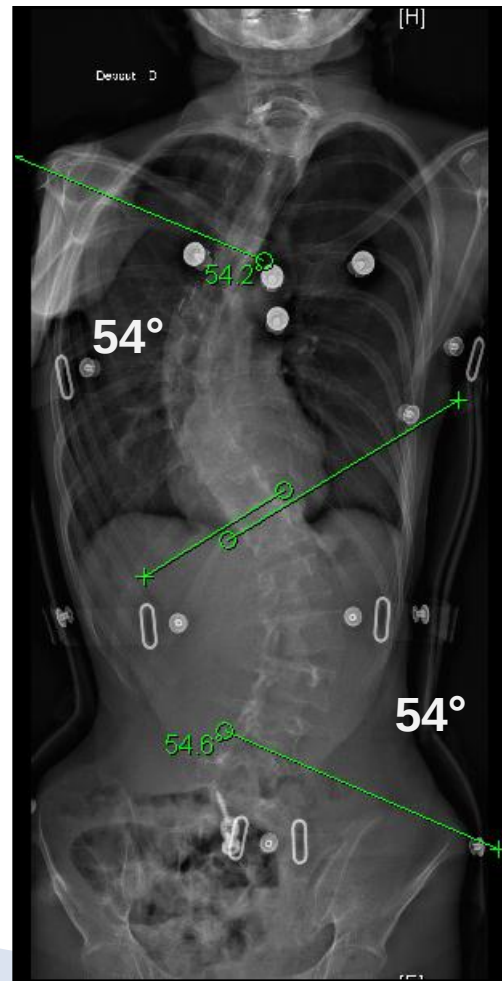
➔ Procédure chir. Suppl. pour l'ablation des cages
Reprise pour pseudarthrose = PLVs bactério

Longues instrumentations: AMO et risque mécanique

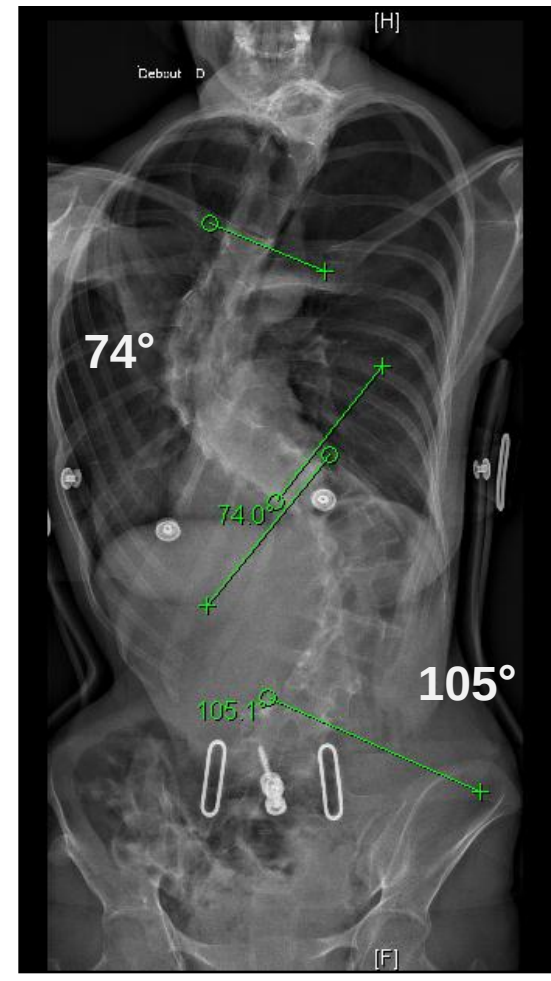
JUIN 2011



JUILLET 2011



JANV 2013



Evidence-based management of deep wound infection after spinal instrumentation

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February 2015 Volume 22, Issue 2,

[Rishi R. Lall](#), [Albert P. Wong](#), [Rohan R. Lall](#), [Cort D. Lawton](#), [Zachary A. Smith](#), [Nader S. Dahdaleh](#) 

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Abstract

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Ablation du matériel et risque mécanique



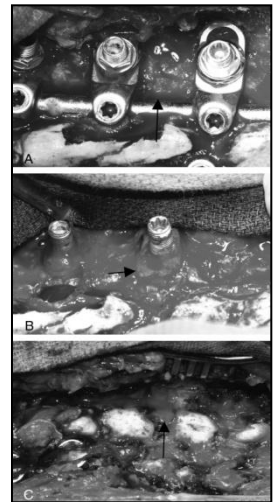
RESULTATS de la LITTERATURE

Spine (Phila Pa 1976). 2009 Jan 1;34(1):60-4. doi: 10.1097/BRS.0b013e31818ed75e.

Failure of attempted implant retention in spinal deformity delayed surgical site infections.

Hedequist D, Haugen A, Hresko T, Emans J.

Children's Hospital Boston/Harvard Medical School, 300 Longwood Avenue, Boston, MA 02114, USA. Daniel.hedequist@childrens.harvard.edu



Abstract

STUDY DESIGN: A retrospective case series.

OBJECTIVE: To determine if implant retention is possible in spinal deformity cases which present as a delayed (greater than 3 months) surgical site infection.

SUMMARY OF BACKGROUND DATA: The retention of spinal implants in deformity surgery is possible with an acute surgical site infection. Currently, the decision whether or not to retain implants in a delayed surgical site infection is unclear.

METHODS: A retrospective review of 26 cases of delayed surgical site infections after spinal deformity surgery. Data and information was recorded regarding the initial management of the surgical site infection, the number of operations performed related to the infection, and whether or not the infection could be cleared with implant retention. The number of operations, hospital days, and charges related to the treatment of the infection were recorded.

RESULTS: In this series no patient was able to clear their infection without spinal implant removal. The number of operations required to clear the infection, length of hospitalization, and financial charges were proportionate to the timing of implant removal.

CONCLUSION: Delayed surgical site infections after spinal instrumentation for deformity need to be treated with implant removal to clear the surgical site infection. Patients may require to undergo repeat instrumentation and fusion at a later date if they develop progressive deformity or symptomatic pseudarthrosis after implant removal.

2008

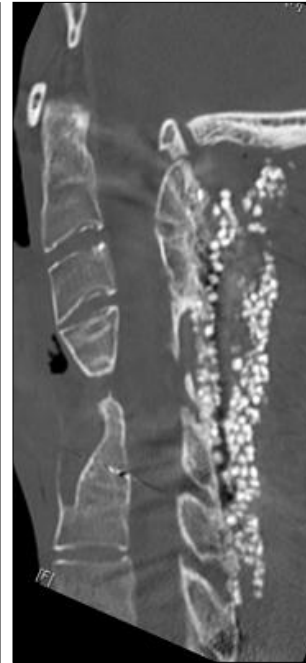
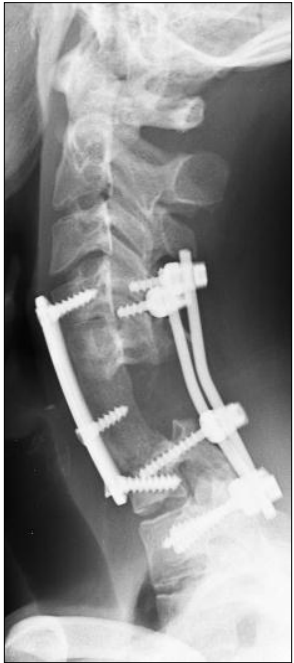
2010

2011

2012

2013

2013



AMO
antérieur

CYPHOSE, FRACTURE
MATERIEL, PSEUD.

N^{elle}
STABILISATION

SUIVI MEDICO-CHIRURGICAL

- Médecin Référent en Infectiologie/CRIOAc
 - Durée/relais/arrêt
 - Tolérance et efficacité de l'Antibiothérapie
- Chirurgien du Rachis
 - Suivi de l'instrumentation/consolidation osseuse
 - Détection complications mécaniques et/ou neurologiques
- Suivi assuré à moyen terme, **2 ans minimum**

The follow-up of patients with postoperative infection of the spine

C. Barrey • O. Launay • E. Freitas • F. Michel •
F. Laurent • C. Chidiac • G. Perrin • T. Ferry

Eur J Orthop Surg Traumatol (2013) 23 (Suppl 1):S29–S34
DOI 10.1007/s00590-013-1243-9

CONCLUSIONS

- ▶ ISO précoce: Lavage avec rétention matériel + ATB
- ▶ ISO tardive: Ablation de l'instrumentation expose parfois au risque d'instabilité et/ou perte de correction
- ▶ Prise en charge multidisciplinaire

