Hôpitaux de Lyon

Journée du CRIOA

Lyon, Domaine Rockefeller, 4 mars 2015

UNIVERSITÉ DE LYON

Infections du Site Opératoire après Instrumentation Rachidienne. Aspects Chirurgicaux.

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

CONTEXTE

- Pathologie 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…)

- **Infection précoce sur rachis instrumenté** +++

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

PubMed.gov
US National Library of Medicine
National Institutes of Health

Littérature

Orthop Traumatol Surg Res. 2011 Oct;97(6 Suppl):S107-16. doi: 10.1016/j.otsr.2011.07.002.

Infections in the operated spine: update on risk management and therapeutic strategies.

Lazennec JY, Fourniols E, Lenoir T, Aubry A, Pissonnier ML, Issartel B, Rousseau MA; French Spine Surgery Society.

World J Orthop. 2012 Nov 18;3(11):182-9. doi: 10.5312/wjo.v3.i11.182.

Management of postoperative spinal infections.

Hegde V, Meredith DS, Kepler CK, Huang RC.

Vishal Hegde, Department of Orthopedic Surgery, Weill Cornell Medical College, New York, NY 10021, United States.

Int Orthop. 2012 Feb;36(2):457-64. doi: 10.1007/s00264-011-1426-0. Epub 2012 Jan 5.

Infections in spinal instrumentation.

Gerometta A, Rodriguez Olaverri JC, Bitan F.

Lenox Hill Hospital, New York, NY 10075, USA. agerometta@wanadoo.fr

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, 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 (1)

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.

Facteurs liés à la procédure (2)

Spine (Phila Pa 1976). 2005 Jun 15;30(12):1460-5.

Risk factors for infection after spinal surgery.

Fang A, Hu SS, Endres N, Bradford DS.

Department of Orthopaedic Surgery, University of California, San Francisco, CA 94143-0728, USA.

Table 5. Intraoperative Risk Factors for All Patients

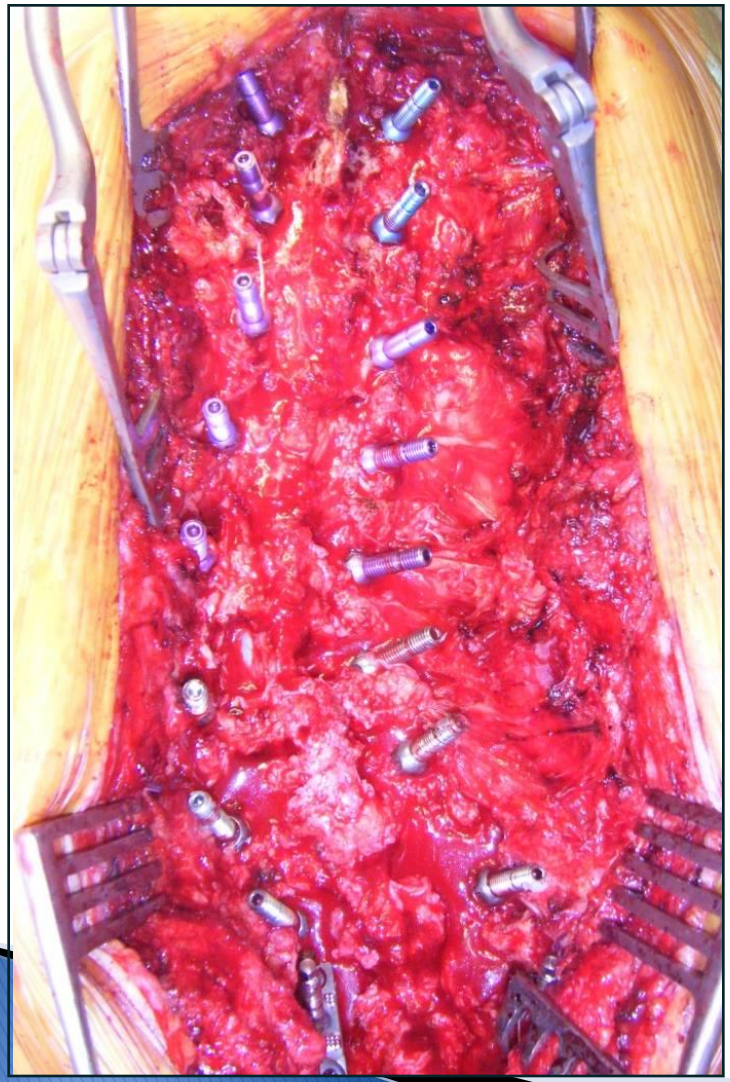
Intraoperative Risk Factor	No. of Factors in Infected Group	No. of Factors in Control Group	*P* Value	OR	95% CI
Staged procedure*	20	18	0.01	3.1	1.4–6.7
Allograft	20	35	0.59	1.22	0.60–2.5
Instrumentation	38	68	0.42	1.51	0.65–3.5
EBL (>2500cc)	24	41		Reference Category	
EBL (<1000–2500 cc)	9	29	0.17	0.53	0.21–1.3
EBL (1000 cc)	12	25	0.65	0.82	0.34–2.0
Time (>5 hs)*	36	52	0.03	2.5	1.1–5.4
Levels (≥14)	19	18		Reference Category	
Levels (7–13)*	7	22	0.03	0.30	0.10–0.89
Levels (1–6)	22	55	0.02	0.38	0.17–0.87

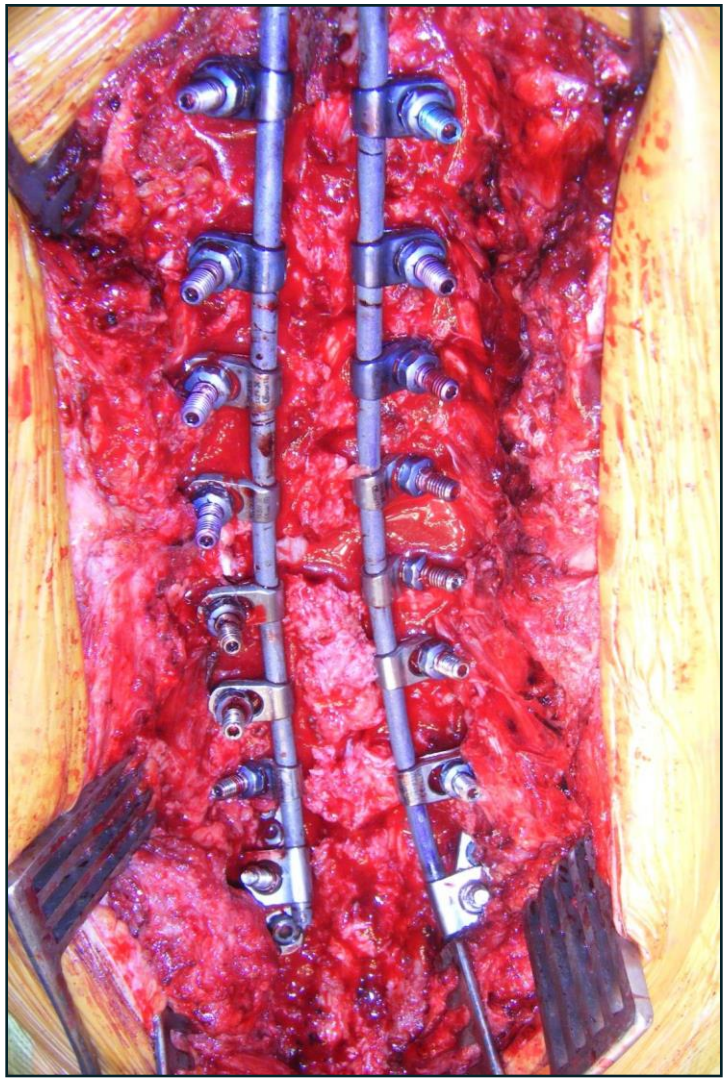
*Statistically significant.
EBL = estimated blood loss.

n=1629 chirurgies

48 ISO (2.9%) [1991-1997]

Chirurgie à risque: chirurgie postérieure instrumentée étendue





Extension au sacrum

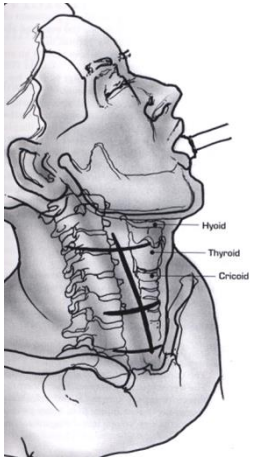
- Fréquente
  - Pathologie dégénérative
  - Déformations
- Proximité avec le périnée
- Cicatrice « malmenée »
  - Appui en position allongée
  - Orthèse
- Incontinence

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

D'après spondyloblog

Orthesia

Risque faible



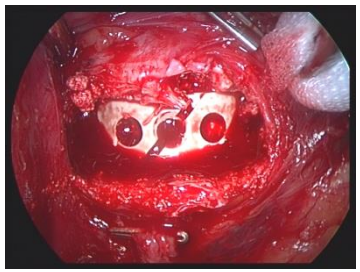
- Chirurgie cervicale antérieure (ACDF)

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

Nanda A[1], Sharma M[2], Sonig A[2], Ambekar S[2], Bollam P[2].

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]

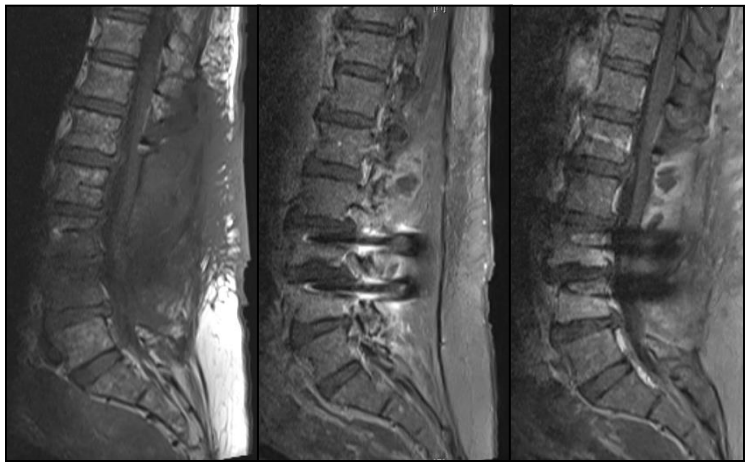
Visceral, vascular, and wound complications following over 13,000 lateral interbody fusions: a survey study and literature review.

Uribe JS[1], Deukmedjian AR.

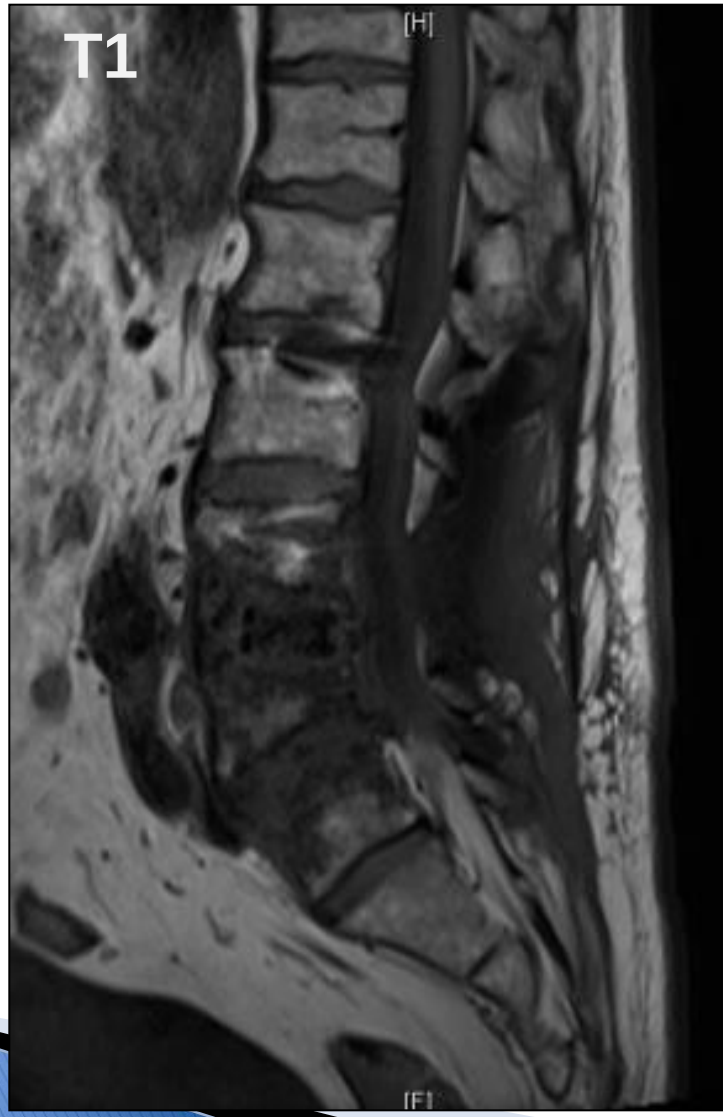
RESULTS: Between 2003 and 2013, 13,004 patients were treated with MIS-LIF by the 40 surgeons who responded to the survey. Of those patients, 0.08 % experienced a visceral complication (bowel injury), 0.10 % experienced a vascular injury, 0.27 % experienced a superficial wound infection, and 0.14 % experienced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

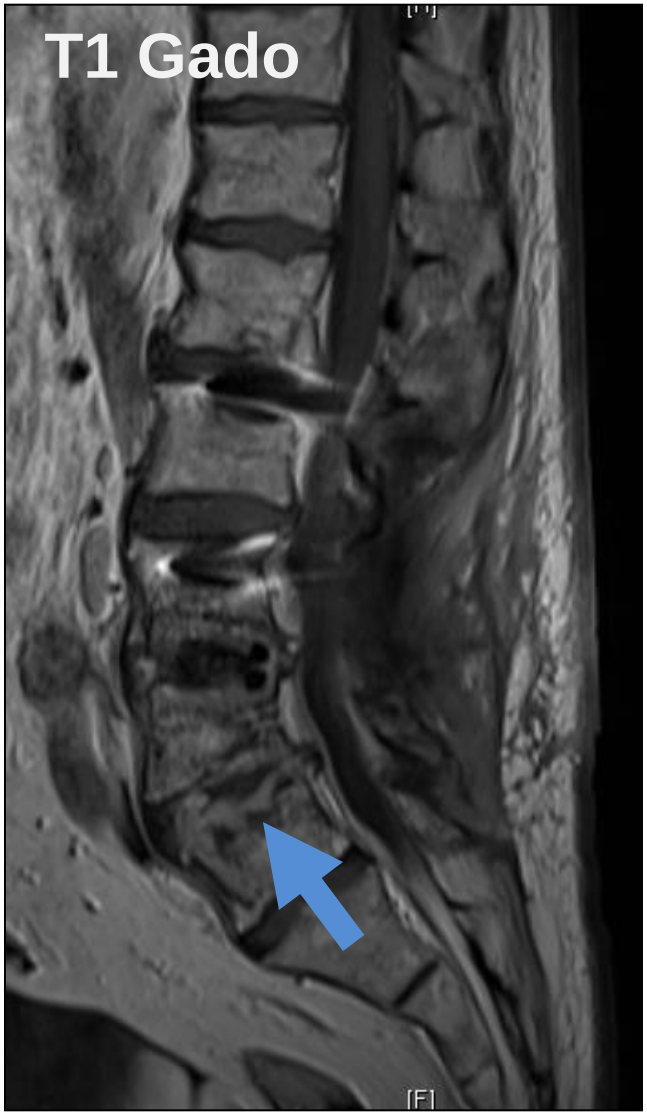
DEMARCHE DIAGNOSTIQUE

- Δ^{ic} Souvent évident en postopératoire immédiat
  - Fièvre, frissons
  - Ecoulement, désunion (signe le + fréquent)
  - Syndrome inflammatoire évolutif (CRP)
- Aucun signe spécifique
- Imagerie (peu d'intérêt en aigu)
  - RX: matériel
  - TDM/IRM: abcès
  - Inflammation locale post-op
  - Artéfacts liés au matériel



Abcès intra-discal

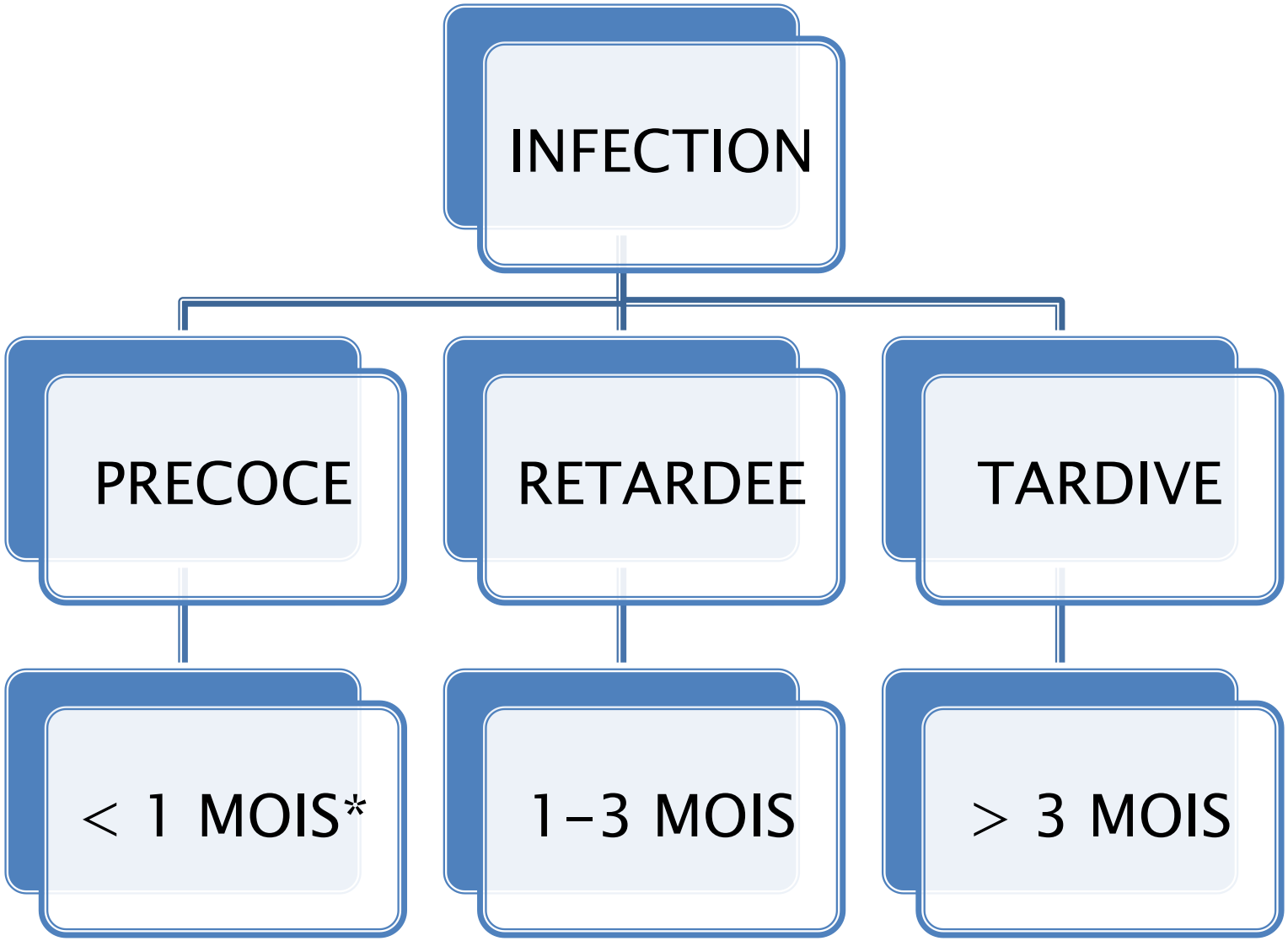




DIAGNOSTIC BACTERIOLOGIQUE

- Essentiel: IDENTIFICATION précise germes
- PLV superficiels (peu de valeur)
- Hémocultures
- Ponction-biopsie sous scanner
- UN BILAN NEGATIF N'ELIMINE PAS UN PROCESSUS INFECTIEUX

- **PRELEVEMENTS PROFONDS (au moins 4)**



* 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)

Original article

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* (%))

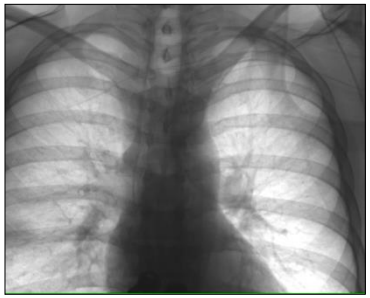
Groups	Incidence of infection	Instrumentation reserved
Acute infection	33 (3.9)*	32 (96.9)‡
Superficial infection	5 (0.6)†	5
Deep infection	28 (3.3)†	27
Delayed infection	8 (1.0)*	1 (12.5)‡
Superficial infection	1 (0.1)†	1
Deep infection	7 (0.9)†	0
P values	<0.05	<0.01

Infections précoces profondes:
70% ISO (*n=28/41*)

STRATEGIE THERAPEUTIQUE

- ATB adaptée (IV puis relais par voie orale)

- Prise en charge chirurgicale
  - Lavage-parage du foyer opératoire
  - Instrumentation
    - Matériel laissé en place
    - Remplacement en 1 temps
    - Ablation complète et définitive
    - Ablation complète et temporaire
    - Ablation partielle



Pic-line

INFECTION PRECOCE

- Reprise au bloc opératoire
- Sous AG^{ale}

- Débridement – Lavage – parage
- PLV bactério. multiples (au moins **4** PLV profonds)
- **Le matériel est LAISSE en place** +++
- Fermeture sur drainages multiples et aspiratifs

Chinese Medical Journal 2013;126 (20)

Original article

Management of postoperative instrumented spinal wound infection

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P values	<0.05	<0.01

*Correlation is significant between acute infection and delayed infection.
†Correlation is significant between superficial infection and deep infection.
‡Correlation is significant between acute infection and delayed infection

Rétention 97%

Ablation 100%

RESULTATS de la LITTERATURE

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

17 ISO (2%) / 854 Chir.

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.

OPTIONS A EVALUER (1)

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

- Staph / BMR
- Tissus nécrotiques et purulents +++
- Récidive écoulement
- Patient reste fébrile > 48H

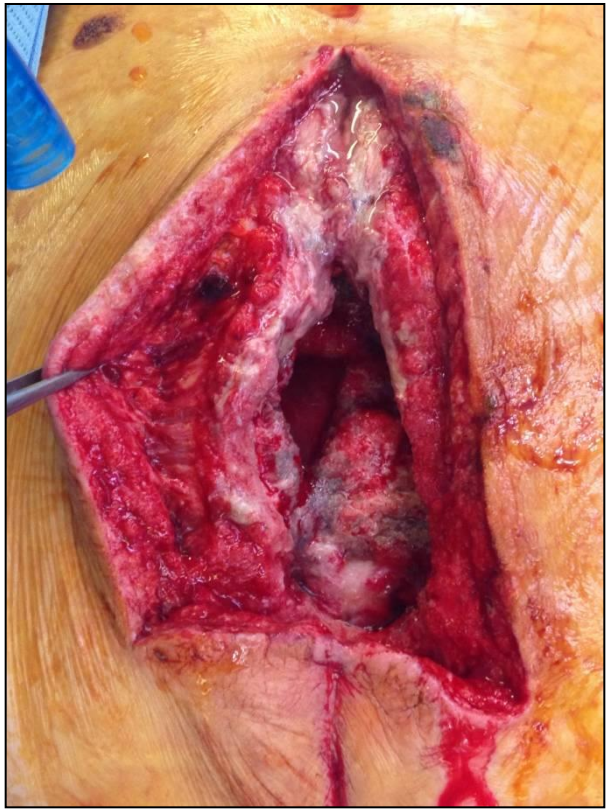
Spine J. 2013 Aug 24. pii: S1529-9430(13)00715-8. doi: 10.1016/j.spinee.2013.06.040. [Epub ahead of print]

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

Perte de Substance



OPTIONS A EVALUER (2)

- 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.

World Neurosurg. 2014 Dec 19. pii: S1878-8750(14)01404-1. doi: 10.1016/j.wneu.2014.12.033. [Epub ahead of print]

The use of vancomycin powder in modern spine surgery: systematic review and meta-analysis of the clinical evidence.

Bakhsheshian J[1], Dahdaleh NS[1], Lam SK[2], Savage JW[3], Smith ZA[4].

Abstract

BACKGROUND: Surgical Site Infections (SSIs) can lead to higher postoperative morbidity, mortality, and health care costs. Despite current prophylactic measures, SSIs rates have been reported in up to 15% of patients undergoing spine surgery. Adjunctive local application of vancomycin powder in spine surgery is a low-cost strategy to help reduce SSIs. Vancomycin is active against skin pathogens that can potentially contaminate the wound during spinal surgery. The local application of vancomycin in its powder form ensures adequate surgical site concentrations while minimizing adverse effects due to undetectable systemic distribution. However, clinical studies have produced conflicting results and the clinical evidence behind the use of vancomycin powder in modern spinal surgery practices is not clear.

PURPOSE: To examine the current clinical evidence on the utilization of vancomycin powder in spine surgery.

STUDY DESIGN: Systematic review and meta-analysis of literature METHODS: A comprehensive search of the English literature was conducted using PubMed (MEDLINE). The inclusion criteria consisted of intrawound vancomycin powder use in spine surgery as a prophylactic agent for SSIs. Studies that investigated non-spine surgeries, selected patients based on clinical suspicion or included patients with infections were excluded. Studies that compared intrawound vancomycin in spine surgery against their standard practice were pooled in the meta-analysis using a random-effects model.

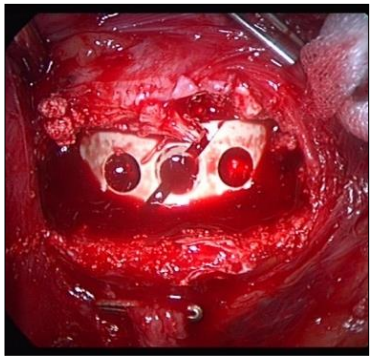
RESULTS: 671 abstracts were reviewed and 18 papers met inclusion/exclusion criteria and were included in this review. These included 1 randomized controlled trial (RCT), 13 comparative studies and 4 case series. The level of evidence in hierarchical order was: 1 level II, 13 level III and 4 level IV. Fourteen of the studies, 1 RCT and 13 comparative studies, were eligible for the meta-analysis. The odds of developing a deep infection with intrawound vancomycin powder was 0.23 times the odds of experiencing an infection without intrawound vancomycin (95 % CI 0.11-0.50, p = 0.04, I2 = 47 %). For combined superficial and deep infections the odds ratio was 0.43 (95 % CI 0.22-0.82, p = 0.14, I2 = 36 %).

CONCLUSIONS: Numerous clinical studies have confirmed the safety of using vancomycin powder in the surgical site. The pooled clinical data supports the use of vancomycin to prevent SSIs in adult spine surgeries. The majority of the supporting literature is class III evidence. Existing studies use different definitions for surgical site infections and different pre-, peri- and post-operative antibiotic regimens. Further high quality investigations should utilize standardized protocols to confirm these findings.

Infection précoce sur matériel antérieur

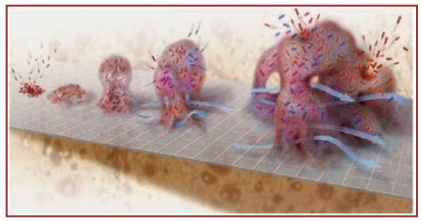
- PEC Complexe
- Peu de données
- Cages/prothèses

  ! Risque vasculaire !
- Préférable de l'enlever

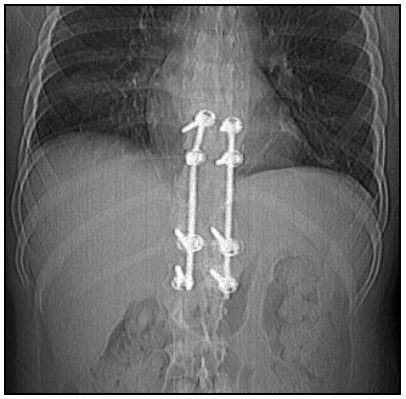


INFECTION TARDIVE

Biofilm

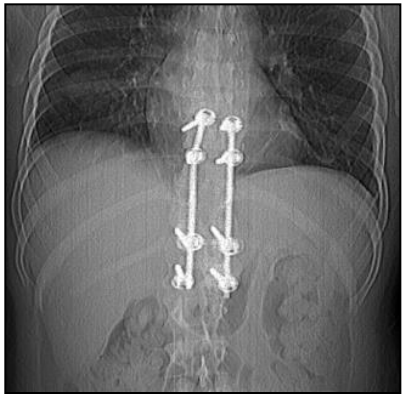
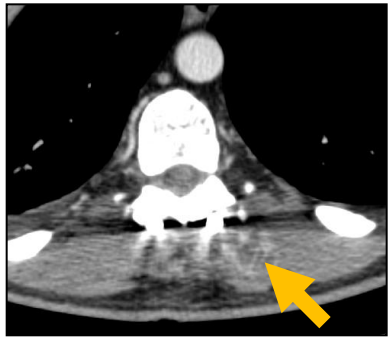


ABLATION DE L'INSTRUMENTATION



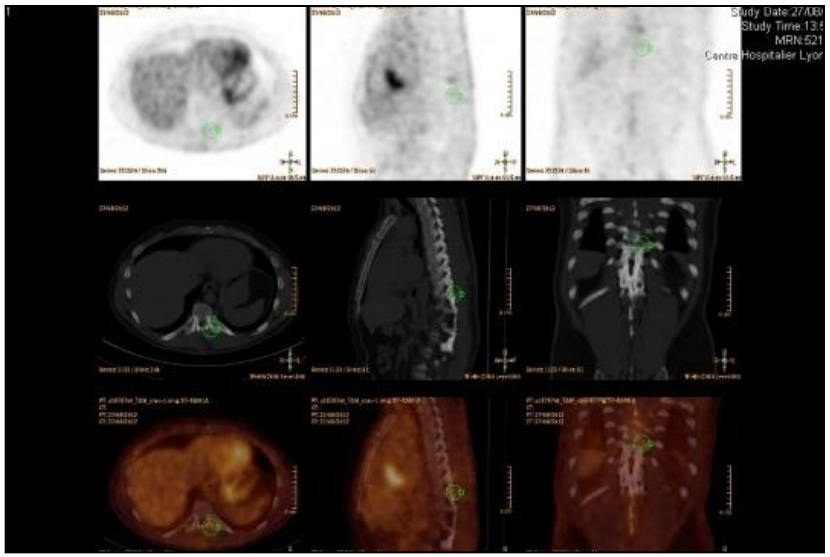
- Situation idéale:
  - Rachis stable et consolidé
  - Ablation matériel facile
- Situations délicates:
  - Rachis instable
  - Rachis non consolidé
  - Matériel difficile d'accès

Chirurgie il y a 15 ans (fracture rachis)
Tableau septique
Hemoc + à Staph Meti-S

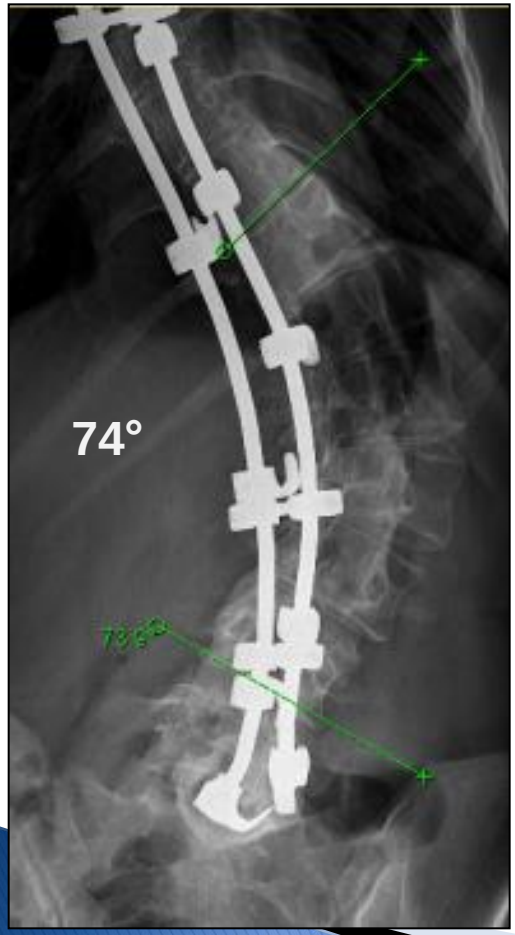




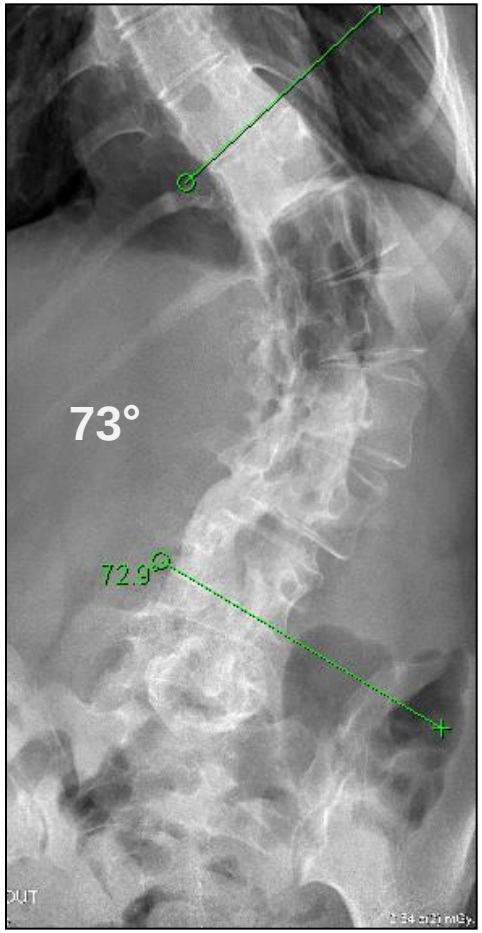



Ablation du matériel et risque mécanique (1)

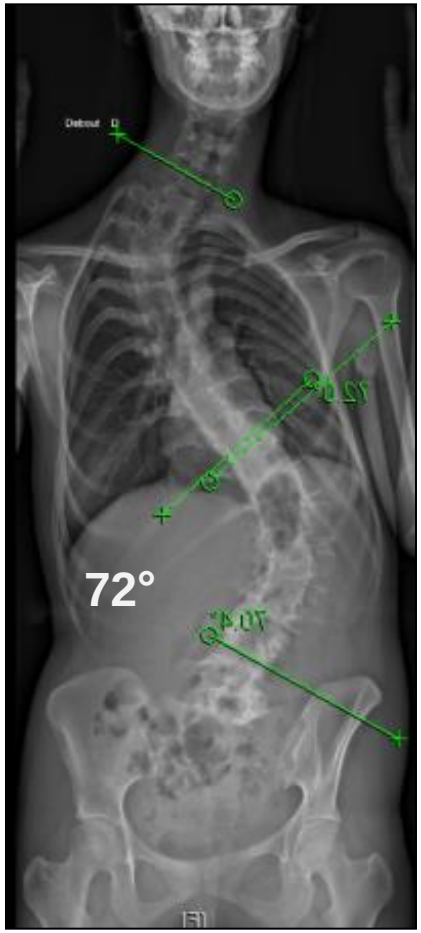
JUILLET 2011



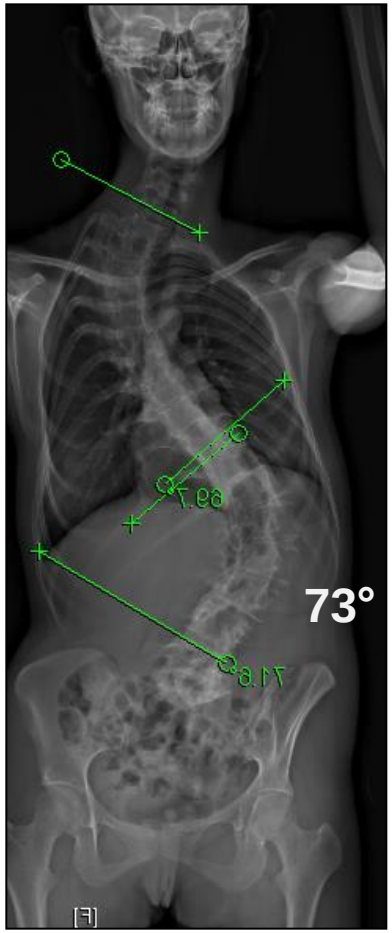
NOV 2012



MARS 2013



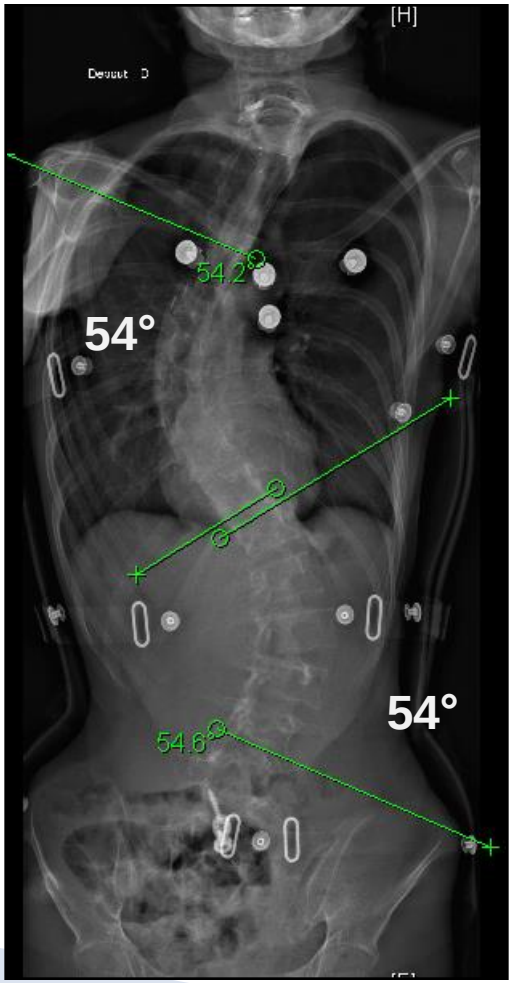
SEPT 2013



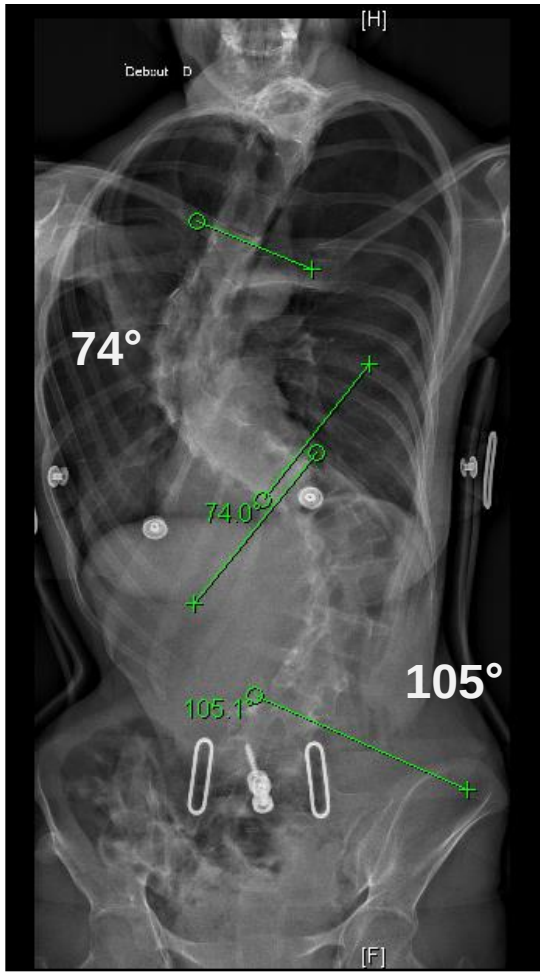
Ablation du matériel et risque mécanique (2)

JUIN 2011

JUILLET 2011

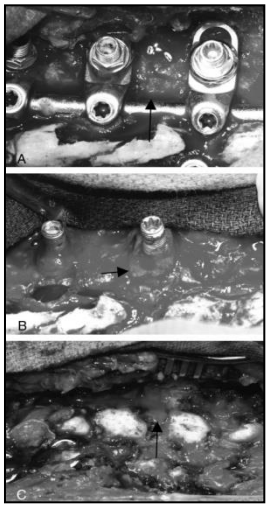


JANV 2013



Ablation du matériel et risque mécanique (3)

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.

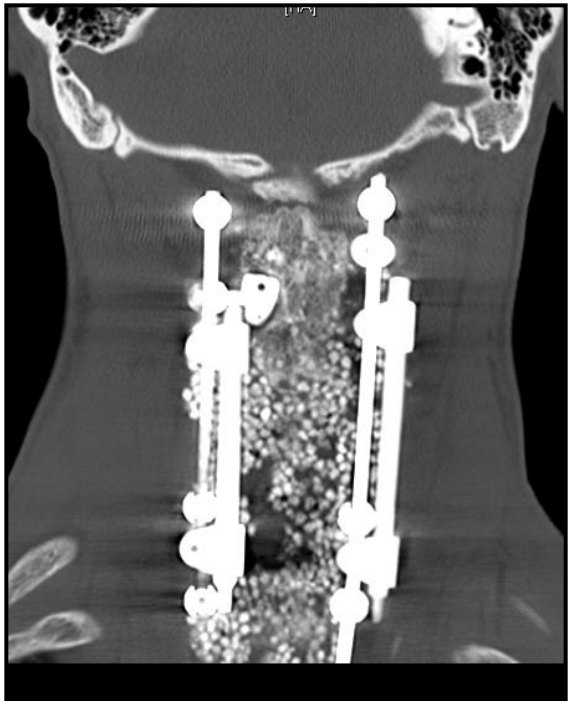
2008 2010 2011 2012 2012 2012

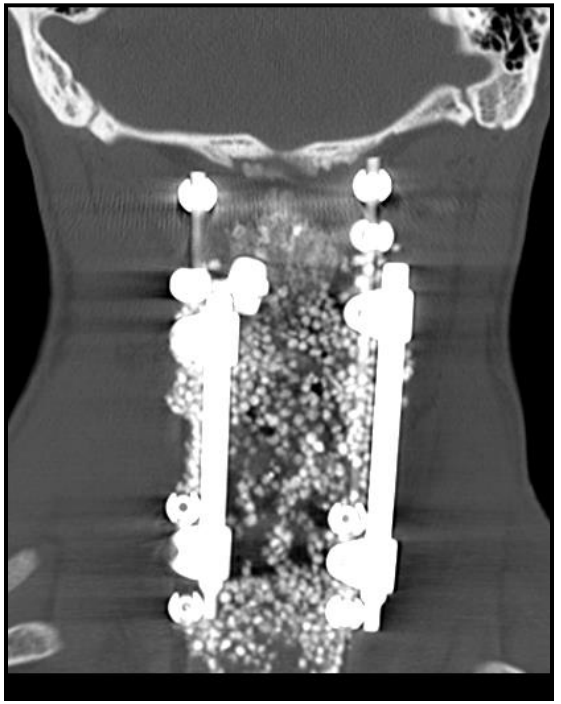
AMO antérieur

CYPHOSE, FRACTURE MATERIEL, PSEUD.

N^elle STABILISATION

2014

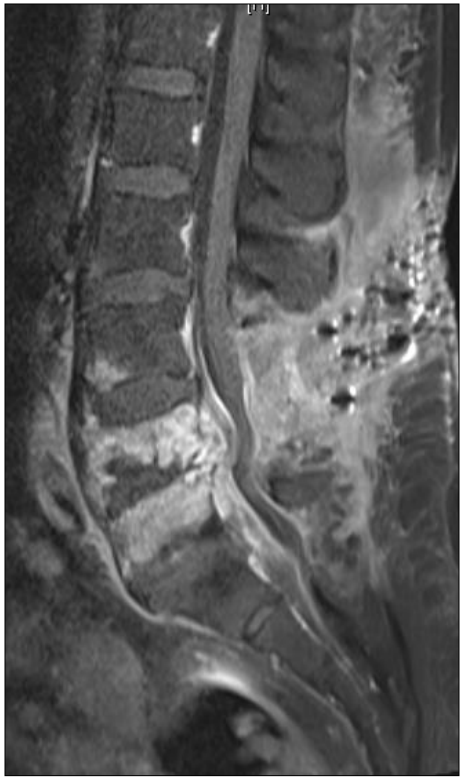




RACHIS INSTABLE

- Orthèses
- Changement d'instrumentation
- Instrumenter le rachis en « pontant » la zone infectée
- Réimplantation à distance
  - Délai ?
  - Pas de consensus

Rachis instable avec menace neurologique

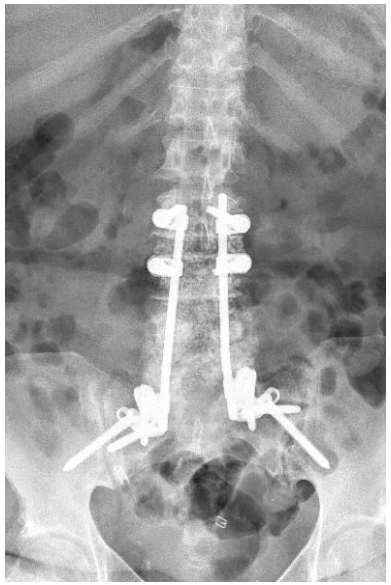


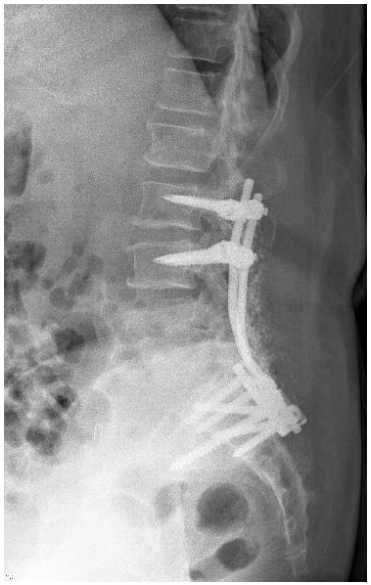
Déficit L4 + L5 bilatéral

J0 (Biopsie)

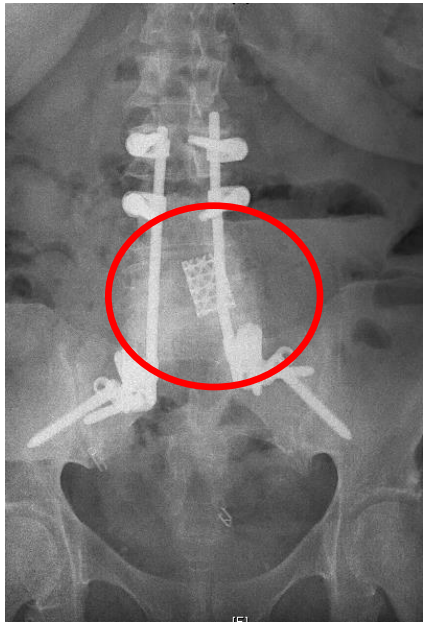
3 MOIS (post)

+

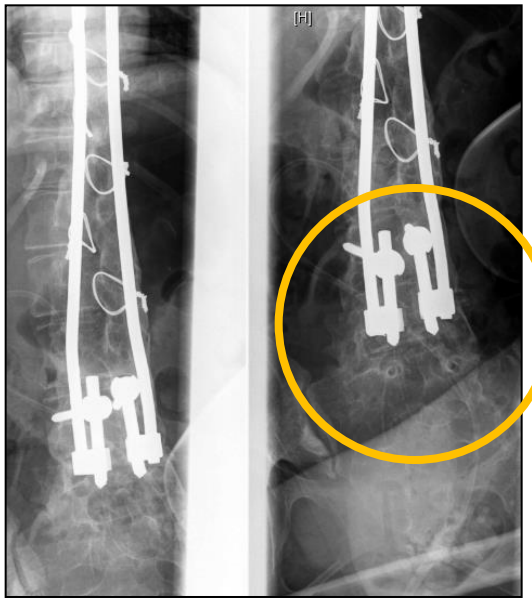


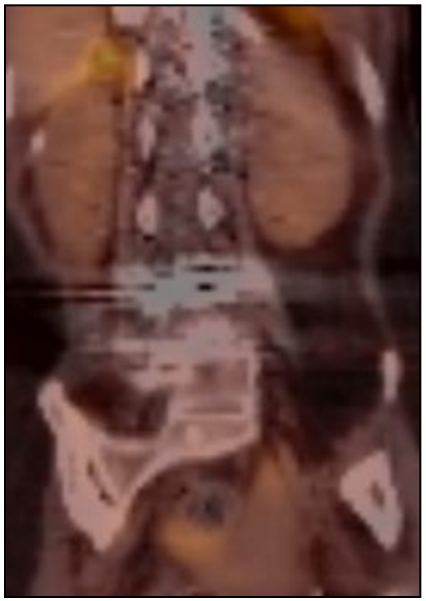


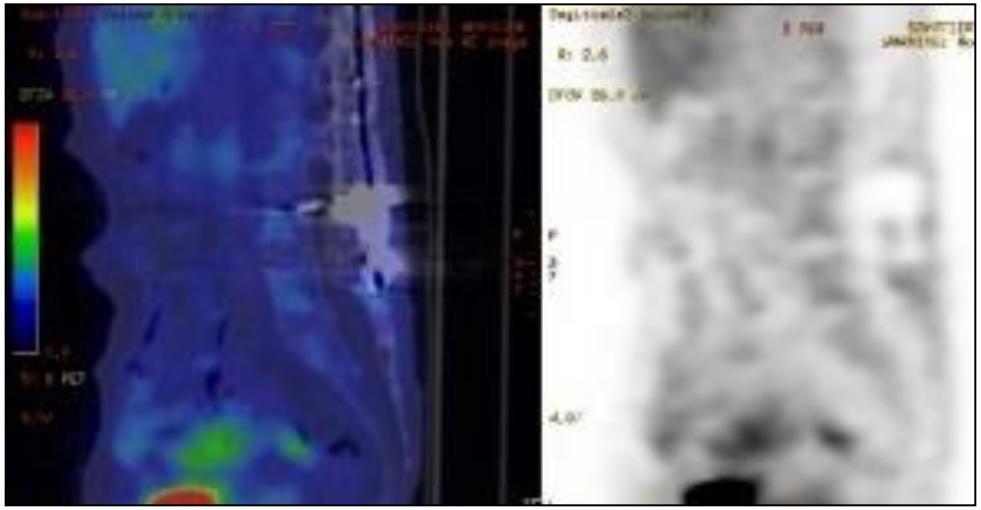
10 MOIS (ant)



Place pour AMO partielle ?







fistule

SUIVI MEDICO-CHIRURGICAL

- Référent en Infectiologie/CRIOAc
  - Durée/relais/arrêt
  - Tolérance
  - Efficacité de l'ATB thérapie
- Chirurgien du Rachis
  - Suivi de l'instrumentation/consolidation osseuse
  - Détection complications mécanique et/ou neurologiques
- Suivi assuré à moyen terme, 2 ans minimum

CONCLUSIONS

- Variabilité des situations cliniques
- Prise en charge complexe
- Infection précoce: rétention matériel + ATB
- Ablation de l'instrumentation expose parfois au risque neurologique et/ou mécanique
- Prise en charge multidisciplinaire
  - Infectiologue spécialisé en IOA
  - Microbiologiste
  - Chirurgien du rachis