Antibioprophylaxie locale péri-opératoire

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Principes de l'antibioprophylaxie

- Efficacité : prévention ISO et conséquences (mortalité, morbidité, durée séjour, coût)
- Activité sur les bactéries pathogènes en cause
- Délai et posologie appropriés, concentration suffisante plasma et tissu
- Durée courte
- Absence d'effets secondaires
- Absence d'impact sur la résistance bactérienne
- Coût

Bratzler DW et al, Am J Health Syst Pharm 2013

- Voie iv ou orale recommandée pour la plupart des interventions (exception : chirurgie ophtalmologique)
- Efficacité ATBP locale : données limitées
- Années 1980 :

ATBP locale > placebo

ATBP locale ≈ ATBP systémique

ATBP locale et systémique ≈ ATBP systémique

- Etudes de haute qualité nécessaires

Bratzler DW et al, Am J Health Syst Pharm 2013

Recommandations Formalisées d'Experts

SFAR

Actualisation de recommandations

Antibioprophylaxie en chirurgie et médecine interventionnelle.
(patients adultes)

2018

Recommandations Formalisées d'Experts

SFAR

Note importante pour les prescripteurs

Les recommandations proposées ne peuvent pas couvrir l'ensemble des situations cliniques. Certaines pratiques n'ont pas fait l'objet d'une évaluation scientifique comme l'irrigation ou l'application locale d'antibiotiques en peropératoire. Des publications à venir préciseront plus avant la conduite à tenir pour ces situations peu claires.

En l'absence de recommandations spécifiques pour une situation donnée, les praticiens peuvent, en évaluant le rapport bénéfice/risque, prescrire une ABP en se rapprochant au plus près des pathologies ou techniques similaires.

Exception : chirurgie ophtalmologique

Acte chirurgical	Produit	Dose initiale	Posologie et durée
Chirurgie à globe ouvert autre que cataracte avec facteur de risque (*cf supra*)	Lévofloxacine per os	500 mg	1 cp 12 h avant + 1 cp 2 à 4 h avant
Cataracte*	Injection intra-camérulaire de céfuroxime*	1 mg dans 0,1 ml	En fin d'intervention.
Traumatisme à globe ouvert	Lévofloxacine	500 mg	500 mg IV à J1 + 500 mg per os à J2
Plaies des voies lacrymales	Péni A + IB**	2g	réinjection de 1g si > 2 h
Ponction de la chambre antérieure	Pas d'ABP		
Ponction de liquide sous rétinien	Pas d'ABP		
Chirurgie à globe fermé	Pas d'ABP		
Injections intravitréennes	Pas d'ABP		

SFAR

* Pour la chirurgie de la cataracte avec et sans facteur de risque, une injection unique dans la chambre antérieure de céfuroxime (1 mg) a une AMM depuis 2014.

Table 2. Potential Advantages and Disadvantages of Using Topical Antimicrobial Therapy for Infected Chronic Wounds

Advantages	Disadvantages
High and sustained concentration of antimicrobial at the site of infection	Few agents have been proven to be effective in clinical trials
Limited total amount of antimicrobial needed	Minimal penetration limits use to open wounds without cellulitis or deep soft-tissue spread of infection
Limited potential for systemic absorption and toxicity	Systemic absorption of some agents may occur if used on large wounds
Can use novel agents not available for systemic use	Some cause local hypersensitivity or contact dermatitis reactions
May enable avoidance of using systemic antibiotics, thereby reducing development of antibiotic resistance	May interfere with wound healing processes
Directs attention of both patient and providers to the wound	Possible alteration of normal cutaneous flora
Easily applied as outpatient, by patient or caregiver, potentially reducing the need for institutional care	Difficult to accurately dose
Often better adherence to treatment, especially for children	Frequent reapplications may be needed
	May be difficult to apply or esthetically unacceptable to some patients
	Can become contaminated during recurrent use of multidose container

Lipsky BA et al, Clin Infect Dis 2009

Journal of Antimicrobial Chemotherapy

The role of topical antibiotics used as prophylaxis in surgical site infection prevention

Des données solides ?

Table 1. Comparative studies showing a statistically significant reduction in SSI rates through prophylactic use of topical of local antibiotics

Surgical specialty	Operation	Study type	Intervention	Significant finding	Reference
Abdominal surgery	colorectal	randomized controlled trial of 221 patients	gentamicin/collagen sponge	reduction from 18.4% to 5.6%	30
	emergency Caesarean section	non-randomized prospective study of 70 patients	fusidic acid	reduction from 17.1% to 2.8%	32
Orthopaedic surgery	hip arthroplasty	meta-analysis of 35659 patients	antibiotic-impregnated bone cement	reduction from 2.3% to 1.2%	46
	debridement and stabilization of compound limb fractures	retrospective observational study of 1085 patients	gentamicin-impregnated beads	reduction from 12% to 3.7%	47
Cardiothoracic surgery	patients undergoing sternotomy	randomized controlled trial of 416 patients	vancomycin	reduction from 3.6% to 0.45%	61
		randomized controlled trial of 2000 patients	gentamicin/collagen sponges	reduction from 9% to 4.3%	55
	patients undergoing lung resection	retrospective observational study of 504 thoracotomies	irrigation of the pleural space with fusidic acid	reduction in empyema from 6.4% to 1%	62
		retrospective observational study of 93 thoracotomies	intracavitary irrigation with penicillin, gentamicin and bacitracin	reduction in empyema from 13% to 0%	63
Dermatological surgery	patients undergoing clean skin lesion excision	randomized controlled trial of 1014 patients	chloramphenicol ointment applied to the surgical site	reduction from 11% to 6.6%	69
Breast surgery	patients undergoing breast augmentation	retrospective observational study of 436 patients	irrigation of the implant pocket with cefalotin solution	reduction from 12.8% to 6.7%	76
Ocular surgery	post-cataract surgery	retrospective observational study of 7260 patients	intracameral cefazolin	reduction in endophthalmitis from 0.63% to 0.055%	85
		retrospective observational study of 13886 cases	administration of differing subconjunctival antibiotics	reduction in endophthalmitis from 0.179% to 0.011%	86

McHugh SM et al, JAC 2011

Myths and Legends in Orthopaedic Practice

Are We All Guilty?

Une pratique fréquente …

Table 1. Summary of results

Practice	Surgeons following the practice		Surgeons not aware of existing literature on the topic		Surgeons who follow the practice and believe there is literature to support it		Surgeons who do not follow the practice and believe there is literature to support them doing so		Surgeons claiming knowledge of literature and do not follow the common practice	
	Academic surgeons	Community surgeons	Academic surgeons	Community surgeons	Academic surgeons	Community surgeons	Academic surgeons	Community surgeons	Academic surgeons	Community surgeons
Blade Change	47%	69%*	81%	83%	30%	10%	9%	29%*	26%	63%
Bending the knee with tourniquet	68%	83%*	68%	77%	32%	27%	31%	0%	32%	0%*
DVT and bed rest	71%	68%	51%	67%	52%	38%	48%	30%	67%	67%
Antibiotics in irrigation	36%	57%*	32%	27%	67%	55%	77%	80%	68%	63%
Hip precautions	86%	96%*	37%	30%	65%	71%	50%	67%	12.1%	6.5%
Antibiotics for wound drainage	45%	41%	47%	50%	44%	50%	50%	50%	63%	61%
Hardware removal in pediatrics	45%	53%	66%	58%	44%	30%	27%	55%*	44%	63%
Operative time and infection	90%	91%	26%	26%	76%	79%	50%	25%	6%	3%
Avoiding dressing changes	43%	67%*	81%	84%	24%	22%	15%	6%	44%	14%

*$p < 0.05$; DVT = deep venous thrombosis.

Tejwani NC et al, Clin Orthop Relat Res 2008

Revue non exhaustive

- Chirurgie orthopédique
- Chirurgie vasculaire
- Chirurgie cardiaque
- Chirurgie digestive
- Neurochirurgie

Non couverts : décontamination préopératoire, pratiques post opératoires (drains, redons, …)

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Antibiotic prophylaxis in total hip arthroplasty

Effects of antibiotic prophylaxis systemically and in bone cement on the revision rate of 22,170 primary hip replacements followed 0–14 years in the Norwegian Arthroplasty Register

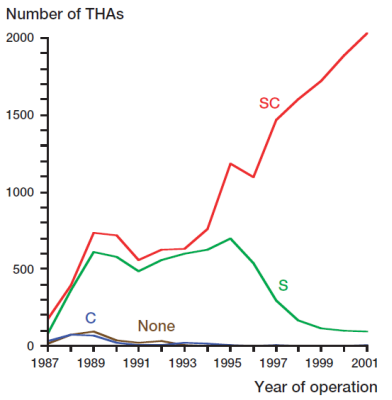
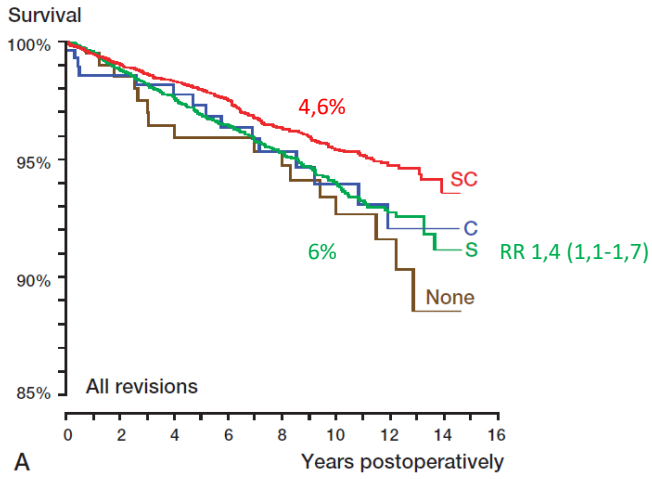


Figure 1. Number of THAs performed annually from 1987 to 2001 in those receiving antibiotic prophylaxis systemically and in cement (SC), only systemically (S), only in cement (C) or no antibiotic prophylaxis (None).



Engesaeter LB et al, Acta Orthop Scand 2003

Efficacy of antibiotic-impregnated cement in total hip replacement

Citation	Lower	Upper	n (total)	P-value	Antibiotic	Non-antibiotic	Effect
Espehaug (1997)	0.158	0.634	10905	0.001	11 / 6043	28 / 4862	0.316
Josefsson (1990)	0.178	1.038	1409	0.053	7 / 711	16 / 698	0.430
Josefsson (1993)	0.290	1.564	1115	0.36	9 / 565	13 / 550	0.674
Lieberman (1994)	0.168	16.908	35	0.65	2 / 19	1 / 16	1.684
Lynch (1987)	0.020	1.779	303	0.10	1 / 194	3 / 109	0.187
Lynch (1987)	0.382	2.501	1075	0.96	7 / 424	11 / 651	0.977
McQueen (1987)	0.047	5.567	295	0.57	1 / 146	2 / 149	0.510
Random combined	0.341	0.751	15137	0.001	38 / 8102	74 / 7035	0.506

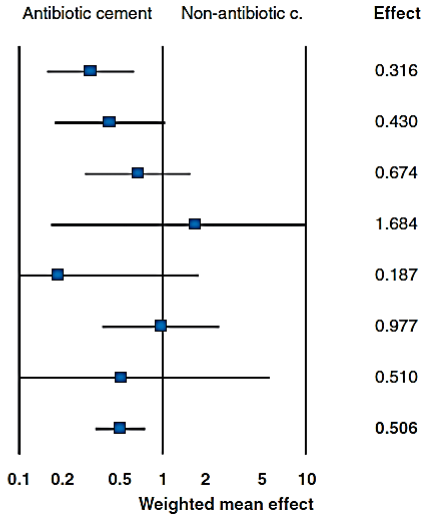


Figure 1. Forest plot showing the weighted mean effect (with 95% confidence intervals) of antibiotic cement in reducing the risk of infection in primary total hip arthroplasty. In the graph, values of less than 1 indicate increasing effectiveness

Parvizi J et al, Acta Orthop 2008

Implication dans la prévention et le traitement des infections de prothèses

- **Efficacité des combinaisons d'antistaphylocociques** au cours des infections à Staphylocoque
- **Concentration locale élevée** lorsque la vancomycine, la gentamicine ou la clindamycine sont utilisés avec des ciments PMMA, **surtout dans les formes combinées (G+C)**
- **Synergie** *in vitro* vancomycine et gentamicine
- **Bactéricidie extracellulaire** de la gentamicine
- **Bactéricidie intracellulaire** de la clindamycine
- **Intérêt potentiel des ciments aux antibiotiques (G+V, G+C):**
  - En prévention dans le cadre de révision prothétiques particulièrement à risque de « *superinfection* »
  - En traitement curatif dans le cadre des infections de prothèses chroniques à staphylocoques

Crédit : T. Ferry

HAS
HAUTE AUTORITÉ DE SANTÉ

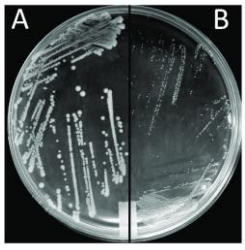
REVISION DE CATEGORIES HOMOGENES DE DISPOSITIFS MEDICAUX

Evaluation des
ciments avec ou sans antibiotiques
pour la fixation des implants articulaires

Date de validation par la CNEDiMTS: 20 décembre 2016

- Dans le cadre d'une arthroplastie primaire et d'une reprise aseptique de hanche ou de genou, le groupe recommande l'utilisation préférentielle des ciments avec gentamicine par rapport aux ciments sans antibiotique. Cette recommandation est fondée sur les données de la littérature relatives aux registres ainsi que sur leur pratique clinique ;

- Dans le cadre d'une reprise septique, une décision pluridisciplinaire est recommandée. Le choix du type de ciment (avec ou sans gentamicine) peut être lié à la sélection du germe, à des raisons microbiologiques ou mécaniques.



Sélection de SCV de *S. aureus* par les billes de gentamicine?

iants and normal colony type of *Staphylococcus aureus* in patients with or without previous local gentamicin

		Previous local gentamicin therapy	Other previous systemic antibiotics	Auxotroph	Cause of osteomyelitis	Recurrence of osteomyelitis*
.	..	No	PenG, Ctax, Cm, Cpfx	No	Postoperative	No
2	n	No	None	No	Hematogenous	No
3	n	No	Cm	No	Contiguous	No
4	n	No	None	No	Posttraumatic	No
5	n	No	None	No	Hematogenous	No
6	n	No	None	No	Hematogenous	No
7	n	No	Oxa	No	Posttraumatic	No
8	n	No	None	No	Hematogenous	No
9	n	No	Ctax	No	Postoperative	No
10	n	No	Amox/CA	No	Contiguous	No
11	SCV	Yes	Vm, Cfur	Hemin	Postoperative	Yes
12	SCV, n	Yes	Cm	Hemin	Postoperative	Yes
13	SCV, n	Yes	Vm	Hemin	Posttraumatic	Yes
14	SCV, n	Yes	Oxa, Ctax, Cm	Menadione	Postvaccination	Yes

NOTE. Amox/CA = amoxicillin/clavulanic acid; Cfur = cefuroxime; Cm = clindamycin; Cpfx = ciprofloxacin; Ctax = cefotaxime; n = normal; Oxa = oxacillin; PenG = penicillin G; SCV = small colony variant; Vm = vancomycin.
* Relapse of osteomyelitis occurring more than 1 year after primary diagnosis and treatment.

Von Eiff C et al, Clin Infect Dis 1997

Revue non exhaustive

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- Chirurgie vasculaire
- Chirurgie cardiaque
- Chirurgie digestive
- Neurochirurgie

Non couverts : décontamination préopératoire, pratiques post opératoires (drains, redons, …)

Résistance de *S. aureus* à la rifampicine, Henri Mondor 2005-2006

	Chirurgie vasculaire	Henri Mondor
N global de souches	77	1825
N de souches Rifamp-R	14 (18%)	109 (6%) P<0.0001
N de souches Méti-R	20 (25%)	493 (27%)
N de souches Rifamp-R	8 (40%)	94 (19%)
N de souches Méti-S	57 (75%)	1332 (73%)
N de souches Rifamp-R	5 (9%)	20 (1,5%) P=0.003

Consommation de rifampicine injectable, Henri Mondor 2005

UA	Quantité consommée
Bloc chirurgie vasculaire	718
Bloc Neurochirurgie	20
Bloc chir	
Bloc con	
Réanimation médicale	416
Réanimation neurochirurgie	287
Service chirurgie vasculaire	44
Total	2387

Bloc et Service Vasculaire = 32% de la consommation globale

Prophylactic antibiotics in vascular surgery: topical, systemic, or both?

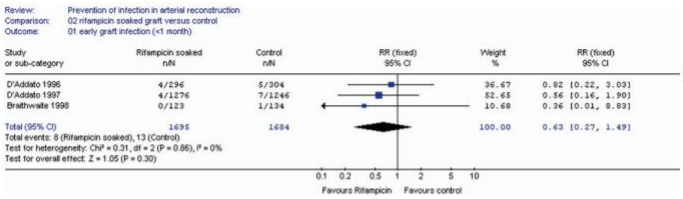
TABLE 2. *Incidence of Groin Wound Infection by Route of Prophylactic Antibiotic Administration*

	Antibiotic Prophylaxis				
	I No Antibiotic	II Topical Cephradine	III Intravenous Cephradine	IV Topical and IV Cephradine	All Groups
Patient infections					
infections*/patients	13/53	0/46	0/55	3/51	16/205
patients infected (%)	24.5%	0%†	0%‡	5.9%†‡§	7.8%
Incisional infections					
infections*/incisions	14/62	0/54	0/56	3/59	17/231
incisions infected (%)	22.6%	0%†	0%‡	5.1%*†‡§	7.4%

* Grade II or III groin wound infection.
† $p < 0.01$, no antibiotic vs topical (I vs II or I vs II and IV).
‡ $p < 0.01$, no antibiotic vs intravenous (I vs III or I vs III and IV).
§ $p < 0.01$, no antibiotic vs topical and intravenous (I vs IV).

Pitt HA et al, Ann Surg 1980

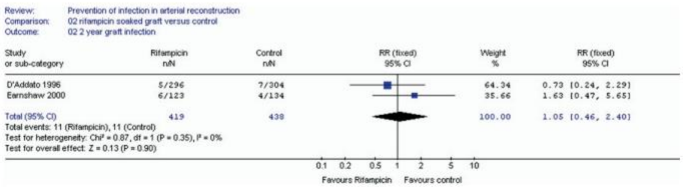
Prothèses artérielles imprégnées de rifampicine



Tendance à 1 mois

RR 0,63 (0,27-1,49)

Fig 4. Review of studies comparing the effect of rifampicin-soaked graft vs control on early graft infection (<1 month) after arterial reconstruction. *RR* = Relative risk; *CI* = confidence interval.



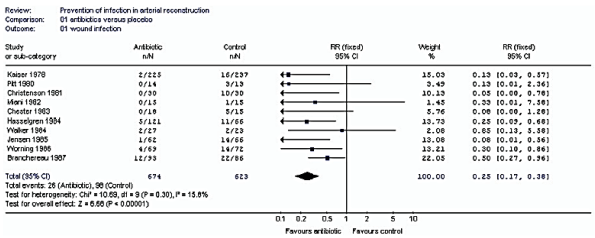
Aucune différence à 2 ans

RR 1,05 (0,46-2,40)

Fig 5. Review of studies comparing the effect of rifampicin-soaked graft vs control on graft infection at 2 years after arterial reconstruction. *RR* = Relative risk; *CI* = confidence interval.

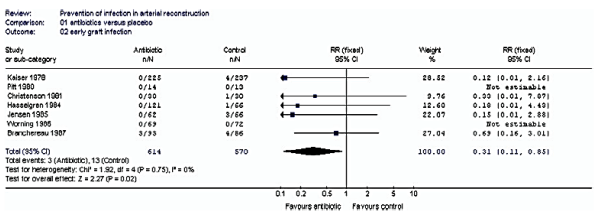
Stewart AH et al, J Vasc Surg 2007

Antibioprophylaxie systémique, prothèses artérielles



RR 0,25 (0,17-0,38)

Fig 1. Review of studies comparing the effect of antibiotics vs placebo on the outcome of wound infection after arterial reconstruction. *RR* = Relative risk; *CI* = confidence interval.



RR 0,31 (0,11-0,85)

Fig 2. Review of studies comparing the effect of antibiotics vs placebo on early graft infection after arterial reconstruction. *RR* = Relative risk; *CI* = confidence interval.

Stewart AH et al, J Vasc Surg 2007

CLINICAL PRACTICE GUIDELINE DOCUMENT

Editor's Choice – European Society for Vascular Surgery (ESVS) 2020 Clinical Practice Guidelines on the Management of Vascular Graft and Endograft Infections☆

Table 9. *In situ* reconstruction with rifampicin bonded grafts for

Author	Publication date	Study type	*n*	Rifampicin dose – mg/ml	Foll up – n
Torsello *et al.*[158]	1997	Retrospective	11	60	33
Hayes *et al.*[156]	1999	Retrospective	11	45–60	12
Young *et al.*[155]	1999	Retrospective	25	1	36
Bandyk *et al.*[157]	2001	Retrospective	19	45–60	17
Oderich *et al.*[144]	2006	Retrospective	52	2.4	41
Batt *et al.*[198]	2011	Retrospective	8	NA	41
Schaefers *et al.*[274]	2018	Retrospective	10	NA	27

Recommendation 40

For patients with abdominal aortic vascular graft/endograft infection, cryopreserved allografts, silver coated grafts, rifampicin bonded polyester grafts, or bovine pericardium should be considered as alternative solutions.

Class	Level	References
IIa	C	Batt *et al.* (2018),[17] Spiliotopoulos *et al.* (2018),[66] Dorigo *et al.* (2003),[69] Dorweiler *et al.* (2014),[142] Heinola *et al.* (2016),[143] Ali *et al.* (2009),[145] Harlander-Locke *et al.* (2014),[148] O'Connor *et al.* (2006),[180] Rodrigues dos Santos *et al.* (2014)[200]

Chafké N et al, Eur J Vasc Endovasc Surg 2020

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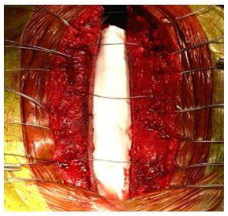
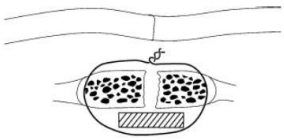
Non couverts : décontamination préopératoire, pratiques post opératoires (drains, redons, …)

La saga des éponges de gentamicine

Introduction





Antibioprophylaxie *in situ*

- Eponge de collagène imprégnée de gentamicine
- Fin de chirurgie en rétro-sternal

Avantages théoriques:

- Action locale d'un ATB large spectre
- Concentrations importantes d'ATB
- Action prolongée
- Réduction de l'impact écologique

Crédit G. Birgand

Des premiers résultats favorables : RCT bi-centrique en Suède

Outcome	Control (n = 967) no. (%)	Treatment (n = 983) no. (%)	RR (95% CI)	*p* Value
Primary end-point				
All SWIs	87 (9.0)	42 (4.3)	0.47 (0.33 to 0.68)	<0.001
Treatment				
Antibiotic treatment	174 (18.0)	114 (11.6)	0.64 (0.52 to 0.80)	<0.001
Surgically treated SWI[a]	38 (3.9)	21 (2.1)	0.54 (0.32 to 0.92)	0.021
Bacterial etiology				
Staphylococcus aureus	20 (2.1)	8 (0.8)	0.39 (0.17 to 0.89)	0.020
Coagulase-negative staphylococci	33 (3.4)	11 (1.1)	0.33 (0.17 to 0.65)	<0.001
Gram-negative bacteria	4 (0.5)	1 (0.1)	—	0.21
Other bacteria or multiple species	15 (1.6)	10 (1.0)	0.66 (0.30 to 1.45)	0.29
Missing or negative bacterial samples	15 (1.6)	13 (1.3)	0.85 (0.41 to 1.78)	0.67
Subclassifications				
Probable SWI	32 (3.3)	15 (1.5)	0.46 (0.25 to 0.84)	0.010
Definite SWI	55 (5.7)	27 (2.7)	0.48 (0.31 to 0.76)	0.001
All superficial SWI	55 (5.7)	19 (1.9)	0.34 (0.20 to 0.57)	<0.001
Depth 1	14 (1.4)	8 (0.8)	0.56 (0.24 to 1.33)	
Depth 2	41 (4.2)	11 (1.1)	0.26 (0.14 to 0.41)	
All deep SWI	32 (3.3)	23 (2.3)	0.71 (0.42 to 1.20)	0.20
Depth 3	17 (1.8)	10 (1.0)	0.58 (0.27 to 1.26)	
Depth 4	15 (1.6)	13 (1.3)	0.85 (0.41 to 1.78)	
General outcome				
Hospital mortality	10 (1.0)	11 (1.1)	1.08 (0.46 to 2.54)	0.85
Total 60-day mortality	17 (1.8)	19 (1.9)	1.10 (0.57 to 2.10)	0.77
Early reoperation for bleeding	22 (2.3)	39 (4.0)	1.74 (1.04 to 2.91)	0.032
Postop hemodialysis[b]	10 (1.0)	10 (1.0)	0.98 (0.41 to 2.35)	0.97
Postop rise in serum creatinine, median μmol/L	5.1	7.8		0.28
Mechanical ventilation more than 48 hours	25 (2.6)	31 (3.2)	0.82 (0.49 to 1.38)	0.45

Friberg O et al,
Ann Thorac Surg 2005

Sans impact écologique négatif ?

Table 1 Primary causative bacterial agents of sternal wound infections and the relative incidence of each agent in the treatment (local gentamicin prophylaxis) and control groups

Bacterial agent	Treatment group (n=983)		Control group (n=967)		RR (95%CI)
	Number (%)	Percent infections within treatment group	Number (%)	Percent infections within control group	
S. aureus	7 (0.71)	16.7	21 (2.17)	24.1	0.33 (0.14–0.77)
CoNS	14 (1.42)	33.3	35 (3.62)	40.2	0.39 (0.21–0.73)
Gram-negative bacteria	1 (0.10)	2.4	4 (0.41)	4.6	0.25 (0.03–2.20)
P. acnes	7 (0.71)	16.7	6 (0.62)	6.9	1.15 (0.39–3.40)
Other, or multiple species	2 (0.20)	4.8	6 (0.62)	6.9	0.33 (0.07–1.62)
Negative or missing culture[a]	11 (1.12)	26.2	15 (1.55)	17.2	0.72 (0.33–1.56)
Total	42 (4.27)	100.0	87 (9.00)	100.0	0.47 (0.33–0.68)

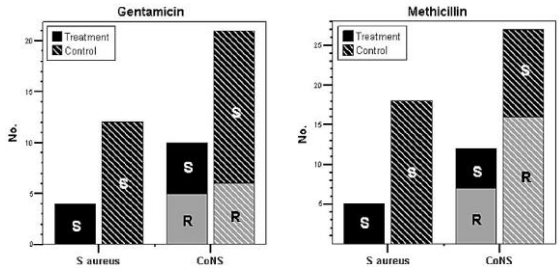


Fig. 1 Patterns of antibiotic susceptibility for gentamicin (*top*) and methicillin (*bottom*) in the treatment and control groups among the staphylococci isolated from the sternal wound infections. Susceptibility was determined in 47 (61%) and 62 (81%) of all staphylococcal wound infections for gentamicin and methicillin, respectively. *CoNS* coagulase-negative staphylococci, *R* resistant, *S* susceptible

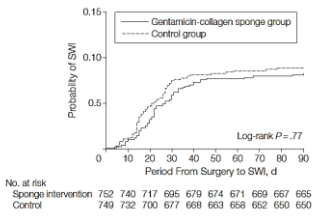
Friberg O et al, Eur J Clin Microbiol Inf Dis 2007

Résultats non confirmés par une étude multicentrique USA

Table 3. Sternal Wound Infection (SWI) and Other Postoperative End Points Through Postoperative Day 90

Characteristic	No. (%) of Patients [95% CI][a]		*P* Value
	Gentamicin-Collagen Sponge (n = 753)	Control (n = 749)	
Intent-to-treat analysis			
Any SWI (primary end point)	63 (8.4) [6.4-10.3]	65 (8.7) [6.7-10.7]	.83
Surgically treated SWI	25 (3.3) [2.0-4.6]	37 (4.9) [3.4-6.5]	.12
Superficial SWI	49 (6.5) [4.8-8.3]	46 (6.1) [4.4-7.9]	.77
Deep SWI	14 (1.9) [0.9-2.8]	19 (2.5) [1.4-3.7]	.37
ASEPSIS score, mean (SD)[b]	1.9 (6.4)	2.0 (7.2)	.67
Rehospitalization for SWI	23 (3.1) [1.8-4.3]	24 (3.2) [1.9-4.5]	.87
Visit to ED or physician office due to wound complaint	48 (6.4) [5.0-8.7]	52 (6.9) [5.7-9.7]	.55
Postoperative hospital length of stay, median (IQR), d	6.0 (5.0-8.0)	6.0 (5.0-8.0)	.88

Figure 2. Kaplan-Meier Curve for Days From Surgery to Surgical Wound Infection (SWI)



Dans cette étude :
- antibioprophylaxie systémique optimale (délai administration ≤ 60 min = 97,9%)
- mupirocine nasale pré opératoire 48,2%

Bennett Guerrero E et al, JAMA 2010

Does a gentamicin-impregnated collagen sponge reduce sternal wound infections in high-risk cardiac surgery patients?

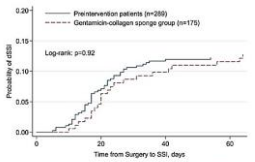


Figure 2: Kaplan–Meier curve of the risk of deep sternal wound infection (dSWI) with and without the gentamicin–collagen sponge.

Impact sur la résistance bactérienne

Birgand G et al,
Interact Cardiovasc Thor Surg 2013

Table 4: Microbiological data among 68 patients with deep sternal wound infection after cardiac surgery

Variables	Overall (*n* = 68)	GCS (*n* = 22)	No GCS (*n* = 46)	RR (95% CI)	*P*
Depth of SWI					
SCA/OM	48 (70.6)	15 (68.2)	33 (71.7)	1.00	–
Mediastinitis	20 (29.4)	7 (31.8)	13 (28.3)	1.18 (0.60–2.35)	0.63
Causative organisms					
One organism	51 (77.3)	16 (76.3)	35 (77.8)	–	–
More than one organism	15 (22.7)	5 (22.7)	10 (22.2)	–	–
Total number of organisms cultured	83.00	27.00	56.00	–	–
Enterobacteriaceae	23 (27.7)	5 (18.5)	18 (32.1)	0.58 (0.24–1.39)	0.19
Gentamicin-R	4 (17.4)	1 (20.0)	3 (16.7)	1.20 (0.16–9.18)	0.62
Staphylococcus aureus	11 (13.3)	0 (0)	11 (19.6)	–	0.03
Methicillin-S	11 (100)	0 (0)	11 (100)	–	–
Gentamicin-R	0 (0)	0 (0)	0 (0)	–	–
Coagulase-negative staphylococci	27 (32.5)	14 (51.8)	13 (23.2)	2.11 (1.16–3.84)	0.01
Gentamicin-R	18 (82.6)	12 (85.7)	6 (46.1)	1.86 (0.99–3.47)	0.07
Enterococcus spp.	16 (19.3)	5 (18.6)	11 (19.7)	0.94 (0.36–2.44)	0.90
Gentamicin-R, low-level	15 (93.7)	5 (100)	10 (91.7)	–	–
Gentamicin-R, high-level	1 (6.2)	0 (0)	1 (8.3)	–	–
Pseudomonas aeruginosa	3 (3.6)	1 (3.7)	2 (3.6)	1.04 (0.10–10.9)	0.55
Gentamicin-R	3 (100)	1 (100)	2 (100)	–	–
Other organisms	3 (3.6)	2 (7.4)	1 (1.8)	–	–
Gentamicin-R	3 (100)	2 (100)	1 (100)		
All gentamicin-R organisms	44 (53.0)	21 (77.8)	23 (41.1)	1.89 (1.30 –2.75)	<0.01
Wound revision for dSWI	68 (100)	22 (100)	46 (100)	–	–
Time to revision, days, median (IQR)	19.5 (15–26.5)	21 (17–36)	17 (13–24)	–	0.04
Time to revision >19.5 days	34 (50.0)	14 (63.2)	20 (43.5)	1.46 (0.93–2.31)	0.19
Bacteremia	14 (20.9)	3 (13.6)	11 (24.4)	0.57 (0.18–1.84)	0.51
Hospital mortality	7 (10.3)	3 (13.6)	4 (8.7)	1.57 (0.38–6.41)	0.27

Revue non exhaustive

- Chirurgie orthopédique
- Chirurgie vasculaire
- Chirurgie cardiaque
- Chirurgie digestive
- Neurochirurgie

Non couverts : décontamination préopératoire, pratiques post opératoires (drains, redons, …)

Impact clinique négatif dans la chirurgie colo-rectale

Table 3. Surgical-Site Infection (SSI) and Other Postoperative End Points through Postoperative Day 60, According to Study Group.*

Characteristic	Gentamicin–Collagen Sponge (N=300)	Control (N=302)	P Value
Intention-to-treat analysis			
SSI — no. of patients (%)			
Any (primary end point)	90 (30.0)	63 (20.9)	0.01
Surgically treated	71 (23.7)	49 (16.2)	0.02
Superficial	61 (20.3)	41 (13.6)	0.03
Deep	25 (8.3)	18 (6.0)	0.26
Organ space	4 (1.3)	4 (1.3)	1.00
ASEPSIS score†			0.17
Median	0.0	0.0	
IQR	0.0–10.0	0.0–4.0	
Rehospitalization for SSI — no. of patients (%)	21 (7.0)	13 (4.3)	0.15
Visit to ER or physician for wound-related sign or symptom — no. of patients/total no. (%)	57 (19.7)	31 (11.0)	0.004
Postoperative hospital length of stay — days	6.0 (5.0–8.0)	6.0 (4.0–8.0)	0.44
Median			
IQR			

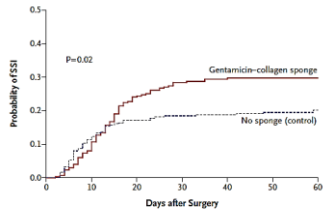


Figure 2. Kaplan–Meier Estimates of the Number of Days from Surgery to Surgical-Site Infection (SSI) within the 60-Day Postoperative Period, According to Study Group.

Bennett_Guerrero E et al, New Engl J Med 2010

Impact écologique négatif dans la chirurgie colo-rectale

Online Supplement Table 2 – Sensitivity of Microbiological Isolates to Gentamicin

	Gentamicin-Collagen Sponge Arm			Control Arm		
Microbial Pathogens	Number of isolates	Sensitive to Gentamicin	Resistant to Gentamicin	Number of isolates	Sensitive to Gentamicin	Resistant to Gentamicin
Citrobacter species	1	1	0	0	0	0
Enterobacter cloacae	0	0	0	3	3	0
Enterococcus avium	1	1	0	0	0	0
Enterococcus faecalis	7	4	3	2	2	0
Enterococcus faecium	2	1	1	1	1	0
Escherichia coli	5	4	1	4	4	0
Klebsiella oxytoca	0	0	0	1	1	0
Klebsiella pneumoniae	2	2	0	2	2	0
Morganella morganii	2	2	0	1	1	0
Proteus mirabilis	4	4	0	1	0	1
Pseudomonas aeruginosa	3	3	0	3	3	0
Staphylococcus aureus	9	9	0	5	5	0
Staphylococcus epidermidis	8	0	8	4	3	1
Staphylococcus haemolyticus	0	0	0	1	1	0
Staphylococcus warneri	1	1	0	0	0	0
Streptococcus agalactiae	1	0	0	1	0	0

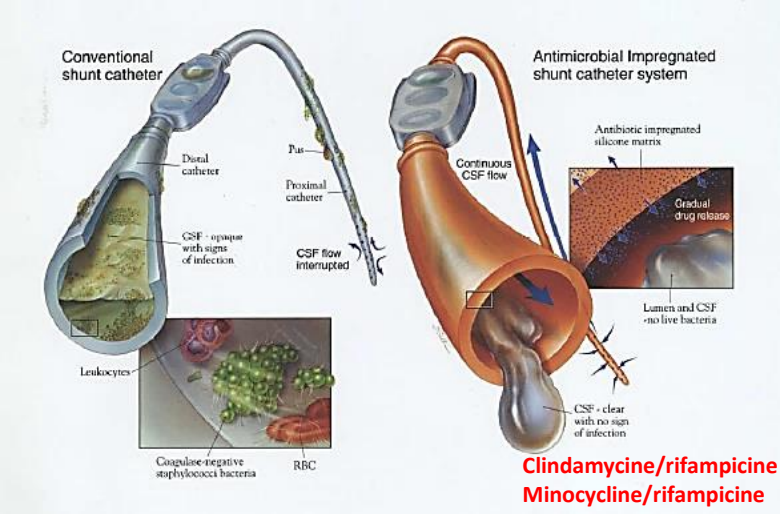
Bennett_Guerrero E et al, New Engl J Med 2010

Revue non exhaustive

- Chirurgie orthopédique
- Chirurgie vasculaire
- Chirurgie cardiaque
- Chirurgie digestive
- Neurochirurgie

Non couverts : décontamination préopératoire, pratiques post opératoires (drains, redons, …)

Effect of antibiotic-impregnated shunt catheters in decreasing the incidence of shunt infection in the treatment of hydrocephalus



Clindamycine/rifampicine
Minocycline/rifampicine

Sciubba DM et al, J Neurosurg 2005

Antimicrobial-impregnated and -coated shunt catheters for prevention of infections in patients with hydrocephalus: a systematic review and meta-analysis

JNS

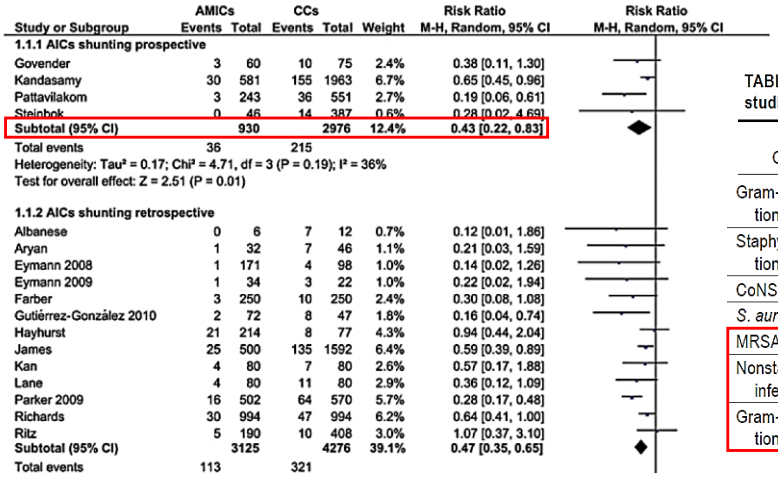


FIG. 2. Forest plot depicting the risk ratios for CSF shunting– and ventricular drainage–associated infections for antimicrobial catheters (AMICs [AICs and SCCs]) compared with CCs (studies on HCCs were not included in the figure). The vertical line

TABLE 3. Development of infections in subgroup analyses of studies with AICs

Studied Characteristic	No. of Procedures	No. of Studies	RR (95% CI), I^2
Gram-positive infections	422	18	0.94 (0.82–1.09), 18%
Staphylococcal infections	366	15	0.87 (0.73–1.03), 0%
CoNS infections	286	14	0.86 (0.59–1.25), 27%
S. aureus infections	323	10	1.01 (0.78–1.31), 0%
MRSA infections	119	4	2.64 (1.26–5.51), 0%
Nonstaphylococcal infections	357	13	1.75 (1.16–2.65), 21%
Gram-negative infections	406	15	2.08 (1.29–3.37), 0%

Konstantelias AA et al, J Neurosurg 2015

2017 Infectious Diseases Society of America's Clinical Practice Guidelines for Healthcare-Associated Ventriculitis and Meningitis*

XII. What is the Best Approach to Prevent Infection in Patients Who are Receiving Cerebrospinal Fluid Shunts?

Recommendations

74. Periprocedural prophylactic antimicrobial administration is recommended for patients undergoing CSF shunt or drain insertion (strong, moderate).
75. Periprocedural prophylactic antimicrobial administration is recommended for patients undergoing placement of external ventricular drains (strong, moderate).
76. Prolonged antimicrobial prophylaxis for the duration of the external ventricular drain is of uncertain benefit and not recommended (strong, moderate).
77. Use of antimicrobial-impregnated CSF shunts and CSF drains is recommended (strong, moderate).

IDSA Infectious Diseases Society of America

Tunkel AR et al, Clin Infect Dis 2017

2017 Infectious Diseases Society of America's Clinical Practice Guidelines for Healthcare-Associated Ventriculitis and Meningitis*

IDSA Infectious Diseases Society of America

VI. Once a Pathogen is Identified, What Specific Antimicrobial Agent(s) Should be Administered?

Recommendations

44. If the staphylococcal isolate is susceptible to rifampin, this agent may be considered in combination with other antimicrobial agents for staphylococcal ventriculitis and meningitis (weak, low); rifampin is recommended as part of combination therapy for any patient with intracranial or spinal hardware such as a CSF shunt or drain (strong, low).

Tunkel AR et al, Clin Infect Dis 2017

Analysis 1.1. Comparison 1 Treatment benefit of antibiotic prophylaxis versus no antibiotic prophylaxis, Outcome 1 Number of participants experiencing shunt infection after administration of antibiotics.

Study or subgroup	Antibiotic prophylaxis n/N	No antibiotic prophylaxis n/N	Risk Ratio IV, Fixed, 95% CI	Weight	Risk Ratio IV, Fixed, 95% CI
1.1.1 Intravenous administration of antibiotics					
Blomstedt 1985	4/62	14/60		15.72%	0.28[0.1,0.79]
Blum 1989	3/50	7/50		10.4%	0.43[0.12,1.56]
Bullock 1988	1/48	3/56		3.5%	0.39[0.04,3.62]
Djindjian 1986	1/30	6/30		4.12%	0.17[0.02,1.3]
Haines 1982	2/35	5/39		7.02%	0.45[0.09,2.15]
Rieder 1987	2/32	3/33		5.88%	0.69[0.12,3.85]
Schmidt 1985	7/79	4/73		12.38%	1.62[0.49,5.3]
Wang 1984	4/55	5/65		10.89%	0.95[0.27,3.35]
Subtotal (95% CI)	**391**	**406**		**69.92%**	**0.55[0.33,0.9]**
Total events: 24 (Antibiotic prophylaxis), 47 (No antibiotic prophylaxis)					
Heterogeneity: Tau^2=0; Chi^2=7.18, df=7(P=0.41); I^2=2.51%					
Test for overall effect: Z=2.37(P=0.02)					
1.1.2 Intrathecal administration of antibiotics					
Bayston 1990	6/78	6/80		14.73%	1.03[0.35,3.04]
Lambert 1984	1/24	4/20		3.92%	0.21[0.03,1.72]
Subtotal (95% CI)	**102**	**100**		**18.64%**	**0.73[0.28,1.93]**
Total events: 7 (Antibiotic prophylaxis), 10 (No antibiotic prophylaxis)					
Heterogeneity: Tau^2=0; Chi^2=1.73, df=1(P=0.19); I^2=42.28%					
Test for overall effect: Z=0.63(P=0.53)					
1.1.3 Antibiotic Impregnated Catheters					
Govender 2003	3/50	10/60		11.44%	0.36[0.1,1.24]
Subtotal (95% CI)	**50**	**60**		**11.44%**	**0.36[0.1,1.24]**
Total events: 3 (Antibiotic prophylaxis), 10 (No antibiotic prophylaxis)					
Heterogeneity: Not applicable					
Test for overall effect: Z=1.62(P=0.1)					
Total (95% CI)	**543**	**566**		**100%**	**0.55[0.36,0.84]**
Total events: 34 (Antibiotic prophylaxis), 67 (No antibiotic prophylaxis)					
Heterogeneity: Tau^2=0; Chi^2=9.71, df=10(P=0.47); I^2=0%					
Test for overall effect: Z=2.8(P=0.01)					
Test for subgroup differences: Chi^2=0.8, df=1 (P=0.67), I^2=0%					

Antibiotic prophylaxis 0.01 0.1 1 10 100 No antibiotic prophylaxis

Route of antibiotic prophylaxis for prevention of cerebrospinal fluid-shunt infection (Review)

Cochrane Library

Arts S et al, Cochrane Database System Rev 2019

Antibiotic or silver versus standard ventriculoperitoneal shunts (BASICS): a multicentre, single-blinded, randomised trial and economic evaluation

	Standard shunt	Antibiotic shunt	Silver shunt	Total
Surgeries				
Patients eligible for primary outcome*	533	535	526	1594
No shunt removal or revision	403 (76%)	403 (75%)	390 (74%)	1196 (75%)
Shunt removal or revision (for any cause)	130 (24%)	132 (25%)	136 (26%)	398 (25%)
Reason for revision as classified by central review				
Patients revised for infection	32 (6%)	12 (2%)	31 (6%)	75 (5%)

	Events (n)	csHR (97·5% CI; p value)	sHR (97·5% CI; p value)
Primary outcome*			
Shunt			
Standard	32	..	..
Antibiotic	12	0·38 (0·18–0·80; 0·0038)	0·38 (0·18–0·80; 0·0037)
Silver	31	0·99 (0·56–1·74; 0·96)	0·99 (0·56–1·72; 0·95)

Mallucci CL et al, Lancet 2019

Patient and Treatment Characteristics by Infecting Organism in Cerebrospinal Fluid Shunt Infection

Table 2. Treatment Characteristics of Children in Study Cohort at the Time of Initial Cerebrospinal Fluid (CSF) Shunt Placement, Shunt Revision(s), and Initial CSF Shunt Infection, Stratified by Organism

Treatment Characteristic	*Staphylococcus aureus*	Coagulase-Negative *Staphylococcus*	Gram-Negative Bacilli	*Propionibacterium acnes*
Initial CSF shunt placement[a]	n = 34	n = 37	n = 23	n = 2[b]
Shunt Location (Proximal-Distal), n (%)[b]				
Ventriculoperitoneal	34 (100%)	34 (92%)	21 (92%)	1 (50%)
Cystoperitoneal	0 (0%)	3 (8%)	0 (0%)	0 (0%)
Complex:peritoneal	0 (0%)	0 (0%)	1 (4%)	0 (0%)
Subdural-peritoneal	0 (0%)	0 (0%)	0 (0%)	1 (50%)
Subdural-atrial	0 (0%)	0 (0%)	1 (4%)	0 (0%)
Ultrasound use, n (%)	11 (32%)	15 (41%)	7 (30%)	0 (0%)
Endoscope use, n (%)	12 (35%)	7 (19%)	7 (30%)	1 (50%)
Antibiotic-impregnated catheter component use, n (%)[b]	6 (18%)	3 (8%)	12 (52%)	0 (0%)

Simon TD et al, J Ped Infect Dis Soc 2019

RESEARCH—HUMAN—CLINICAL STUDIES

Topical Vancomycin Reduces Surgical-Site Infections After Craniotomy: A Prospective, Controlled Study

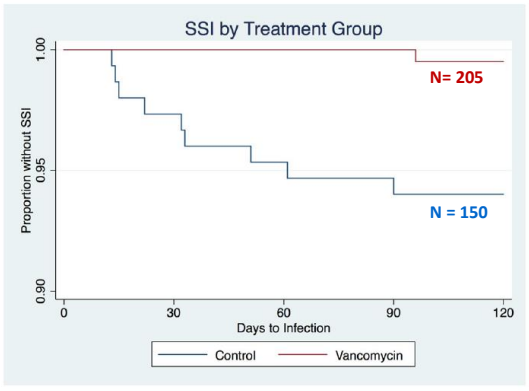


FIGURE 2. *SSI by treatment group over first 120 d of follow-up. No patients presented with SSI following 120 d.*

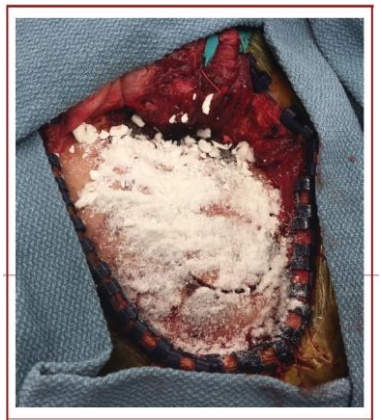


FIGURE 1. *Topical vancomycin applied in the subgaleal space over the craniotomy.*

Mallela AK et al. Neurosurg 2018

Effect of Intrawound Vancomycin on Surgical Site Infections in Nonspinal Neurosurgical Procedures: A Systematic Review and Meta-Analysis

BACKGROUND: Applying vancomycin into the surgical site has been well-described in spinal neurosurgery, with extensive institutional experience and systematic reviews describing its effectiveness in reducing surgical site infections (SSIs). Its use in nonspinal neurosurgical procedures is a logical extension of those findings; however, recent studies have described varying degrees of success. We have summarized the effect of local vancomycin application on SSIs in nonspinal neurosurgical procedures and describe the quality of the supporting evidence.

METHODS: MEDLINE, Embase, and Google Scholar were searched through June 2018. Information on study design, demographic data, exposure, and outcomes was extracted. The estimates were combined using random-effects models.

RESULTS: Our search retrieved 9 studies for quantitative analysis. They assessed vancomycin use in craniotomy, cranioplasty, deep brain stimulator-related procedures, and ventriculoperitoneal shunt surgery. Most of the studies had serious methodological shortcomings that introduced confounding. We found an overall beneficial effect on SSI incidence (odds ratio, 0.25; 95% confidence interval, 0.12—0.52), which was seen across all subspecialties, except for cranioplasty. The use of vancomycin did not result in the emergence of resistant infections or in a significant increase in the proportion of infections caused by gram-negative organisms.

CONCLUSIONS: Vancomycin use in nonspinal neurosurgery is not supported by high-quality evidence, limiting the strength of the conclusions that can be drawn on the topic. Nonetheless, we found an overall favorable effect on SSIs (except in the context of cranioplasty), which should be reproduced in a randomized controlled fashion.

Bokhari R et al, World Neurosurg 2018

Impact of Powdered Vancomycin on Preventing Surgical Site Infections in Neurosurgery: A Systematic Review and Meta-analysis

BACKGROUND: Surgical site infections (SSIs) after spine and brain surgery present a major burden to patients and hospitals by increasing morbidity, mortality, and healthcare costs.
OBJECTIVE: To review available literature investigating the role of intrawound powdered vancomycin against SSIs after neurosurgical operations.
METHODS: All randomized and observational English language studies of intrawound powdered vancomycin use in spinal and cranial surgery were included and analyzed using random-effects modeling.
RESULTS: In spine surgery (25 studies with 16 369 patients), patients in the vancomycin group had a significantly lower risk for any SSI (odds ratio [OR]: 0.41; 95% confidence interval [CI]: 0.30-0.57; $P < .001$; $I^2 = 47\%$). However, when separate analyses were conducted for superficial and deep SSIs, a significant difference was found only for deep (OR: 0.31; 95% CI: 0.22-0.45; $P < .001$; $I^2 = 29\%$). Subgroup analyses for different vancomycin powder dosages (1 g vs 2 g vs composite dose) did not point to any dose-related effect of vancomycin. In cranial surgery (6 studies with 1777 patients), use of vancomycin was associated with a significantly lower risk for SSIs (OR: 0.33; 95% CI: 0.18-0.60; $P = .0003$; $I^2 = 45\%$). In meta-regression analysis, trial-level variability of diabetes had no influence on the association of vancomycin powder use with SSIs.
CONCLUSION: Use of vancomycin powder in spinal and cranial surgery might be protective against SSIs, especially against deep SSIs. No dose-related effect of vancomycin powder was identified. However, caution is needed in the clinical interpretation of these results, owing to the observational design of the included studies in this meta-analysis.

Texakalidis P et al, Neurosurg 2018

A Care Bundle Intervention to Prevent Surgical Site Infections after a Craniotomy

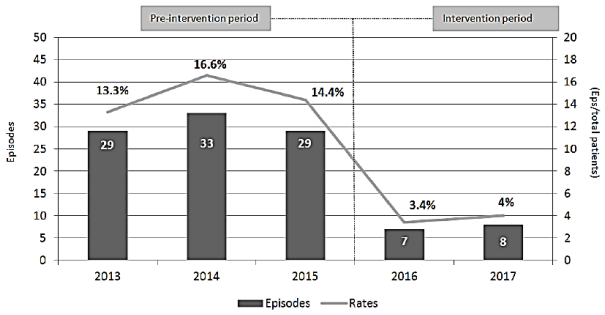


Figure 2: *Episodes and rates of SSI-CRANs in the pre-intervention and intervention periods.*

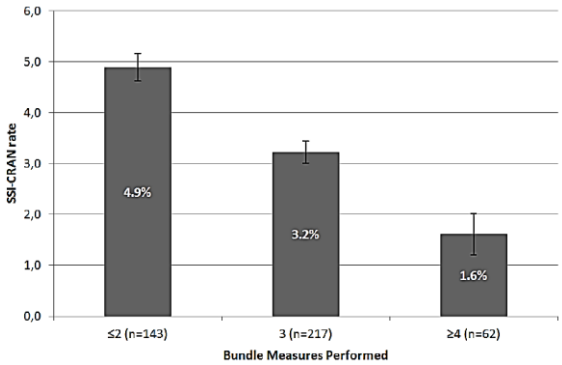


Figure 1: *Rates of infections according to compliance with the care bundle implementation.*

Jimenez Martinez E et al, Clin Infect Dis 2021

Case report

Red man syndrome caused by vancomycin powder

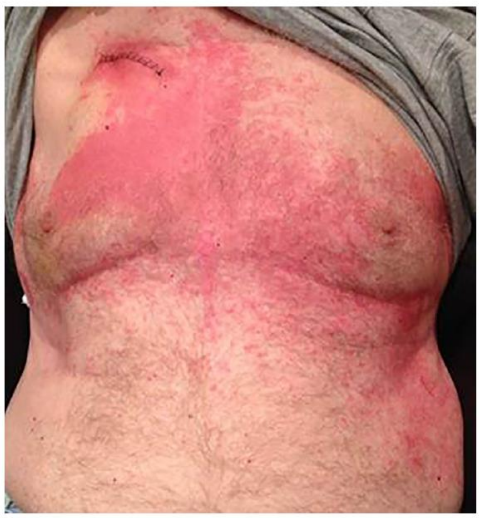


Fig. 1. Photograph of the patient several days after the second operation showing the erythematous segmental rash involving the chest and upper abdomen. Note the surgical scar in the right infraclavicular region.

Highlights

- Red man syndrome (RMS) is a hypersensitivity reaction caused by IV vancomycin.
- Vancomycin powder has been increasingly used for surgical site infection prophylaxis.
- We report the first reported case of RMS from use of vancomycin powder.

Nagahama Y et al, J Clin Neuroscience 2018

Chloramphenicol use in plastic surgery

Sir,

We have recently conducted a postal questionnaire survey to determine chloramphenicol use by practising consultant surgeons in the UK and Ireland. Chloramphenicol ophthalmic eye ointment is widely used by plastic surgeons as a topical wound application following eye surgery, over facial wounds, suture lines or on skin grafts, etc. However, fatal aplastic anaemia has been reported as a complication of topical use.[1]

A confidential questionnaire was sent to 209 consultant plastic surgeons in the UK and Ireland with an overall response rate of 151/209 (72%). Of these, 100 (66%) use chloramphenicol eye ointment in their practice. The reasons given for use are as follows: as prophylaxis against infection (69%); as a therapeutic intervention (24%); and as a moisturiser (57%). Dose regimens varied from once only to up to four times per day and up to 14 days' duration. Twenty percent enquired about family history of chloramphenicol allergy. Fifteen percent had experienced side effects; among the most serious were two cases of aplastic anaemia. Allergic reactions such as chemical conjunctivitis and skin rashes were also recorded.

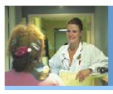
Chloramphenicol is a broad-spectrum antibiotic which inhibits bacterial protein synthesis by reversibly binding to the 50s subunit of the 70s ribosome thus preventing successful attachment of complete transfer RNA to the ribosome and consequently disrupting peptide bond formation.[1] Various forms are readily available, such as oral, parenteral or topical as eye ointment and eye drops. As a topical agent this antibiotic is cheap, well absorbed and effective against most gram-positive and gram-negative organisms, with excellent eye penetration. However, aplastic anaemia is a very rare but often fatal complication.

The association of the systemic use of chloramphenicol and chloramphenicol-induced aplastic anaemia is well documented in the literature. The estimated risk of developing aplastic anaemia from oral chloramphenicol administration is 13 times greater than the incidence of idiopathic aplastic anaemia.[2]

Chloramphenicol-induced blood dyscrasias present in two different forms.[1,2] The first type is dose related, occurs more commonly, is reversible and causes anaemia, thrombocytopenia and neutropenia. The second type is idiosyncratic, irreversible, is not dose related, is late in onset and often fatal following pancytopenia. The estimated risk of developing an idiosyncratic reaction is 1:30–50,000.[2] This type of reaction is thought to occur in people who have a genetically determined difference in metabolism of the agent.[2] A nitroreduction derivative of chloramphenicol or another metabolite of chloramphenicol produced by the predisposed patient results in DNA damage in stem cells. The toxic metabolite may be produced in the marrow rather than the liver, thus making the marrow both the site of metabolic conversion and the target of injury.[3]

Previous studies have shown that systemic absorption occurs following ocular use[4] and after application to the skin.[5] This indicates that a theoretical but as yet not conclusively proved risk of chloramphenicol-induced idiosyncratic aplastic anaemia exists with topical application. There are 26 reported cases of blood dyscrasias thought to be associated with topical chloramphenicol use in which 13 patients died.[3,6]

Erel E et al, Br J Plast Surg 1999



> **Journées régionales**
sur l'**évaluation** des pratiques professionnelles
en **établissements** de santé

HAS
HAUTE AUTORITÉ DE SANTÉ

Les résultats

Dysfonctionnement ou non-conformité - audits organisationnels	
Protocole non co-signé par les anesthésistes et les chirurgiens Réactualisation des protocoles non définie Rôles propres non définis	
Pas de surveillance systématique de l'incidence des ISO Pas de revue systématique des ISO	
Items de pratique nécessitant une action corrective	**Pourcentage de réponse**
Traçabilité du questionnement « allergie ? » Identification du prescripteur (prescription papier)	87% 93%
Traçabilité de l'administration Conformité de la molécule Conformité de la dose Délai injections per et post-opératoire respecté Conformité de la durée	85% 92% 93% 10% 90%

Guignabert C, Russin M, 2006

Conclusions

- Pratique fréquente
- Biais méthodologiques
- Niveau de preuve dans de rares situations
- Impact écologique rarement évalué ou négatif
- Antibiotique utilisé en prophylaxie et en curatif
- Ne pas oublier les fondamentaux

IL N'Y A AUCUNE MAITRISE

DU RISQUE SANS

HYGIENE DES MAINS !!!!