SITA
Società Italiana di Terapia Antinfettiva
Antibatterica Antivirale Antifungina

13° CONGRESSO NAZIONALE

PADOVA | 23-24 novembre 2023

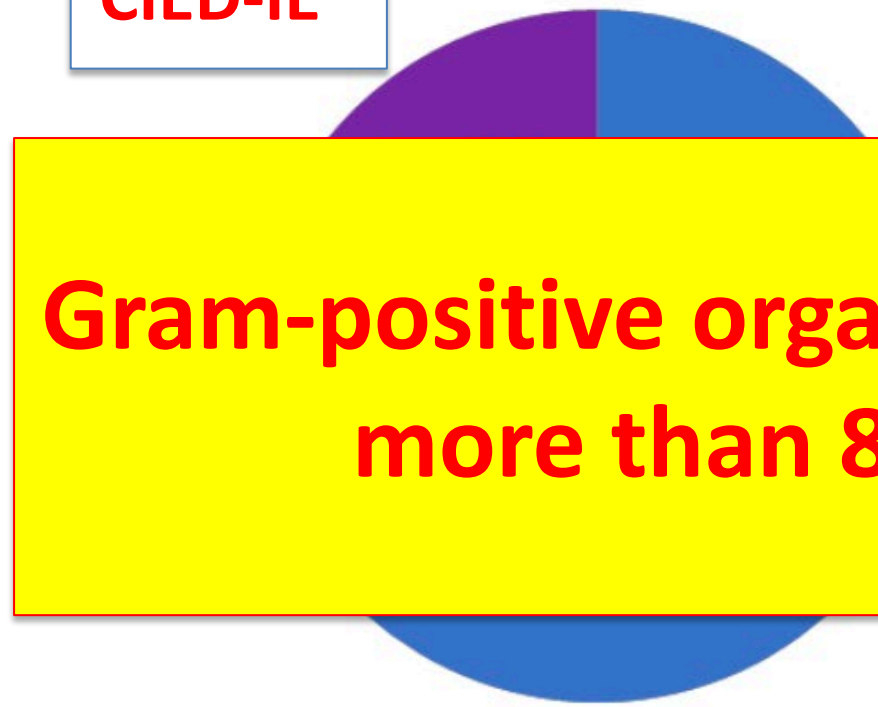
La gestione delle infezioni dei devices cardiaci e delle protesi endovascolari

Mario Venditti

Distribution of pathogens in CIED and TAVI endocarditis: review of literature

Cimmino et al, *Life* 2022

CIED-IE*



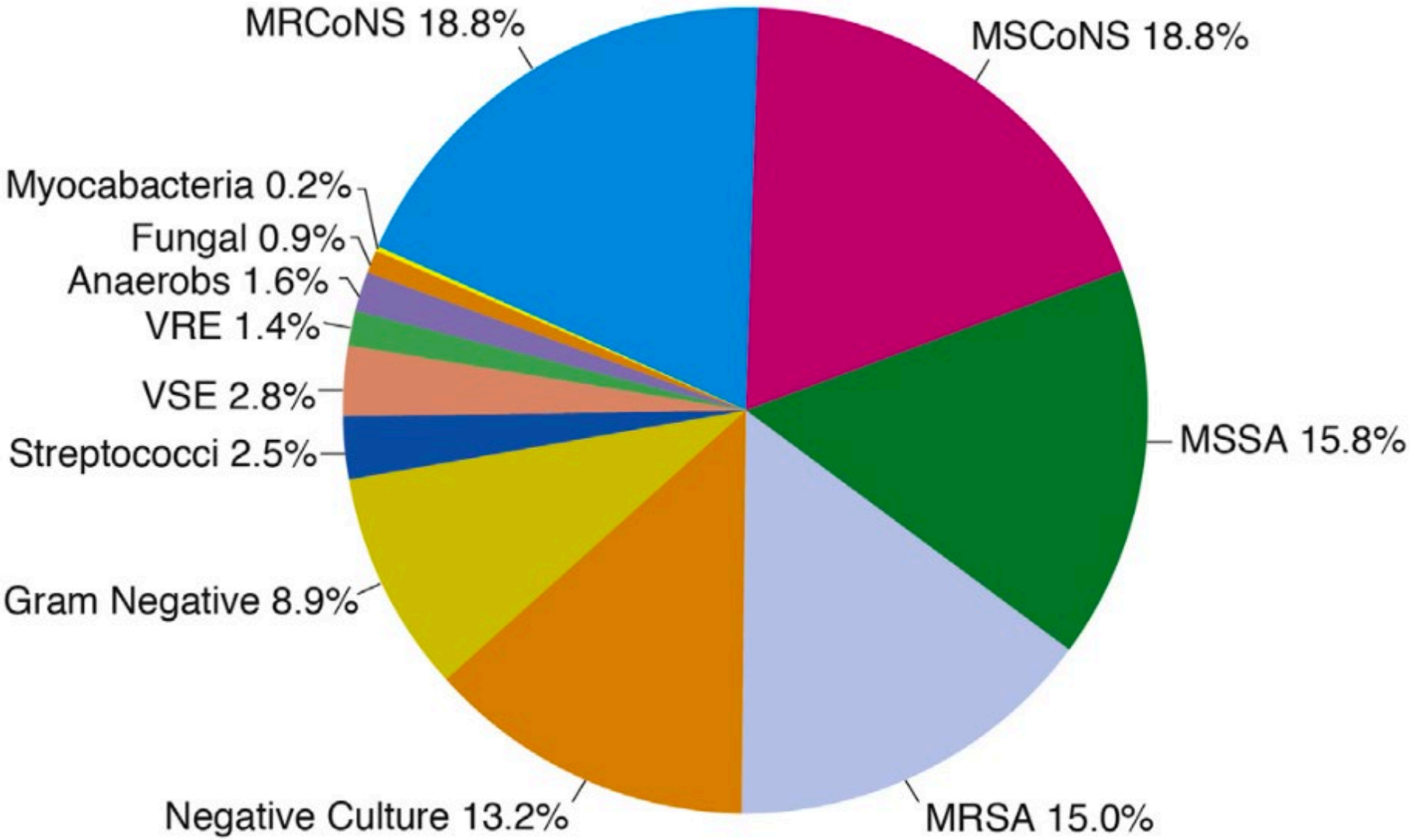
TAVI-IE**

Gram-positive organims are in involved in more than 80% of the cases

* «other» includes *Candida* spp and other fungi, Gran neg. Bacilli, poymicrobial

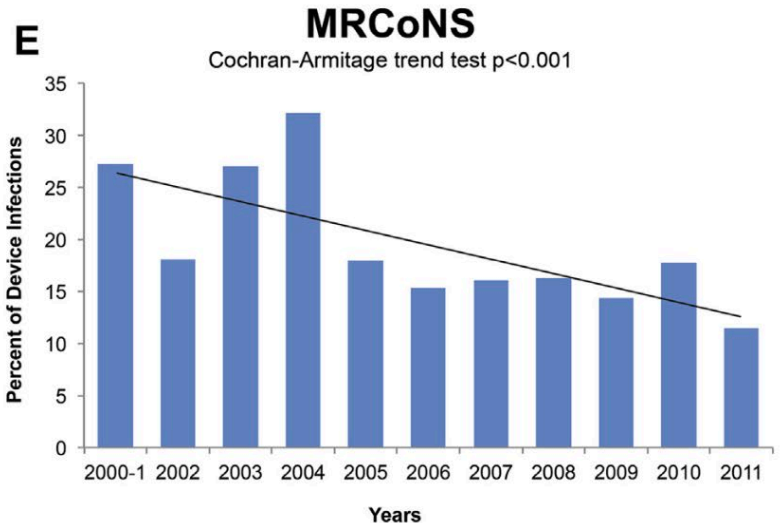
** «other» includes *Candida* spp and other fungi, Gran neg. Bacilli, *Corynebacterium* spp

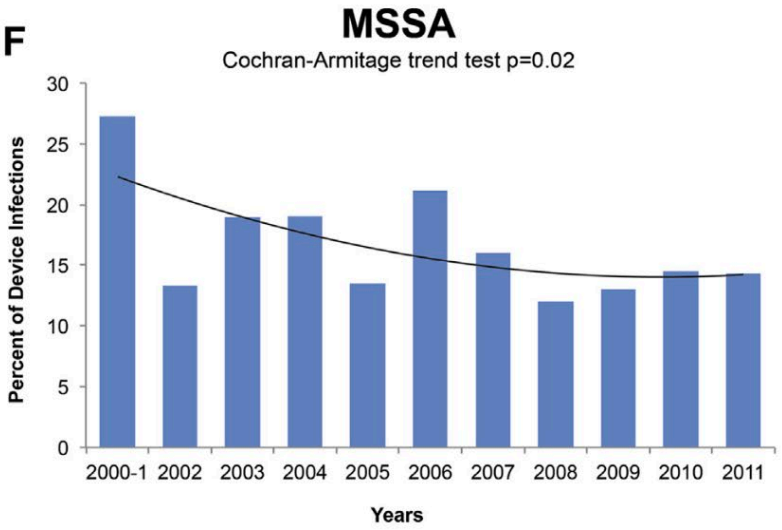
Microbiology and Pathogens in 816 Consecutive Patients Who Underwent Lead Extraction or Removal for Device Infection at the Cleveland Clinic Between 2000 and 2011

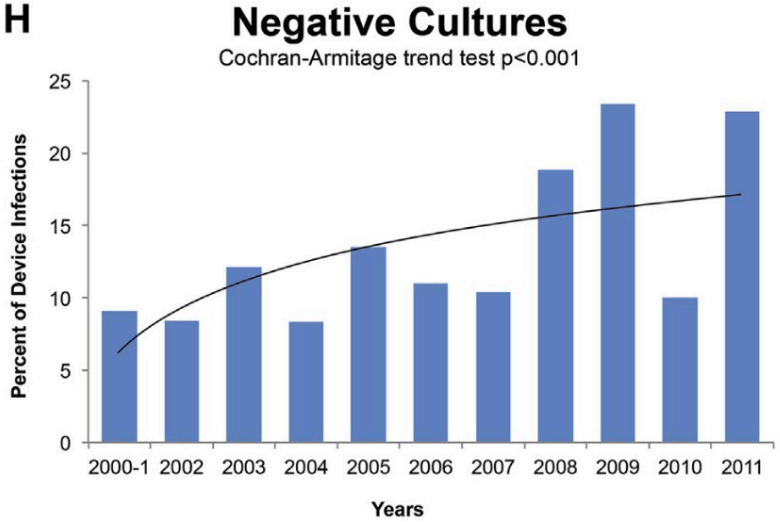


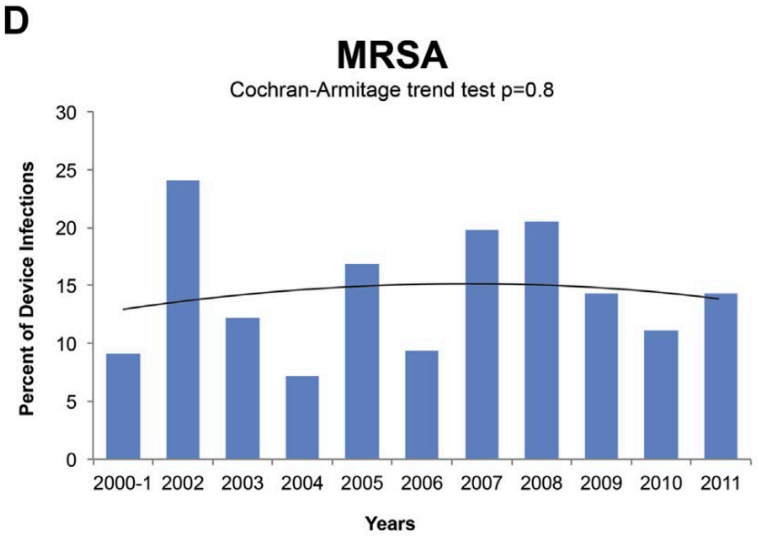
Microbiology and Pathogens in 816 Consecutive Patients Who Underwent Lead Extraction or Removal for Device Infection at the Cleveland Clinic Between 2000 and 2011

Hussein AA et al *JACC: CLINICAL ELECTROPHYSIOLOGY*, 2016





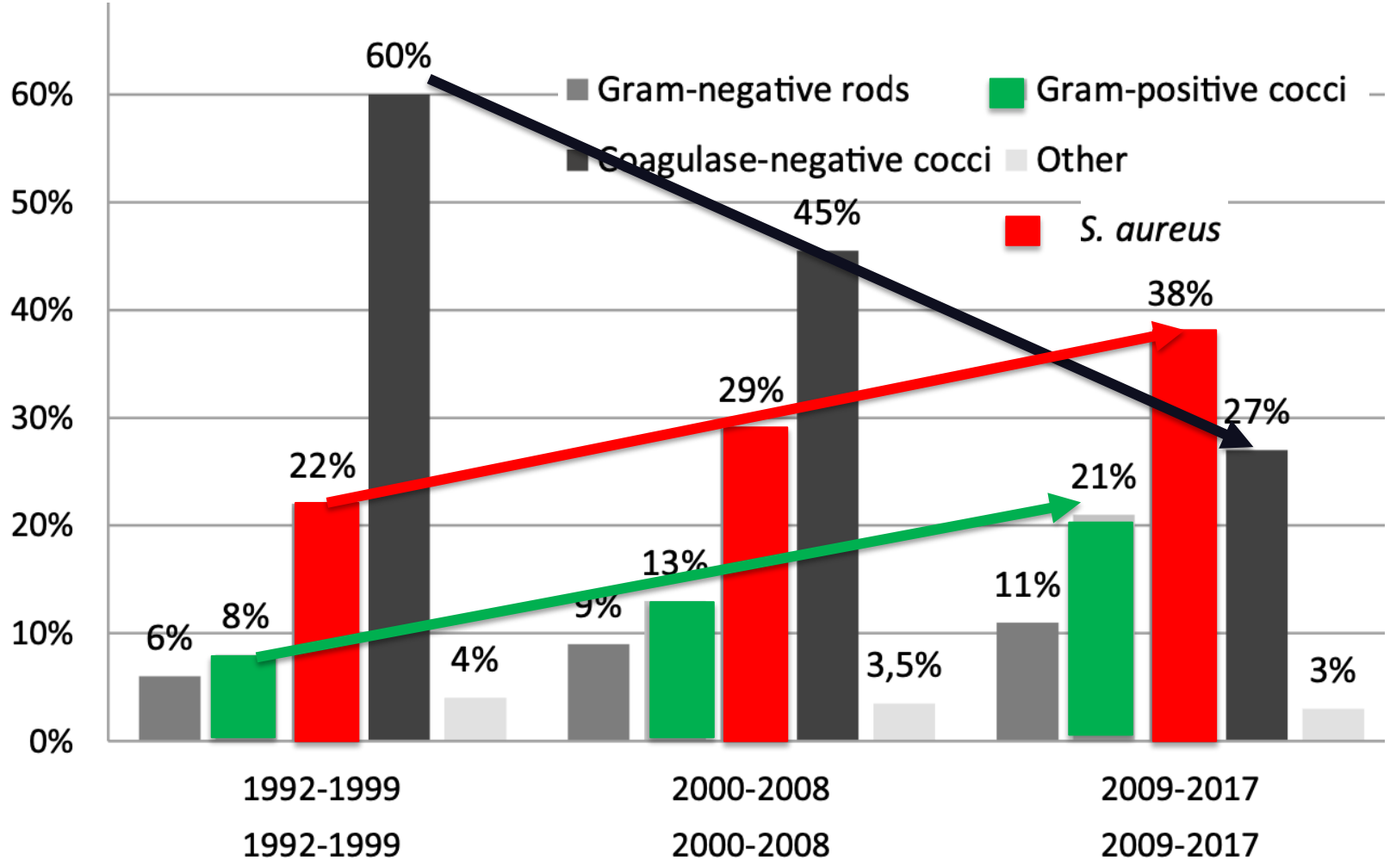




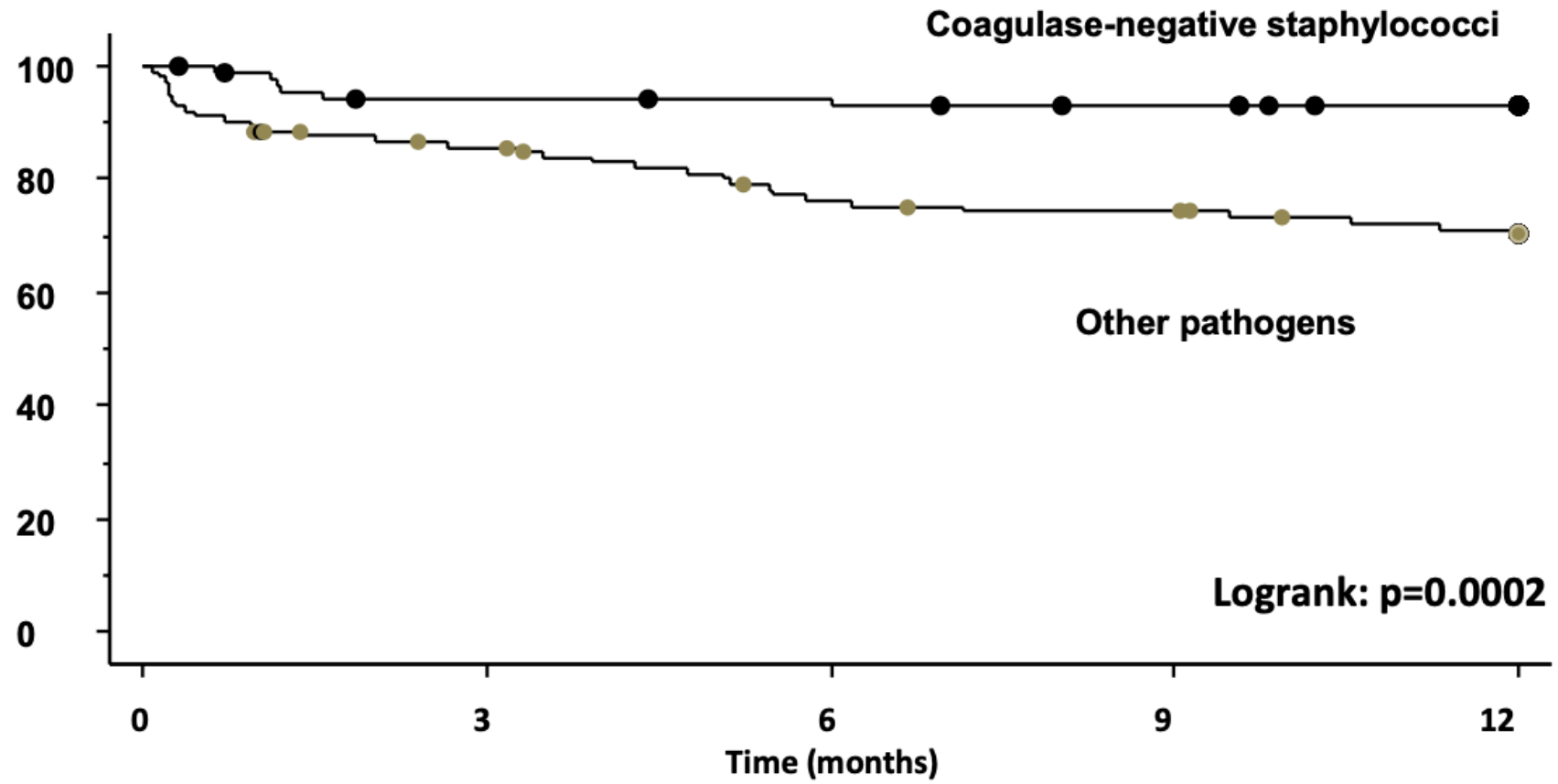
The emergence of *S aureus* as the primary cause of cardiac device-related infective endocarditis

Urien & Tattevin et al *Infection* 2020

Repartition of microorganisms responsible for cardiac device-related endocarditis in 1992–1999, 2000–2008, and 2009–2017



Cumulative survival at one year for CIED endocarditis due to coagulase-negative staphylococci (CoNS), versus other pathogens Urien & Tattevin et al *Infection* 2020



Antibiotic regimen mostly consisted of penicillins (71%), and glyco/lipopeptides (14%), for a median duration of 35 days [28.5–45]. Most pts received a combo with aminoglycoside (70%).

CIED was removed in 93% of cases (): percutaneously (84% of all extraction), or with cardiopulmonary bypass (16%).

Management and Outcome of Permanent Pacemaker and Implantable Cardioverter-Defibrillator Infections

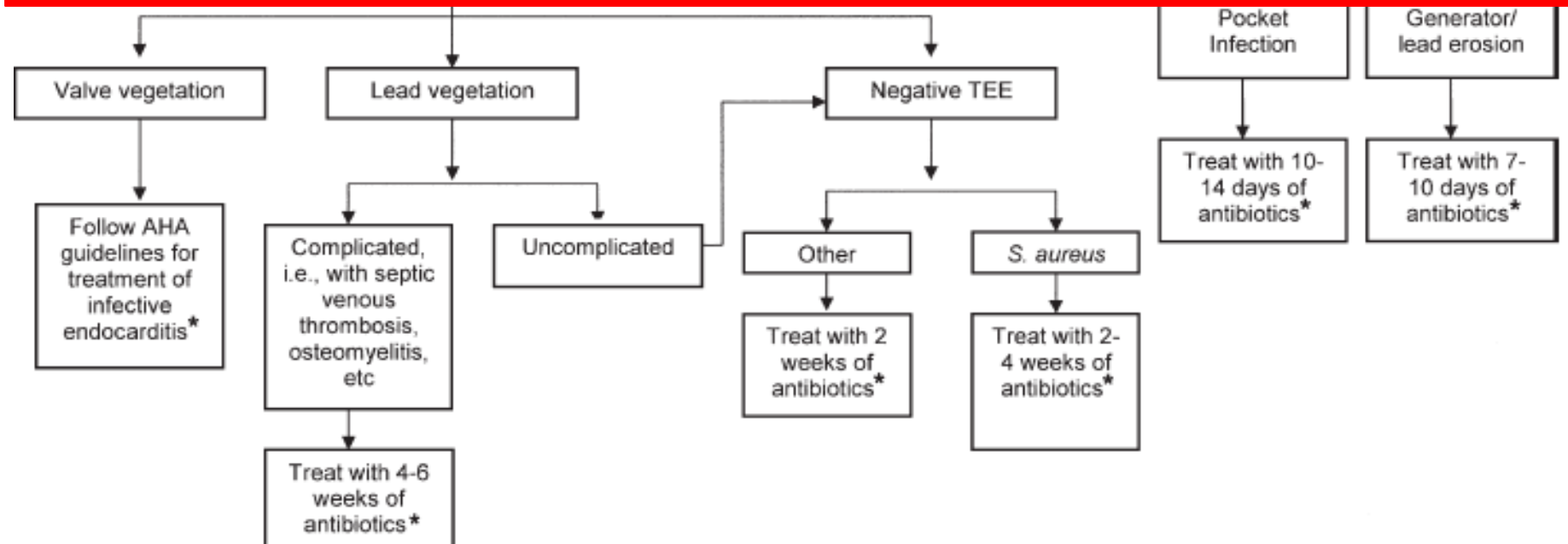
SOHAIL MR, USLAN DZ, KHAN AH, FRIEDMAN P, HAYES DL, WILSON, WR, STECKELBERG JM, JENKINS S, BADDOUR,LM

Journal of the American College of Cardiology 49: 1852, 2007

Algoritmo suggerito per la gestione delle infezioni dei PM/DIC

***=**

Durata della terapia antibiotica dopo rimozione del dispositivo



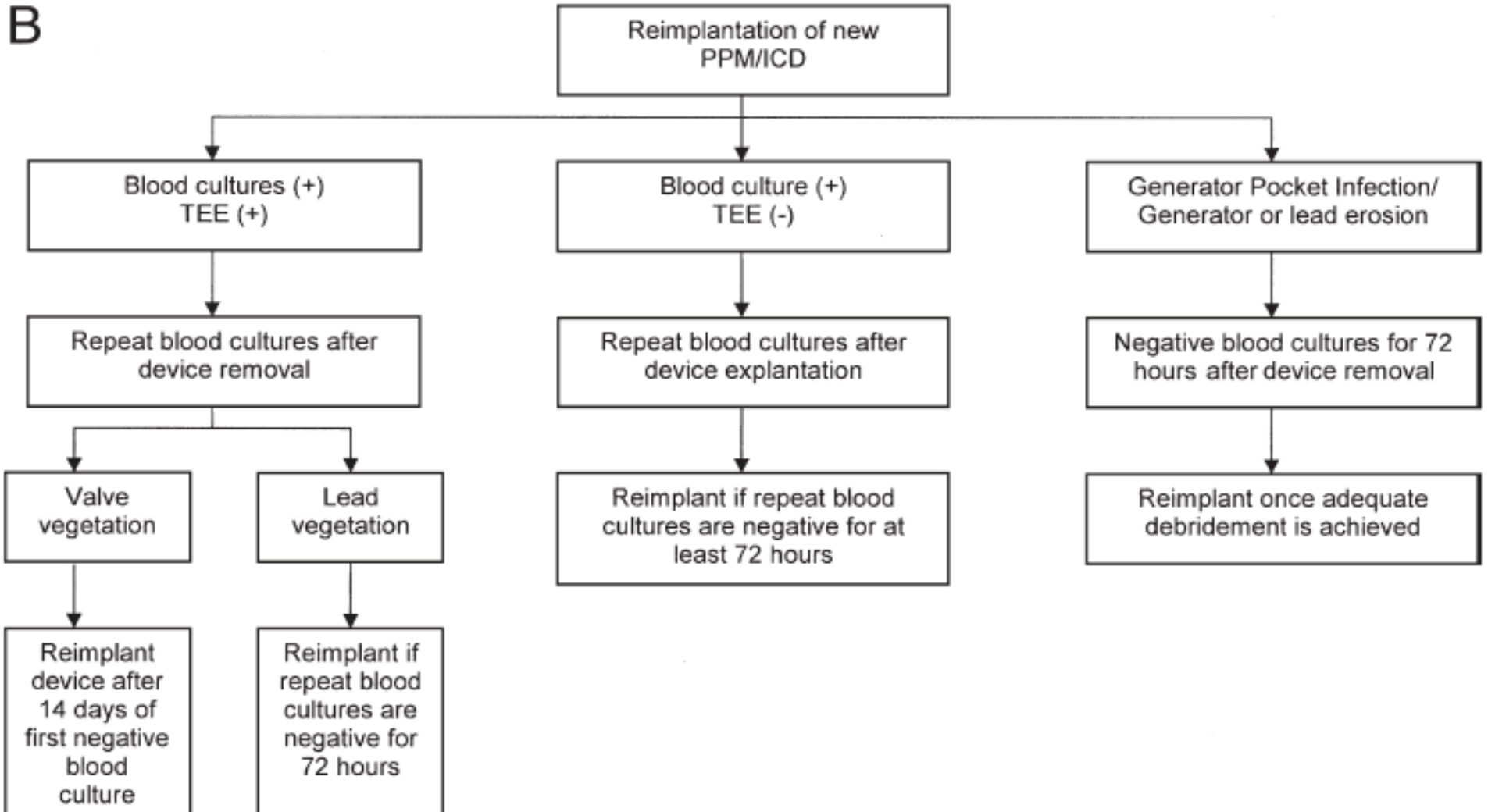
Management and Outcome of Permanent Pacemaker and Implantable Cardioverter-Defibrillator Infections

SOHAIL MR, USLAN DZ, KHAN AH, FRIEDMAN P, HAYES DL, WILSON, WR, STECKELBERG JM, JENKINS S, BADDOUR,LM

Journal of the American College of Cardiology 49: 1852, 2007

Algoritmo suggerito per la gestione delle infezioni dei PM/DIC

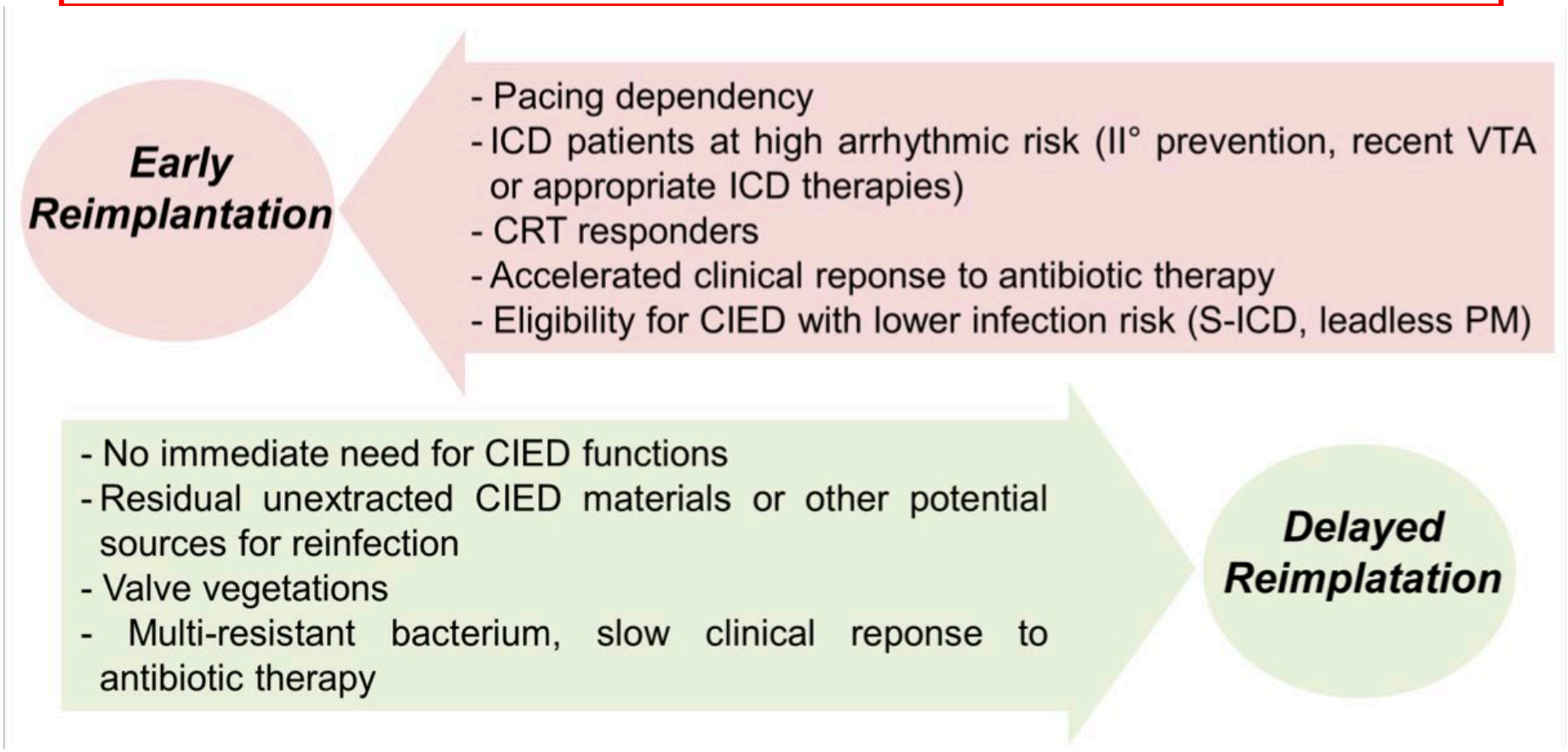
B



Practical Considerations for Cardiac Electronic Devices Reimplantation Following Transvenous Lead Extraction Due to Related Endocarditis

Ali H et al J Clin Med, 2023

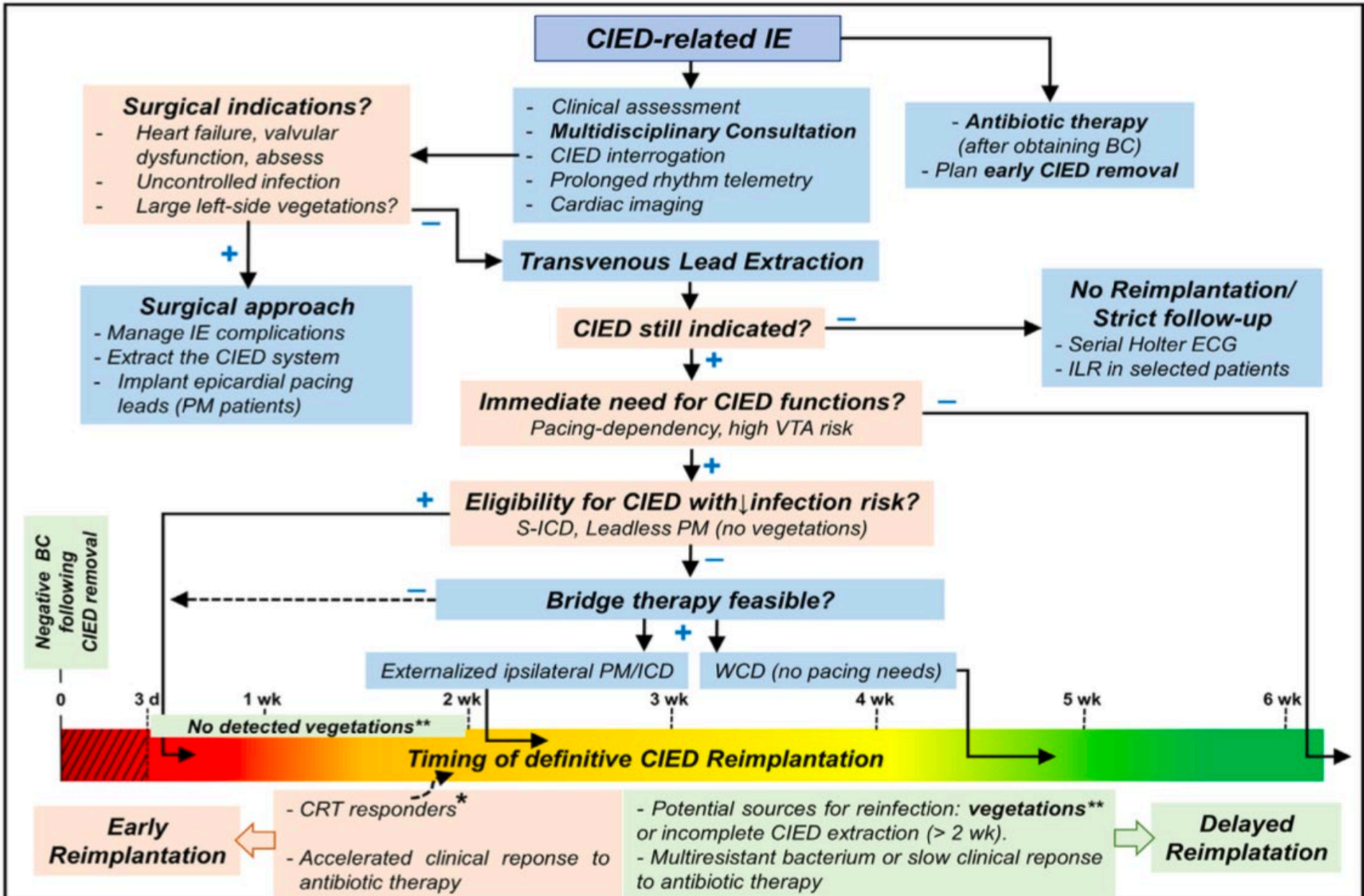
Elements favoring early vs. delayed CIED reimplantation after TLE for IE.

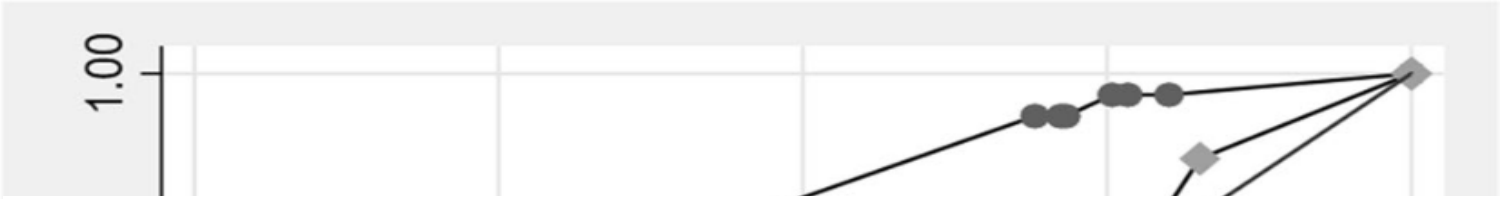


VTA: ventricular tachyarrythmias; CRT: cardiac resynchronization therapy; CIED: cardiac implantable electronic device; ICD: implantable cardioverter-defibrillator; PM: pacemaker; S-ICD: subcutaneous ICD.

A proposed approach to manage patients undergoing lead extraction

Ali H et al *J Clin Med*, 2023





evice, and the
cohort study
1

All SAB in Stockholm Region, 8,084 positive BC in 3,755 patients

SAB in CIED patients, 293 episodes

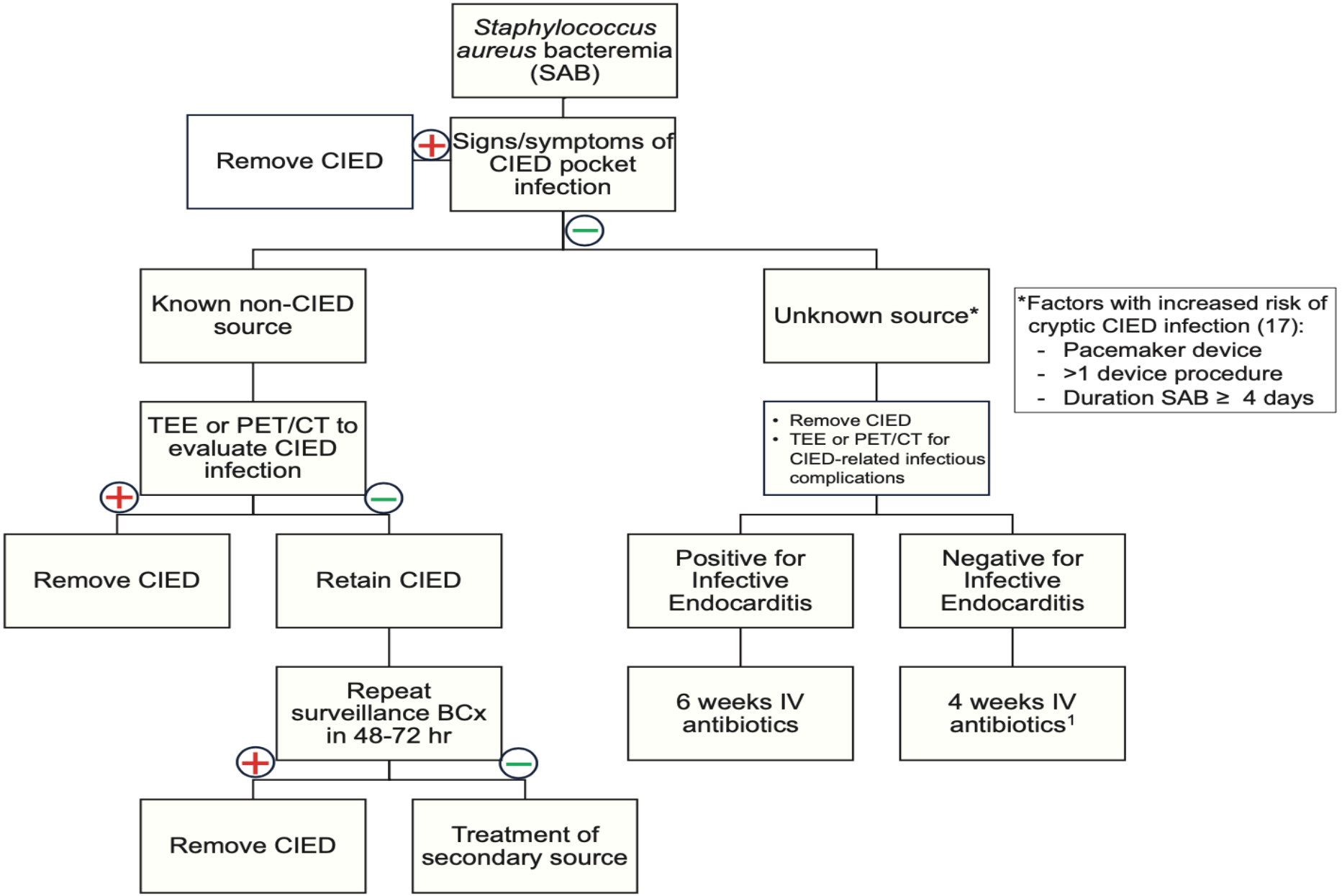
First episodes in 274 patients

Definite IE: 38 episodes (14%)

SAB without definite IE: 236 episodes

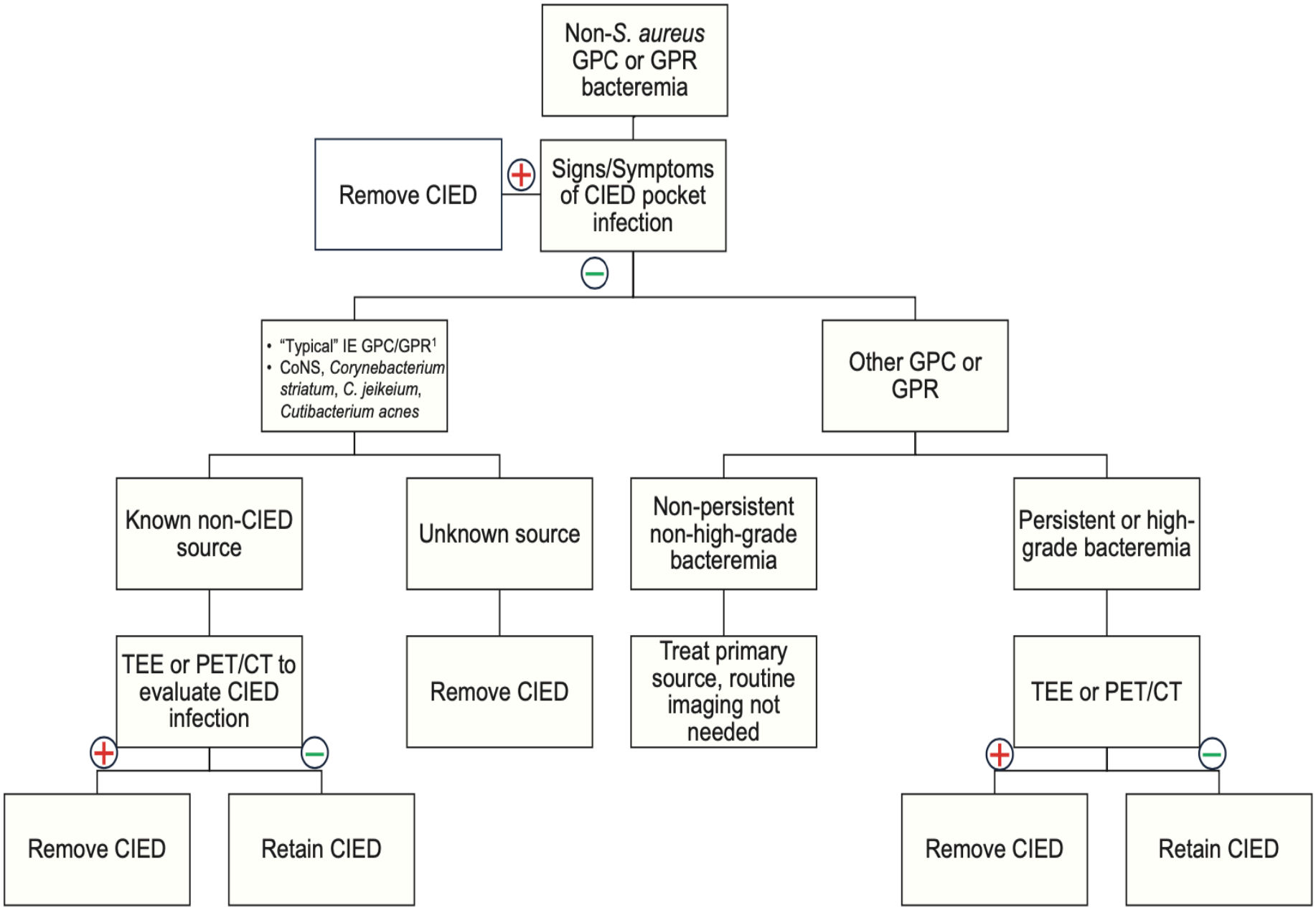
Management of *S aureus* bacteremia (SAB) in pts with CIED

Axell-House DB, Khalil S,Sohail MR. *Methodist DeBakey Cardiovasc J*. 2023;19(4):48-57. doi: 10.14797/mdcvj.1271



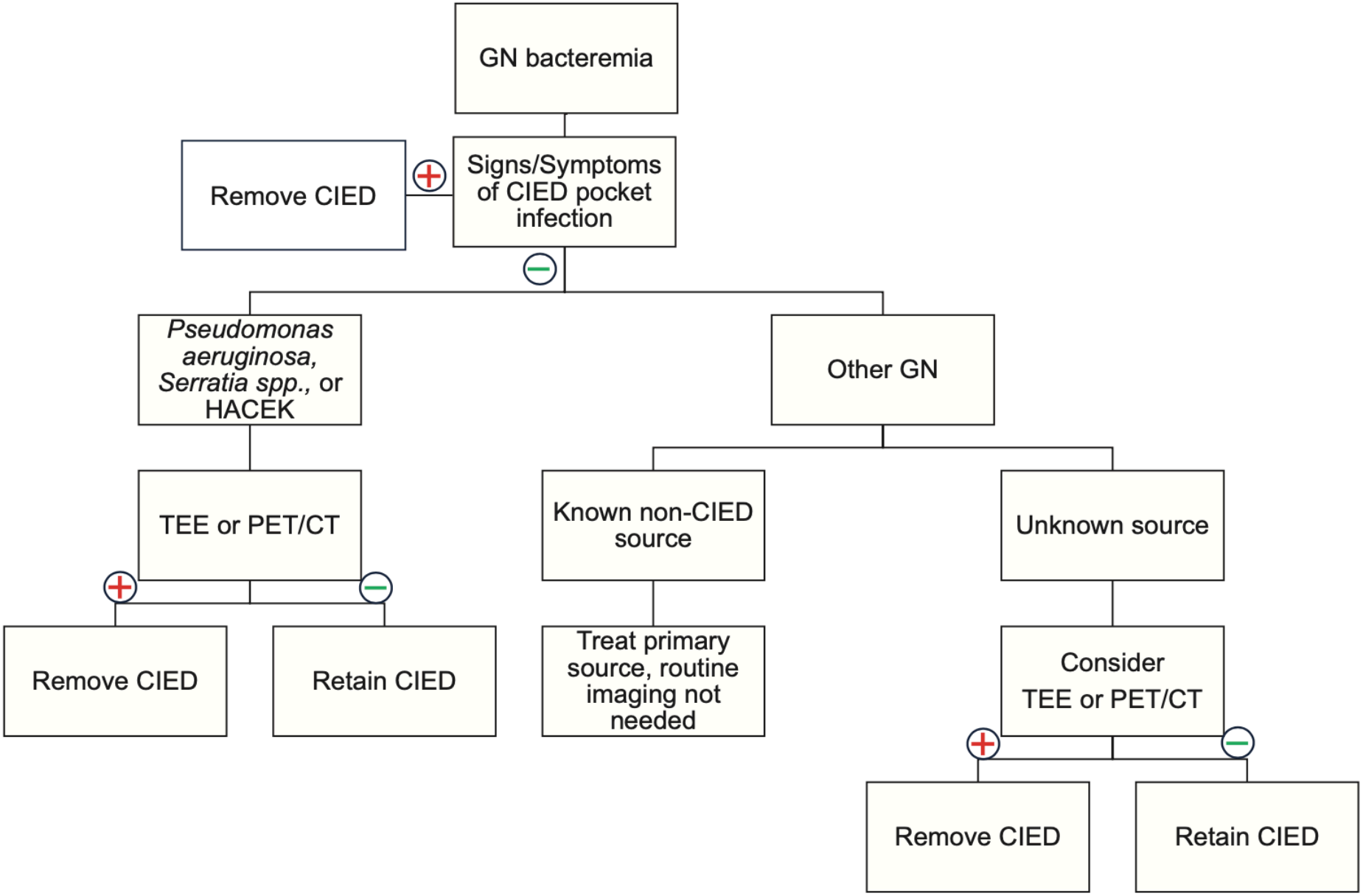
Management of non-*S. aureus* gram-positive bacteria bacteremia in pts with CIED

Axell-House DB, Khalil S,Sohail MR. *Methodist DeBakey Cardiovasc J*. 2023;19(4):48-57. doi: 10.14797/mdcvj.1271



Management of gram-negative bacteremia in pts with CIED

Axell-House DB, Khalil S,Sohail MR. *Methodist DeBakey Cardiovasc J*. 2023;19(4):48-57. doi: 10.14797/mdcvj.1271

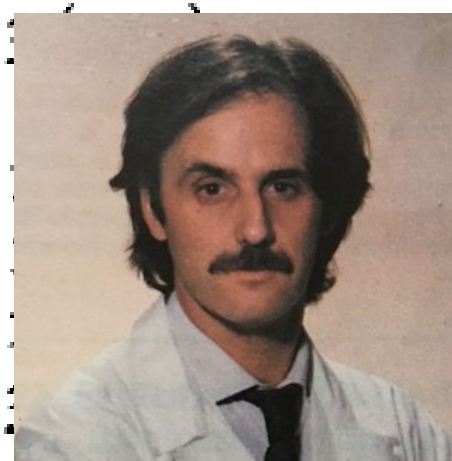


Aorto-femoral graft infections: a clinical and microbiological analysis

Journal of Infection (1992) 25, 17–26

Table II *Organisms cultured in 17 aortic graft infections*

Organism	Early onset* ($n = 5$)	Late onset† ($n = 12$)
S. epidermidis	2 (40)	3 (25·0)
S. saprophyticus	—	1 (8·3)
P. aeruginosa	2 (40)	2 (16·7)
E. coli	2 (40)	—
Enterococcus spp.	1 (20)	2 (16·7)
S. aureus	—	
E. cloacae	1 (20)	
P. vulgaris	—	
Citrobacter spp.	—	
Corynebacterium spp.	—	
Sterile cultures	—	

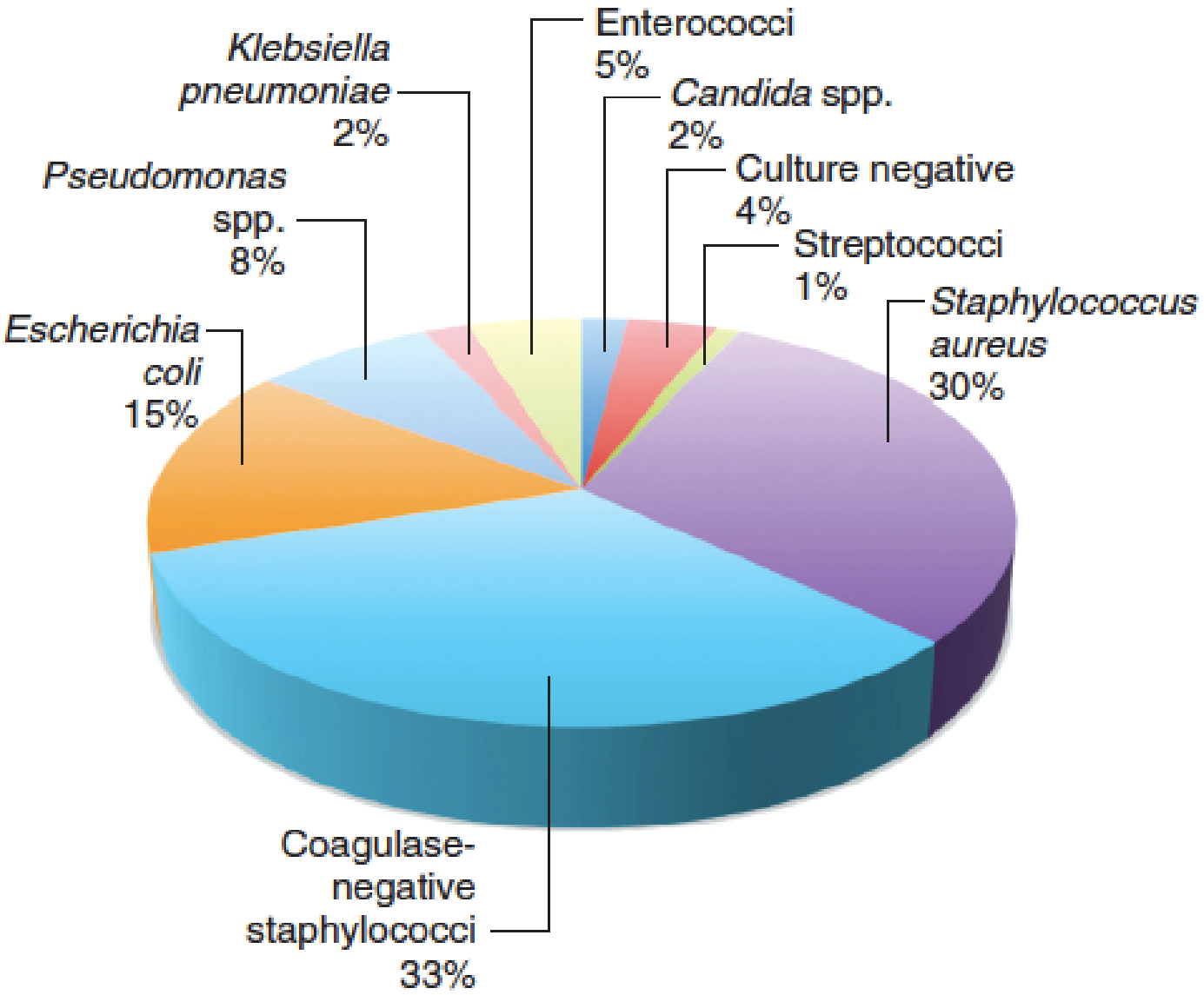


Vascular graft infection: the problem

- **Prosthetic vascular graft (PVG) insertion is complicated by infection in 0.5-4% of cases, causing major morbidity, mortality, and economic cost.**
- **Fundamental tenets of aortic PVG infection management are removal of the infected device, revascularization (either by an anatomic route, or an uninfected extra-anatomic route), and adjunctive antimicrobial therapy.**
- **However, surgical explantation carries a mortality of 18-30%.**
- **Conversely, if an infected PVG is left in situ chronic suppressive antimicrobial treatment is associated 100% mortality within 2 years.**

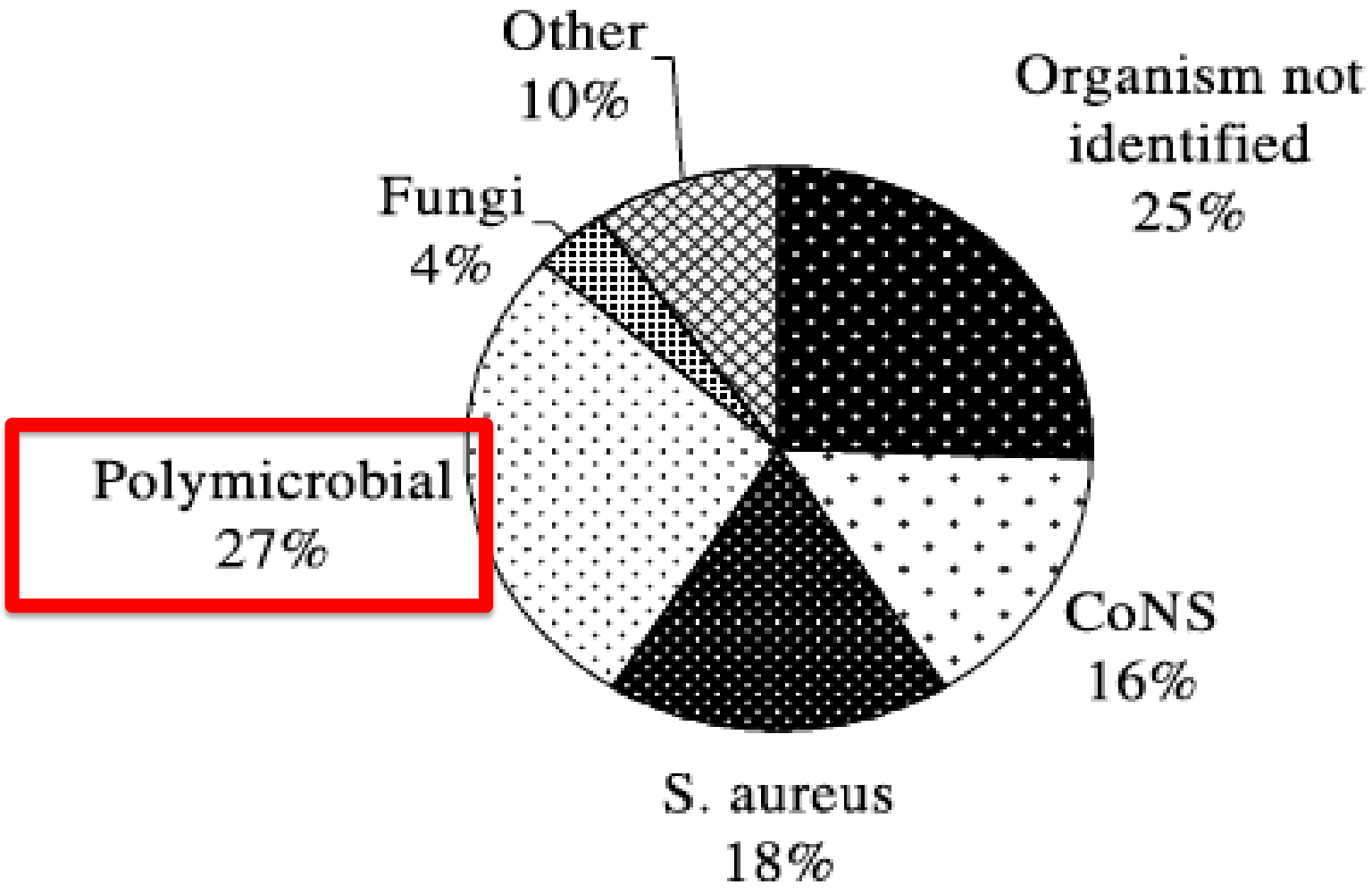
Microbiology of prosthetic vascular graft infections

(intraoperative culture results from 119 pts, 68 with aortoiliofemoral and 51 with extracavitary graft infections).
Bandyk DF et al. *J Vasc Surg* 2001



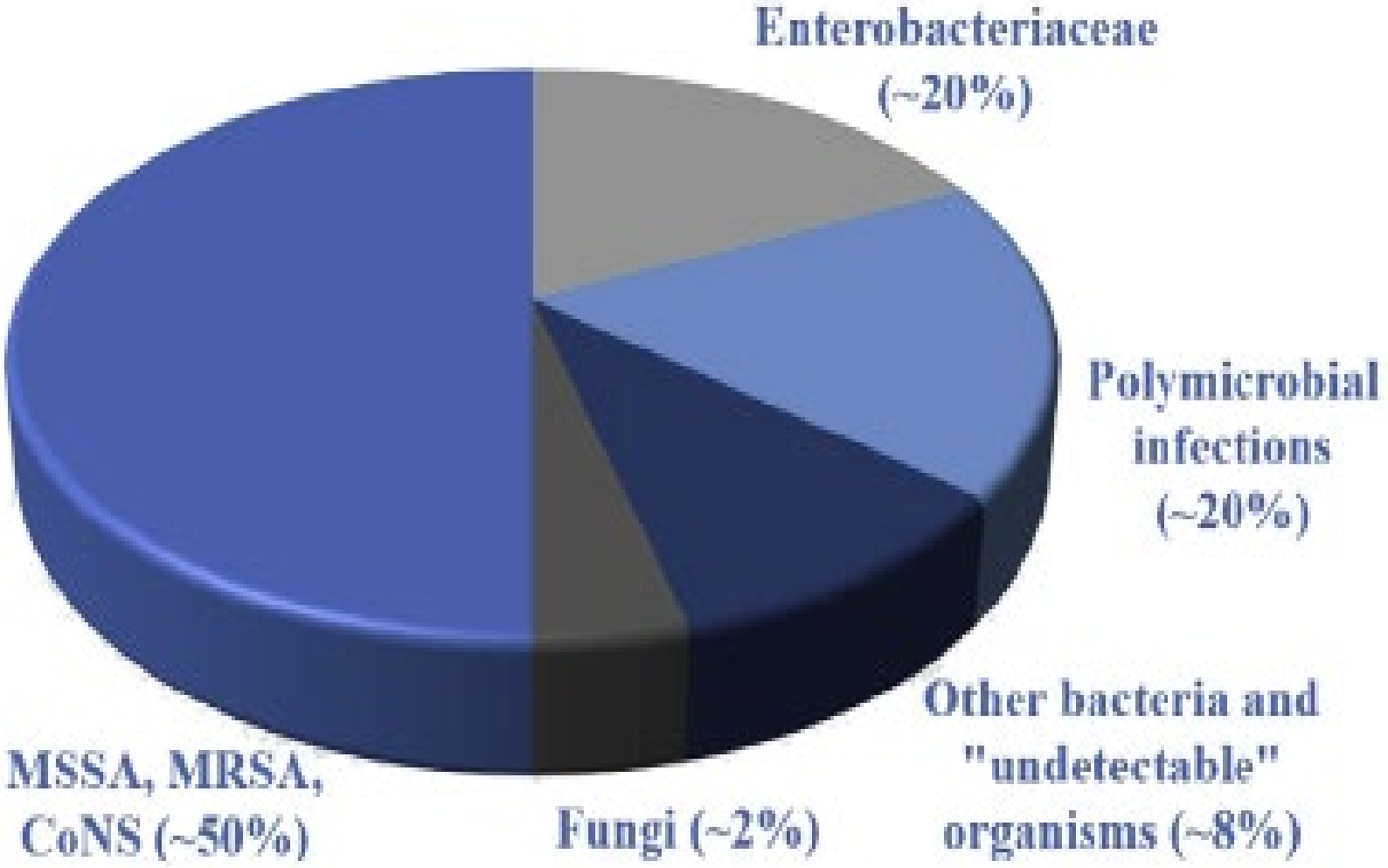
Microbiology of PVGIs at Mayo Clinic Rochester between 1982 and 2002

Antonios VSS et al *Journal of Infection* (2006)



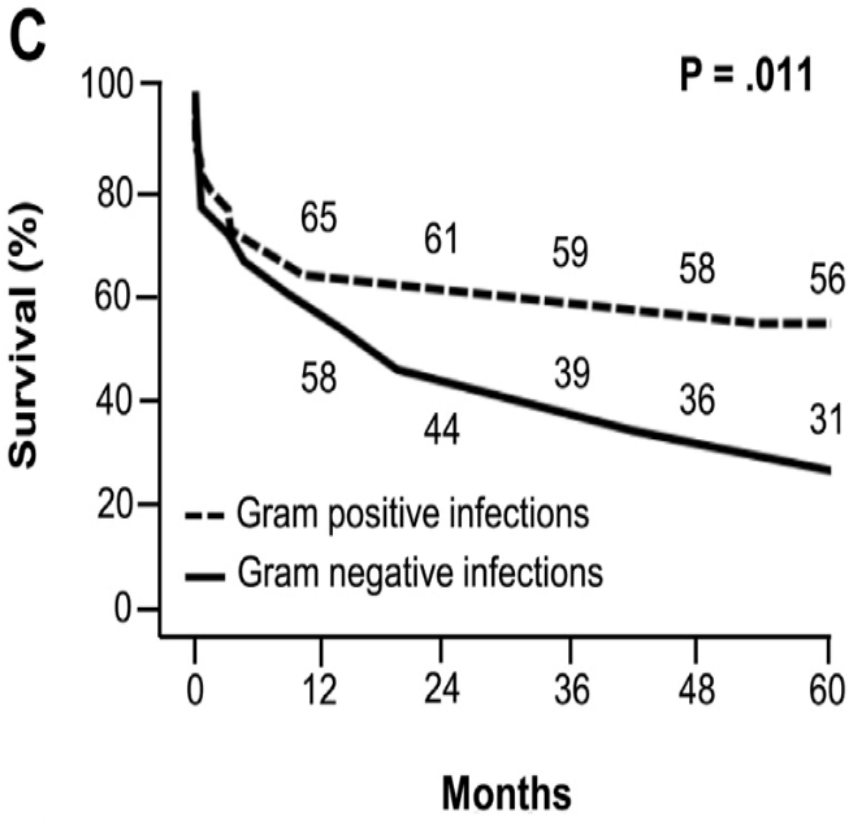
Pathogens most frequently responsible for Abdominal PVGIs and relative percentages

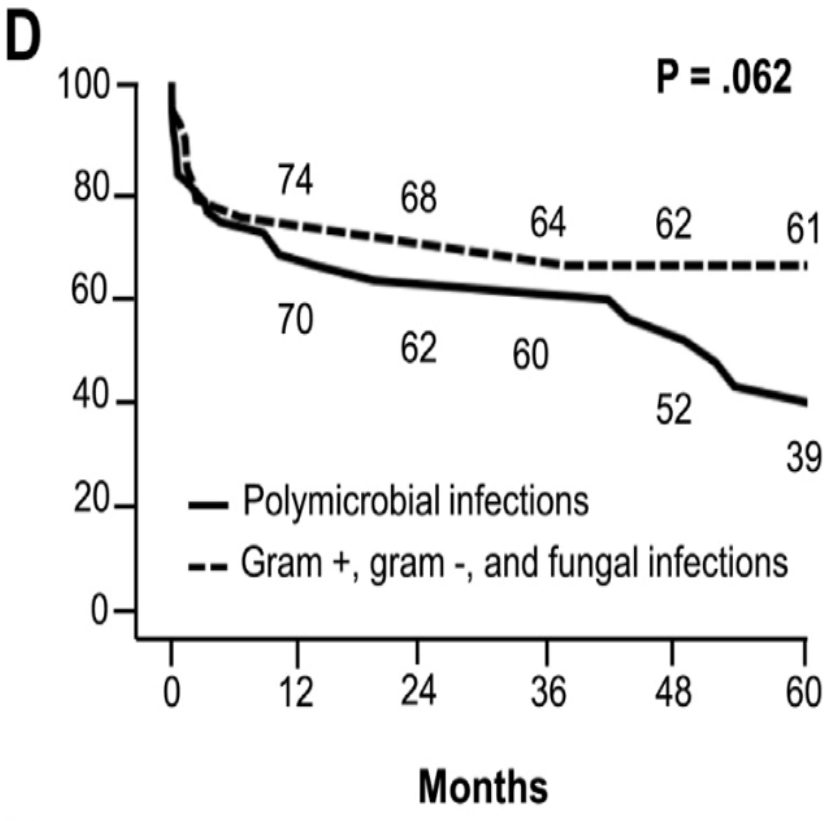
Antonello *J Infect Chemother* (2019)



Survival of patients with aortic endograft infection according to isolated pathogens

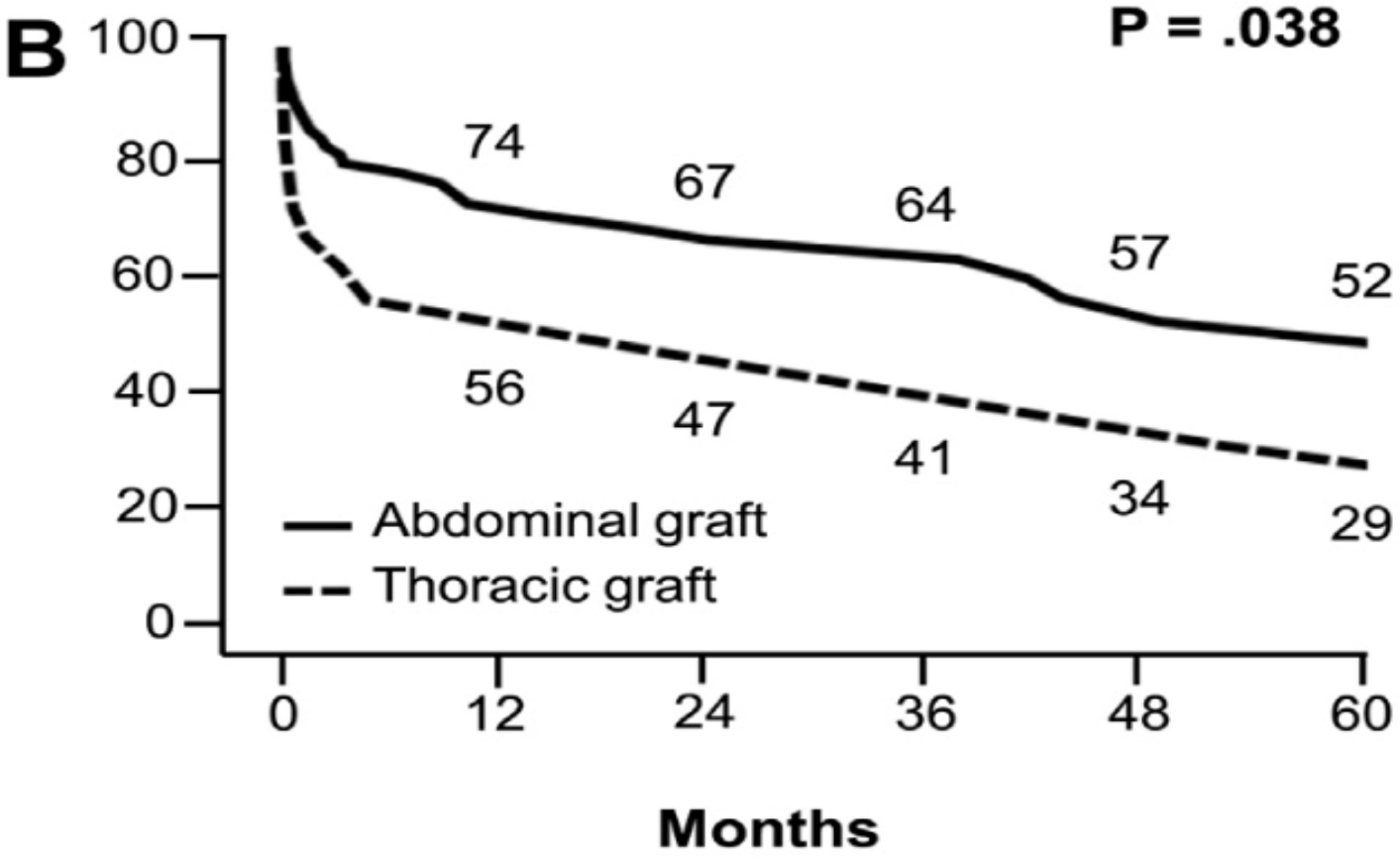
Smeds et al. *J Vasc Surg* 2016;63:332-340





Survival of patients according to localization of aortic endograft infection: abdominal graft vs thoracic graft

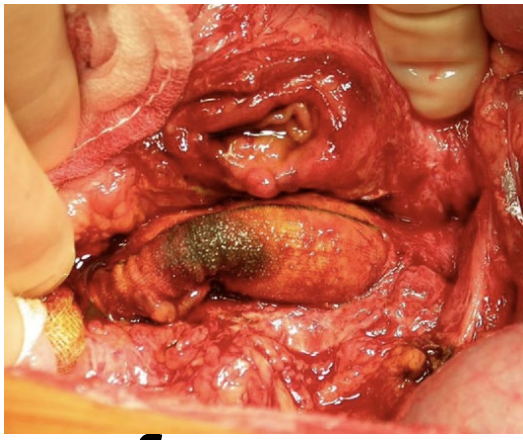
Smeds et al. *J Vasc Surg* 2016;63:332-340



Risk Factors for Prosthetic Vascular Graft Infection

- **Groin incision**
- **Poor wound healing/infection at surgical site**
- **Emergent surgery**
- **Lack of appropriate antimicrobial prophylaxis in the perioperative period**
- **Bloodstream infection during index hospitalization**
- **History of multiple invasive interventions before or after graft placement**
- **Contiguous infection in the graft area**
- **Comorbid conditions (diabetes mellitus, chronic renal insufficiency, obesity, immunocompromised host)**

Clinical presentation of prosthetic vascular graft infection



1. **Perigraft infection or abscess formation**
2. **Graft exposure due to disruption of the superficial soft tissue layers overlying the prosthesis**
3. **Graft erosion or fistula formation involving a mucosal surface.**

- **However, these three presentations of graft infection are not mutually exclusive.**

Major and minor criteria according to the Management of prosthetic vascular graft infection Collaboration (MAGIC)

Lyons et al *Eur J Vasc Endovasc Surg* 2016

	Clinical/Surgical	Radiology	Laboratory
Major criteria	• Pus (confirmed by microscopy) around graft or in an aneurysm sac at surgery • Open wound with exposed graft or communicating sinus • AEF • Graft insertion in an infect site (e.g. aneurysm, fistula)	• Peri-graft fluid on CT scan ≥3 months after insertion • Peri-graft gas on CT scan ≥7 weeks after insertion • Increase in peri-graft gas volume demonstrated on serial imaging	• Organisms recovered from an explanted graft • Organisms recovered from an intra-operative specimen • Organisms recovered from a percutaneous, radiologically-guided aspirate or peri-graft fluid
Minor criteria	• Localized clinical features of AGI (e.g. erythema, warmth, swelling, purulent discharge, pain) • Fever ≥38 °C with AGI as most likely cause	• Other (e.g suspicious peri-graft gas/fluid/soft tissue inflammation; aneurysm expansion; pseudo-aneurysm formation; focal bowel wall thickening; discitis/osteomyelitis; suspicious metabolic activity on FDG-PET/CT; radiolabeled leukocyte uptake)	• Blood culture(s) positive and no apparent source except AGI • Abnormally elevated inflammatory markers with AGI as most likely cause

AGI should be suspected if a single major criterion or two or more minor criteria from different categories are present.
AGI should be diagnosed if there is one major plus any other criterion (major or minor) from another category

Sensitivities and specificities for each imaging modality in the diagnosis of vascular graft/endograft infection

Chakfé et al. *Eur J Vasc Endovasc Surg* 2020;59:339-384

Imaging tool	Reported ranges	
	Sensitivity	Specificity
CT angiography	0.64–1.00	0.00–0.86
FDG-PET	0.86–0.98	0.63–0.76
FDG-PET CT	0.80–1.00	0.60–0.92
WBC scintigraphy	0.73–1.00	0.50–1.00
WBC SPECT/CT	0.94–1.00	0.50–1.00

CT, computed tomography; FDG, fluorodeoxyglucose; PET, positron emission tomography; WBC, white blood cell; SPECT, single photon emission computed tomography

18F-FDG PET in the Diagnosis of Vascular Prosthetic Graft Infection:A Diagnostic Test Accuracy Meta-Analysis

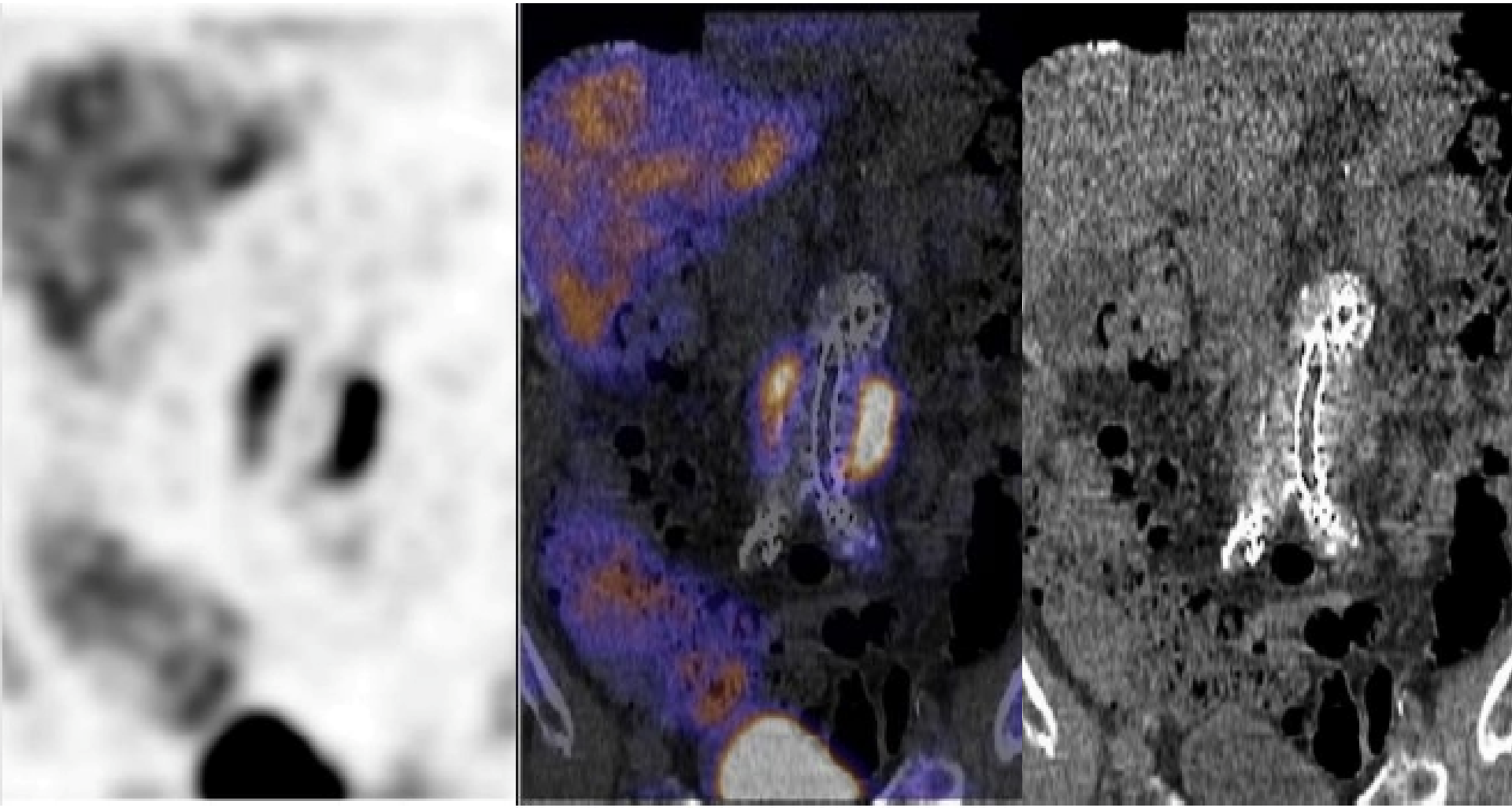
Rojoa D, et al. *Eur J Vasc Endovasc Surg.* 2019

PET scan evaluation method	Pooled estimates of	
	sensitivity (95% CI)	specificity (95% CI)
graded uptake*	0.89(0.73-0.96)	0.61(0.48-0.74)
focal uptake*	0.93(0.83-0.97)	0.78(0.53-0.92)
SUVmax*	0.98(0.42-0.99)	0.80(0.70-0.88)
tissue to background ratio(TBR)	0.57(0.39-0.73)	0.76(0.64-0.85)
dual time point (DTP)	1.00(0.48-1.00)	0.88(0.68-0.97)

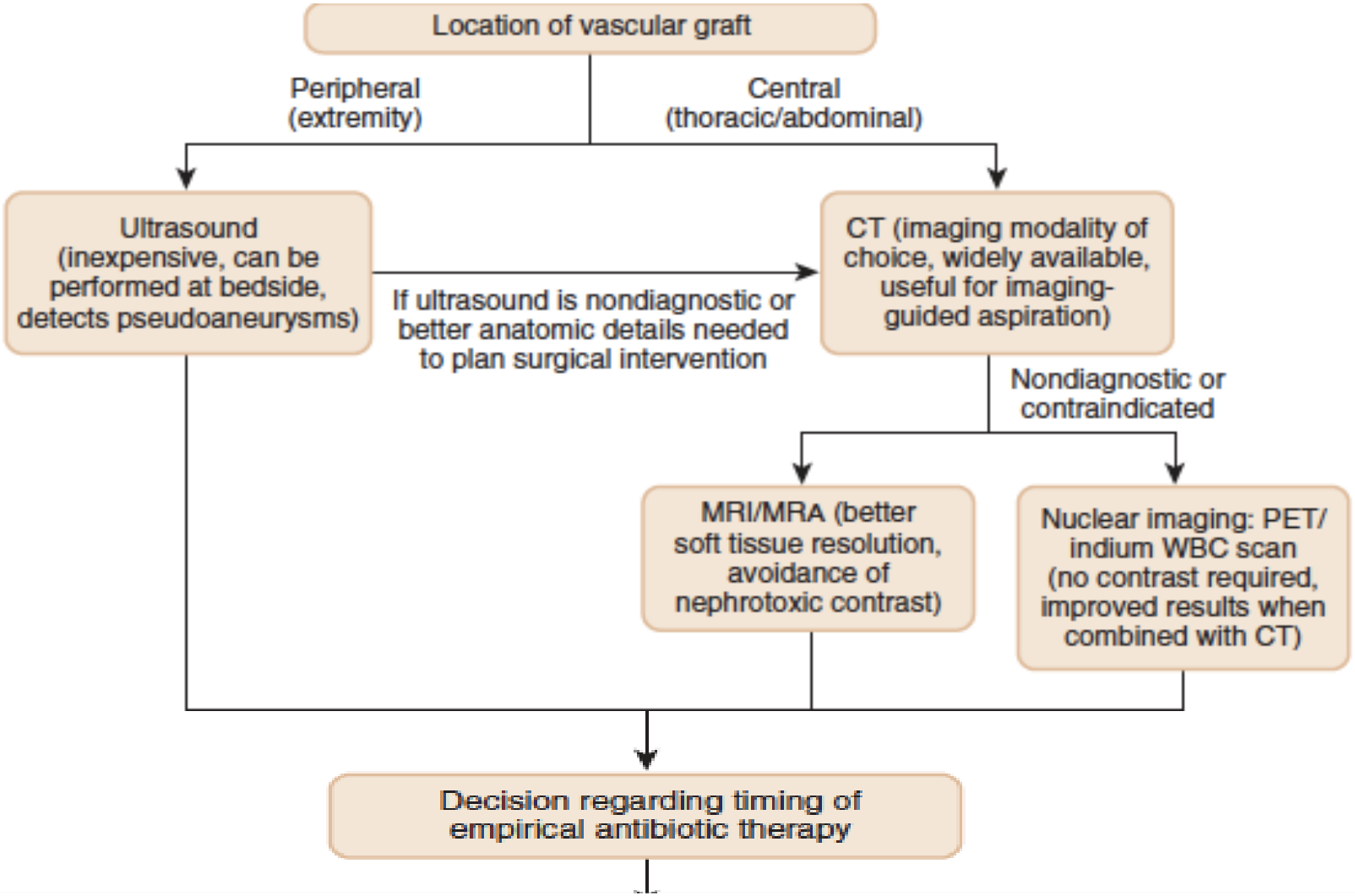
* the diagnostic accuracy of PET combined with CT showed higher sensitivity and specificity for these methods

Graft infection in a patient with an aortoiliac graft. SPECT taken 24 hours after administration of radiotraced WBC (left) demonstrate a focal high-level site of radiotracer activity. The exact localization is possible thanks to the co-registration of CT image (SPECT/CT middle, CT right), Confirming the diagnosis of Abdominal PVGI.

Antonello et al *J infect Chemother*, 2019



Diagnostic evaluation and initial management of prosthetic vascular infections



General Principles for Management of Prosthetic Vascular Graft Infection

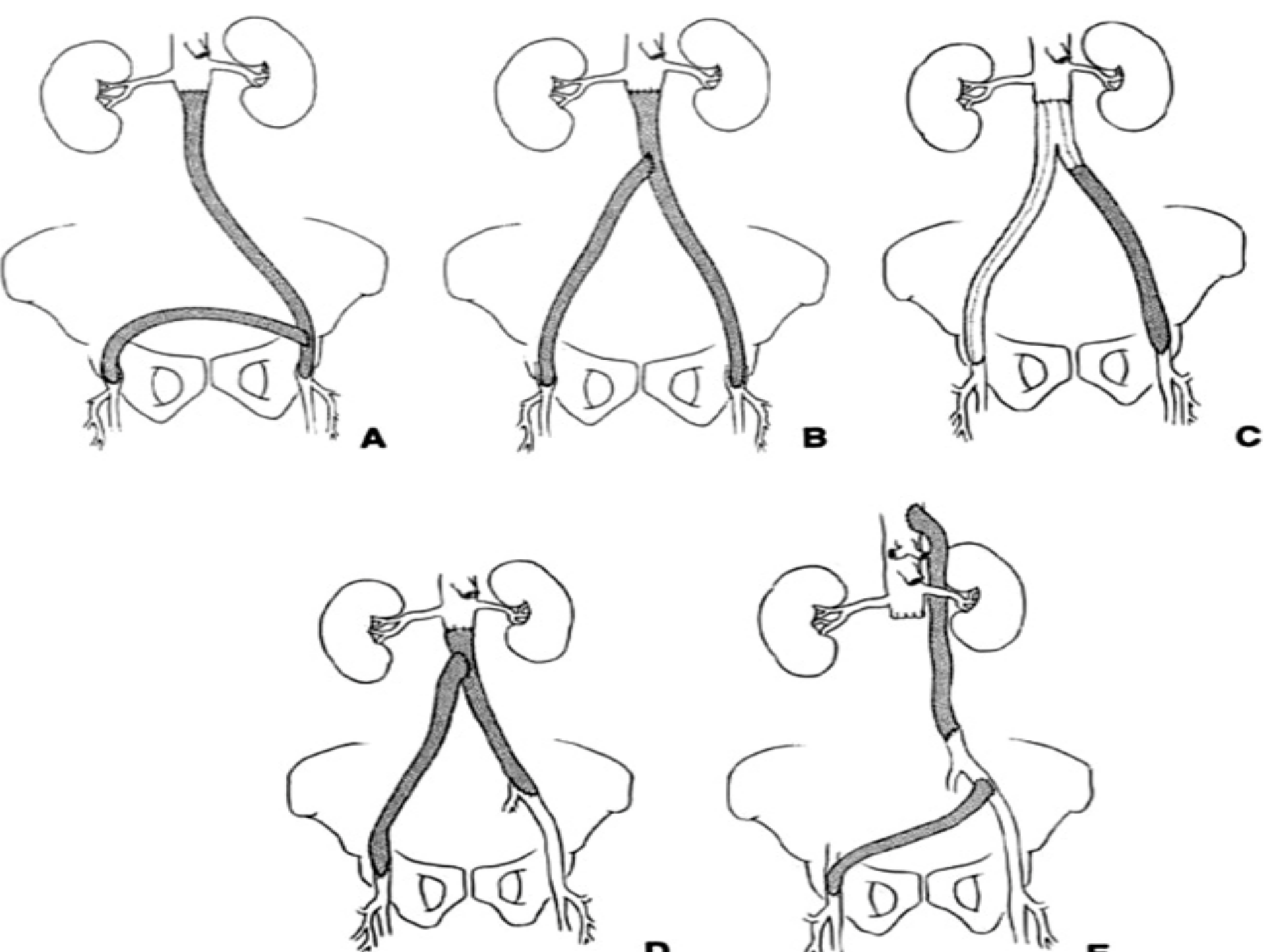
- Complete excision of the infected graft material
- Extensive débridement of all infected, devitalized tissues in the perigraft area
- Revascularization of distal tissues
- Microbiologic identification of causative pathogen, followed by appropriate systemic antimicrobial agents for >6 wk (depending on clinical response andrepeat imaging).
- Bactericidal antibiotics are preferred and combinations are often used

Table III *Results of treating 19 aortic graft infections by different surgical procedures*

Procedure (number of patients)	Recovered	Amputation	Deaths
Total excision without revascularisation (4)	1	—	3
Total excision with extra-anatomic revascularisation (10)	2	3	5*
Total excision with '*in situ*' replacement (2†)	2	—	—
Partial excision without revascularisation (1)	—	—	1
Partial excision with revascularisation (1)	—	1	—
Antibiotic and local treatment (1)	1	—	—
Total	6	4	9

Advantages and disantvages of Reconstruction (total excision with extranatomic revascularization) for Management of aoro-iliac PVGI

advantages	disadvantages
• Theoretically reduced risk of new graft infection by avoiding placement of a new prosthetic material or allograft in a previously infected tissue bed	• Need for a second procedure if staged operative strategy is used • Reduced limb salvage rates (20%-30% lower extremity amputation rate) • Aortic stump blowout (20%) • 20% reinfection rate


A
B
C

Management of open revascularisation for infection of prosthetic materials or stents involving the supra-aortic trunks: review of 138 cases, mostly involving carotid patches

Lejay A et al *Eur J Vasc Endovasc Surg* (2018)

Deaths.

6/138(4%)

….excluding

conservative treatments after debridment:

6/112(5%)

(including 1 muscle flap)

conservative treatment n=26

Antibiotics alone n=22 → none n=21, cardiac failure n=1

Antibiotics + flap n=4 → none n=3, bleeding n=1

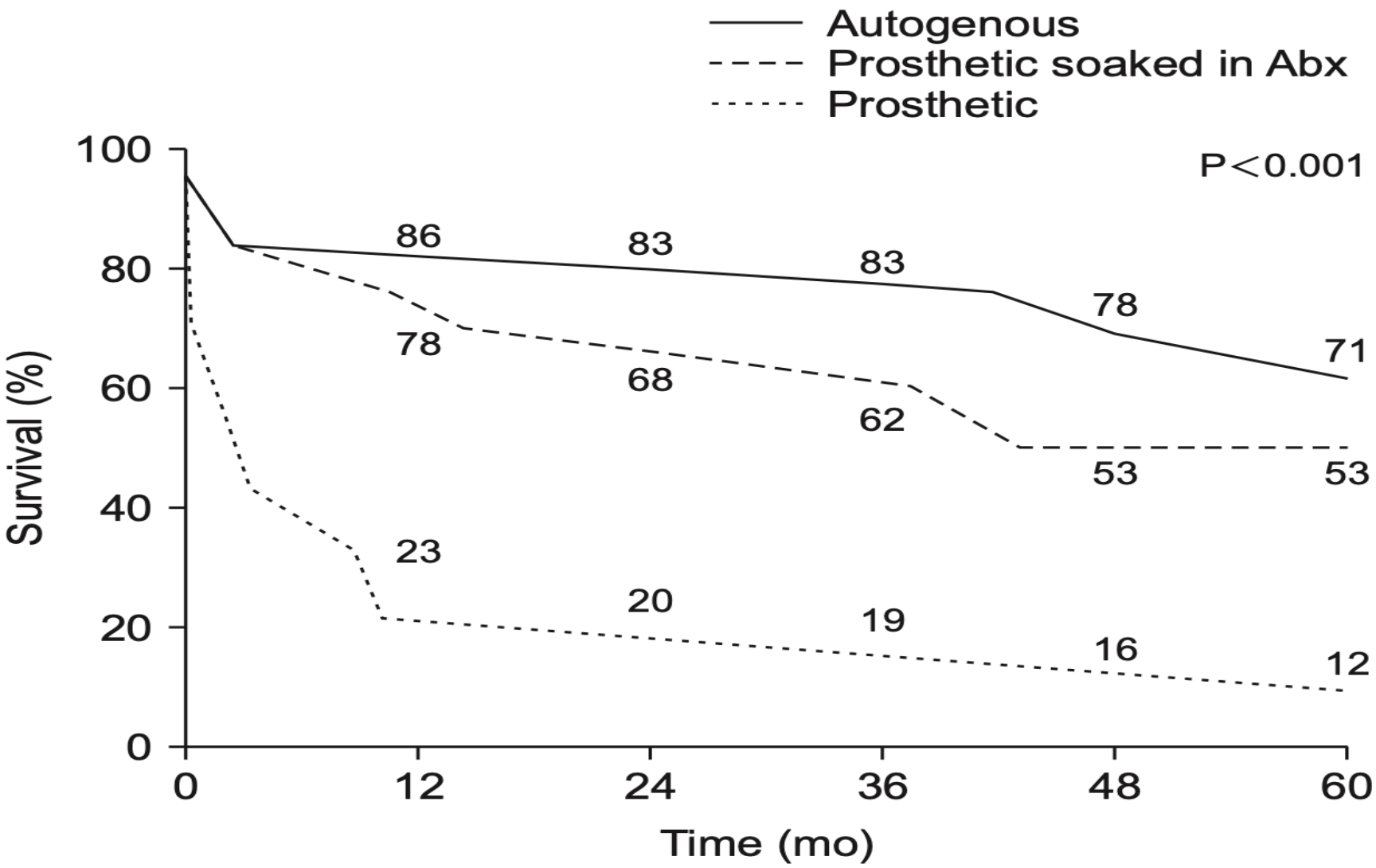
Advantages and disadvantages of various aortic conduits used in in situ aortic reconstruction for patients with aortic endograft infection

Kim YW *Vasc Specialist Int* 2023. https://doi.org/10.5758/vsi.23007

Conduit	Advantages	Disadvantages
Autogenous vein graft	Lower reinfection rate Desirable patency	Optimal vein is not always available Extended surgery time Not readily available in emergency setting Uncommon but possible postoperative leg edema
Cryopreserved allograft	Lower reinfection rate than prosthetic graft	Not easily available Late degeneration (aneurysmal change or graft rupture)
Prosthetic graft	Readily available	Higher reinfection rates compared to biologic grafts
Antimicrobial-treated prosthetic graft	Readily available	Cytotoxicity to the vessel wall Emergence of resistant bacterial strain Antibacterial effect does not last long
Biosynthetic graft	Readily available	Outcomes need to be evaluated in the future Graft occlusion is common

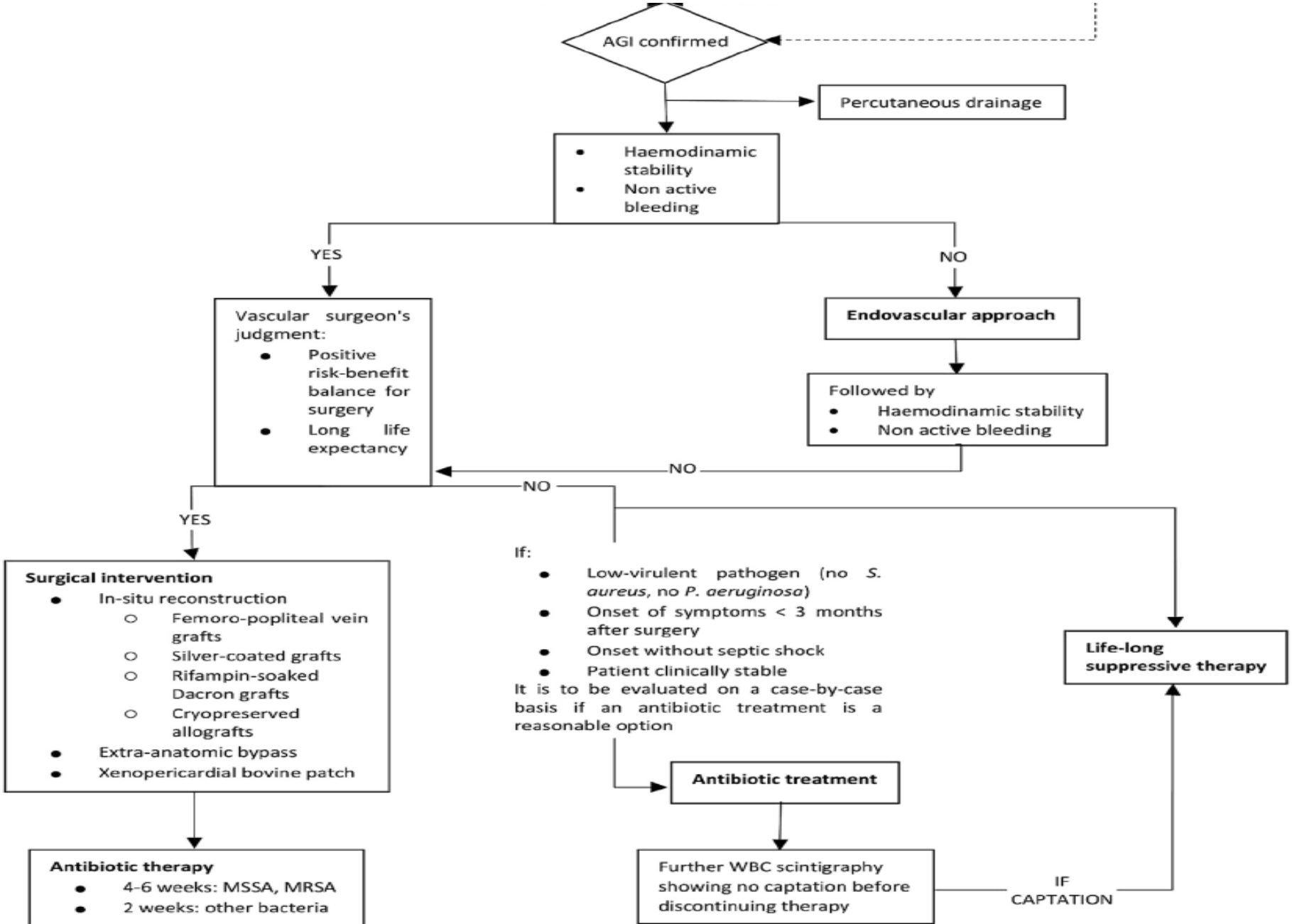
survival rates according to the graft material after in situ aortic reconstruction for pts with aortic endograft infection

Smeds et al. *J Vasc Surg* 2016;63:332-340



Therapy management of PVGI

Antonello et al *J Infect Chemother*, 2019



Therapy management of PVGI

Antonello et al *J Infect Chemother*, 2019

	3–6 months or post-surgery antibiotic treatment	Life-long suppressive therapy
VRE	Daptomycin▪ 8-10 mg/kg IV q24h + Ampicillin▪ 2 g IV q4h **or** Ceftaroline▪ 600 mg IV q12h	Linezolid 600 mg PO q12h [Unavoidably leading to pancytopenia. Consider surgica treatment as far as possible]
***Enterococci* penicillin-susceptible**	Penicillin G▪ 20–24 million units IV q24h continuously or in 6 divided doses **or** Ampicillin▪ 2 g IV q4h + ceftriaxone/ceftobitprole Dalbavancin▪ 1500 mg IV over 30 minutes once a week.*	Amoxicillin▪ 1 g PO q8h + cefditoren
P. aeruginosa	Piperacillin-Tazobactam▪ 4,5 g IV q6-8h **or** Cefepime▪ 2 g IV	Ciprofloxacin▪ 500-750 mg PO q12h

Therapy management of PVGI

Antonello et al *J Infect Chemother*, 2019

	3-6 months or post-surgery antibiotic treatment	Life-long suppressive therapy
MSSA & MSCons	Cefazolin▪ 2 g IV q8h **or** Oxacillin 2 g IV q4h + Rifampin 600 mg IV/PO q24h Dalbavancin▪ 1500 mg IV over 30 minutes once a week* + Rifampin 600 mg IV/PO q24h	Amoxicillin-clavulanate▪ 1 g PO q8h **or** Cephalexin▪ 1g PO q8h **or** Trimethoprim/Sulfamethoxazole▪ 2 tablets PO q12h **or** Clindamycin 450 mg PO q8h **Cipro or levo**
MRSA & MRCons **+ ceftaroline or ceftobiprole** ***WARNING!** add rifampin when the microbial burden of local prokariotic cell might be substantially rediced	Vancomycin▪ loading dose of 25-30 mg/kg then 15-20 mg/kg IV q8-12h + * Rifampin 600 mg IV/PO q24h Daptomycin▪ 6 mg/kg IV q24h + * Rifampin 600 mg IV/PO q24h Dalbavancin▪ 1500 mg IV over 30 minutes once a week*	Minocycline 100 mg PO q12h **or** Doxycycline 100 mg PO q12h **or** Trimethoprim/Sulfamethoxazole▪ 2 tablets PO q12h

Long acting lypopeptides in the treatment of gram-positive BSI & endocarditis

Tran et al *AAC*, May, 2022

Dalbavancin

Reference	*n*	Infection(s)	Bacterium or bacteria (*n*)	Most frequent dosage(s)	Duration/ no. of doses	Success, *n* (%)[b]	Adverse event(s) (*n*)
Bloodstream infections							
Bhavnani et al., 2006 (73)	55	Bacteremia	*S. aureus* (55)	5–10 mg/kg/day	10–14 days	45 (78)	N/R
Johnson et al., 2015 (109)	1	PVE	VR *E. faecium* (1)	1,200 mg every 48 h × 3 doses, then 1,200 mg weekly × 6 wk, then 1,200 mg biweekly × 10 wk	14 doses	1 (100)[c]	Anorexia, nausea, elevated LFTs (1)
Stewart et al., 2017 (82)	6	Bacteremia[d]	MSSA (4), CoNS (1), *Enterococcus* spp. (1)	1,200 mg	1 dose	4 (66.7)	None
Stewart et al., 2017 (82)	1	NVE	*S. agalactiae* (1)	1,200 mg	1 dose	0 (0)	None
Datta et al., 2018 (74)	3	Bacteremia	MRSA (1), *S. gallolyticus* (1), *Granulicatella adiacens* (1)	1,200 mg	1 dose	3 (100)	N/R
Brownell et al., 2020 (76)	4	Endocarditis	Not specified[e]	1,200 mg then 800–1,200 mg weekly	N/R[e]	4 (100)	None
Redell et al., 2019 (77)	7	Bacteremia	MRSA (2), MSSA (1), *S. epidermidis* (2), other (2)	1,200 mg once	1 dose	7 (100)	Not specified (29)[f]
Schulz et al., 2018 (80)	1	Bacteremia	VR *E. faecium* (1)	1,200 mg then 800 mg weekly	4 doses	0 (0)	None
Total	78					64 (82)	

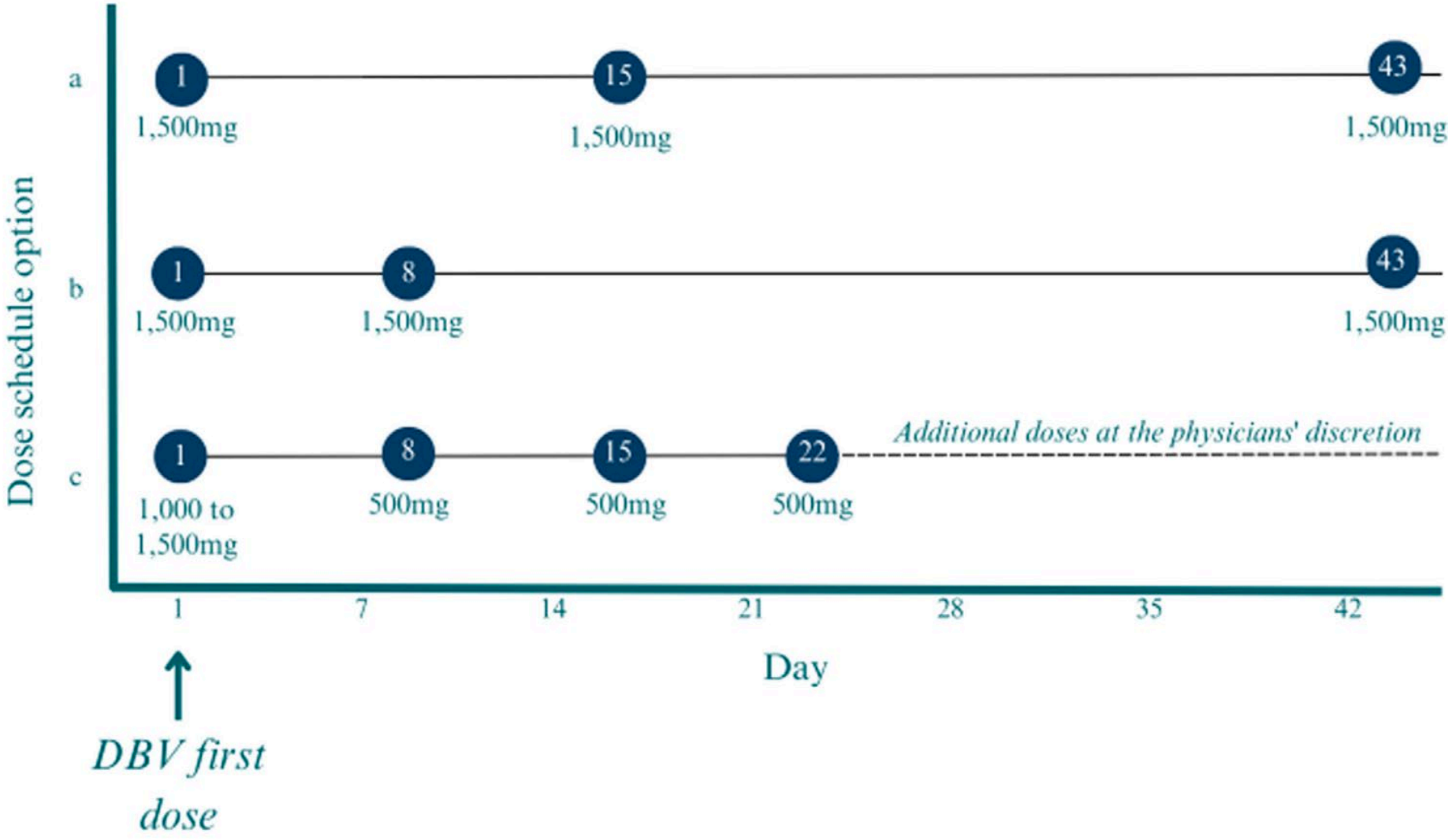
Oritavancin

Bloodstream infections							
Bhavnani et al., 2006 (73)	55	Bacteremia	*S. aureus* (55)	5–10 mg/kg/day	10–14 days	45 (78)	N/R
Johnson et al., 2015 (109)	1	PVE	VR *E. faecium* (1)	1,200 mg every 48 h × 3 doses, then 1,200 mg weekly × 6 wk, then 1,200 mg biweekly × 10 wk	14 doses	1 (100)[c]	Anorexia, nausea, elevated LFTs (1)
Stewart et al., 2017 (82)	6	Bacteremia[d]	MSSA (4), CoNS (1), *Enterococcus* spp. (1)	1,200 mg	1 dose	4 (66.7)	None
Stewart et al., 2017 (82)	1	NVE	*S. agalactiae* (1)	1,200 mg	1 dose	0 (0)	None
Datta et al., 2018 (74)	3	Bacteremia	MRSA (1), *S. gallolyticus* (1), *Granulicatella adiacens* (1)	1,200 mg	1 dose	3 (100)	N/R
Brownell et al., 2020 (76)	4	Endocarditis	Not specified[e]	1,200 mg then 800–1,200 mg weekly	N/R[e]	4 (100)	None
Redell et al., 2019 (77)	7	Bacteremia	MRSA (2), MSSA (1), *S. epidermidis* (2), other (2)	1,200 mg once	1 dose	7 (100)	Not specified (29)[f]
Schulz et al., 2018 (80)	1	Bacteremia	VR *E. faecium* (1)	1,200 mg then 800 mg weekly	4 doses	0 (0)	None
Total	78					64 (82)	

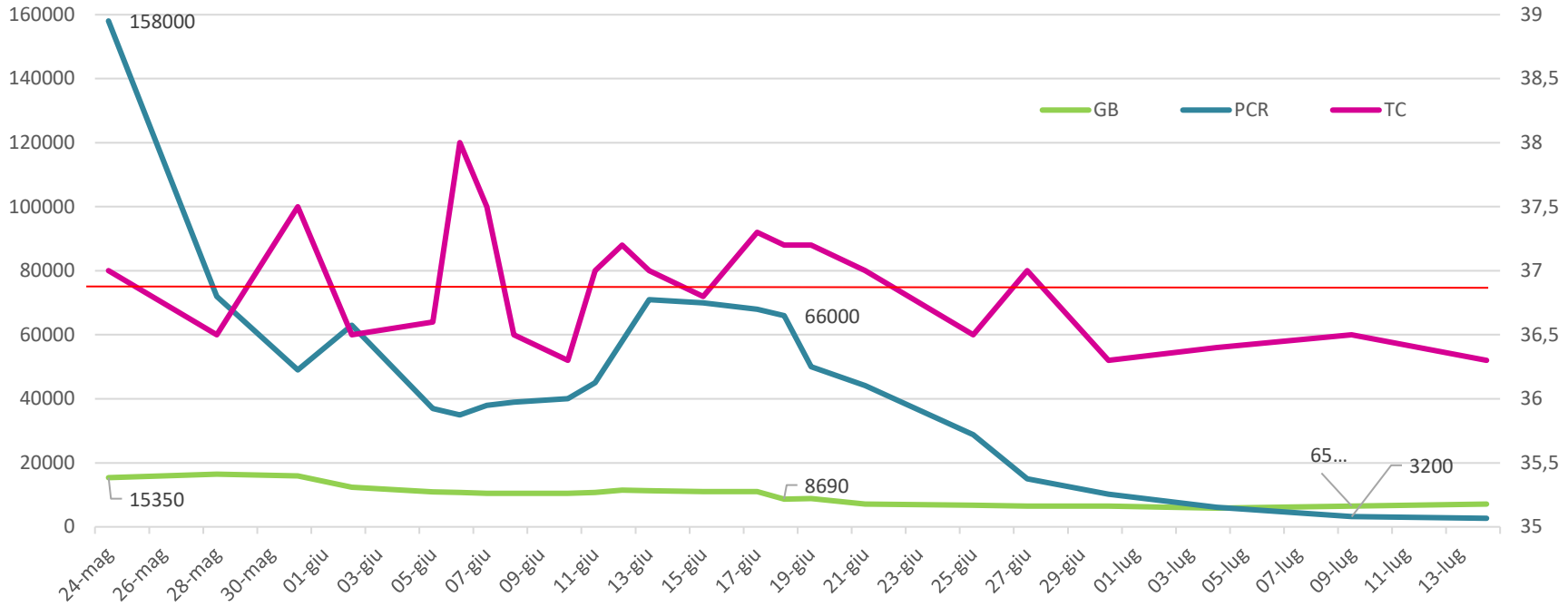
How to monitor Dalba & Orita therapy?

Dose regimens for clinical scenarios where the expected duration of dalbavancin (DBV) treatment is more than 6 weeks. TDM should guide the timing of the subsequent dalbavancin dose and be initiated between Day 28 and Day 35.

Senneville E. et al. (…& Pea F) *International Journal of Antimicrobial Agents* 62 (2023)



Clinical course: chronic suppessive dalba therapy for MR-Cons inoperable PVE



then 1,000–1,500 mg at day 7 or 14

7	Not specified[h]	Not specified[e]	Not specified[e]	Median, 4 doses

Chronic suppressive dalba therapy scheduled according to SBA titer guide

Day of therapy	Dalbavancin (mg, i.v.)	SBA	Dalba serum conc (mg/l)
Day 1	1500	n.a.	n.a.
Day 7	1500	n.a.	n.a.
Day 42	70 days Interval between doses	1:128*	n.a.
Day 63		1:512	32,8
Day 112	77 days Interval between doses	1:8*	0,6* (410,5**)
Day 133		1:128	17,9
Day 154		1:16	n.a
Day 189		1:2*	n.a.

*SBA titer or serum drug concentration measured before DBV administration; ** serum drug concentration measured 15 minutes after DBV administration

What about this patient after the case report?

Chronic suppressive dalba therapy scheduled according to SBA titer guide

Oliva A & Venditti M unpublished data, 2022

Day of therapy	Dalbavancin (mg, i.v.)	SBA*	Days interval between doses
Day 189	1500	1:2	
Day 231	1500	n.a.	42 days
Day 268	1500	n.a.	37 days
Day 310	1500	1:64	42 days
Day 373	1500	1:16	63 days
follow up	Day 378: PET-TC: no focal uptake No relapse more than 2 years after dalbavancin discontinuation		

*SBA titer or serum drug concentration measured before DBV administration;

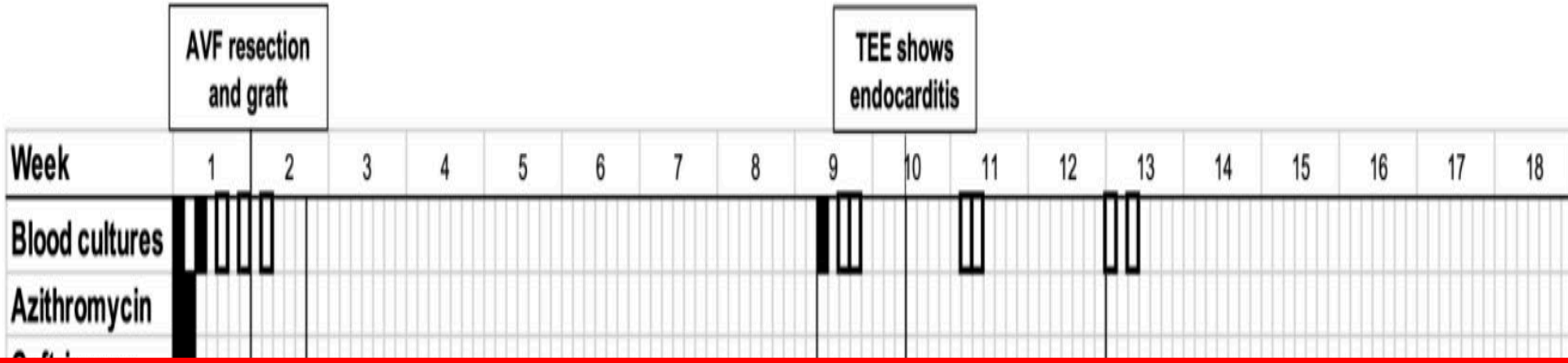
Dalbavancin for aortic valve plus ascenting aorta prosthesis grampositive infection

Oliva A & Venditti M ECCMID 2022

Case, Age Sex	Comorbidity	Type of infection	Bacteria	Type of iv therapy	DAL schedule	PET-TC	Outcome
# 1, 78yM	aortic valve-ascending aorta replacement	**Very early infection** PVE, ischemic lesions in kidneys and spleen	MR-S. *epidermidis,* PEN-S *S. mitis*	CEF, DAP	1500 mg (d 1-7-42-112-189….) based on SBA)	Focal uptake aortic tube on d 42, remarcably reduced on day 1 No focal uptake on day 378	No relapse after 2 years of follow up
#2, 77y M	aortic valve-ascending aorta replacement pacemaker Solitary nodule of the lung , Chronic lymphocytic leukemia	**Late infection** PVE, perivalvular abscess	*S. intermedius*	CEF, VAN (other hospital), CEF	1500mg (d1-8-60-144-197) based on SBA	Focal uptake aortic tube before therapy	No relapse and No PET-TC uptake on day 278(90 days after dose IV) Multiple metastases (lung cancer?)
#3, 74y, F	aortic valve-ascending aorta replacement & Descendinng aortic arch graft Postoperative mediastinitis	**Relapse after 11 months of a postoperative mediastinitis** Ascending aorta prosthesis infecion,perigraft abscess	MR-S. *epidermidis, C. albicans*	Cefta+dap+caspo→fluco	1500 mg (d1-8-62-129…→248-256 Chronic suppressive fluco	• D 21: Uptake ascending aortic graft • D 130: no uptake • D 240: uptake ascending aortic graft	Neither signs nor laboratory findings on clinical relapse, Persistentitly negative negative BDG

Emergence of dalbavancin, vanco & dapto non-susceptible *S. aureus* in a patient treated with dalbavancin

Zhang et al *Clin Infect Dis*, 2022



At the time VAHP-2049 was isolated from the patient, the dalbavancin plasma concentration was 24mg/L. Assuming 99% average protein Binding, the circulating unbound concentration was 0.24mg/L or ~0.5x the MIC of VAHP-2049.

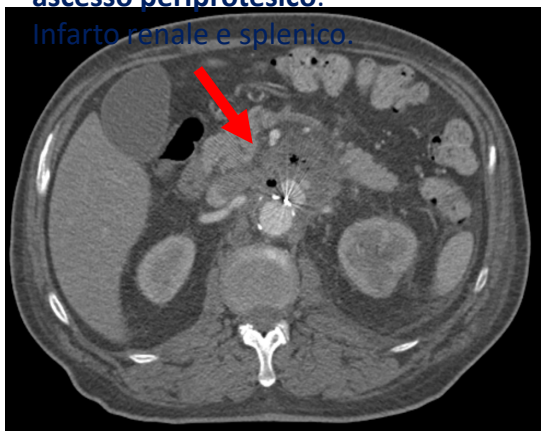
Caso clinico

Uomo di 76aa, APR: IPB, FAP e IAS

Novembre 2018 AAA → endoprotesi aorto-bisiliaca

Gennaio 2020: febbre, dolore addominale, PCR 13 mg/dL

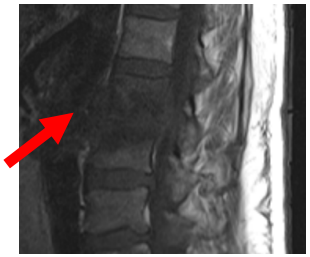
Raccolta saccata 53x48x50mm in comunicazione con ampio **endoleak di tipo I**.
Nel contesto multiple **bolle aeree** come per **ascesso periprotesico**.
Infarto renale e splenico.

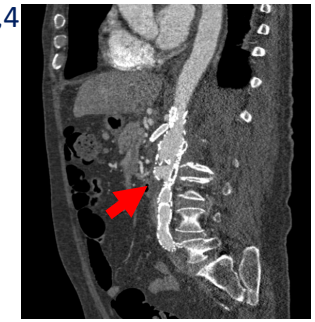


Sostituzione endovascolare urgente con endoprotesi aortica.
Meropenem e daptomicina 6 settimane

Tampone rettale alla dimissione: ***K. pneumoniae* produttrice di KPC**

Agosto 2021 febbre, brivido scuotente, dolore lombare e fianco sx, PCR 10 mg/dL, PCT 11 ng/ml, Creat 2,4



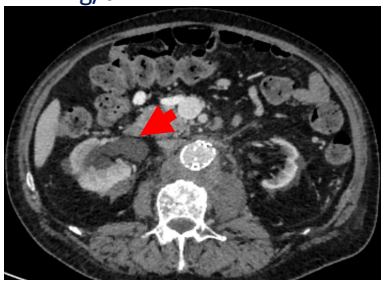


Aspirazione:

- **E. faecalis (MIC ampicillina 8)**
- **MRSA**

Daptomicina e meropenem 4 settimane.A seguire **inizia infusioni ambulatoriali di dalbavancina**

Marzo 2022. Febbre, brivido scuotente, dolore addominale e lombare, Creat 2.9 mg/dl, PCR 41 mg/dL.



Raccolta ingloba uretere dx → idroureteronefrosi->Stent ureterale JJ->Nuovo ciclo di trattamento antibiotico ev

Giugno, settembre 2022 , gennaio e marzo 2023 urosepsi da E. coli, K oxytoca e KPC Kp

Agosto 2023 quadro settico, PCR 20 mg/dL

- **Inizia CZA + FOF + DAP**
- **TC 02/08 *Nuova quota fluida disposta emicirconferenzialmente in sede paravertebrale che anteriormente entra in contatto con l´aorta.***

Drenaggio interventistico delle raccolte purulente:

Enterococcus faecalis

Antibiotico	MIC	Interpretazione
Ampicillina	4	S
Benzilpenicillina	>8	R
Dalbavancin	**6**	**IE**
Daptomicina	**1**	**IE**
Eritromicina	>4	R
Gentamicina HC	>500	R
Imipenem	≤2	S
Linezolid	≤1	S
Minociclina	8	R
Teicoplanina	>16	R
Tetraciclina	>8	R
Tigeciclina	≤0,25	S
Vancomicina	>32	R

Klebsiella pneumoniae

Antibiotico	MIC	Interpretazione
Imipenem	>8	R
Amikacina	≤8	S
Aztreonam	>4	R
Cefepime	>8	R
Cefiderocol		**R**
Ceftazidime/avibactam	**>256**	**R**
Ceftolozane/tazobactam	>4	R
Ciprofloxacina	>1	R
Colistina	≤2	S
Gentamicina	≤2	S
Tigeciclina	≤0,25	S
Meropenem	>32	R
Meropenem/vaborbactam	**4**	**S**
Imipenem/relebactam	**1,5**	**S**
Piperacillina/tazobactam	>16	R
Cotrimossazolo	≤2/38	S
Fosfomicina	64	R
KPC	POS	+

Inizia imipenem/cilastatina/relebactam (off label) con miglioramento clinico e laboratoristico

Ongoing

…