Infections fungiques invasives à levures. Prise en charge au long cours : les infections ostéo-articulaires

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Principales infections candidosiques nécessitant un traitement prolongé ?

- Traitement prolongé : durée ≥ 1 mois
- Candidose chronique disséminée
- Infections cardio-vasculaires
  - Endocardites
  - Infections de prothèse vasculaire
- **Infections ostéo-articulaires**
  - Ostéite
  - Arthrite septique
    - Articulation native
    - **Prothèse articulaire**

Origine des IOA candidosiques

- Hématogène
  - Rachis +++

    → Délai entre épisode candidémique et premiers signes locaux d'infection = 2 à 12 M dans plus de 2/3 des cas.
  - Genoux ++

- Inoculation directe ou infection par contiguité
  - Après trauma
  - Post-chirurgicale
    - Après chirurgie cardiaque → sternite
    - Après pose de matériel d'ostéosynthèse ou de **prothèse articulaire**
  - Suite à injection d'héroïne IV → arthrite costo-chondrale ou sterno-claviculaire

Diagnostic des IOA candidosiques

- Signes cliniques, non spécifiques, selon la localisation
  - Douleur isolée
  - Signes inflammatoires
  - Limitation fonctionnelle
  - Ecoulement-Fistule
  - Fièvre : dans moins d'1/3 des cas
- Examens complémentaires
  - Imagerie
    - Radiographies standard => parfois long délai d'apparition des anomalies
    - IRM (rachis +++)
    - Imagerie nucléaire (PET-Scan, Scintigraphie os + leucocytes marqués)
    - Echographie + ponction
  - Microbiologiques
    - Cultures
    - Biologie moléculaire

Données générales sur le traitement des IOA candidosiques

- Ablation du matériel infecté à chaque fois que réalisable
  - Ablation définitive si possible
  - Faible taux de réussite de la stratégie conservatrice (type DAIR + antifungiques)
  - Changement en un temps ou en 2 temps ?
- Intérêt des antifungiques locaux non formellement démontré
- Bonne pénétration des antifungiques dans le liquide articulaire
- Faible concentration d'antifungiques dans l'os (peu de données expérimentales).

Figure 35. *Candida* osteomyelitis.

There is destruction of the vertebral endplates in the L4-L5 disc space, which has lost its normal signal and appears rather isointense in T1. The adjacent vertebral endplates show relatively little oedema. However, there is clear contrast of the disc space and peri-vertebral tissues without collection. No lesions in the spinal canal. Courtesy of Donald Vinh.

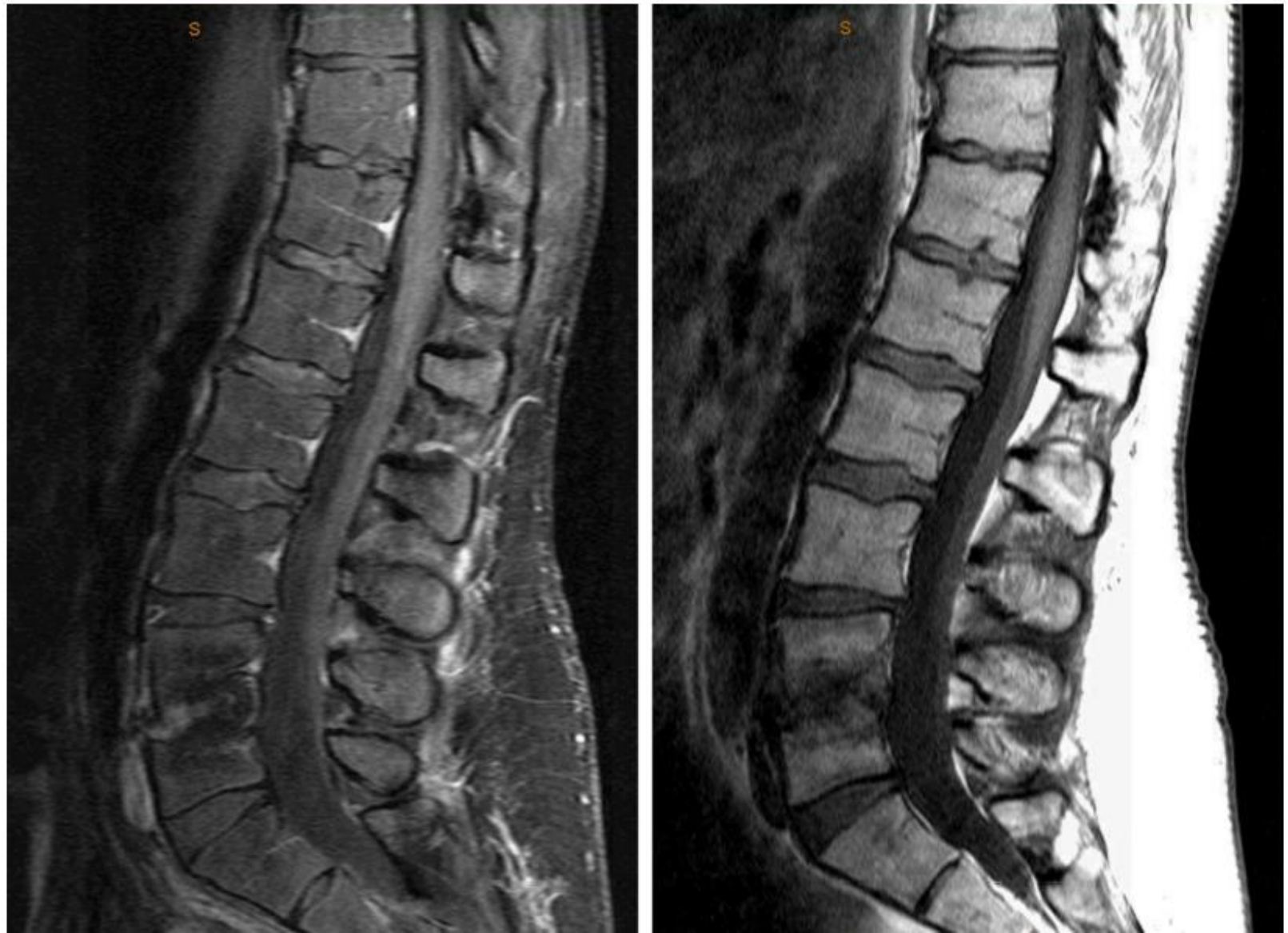
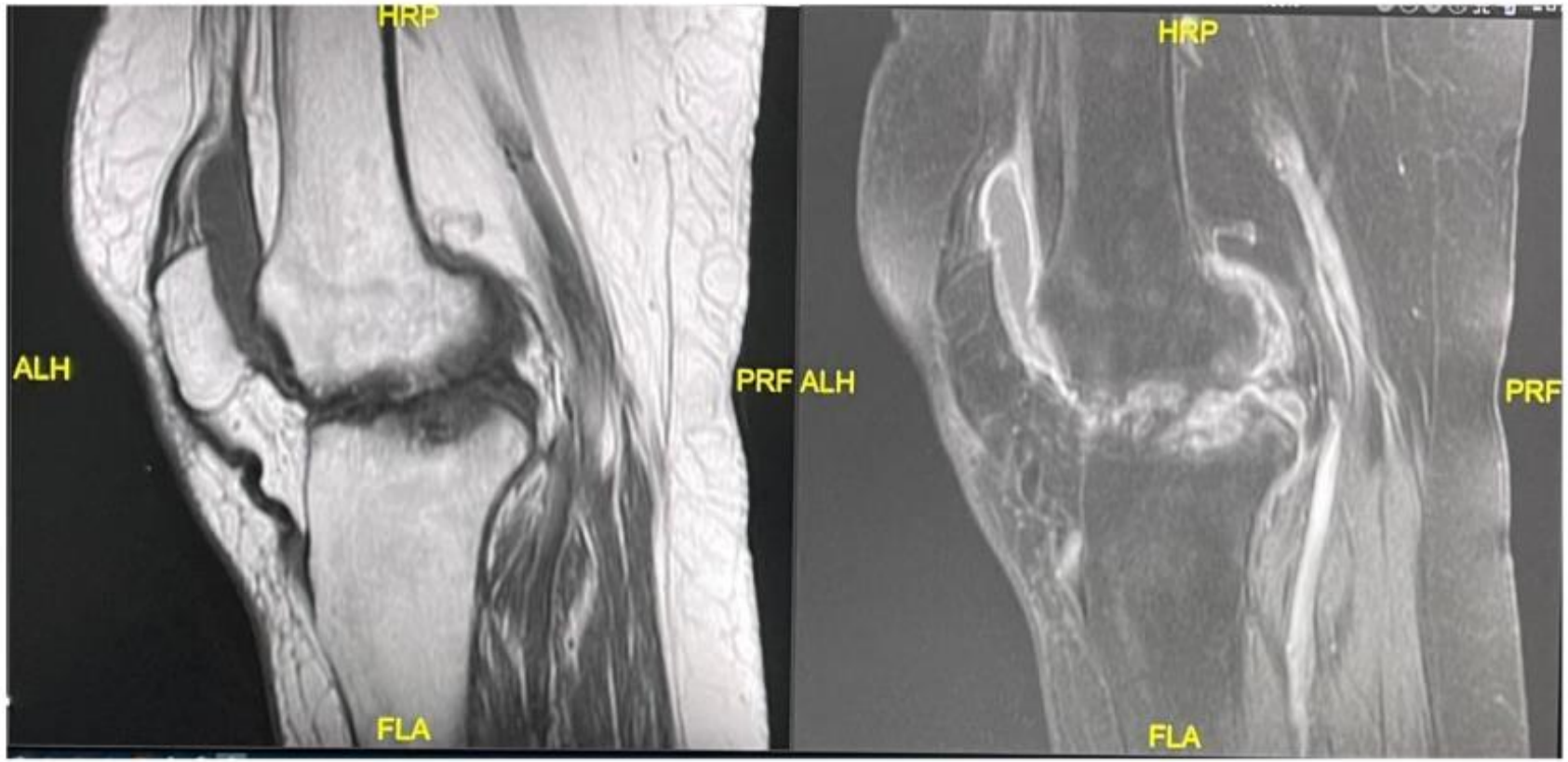


Figure 36. *Candida* arthritis.

A. Sagittal T1-weighted MR image of knee shows uneven and thick synovium with severe bone erosions.

B. Sagittal Fat-saturated, gadolinium-enhanced T1-weighted MR image demonstrates severe synovial contrast enhancement with moderate joint effusion.

Courtesy of Liping Zhu.



Infection ostéo-articulaire (ESCMID Guidelines 2012)

- Il n'existe aucun travail randomisé
- En cas d'ostéomyélite, de spondylodiscite, d'arthrite, le traitement par fluconazole est fortement recommandé pendant 6-12 mois (AII)
- Une phase initiale avec de l'amphotéricine lipidique peut être proposée pendant 2-6 semaines (AII)
- En cas d'infection de prothèse, si celle ci ne peut être enlevée, un traitement suppressif à vie par fluconazole peut être proposé (AIII)

Synthèse réalisée par la SPILF 23/04/2013

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Global guideline for the diagnosis and management of candidiasis: an initiative of the ECMM in cooperation with ISHAM and ASM

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Recommandation - Les infections ostéo-articulaires à *Candida* sont traitées par un traitement antifongique systémique prolongé de 6 à 12 mois, associé à un débridement chirurgical **et** à l'ablation de la prothèse lorsque cela est indiqué et possible. Le traitement de première intention des infections osseuses et articulaires à *Candida* est le L-AMB ou les échinocandines, suivi d'un traitement prolongé au FCZ, ou uniquement au FCZ si la sensibilité aux antifongiques est prouvée. L'AMB et le 5-FC ont également été administrés par injection dans l'articulation en cas d'arthrite à *Candida*, en tant que traitement d'appoint. Cependant, le rôle des thérapies locales, telles que l'irrigation ou le ciment imprégné d'antifongique, n'est pas clair et doit être envisagé au cas par cas.

Figure 29. Optimal treatment pathway for *Candida* joint infections in adults when all treatment modalities and antifungal drugs are available.

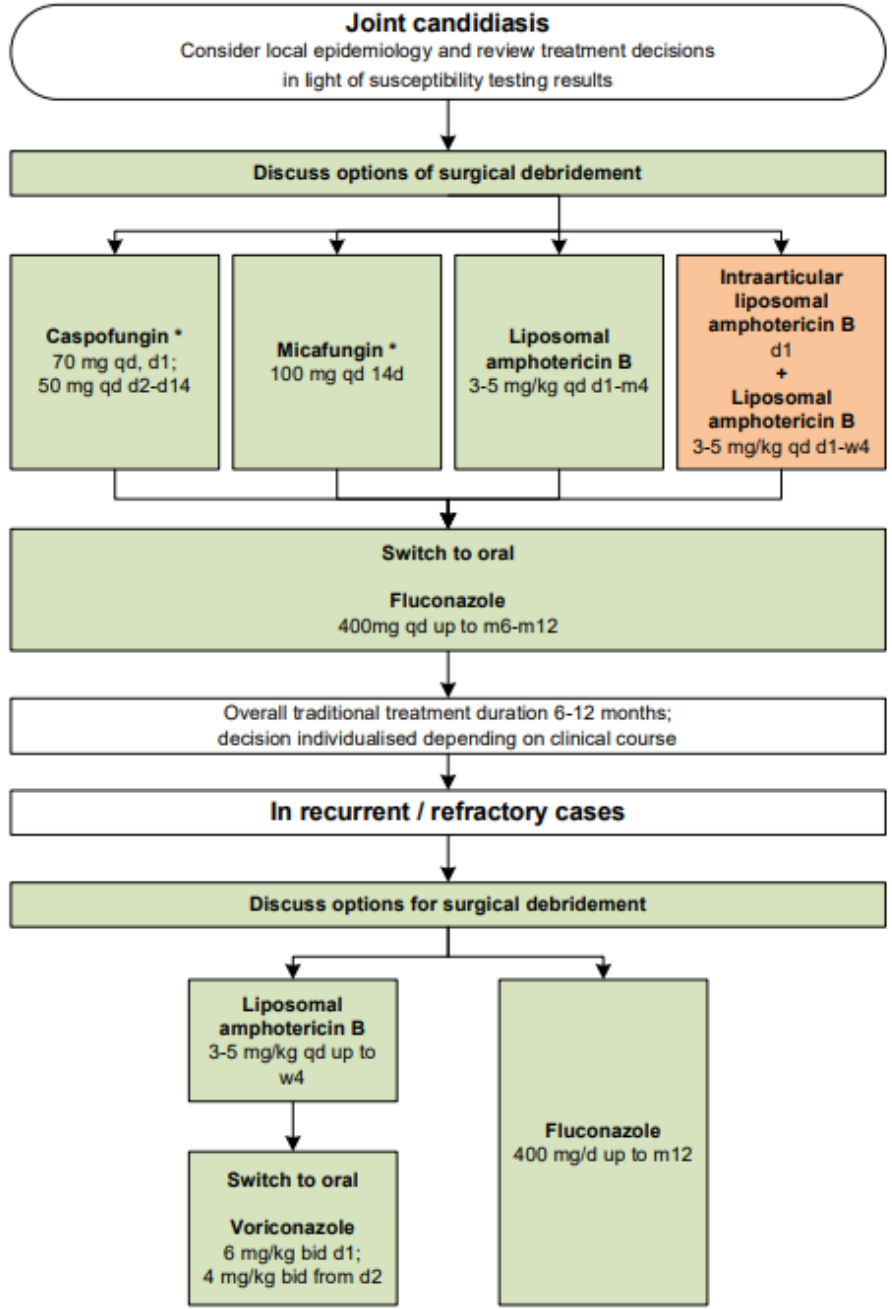


Figure 30. Treatment pathway for *Candida* joint infections in adults when echinocandins are unavailable.

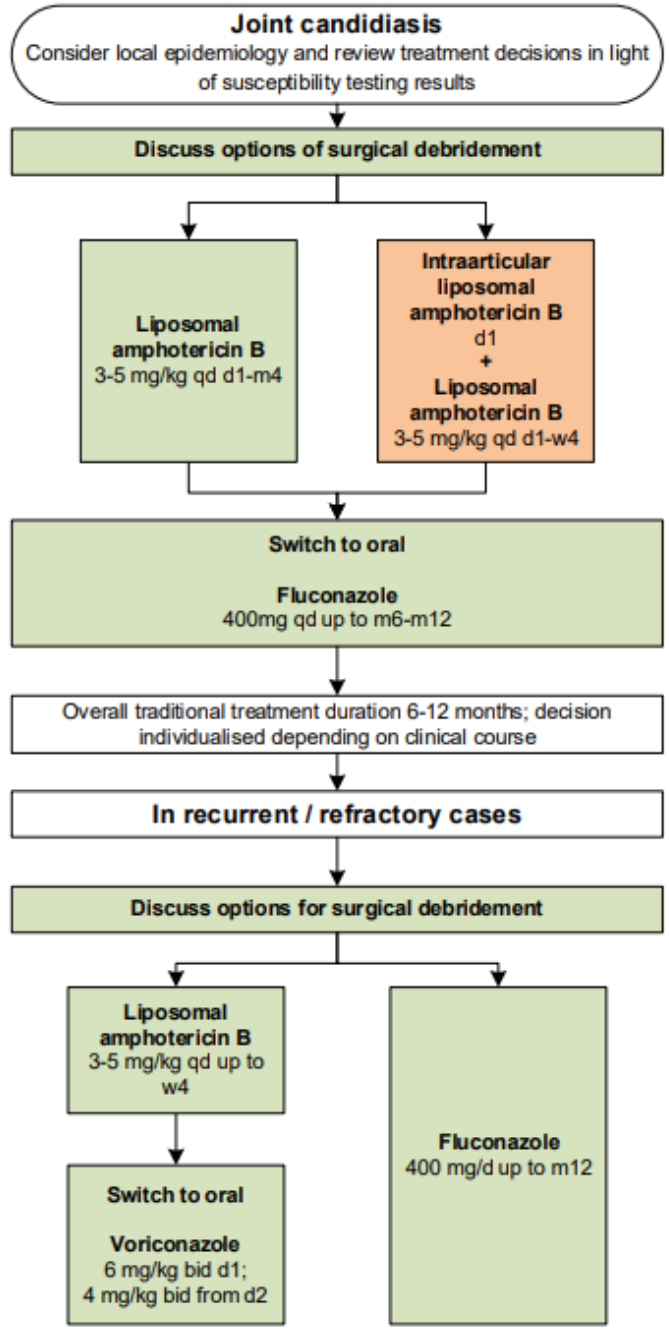


Figure 31. Treatment pathway for *Candida* joint infections in adults when liposomal amphotericin B is unavailable.

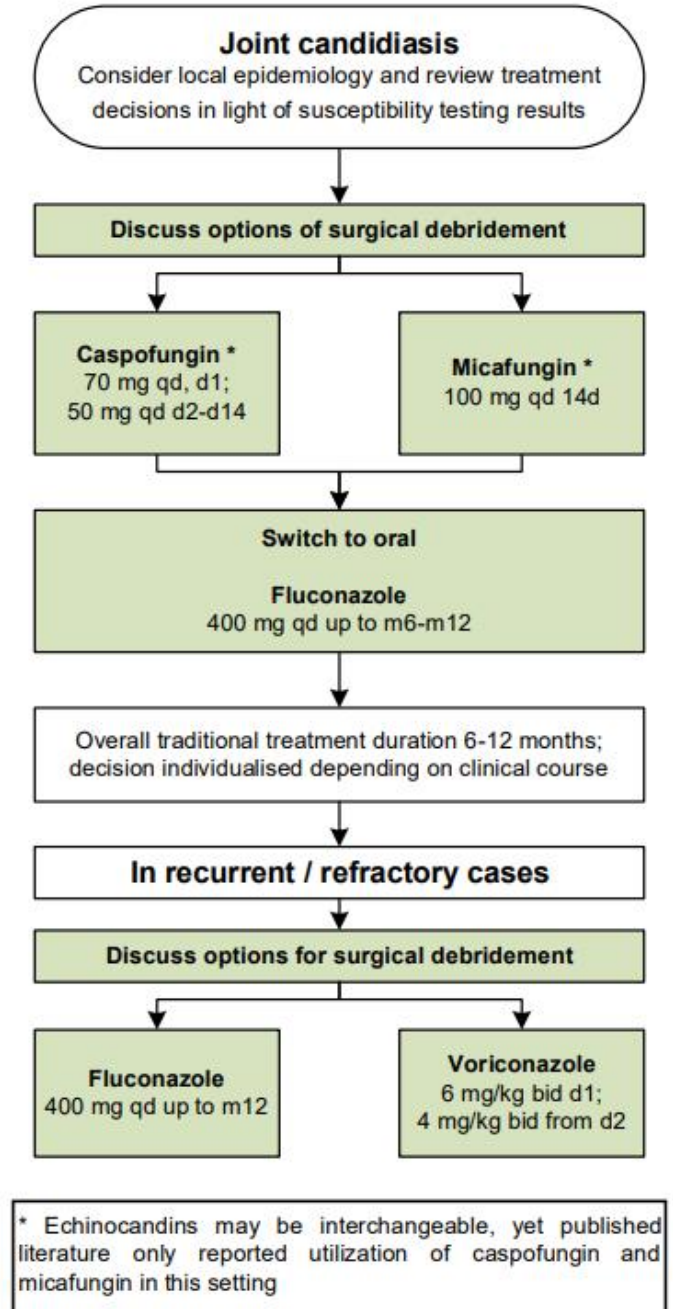


Figure 32. Optimal treatment pathway for *Candida* bone infections in adults when all treatment modalities and antifungal drugs are available.

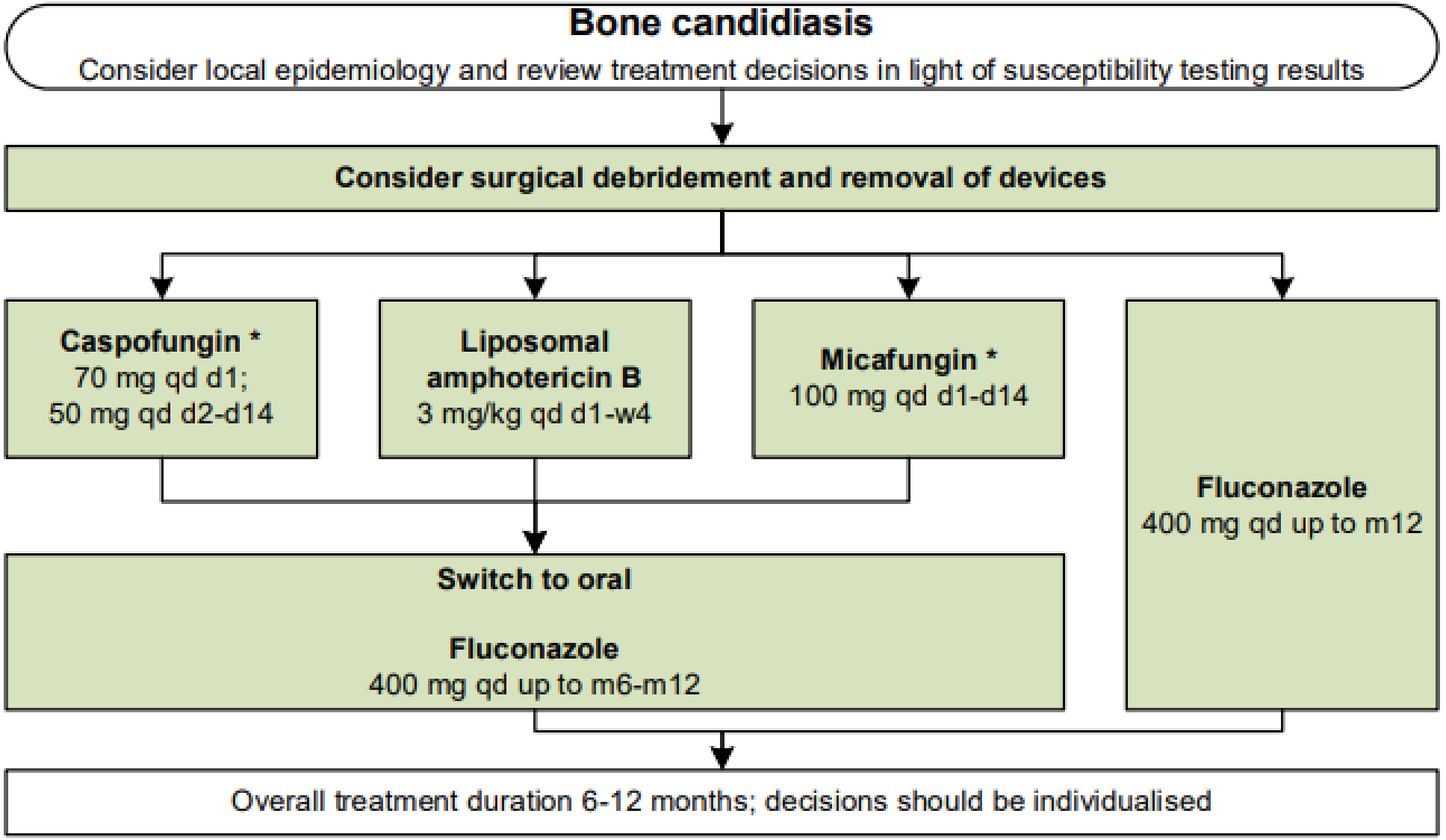


Figure 33. Treatment pathway for *Candida* bone infections in adults when echinocandins are unavailable.

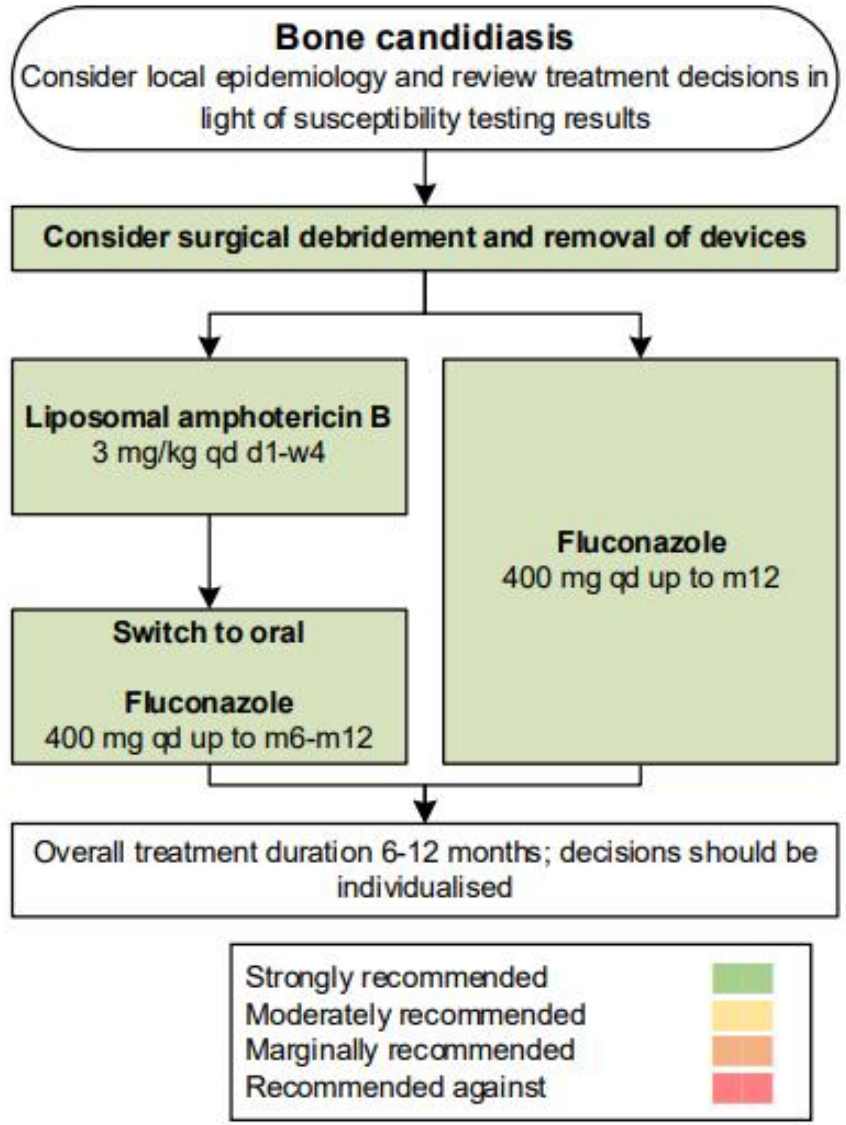
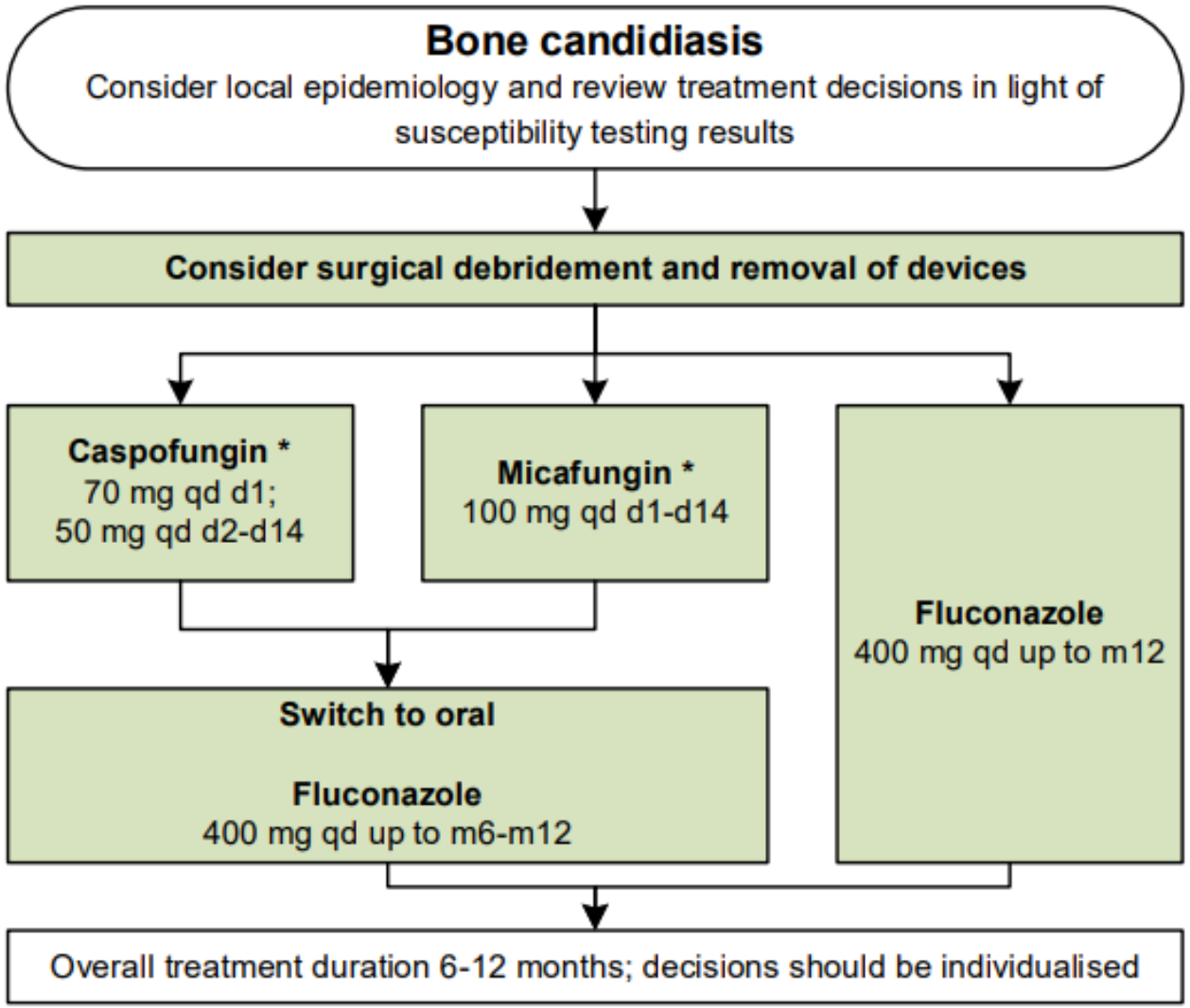


Figure 34. Treatment pathway for *Candida* bone infections in adults when liposomal amphotericin B is unavailable.



Focus sur les infections de prothèse articulaire à *Candida*

Clinical Infectious Diseases

MAJOR ARTICLE

Prosthetic Joint Infections due to *Candida* Species: A Multicenter International Study

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Table 1. Study Patients' Characteristics

Characteristic	Cure (n = 156)	Failure (n = 113)	Total (n = 269)	*P* Value
Male patients	75 (48.1)	50 (44.2)	125 (46.5)	.534
Age, y, median (IQR)	71.5 (60.8–77.0)	75.0 (68.0–80.0)	73.0 (64.0–79.0)	.003*
BMI, kg/m^2, median (IQR)	28.4 (24.9–33.8)	30.4 (26.2–35.3)	29.4 (25.2–34.7)	.266
Charlson score, median (IQR)	3.0 (2.0–5.0)	4.0 (2.0–5.0)	4.0 (2.0–5.0)	.053
Immunosuppression	19 (12.2)	10 (8.8)	29 (10.8)	.385
Immunosuppressive treatments	14 (9)	10 (8.8)	24 (8.9)	.989
Diabetes	38 (24.4)	34 (30.1)	72 (26.8)	.295
Localization of prosthesis				
Hip	80 (51.3)	64 (56.6)	144 (53.5)	.385
Knee	69 (44.2)	47 (41.6)	116 (43.1)	.666
Shoulder	2 (1.3)	2 (1.8)	4 (1.5)	.744
Tibia (knee hemiprosthesis)	2 (1.3)	0 (0)	2 (0.7)	.227
Femur (hip hemiprosthesis)	2 (1.3)	0 (0)	2 (0.7)	.227
Ankle	1 (0.6)	0 (0)	1 (0.4)	1.000
No. of previous surgeries, median (IQR)	3.0 (2.0–5.0)	3.0 (2.0–5.0)	3.0 (2.0–5.0)	.297
No. of previous surgeries due to infection, median (IQR)	1.0 (0.0–2.0)	1.0 (1.0–3.0)	1.0 (0.0–2.0)	.310
Time between previous surgery and index infection, d, median (IQR)	79.0 (32.5–543.8)	43.0 (21.0–234.5)	58.0 (24.0–383.3)	.008*
Previous surgery <1 mo	36 (23.1)	45 (39.8)	81 (30.1)	.004*
Previous surgery <3 mo	77 (49.4)	70 (61.9)	147 (54.6)	.046
History of previous infection				
Previous infection	116 (74.4)	88 (77.9)	204 (75.8)	.506
Previous infection due to *Candida* spp	9 (5.8)	4 (3.5)	13 (4.8)	.376

Microbiology analysis of previous infections				
Mono-bacterial infection	52 (33.3)	41 (36.3)	93 (34.6)	.737
Staphylococcus sp	77 (49.4)	56 (49.6)	133 (49.4)	.748
Staphylococcus aureus	33 (21.2)	22 (19.5)	55 (20.4)	.611
Coagulase-negative staphylococci	54 (34.6)	38 (33.6)	92 (34.2)	.674
Streptococcus sp	4 (2.6)	6 (5.3)	10 (3.7)	.328
Enterococcus sp	16 (10.3)	18 (15.9)	34 (12.6)	.190
Acinetobacter sp	2 (1.3)	1 (0.9)	3 (1.1)	1.000
Pseudomonas aeruginosa	13 (8.3)	14 (12.4)	27 (10)	.308
Enterobacterales	40 (25.6)	23 (20.4)	63 (23.4)	.212
Corynebacteria	5 (3.2)	7 (6.2)	12 (4.5)	.232
Anaerobes	9 (5.8)	10 (8.8)	19 (7.1)	.317
Previous antibiotic therapy	111 (71.2)	84 (74.3)	195 (72.5)	.755
No. of lines of antibiotics, median (IQR)	1.0 (1.0–2.0)	1.0 (1.0–2.0)	1.0 (1.0–2.0)	.249
Clinical signs				
Fever	25 (16)	21 (18.6)	46 (17.1)	.487
Inflammatory signs	74 (47.4)	62 (54.9)	136 (50.6)	.109
Purulent discharge	4 (2.6)	3 (2.7)	7 (2.6)	1.000
Dehiscence	43 (27.6)	40 (35.4)	83 (30.9)	.118
Fistula	52 (33.3)	39 (34.5)	91 (33.8)	.781
Hematoma	24 (15.4)	17 (15)	41 (15.2)	.977
Biological analysis, median (IQR)				
Leukocyte count, g/L	7.5 (6.1–8.9)	7.6 (6.3–9.5)	7.6 (6.1–9.1)	.406
Neutrophil count, g/L	5.2 (3.6–6.6)	5.0 (3.9–6.4)	5.1 (3.7–6.6)	.807
C-reactive protein level, mg/L	34.9 (14.4–66.3)	36.9 (14.0–89.3)	35.0 (14.0–73.0)	.802
ESR, mm/h	48.5 (37.3–68.5)	66.0 (34.0–90.0)	64.0 (35.0–85.0)	.540
Albumin level, g/L	31.7 (24.0–36.0)	29.5 (20.3–35.0)	31.0 (22.8–36.0)	.230
Radiographic evidence of infection				
X-ray	61 (39.1)	43 (38.1)	104 (38.7)	.843
CT scan	15 (9.6)	14 (12.4)	29 (10.8)	.529
Scintigraphy	2 (1.3)	3 (2.7)	5 (1.9)	.387
Loosening	21 (13.5)	13 (11.5)	34 (12.6)	.644
Abscess	13 (8.3)	13 (11.5)	26 (9.7)	.283
TTE/TOE	7 (4.5)	9 (8)	16 (5.9)	.356
Signs of endocarditis	0 (0)	1 (0.9)	1 (0.4)	.396

Characteristic	Cure (n = 156)	Failure (n = 113)	Total (n = 269)	*P* Value
Type of surgery				
DAIR	45 (28.8)	51 (45.1)	96 (35.7)	.004*
1-stage exchange	51 (32.7)	25 (22.1)	76 (28.3)	.071
2-stage exchange	54 (34.6)	24 (21.2)	78 (29)	.022*
Girdlestone resection	3 (1.9)	4 (3.5)	7 (2.6)	.454
Prosthesis removal	2 (1.3)	2 (1.8)	4 (1.5)	1.000
Amputation	1 (0.6)	1 (0.9)	2 (0.7)	1.000
Microbiology analysis of index infection				
Positive blood culture	19 (12.2)	13 (11.5)	32 (11.9)	.895
Pluri-microbial	75 (48.1)	51 (45.1)	126 (46.8)	.598
Only due to *Candida* spp	74 (47.4)	57 (50.4)	131 (48.7)	.626
Candida albicans	78 (50)	72 (63.7)	150 (55.8)	.025*
Candida glabrata	11 (7.1)	10 (8.8)	21 (7.8)	.587
Candida parapsilosis	54 (34.6)	25 (22.1)	79 (29.4)	.026*
Candida tropicalis	10 (6.4)	5 (4.4)	15 (5.6)	.484
Candida dubliniensis	1 (0.6)	2 (1.8)	3 (1.1)	.574
Candida metapsilosis	3 (1.9)	1 (0.9)	4 (1.5)	.641
Candida orthopsilosis	2 (1.3)	0 (0)	2 (0.7)	.511
Candida krusei	1 (0.6)	1 (0.9)	2 (0.7)	1.000
Candida kefyr	1 (0.6)	0 (0)	1 (0.4)	1.000
Candida lusitaniae	1 (0.6)	0 (0)	1 (0.4)	1.000
Coinfection with bacteria				
Staphylococcus sp	40 (25.6)	33 (29.2)	73 (27.1)	.541
Staphylococcus aureus	13 (8.3)	12 (10.6)	25 (9.3)	.538
Coagulase-negative staphylococci	32 (20.5)	22 (19.5)	54 (20.1)	.802
Enterococcus sp	13 (8.3)	7 (6.2)	20 (7.4)	.495
Streptococcus sp	1 (0.6)	1 (0.9)	2 (0.7)	1.000
Enterobacterales	27 (17.3)	10 (8.8)	37 (13.8)	.043*
Escherichia coli	8 (5.1)	3 (2.7)	11 (4.1)	.365
Klebsiella pneumoniae	7 (4.5)	3 (2.7)	10 (3.7)	.525
Enterobacter sp	8 (5.1)	3 (2.7)	11 (4.1)	.365
Proteus sp	2 (1.3)	1 (0.9)	3 (1.1)	1.000
Pseudomonas aeruginosa	6 (3.8)	4 (3.5)	10 (3.7)	1.000
Acinetobacter baumannii	0 (0)	1 (0.9)	1 (0.4)	.422
Stenotrophomonas maltophilia	2 (1.3)	2 (1.8)	4 (1.5)	1.000
Corynebacteria	6 (3.8)	7 (6.2)	13 (4.8)	.384
Anaerobes	5 (3.2)	4 (3.5)	9 (3.3)	1.000
Neisseria macacae	1 (0.6)	0 (0)	1 (0.4)	1.000

Antifungal susceptibility testing				
Resistance to fluconazole	10 (6.4)	11 (9.7)	21 (7.8)	.327
Resistance to voriconazole	6 (3.8)	5 (4.4)	11 (4.1)	1.000
Resistance to posaconazole	4 (2.6)	1 (0.9)	5 (1.9)	.639
Resistance to AmB	2 (1.3)	2 (1.8)	4 (1.5)	1.000
Resistance to echinocandins	21 (13.5)	8 (7.1)	29 (10.8)	.169
Resistance to 5-fluorocytosine	3 (1.9)	2 (1.8)	5 (1.9)	1.000
Resistance to itraconazole	0 (0)	1 (0.9)	1 (0.4)	.300
Antifungal treatments				
Azoles	116 (74.4)	88 (77.9)	204 (75.8)	.884
Echinocandins	46 (29.5)	37 (32.7)	83 (30.9)	.777
Azoles & echinocandins	9 (5.8)	7 (6.2)	16 (5.9)	.972
AmB	11 (7.1)	8 (7.1)	19 (7.1)	.910
5-flucytosine	1 (0.6)	0 (0)	1 (0.4)	1.000
Echinocandins & 5-flucytosine	2 (1.3)	4 (3.5)	6 (2.2)	.407
Echinocandins & AmB	1 (0.6)	2 (1.8)	3 (1.1)	.580
Azoles & 5-flucytosine	5 (3.2)	1 (0.9)	6 (2.2)	.238
Azoles & AmB	0 (0)	1 (0.9)	1 (0.4)	.433

Characteristic	Cure (n = 156)	Failure (n = 113)	Total (n = 269)	*P* Value
No. of lines, median (IQR)	1.0 (1.0–2.0)	1.0 (1.0–2.0)	1.0 (1.0–2.0)	.799
Antifungal treatment duration, d, median (IQR)	92.0 (59.8–177.0)	92.5 (45.8–187.8)	92.0 (54.5–181.3)	.968
Antifungal duration <6 wk	18 (15.5)	18 (22.5)	36 (18.4)	.215
Antifungal duration 6–12 wk	29 (25.0)	15 (18.8)	44 (22.4)	.303
Antifungal duration >12 wk	69 (59.5)	47 (58.8)	116 (59.2)	.918
Percentage of total treatment time, median (IQR)				
Azoles	100.0 (83.1–100.0)	100.0 (86.0–100.0)	100.0 (85.0–100.0)	.905
Echinocandins	21.7 (8.1–100.0)	34.2 (12.8–100.0)	24.2 (9.4–100.0)	.429
Azoles & echinocandins	12.8 (8.0–14.0)	20.4 (12.4–34.3)	13.4 (9.6–26.7)	.181
AmB	14.5 (13.2–26.9)	19.2 (9.3–44.7)	14.5 (10.5–28.1)	.607
Echinocandins & 5-flucytosine	19.3 (18.7–19.9)	75.7 (41.1–100.0)	35.9 (18.7–87.8)	.481
Echinocandins & AmB	15.0 (15.0–15.0)	2.1 (2.1–2.1)	8.5 (5.3–11.7)	>.999
Azoles & 5-flucytosine	61.1 (56.4–74.2)	21.6 (21.6–21.6)	58.7 (30.3–70.9)	.667
Azoles & AmB	…	12.4 (12.4–12.4)	12.4 (12.4–12.4)	
Antifungal spacer	8 (5.1)	4 (3.5)	12 (4.5)	.533
Spacer voriconazole	4 (2.6)	1 (0.9)	5 (1.9)	.576
Spacer AmB	4 (2.6)	2 (1.8)	6 (2.2)	1.000
Spacer fluconazole	0 (0)	1 (0.9)	1 (0.4)	.333

Table 3. Univariable and Multivariable Analysis of Factors Associated With Failure

	Univariable Analysis			Multivariable Analysis		
Factor	OR	(95% CI)	*P* Value	OR	(95% CI)	*P* Value
Age >70 y	1.881	(1.140–3.138)	.014	1.811	(1.079–3.072)	.026
DAIR	2.113	(1.271–3.534)	.004	1.946	(1.157–3.285)	.012
Presence of *Candida parapsilosis*	0.537	(.305–.925)	.027	0.546	(.305–.958)	.037

Abbreviations: CI, confidence interval; DAIR, debridement, antibiotics, and implant retention; OR, odds ratio.

Principales informations à retirer de cette étude (1)

- Survenue d'IPA à *Candida* surtout chez des patients déjà opérés (souvent multi-opérés)
  - Infection bactérienne antérieure dans environ ¾ des cas
- Présentation clinique « banale » (fièvre rare)
- Deux espèces prédominantes : *C. albicans* +++ et *C. parapsilosis*
  - Meilleur pronostic des infections à *C. parapsilosis*
- Co-infection bactérienne chez environ la moitié des patients

Principales informations à retirer de cette étude (2)

- Globalement, mauvais pronostic (taux d'échec = 42%)
- Facteurs de mauvais pronostic
  - Age > 70 ans
  - Traitement chirurgical sans changement de prothèse
    - NB : pas de différence entre 1 temps et 2 temps
- Facteurs non associés à l'évolution
  - Immunodépression
  - Localisation (hanche, genou)
  - Utilisation d'azolés
  - Durée de traitement (durée médiane = 3 mois)
  - Traitement antifungique local ? (effectif trop faible pour analyse)

Remerciements

09 July 2021 - 2462

Prosthetic joint infections with Candida spp.: about 21 cases

Camille Fourcade, C. Fourcade (1), J. Lourtet-Hascouet (2), A. Bouige (3), L. Gautié (1), A. Bicart-See (1), G. Krin (1), G. Giordano (1), E. Bonnet (1)

Event: ECCMID 2021, Vienna, Austria
Session: 8b. Other foreign-body and implant infections

- A l'équipe multi-disciplinaire de Joseph Ducuing à l'
l'étude.
- A l'ensemble des centres ayant participé à l'étude
- A Aurélien Dinh et son équipe pour avoir repris le flambeau et mené à bien cette étude.
- A l'ESGIAI pour avoir apporté son support à l'étude.

Autres publications récentes sur les IPA à *Candida*

The Journal of Arthroplasty 38 (2023) 2464–2471

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journal homepage: www.arthroplastyjournal.org

Systematic Review and Meta-Analysis

Treatment and Outcomes of Fungal Prosthetic Joint Infections: A Systematic Review of 225 Cases

Marcos R. Gonzalez, MD, Angad D.S. Bedi, BS, Daniel Karczewski, MD,
Santiago A. Lozano-Calderon, MD, PhD *

Table 4
Risk Factors for Prosthetic Joint Infection Recurrence on Multivariate Regression Analyses.

Factors	Total		Knee	
	OR (95% CI)	*P*	OR (95% CI)	*P*
CCI ≥ 3	17.33 (4.08-73.64)	<.001	18.57 (2.31-149.15)	.006
Pathogen				
NCA	1	-	1	-
CA	3.05 (1.46-6.38)	.003	3.56 (1.34-9.47)	.011
Mixed				
Bacterial co-infection	2.05 (0.98-4.29)	.055	1.92 (0.71-5.19)	.201
Previous PJI	1.51 (0.40-5.70)	.547	2.57 (0.52-12.76)	.248
Initial surgery (arthroplasty)				
Primary	1	-	1	-
Revision	5.60 (0.82-38.01)	.078	3.50 (0.40-30.80)	.259
AF length (wks)	0.99 (0.94-1.05)	.822	1.00 (0.95-1.06)	.95
Use of antifungal in cement or spacer	1.38 (0.55-3.45)	.488	1.31 (0.40-4.27)	.655
Type of surgery				
DAIR	1	-	1	-
1-stage	0.28 (0.06-1.39)	.12	0.76 (0.10-5.81)	.795
2-stage	0.20 (0.05-0.74)	.016	0.18 (0.03-0.93)	.04
3-stage	0.33 (0.06-2.01)	.23	0.62 (0.06-6.10)	.686
Resection arthroplasty	2.52 (0.51-12.50)	.257	3.58 (0.23-55.56)	.361
Time to prosthesis re-implantation	1.04 (0.99-1.08)	.098	1.02 (0.97-1.08)	.424
CRP at presentation ≥ 6 mg/dL	5.98 (1.32-27.03)	.02	6.54 (1.21-35.27)	.029
ESR at presentation ≥ 30 mm/h	4.20 (0.45-39.16)	.208	3.10 (0.30-31.62)	.339

AF, antifungal; CA, Candida albicans; CCI, Charlson Comorbidity Index; CI, confidence interval; CRP, C-reactive protein; DAIR, debridement, antibiotics, and implant retention; ESR, erythrocyte sedimentation rate; NCA, non-Candida albicans; OR, odds ratio; PJI, prosthetic joint infection.

Shang *et al. BMC Musculoskeletal Disorders* (2024) 25:648
https://doi.org/10.1186/s12891-024-07616-6

BMC Musculoskeletal Disorders

SYSTEMATIC REVIEW Open Access

The heavy burden and treatment challenges of fungal periprosthetic joint infection: a systematic review of 489 joints

Guangqian Shang[1,2], Siqi Zhao[3], Shuai Yang[4*] and Ji Li[1*]

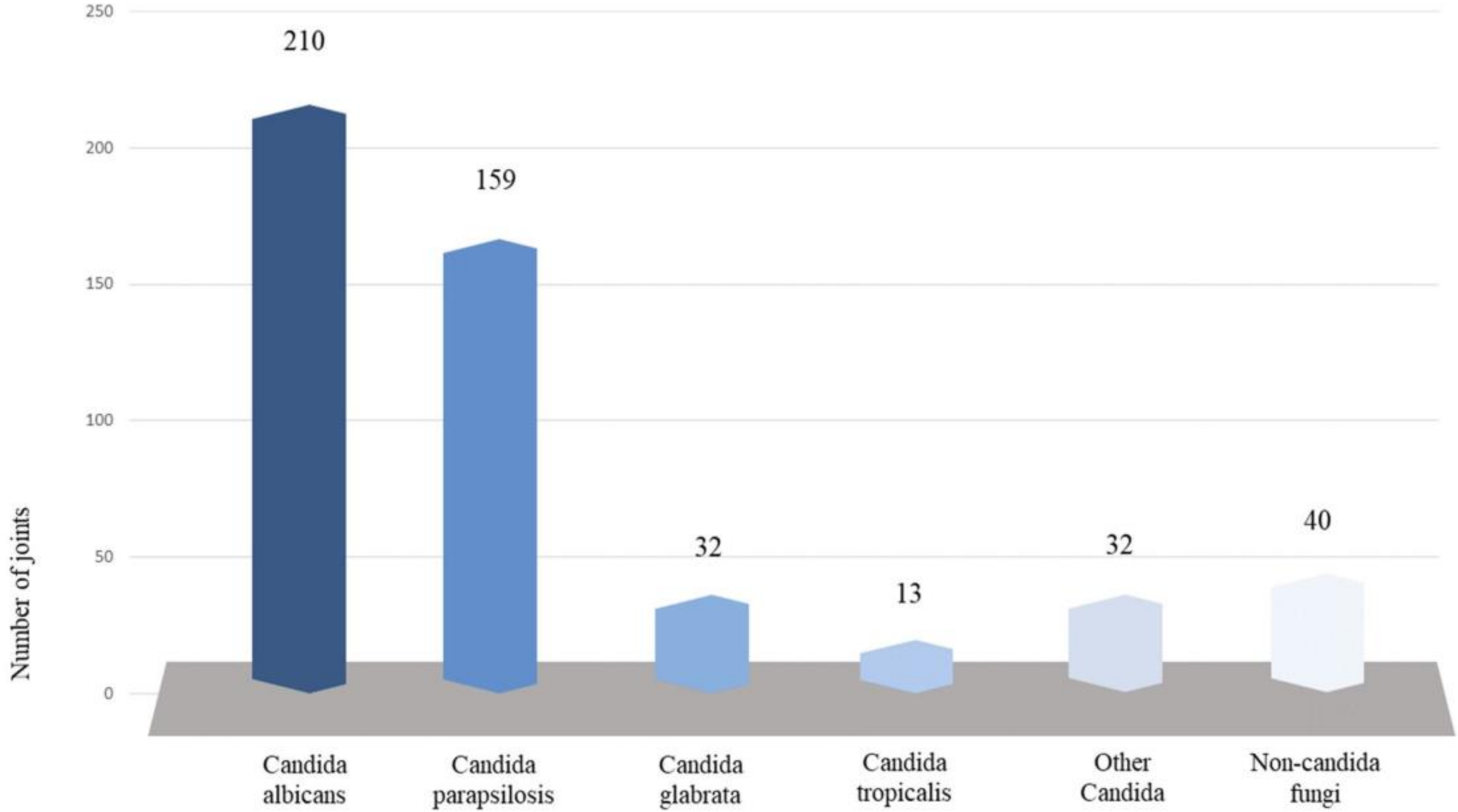

Fig. 2 The fungal species of Fungal prosthetic joint infection

Table 3 Logistics regression analysis to identify risk factors for infection recurrence

	OR (95% CI)	*P* value
Age	0.999 (0.975–1.023)	0.921
Gender (female)	0.604 (0.331–1.104)	0.102
BMI	1.158 (0.986–1.359)	0.074
Affected joint (knee)	0.424 (0.250–0.718)	**0.001**
Time from TJA to FPJI	0.999 (0.995–1.002)	0.478
Prior surgeries on the affected joint	1.079 (0.924–1.261)	0.337
Preoperative joint score	0.997 (0.896–1.109)	0.957
ASA	4.284 (0.796–23.063)	0.090
CCI	1.483 (0.890–2.471)	0.130
Presence of sinus tract	1.360 (0.519–3.566)	0.532
Fungal infection caused by CA	1.717 (1.021–2.886)	**0.041**
Concurrent fungal and bacterial infections	1.224 (0.693–2.160)	0.486
Multi-fungal infections	0.578 (0.118–2.844)	0.500
Type of surgery		
DAIR	8.433 (2.106–33.769)	**0.003**
Resection arthroplasty	1.917 (0.507–7.244)	0.338
Two-stage	1.989 (0.765–5.172)	0.158
Three-stage	0.737 (0.198–2.740)	0.649
Other	2.300 (0.424–12.465)	0.334
Duration of prosthesis-free interval	1.026 (0.999–1.054)	0.057
The length of systematic antifungal	0.999 (0.967–1.032)	0.952
Use of antifungal after reimplantation	0.170 (0.056–0.520)	**0.002**
Use of antifungal in spacer or cement	0.293 (0.104–0.823)	**0.020**

OR odds ratio, *CI* confidence interval, *BMI* body mass index, *TJA* total joint arthroplasty, *FPJI* fungal prosthetic joint infection, *CRP* C-reactive protein, *ESR* erythrocyte sedimentation rate, *ASA* American Society of Anaesthesiologists score, *CCI* Charlson Comorbidity Index (CCI), *CA* candida albicans, *DAIR* debridement, antibiotics, and implant retention

Statistically significant values are identified in boldface

Traitements antifungiques locaux

antibiotics

MDPI

Review

Antifungal-Loaded Acrylic Bone Cement in the Treatment of Periprosthetic Hip and Knee Joint Infections: A Review

Konstantinos Anagnostakos [1,*], Sören L. Becker [2] and Ismail Sahan [1]

Antibiotics 2022, 11, 879. https://doi.org/10.3390/antibiotics11070879

Abstract: Little is known about the clinical use of antifungal-loaded acrylic bone cement in the treatment of periprosthetic hip and knee joint infections (PJIs). Hence, we performed a literature search using PubMed/MEDLINE from inception until December 2021. Search terms were "cement" in combination with 13 antifungal agents. A total of 10 published reports were identified, which described 11 patients and 12 joints in which antifungal-loaded cement was employed. All studies were case reports or case series, and no randomized controlled trials were identified. In 6 of 11 patients, predisposing comorbidities regarding the emergence of a fungal PJI were present. The majority of the studies reported on infections caused by *Candida* species. In six cases (seven joints), the cement was solely impregnated with an antifungal, but no antibiotic agent (amphotericin B, voriconazole, and fluconazole). In the other five joints, the cement was impregnated with both antibiotic(s) and antifungals. Great discrepancies were seen regarding the exact loading dose. Four studies investigated the local elution of antifungal agents in the early postoperative period and observed a local release of antifungals in vivo. We conclude that there is a paucity of data pertaining to the clinical use of antifungal-loaded bone cement, and no studies have assessed the clinical efficacy of such procedures. Future studies are urgently required to evaluate this use of antifungals in PJI.

Frank *et al. Journal of Orthopaedic Surgery and Research* (2025) 20:151
https://doi.org/10.1186/s13018-025-05565-x

Journal of Orthopaedic Surgery and Research

RESEARCH Open Access

Evaluation and testing of polymethylmetacrylic (PMMA) bone cements with admixed Amphotericin B

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Abstract

Background Amphotericin is admixed to Polymethylmethacrylic (PMMA) spacers for fungal periprosthetic joint infections (PJI) during two-stage exchanges. We aimed to analyse the mechanical properties of PMMA cement with admixed Amphotericin B.

Materials and methods We tested Amphotericin in PMMA cement mechanically, its elution properties in vitro and present two cases of fungal PJI treated with Amphotericin B powder in Copal cement in vivo.

Results Sterile Amphotericin B is not available as a pure substance but only as powder for infusions. PMMA mixed with such pharmaceutical Amphotericin B formulations colored the cement orange. Compression strength was slightly decreased, bending and impact strength significantly decreased whereas bending modulus was increased. Drug elution was high within the first 24 h and decreased over time until day 5. Amphotericin B in combination with Copal was successfully used in two cases with *Candida ssp.* infections. No negative side effects, especially no nephrotoxic effects, were observed. Sterile Amphotericin B powder for preparing an infusion solution contains only small amounts of pure drug. In vivo polymicrobial *Candida*-infections with bacterial co-infection were successfully treated using the combination of Copal cements with added Amphotericin B without systemic nephrotoxic impact.

Conclusions The addition of Amphotericin B to PMMA cement affects the cement's properties in vitro whereas in vivo the combination with Copal is clinically successful in treating complex cases of fungal PJI.

Rezafungine et IOA à Candida

J Antimicrob Chemother
https://doi.org/10.1093/jac/dkaf143

Journal of Antimicrobial Chemotherapy 50 years

Early use of the novel antifungal rezafungin: a case series and literature review

H. C. Davidson [1,2]*, T. Yau[3], I. Dunstan[4], A. Houston[2], M. Basarab[2] and T. Bicanic [1,2]

Conclusion

- Rareté des infections ostéo-articulaires à *Candida* notamment en l'absence de matériel (ostéosynthèse, prothèse articulaire).
- IPA à Candida rarement d'emblée (infection bactérienne antérieure)
- Espèces les plus fréquentes : *C. albicans* et *C. paraspilosis* (→ meilleur pronostic).
- Co-infection bactérienne fréquente.
- Traitement : ablation (changement) du matériel +++ et traitement antifungique de 12 semaines.
- Antifungiques systémiques possibles : Echinocandines, AmphoB-liposomale, Azolés.
- Place des antifungiques locaux à définir.