

Supplementary article data

2-stage revision recommended for treatment of fungal hip and knee prosthetic joint infections

An analysis of 164 patients, 156 from the literature and 8 own cases

Jesse WP Kuiper¹, Michel PJ van den Bekerom², Jurgen van der Stappen³, Peter A Nolte⁴, and Sascha Colen³

¹Department of Orthopedic Surgery, Center for Orthopaedic Research Alkmaar (CORAL), Alkmaar Medical Center, Alkmaar, the Netherlands; ²Department of Orthopedic Surgery, Onze Lieve Vrouwe Gasthuis, Amsterdam, the Netherlands; ³Department of Orthopedic Surgery, University Hospitals Leuven, Pellenberg Site, Belgium; ⁴Department of Orthopedic Surgery, Spaarne Hospital, Hoofddorp, the Netherlands.

Correspondence: sascha.colen@uzleuven.be

Submitted 13-05-27. Accepted 13-09-06

Table 2. Characteristics of 8 additional patients from our own institutions with fungal PJI

Age	Sex	Comorbidity	Joint	Primary/ revision	Diagnosis	Symptoms	Months from surgery to PJI diagnosis	
1	62	M	DM, gout, obesity, cutaneous candida	Hip	Revision	Recurrent luxations	Pain, swelling, redness, shivering	27
2	81	F	Obesity, tuberculosis in past	Hip	Revision	Fracture	Pain, swelling	24
3	73	F	DM, obesity, cutaneous candida	Hip	Primary	Avascular necrosis	Pain, swelling, skin necrosis	1.5
4	78	F	DM	Hip	Primary	Fracture	Pain, redness, fistula	10
5	70	F	–	Hip	Revision	Osteoarthritis	Pain, subluxations	14
6	80	F	Renal disease, chronic wound infection with fistula, candida infection of catheter, obesity	Hip	Revision	Osteoarthritis	Pain	13
7	80	F	Cardiac disease, obesity	Hip	Primary	Fracture	Pain, redness, swelling, shivering	1.5
8	58	M	Multiple sclerosis, metastatic malignancy with pelvic radiotherapy and chemotherapy	Hip	Revision	Fracture	Pain, shivering, vomiting, diarrhea	14

	Species	Culture origin	Considered contamination	Other cultures	CRP (mg/L)	ESR (mm/h)	Radiographic findings
1	<i>Candida albicans</i>	Intraoperative	Yes	MSSA, <i>Staphylococcus capitis</i>	77	53	No loosening
2	<i>Candida albicans</i>	Intraoperative	No	CNS	21	X	No loosening
3	<i>Candida albicans</i>	Intraoperative	Yes	CNS, <i>Enterococcus faecalis</i>	116	83	No loosening
4	<i>Candida albicans</i>	Sinus tract + intraoperative	No	MSSA	15	22	No loosening
5	<i>Candida albicans</i>	Aspiration	No	CNS, <i>Corynebacterium species</i> , <i>Streptococcus viridans</i>	25	110	Osteolysis
6	<i>Candida glabrata</i> , <i>candida albicans</i>	Intraoperative	No	MSSA	42	140	Loosening
7	<i>Candida albicans</i>	Intraoperative	Yes	MSSA, CNS	67	X	No loosening
8	<i>Candida parapsilosis</i>	Aspiration	No	<i>Streptococcus mitis</i> , CNS	13	25	No loosening

	Spacer	Antifungal therapy	Duration	Initial treatment	Second treatment	Time to reimplantation	Outcome	Follow-up (months)
1	No	Fluconazole	6 months	Debridement	Resection arthroplasty	–	Resection arthroplasty	12
2	Yes	Fluconazole	2 months	Resection arthroplasty	Reimplantation	4	Cure	32
3	Yes (GM, VM)	None	–	Debridement	Resection arthroplasty	–	Resection arthroplasty	95
4	Yes (GM)	Fluconazole	6 days	Debridement	–	–	Deceased	1
5	No	Fluconazole	5 months	Resection arthroplasty	Reimplantation	4	Resection arthroplasty	43
6	No	Caspofungin	6 weeks	Resection arthroplasty	Reimplantation	14	Deceased	7
7	Yes (GM)	Fluconazole	7 days	Resection arthroplasty	Reimplantation	4	Cure	45
8	Yes (GM, VM)	None	–	Resection arthroplasty	–	Not performed	Refused further treatment	8

DM: diabetes mellitus; PJI: prosthetic joint infection; MSSA: methicillin-sensitive *Staphylococcus aureus*; CRP: C-reactive protein; ESR: erythrocyte sedimentation rate; GM: gentamicin; VM: vancomycin.

Table 1. Studies included in this review, describing hip and knee fungal prosthetic joint infection

	Study	Language	N	Joint	Type
1	Acikgoz et al. 2002	English	1	Knee	Case report
2	Anagnostakos et al. 2012	English	7	Hip & Knee	Case series
3	Antony et al. 2008	English	1/2	Hip	Case series
4	Austen et al. 2012	English	1	Knee	Case report
5	Austin et al. 1992	English	1	Knee	Case report
6	Azzam et al. 2009	English	31	Hip & Knee	Retrospective cohort study
7	Badrul and Ruslan 2000	English	1	Knee	Case report
8	Baumann et al. 2001	English	1	Knee	Case report
9	Bland and Thomas 2009	English	1	Knee	Case report
10	Brooks and Puppato 1998	English	1	Knee	Case report
11	Bruce et al. 2001	English	2	Hip	Case series
12	Cardinal et al. 1996	English	3	Hip	Case series
13	Chiu et al. 2012	English	1	Hip	Case report
14	Cushing and Fulgenzi 1997	English	1	Knee	Case report
15	Cutrona et al. 2002	English	1	Hip	Case report
16	Darouiche et al. 1989	English	4	Hip & Knee	Case series
17	Deelstra et al. 2012	English	1	Hip	Case report
18	DeHart 1995	English	1	Knee	Case report
19	Dumaine et al. 2008	English	1	Knee	Case report
20	Dutronic et al. 2010	English	7	Hip & Knee	Case series
21	Evans and Nelson 1990	English	2	Hip	Case series
22	Fabry et al. 2005	English	1	Knee	Case report
23	Fowler Jr. et al. 1998	English	1	Hip	Case report
24	Fukasawa and Shirakura 1997	English	1	Knee	Case report
25	Garcia-Oltra et al. 2011	Spanish	8/10	Hip & Knee	Case series
26	Gaston and Ogden 2004	English	1	Knee	Case report
27	Goodman et al. 1983	English	2	Hip & Knee	Case series
28	Gottesman-Yekutieli et al. 2011	English	1	Hip	Case report
29	Graw et al. 2010	English	2	Knee	Case series
30	Guyard et al. 2006	French	1	Hip	Case report
31	Hennesy 1996	English	1	Knee	Case report
32	Hwang et al. 2012	English	30	Knee	Retrospective cohort study
33	Iskander and Khan 1988	English	1	Knee	Case report
34	Johannsson and Callaghan 2009	English	1	Hip	Case report
35	Kelesidis and Tsiodras 2010	English	1	Hip	Case report
36	Koch 1988	English	1	Knee	Case report
37	Kuberski et al. 2011	English	2/6	Hip & Knee	Case series
38	Lackner et al. 2011	English	1	Knee	Case report
39	Lambertus et al. 1988	English	2	Hip & Knee	Case series
40	Langer et al. 2003	English	1	Knee	Case report
41	Lazzarini et al. 2004	English	1	Hip	Case report
42	Lejko-Zupanc et al. 2005	English	1	Hip	Case report
43	Lerch et al. 2003	English	1	Knee	Case report
44	Levine et al. 1988	English	1	Knee	Case report
45	MacGregor et al. 1979	English	1	Knee	Case report
46	Marra et al. 2001	English	1	Hip	Case report
47	Merrer et al. 2001	English	1	Hip	Case report
48	Moisés et al. 1998	Spanish	1	Hip	Case report
49	Nayeri et al. 1997	English	1	Hip	Case report
50	Paul et al. 1992	English	1	Knee	Case report
51	Phelan et al. 2002	English	4/10	Hip & Knee	Case series
52	Prenzel et al. 2003	German	1	Hip	Case report
53	Ramamohan et al. 2001	English	1	Hip	Case report
54	Selmon et al. 1998	English	1	Knee	Case report
55	Simonian et al. 1997	English	1	Knee	Case report
56	Tunkel et al. 1993	English	1	Knee	Case report
57	Villamil-Cajoto et al. 2012	English	1	Knee	Case report
58	Wada et al. 1998	English	1	Knee	Case report
59	White and Goetz 1995	English	1	Knee	Case report
60	Wu and Hsu 2011	English	1	Knee	Case report
61	Wyman et al. 2002	English	1	Knee	Case report
62	Yang et al. 2001	English	1	Knee	Case report
63	Yilmaz et al. 2011	English	1	Knee	Case report
64	Younkin et al. 1984	English	1	Hip	Case report