

Epidémiologie et fardeau de la maladie

Dr Armelle Pasquet

23 Avril 2015

Epidémiologie

- Complication rare mais souvent grave
- Données de la littérature très pauvres
- Plusieurs milliers d'implants vasculaires posés chaque année
 - évaluation non précise
 - incidence annuelle <1 cas/100.000 habitants
- 30-45% admissions dans les 30 jours suivant la mise en place d'une prothèse vasculaire
- Fréquence entre 1-6%, dépend
 - du type de matériel
 - de la localisation

Cumulative Incidence of Graft Infection after Primary Prosthetic Aortic Reconstruction in the Endovascular Era

P. Berger ^{a,*}, I. Vaartjes ^b, F.L. Moll ^a, G.J. De Borst ^a, J.D. Blankensteijn ^c, M.L. Bots ^b

^aDepartment of Surgery (Division of Vascular Surgery), University Medical Center Utrecht, Utrecht, The Netherlands

^bJulius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht, The Netherlands

^cDepartment of Surgery (Division of Vascular Surgery), VU Medical Centre, Amsterdam, The Netherlands

Table 2. Baseline characteristics.

Variable	
Total cohort, <i>N</i>	514
Age, mean (SD)	69.2 (9.5)
	<i>N</i> (%)
Sex (male)	438 (85)
AGI	23 (5)
<i>Comorbidities</i>	
Diabetic	52 (10)
Hypertension (SVS class 1, 2, or 3)	212 (41)
Cardiac (SVS class 1, 2, or 3)	154 (30)
Pulmonary (SVS class 1, 2, or 3)	79 (15)
Cerebrovascular disease (TIA/CVA)	41 (8)
<i>Operation indication, initial operation</i>	
Elective	287 (56)
Abdominal aortic aneurysm	440 (86)
Occlusive aortic disease	68 (13)
Other	6 (1)
<i>Operation type, initial operation</i>	
Abdominal tube	295 (57)
Aorto-(bi)-iliac	130 (25)
Aorto-(bi)-femoral	48 (9)
Aorto-iliaco-femoral	11 (2)
Other	30 (6)
Suprarenal clamp	45 (9)

Because of adverse legislation, baseline characteristics could not

- Endocavitaire
 - Incidence IPV de 3,6 % (1,7-5,5) a 1 an et 4,5 % à 2 ans (2,4-6,6)
 - 1^{re} Etude avec un vrai report Incidence

Definitions

AGI was defined as either, proven by at least one positive culture of peri-prosthetic material, or at least one positive culture of a (partially) explanted prosthetic graft, or clinically by a combination of clinical symptoms of infection and either imaging studies confirming AGI or draining subcutaneous sinus with underlying prosthetic vascular graft with negative cultures (Table 1). All other patients were labeled unsuspected for AGI. Because of the expected small case

The effect of Surgical Care Improvement Project measures on national trends on surgical site infections in open vascular procedures

Anahita Dua, MD, MS, MBA,^a Sapan S. Desai, MD, PhD, MBA,^b Gary R. Seabrook, MD,^a Kellie R. Brown, MD,^a Brian D. Lewis, MD,^a Peter J. Rossi, MD,^a Charles E. Edmiston, PhD,^a and Cheong J. Lee, MD,^a *Milwaukee, Wisc; and Springfield, Ill*

Table V. Breakdown of surgical site infections (SSIs) by year between 2000 and 2005 and between 2007 and 2010 for patients who underwent carotid endarterectomy (CEA), elective repair of an unruptured abdominal aortic aneurysm (AAA), and peripheral bypass^a

Procedure	2000	2001	2002	2003	2004	2005	2007	2008	2009	2010
CEA										
SSI	446	384	435	412	369	340	364	328	300	251
Total	20,230	19,700	19,539	18,062	16,558	15,183	13,999	14,193	13,354	12,311
%	2.2	1.9	2.2	2.3	2.2	2.2	2.6	2.3	2.2	2.0
AAA^b										
SSI	51	52	60	57	50	41	45	20	42	27
Total	7572	5563	4958	4698	4156	3570	2616	2597	2302	1782
%	0.7	0.9	1.2	1.2	1.2	1.1	1.7	0.8	1.8	1.5
Bypass										
SSI	42	35	48	44	37	48	36	39	29	19
Total	30,277	30,190	30,979	29,440	26,285	25,188	24,628	24,541	22,592	19,665
%	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.1

^aPooled values between 2000 and 2005 and between 2007 and 2010 were compared using χ^2 with Yates correction, with $P < .05$ indicating significance.

^b $P < .05$.

Aucun effet ISCI. Analyse Rétrospective

(J Vasc Surg 2014;60:1635-9.)

Table IV. Demographics and surgical site infection (SSI) status of patients who underwent carotid endarterectomy (CEA), abdominal aortic aneurysm (AAA) repair, or peripheral bypass separated by the development of an SSI in the Nationwide Inpatient Sample (NIS) from 2007 to 2010

<i>Variable</i>	<i>CEA+ SSI</i> (<i>n</i> = 123)	<i>CEA- SSI</i> (<i>n</i> = 91,302)	<i>AAA+ SSI</i> (<i>n</i> = 134)	<i>AAA- SSI</i> (<i>n</i> = 9163)	<i>Bypass+ SSI</i> (<i>n</i> = 1243)	<i>Bypass- SSI</i> (<i>n</i> = 52,612)
Age, mean $\pm$ SD, years	70 $\pm$ 10	71 $\pm$ 10	71 $\pm$ 9	71 $\pm$ 9	66 $\pm$ 14	67 $\pm$ 13
Female, %	35	42	30	27	42	37
Caucasian, %	79	88	88	88	75	74
COPD, %	21	22	46	35	25	27
Diabetes mellitus, %	28	28	11	15	17	26
LOS, median (IQR), days	15 (7-28)	1 (1-3)	19 (10-33)	7 (5-10)	15 (8-27)	5 (3-10)
In-hospital mortality, %	7	0	11	4	5	2
Total charges, median (IQR), \$	140,876 (\$61,851- \$246,967)	23,236 (\$15,977- \$38,798)	159,147 (\$72,437- \$363,191)	69,842 (\$46,882- \$112,722)	112,726 (\$62,539- \$215,503)	49,490 (\$29,489- \$89,949)

IQR, Interquartile range; *LOS*, Length of stay; *SD*, standard deviation.

Epidémiologie

US Incidence rates of *S. aureus* infections associated with surgery.

Surgical subgroup	<i>S. aureus</i> infection rate (%)	MRSA rate (% of <i>S. aureus</i> infections)
Vascular	2.4	47.5
Cardiothoracic	2.0	36.5
General	3.2	35.9
GYN/GU	0.6	51.4
Neurosurgical	1.8	39.0
Orthopedic	0.8	39.4
Plastic	3.1	29.4

Taux infection selon Type de Prothèse

Localisation	Fréquence (%)
Aorto-iliaque	< 1
Aorto-fémorale	1-1,5
Fémoro-fémorale	1,3-4,5
Fémoro-poplitée	2-7
Axillo-fémorale	2-8

- Matériel :
 1. Dacron > PTFE > Allogreffe artérielle > Autogreffons veineux
- PTFE s'infecte moins Dacron car le Dacron est plus poreux et moins hydrophobe
 - BGN enveloppe hydrophile avec affinité > Dacron
 - Staphylocoques hydrophobes > PTFE

Taux infection selon le délai de survenue

- Tardives ≥ 4 mois dans 68-85% des cas
 - antibioprophylaxie
- Précoces < 4 mois
- Délai moyen de survenue varie entre 25-41 mois après implantation
 - 7 mois IPV du membre inférieur
 - 40 mois pour IPV aortique



Surgical and Antimicrobial Treatment of Prosthetic Vascular Graft Infections at Different Surgical Sites: A Retrospective Study of Treatment Outcomes

Stefan Erb^{1,3*}, Jan A. Sidler^{1,3*}, Luigia Elzi^{1,3}, Lorenz Gurke^{2,3}, Manuel Battegay^{1,3}, Andreas F. Widmer^{1,3}, Maja Weisser^{1,3*}

Table 1. Comparison of patient characteristics and clinical presentation with respect to graft location in patients with prosthetic vascular graft infection.*

Variable	Thoracic-Aortic PVGI (n = 24)	Abdominal-Aortic PVGI (n = 27)	Peripheral-Arterial PVGI (n = 10)	p-Value [†]
Patient Characteristics at the Time of Graft Infection				
Median age in years	58 (IQR 48–65)	70 (IQR 66–76)	74 (IQR 57–78)	<0.001
Male patients, n	21 (87.5%)	25 (92.6%)	7 (70.0%)	0.202
Median BMI in kg/m ²	27 (IQR 24–28)	25 (IQR 23–28)	25 (IQR 20–27)	0.622
Patients with a ICU stay, n	9 (37.5%)	11 (40.7%)	3 (30.0%)	0.938
Cardiovascular disease [‡] , n	11 (45.8%)	18 (66.7%)	10 (100%)	0.007
Diabetes mellitus, n	4 (16.7%)	5 (18.5%)	1 (10.0%)	0.823
COPD, n	4 (16.7%)	8 (29.6%)	3 (30.0%)	0.533
Renal impairment [§] , n	5 (20.8%)	13 (48.1%)	1 (10.0%)	0.037
Complications at the Time of Graft Implantation				
Open graft implantation, n patients	23 (95.8%)	26 (96.3%)	10 (100%)	0.813
Emergency surgery, n patients	5 (20.8%)	7 (25.9%)	3 (30.0%)	0.791
Early graft revision <24 hours, n patients	2 (8.3%)	10 (37.0%)	1 (10.0%)	0.034
Blood transfusions, n patients	9 (37.5%)	10 (37.0%)	2 (20.0%)	0.631
Intubation >24 hours, n patients	5 (20.8%)	4 (14.8%)	0 (0.0%)	0.399
Onset of Graft Infection				
Median time from graft implant to diagnosis of infection in days	37 (IQR 11–131)	40 (IQR 6–440)	15 (IQR 6–26)	0.538
Early onset of infection (≤4 months after graft implant), n patients	18 (75.0%)	15 (55.6%)	8 (80.0%)	0.384
Late onset of infection (>4 months after graft implant), n patients	6 (25.0%)	12 (44.4%)	2 (20.0%)	0.384

Signs and Symptoms of Graft Infection

Facteurs de Risques

JOURNAL OF VASCULAR SURGERY
November 2014

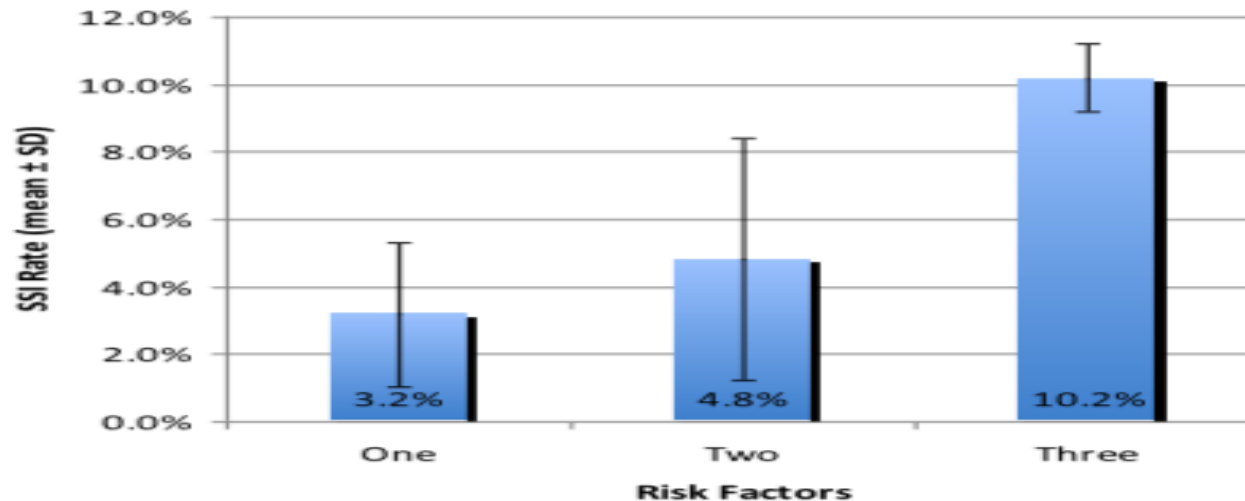


Fig 1. Predicted surgical site infection (SSI) rate based on modifiable risk factors. *SD*, Standard deviation.

From the Society for Vascular Surgery

Factors associated with surgical site infection after lower extremity bypass in the Society for Vascular Surgery (SVS) Vascular Quality Initiative (VQI)

Jeffrey A. Kalish, MD,^a Alik Farber, MD,^a Karen Homa, PhD,^b Magdiel Trinidad, MD,^c Adam Beck, MD,^d Mark G. Davies, MD, PhD,^e Larry W. Kraiss, MD,^f and Jack L. Cronenwett, MD,^g on behalf of the Society for Vascular Surgery Patient Safety Organization Arterial Quality Committee, *Boston, Mass; Chicago, Ill; Tucson, Ariz; Gainesville, Fla; Houston, Tex; Salt Lake City, Utah; and Lebanon, NH*

Pronostic

- Evaluation difficile:
 - morbi-mortalité: non systématiquement renseignée, pas études comparatives
 - indicateurs de morbidités non homogènes selon les études
 - prise en charge non homogène:
 - technique chirurgicale: in situ, extra-anatomique...
 - traitement médical utilisé

Complications

- Immédiate
 - Sepsis sévère ou choc septique
 - Thrombose du substitut vasculaire: 25%
 - Hémorragie: érosion de la paroi vasculaire
 - Fistule aorto-digestive ou prothéto-digestive : 1/3 des IPV aortiques, mortalité d'environ 40 %
- Post-opératoire:
 - **Décès**
 - Thrombose et **Amputation**
 - Récidive

Morbi-Mortalité: Localisation

- **Taux amputation** entre 10-30 %
 - Site implantation
 - membre inférieur: 10-70%
 - aortique : 10-27%
 - Indication opératoire
 - Type matériel et Technique opératoire
- **Mortalité** entre 10-50% plus récemment entre 6-22% (IPV précoce) et 15-30% (IPV tardive)
 - membre inférieur: 10-30 %
 - aortique : 20-56 %

Morbidité: Traitement

- Conservation prothèse:
 - Mortalité précoce nulle, 60% rechute
 - Antibiothérapie suppressive+++
- Exérèse prothèse revascularisation extra-anatomique
 - Plus recommandée en première intention, morbi-mortalité lourde

TABLE 11. Pooled estimates of mean event rates for the outcomes derived from all studies before and after tests of heterogeneity using fixed effect analyses

Outcomes	Extra-anatomic bypass (n = 459)	Rifampicin-bordered prosthetic (n = 96)	Cryo-preserved allograft (n = 616)	Autogenous vein (n = 219)
<i>Before tests of heterogeneity</i>				
Amputation	0.12 ^{1‡}	0	0.03	0.08
Conduit failure	0.20 [‡]	0.02 [*]	0.09	0.17
Reinfection	0.07 [§]	0.07	0.03	0.01
Early mortality	0.15 [†]	0.07	0.14	0.10
Late mortality	0.33	0.16	0.14	0.14
All outcomes combined	0.17 ^{1‡§}	0.07	0.09	0.10
<i>After tests of heterogeneity</i>				
Amputation	0.08 [†]	0	0.03	0.08
Conduit failure	0.25 [‡]	0.02 [*]	0.09	0.17
Reinfection	0.06 [§]	0.07	0.03	0.01
Early mortality	0.18 [†]	0.07	0.14	0.10
Late mortality	0.24	0.16	0.14	0.14
All outcomes combined	0.16 ^{1‡§}	0.07	0.09	0.10

A systematic review and meta-analysis of treatments for aortic graft infection

Stephen O'Connor, PhD, Hon. FRCP,^a Peter Andrew, MMedSci, PhD,^b Michel Batt, MD,^c and Jean Pierre Becquemin, MD,^d Bedfordshire, United Kingdom; St. Lazare, Québec, Canada; and Nice and Créteil, France

Morbidité: Traitement

- **Revascularisation in-Situ**
 - Prothèse dacron/PTFE
 - Amputation 0-15%
 - Ré-infection 11-22%
 - Mortalité 20-30%
 - Autogreffe Veineuse
 - Amputation 0-20 %: thrombose greffons, syndrome des loges
 - Ré-infection $\sim$ nul
 - Mortalité 7-17 %
 - Allogreffe artérielle+++
 - Amputation 0-5%
 - Ré-infection 0-<10%
 - Mortalité 6-23%, survie 75% à 5 ans

FDR de mortalité

TABLE 2. Multivariate analysis of risk factors for in-hospital mortality

Variable	OR (95% CI)	p-value
Complete model		
Aortic graft infection	9.17 (1.42–58.87)	0.02
Early-onset infection	0.34 (0.09–1.36)	0.13
Age >70 years	10.74 (1.76–65.48)	0.01
PVGI caused by Gram-negative bacilli	2.41 (0.58–9.98)	0.22
Surgical debridement with excision of infected graft	2.84 (0.62–13.0)	0.18
Logistic procedure		
Aortic graft infection	5.6 (1.1–28.7)	0.037
Age >70 years	9.1 (1.83–45.43)	0.007

PVGI, prosthetic vascular graft infection.

Characteristics and prognosis in patients with prosthetic vascular graft infection: a prospective observational cohort study

L. Legout¹, B. Sarraz-Bournet², P. V. D'Elia^{1,3}, P. Devos⁴, A. Pasquet¹, M. Caillaux⁵, F. Wallet⁶, Y. Yazdanpanah¹, E. Senneville¹, S. Haulon⁶ and O. Leroy⁷

Table 3 Factors associated with in ICU mortality in case of definite infections, univariate analysis.^a

Characteristics	Non survivors n = 11	Survivors n = 22	p
<i>Patient and infection characteristics</i>			
Age >70 years	8 (73)	6 (27)	0.04
Type of bacteria			
Aerobes cocci gram positive	5 (45)	15 (68)	0.14
Enterobacteriaceae	6 (55)	7 (32)	0.14
Early-onset infection	5 (45)	13 (59)	0.22
Aortic graft infection	7 (64)	11 (50)	0.22
<i>Chirurgical and intra-operative care</i>			
Cryopreserved allograft	5 (45)	13 (59)	0.22
Extra-anatomic bypass	5 (45)	3 (14)	0.05
POSSUM score > 45	8 (73)	6 (27)	0.02
Intraoperative therapeutic intensity score	25 ± 11	17 ± 8	0.06
Intraoperative blood transfusion	6 ± 3	3 ± 2	0.004
Intraoperative fresh frozen plasma (units)	2.8 ± 2.8	0.7 ± 1.2	0.02
<i>Characteristics and care in ICU</i>			
SAPS II	58 ± 26	38 ± 17	0.03
dialysis	5 (45)	3 (14)	0.05
Mechanical ventilation	8 (73)	16 (73)	>0.99
Schock	10 (91)	8 (36)	0.003
Adequate antibiotherapy	11 (100)	20 (91)	0.44
Aminoglycoside prescription	3 (27)	13 (59)	0.07

^a Data are presented as No (%) or mean ± SD.

Vascular graft infections in the intensive care unit: Clinical spectrum and prognostic factors

Magdalena Szczot^a, Agnès Meybeck^{a,*}, Laurence Legout^b, Armelle Pasquet^b, Nicolas Van Grunderbeeck^a, Joachim Langlois^a, Béatrice Sarraz-Bournet^c, Patrick Devos^d, Olivier Leroy^a

eP102: Characteristics and prognosis of patients with staphylococcal prosthetic vascular graft infection (PVGI): a prospective cohort of 92 patients

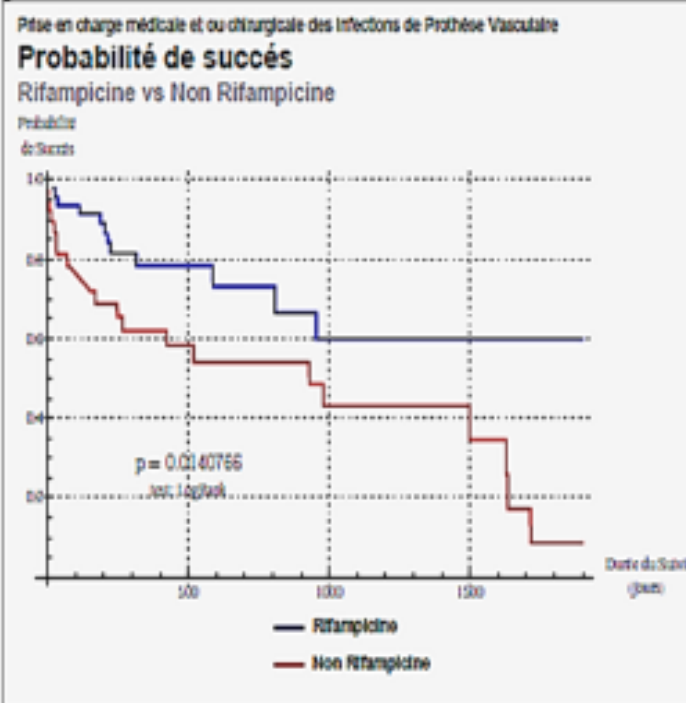
Armelle Pasquet¹, Michel Valette¹, Laurence Legout², Philippe Choisy¹, Pierre Vito D'Elia³, Beatrice Sarraz Boumet³, Olivier Leroy⁴, Eric Senneville¹

1-Department of Infectious diseases, Dron Hospital of Tourcoing, France 2-Department of Infectious diseases, Alpes Leman Hospital, France, 3-Department of Vascular surgery, Dron Hospital of Tourcoing, France, 4-Intensive care Unit, Dron Hospital of Tourcoing, France

Table 1: baseline characteristics (n ; %)

	Death		P
	No	Yes	
COP			
No	59 (88)	8 (12)	0.03
Yes	17 (68)	8 (32)	
Arterial aneurysm			
No	54 (92)	5 (8)	0.01
Yes	22 (67)	11 (33)	
Extrarenal euration in ICU			
No	80 (91)	8 (9)	0.03
Yes	2 (50)	2 (50)	
Cavitary PVGI			
No	38 (95)	2 (5)	<0.01
Yes	38 (73)	14 (27)	
Fever			
No	29 (100)	0	0.06
Yes	46 (74)	16 (26)	
Rifampicin Use			
No	28 (70)	12 (30)	0.01
Yes	48 (92)	4 (8)	
Age (median ; IQR)	56 [62-73]	63 [55-74]	0.01

Figure 1



Courbes de survie — Méthode de Kaplan-Meier

Conclusions

- Homme > 65 ans
- comorbidités+++
 - DNID
 - BPCO
 - Pathologies cardio-vasculaires
 - BMI>25
- Fréquence 1-6%
 - Prothèse périphérique 2-7%
- Délai de survenue:
 - Prothèse aortique: 40 mois moyenne
 - Prothèse périphérique: 7 mois moyenne

Conclusions

- **Mortalité :**
 - Précoce: 2-20 %
 - Tardive (5 ans): 15-30 %
- **Facteurs de mortalité:**
 - IPV endocavitaire
 - Age
 - Type prise en charge chirurgicale et ATB
 - Dialyse, présentation clinique
- **Probables progrès à venir:**
 - Harmonisation des pratiques
 - Nouvelles techniques

RECENT
AMELIORATION TECHNIQUE?
DIAGNOSTIQUE PRECOCE (formation,
(TEP) ?

Bibliographie

1. Seeger JM. Am Surg. 2000 Feb;66(2):166-77.
2. Valentine RJ. Semin Vasc Surg. 2001 Dec;14(4):292-301.
3. Baddour LM, Bettmann MA, Bolger AF, Epstein AE, Ferrieri P, Gerber MA, et al. Circulation. 2003 Oct 21;108(16):2015-31.
4. Davenport DL, Zwischenberger BA, Xenos ES. J Vasc Surg. Jun 25.
5. Kalish JA, Farber A, Homa K, Trinidad M, Beck A, Davies MG, et al. J Vasc Surg. Jun 19.
6. Leroy O, Meybeck A, Sarraz-Bournet B, d'Elia P, Legout L. Vascular graft infections. Curr Opin Infect Dis. 2012 Apr;25(2):154-8.
7. Legout L, D'Elia PV, Sarraz-Bournet B, Haulon S, Meybeck A, Senneville E, et al. Med Mal Infect. 2012 Mar;42(3):102-9.
8. Homer-Vanniasinkam S. Int J Infect Dis. 2007 May;11 Suppl 1:S17-22.
9. Koskas F. In: AERCv, editor. Infections artérielles; 1997. p. 13-33.
10. Kaebnick HW, Bandyk DF, Bergamini TW, Towne JB. Surgery. 1987 Oct;102(4):756-62.
11. Leschi J, Goëau-Brissonniere O. In: AERCv, editor. Infections Artérielles; 1997. p. 62-5.
12. Richet HM, Chidiac C, Prat A, Pol A, David M, Maccario M, et al. Am J Med. 1991 Sep 16;91(3B):170S-2S.
13. Perera GB, Fujitani RM, Kubaska SM. Vasc Endovascular Surg. 2006 Jan-Feb;40(1):1-10.
14. Antonios VS, Noel AA, Steckelberg JM, Wilson WR, Mandrekar JN, Harmsen WS, et al. J Infect. 2006 Jul;53(1):49-55.
15. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR. Am J Infect Control. 1999 Apr;27(2):97-132; quiz 3-4; discussion 96.
16. Hasse B, Husmann L, Zinkernagel A, Weber R, Lachat M, Mayer D. Swiss Med Wkly. 143:w13754.
17. Keidar Z, Nitecki S. Semin Nucl Med. Sep;43(5):396-402.
18. Oderich GS, Panneton JM. Acta Chir Belg. 2002 Feb;102(1):7-13.
19. Goëau-Brissonniere O. In: AERCv, editor. Infections artérielles; 1997. p. 43-53.