

# Vascular infection: current spectrum and new challenges

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## Disclosure.....

Speaker name: Sarah Jolivet

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Shareholder in a healthcare company
- Owner of a healthcare company
- Other(s)
- I do not have any potential conflict of interest

# Epidemiology

## Graft infection

According to the CDC National Nosocomial Infection Surveillance System : vascular interventions are clean procedures

- **Incidence** : 1-6%<sup>1</sup>
- **Mortality** : 10–50%  
(aortic > femoro popliteal)
- **Amputation** : 15-60%

Graft implant site	incidence <sup>2</sup>
Thoracic aorta	1.9 - 3.0%
Aorto iliac	0 - 1.3%
Aorto femoral	1.6 - 5.6%
Femoro femoral	3.6 - 7.7%
Axillo femoral	5.3 - 8%
Femoro popliteal	2.2 - 3.5%
carotid	0.2 - 0.8 %

<sup>1</sup>Seeger JM, Am Surg 2000;66(2):166-77

<sup>2</sup>De Donato G, J Cardiovasc Surg 2014;55(6):779-92.

# Epidemiology

## Graft infection

**Graft** = microenvironment favorable for bacterial attachment and biofilm formation (host defenses and antimicrobial therapy)

**Early infection**  
< 4 months

**Contamination during surgery :**  
*Staphylococcus aureus* -> MRSA  
*Staphylococcus spp*  
*Streptococcus spp*  
*Enterococcus spp*  
Gram negative organisms



**Late infection**  
> 4 months -> 30 months

**Hematogenous spread**  
**Biofilm**  
**Enteric fistula formation**  
*Staphylococcus spp*  
*Enterococcus spp*  
*Enterobacteriaceae*



# Prevention

- Review and meta analysis (34 RCTs)<sup>1</sup>
  - Preventing infection in patients undergoing peripheral arterial reconstruction

	RR	CI
<b>Antibiotics vs placebo</b>	0.25	[0.17-0.38]
<b>Short vs long duration antibiotics</b>	1.28	[0.82-1.98]
<b>Rifampicin bonding to graft (2 years)</b>	1.05	[0.46-2.40]
<b>Suction groin wound drainage</b>	0.96	[0.5 - 1.86]
<b>Preoperative bathing with antiseptic agents vs. unmedicated bathing</b>	0.97	[0.7 - 1.36]

<sup>2</sup>Cefazolin +++;  
 Vancomycin  
 Clindamycin

<sup>1</sup>Stewart J Vasc Surg 2007

<sup>2</sup>Bratzler DW, Surg Infect. 2013;14(1):73-156

# Prevention

- **Nasal decontamination**
  - Bode JG N Engl J Med. 2010
  - Mupirocin + chlorexhidine vs placebo → RR = 0.91 IC [0.28-2.96]
- **Silver vascular graft**
  - No RCT, retrospective or in vivo studies : trend toward success
  - “no high level of evidence for the effectiveness of antimicrobial vascular prostheses, including silver graft” - Ricco Semin Vasc Surg 2011
- **Adherence to infection control measure** : skin prep, hand disinfection, antibioprophylaxis, sterile surgical techniques

# Management Surgical treatment

**Graft removal + systemic antibiotics + debridment**

**extra anatomic bypass**

**in situ replacement**

- allografts
- autogenous veins
- antibiotic or silver bonded prosthetic graft

# Management

## Surgical treatment

**Graft removal + systemic antibiotics + debridement**

**extra anatomic bypass**

**in situ replacement**

<i>Outcomes</i>	<i>Extra-anatomic bypass (n = 459)</i>	<i>Rifampicin-bonded prosthetic (n = 96)</i>	<i>Cryo-preserved allograft (n = 616)</i>	<i>Autogenous vein (n = 219)</i>
<b>After tests of heterogeneity</b>				
Amputation	0.08 <sup>†</sup>	0	0.03	0.08
Conduit failure	0.25 <sup>‡</sup>	0.02 <sup>*</sup>	0.09	0.17
Reinfection	0.06 <sup>§</sup>	0.07	0.03	0.01
Early mortality	0.18 <sup>†</sup>	0.07	0.14	0.10
Late mortality	0.24	0.16	0.14	0.14
All outcomes combined	0.16 <sup>†‡§</sup>	0.07	0.09	0.10

# Management Graft preservation

- **Selected patients :**
  - Comorbidities
  - Graft position (thoraco-abdominal, aortic arch graft)
  - Localization infection
  - Micro organisms (Gram positive organisms)
- **+ Long-term suppressive antibiotic therapy**
- **+/- drainage/Negative pressure wound therapy/EndoVAC**
- **<sup>1</sup>Meta analysis : TEVAR**
  - explantation vs preservation OR=0.52 [0.18-1.48]
  - Group preservation : drainage and repair of the fistula OR=2.22 [0.55-8.90]

<sup>1</sup>Moulakakis KG J Vasc Surg. 2014 Oct;60(4):1061-71

# Conclusion

- **Infection** : serious complication (morbidity/mortality)
- **Prevention** : skin prep, hand disinfection, antibioprophylaxis, sterile surgical techniques
- **Management** : no well defined-guidelines -> center and operator's experience