Support For The Graft Preservation Concept For Treating Prosthetic Aortic Graft Infections From A European Multicenter Study (VASGRA): All Or Part Of The Infected Graft May Be Preserved: Under What Circumstances

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Support For The Graft Preservation Concept For Treating Prosthetic Aortic Graft Infections From A VASGRA Registry: All Or Part Of The Infected Graft May Be Preserved: Under What Circumstances

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Disclosure

Nothing to disclose to this talk

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VGEI diagnosis is challenging and there is no one gold standard

- Non specific FitzGerald criteria (2005)
  - Abdominal and Peripheral VGEI
- Modified Duke criteria to thoracic VGEIs of composite grafts (2000)
  - Thoracic aorta, infective endocarditis
- MAGIC CRITERIA (2016)
  - Aorta
- ESVS Guidelines (2020) "suggest" use of MAGIC criteria for VGEI
  - Abdominal and Thoracic Aorta, and peripheral

FitzGerald et al. Journal of Antimicrobial Chemotherapy 2005; 56, 996–999
Li et al. Clin Infect Dis. 2000; 30: 633-638
Lyons et al. Eur J Vasc Endovasc Surg 2016;52(6):758-763
Chakfe et al. Eur J Vasc Endovasc Surg 2020;59:339-84.

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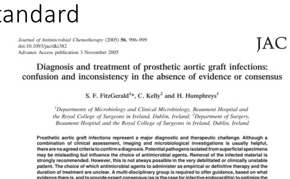
VGEI diagnosis is challenging and there is no one gold standard

- Non specific FitzGerald criteria (2005)
  - Abdominal and Peripheral VGEI

- clinical /imaging/MB investigation
- pathogen isolation misleading
- graft removal not always possible
- duration AB TX?
- multidisciplinary team to optimize TX


Journal of Antimicrobial Chemotherapy (2005) **56**, 996–999
doi:10.1093/jac/dki382
Advance Access publication 3 November 2005

JAC

Diagnosis and treatment of prosthetic aortic graft infections: confusion and inconsistency in the absence of evidence or consensus

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Prosthetic aortic graft infections represent a major diagnostic and therapeutic challenge. Although a combination of clinical assessment, imaging and microbiological investigations is usually helpful, there are no agreed criteria to confirm a diagnosis. Potential pathogens isolated from superficial specimens may be misleading but influence the choice of antimicrobial agents. Removal of the infected material is strongly recommended. However, this is not always possible in the very debilitated or clinically unstable patient. The choice of which antimicrobial agents to administer as empirical or definitive therapy and the duration of treatment are unclear. A multi-disciplinary group is required to offer guidance, based on what evidence there is, and to provide expert consensus (as is the case for infective endocarditis) to optimize the management of these difficult infections.

FitzGerald et al. Journal of Antimicrobial Chemotherapy 2005; 56, 996–999

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62, male, AFF Dacron Bypass

Enterococcus faecalis
Staphylococcus epidermidis

Initial operation

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62, male, AFF Dacron Bypass: *Complete Preservation*

Biofilm breakdown

4 weeks after initial operation

21 months after

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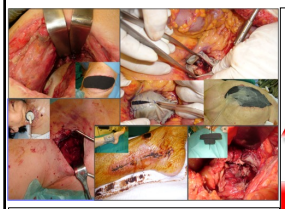
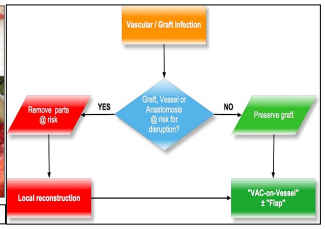
Intention-to-treat: Multi-staged Negative Pressure Wound Therapy (NPWT)





44 patients 30-d-Mortality 0%, 1-y-Mortality 16%

Annals of Surgery 2011; 254(5):754-760; Gefässchirurgie 2020; 25:621-31

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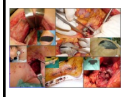
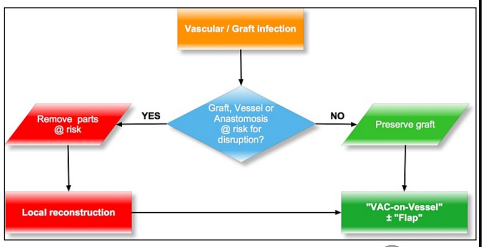
Intention-to-treat: Multi-staged Negative Pressure Wound Therapy (NPWT)





Annals of Surgery 2011; 254(5):754-760; Gefässchirurgie 2020; 25:621-31

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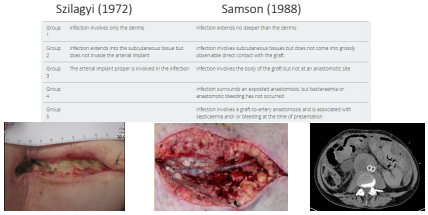
VGI classification: mainly validated for peripheral surgery

Szilagyi (1972) Samson (1988)



Samson II Samson III-IV Samson V

Szilagyi DE, et al. Ann Surg. 1972; 176: 321-333.
Samson RH, et al. JVS 1988; 8:147-53.

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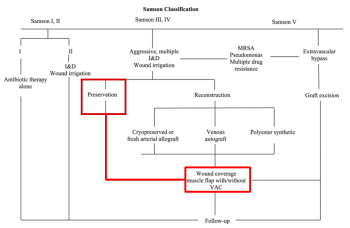
AHA: concept of multistage NPWT for extra-cavitary Samson III+IV infections



Samson III-IV

AHA Scientific Statement, Circulation 2016;134(20):e412-e460

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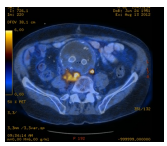
62, male, EVAR infection: Intention to preserve failed



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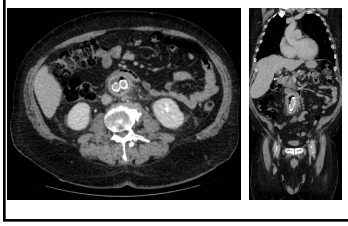
62, male, EVAR infection: No intention to preserve

Dg: Aorto-Enteric Fistula, avid infection
TX: Xenopericard replacement, no NWPT

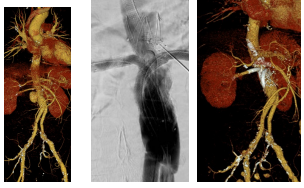


62, male, EVAR infection: No intention to preserve

Proximal Anastomosis Pseudoaneurysm (*3 Months CTA*)

62, male, EVAR infection: No intention to preserve

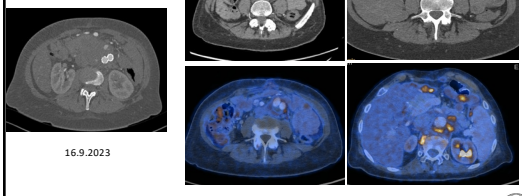
TX CHIPMS and Antibiotic Therapy



62, male, EVAR infection: No intention to preserve

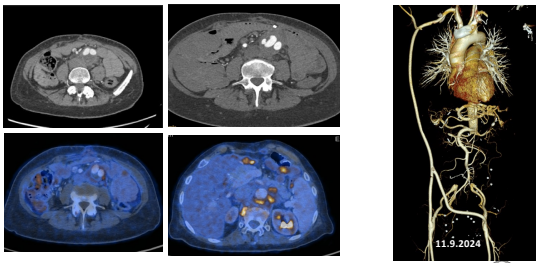
Antibiotic Therapy (6 Mo)

62, female, REVAR infection: No intention to preserve



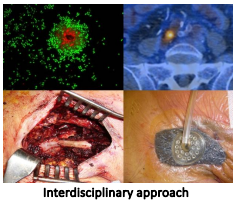
16.9.2023 18.1.2024 11.4.2024

62, female, REVAR infection: No intention to preserve



18.1.2024 11.4.2024

VASGRA: Prospective observational patients cohort after vascular graft surgery



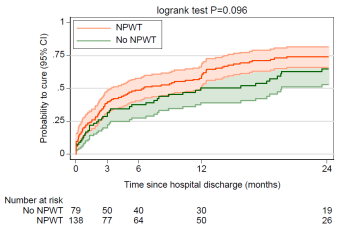
Interdisciplinary approach

Vascular surgery, Infectious Disease Service, Microbiology, Radiology, Surgical Pathology

VASGRA: Study details and methods

- **Data sources:**
  - ***Retrospective data***: **93** patients with vascular graft infections (VGI) diagnosed between 11/1999–10/2012. Outcomes updated in 10/2019
  - ***Prospective data***: **124** patients with VGI diagnosed from 4/2012 -11/2019
  - Analyses of combined dataset (characteristics and mortality comparable)
- **Definitions:**
  - Baseline: End of surgical treatment after diagnosis of VGI
  - Outcome: End of antimicrobial therapy (cure of infection)

NPWT trend for faster cure of VGEI (Univariable)



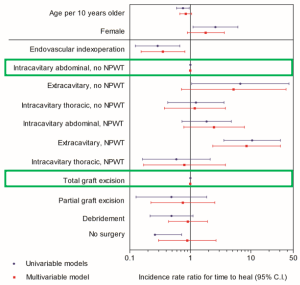
217 patients

Extra-cavitary (39): NWPT 32, Without NWPT 7;
Intra-abdominal (118): NWPT 88, Without NWPT 30;
Intra-thoracic (60): NWPT 18, Without NWPT 42;

Time to cure from PVGI:
NPWT *IRR **1.44** (95% CI 0.97-2.1)

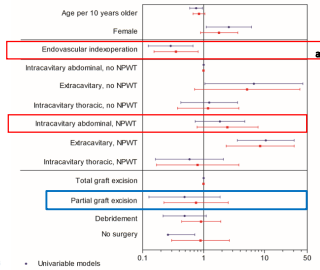
*IRR, incidence rate ratio

NPWT: Time to cure of VGEI (Multivariable model)



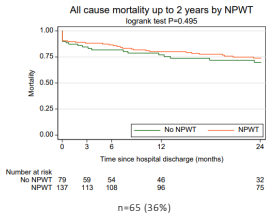
NPWT: Time of cure to infection in abdominal PVGI

Longer

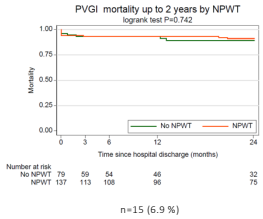


Faster

All cause mortality and infect-related mortality by NPWT (FUP 2 years)



n=65 (36%)



n=15 (6.9 %)

Management of Aortic Graft Infection Collaboration (*MAGIC*) criteria


Diagnosis of Aortic Graft Infection: A Case Definition by the Management of Aortic Graft Infection Collaboration (MAGIC)

	CLINICAL / SURGICAL	RADIOLOGY	LABORATORY
MAJOR CRITERIA	• Pus (confirmed by microscopy) around graft or in aneurysm sac at surgery • Open wound with exposed graft or communicating sinus • Fistula development e.g. aorto-enteric or aorto-bronchial • Graft insertion in an infected site e.g. fistula, mycotic aneurysm or infected pseudoaneurysm	• 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 of 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; pseudoaneurysm formation; focal bowel wall thickening; discitis/ osteomyelitis; suspicious metabolic activity on FDG PET/ CT; radiolabelled leukocyte uptake	• Blood culture(s) positive and no apparent source except AGI • Abnormally elevated inflammatory markers with AGI as most likely cause e.g. ESR, CRP, white cell count

Lyons et al. Eur J Vasc Endovasc Surg 2016;52(6):758-763

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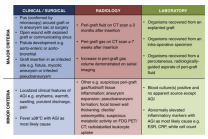
Management of Aortic Graft Infection Collaboration (*MAGIC*) criteria



- AGI is **diagnosed** if there is
  - one *major*

  AND
  - any criterion (*major* or *minor*) from another category.
- AGI is **suspected** if there is presence
  - a single *major* criterion

  OR
  - two or more *minor* criteria from different categories.

Lyons et al. Eur J Vasc Endovasc Surg 2016;52(6):758-763

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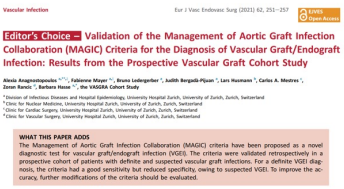
Management of Aortic Graft Infection Collaboration (MAGIC) criteria. Validation for VGEI in the VASGRA study


Vascular Infection

Editor's Choice – Validation of the Management of Aortic Graft Infection Collaboration (MAGIC) Criteria for the Diagnosis of Vascular Graft/Endograft Infection: Results from the Prospective Vascular Graft Cohort Study

WHAT THIS PAPER ADDS

The Management of Aortic Graft Infection Collaboration (MAGIC) criteria have been proposed as a novel diagnostic test for vascular graft/endograft infection (VGEI). The criteria were validated retrospectively in a prospective cohort of patients with definite and suspected vascular graft infections. For a definite VGEI diagnosis, the criteria had a good sensitivity but reduced specificity, owing to suspected VGEI. To improve the accuracy, further modifications of the criteria should be evaluated.

Retrospective analysis

- To validate the MAGIC criteria for VGEI diagnosis in VASGRA study
- To evaluate the accuracy of MAGIC criteria for a different VGEI location

Lyons et al. Eur J Vasc Endovasc Surg 2016;52(6):758-763
Anagnostopoulos et al. Eur J Vasc Endovasc Surg 2021; 62:251-257

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VASGRA: Prospective observational cohort of patients after vascular graft surgery

Follow- up controls

- >18 years
- vascular graft implantations
- Operated at UHZ
- 4.2013- 9.2019

REGULAR

- Image:
  - CECT
- Laboratory tests

VGEI Suspected Re-admission

- Image:
  - FDG PET/CT
  - CECT
  - CEPET/CT

  (In 89% suspected/confirmed VGEI
  In 100% rejected VGEI)
- Laboratory (CRP, SE, WBC)
- Blood/tissue culture
- Serology, if culture negative

VASGRA Vascular Graft Cohort Study

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Comparison MAGIC and VASGRA status for suspected VGEI (48)

MAGIC adjudication	VASGRA adjudication				Total
	Confirmed VGEI	Suspected VGEI	Rejected VGEI	Control patients	
Confirmed VGEI	126 (93.3)	1 (50)	5 (14)	3 (3)	135 (52.5)
Suspected VGEI	8 (5.9)	1 (50)	25 (71)	14 (16)	48 (18.7)
Excluded VGEI	1 (0.7)	0 (0)	5 (14)	0 (0)	6 (2.3)
			0 (0)	68 (80)	68 (26.4)
			35 (100)	85 (100)	257 (100)

MAGIC and VASGRA suspected VGEI (48)

25/48 (52.1%) rejected by VASGRA
8/48 (16.6%) confirmed by VASGRA
14/48 (29.2%) control by VASGRA
1/48 (2.1%) was also suspected

Overtreatment: surgery +/- AB Tx, discomfort

Using the MAGIC criteria: 1.overestimation of suspected VGEI, 2. higher "diseased" patients 71.2%

VASGRA Vascular Graft Cohort Study

Anagnostopoulos et al. Eur J Vasc Endovasc Surg 2021; 62:251-257

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25/48 (52.1%) rejected by VASGRA
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14/48 (29.2%) control by VASGRA
1/48 (2.1%) was also suspected

Delay in surgery

Using the MAGIC criteria: 1.overestimation of suspected VGEI, 2. higher "diseased" patients 71.2%

VASGRA Vascular Graft Cohort Study

Anagnostopoulos et al. Eur J Vasc Endovasc Surg 2021; 62:251-257

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Conclusion

1. Partial graft excision and debridement show longer time to cure, but similar to complete graft excision.
2. If the NWPT is in use there is trend to faster cure.
3. Current MAGIC criteria were in line with VASGRA cohort in 93% offer *good sensitivity and specificity* in the context of true VGEI.
4. The current MAGIC criteria offer *reduced specificity* for a suspected VGEI.

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