Infected Vascular graft, What can we do?

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A vascular graft or endograft infection(VGEI) is a severe complication that can occur after vascular graft or endograft surgery and is associated with

high morbidity and **mortality rates**.

- In retrospective view 141grafts involving the Femoral artery, VGI occurred in 25 cases (18%).

Brothers TE ,et al, 2009.

- Wound complications following vascular bypass procedures involving the groin has been reported upto 20%.

Thermann F, et al 2014

Algorithm for Management

Diagnosis

Treatment Options

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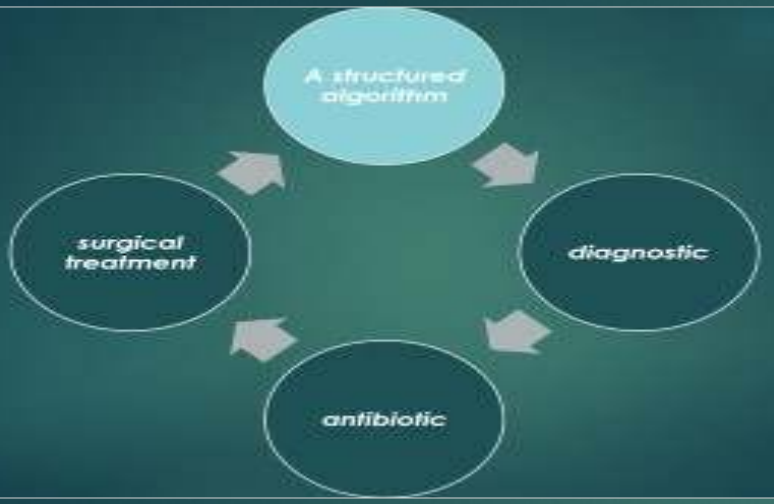
Practical APPLICATION

Multidisciplinary approach

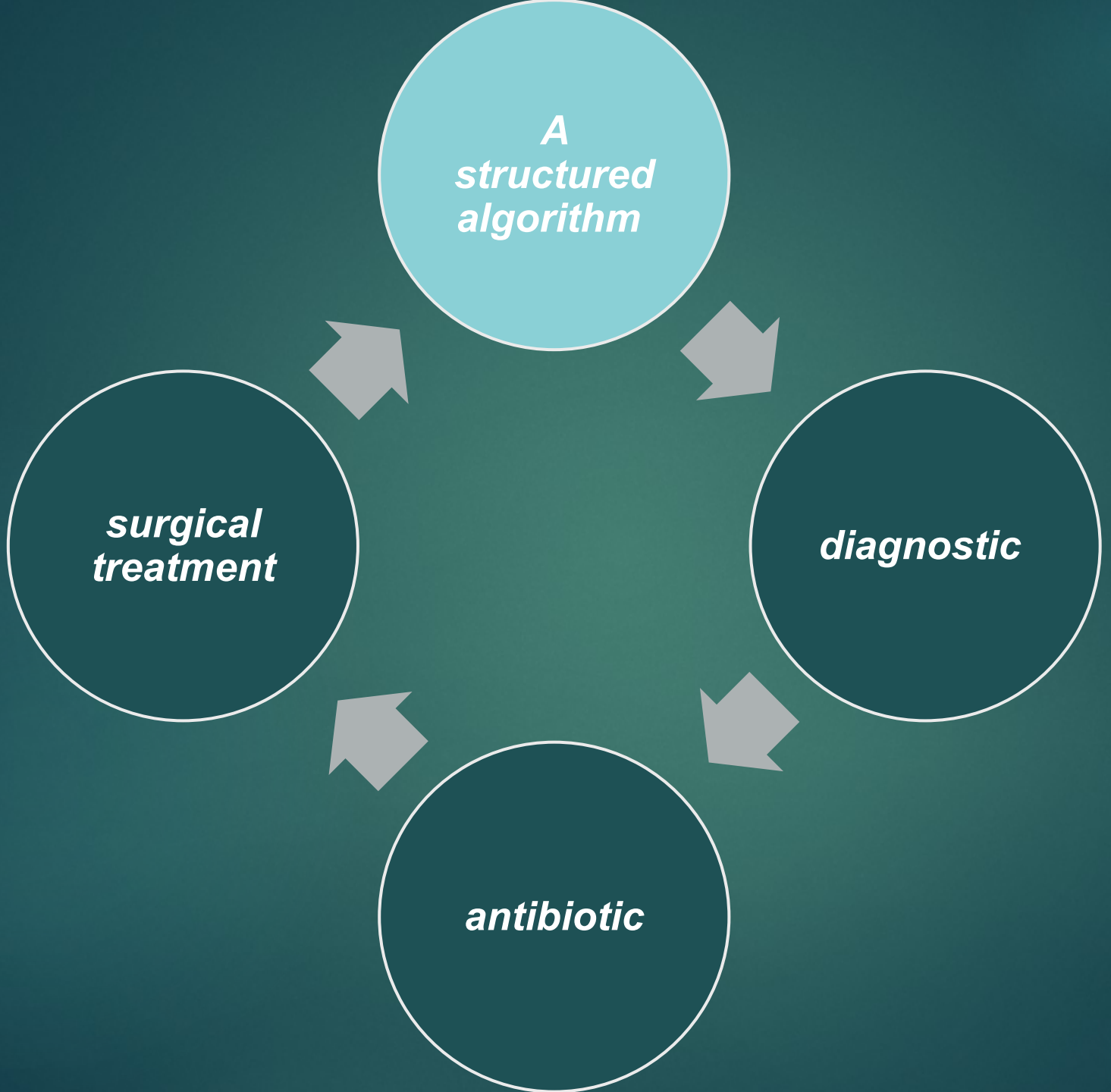
- *Vascular surgeons*
- *Infectious diseases specialists*
- *Medical microbiologists ,*
- *Radiologists*
- *Nuclear medicine specialists*
- *Pharmacists*



Diagnosis

Medical History

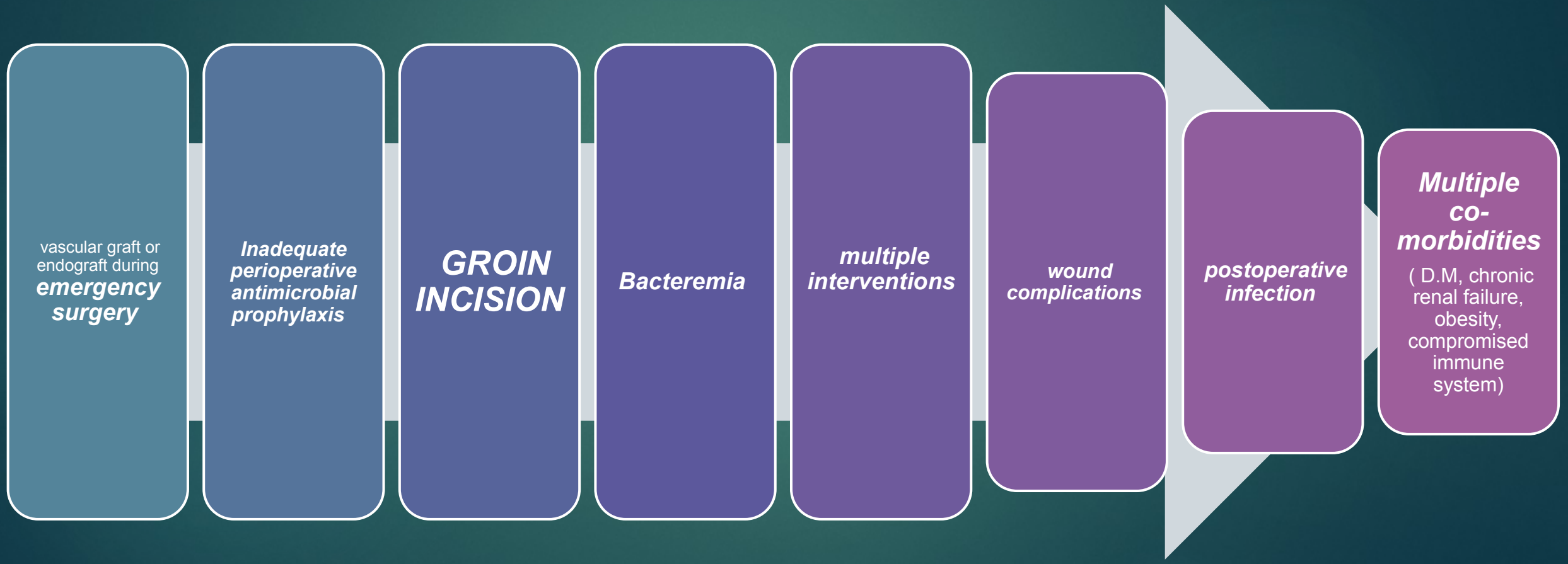
Risk Factors **VGEI**


A structured algorithm
diagnostic
antibiotic
surgical treatment

Diagnosis

Medical History

Risk Factors **VGEI**



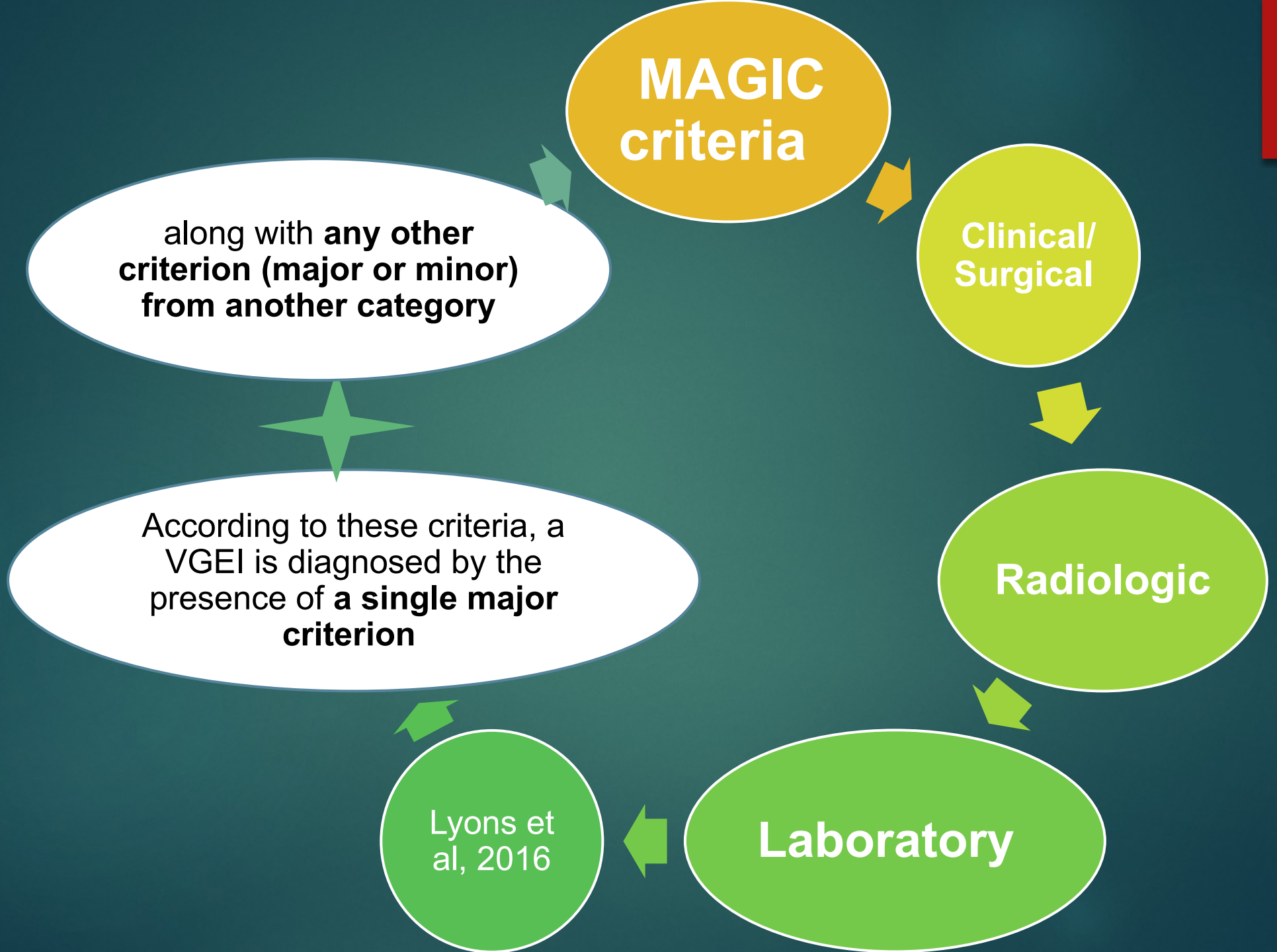

MAGIC criteria
Clinical/ Surgical
Radiologic
Laboratory
Lyons et al, 2016
According to these criteria, a VGEI is diagnosed by the presence of **a single major criterion**
along with **any other criterion (major or minor) from another category**

Table 5. The MAGIC classification[1]

Criterion	Clinical/surgical	Radiology	Laboratory
Major			
	Pus (confirmed by microscopy) around graft or in aneurysm sac at surgery	Perigraft fluid on CT scan ≥ 3 months after insertion	Organisms recovered from an explanted graft
	Open wound with exposed graft or communicating sinus	Perigraft gas on CT scan ≥ 7 weeks after insertion	Organisms recovered from an intra-operative specimen
	Fistula development, e.g., aorto-enteric or aortobronchial	Increase in perigraft gas volume demonstrated on serial imaging	Organisms recovered from a percutaneous, radiologically guided aspirate of perigraft fluid
	Graft insertion in an infected site, e.g., fistula, mycotic aneurysm, or infected pseudo-aneurysm		
Minor			
	Localised clinical features of graft infection, e.g., erythema, warmth, swelling, purulent discharge, pain	Other, e.g., suspicious perigraft gas/fluid soft tissue inflammation; aneurysm expansion; pseudo-aneurysm 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 graft infection
	Fever ≥38°C with graft infection as most likely cause		Abnormally elevated inflammatory markers with graft infection as most likely cause, e.g., erythrocyte sedimentation rate, C reactive protein, white cell count

CT = computed tomography; FDG-PET/CT = 18F-fluoro-D-deoxyglucose positron emission tomography/computed tomography

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Recommendation 1

Once vascular graft/endograft infection is suspected, exhaustive evaluation of clinical status, signs of infection and patient comorbidities according to the MAGIC criteria is recommended.

Class	Level	References
I	C	Lyons *et al.* (2016),[1] Back (2014),[6] Teebken *et al.* (2012)[12]

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Recommendation 7

For suspected vascular graft/endograft infection, CTA is recommended as the first line diagnostic modality.

Class	Level	References
I	B	Reinders Folmer *et al.* (2018)[37]

Recommendation 8

For patients suspected of vascular graft/endograft infection, if CTA is contra-indicated, the use of MRA may be considered.

Class	Level	References
IIb	C	Shahidi *et al.* (2007)[38]

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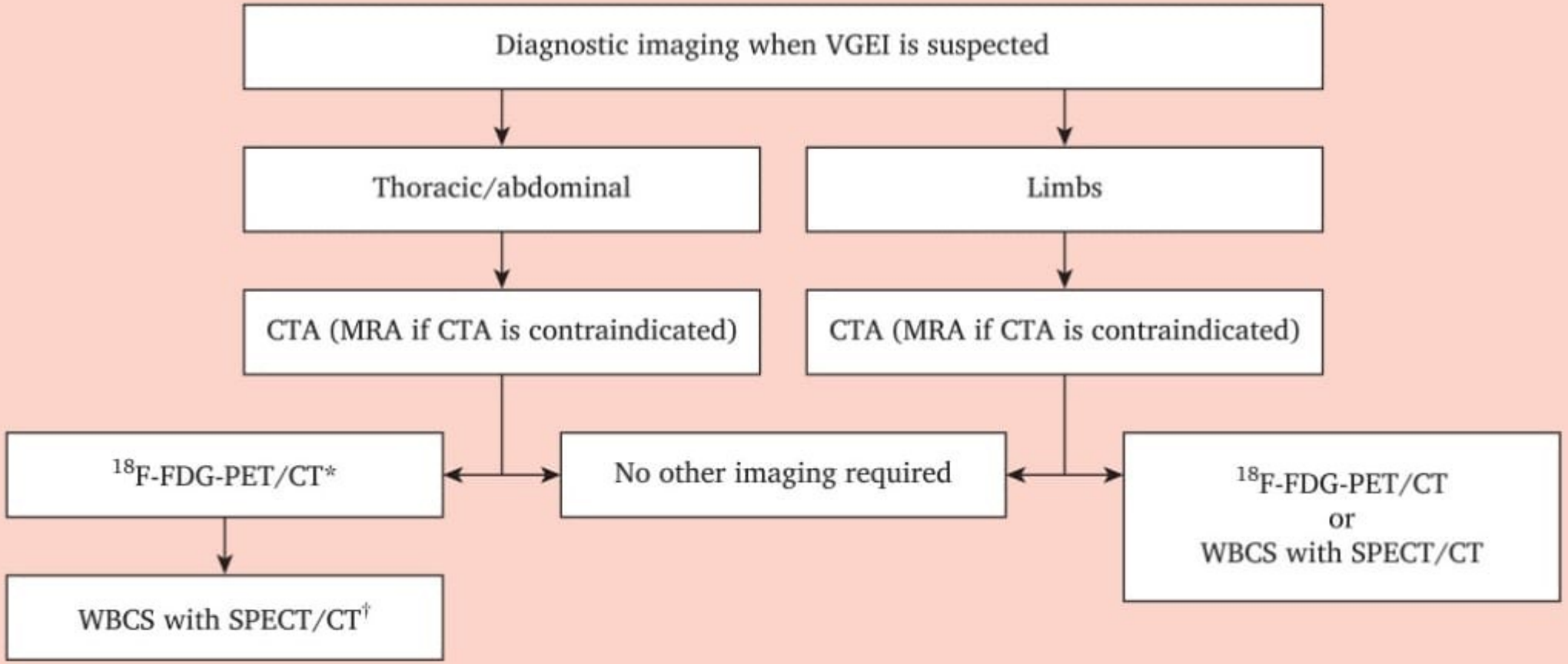
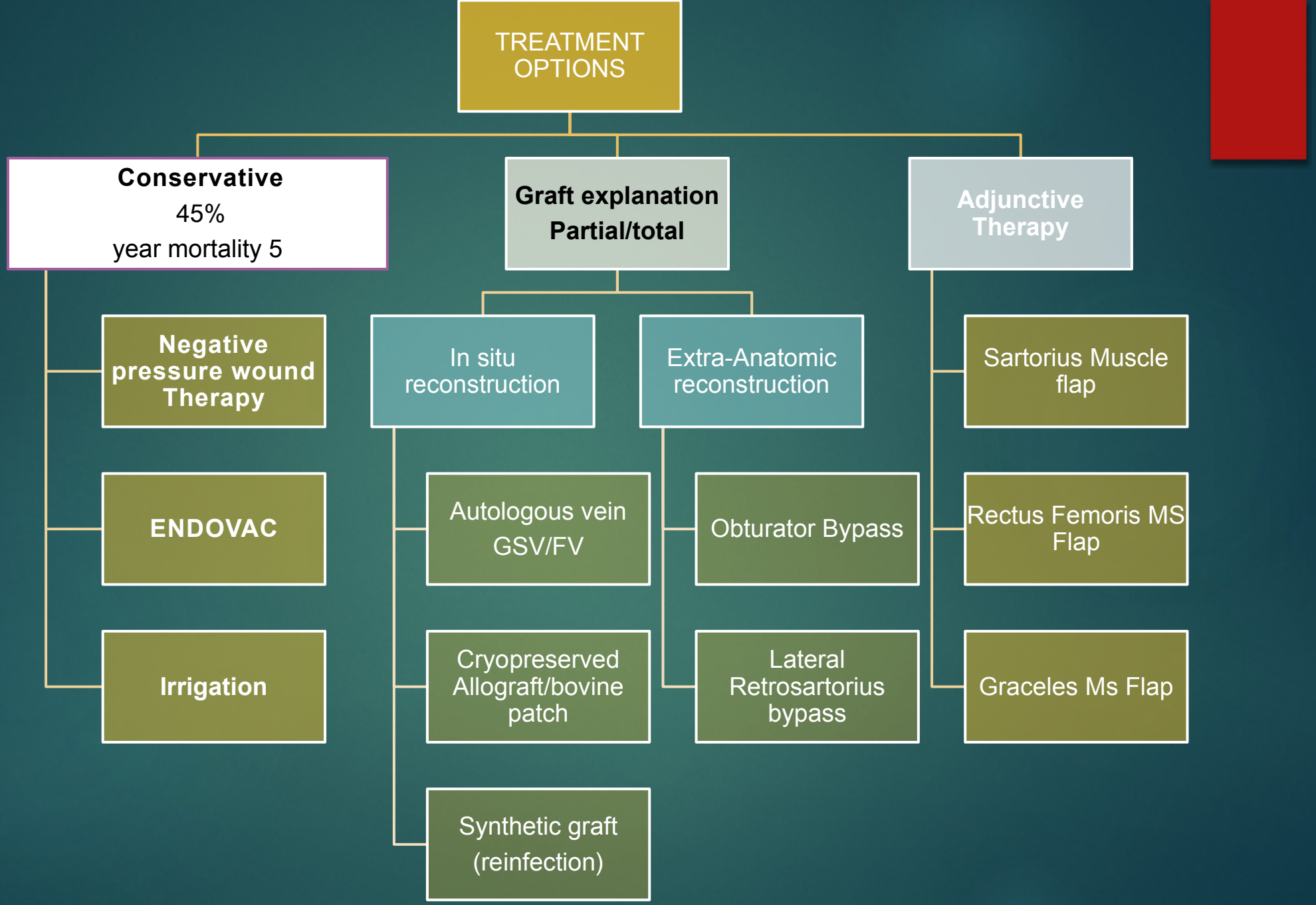


Figure 2. Imaging workflow if vascular graft/endograft infection (VGEI) is suspected, divided into thoracic/abdominal and limb g
CTA = computed tomography angiography; MRA = magnetic resonance angiography; ^{18}F-FDG-PET/CT = ^{18}F-fluoro-D-deoxyglucose
tron emission tomography/computed tomography; WBCS = white blood cell scintigraphy; SPECT/CT = single photon emission comp
tomography/computed tomography. *^{18}F-FDG PET/CT can add more information, particularly in inconclusive CT. In some high g
infection cases a second imaging modality as 18F-FDG PET/CT and/or WBCS combined with SPECT/CT may be useful to map the exte
the infection. †WBCS can be applied if available otherwise, ^{18}F-FDG PET/CT can be used.


TREATMENT OPTIONS
Conservative
45%
year mortality 5
Graft explanation
Partial/total
Adjunctive Therapy
Negative pressure wound Therapy
ENDOVAC
Irrigation
In situ reconstruction
Extra-Anatomic reconstruction
Autologous vein GSV/FV
Cryopreserved Allograft/bovine patch
Synthetic graft (reinfection)
Obturator Bypass
Lateral Retrosartorius bypass
Sartorius Muscle flap
Rectus Femoris MS Flap
Graceles Ms Flap

Recommendation 11		
In every case where a vascular graft/endograft is implanted, antimicrobial prophylaxis to cover the first 24 hours, by intravenous administration of a first/second generation cephalosporin or vancomycin in the event of penicillin allergy, is recommended.		
Class	**Level**	**References**
I	A	Stewart *et al.* (2007)[56]

Recommendation 12		
Before implantation of any vascular graft/endograft, elimination of any potential source of sepsis, especially of dental origin, should be considered.		
Class	**Level**	**References**
IIa	C	Habib *et al.* (2015)[63]

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Recommendation 49

For patients with peripheral vascular graft/endograft infection, *in situ* reconstruction with autologous vein is recommended if [illegible] of the infected [illegible] is likely to lead to limb ischaemia.

Class	Level	References
I	C	Siracuse *et al.* (2013)[221]

Recommendation 50

For patients with peripheral vascular graft/endograft infection limited to [illegible] of the graft and in patients unfit for surgery, local irrigation and/or negative pressure wound therapy may be considered.

Class	Level	References
IIb	C	Thermann and Wollert (2014),[213] Andersson *et al.* (2018),[218] Monsen et al. (2014)[219]

Recommendation 51

For patients with a peripheral vascular graft/endograft infection and a large tissue defect, negative pressure wound therapy should be considered in order to promote wound healing following infected graft removal and debridement with or without vascular reconstruction.

Class	Level	References
IIa	C	Verma *et al.* (2015),[215] Armstrong *et al.* (2007),[216] Cheng *et al.* (2014)[217] Andersson *et al.* (2018),[218] Monsen et al. (2014)[219]

Recommendation 52		
For patients with peripheral vascular graft/endograft infection, *in situ* reconstruction with cryopreserved allografts should be considered as an alternative after infected graft removal if it is likely to lead to limb ischaemia.		
Class	**Level**	**References**
IIa	C	Lejay *et al.* (2017),[147] Ehsan and Gibbons (2009),[223] Zetrenne *et al.* (2007),[225] Gabriel *et al.* (2004),[226] Verhelst *et al.* (2004)[227]

Recommendation 53		
For patients with a peripheral vascular graft/endograft infection and a large tissue defect, muscle or musculocutaneous flaps should be considered to promote groin healing following graft removal and debridement with or without vascular reconstruction.		
Class	**Level**	**References**
IIa	B	McMillan *et al.* (2012),[237] Brewer *et al.* (2015),[238] Mirzabeigi *et al.* (2017),[244] Dua *et al.* (2018)[246]

The Sartorius Muscle Transposition: A Brilliant Solution for Infected Groin Wounds including Vascular Conduits

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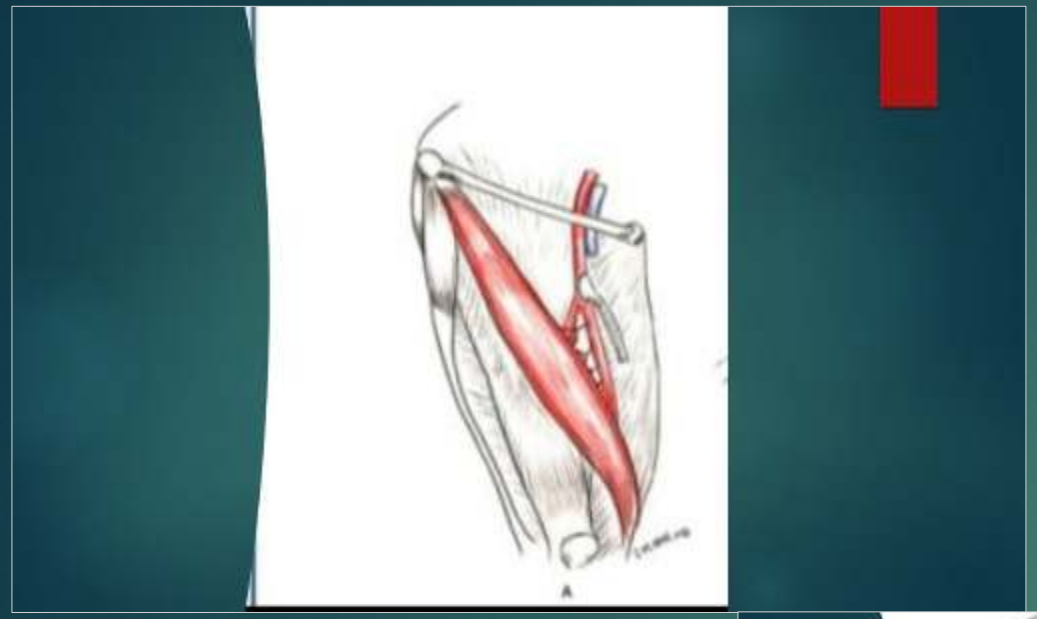
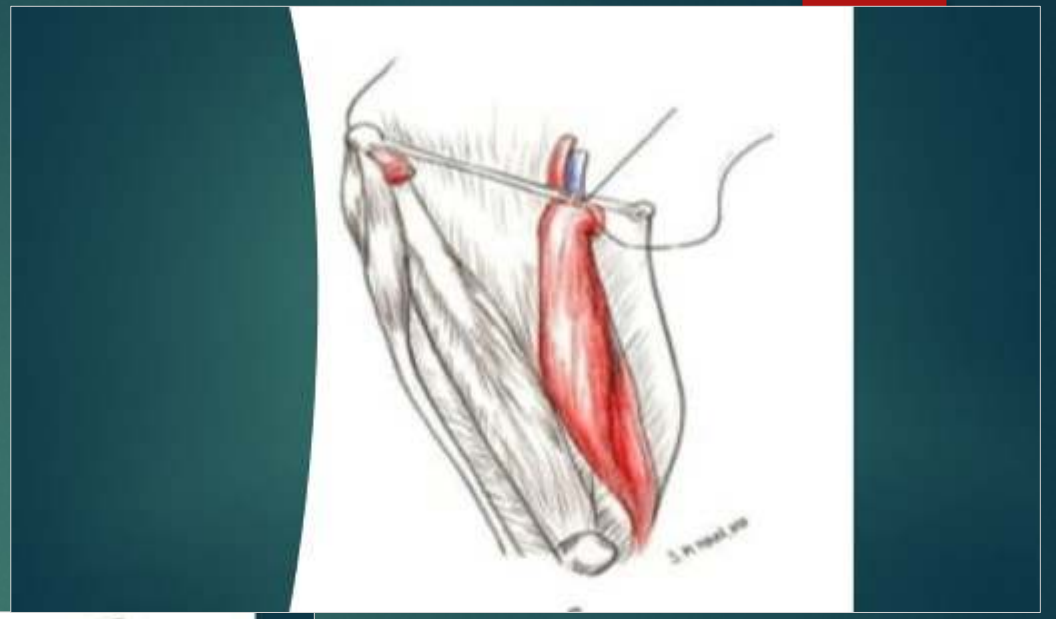
Egyptian Journal of Hospital Medecine, September 2023

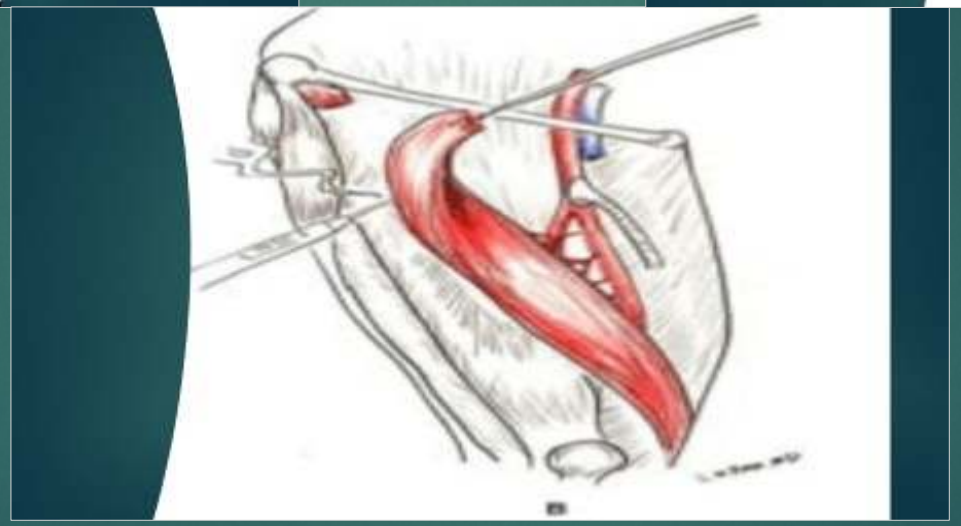
The aim of this study was to emphasize the ***efficacy and safety of the sartorius muscle flap for the salvage of infected groin wounds***

- This prospective study included 5 patients ***with infected or threatened groin wounds*** after femoral artery open intervention, who underwent sartorius muscle flap surgery between January 2020 and December 2022 at Mataria Teaching Hospital, Cairo,

- The initial surgeries involved femoral thrombectomy in one trauma case, femoral artery repair for one patient with a femoral pseudoaneurysm post-PCI, and femoropopliteal bypass with a saphenous graft in three patients.

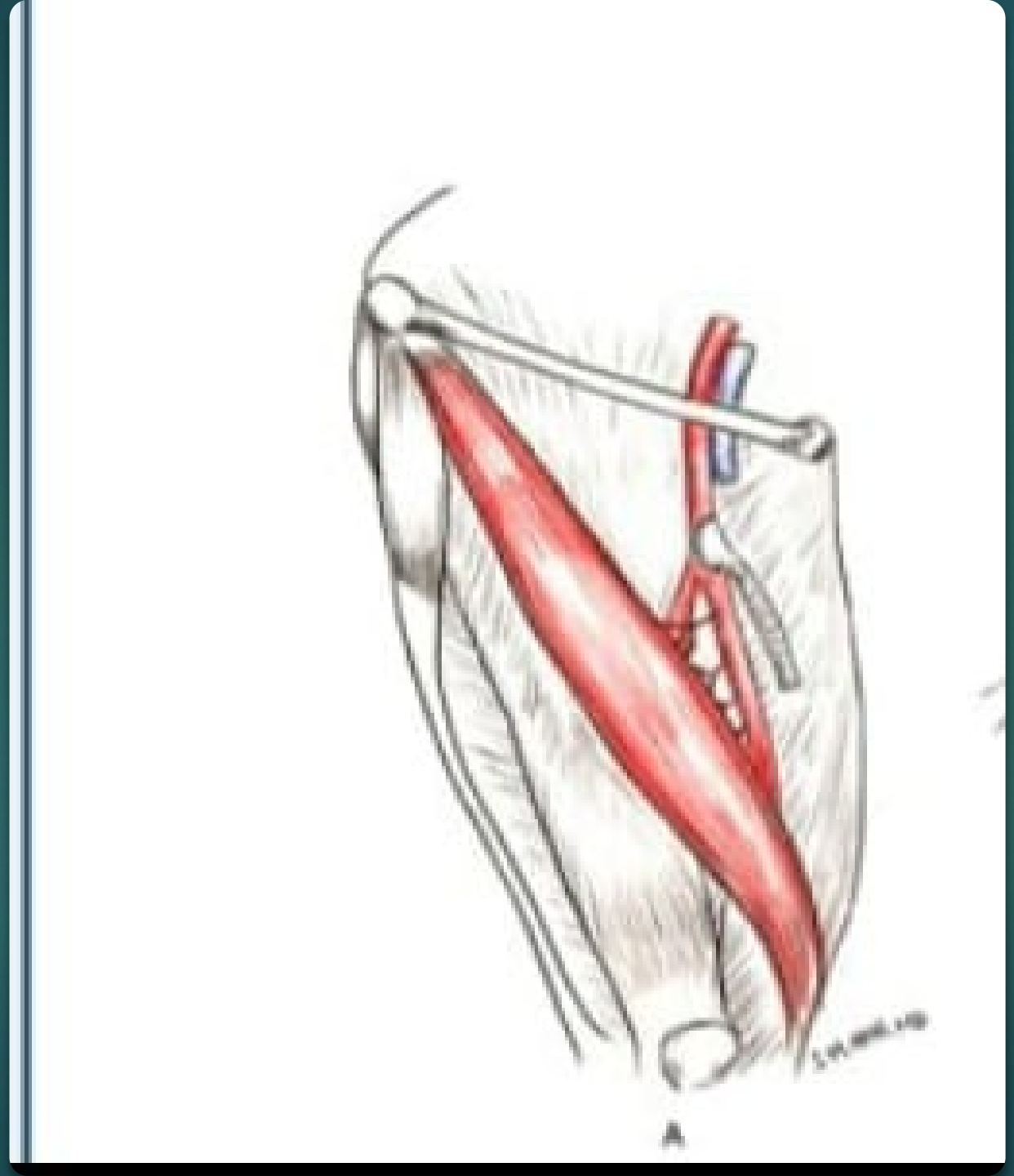






Sartorius Muscle Flaps for Vascular Groin Wound Complications . M. Brewer, Christian J Ochoa, V. Rowe

Published in The American surgeon 1 November 2015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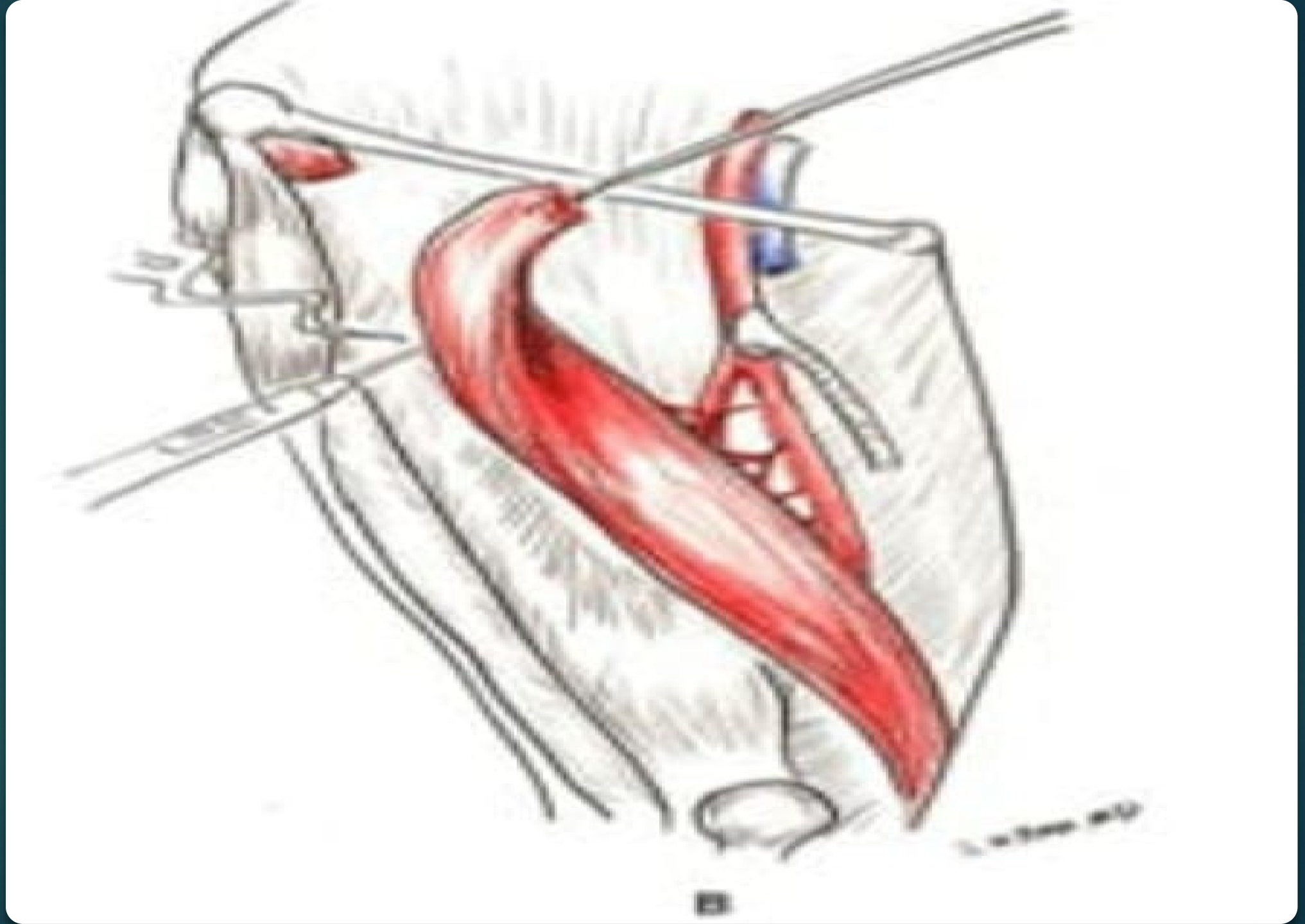

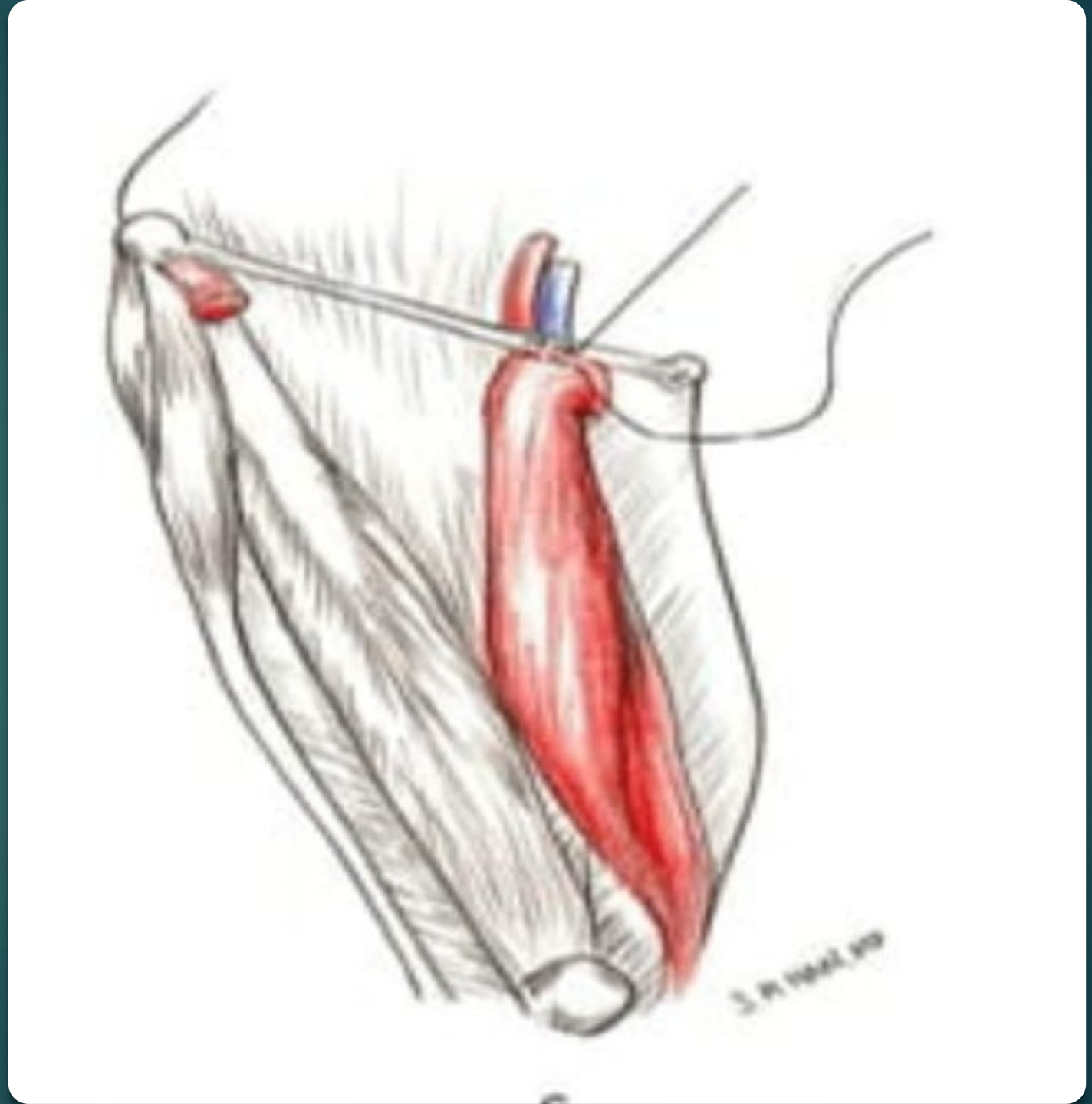

Results:

- Following the sartorius muscle flap procedures, **all patients achieved complete wound healing.** Primary wound closure was successfully attained in all cases, with an average healing duration of one month.

Recommendation 53

For patients with a peripheral vascular graft/endograft infection and a large tissue defect, muscle or musculocutaneous flaps should be considered to promote groin healing following graft removal and debridement with or without vascular reconstruction.

Class	Level	References
IIa	B	McMillan *et al.* (2012),[237] Brewer *et al.* (2015),[238] Mirzabeigi *et al.* (2017),[244] Dua *et al.* (2018)[246]

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TAKE HOME MESSAGE

- The **MAGIC criteria** consist of **clinical/surgical, radiologic, and laboratory criteria for diagnosis** .

- According to these criteria, a VGEI is diagnosed by the presence of **a single major criterion** along with **any other criterion (major or minor) from another category**

- A structured ***diagnostic, antibiotic, and surgical treatment algorithm*** helps clinical decision making and ultimately aims to improve the clinical outcome of patients with a **VGEI.**

- The use of **sartorius muscle flaps** by **vascular surgeons** can aid in the healing of infected groin wounds while preserving graft patency and ensuring limb salvage.

Thank You.!