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# Clinical Studies Reporting on Vascular Graft Coatings for the Prevention of Aortic Graft Infection: A Systematic Review and Meta-Analysis

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## Introduction

- Incidence of vascular graft infection (VGI) is **low**:

1,6%

3,6%

4,5%

2y

- Mortality after VGI = **high** (50%)

**PREVENTION**

SYSTEMATIC REVIEW

## Pre-clinical *In Vitro* Models of Vascular Graft Coating in the Prevention of Vascular Graft Infection: A Systematic Review

Hozan Mufty <sup>a,b,\*</sup>, Jef Van Den Eynde <sup>a,b</sup>, Bart Meuris <sup>b,c</sup>, Willem-Jan Metsemakers <sup>d</sup>, Eric Van Wijngaerden <sup>e</sup>, Thomas Vandendriessche <sup>f</sup>, Hans P. Steenackers <sup>g</sup>, Inge Fourneau <sup>a,b</sup>

Vascular Infection

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SYSTEMATIC REVIEW

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## Our aim...

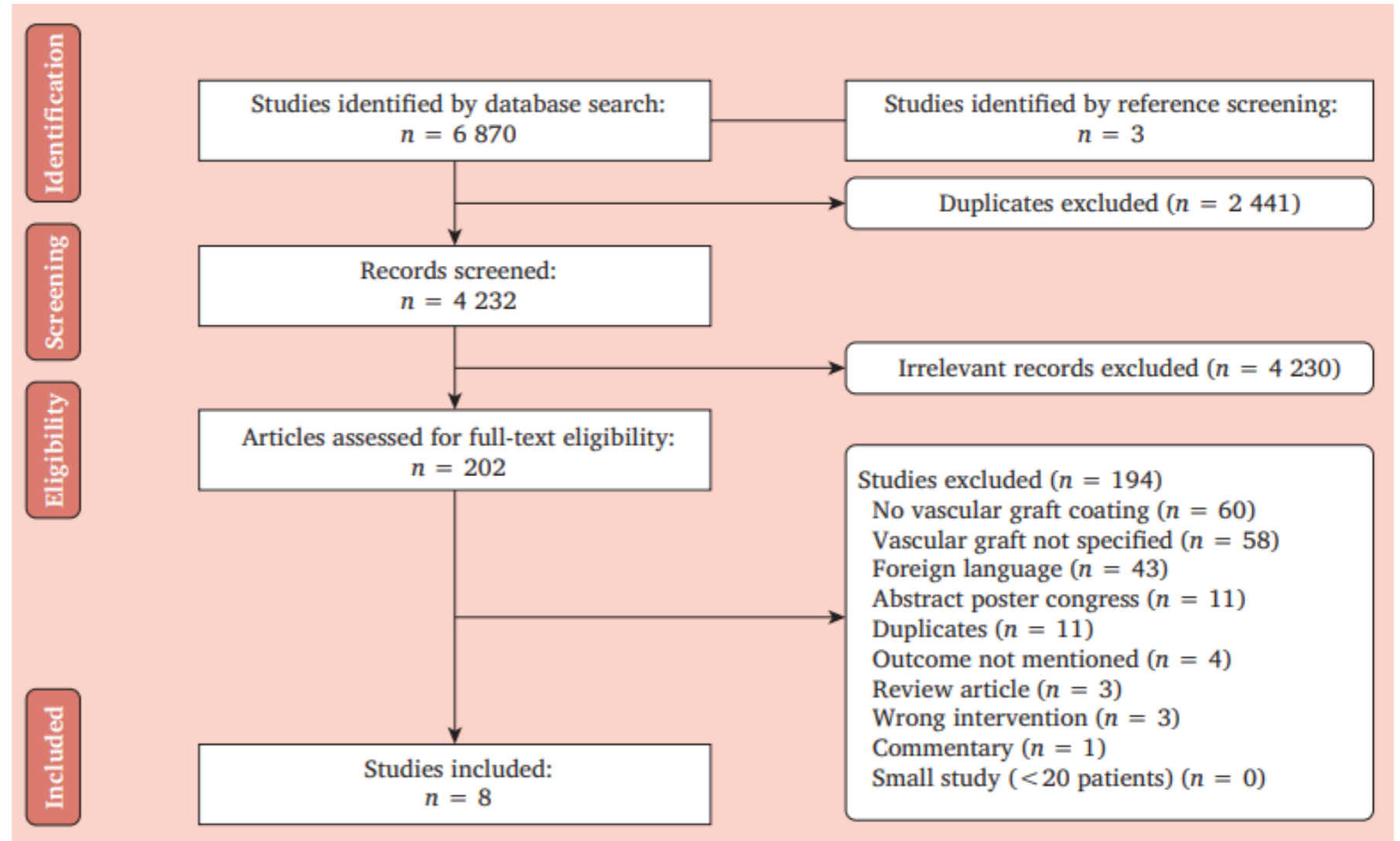
To give an overview of the different clinical vascular coatings published with a focus on grafts in the aorto-femoral and aorto-iliac position.

# Systematic search

- Medline (Via Pubmed)
- Embase
- Web Of Science
- Cochrane Library

Registered in PROSPERO: **CRD42020206436**

# PRISMA flow diagram



## 3 groups

- 1/ Silver coated grafts
- 2/ Antibiotic soaked grafts
- 3/ Polymer coated grafts

# 1/ Silver coated grafts (N= 776)

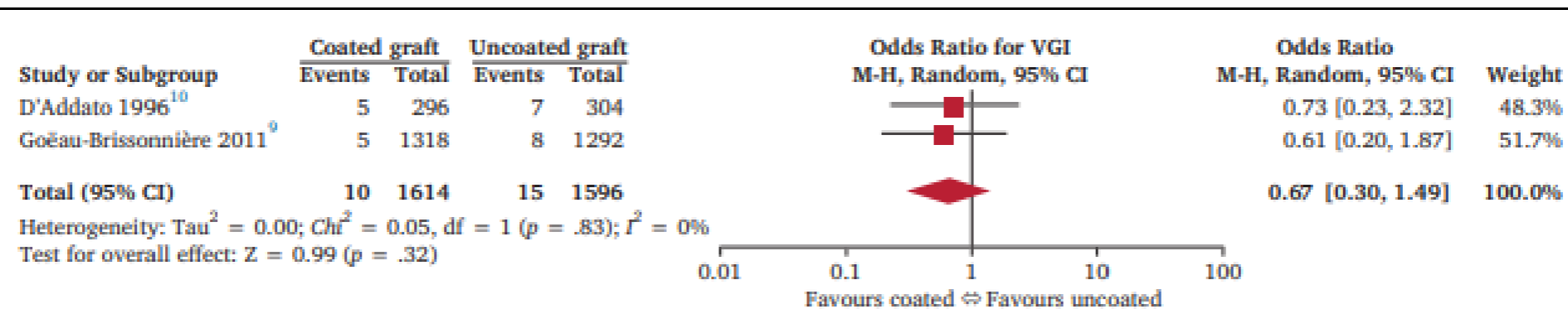
- Silver graft (Braun); 1 study (N=220)
- Intergard Silver (Maquet); 2 studies (N=456)

Author	Infection Szilagyi III		significance	graft
	With coating	Without coating		
Zegelman et al.	After mean 15.6 +/- 8.3 m: 2.6% (N=2)			Silver graft
Larena-Avellaneda et al.	After mean 56.7 months: 0.8% (N=1)	After mean 56.7 months: 4.1% (N=6)	<b>P=0,13</b>	Intergard silver
Ricco et al.	1y: 0.69% (N=2)			



## 2/ Antibiotic coated grafts (N= 3210)

- Rifampicin (1mg/ml soaked for 15 min)
- 2 RCT



**Figure 2.** Forest plot presenting the association between rifampicin coating and early two month vascular graft infection (VGI) in an aortic position in two included studies. CI = confidence interval; M-H = Mantel-Haenszel.

- **Neomycin/bacitracin**
- Added to 150ml blood for preclotting
- N= 86
- No VGI at 2y

## 3/ Polymer coatings (N= 52)

- 2 studies

Author	coating	1ary Patency		Infection Szilagyi III		Survival	
		With coating	Without coating	With coating	Without coating	With coating	Without coating
<b>Björck et al.</b>	Silicon elastomer coating	30d: 50% 1y:42.9% 2y:39.3%		10.7% (N=3)		30d: 78.6% 1y: 75%	
<b>Halloul et al.</b>	Degradable and absorbable polymer plend	30d: 77.3%		0		8.3% (N=3) in hospital death	

## Conclusion

- Clinical studies reporting on antibacterial effect of VGC to prevent VGI are **scarce**
- Majority studies are based on **antibiotic soaking** and **prefabricated silver**
- This uses an active release system which is only active in the **short term**
- **New and long acting** coating strategies are mandatory

# Thank you

## SYSTEMATIC REVIEW

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#### WHAT THIS PAPER ADDS

A high mortality rate makes aortic vascular graft infection a feared complication after aortic surgery. Every measure should be taken to reduce this risk. Many vascular graft coatings have been studied in preclinical studies; only a few are used in the clinic. This systematic review with meta-analysis summarises the effect and benefit of all available clinical vascular graft coatings that can be used in the prevention of aortic vascular graft infection. The current available antibacterial coatings (silver and antibiotics) are not capable of preventing graft infection.

**Objective:** The aim of this study was to investigate the efficacy of vascular graft coatings used in the aortic position to prevent vascular graft infection (VGI).

**Methods:** A systematic review was conducted in accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines using a pre-registered protocol (CRD42020206436). Eligible studies used a vascular graft coating in the aortic position and reported on VGI. A search was performed in MEDLINE (PubMed), Embase, Web of Science, and the Cochrane Library. Primary outcome parameters were VGI, patency, and mortality. Pooled estimates of VGI were calculated using odds ratio (OR) and 95% confidence intervals (CIs) wherever possible. Quality assessment was performed with the Newcastle–Ottawa Assessment Scale and the Revised Cochrane risk of bias tool for randomised trials.

**Results:** In total, 6 873 papers were identified. Only eight studies were included. Six of eight studies (75%) reported on known antimicrobial coating strategies such as antibiotics ( $n = 3$ ) and silver ( $n = 3$ ). In the other two studies, polymer coated grafts were used. Only three of eight studies compared coated with uncoated grafts (two antibiotic and one silver). Two randomised controlled trials reported on the effect of rifampicin soaked (1 mg/mL) grafts and showed no significant effect in the early (2 months; OR 0.69, 95% CI 0.29 – 1.62) or late (2 years; OR 0.73, 95% CI 0.23 – 2.32) post-operative periods. A retrospective cohort study focusing on the effect of silver coated grafts did not reveal any advantage (OR 0.19, 95% CI 0.02 – 1.64). Two polymer coated grafts were not considered to have a potential benefit in the prevention of VGIs.

**Conclusion:** Clinical studies reporting on the antibacterial effect of vascular graft coatings in the aortic position to prevent VGI are scarce. For silver and antibiotic coatings, no significant protection for VGI was observed. New types of grafts or long acting coating strategies are mandatory to prevent this complication in the future.

**Keywords:** Aorta, Coating, Infection, Prevention, Vascular graft

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