



Original article

Real-world use of Dalbavancin for vascular graft and Endograft infections

C. Leanza^{a,*}, M. Ascione^{b,a,1}, M. Carnevalini^a, F. Faccenna^b, F. Miceli^b, A. Di Girolamo^b,
L. Di Marzo^b, C. Mastroianni^a, W. Mansour^b, A. Oliva^a

^a Department of Public Health and Infectious Diseases, Sapienza University of Rome, Rome, Italy

^b Vascular and Endovascular Surgery Division, Department of General Surgery and Surgical Specialties, Policlinico Umberto I, "Sapienza" University of Rome, Rome, Italy

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ABSTRACT

Objective: To describe the clinical effectiveness and safety of dalbavancin (DAL) for the treatment of Vascular Graft and Endograft Infections (VGEI).

Methods: A retrospective, single-center observational study was conducted at a tertiary-care university hospital in Rome from January 2020 to December 2024, including all consecutive patients diagnosed with VGEI who received at least one dose of DAL. Cases were identified through the hospital electronic medical record database. VGEIs were diagnosed using MAGIC criteria. Primary outcomes were clinical and radiological response at the end of treatment (EOT) and at six-month follow-up.

Results: Thirteen patients were included (median age: 76 years; 92% of males; median Charlson Comorbidity Index 5). Aortic vessels were involved in 61.5% of cases, peripheral vessel in 38.5%. Microbiological identification was achieved in 84.6% of cases, with *Staphylococcus aureus* (MSSA and MRSA) being the most frequent pathogen. Surgical explant was performed in 53.8% of patients, predominantly for peripheral VGEIs. DAL was used to facilitate early discharge (69.2%) or as suppressive antibiotic therapy (30.8%). No adverse events related to DAL were reported. Clinical success was achieved in 84.6% of patients at EOT and maintained in 61.5% at six-month follow-up.

Conclusion: DAL appears to be an effective and well-tolerated option for the management of VGEI, particularly in frail patients or those not eligible for surgery, both to facilitate early discharge and as long-term suppressive antibiotic therapy (SAT). Further prospective studies are needed to confirm these findings.

1. Introduction

Vascular Graft and Endograft Infections (VGEI) are severe complications of vascular procedures, with an incidence ranging from 0.5% to 9% of implanted arterial grafts [1]. Management requires a multidisciplinary approach, typically combining graft explantation with prolonged antimicrobial therapy [2]. However, many patients are not surgical candidates due to significant comorbidities, and for these individuals suppressive antibiotic therapy (SAT) is often the only viable option [3,4]. Evidence regarding optimal SAT regimens, treatment duration, and follow-up strategies remains limited [5,6]. The ideal agent should be well tolerated, have good tissue penetration, and carry a low risk of drug-drug interactions—properties that are frequently lacking in conventional oral agents [7].

Dalbavancin (DAL) is a long-acting lipoglycopeptide antibiotic

approved for acute bacterial skin and soft tissue infections (ABSSSI) with potent in-vitro activity against Gram-positive pathogens, including methicillin-resistant strains [8].

Its extended half-life allows once-weekly or even less frequent dosing, making it particularly attractive for outpatient parenteral therapy and long-term SAT [9,10], and helps shorten hospitalization [11–12–13–14]. Despite these advantages, evidence supporting its use in VGEI remains limited [9–14].

The aim of this study was to describe the clinical effectiveness and safety of DAL in patients with VGEI.

2. Methods

This retrospective, single-center study included all consecutive patients diagnosed with VGEI and treated with a least one dose of DAL

* Corresponding author.

E-mail address: cristiana.leanza@uniroma1.it (C. Leanza).

¹ Authors equally contributed to the manuscript.

between January 2020 and December 2024 at a tertiary-care hospital in Rome. Patients were identified through electronic medical records using discharge codes and pharmacy dispensing records for DAL. No patients were excluded.

2.1. Vascular graft and Endograft infections

VGEIs were defined according to the MAGIC (Management of Aortic Graft Infection Collaboration) criteria [2] which integrate clinical, radiological, and microbiological findings into major and minor criteria to classify infections as “definite” or “suspected”. Major criteria include intraoperative evidence of pus around the graft; exposed graft through a wound or sinus tract; enteric or bronchial fistulae; microbiological confirmation from explanted grafts or perigraft aspirates; perigraft fluid persisting beyond three months; perigraft gas beyond seven weeks; or increasing perigraft gas on serial imaging. Minor criteria include local signs of infection (erythema, swelling, pain, discharge); systemic inflammatory response without an alternative source; and imaging findings suggestive but not definitive for infection (perigraft soft tissue changes, pseudo-aneurysm, increased FDG-PET/CT uptake). According to the MAGIC definition, vascular graft infection is classified as suspected in the presence of at least one major or two minor criteria from different categories, and as definite when at least one major criterion plus any other criterion (major or minor) from another category is present.

It should be noted that MAGIC criteria have lower specificity for peripheral graft infections [15].

2.2. Microbiological analyses

Bacterial identification was performed by MALDI-TOF MS (Bruker Daltonik GmbH, Bremen, Germany). Antimicrobial susceptibility testing was performed using Vitek 2 (bioMérieux, Marcy l'Etoile, France) and MicroScan Walkaway (Beckman and Coulter, Brea, CA, USA). Coagulase-negative Staphylococci and *Corynebacterium* spp. were considered pathogens only if isolated from two or more independent samples.

2.3. Outcomes

Primary outcomes were clinical and radiological response at EOT and at six-month follow-up. Clinical success was defined as the resolution or improvement of symptoms and normalization of inflammatory markers (C-reactive protein, procalcitonin). Radiological success was defined as resolution of imaging signs of infection. Treatment failure was defined as infection recurrence, need for re-intervention at the graft site, or infection-related death. Safety was assessed by recording all adverse events attributed to DAL throughout the follow-up period.

2.4. Statistical analyses

Continuous variables are presented as medians with interquartile ranges (IQR); categorical variables as frequencies and percentages. Between-group comparisons used the Mann-Whitney *U* test and Fisher's exact test or chi-square test, as appropriate. All statistical analyses were performed using STATA TM software, v. 18 (StataCorp) and Graphpad Prism™.

2.5. Ethics

The study was conducted in accordance with the principles of the Declaration of Helsinki and approved by the local Ethics Committee (0341/2023). The clinical and diagnostic management of the patients was carried out according to normal clinical practice.

3. Results

Thirteen patients were included (Table 1). Median age was 76 years (range 68–79), 12 were males (92%). Median Charlson Comorbidity Index (CCI) Index was 5 [4–6]. Primary endovascular procedure was carried out in nine patients (69.2%), including aortic endoprosthesis implantation in seven patients (53.8%) and peripheral vessel grafting in two (15.3%). Primary open surgery was performed in four patients (30.7%), all involving heterologous grafts, of which three were synthetic (23%) and one was biological (7.6%). Additionally, two patients (15.3%) underwent an initial hybrid procedure. Surgery had been performed as an emergency in five patients (38.4%). No patient developed post-operative infectious complications following the initial surgery.

Aortic vessels were involved in eight patients (61.5%), and peripheral vessels in five (38.5%, one superficial femoral artery, three common femoral arteries, and one popliteal artery). MAGIC [2] criteria classified 10 cases as definite (76.9%) and three as suspected (23.1%). Median time from primary surgery to VGEI diagnosis was 120 days (range 0–1095).

Microbiological identification was achieved in 11 patients (84.6%). Blood cultures were positive in five patients (38.5%), intraoperative samples in five (38.5%), and percutaneous drainage cultures in three (23.1%); in two patients the same pathogen was isolated from more than one sample type. The most common pathogen was *S. aureus* (methicillin-susceptible *S. aureus*, MSSA, *n* = 2, 15.4% and methicillin-resistant *S. aureus*, MRSA, *n* = 1, 7.7%). Other causative agents included methicillin-resistant *S. warneri*, *Winkia neuvi*, *Corynebacterium striatum*, *Enterococcus faecalis*, *Streptococcus sanguinis*, and *Staphylococcus lugdunensis* (one case each, 7.7%). Two infections (15.4%) were polymicrobial (*Listeria monocytogenes* and methicillin-resistant *S. epidermidis*; *E. faecalis* and MRSA). Two patients (15.4%) remained culture negative.

Surgical explant was performed in seven patients (53.8%), more frequently for peripheral than aortic VGEI (*n* = 5/5, 100% versus *n* = 2/8, 25%). All explanted patients received a heterologous graft: bovine pericardium in five (38.4%), rifampin-impregnated Dacron prosthesis in two (22.2%).

All patients received prior intravenous antibiotics (median 21.5 days, 14–42). DAL was used to facilitate early hospital discharge in nine patients (69.2%) and as SAT in four patients (30.8%), including one as a bridge to surgery. In one patient, SAT with DAL was still ongoing at the time of analysis. Three dosing regimens were used: a single 1500 mg dose in two patients (15.3%); 1500 mg on Day 1 and Day 8 in seven patients (53.8%); and 1500 mg on Day 1 and Day 8 followed by 1500 mg every 4 weeks (range 5–22 total administrations) in four patients (30.7%). DAL was administered in combination with other antibiotics in 10 patients (76.9%).

3.1. Outcomes

Clinical success at EOT was achieved in 11 patients (84.6%), with one patient not assessable due to ongoing therapy and one patient with aortic vessel infection experiencing clinical failure (7.6%) due to a new VGEI caused by a different pathogen (vancomycin-resistant *Enterococcus faecium* and KPC-producing *K. pneumoniae*).

At six-month follow-up, clinical success was maintained in eight patients (61.5%). The remaining five patients could not be evaluated: one was still on treatment, two were lost to follow-up, and two died from another cause than an infective one. Radiological success was observed in eight patients (61.5%), while in the remaining five patients imaging was not performed. Two patients (15.3%) died due to non-infectious causes. The median follow-up was 12.5 months (range 9.5–17.5). No adverse events related to DAL were reported.

Table 1

Clinical characteristics, treatment schemes, and outcome of vascular graft endograft infection treated with dalbavancin.

	Total n = 13
Age at VGEI, years, median (IQR)	76 (68–79)
Sex (male), n (%)	12 (92)
CCI, median (IQR)	5 (4–6)
Previous vascular surgery	
Previous vascular surgery in another hospital, n (%)	7 (53.8)
Elective intervention, n (%)	8 (61.5)
Emergency intervention, n (%)	5 (38.4)
Days from first surgery to diagnosis of VGEI, days, median (IQR)	120 (0–1095)
Type of previous surgery	
Implant of endoprosthesis, n (%)	9 (69.2)
Implant of heterologous biological graft, n (%)	1 (7.6)
Implant of heterologous synthetic graft, n (%)	3 (23.0)
MAGIC criteria	
Diagnostic, n (%)	10 (76.9)
Suspected, n (%)	3 (23.1)
Type of VGEI	
Aortic vessel, n (%)	8 (61.5)
Peripheral vessel, n (%)	5 (38.5)
Microbiology	
Microbiological identification, n (%)	11 (84.6)
Blood culture, n (%)	5 (38.4)*
Periprosthetic drainage culture, n (%)	5 (38.4)*
Intraoperative sample culture, n (%)	3 (23)*
Negative culture, n (%)	2 (15.3)
Surgical Treatment for VGEI	
Explant of infected graft	7 (53.8)
Re-Implant of heterologous biological graft, n (%)	5 (38.4)
Re-Implant of heterologous synthetic graft, n (%)	2 (15.3)
Bridging procedure, n (%)	2 (15.3)
Elective intervention, n (%)	7 (53.8)
Emergency intervention, n (%)	2 (15.3)
Antibiotic treatment for VGEI	
Duration of antibiotics prior to DAL, days, median (IQR)	21.5 (14–42)
Number of DAL 1500 mg doses administered, median (IQR)	2 (1.7–2.7)
DAL in combination therapy, n (%)	10 (76.9)
Reasons for DAL usage	
Hospital discharge, n (%)	9 (69.2)
SAT, n (%)	4 (30.8)
Outcomes	
Clinical success at end of treatment**, n (%)	11 (84.6) [°]
Clinical success at six months follow-up**, n (%)	8 (61.5) [§]
Failure ^{§§} , n (%)	1 (7.6)
Radiological success**, n (%)	8 (61.5)
Death	2 (15.3) ***
Duration of follow-up after VGEI, months, median (IQR)	12.5 (9.5–17.5)

CCI, Charlson comorbidity index; DAL, dalbavancin; VGEI, vascular graft endograft infection; SAT: suppressive antibiotic therapy.

[°]In one case clinical success at the end of treatment was not available, therapy is still ongoing.

* In two cases, growth of the same pathogen coexisted in different samples.

** Clinical success was defined as the resolution/improvement of symptoms and laboratory testing at the end of treatment, when feasible, or at the end of a six-month follow-up. Radiological success was defined as resolution of signs of infection in imaging at the end of treatment and at the end of a six-month follow-up.

*** Death for non-infectious causes.

[§] In four patients, clinical success at six months follow-up was not available (two were lost to follow-up, one therapy still ongoing, one death occurred before follow-up started).

^{§§} Failure was considered if any of the following occurred during the follow-up period: i) re-intervention at the vascular graft, ii) infection recurrence or newly diagnosed infection, and iii) infection-related death.

3.2. Description of cases

3.2.1. Aortic graft infections (Cases #1–8)

Eight patients had infections involving either abdominal (cases #1–4,6–7) or thoracic aortic endografts (case #5) or Bentall prostheses (case #8). Pathogens identified were as follows: *Listeria monocytogenes* and MRSE (case #1), methicillin-resistant *Staphylococcus warneri* (case #3), *Winkia neuvi* (case #4), *Corynebacterium striatum* (case #5), *Enterococcus faecalis* and MRSA (case #6), *E. faecalis* (case #7), and *Streptococcus sanguinis* (case #8). In one case, cultures were negative (case #2). All patients had received prior intravenous broad-spectrum or targeted antimicrobial therapy. DAL was administered mostly in combination (cases #1–4,6–8) with oral regimens including amoxicillin, amoxicillin/clavulanic acid, trimethoprim/sulfamethoxazole, moxifloxacin, doxycycline, or minocycline. DAL used as early discharge (cases #1–3,8), bridging to surgery (case #4), or long-term suppressive therapy (cases #5–7). Heterologous graft was replaced with bovine pericardium or prosthetic material in selected cases (cases #1–3,5,8) (Table S1).

3.2.2. Peripheral vascular graft infections (Cases #9–13)

Five patients had infections involving femoral (cases #9–11, 13) or popliteal (case #12) artery grafts or patches. Pathogens identified were as follows: *Staphylococcus lugdunensis* (case #9), MSSA (cases #10,12), methicillin-resistant *S. epidermidis* (case #11), and one culture-negative case (case #13). All patients had been treated with intravenous broad-spectrum or targeted antimicrobial regimens prior to DAL, which was administered mostly in combination (cases #10–13). Combined oral regimens included amoxicillin (case #10), amoxicillin/clavulanic acid (case #13), and minocycline (cases #11–12). Heterologous graft was replaced by bovine pericardium (cases #9–10) or rifampin-impregnated Dacron grafts (cases #11–13) in selected cases (Table S1).

4. Discussion

This study provides real-world evidence supporting the use of DAL in VGEI, a clinical setting in which therapeutic options remain limited. Our findings suggest that DAL is an effective and well-tolerated treatment, with high clinical success rates at the end of treatment and at six-month follow-up. The study population was mainly composed of elderly patients with multiple comorbidities, reflecting the complexity of VGEI management in clinical practice.

Identifying the etiologic agent is crucial for selecting the appropriate treatment strategy [16]. In our case series, microbiological diagnosis was achieved in 84.6% of cases, with a notable rate of positive blood cultures, underscoring the importance of performing blood cultures in all suspected VGEI cases, including those presenting with subtle symptoms. Only two patients (15.4%) had a polymicrobial infection, both involving endovascular aneurysm repair (EVAR) of aortic vessels (subrenal abdominal aorta), a percentage lower than previously described, where authors found polymicrobial infections in approximately 39% of patients [17].

In our study, a significant proportion of patients underwent explant of the infected graft, which remains the cornerstone of treatment, when feasible. Removal of the infected graft has been associated with a longer infection-free survival [18].

DAL was primarily used to facilitate early discharge, confirming its practical role in reducing prolonged hospitalization and its associated risks in frail patients. It was also used as SAT in patients unfit for surgical graft removal, a setting in which conventional options are limited by toxicity, drug-drug interactions, and compliance challenges. Compared with agents such as linezolid, trimethoprim/sulfamethoxazole, or vancomycin, DAL avoids myelotoxicity and the need for therapeutic drug monitoring, while its infrequent dosing schedule supports compliance [19].

In our cohort, DAL was frequently administered in combination with

other antibiotics, which represents an important limitation of the present analysis, as it precludes attribution of clinical outcomes solely to DAL. This approach differs from a recent study in which DAL was more commonly used as monotherapy [13]; however, it is consistent with the experience reported by Ruiz-Sancho et al., who described DAL-based SAT in eight patients with vascular and joint prosthetic infections not undergoing surgical treatment, finding that DAL was combined with other agents—most notably rifampicin—in 80% of aortic cases ($n = 5$), with high success rates [12].

A key challenge in the off-label use of DAL is selecting the appropriate dosing regimen, particularly for long-term SAT. A recent position paper proposed a structured approach: for treatment durations up to six weeks, a total of 3000 mg (1500 mg on Day 1 and Day 8 or 15) is recommended; for durations exceeding six weeks, dosing should be guided by therapeutic drug monitoring where available, or follow fixed extended regimens (1500 mg on Day 1/8 or 1/15, with an additional dose on Day 43) to provide 12 weeks of coverage [20]. Notably, no recommendations exist for treatment durations beyond 12 weeks—a scenario that is not uncommon in VGEI managed conservatively. In our center, therapeutic drug monitoring is unavailable; dosing was therefore standardized as 1500 mg on Day 1 and Day 8, followed by 1500 mg every four weeks when continued. Prospective studies addressing DAL dosing optimization in this setting are surely warranted.

The optimal duration of antibiotic therapy in VGEI remains poorly defined [2]. Following graft explantation, 6 weeks of treatment is generally accepted, though evidence supporting this practice is limited and no consensus exists regarding peripheral versus aortic infections or the type of replacement material used. In clinical practice, duration is often guided by inflammatory marker trends and follow-up imaging, particularly FDG-PET/CT, which plays a central role in monitoring treatment response [21]. However, normalization of both markers and imaging does not preclude recurrence, as biofilm persistence on residual or replacement material may sustain infection. In this context, DAL's documented anti-biofilm activity, potentiated by combination with rifampicin provides a further rationale for its use in VGEI, both for early discharge and long-term suppression.

This study has several limitations. First, the small sample size limits the statistical power and generalizability of findings. Second, the retrospective and non-comparative design prevents definitive conclusions regarding efficacy. Third, the heterogeneity of treatment regimens and follow-up further complicates interpretation of the results. Fourth, the absence of therapeutic drug monitoring precluded individualized dosing. Fifth, long-term follow-up (beyond 12 months) was incomplete in several patients.

In conclusion, DAL appears to be an effective and well-tolerated option for the management of VGEI, particularly in frail patients, those not eligible for surgery, or those with methicillin-resistant infections, facilitating both early discharge and long-term suppressive antimicrobial therapy. Prospective multicenter studies are warranted to confirm these findings and to define optimal dosing strategies, particularly for SAT exceeding 12 weeks.

CRedit authorship contribution statement

C. Leanza: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft. **M. Ascione:** Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft. **M. Carnevalini:** Investigation, Data curation, Validation. **F. Faccenna:** Investigation, Data curation, Validation. **F. Miceli:** Investigation, Data curation, Validation. **A. Di Girolamo:** Investigation, Data curation, Validation. **L. Di Marzo:** Investigation, Data curation, Validation. **C. Mastroianni:** Supervision, Resources, Writing – review & editing. **W. Mansour:** Formal analysis, Methodology, Writing – review & editing. **A. Oliva:** Conceptualization, Supervision, Project administration, Writing – review & editing.

Declaration of competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.idnow.2026.105313>.

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