Aortic Graft Infections Caused by *Propionibacterium acnes* at the Minneapolis Veterans Affairs Health Care System (MVAHCS) 2007 – 2017

Abdelghani El Rafei, MD[1], Dimitri Drekonja, MD, MS[1,2].

[1]*Department of Medicine, University of Minnesota, Minneapolis, Minnesota, USA.* [2]*Division of Infectious Diseases, Department of Medicine, Minneapolis Veterans Affairs Health Care System, Minneapolis, Minnesota, USA*

Background

- *Propionibacterium acnes* (recently renamed *Cutibacterium acnes*) is a gram positive microaerophilic organism that is known primarily as a commensal skin organism[1]
- *P. acnes* biofilm hardware infections have been increasingly recognized, particularly in prosthetic joints and cardiac devices[2].
- Aortic graft infection (AGI) is a life threatening infection with significant morbidity and mortality [3]. To date there have been a handful of case reports of describing *P. acnes* AGI.

Methods

- Microbiology laboratory records at the Minneapolis Veterans Affairs Health Care System were reviewed to identify all *P. acnes* cultures from January 2007 to January 2017.
- We retrospectively reviewed all adult (≥18 years) patient's medical records to identify associated infectious syndromes.
- Case definitions by the management of Aortic Graft Infection Collaboration were used to classify aortic graft infection cases[3].

Results

- We identified 328 positive *P. acnes* cultures. *P. acnes* was classified as a pathogen in 48 (15%), a pathogen of undetermined significance in 70 (21%), and a contaminant in 210 (64%) cases.
- Infections caused by *P. acnes* are described in figure (1). We identified 3 cases AGI which accounted for (2.5%) of infections caused by *P. acnes*. Demographics, clinical presentation , management of cases are described in table (1).
- No relapses were documented and survival was 100% at one year.

Table 1: Demographics, Clinical presentation, and management of Aortic Graft Infections Caused by *Propionibacterium acnes*

Age/Sex	Comorbidities (CCI)	Graft site (type of placement)	Total revision prior to infections (type of procedure)	Symptoms on presentation (WBC, CRP)	Time to diagnoses from symptom onset	Imaging modality	Culture results (Blood/percutaneous aspirate/Graft)	Antibiotic Therapy In hospital/lifelong suppressive	Treatment/Outcome (follow up months)
76/M	Dementia, Immunosuppressive therapy (4)	Intraabdominal (Endovascular)	1 (coil embolization)	Pain, Fever, AMS (10, 106)	78	CT scan PET scan Tagged WBC scan	$B^{2/8}/P^{+}/G^{+}$	Ceftriaxone/Amoxicillin + probenecid	Antibiotics only/cure (11)
83/M	CHF, PVD (6)	Intraabdominal (Endovascular)	3 (embolization of type 1 endoleak)	Pain, chills, fistula (+/+)	140	CT scan	$B^{+}/P^{+}/G^{2/3}$	Ceftriaxone	Surgical explanation/cure (12)
68/M	CVA (3)	Intraabdominal (Endovascular)	1 (embolization of type 2 endoleak)	Fever, Pain, weight loss (13, 41)	120	CT scan	$B^{0/8}/P^{1/2}/G^{0/?\ S+}$	Ceftriaxone/Amoxicillin	Surgical explanation/cure (12)

CCI= Charlson comorbidity index, WBC=white blood count, CRP=C-reactive protein, AMS=altered mental status, B=blood, P=percutaneous aspirate, G=aortic graft , S+ = Gram stain positive, #/#=number of positive blood cultures/number of cultures obtained.

Figure 1: Distribution of infections Cause by *Propionibacterium acnes* at the MVAHCS, 2007 – 2017

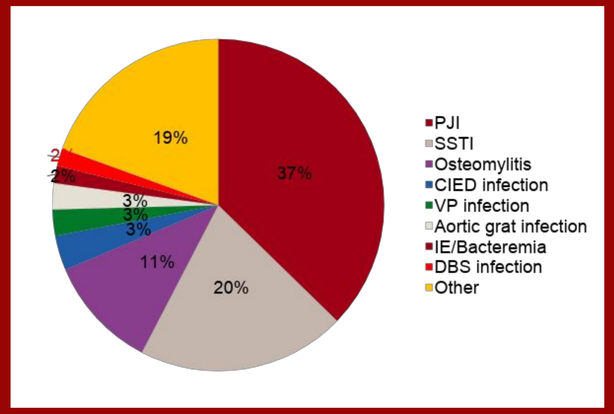

Table 2: Review of the literature of cases of Aortic Graft Infections Caused by *Propionibacterium acnes*

Study author (Year)	Number of Cases (type of graft)	Culture results (time to growth, days)	Revision prior to infection	Treatment/Outcome (follow up months)
Harlock, et al. (2013)	1 (Abdominal)	G (+)	Yes	Surgical explanation/cure (6)
Pineda, et al. (2016)	2 (Abdominal)	Case#1 G (6) Case #2 G (7)	No Yes	Surgical explanation/cure (+)
Ramos, et al. (2016)	2 (Thoracic)	Case #1 B (+) Case #2 G (+)	+ +	Antibiotics alone/cure (+) Surgical explanation/cure(+)
Etienne, et al. (2016)	1 (Abdominal)	B (+) / P /(+) / G (+)	Yes	Surgical explanation/cure (6)
Pallotto, et al. (2018)	1 (Abdominal)	G(4)	Yes	Surgical explanation/cure (6)

Discussion

- *P. acnes* can be difficult to isolate. Mean time to culture growth is 6.4, 6.1 and 10-14 days in aerobic, anaerobic blood cultures, and tissue cultures, respectively[2]. Time to culture growth in the majority of *P. acnes* AGI was 7 days. A prolonged cultivation time is necessary to diagnose *P. acnes* AGI.
- The majority of cases underwent coil embolization prior to infection (table 1-2). Palloto et al, theorized that *P. acnes* inoculation occurred during coil embolization with subsequent "early" infection.
- *P. acnes* is known for low virulence and prolonged incubation time[2]. Alternatively, *P. acnes* contamination may have occurred during graft placement and triggered by coil embolization. The mechanism of infection remains unclear.
- Compared to a large series published in 1991 by Brook, et al[1] rates of *P. acnes* isolated considered as pathogens didn't significantly differ in our series (12% vs 15%, respectively).

Conclusions

- *P. acnes* AGI is accounted for 2.5% of all infections caused by *P. acnes* during a 10 years study period. Infections are difficult to diagnose with multiple cultures and prolonged incubation periods prior to diagnosis. All cases occurred after coil embolization for endoleak. Outcomes were favorable with low mortality at 1 year.
- The distribution of infections caused by *P. acnes* was similar to prior case series.

References

1. Brook, et al. **Infections Caused by *Propionibacterium* Species.** Reviews of Infectious Diseases, Vol. 13, No. 5 (Sep. - Oct., 1991), pp. 819-822
2. Achermann, et al. ***Propionibacterium acnes*: from Commensal to Opportunistic Biofilm-Associated Implant Pathogen.** Clin Microbiol Rev. 2014 Jul; 27(3): 419–440.
3. Lyons, et al. **Diagnosis of Aortic Graft Infection: A Case Definition by the Management of Aortic Graft Infection Collaboration (MAGIC).** Eur J Vasc Endovasc Surg. 2016 Dec;52(6):758-763