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Introduction

- Foot and ankle infections are an extreme threat to morbidity and mortality in all populations so appropriate interventions must be made in a timely fashion to maximize recovery.
- There have been recommendations made regarding the protocol for lower extremity infection treatment.
- The goal of this study was to explore any relationships and patterns between infective anaerobic organisms and subsequent surgical outcomes and amputation level. If positive correlations are found, this could aid in determining goals for treatment of lower extremity infection and prevent major limb amputations.

Materials & Methods

- A random sample of 300 positive foot and ankle culture results were obtained from the Ascension Providence Hospital system for patients between 2014 and 2015; 82 positive anaerobic cultures were identified (Table 1).
- The depth of surgical intervention was determined for patients through extensive chart review.
- Surgical amputation level was divided into 6 categories (Table 2):
 - Irrigation and Debridement (I&D)
 - Digit
 - Metatarsal
 - Transmetatarsal
 - Chopart
 - Below Knee Amputation/Above Knee Amputation (BKA / AKA)
- Patient Demographics:
 - 158 patients
 - 94 male; 64 female
 - Peripheral vascular disease: 36
 - Diabetes: 104

Results



Figure 1. Types of amputations. Soft tissue gas in the dorsal foot (A) with subsequent intraoperative transmetatarsal amputation (B). Final radiograph of amputation (C). Example of Chopart amputation (D).

Table 1. Incidence of each bacterium in samples.

Bacterial species	Total (n=82)
<i>Peptostreptococcus sp</i>	33
<i>Bacteroides sp</i>	20
<i>Prevotella sp</i>	9
<i>Fusobacterium sp</i>	4
<i>Propionibacterium sp</i>	4
<i>Veillonella sp</i>	4
<i>Arcanobacterium sp</i>	2
<i>Actinomyces sp</i>	2
<i>Clostridium sp</i>	2
<i>Gemella sp</i>	2

Table 2. Prevalence of gas-forming bacteria based on the 6 levels of surgical intervention.

Bacterial species	I&D* (1)	Digit (2)	Metatarsal (3)	Transmetatarsal (4)	Chopart (5)	BKA/ AKA (6)
<i>Peptostreptococcus</i>	15	3	11	2	1	1
<i>Bacteroides</i>	10	0	9	0	1	0
<i>Prevotella</i>	3	1	2	1	2	0
<i>Clostridium</i>	1	0	1	0	0	0
<i>Fusobacterium</i>	2	0	2	0	0	0
<i>Propionibacterium</i>	2	0	1	1	0	0
<i>Gemella</i>	2	0	0	0	0	0
<i>Arcanobacterium</i>	2	0	0	0	0	0
<i>Actinomyces</i>	2	0	0	0	0	0
<i>Veillonella</i>	0	0	3	1	0	0

*I&D, irrigation and debridement; BKA/AKA, below knee amputation/above knee amputation

Results

- There were a total of 10 different species with *Peptostreptococcus sp* being the most common (Table 1).
- *Peptostreptococcus sp* also yielded the most proximal amputations (Table 2).
- Although less common, *Bacteroides sp* and *Prevotella sp* also grew in those patients with amputations proximal to the metatarsals (Table 2).

Conclusions

- Amputation prevention is of highest priority in limb salvage as there is a 50% mortality rate in 5 years after lower extremity amputation¹.
- The data in this study have categorized the types of organisms to show how particular anaerobic bacterial strains result in a more extensive surgical intervention. The standard of care for how lower extremity infections are treated could be enhanced by this study to prevent further infection and amputation.

Future Directions

- There are many future implications for the study including a larger sample size, correlating data with various comorbidities, as well as correlating aerobic bacteria with the level of surgical intervention.

References

1. Brucato et al. Diagnosis of Gas Gangrene: Does a Discrepancy Exist between the Published Data and Practice? J Foot Ankle Surg. 2014; 53(2):137-40.
2. Kensuke, Hiroyuki, Yoshihide and Sadaki. Clinical Features of Non-clostridial Gas Gangrene and Risk Factors for In-hospital Mortality. Department of Emergency and Critical Care Medicine, Tokai University of Medicine, Japan. 2015; 40(3):124-129.