



# Can a Diseased Heart Heal? A Retrospective Review of the Natural Progression of Cardiac Vegetation

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## Introduction

- Infective endocarditis (IE) is a complex endovascular infection with potentially life-threatening complications and a mortality of up to 40% despite advances in antimicrobial treatments
- The pathological hallmarks of IE are cardiac vegetations, however factors that affect initial vegetation size and changes in size on treatment, continue to remain unclear; also considerable debate regarding the prognostic implications of the initial size of vegetations
- **The purpose of our study was to assess the natural history of cardiac vegetations in Native Valve Infectious Endocarditis (NVIE) including changes in size and/or resolution with adequate treatment, as well as analyze factors that influence initial size and potential for persistence**

## Methods

- Retrospective review of 102 patients with a diagnosis NVIE at a community hospital from September 1, 2017 to June 31, 2019
- Patients were 18 years or older and completed an adequate course of antimicrobial therapy and had a follow up echocardiogram completed
- Exclusion criteria included individuals younger than 18 years of age, those with prosthetic-valve endocarditis, pregnant patients, prisoners and individuals with mortality <30 days from initial diagnosis
- Primary outcome measured was the change in vegetation size with treatment
- Secondary measures included pathogen identified, the type of valve involved, the number and type of complications, associated intravenous drug use and any co-infection with hepatitis B or C
- Patients who met eligibility criteria were identified via Electronic Health Record (EHR) and study variables including initial vegetation size, change in vegetation size on follow up echocardiogram, history of IV drug use, hepatitis B or C, valvular and embolic complications and 30-day mortality were extracted from the EHR
- Continuous variables were expressed as mean. Nominal values were expressed as numbers. Unless otherwise noted, the test used for significance was independent sample t-test. A value of  $p < 0.05$  was considered significant

## Results

- Out of 102 patient chart cases reviewed, 31 patients fulfilled all of the inclusion criteria
- Among the 31 patients, 18 were female and 13 were males. Mean Age was 51.16 years
- Primary results showed an initial mean vegetation size of 170.12 mm<sup>2</sup> (SD 212.63) upon initial echocardiography. The follow up size was 78.28 mm<sup>2</sup> (SD 146.27)
- There was a statistically significant relationship between antibiotic completion and reduction in vegetation size on follow up echocardiograms. (p-value 0.005 , 95% CI (30.13,153.55))

Figure 1

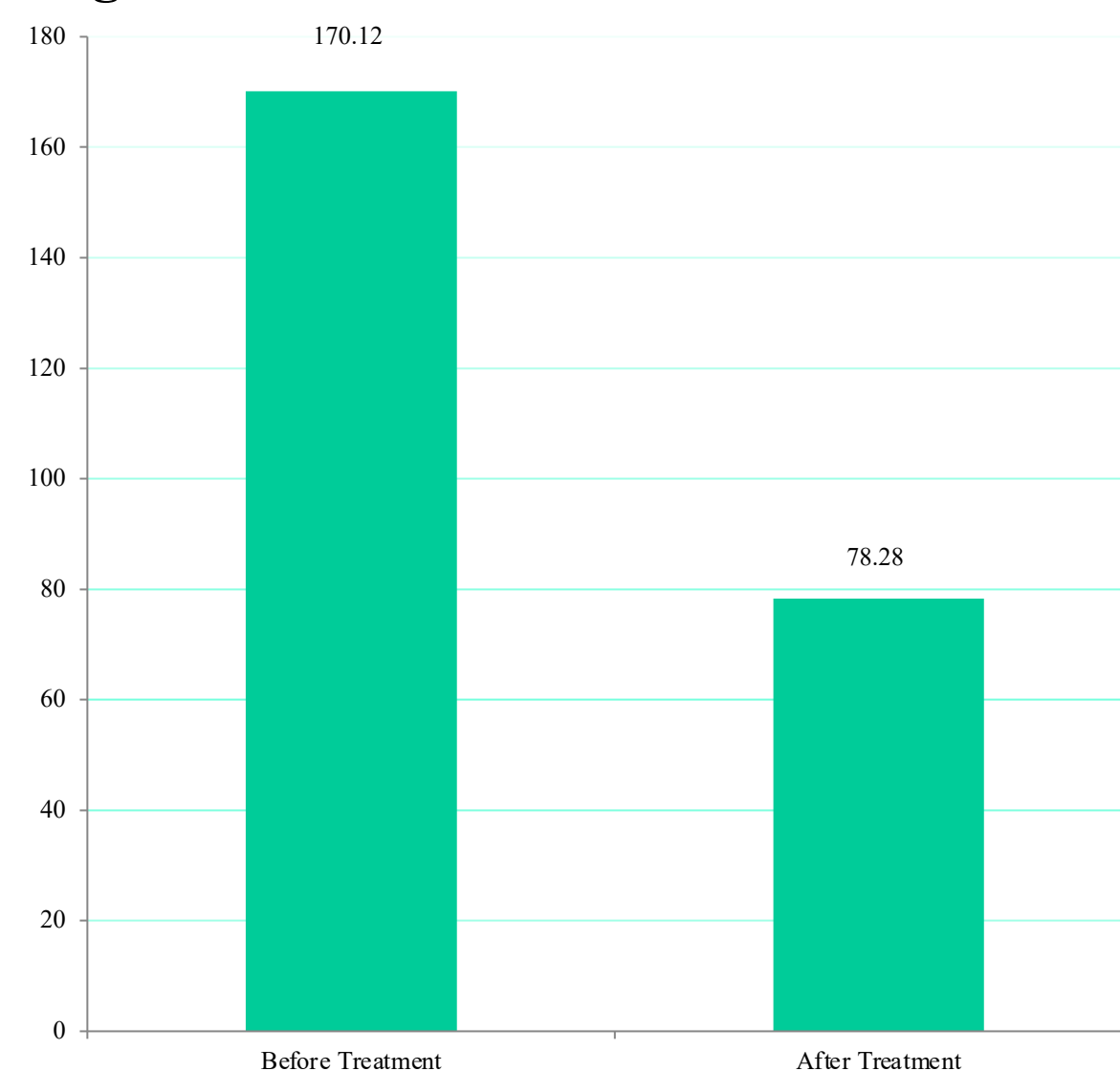
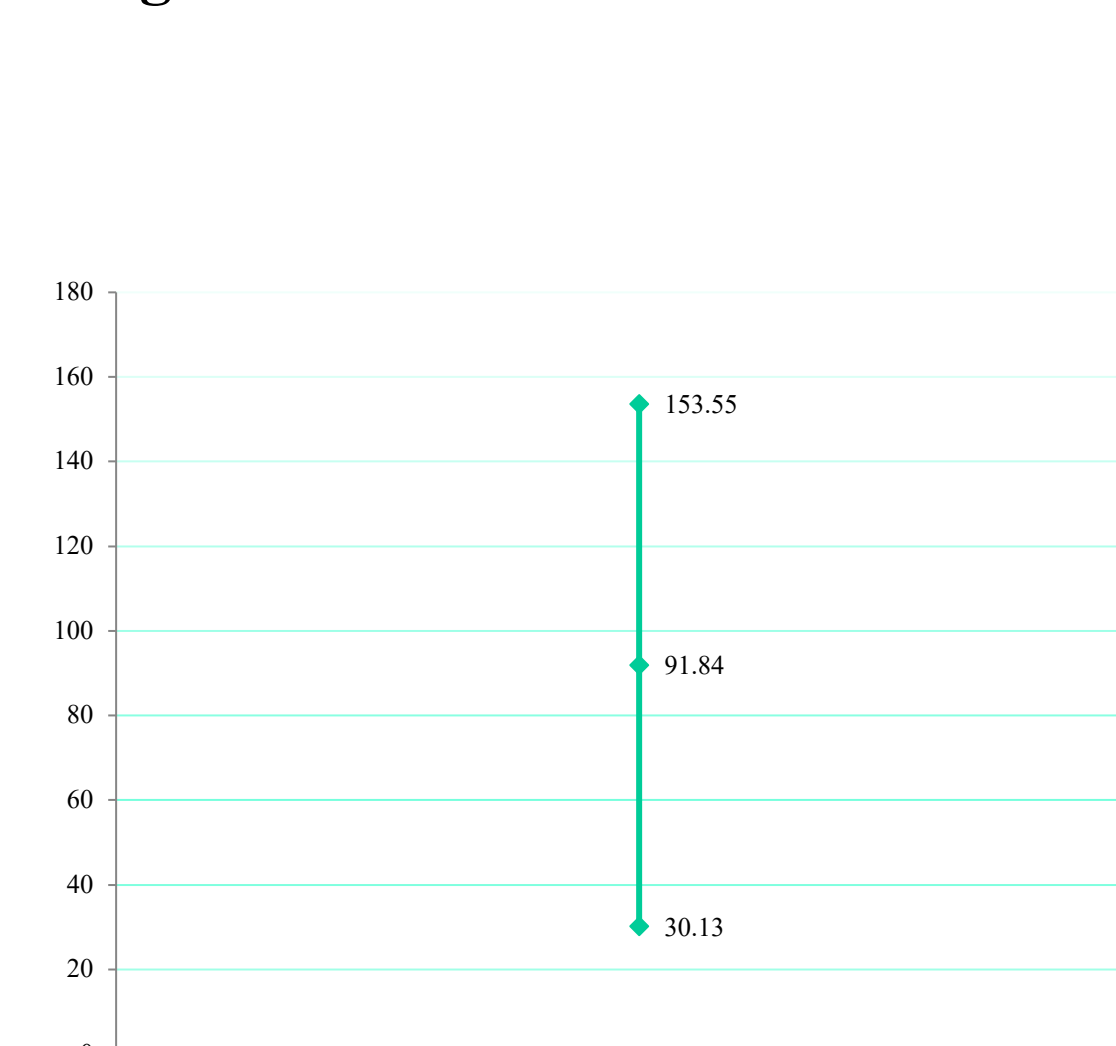


Figure 1: Mean size of vegetation on initial echocardiogram compared to follow up echocardiogram after treatment  
Figure 2: 95% Confidence Interval For Mean Change in Growth Size From Before and After Treatment

Figure 2



## Subgroup Analysis

- Initial size of vegetation was statistically significantly larger in injection drug users (n=11 , mean 311.47 mm<sup>2</sup> ) when compared to non IV drug users ( n=20 , mean 92.37 ) (p-value= 0.026)
- No significant relationship between initial vegetation size or change in size after treatment based on the history of hepatitis or type of valve involved

### Embolic Complications

- Patients who had embolic phenomena had significantly larger initial vegetations than those with no embolic complication (vegetation size 308.61 mm<sup>2</sup> vs 82.65 mm<sup>2</sup>, p-value 0.013)
- Patients with *Staphylococcus aureus* IE were more likely to have embolic complications

### Pathogen Analysis

- *Staphylococcus aureus* infection (MRSA and MSSA) had larger initial vegetation size compared to the other pathogens with a mean difference 224.98 mm<sup>2</sup> 95 % CI = [105.54,344.42] ( p = 0.001). (MSSA/MRSA group mean = 264.46 mm<sup>2</sup> vs other culture group mean = 39.48 mm<sup>2</sup>)
- *Staphylococcus aureus* group was also found to have statistically significant reduction in vegetation size with treatment follow up echocardiograms as compared to other group (mean difference 145.46 95% CI [44.49,246.43] p-value 0.007).

Figure 3

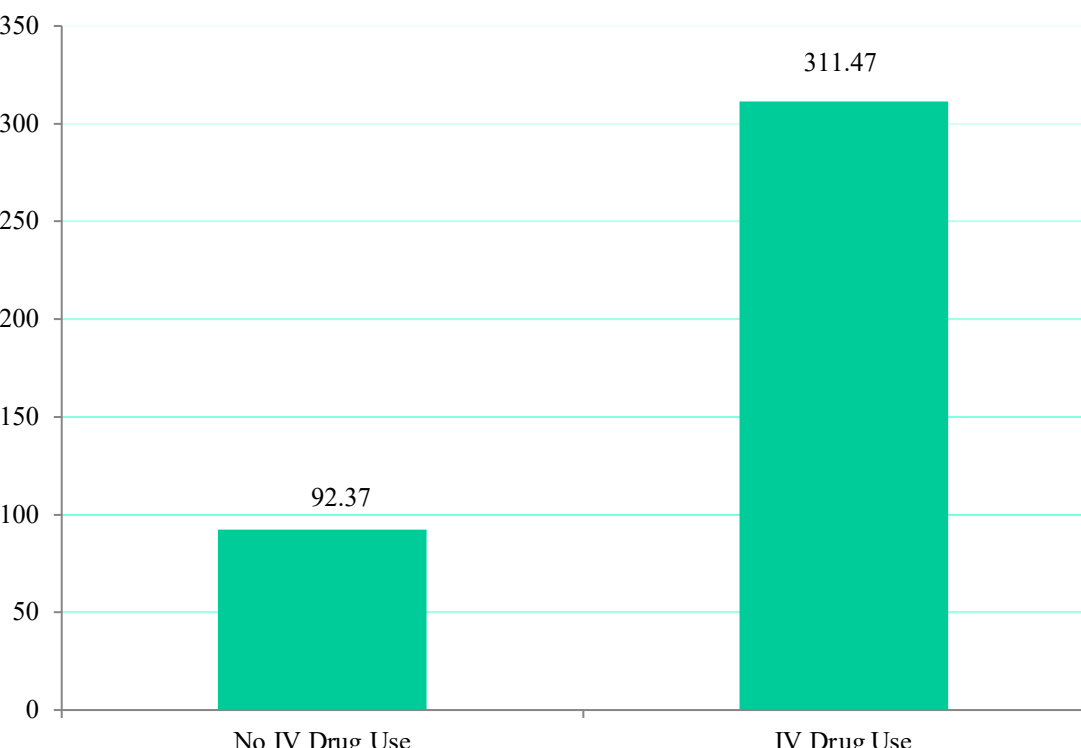


Figure 4

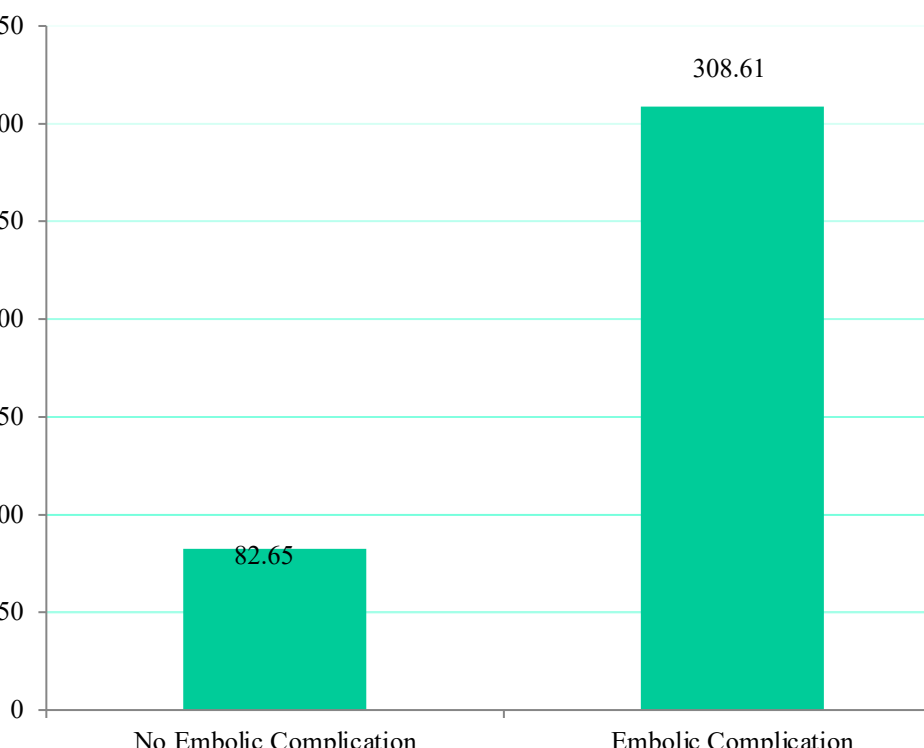


Figure 5

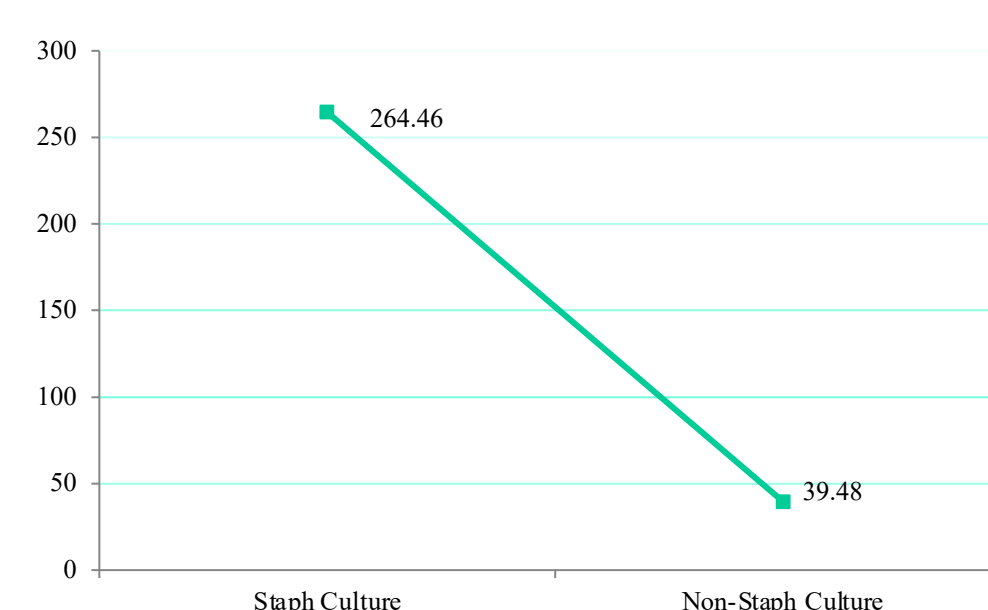


Figure 6

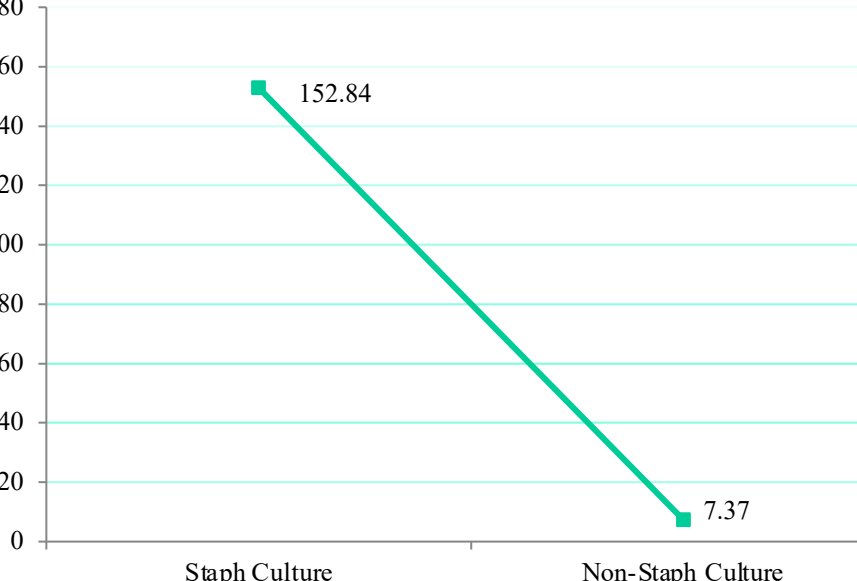


Figure 3: Mean initial size of vegetation in IV drug users vs non-IV drug users. Figure 4: Mean size of initial vegetation in relation to embolic complications. Figure 5: Mean size of initial vegetation in relation to pathogen. Figure 6: Reduction in vegetation size in with treatment relation to pathogen

## Discussion

- Previous studies have shown that increasing risk of embolization is seen with increasing vegetation size. Our data shows that IV drug users and *Staphylococcus aureus* species had larger vegetation size.
- In our study, the mean vegetation size with completion of antibiotic treatment was significantly reduced on follow up echocardiogram. Residual vegetation size however was not significant in terms of the risk of embolism, death, or recurrence (6). Based on these observations, initial vegetation size rather than change in vegetation size seems to be more important regarding risk of embolic complications. Therefore deciding treatment durations or extending treatment duration based on vegetation size on follow up echocardiogram is not needed.
- In our study, the mean size of initial vegetation in patients with embolic complications was noted to be 308.61 mm<sup>2</sup>. According to AHA guidelines, early surgical intervention is considered in patients with infective endocarditis who are found to have mobile vegetation of >10 mm (3). Since the initial vegetation size associated with embolic and valvular complications was significantly larger than 10 mm in our study, we question whether the cutoff can be much more liberal than 10 mm for consideration of early surgical intervention
- Larger initial valve vegetation was seen with *Staphylococcal* infection leading to the question of whether these individuals should also be considered for early surgical invention.
- Though a follow up echocardiogram is recommended to establish a new baseline for valvular morphology upon completion of antibiotic therapy, change in vegetation size on follow up echocardiogram does not seem to have any prognostic implication.

## Conclusions

Larger initial vegetation size rather than change in vegetation size on follow up echocardiogram seems to have more significant prognostic implications in terms of embolic complications. Positive blood cultures for *Staphylococcus aureus* species seems to be an independent factor for larger initial vegetation size.

## References

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