

The Use Of AngioVac in Large Sized Vegetations With Tricuspid Valve Infective Endocarditis

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Background

AngioVac System can be used as an alternative to surgery in critically ill patients with large vegetations in tricuspid valve infective endocarditis (IE).

Case

- A 38-year-old male with a history of active IV drug use presented to the emergency department with encephalopathy and anemia. He was admitted to ICU due to DIC, sepsis, and PEA arrest. Blood cultures were positive for *Streptococcus gordonii* and *H. influenzae* treated with appropriate antibiotics. TTE revealed a large vegetation on the tricuspid valve.

Clinical Progression

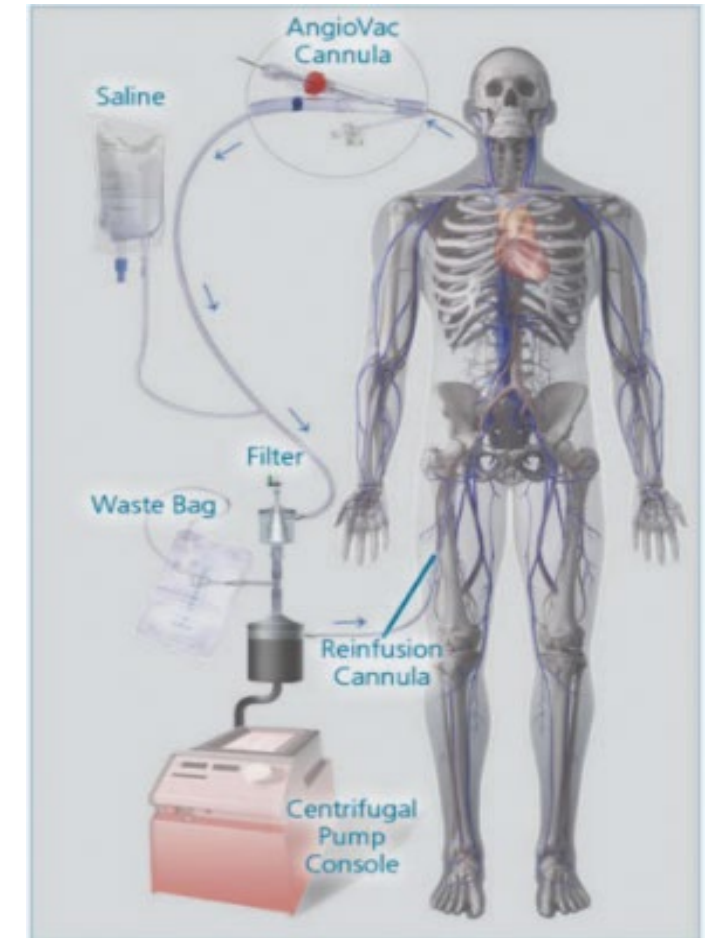
- **Echo: 40-45%, Definite large vegetations on anterior and septal leaflets of tricuspid valve. Moderate to severe TR.**
- **CTA Chest: 09/17: Without evidence of pulmonary septic emboli.**
- **Hgb 4.1→10.4 s/p massive transfusion, PLT 35,000 on admission**
- **Persistent Bcx with growth of *Streptococcus gordonii* and *Haemophilus parainfluenzae* on IV Ceftriaxone.**

Clinical Question

- In patients with large vegetation size (>10-20 mm) and persistent bacteremia despite proper antibiotic therapy, surgical intervention is considered first line.
- In setting of Thrombocytopenia and Anemia, patient was deemed to not be a surgical candidate .
- Can AngioVac vegetectomy be used in such a clinical dilemma and with good results?

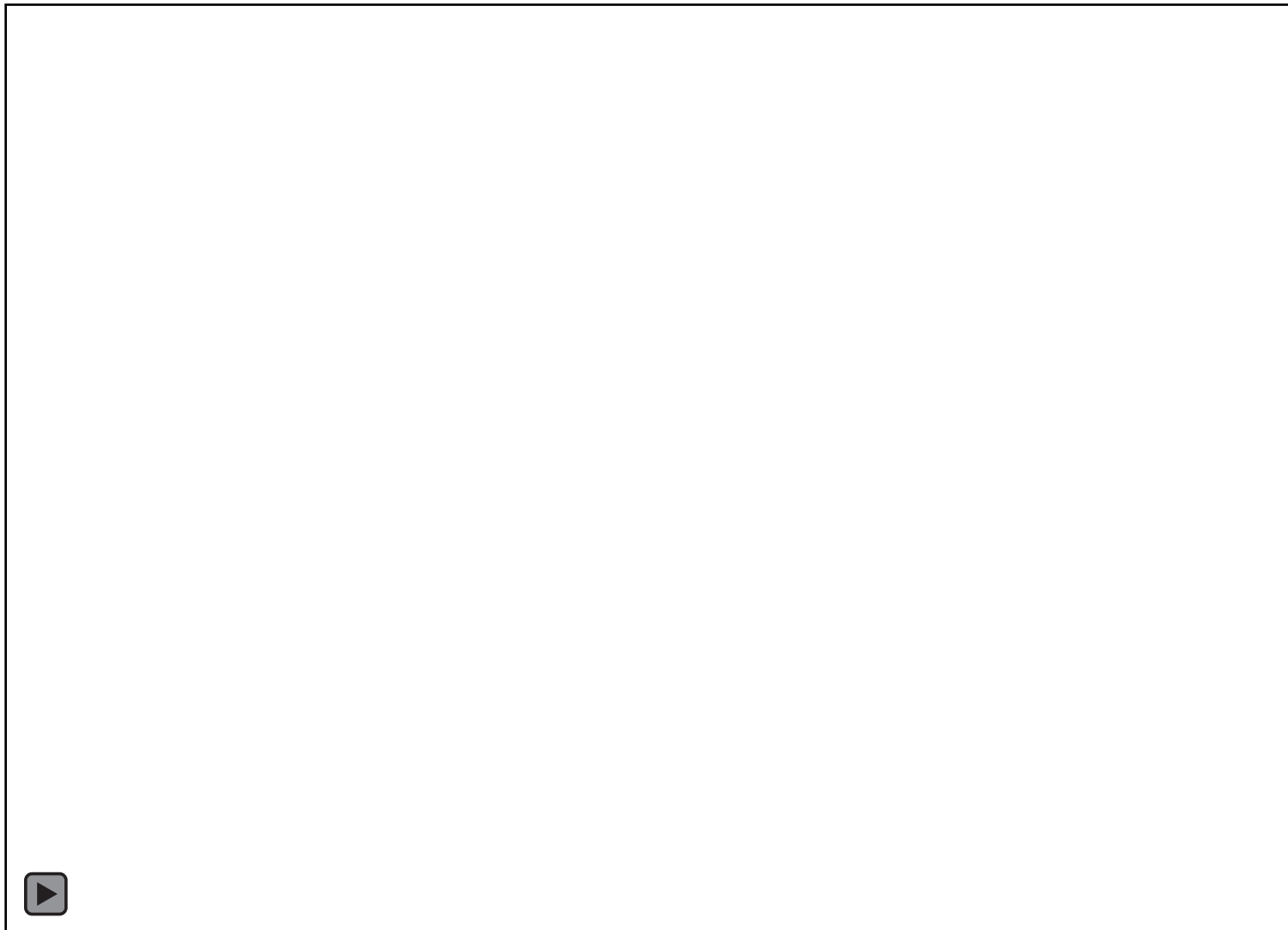
AngioVac Suction Vegetectomy

- Image guidance via simultaneous Fluoroscopy and TEE
- A 17 Fr bypass cannula inserted into the right femoral vein and connected to the return line
- A 26 Fr dry seal sheath inserted into the right IJ vein
- Angiovac catheter advanced to RA and positioned over TV under TEE guidance.

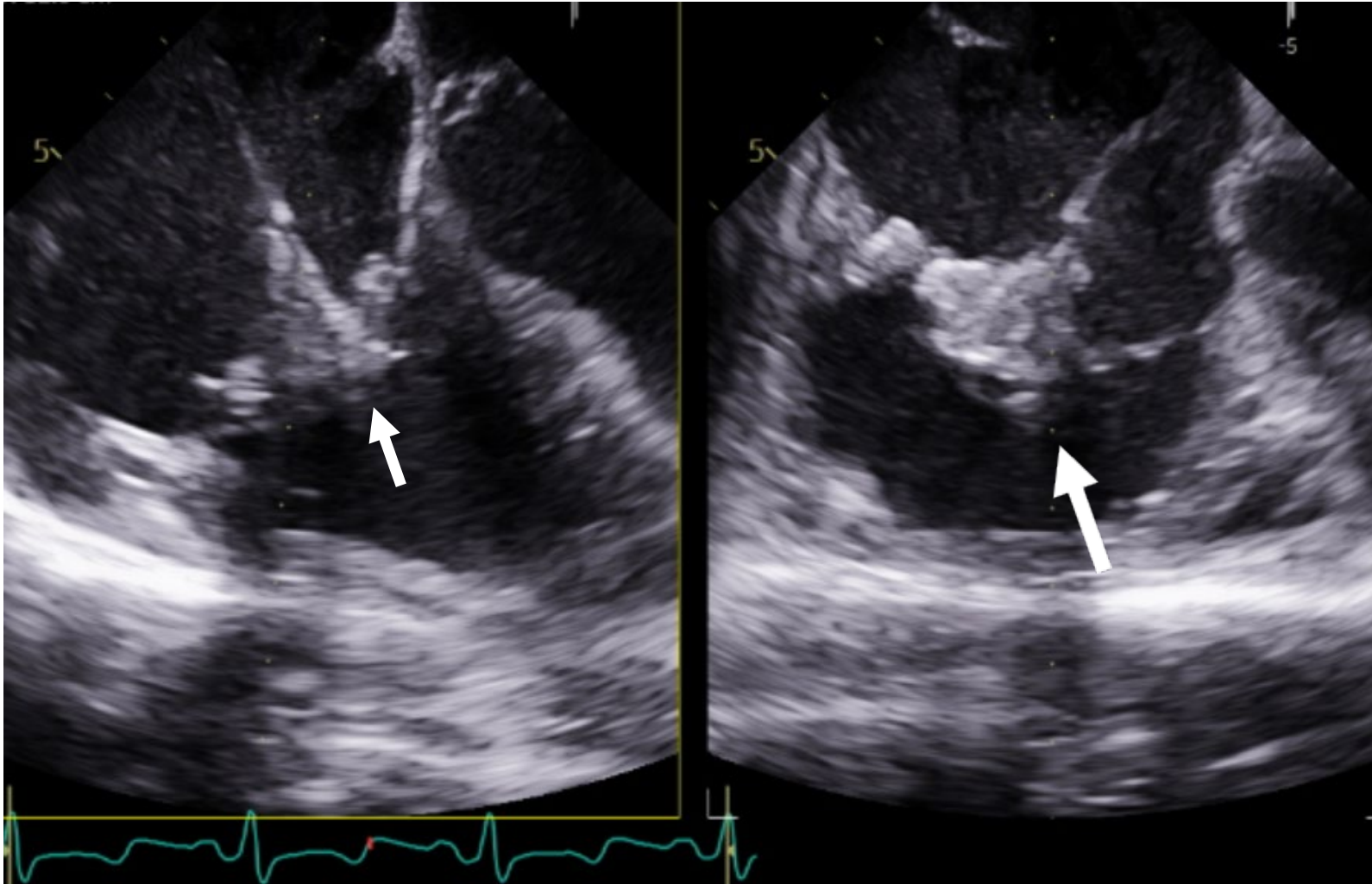


Ghawanmeh 2022 AHA

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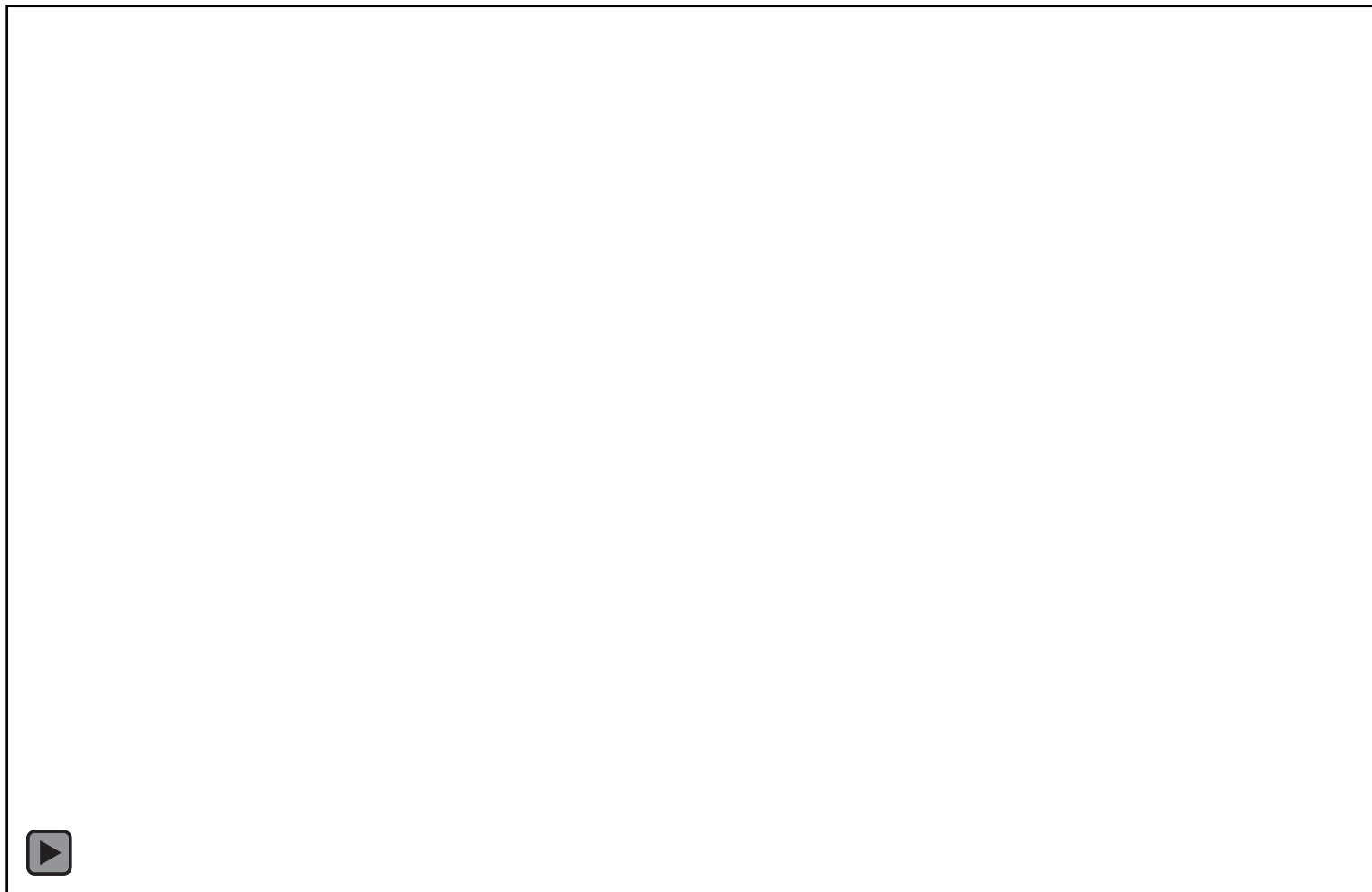


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Post-Vegectomy



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Burden of Disease

- **TV endocarditis accounts for 15% of endocarditis cases**
- **>50% IVDU**
 - Other risk factors: cardiac implantable device, chronic vascular access
- **Mostly treated with medical management**
 - 20% require surgery

Other factors

- Pathogen – *S. aureus* (40-77%, half MRSA), coagulase neg staphylococci in devices and prosthetic valves (25%)
- Cardiogenic shock (33%)
- Worsening conduction defect (10%)
- Existing cardiac implantable electronic device
- Prior heart surgery – prosthetic endocarditis (15%)
- Other embolic complications – pulmonary (23-70%), systemic (3-15%), cerebral (3-23%)

Slaughter 2019 JTCVS
Wang 2018 JAMA

Definite IE

Pathological Criteria

- **Microorganisms demonstrated by culture or histological examination of a vegetation, vegetation which has embolized, or an intracardiac abscess specimen.**
- **Pathological lesions, vegetation or intracardiac abscess confirmed by histological exam showing active endocarditis.**

Clinical Criterion

- 2 major criteria; or
- 1 major criterion and 3 minor criteria; or
- 5 minor criteria

Table 2 Major and Minor Criteria in Modified Duke Criteria

Major Criteria

1. Blood culture positive for IE

- a. Typical microorganisms consistent with IE from 2 separate blood cultures:
 - *Viridans streptococci*, *Streptococcus gallolyticus* (*Streptococcus bovis*), *HACEK* group, *Staphylococcus aureus*; or
 - Community-acquired enterococci, in the absence of a primary focus; or
- b. Microorganisms consistent with IE from persistently positive blood cultures:
 - ≥ 2 positive blood cultures of blood samples drawn >12 h apart; or
 - All of 3 or a majority of ≥ 4 separate cultures of blood (with last samples drawn ≥ 1 h apart); or
 - Single positive blood culture for *Coxiella burnetii* or phase I IgG antibody titre $>1:800$

2. Evidence of endocardial involvement

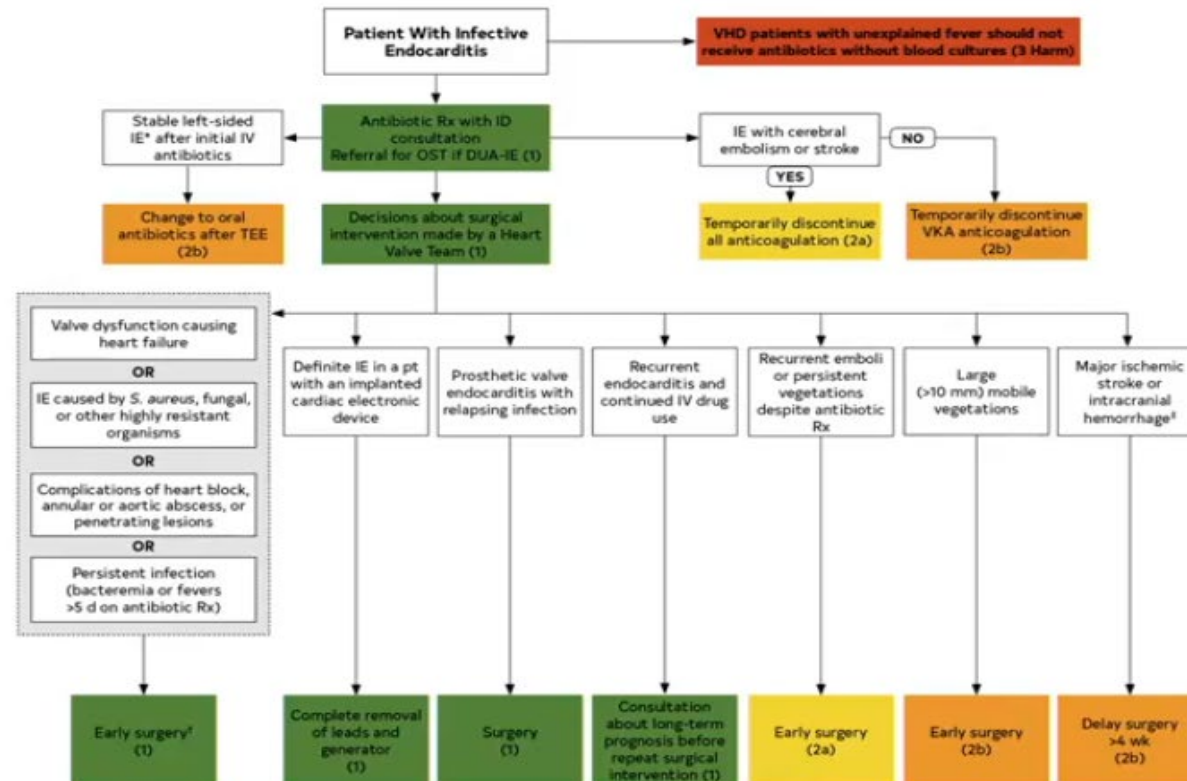
- a. Echocardiogram positive for IE:
 - Oscillating intracardiac mass on valve or supporting structure
 - Abscess; or
 - New partial dehiscence of prosthetic valve
- b. New valvular regurgitation (worsening or changing of pre-existing murmur not sufficient)

Minor Criteria

- 1. Predisposition, predisposing heart condition, or injection drug use
- 2. Fever defined as temperature $>38^{\circ}\text{C}$
- 3. Vascular phenomena, major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial hemorrhage, conjunctival hemorrhages, and Janeway lesions
- 4. Immunological phenomena: glomerulonephritis, Osler's nodes, Roth's spots, and rheumatoid factor
- 5. Microbiological evidence: positive blood culture but does not meet a major criterion as noted above or serological evidence of active infection with organism consistent with IE.

Otto C, et al. *J Am Coll Cardiol* 2021;77:e25-e197.

Endocarditis Treatment Guidelines



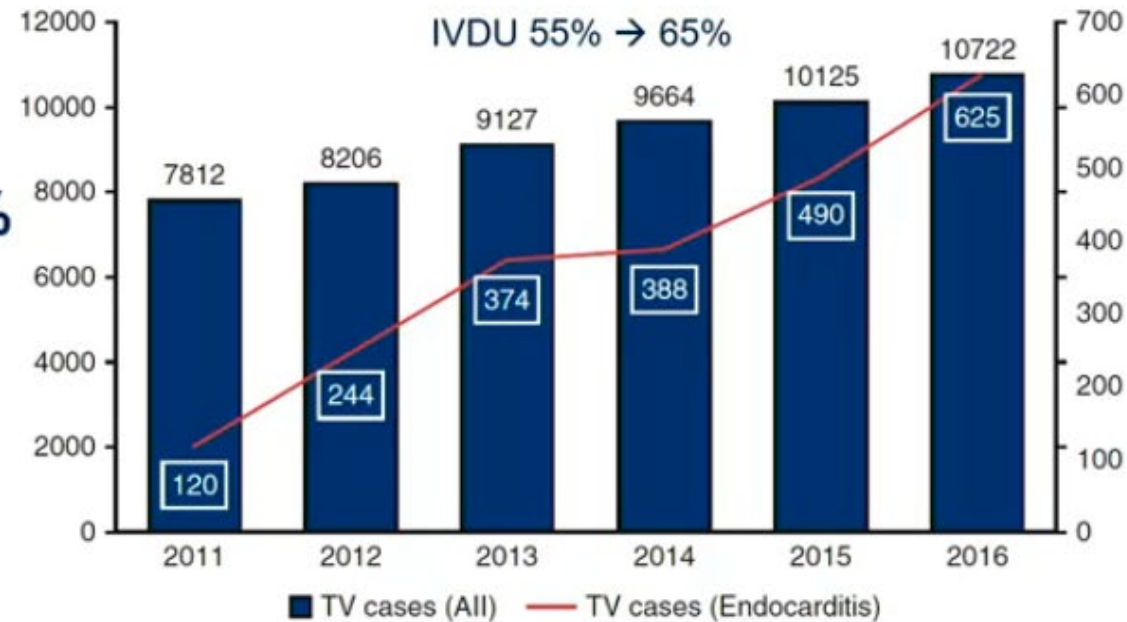
Otto 2021 JACC

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Strategies

- Valvectomy – 7%
- Repair – 33%
- Replacement – 60%

STS Database 2011-2016, 500% increase



Slaughter 2019 JTCVS

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Operative Mortality

- **Valvectomy- 16%**
- **Repair-2%** **($P<0.01\%$)**
- **Replacement-3%**

Factors related to mortality:

- **WBC, Emergent Surgery, ECMO, NYHA class >2, Valvectomy vs Repair, Hospital Volume.**

Percutaneous vegetectomy for right heart endocarditis

Systematic review of 49 patients, small case series and reports, mix of leads, indwelling catheters and tricuspid endocarditis

Indications for percutaneous vegetectomy:

- **81% poor surgical candidates**
- **19% prevent emboli**

Results:

- **93% survival to discharge when reported**
- **No long term data**

Riasat 2023 IJC HV

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Conclusion

- **IVDU-related IE requires a multidisciplinary approach.**
- **In critically ill patients with high preoperative risk complete optimization is not always achieved.**
- **This underlines the use of a minimally invasive approach with AngioVac in debulking large tricuspid vegetations and achieving a successful outcome.**

Citations

- 1. Otto C, Nishimura R, Bonow R, et al. 2020 ACC/AHA guideline for the management of patients with valvular heart disease. *J Am Coll Cardiol* 2021;77:e25-e197.
- 2. Baddour LM, Wilson WR, Bayer AS, et al. Infective endocarditis in adults: diagnosis, antimicrobial therapy, and management of complications: A scientific statement for healthcare professionals from the American Heart Association. *Circulation* 2015;132:1435-86.
- 3. Slaughter MS, Badhwar V, Ising M, Ganzel BL, Sell-Dottin K, Jawitz OK, Zhang S, Trivedi JR. Optimum surgical treatment for tricuspid valve infective endocarditis: An analysis of the Society of Thoracic Surgeons national database. *J Thorac Cardiovasc Surg.* 2021 Apr;161(4):1227-1235.e1. doi: 10.1016/j.jtcvs.2019.10.124. Epub 2019 Nov 11.
- 4. Riasat M, Hanumanthu BKJ, Khan A, Haseeb Riaz A, Anjum Z, Ehtesham M, Ur Rehman S, Javed A, Muhammad A, Misra D. Outcomes and survival of patients undergoing percutaneous vegetectomy for right heart endocarditis. *Int J Cardiol Heart Vasc.* 2023 Jun 12;47:101231. doi: 10.1016/j.ijcha.2023.101231.