Injection Drug use and Endocarditis

Anthony W. DiScipio M.D.

2/8/2018
Case

- 57 yo female who presents with intra-cranial hemorrhage and left hemiplegia
- Underwent previous MVR in 2013 for endocarditis from dental procedure
- Has been on chronic opiates for pain from psoriatic arthritis, managed from a pain clinic in Florida
- Had drug paraphernalia on her at admission
- Blood cultures positive for MSSA
- ECHO shows vegetation on the mitral valve
- Finally admits that she has been crushing her dilaudid, melting in a spoon and injecting it into her foot
Issues to discuss

• Medical Aspects of IV drugs use and endocarditis
• Outcomes and trends in surgical treatment of endocarditis
• Ethical challenges
Do Opiates affect the heart?

- Very little direct effect of opiates on the heart itself
- Methadone and buprenorphine can prolong QTc
- Some opiates may effect blood pressure, heart rate and cause edema or syncope
- Not all IV drug use is opiate
- Street drugs are often laden with other substances
Other IVDU infections

- HIV
  - Risk of a non-infected IVDU sharing needles is 1:160
  - Lifetime risk for IVDU
    - 1:23 chance for women
    - 1:36 chance for men

- Hepatitis C
  - Risk is much higher than HIV

- IVDU patients are less likely to get testing, exposure prophylaxis, early diagnosis, or treatment. They are more likely to engage in multiple risky behaviors that affect infection status
Why do IVDUs get endocarditis?

• Some have abnormal heart valve to begin with
• Possible repeated subclinical infections
• Particulate matter in the injection causing direct valve damage
• Hypoxic injury from overdose episodes or less severe apneic episodes
• Opiate laced with stimulant substances
Factors influencing increased infective endocarditis (IE) incidence among intravenous drug users (IVDUs).

At risk individual; e.g. concurrent HIV infection, increased *S. aureus* colonisation

Risk associated with the solvent/solute injected

Development of Infective Endocarditis in IVDUs

Risks associated with the process of non-sterile injection

Risks associated with the drug injected

Endocarditis

- Infection of the endocardium of the heart, usually heart valves, but can include muscle structures as well
- Acute, subacute, chronic
- Symptoms often prolonged and not obvious
- Many cases present with more than a month of infection
- Infection often causes aggregates of immune cell, fibrin, bacteria and platelets called vegetations
- Vegetations often embolize from the infected area and spread infection hematogenously to other sites
Diagnosis of Endocarditis

**Infective Endocarditis: Modified Duke Criteria**

<table>
<thead>
<tr>
<th>MAJOR CRITERIA</th>
<th>minor criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Blood cultures positive for infective endocarditis</td>
<td>1. Predisposing factor&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>2. Evidence of endocardial involvement</td>
<td>2. Temperature &gt;38°C</td>
</tr>
<tr>
<td></td>
<td>3. Vascular phenomena&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>4. Immunologic phenomena&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>5. Microbiologic evidence&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Intravenous drug use or a predisposing heart condition.

<sup>b</sup> Vascular phenomena include major arterial emboli, septic emboli, pulmonary infarcts, mycotic aneurysm, intracranial haemorrhage, conjunctival haemorrhage, and painless skin lesions (i.e., Janeway lesions).

<sup>c</sup> Immunologic phenomena include glomerulonephritis, painful nodes (i.e., Osler's nodes), retinal haemorrhages with small, clear centers (i.e., Roth's spots), and positive rheumatoid factor.

<sup>d</sup> Positive blood culture not meeting a major criterion or serologic evidence of an active infection with an organism known to cause infective endocarditis.

Two major criteria or One major and three minor criteria or Five minor criteria

Definite Diagnosis

One major and one minor criterion or Three minor criteria

Possible Diagnosis
Endocarditis Lesions
Endocarditis By The Numbers

10x
Addicted endocarditis patients are 10 times more likely to die or need a second surgery

$700 million
$700 million dollars are spent through Medicaid on endocarditis patients

40-50 thousand
There are between 40,000 and 50,000 new endocarditis patients each year

$120 thousand
$120,000 is the average cost of treatment per patient

Source: Center for Disease Control; medscape.com
Graphic by Alexandra Kanik
Treatment of endocarditis

• IV antibiotics
• Treatment of peripheral infection
• Cardiac surgery
OUTCOMES OF SURGERY IN NORTHERN NEW ENGLAND
Rate of endocarditis among valve patients is increasing
Rate of endocarditis among valve patients is increasing
Reported use of illicit drugs in valve patients is increasing.

NOTE: Illicit drug abuse data only available in the STS data
Valve patients with endocarditis show a three-fold increase in illicit drug use over these years.

NOTE: Illicit drug abuse data only available in the STS data.
What data do we have on the endocarditis organism? Has it changed over time?
Infectious endocarditis culture (N=377)

- Fungal: 1.9%
- Coagulase neg staph: 2.7%
- Culture negative: 4.0%
- Unknown: 9.8%
- Other: 10.6%
- Enterococcus species: 12.5%
- Strep species: 28.9%
- Staph aureus: 29.7%

NOTE: Endocarditis culture data only available from STS.
NOTE: Endocarditis culture data only available from STS
Compared to endocarditis patients <2011, patients in 2011-2014:

- are more likely to have an isolated valve rather than a valve/CABG
- are younger
- are less likely to have an elevated WBC
- are less likely to have had a prior CABG or PCI
- have lower rates of diabetes and renal failure or insufficiency
- are less likely to have had a recent MI
- have better preop EFs
- are more likely to be elective

i.e. - They are younger and less sick in 2011-2014 than in the past
Risk adjusted* in-hospital mortality with endocarditis over time

p trend = 0.148

* Adjusted for primary procedure, age, sex, BSA, ejection fraction, 3VD, left main stenosis, preop WBC, recent MI, prior CABG, PVD, DM, COPD, preop dialysis, prior CVA, CHF, preop afib, preop creatinine, priority at surgery
When adjusted for differences in patient risk, in-hospital mortality for endocarditis patients does not differ over time.
Survival following surgery for endocarditis

log rank p value for 3 yr. survival = 0.019
HR at 3 yr. for 2011-2014 vs previous time periods = 1.31 CI(0.95-1.81)
Survival among younger patients (<50) is worst in the current time period (2011-2014).
Survival among patients >=50 is worst in the early time period (2001-2005) with most deaths within the first 6 months.
Adjusted 3 year survival
Adjusted* 3 year survival for endocarditis patients in 2011-2014 versus 2001-2010

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Adj HR</th>
<th>CI95%</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>759</td>
<td>1.35</td>
<td>0.94 - 1.95</td>
<td>0.108</td>
</tr>
<tr>
<td>Patients alive at 6 months</td>
<td>567</td>
<td>1.80</td>
<td>0.99 - 3.29</td>
<td>0.056</td>
</tr>
</tbody>
</table>

* Adjusted for primary procedure, age, sex, BSA, ejection fraction, 3VD, left main stenosis, preop WBC, recent MI, prior CABG, PVD, DM, COPD, preop dialysis, prior CVA, CHF, preop afib, preop creatinine, priority at surgery
Either way, in almost all cases, adjusted 3 year survival for endocarditis patients is worse in 2011-2014 than in previous time periods although the difference is not always statistically significant.
occarditis among

Maroun Yammine, MD, b Masahiko Ando, MD, a
B. Nelson, MD, c Arthur Y. Kim, MD, c
Thomas E. MacGillivray, MD, a
Thoralf M. Sundt III, MD a

**FIGURE 2.** Kaplan-Meier curves for clinical outcomes between intravenous drug users (IVDUs) and non-IVDUs. A. Overall death. B. Valve re-infection. C. Valve re-operation. D. Composite of valve-related complications. Transparent bands indicate area within the 95% confidence interval.
Ethical Obligation of Surgeons to Noncompliant Patients: Can a Surgeon Refuse to Operate on an Intravenous Drug-Abusing Patient With Recurrent Aortic Valve Prosthesis Infection?

J. Michael DiMaio, MD, Tomas A. Salerno, MD, Ron Bernstein, JD, Katia Araujo, PsyD, Marco Ricci, MD, and Robert M. Sade, MD

Cardiothoracic Surgery, University of Texas Southwestern Medical Center at Dallas, Dallas, Texas; Department of Surgery and Division Cardiothoracic Surgery, University of Miami Miller School of Medicine and Jackson Memorial Hospital, Miami-Dade County Attorney’s Office, Kaplan University, School of Criminal Justice Online Program at Kaplan, Miami, Florida; and Institute of Human Values in Health Care, Medical University of South Carolina, Charleston, South Carolina
Issues

• Non-compliance with care plan and addiction treatment
• Recidivism and return to drug use
• Surgical treatment for recurrent episodes
• Caring for abusive patients
• Futility of longterm care
• Can we make patients sign a contract for care?
• How do we manage the costs?
• At what point do you say no?
Thank You!