ENDOCARDITIS 2010: Evidence-based Guidelines

What is the evidence?

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Infective Endocarditis:  
**Basic Tenets of the Disease**

- An uncommon but life-threatening disease
  - *Prevention is preferable to treatment of an established infection*
- Certain underlying cardiac conditions predispose to IE
- Common causative organisms are our normal flora
  - *Invasive dental, GI, or GU track procedures may induce bacteriemiias with these organisms*
- Antimicrobial prophylaxis was proven to be effective for prevention of experimental IE in animals
- **Antimicrobial prophylaxis was thought to be effective in humans for prevention of IE associated with dental, GI, or GU track procedures.**
Infective Endocarditis:

**Predisposing Factors**

• Turbulent blood flow (common with certain types of congenital or acquired cardiac lesions) may traumatize the endothelium
  
  – *Surface platelets & fibrin* → *NBTE*:
    • Colonization with pathogenic microbial species

• Human mucosal surfaces commonly colonized with endogenous microflora.
  
  – *Trauma to a mucosal surface (especially oral/GI/GU)* often *leads to transient bacteremia.*

• Certain bacteria have a high virulent potential with the ability to adhere to susceptible tissue, colonize, and lead to an infection
Infective Endocarditis:

• What is the (observational) data:
  – *(Lancet) 1885* Osler noted an association between bacteremia – surgery - IE
  – *(Lancet) 1935*: 11% of pts with poor oral hygiene
    • had (+) blood cultures wth Step V
    • 61% had (+) blood cultures with a dental extraction
  – Recent population-based studies in France, Delaware Valley, and the Netherlands all concluded that an inordinate # of pts would need to be treated to prevent 1 case of IE
Infective Endocarditis:

• Animal model studies:
  – Mechanical disruption of valvular endothelial tissue followed by massive inoculations of bacteria results in acute endocarditis

• **NO PROPECTIVE RANDOMIZED HUMAN TRIALS HAVE EVER BEEN DONE**
Infective Endocarditis: Prevention

• Dental procedures induce bacteremia with organisms known to cause IE....... 
  – Prophylactic antibiotics for at-risk pts undergoing dental procedures should reduce the incidence of IE 
  – Antibiotics definitely prevent IE in experimental animals.
Infective Endocarditis: 

**Bacteremias from dental procedures**

- Dental extractions induce bacteremia
  - *but so do everyday activities like brushing teeth*
- The degree of bacteremia is likely less with teeth brushing than a tooth extraction
  - *The overall burden of bacteremia over extended periods of time from routine daily activities is much greater.*
    - As much as $5.6 \times 10^6$ times greater!
Infective Endocarditis:  
**Bacteremias from dental procedures**

- Estimated the cumulative exposure of bacteremia over a 4 week period in dentulous pts resulting from random bacteremia from chewing food, teeth brushing/etc. is:
  - 5,370 minutes
  - *Duration of bacteremia associated with a single tooth extraction:*
    - 6 – 30 minutes
  - Cumulative exposure from routine, daily activities:
    - 5.6 million X > than that from a single tooth exposure
    - Although the single isolated bacteremia exposure from tooth extraction may be higher
Infective Endocarditis:  
*Bacteremias from dental procedures*

- **Tooth extraction**  
  - 10 – 100%
- **Periodontal surgery**  
  - 36 – 88%
- **Scaling/root planing**  
  - 8 – 80%
- **Teeth cleaning**  
  - 40%
- **Endodontic procedures**  
  - 20%
- **Wooden toothpicks**  
  - 20 – 40%
- **Water irrigation devices**  
  - 7 – 50%
- **Chewing food**  
  - 7 – 51%
Infective Endocarditis: Lifetime Risk

- The overall incidence of IE from 1950 - 2000
  - ~3.6 – 7.0 cases/100,000 pt. years
  - 10-20,000 cases in US per year
- Mitral Valve Prolapse:
  - 52 cases/100,000 pt years ➔ audible systolic murmur
  - 4.6 cases/100,000 pt years ➔ no audible murmur
- Rheumatic Valve Disease:
  - 440 cases/100,000 pt years ➔ During era of antibiotic prophylaxis
  - 380 cases/100,000 pt years ➔ Era of no antibiotic prophylaxis
- Prosthetic Valves:
  - 308 cases/100,000 pt years ➔ Mechanical Prosthesis
  - 383 cases/100,000 pt years ➔ Bioprosthesis
- Congenital Heart Disease
  - 120/100,000 pt years
- Previous h/o Endocarditis:
  - 300-740 cases/100,000 pt years
Infective Endocarditis:

*Bacteremias from dental procedures*

- Absolute risk for UE from a dental procedure is impossible to accurately measure
- Theoretically--- if dental procedures are the cause of 1% of all cases of Strep V. IE annually in the U.S.
  - *1 case per 14 million dental procedures*
- Estimated risk in pts with underlying cardiac conditions:
  - **MVP**: 1 per 1.1 million procedures
  - **CHD**: 1 per 475,000 procedures
  - **RHD**: 1 per 142,000 procedures
  - **Prosthetic Cardiac Valve**: 1 per 114,000 procedures
  - **Previous IE**: 1 per 95,000 procedures
- Even if prophylactic antibiotics are 100% effective – effectiveness would be small
YIKES! THIS IS BAD. IT'S GOTTEN TO THE POINT WHERE BACTERIA HAVE SET UP OFFICES WITH WALL HANGINGS, DIPLOMAS...

PLAQUE REMOVAL
Infective Endocarditis: 

**AHA Guidelines**

- **1955**: 1st guidelines published.
  - *Were raised as an aside after the AHA provided the 1st guidelines for avoiding rheumatic fever*

- **1960**: Revised guidelines noting possible emergence of PNC—resistant oral flora and the need for prolonged preventative antibiotic dosing

- **1965**: Recognition of enterococci after GI/GU procedures

- **1972**: Guidelines recognized by the ADA, and importance of good oral hygiene noted

- **1977**: Grouped pts into high and low-risk groups
Infective Endocarditis:

**AHA Guidelines**

- **1984**: Attempts to simplify tx protocols. Reduced post procedure Rx for GI/GU cases
- **1990**: A more detailed list of dental / surgical procedures and cardiac conditions that did or did not need prophylaxis was provided.
- **1997**: Stratified cardiac conditions into high, moderate, and low risk categories; prophylaxis not needed for low risk group. A more detailed list of dental, respiratory, GI, GU procedures was outlined.
- **2007**: Committee recognized that the guidelines had become overly complex, and contained ambiguities and some inconsistencies.
Table 1. Summary of 9 Iterations of AHA-Recommended Antibiotic Regimens From 1955 to 1997 for Dental/Respiratory Tract Procedures*

<table>
<thead>
<tr>
<th>Year (Reference)</th>
<th>Primary Regimens for Dental Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1955 (6)</td>
<td>Aqueous penicillin 600 000 U and procaine penicillin 600 000 U in oil containing 2% aluminum monostearate administered IM 30 minutes before the operative procedure</td>
</tr>
<tr>
<td>1957 (7)</td>
<td>For 2 days before surgery, penicillin 200 000 to 250 000 U by mouth 4 times per day. On day of surgery, penicillin 200 000 to 250 000 U by mouth 4 times per day and aqueous penicillin 600 000 U with procaine penicillin 600 000 U IM 30 to 60 minutes before surgery. For 2 days after, 200 000 to 250 000 U by mouth 4 times per day.</td>
</tr>
</tbody>
</table>
| 1960 (8)         | Step I: prophylaxis 2 days before surgery with procaine penicillin 600 000 U IM on each day  
Step II: day of surgery: procaine penicillin 600 000 U IM supplemented by crystalline penicillin 600 000 U IM 1 hour before surgical procedure  
Step III: for 2 days after surgery: procaine penicillin 600 000 U IM each day |
| 1965 (9)         | Day of procedure: procaine penicillin 600 000 U, supplemented by crystalline penicillin 600 000 U IM 1 to 2 hours before the procedure  
For 2 days after procedure: procaine penicillin 600 000 U IM each day |
| 1972 (10)        | Procaine penicillin G 600 000 U mixed with crystalline penicillin G 200 000 U IM 1 hour before procedure and once daily for the 2 days after the procedure |
| 1977 (11)        | Aqueous crystalline penicillin G (1 000 000 U IM) mixed with procaine penicillin G (600 000 U IM) 30 minutes to 1 hour before procedure and then penicillin V 500 mg orally every 6 hours for 8 doses. |
| 1984 (12)        | Penicillin V 2 g orally 1 hour before, then 1 g 6 hours after initial dose |
| 1990 (13)        | Amoxicillin 3 g orally 1 hour before procedure, then 1.5 g 6 hours after initial dose |
| 1997 (1)         | Amoxicillin 2 g orally 1 hour before procedure |

IM indicates intramuscularly.
*These regimens were for adults and represented the initial regimen listed in each version of the recommendations. In some versions, >1 regimen was included.
Table 2. Primary Reasons for Revision of the IE Prophylaxis Guidelines

IE is much more likely to result from frequent exposure to random bacteremias associated with daily activities than from bacteremia caused by a dental, GI tract, or GU tract procedure.

Prophylaxis may prevent an exceedingly small number of cases of IE, if any, in individuals who undergo a dental, GI tract, or GU tract procedure.

The risk of antibiotic-associated adverse events exceeds the benefit, if any, from prophylactic antibiotic therapy.

Maintenance of optimal oral health and hygiene may reduce the incidence of bacteremia from daily activities and is more important than prophylactic antibiotics for a dental procedure to reduce the risk of IE.
Updated Guidelines
Classes of Recommendations

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>IIa</th>
<th>IIb</th>
<th>III</th>
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<td>X</td>
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</tbody>
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Intervention is useful and effective

Evidence conflicts/opinions differ but leans towards efficacy

Evidence conflicts/opinions differ but leans against efficacy

Intervention is not useful/effective and may be harmful
# Classification of recommendations and levels of evidence.

<table>
<thead>
<tr>
<th>CLASSIFICATION OF RECOMMENDATIONS</th>
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<tbody>
<tr>
<td>Class I</td>
<td>Conditions for which there is evidence and/or general agreement that a given procedure or treatment is useful and effective</td>
</tr>
<tr>
<td>Class II</td>
<td>Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness or efficacy of a procedure or treatment</td>
</tr>
<tr>
<td>IIa</td>
<td>Weight of evidence/opinion is in favor of usefulness/efficacy</td>
</tr>
<tr>
<td>IIb</td>
<td>Usefulness/efficacy is less well-established by evidence/opinion</td>
</tr>
<tr>
<td>Class III</td>
<td>Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful or effective and, in some cases, may be harmful</td>
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<table>
<thead>
<tr>
<th>LEVEL OF EVIDENCE</th>
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<tbody>
<tr>
<td>A</td>
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<td>B</td>
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<td>C</td>
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</table>

* Adapted from the American College of Cardiology Foundation and American Heart Association Task Force on Practice Guidelines.
Recommendations for IV Nitro

The usefulness of intraoperative nitroglycerin as a prophylactic agent to prevent myocardial ischemia and cardiac morbidity is unclear for high-risk patients undergoing noncardiac surgery, particularly those who have required nitrate therapy to control angina. The recommendation for prophylactic use of nitroglycerin must take into account the anesthetic plan and patient hemodynamics and must recognize that vasodilation and hypovolemia can readily occur during anesthesia and surgery.
### Infective Endocarditis:

**Table 1. Comparison of guidelines for infective endocarditis prophylaxis (1997–2008).**

<table>
<thead>
<tr>
<th>Guidelines</th>
<th>AHA 1997&lt;sup&gt;17&lt;/sup&gt;</th>
<th>SPILF/SFC 2002&lt;sup&gt;18&lt;/sup&gt;</th>
<th>ESC 2004&lt;sup&gt;19&lt;/sup&gt;</th>
<th>BSAC 2005&lt;sup&gt;20&lt;/sup&gt;</th>
<th>AHA 2007&lt;sup&gt;4&lt;/sup&gt;</th>
<th>NICE 2008&lt;sup&gt;21&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk groups described based on cardiac conditions*</td>
<td>High, moderate, negligible</td>
<td>High, low</td>
<td>High, moderate</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Risk groups where prophylaxis is recommended or optional†</td>
<td>High, moderate</td>
<td>High, low</td>
<td>High, moderate</td>
<td>High</td>
<td>High</td>
<td>-</td>
</tr>
<tr>
<td>Dental</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Respiratory</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Procedures with recommendation for prophylaxis‡</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Infected skin/musculoskeletal</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>Antiseptic rinse</td>
<td>Yes</td>
<td>Yes</td>
<td>Optional</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

*Individual guidelines have classified cardiac conditions into different groups based on their risk for IE. The cardiac conditions included, as well as the risk groups described, differ among individual guidelines. We have tabulated the risk groups described by these guidelines.

†In the setting of a procedure causing bacteremia.

‡In patients with cardiac risk factors.

Yes: Prophylaxis recommended when criteria met; No: Prophylaxis not recommended; N/A: No specific recommendation. Bold typeface used to emphasize the change in recommendations from yes to no.

AHA, American Heart Association; BSAC, British Society for Antimicrobial Chemotherapy; ESC, European Society of Cardiology; NICE, National Institute for Health and Clinical Excellence; SPILF/SFC, Société de Pathologie Infectieuse de Langue Française/ Société Française de Cardiologie.
Cardiac conditions associated with the highest risk of adverse outcome from endocarditis for which prophylaxis with dental procedures is reasonable.

- Prosthetic cardiac valve or prosthetic material used for cardiac valve repair
- Previous infective endocarditis
- Congenital heart disease (CHD)*
  - Unrepaired cyanotic CHD, including palliative shunts and conduits
  - Completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first six months after the procedure†
  - Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device (which inhibit endothelialization)
- Cardiac transplantation recipients who develop cardiac valvulopathy

* Except for the conditions listed above, antibiotic prophylaxis is no longer recommended for any other form of CHD.
† Prophylaxis is reasonable because endothelialization of prosthetic material occurs within six months after the procedure.
Oral Hygiene *may be* the best defense against endocarditis
"I haven't brushed or flossed in years because I want to take advantage of my dental insurance."
Infective Endocarditis

Clinical Work-up
## Endocarditis Diagnosis

1. Positive valve culture or histology

2. 2 major criteria:
   a. Typical organism
   b. Positive echocardiography for vegetations
   c. Abscess or valve dehiscence

3. 5 of 6 minor criteria:
   a. Valvular heart disease or IV drug abuse
   b. Fever greater than 38°C
   c. Vasculitis
   d. Skin lesions
   e. Suggestive echocardiography (but not definitive)
   f. Positive blood culture

4. 1 major and 3 minor criteria

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<table>
<thead>
<tr>
<th>TABLE 2. Use of Echocardiography During Diagnosis and Treatment of Endocarditis</th>
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</thead>
</table>

**Early**
- Echocardiography as soon as possible (<12 h after initial evaluation)
- TEE preferred; obtain TTE views of any abnormal findings for later comparison
- TTE if TEE is not immediately available
- TTE may be sufficient in small children

**Repeat echocardiography**
- TEE after positive TTE as soon as possible in patients at high risk for complications
- TEE 7–10 d after initial TEE if suspicion exists without diagnosis of IE or with worrisome clinical course during early treatment of IE

**Intraoperative**
- Prepump
  - Identification of vegetations, mechanism of regurgitation, abscesses, fistulas, and pseudoaneurysms
- Postpump
  - Confirmation of successful repair of abnormal findings
  - Assessment of residual valve dysfunction
    - Elevated afterload if necessary to avoid underestimating valve insufficiency or presence of residual abnormal flow

**Completion of therapy**
- Establish new baseline for valve function and morphology and ventricular size and function
- TTE usually adequate; TEE or review of intraoperative TEE may be needed for complex anatomy to establish new baseline
TABLE 3. Echocardiographic Features That Suggest Potential Need for Surgical Intervention

**Vegetation**
- Persistent vegetation after systemic embolization
- Anterior mitral leaflet vegetation, particularly with size > 10 mm*
- ≥1 embolic events during first 2 wk of antimicrobial therapy*
- Increase in vegetation size despite appropriate antimicrobial therapy**†

**Valvular dysfunction**
- Acute aortic or mitral insufficiency with signs of ventricular failure†
- Heart failure unresponsive to medical therapy†
- Valve perforation or rupture†

**Perivalvular extension**
- Valvular dehiscence, rupture, or fistula†
- New heart block†‡
- Large abscess or extension of abscess despite appropriate antimicrobial therapy†
### TABLE 16. Care During and After Completion of Antimicrobial Treatment

<table>
<thead>
<tr>
<th>Initiate before or at completion of therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtain transthoracic echocardiogram to establish new baseline</td>
</tr>
<tr>
<td>Drug rehabilitation referral for patients who use illicit injection drugs</td>
</tr>
<tr>
<td>Educate regarding signs of endocarditis, need for antibiotic prophylaxis for certain dental/surgical/invasive procedures</td>
</tr>
<tr>
<td>Thorough dental evaluation and treatment if not performed earlier in evaluation</td>
</tr>
<tr>
<td>Prompt removal of IV catheter at completion of antimicrobial therapy</td>
</tr>
</tbody>
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<table>
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<tr>
<th>Short-term follow-up</th>
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<tbody>
<tr>
<td>Obtain at least 3 sets of blood cultures from separate sites for any febrile illness and before initiation of antibiotic therapy</td>
</tr>
<tr>
<td>Physical examination for evidence of congestive heart failure</td>
</tr>
<tr>
<td>Evaluate for toxicity resulting from current/previous antimicrobial therapy</td>
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</tbody>
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<thead>
<tr>
<th>Long-term follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtain at least 3 sets of blood cultures from separate sites for any febrile illness and before initiation of antibiotic therapy</td>
</tr>
<tr>
<td>Evaluation of valvular and ventricular function (echocardiography)</td>
</tr>
<tr>
<td>Scrupulous oral hygiene and frequent dental professional office visits</td>
</tr>
</tbody>
</table>
Infective Endocarditis

What about the legal ramifications of the new AHA guidelines?
Infective Endocarditis: 

*Legal Ramifications*

- Substantially fewer pts will meet current guideline recommendations
- Concerns that the new guidelines will induce trepidation among health care professionals as well as patients who have previously taken antibiotics to prevent an “infection”
  - *A previous sense of reassurance for routine antibiotic treatment likely existed.*
Infective Endocarditis: 

**Legal Ramifications**

- Case of IE-temporally or remotely associated with an invasive procedure (especially dental) have frequently been the basis for malpractice lawsuits

- Will require educating pts previously tx
  - *Can make a much bigger reduction in risk with good oral hygiene*

- Needs to be agreement among Health Care Professionals:
  - *Dentist feels not necessary, pt arrives at a dental apt. with an Rx from his primary care D.O.*
Infective Endocarditis:

References

• Round H, Kirkpatrick HJR, Hails CG. Further investigations on bacteriological infections of the mouth. Proc R Soc Med 1936;29:1552-6
Infective Endocarditis:

References

• Sconyers JR, Crawford JJ, Moriarty JD. Relationship of bacteremia to toothbrushing in patients with periodontitis. JADA 1973;87(3):616-22
• Osler W: Gulstonian lectures on malignant endocarditis. Lecture I. Lancet I: 415-18, 1885
• Blumer G: Subacute bacterial endocarditis. Medicine 2:105-170, 1922
WOW! I'VE NEVER HEARD THIS ONE BEFORE

WHAT IS IT?

MOST PEOPLE HAVE A HEART MURMUR
YOURS IS SCREAMING AND CURSING!
CASE 1

• 36 y/o Female
  – SLE, HTN, B/L tubal ligation
  – OP Meds:
    • Imuran, Prednisone, Plaquenil, Quinacrine
    • (briefly on Cellcept-d/c’d b/c of GI issues, never on Cytoxin)
  – No Allergies
  – Admitted with fever, diarrhea, confusion
  – WBC 6.5, Hg 10, SCr 1.9
  – C₃ 76, C₄ 5, ESR 129, Plt 107 CK 1610, Trop 0.67
  – Head CT: Unremarkable
  – Working dx: Encephalitis vs. cerebritis
  – LP: Glucose 42, Protein 37, RBC 3, WBC 28/96% neutrophils
  – Started on Vanc / Acyclovir
CASE 1

• Blood cultures:
  – Positive for Staph species
  – TEE performed:
Case 1 ECHO
Case 1 ECHO
CASE 1
CASE 1
CASE 1
CASE 1

• TEE performed:
  – 1.5 X 2 cm MV vegetation with posterior leaflet perforation and severe MR
  – Started on Oxacillin / Rifampin
  – Blood cultures:
    • MSSA
CASE 1

• CVS consulted:
  – Preferred a several week course of antibiotics:
  – Reasons for delayed surgical intervention:
    • *Immunosuppressed state, Renal disease, High risk of prosthetic valve seeding*

• Pt. transferred (at family request) to our facility for further evaluation:
  – At transfer SCr 1.4, Hg 8.2
  – Oxacillin changed to Nafcillin
CASE 1

At this point, is it reasonable to delay a surgical intervention for this patient?

How do we address the SLE tx- issues during an infective process?
CASE 1

- Pt. subsequently became hemodynamically unstable:
  - Required IABP
  - Mild elevation in Troponin levels
  - Pt stabilized
  - Planned for surgical intervention on her MV
  - Cardiac cath pre-op:
    No significant CAD
CASE 1

- Antibiotics changed at time of IABP:
  - Vancomycin
  - Zosyn
  - Cefuroxime

Comments re: antibiotic changes?
CASE 1

- Pt underwent successful repair of her MV with a pericardial patch
- Antibiotics changed to Nafcillin only
- Pt kept on Prednisone only for her SLE at this point
CASE 1

- Final thoughts for this case?
CASE 2

• 69 y/o female
  – Previous St. Jude’s MVR (1995) secondary to IE RHD, Chronic Afib, Hypothyroid, OA
  – SX: MVR, Appy, T/A
  – ASA 81mg, Synthroid, Aldendronate, Simvistatin, Coumadin, Diltiazem
  – Acute onset left facial droop, slurred speech while watching television
  – Initial hospital eval: CT (old left MCA territory infarct), INR 2.3, all symptoms resolved upon arrival to ED. No c/o CP, SOB, etc.e.tc.
  – Tnsf → further w/u
CASE 2

- Admitted originally to Neuro service
- Pt had mild temp (101.3), WBC 11.5
- Blood cultures:
  - At 48 hours grew Strep Bovis
- TEE:
CASE 2: TTE
St. Jude Mechanical MV
CASE 2: TEE
CASE 2: TEE
CASE 2

• Issues:
  – Started on Daptomycin and Gentomycin
  – 4mm X 9mm mobile density on MVR
  – Strep Bovis likely causative organism

--- FINAL REPORT ---

STREPTOCOCCUS BOVIS
**** CRITICAL VALUE **** DR LINDSEY DE LOTT WAS NOTIFIED
OF POSSIBLE GRAM POSITIVE COCCI IN CHAINS AND RESULT
WAS READ BACK ON 02-09-10 AT 119 MICROMM

SUSCEPTIBILITIES

<table>
<thead>
<tr>
<th></th>
<th>MIC VALUE</th>
<th>INTERP</th>
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<tbody>
<tr>
<td>PENICILLIN</td>
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<tr>
<td>CEFTRIAXONE</td>
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<td>CLINDAMYCIN</td>
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<td>VANCOMYCIN</td>
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<tr>
<td>LEVOFLOXACIN</td>
<td>2</td>
<td>S</td>
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</tbody>
</table>
CASE 2

– Questions regarding the work-up thoughts at this point?

Antibiotic choices?

Surgical approach to MV vegetation?

Issues re: Strep Bovis?

Recurrent endocarditis in pt

Embolic phenomenon

Innocent bystander or causative agent

_Pt also has Afib_

_Surgical risk of re-do MVR_
CASE 2

• Approach to MV vegetation:
  • Surgical approach or medical Rx?
    – No valvular dysfunction (perivalvular leak, etc.)
    – No immediate plan for surgery
    – OP antibiotics – repeat TEE after Rx course completed assuming no clinical signs of recurrent infection
    – Tx’d with Gent X 2 weeks, ceftriaxone X 6 weeks

• Evaluation b/c of Strep Bovis:
  – No family h/o GI malignancies
  – No prior screening colonoscopy
  – Colonoscopy → benign polyps
CASE 2

• OP re-eval:
  – Off antibiotics, blood cultures (-)
  – No fevers, chills
  – WBC 6.8
  – No recurrent neurologic s/s
  – What should the follow-up course be at this point?
  – Plan for re-eval in 3 months with blood cultures, repeat TEE
CASE 2

• F/U TEE:
CASE 2: F/U TEE
CASE 2: F/U TEE
CASE 2

- Final thoughts for this case?
CASE 3

• 18 y/o healthy and active male:
  – Benign osteoma L tibia s/p RF ablation, ADHD
  – Remote tonsillectomy
  – Social hx unremarkable, no prior blood transfusions, no high-risk sexual activity
  – 6/10:
    • Noted acute onset Left CVA tenderness, responsive to OTC Motrin. Had intermittent c/o flu-like symptoms, fatigue, and intermittent night sweats.
CASE 3

• Medical evaluation:
  – *Splenomegaly on abd. u/s*
  – *Abd CT: horseshoe kidney*

• Over the ensuing several weeks:
  – *Developed microscopic hematuria and acute kidney dysfunction (Scr 2.3)*
  – *Renal biopsy attained late August*

• No recent h/o sore throat, fever, chills, rash, joint symptoms, gross hematuria, abd. pain, l/e edema, bruising, bleeding.

• Serology (-) for ANA, ANCA, anti-GBM antibody, compliment normal.
CASE 3
CASE 3

• 9/2/10:
• Renal Biopsy results
  – *Light microspopy* – 14 glomeruli found
  – 1 w/ *global sclerosis*
  – *No mesangial matrix expansion or hypercellularity, basement membrane duplication*
  – 3 glomeruli showed *segmental sclerosis w/ previous necrosis or crescents*
  – *Negative staining for IgA, IgG, fibrinogen*
• Mid September labs:
  – Scr 5.9
  – Hg 6.7 platelets 139, WBC 11.9, K+ 5.6
• Mayo Clinic final interpretation:
  – *3/14 glomeruli crescentic / necrotic glomerulonephritis c/w post-infectious GN*
• Initially started on IV prednisone → 60 mg QD X 3 weeks
CASE 3

• Working Dx:
  – Crescentic Glumerulonephritis with rapid decline in renal function
    • Post infectious discrepancies:
      – *No sore throat s/s prodrome*
      – *Normal BP*

• Nephro Recommendations:
  – Admitted 9/23 for Dialysis, RBC transfusion, Cyclophosphamide
    • Dialysis *(9/23, 9/26, 9/29)*
    • Cyclophosphamide tx. *(9/24)*
CASE 3

• New (?) murmur noted (9/25):
  – TTE performed:
    • BAV, possible AV vegetation
    • Transferred to our facility for further evaluation
CASE 3: TEE
CASE 3: TEE
CASE 3: TEE
CASE 3: TEE
CASE 3

• Questions:
  Was the original approach reasonable?
  Should the pt. have had a TTE early in the work-up?
  What should the approach be now?

  Most likely organisms?
  Blood cultures collected: 9/26, 9/28
  Bactrim given 9/23, 9/25, 9/29
  Vancomycin given 9/28 and 9/29
  All cultures negative
  Q fever, Baronella negative
CASE 3

• What is the timing of the surgical approach?
  – Are there any risks for this pt with cardiothoracic surgery?
CASE 3

• Pt scheduled for surgery
  – While in pre-op during placement of a PA catheter the pt had an acute left-sided CVA
  – Subsequently dx. with a large ICB secondary to a mycotic aneurysm
    • Should this pt. have been screened for cerebral mycotic aneurysms?
    • Pt quoted a 30 -40% risk of ICB during surgery
CASE 3
Successful recovery of infective endocarditis-induced rapidly progressive glomerulonephritis by steroid therapy combined with antibiotics: a case report

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Abstract

Background: The mortality rate among patients with infective endocarditis, especially associated with the presence of complications or coexisting conditions such as renal failure and the use of combined medical and surgical therapy remains still high. Prolonged parenteral administration of a bactericidal antimicrobial agent or combination of agents is usually recommended, however, the optimal therapy for infective endocarditis associated with renal injury is not adequately defined.

Case presentation: Patient was a 24-years old man who presented to our hospital with fever, fatigue, and rapidly progressive glomerulonephritis. He had a history of ventricular septum defect (VSD). A renal biopsy specimen revealed crescentic glomerulonephritis and echocardiogram revealed VSD with vegetation on the tricuspid valve. Specimens of blood demonstrated Propionibacterium Acnes. The intensive antibiotic therapy with penicillin G was started without clinical improvement of renal function or resolution of fever over the next 7 days. After the short-term treatment of low dose of corticosteroid combined with continuous antibiotics, high fever and renal insufficiency were dramatically improved.

Conclusion: Although renal function in our case worsened despite therapy with antibiotics a short-term and low dose of corticosteroid therapy with antibiotics was able to recover renal function and the patient finally underwent tricuspid valve-plasty and VSD closure. We suggest that the patients with rapidly progressive glomerulonephritis associated with infective endocarditis might be treated with a short-term and low dose of corticosteroid successfully.
CASE 3: Mycotic Aneurysms

• Mycotic aneurysms are rare inflammatory neurovascular lesions
  – Account 0.7–6.5% of all intracranial aneurysms
  – MA’s have distinct angiographic features
  – Frequently develop at terminal arterial branches

• Because of their spontaneous rupture potential:
  – They are associated with significant morbidity and mortality, as high as 60%–90% in earlier case studies, and 12–32% in more recent literature reviews
CASE 3: Mycotic Aneurysms

• Mycotic aneurysms develop in IE when friable cardiac vegetations result in septic emboli which lodge in intracranial vessel branching points or distal branches.
  – These emboli may occlude vessels, cause cerebral infarction, or promote infection

• The vasa vasorum theory is the most widely accepted mechanism of pathogenesis.
  – It proposes that bacteria escape through the vasa vasorum and induce inflammation of the adventitia.
  – The infection then spreads inwardly.
  – The arterial pulsation against the weakened vessel wall eventually results in aneurysm formation and enlargement.
CASE 3: Mycotic Aneurysms

- Are usually fusiform and eccentric, without saccular characteristics, and are more common in the anterior circulation.
- Histologically are characterized by acute neutrophilic infiltration, along with marked intimal proliferation and internal elastic lamina destruction.
CASE 3: Mycotic Aneurysms

- Although a wide variety of bacteria, mycobacteria, viruses, and fungi may cause mycotic aneurysms:
  - *Viridans Streptococci* and *Staphylococci*
CASE 3: Mycotic Aneurysms

• A scoring system based on the presence of specific clinical and radiographic findings has been proposed:

• Points given for the presence of clinical markers:
  – IE, meningitis, orbital cellulitis, cavernous sinus thrombophlebitis, persistent fever, age less than 45, recent lumbar puncture, and radiographic evidence of aneurysm multiplicity, distal location, fusiform shape, and rapid change in size
CASE 3

• Final thoughts for this case?
CASE 4

• 63 y/o male:
  – DMII, HTN, Hyperlipidemia, GERD
  – Actos, Glyperide, Prilosec, Januvia, Lisinopril, Atorvastatin
  – Presents to PMD w/ 3 – 4 wks h/o fever (103\degree), occasional myalgias, arthralgias. Recent 20# unintentional wt loss. Intermittent non-bloody diarrhea, and fatigue.
CASE 4

- Physical exam: 116/74, 116, 18, Temp 36.9°C
  soft MR murmur (? new)
- WBC 12.2, Hg, 11.1, SCr 1.3
- Blood cultures obtained
- TTE ordered during initial work-up
CASE 4: TTE
CASE 4: Post TTE
CASE 4: TTE
CASE 4

• Initial AB:
  – Vanc, Gent. Cephtriaxone
  – Do you agree with the initial antibiotic choices?
  – Pt. transferred to a tertiary care facility with concerns for the need of a surgical approach to his MV vegetation:
    • 1.9 cm X .9 cm AML
  – At day # 4 Blood cultures: no growth
  – At d/c: ID recommended:
    • d/c Gent (suspicion for enterococcus low)
    • Suggested:
      – 6 weeks IV Vanc 1500 BID
      – Cephtriaxone IV 2g q 24 hrs
  – Planned OP follow-up
CASE 4

- CVS did not feel a compelling need for urgent surgery and would prefer a several week course of anitbiotics and will re-address.

- Two days post d/c for OP IV therapy:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
<th>Result 1</th>
<th>Result 2</th>
<th>Result 3</th>
<th>Result 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBR</td>
<td>Brucella Ab, IgG and IgM, Serum -</td>
<td>Negative</td>
<td>Negative</td>
<td>see fn-f</td>
<td></td>
</tr>
<tr>
<td>QF</td>
<td>Q Fever Ab, IgG and IgM, Serum</td>
<td>QFI IgG &lt;1:16</td>
<td>QFI IgG &lt;1:16</td>
<td>QFI IgM &lt;1:16</td>
<td>QFI IgM &lt;1:16</td>
</tr>
<tr>
<td>SCLAM</td>
<td>Chlamydia Serology, Serum -</td>
<td>CPNEU IGG &lt;1:64</td>
<td>CPNEU IGM &lt;1:10</td>
<td>CTRACH IGG &lt;1:64</td>
<td>CTRACH IGM &lt;1:10</td>
</tr>
</tbody>
</table>
CASE 4

• ID f/u:
  – Re-discussions with pt revealed that he was scratched by his cat on his ankle approx 2 weeks before his initial symptoms. There was initially some redness and pain around this site.

*What should our antibiotic Rx be?*
CASE 4

- Add doxycycline 100 mg BID PO, and suggested re-adding Gent back
- Do you agree with these changes?

PT developed nausea / vomiting with doxy:
Doxy d/c’d and Azithromycin 500 mg PO QD added
Gent 100 IV Q 12 h

9/22 Lab values:
SCr 3.0, K⁺ 6.5, elevated vanc levels → Gent/ vanc d/c’d

Current Antibiotics:
Cephtriaxone 2 gm Q 24 & Azithromycin 500 mg PO QD
Renal function recovered post d/c of gent/vanc

F/U TTE as OP
CASE 4: Post TTE
CASE 4: Post TTE
CASE 4

- Final thoughts for this case?
CASE 4

• Bartonella was first described as a cause of endocarditis in two separate reports in 1993. Now recognized as an important cause of culture-negative endocarditis
  – 3 Bartonella species are known to cause infective endocarditis:
    • B. henselae, B. quintana, and B. elizabethae.
• Multicenter study culture-negative endocarditis:
  – 22 pts w/ Bartonella endocarditis were found (3% of cases):
    • 5 were infected with B. quintana, 4 were infected with B. henselae, and 13 were infected with an undetermined Bartonella species.
• Significant antibody titer levels to diagnose infection are not known.
  – An IgG titer of >100 to be significant
  – Antibody specificity remains a question of antibody estimation tests.
  – Cross-reactivity between Bartonella species and other organisms, including Coxiella burnetii (6) and Chlamydia species has been reported.
CASE 4

• Optimal antibiotic therapy for Bartonella endocarditis is unknown.
• Bartonella-induced endocarditis usually results in extensive valve damage requiring replacement
• Only aminoglycosides appear to be bactericidal against B. henselae
• An antibiotic regimen for Bartonella endocarditis consisting of gentamicin and either ceftriaxone or doxy-cycline has been suggested
• Based on experience with other Bartonella infections, the use of macrolides (erythromycin, azithromycin, and clarithromycin) is a reasonable option, but given their static nature, the addition of a bactericidal agent is recommended.

• JOURNAL OF CLINICAL MICROBIOLOGY, Sept. 2001, p. 3417–341
CASE REVIEW

• CASE 1: SLE pt with MSSA
  – Had a g/u procedure 3 weeks before illness (colposcopy)

• CASE 3:
  – Had braces removed and teeth scaling 4 weeks before illness

• CASE 4:
  – Cat scratch in “immunocompromised host” (DM)
REMEMBER: Guidelines are just that.....

Guidelines
Final Questions:

1) Have the new AHA guidelines changed your practice patterns for SBE prophylaxis?

2) Have you noticed concerns among patients who were previously treated with antibiotics and are now told they don’t need them?

3) Do you choose your SBE prophylaxis decisions more on:

   A) Strict guideline adherence
   B) On a case by case basis