

2020-11-26

Bacteremia and Endocarditis

Steven C. Hatch
University of Massachusetts Medical School

Let us know how access to this document benefits you.

Follow this and additional works at: https://escholarship.umassmed.edu/liberia_peer



Part of the Bacteria Commons, Bacterial Infections and Mycoses Commons, Cardiovascular Diseases Commons, Family Medicine Commons, Infectious Disease Commons, Medical Education Commons, Pathogenic Microbiology Commons, and the Pathological Conditions, Signs and Symptoms Commons

Repository Citation

Hatch SC. (2020). Bacteremia and Endocarditis. PEER Liberia Project. <https://doi.org/10.13028/5mxy-0r88>. Retrieved from https://escholarship.umassmed.edu/liberia_peer/67

This material is brought to you by eScholarship@UMMS. It has been accepted for inclusion in PEER Liberia Project by an authorized administrator of eScholarship@UMMS. For more information, please contact Lisa.Palmer@umassmed.edu.



USAID
FROM THE AMERICAN PEOPLE



University of
Massachusetts
UMASS Medical School

Bacteremia and Endocarditis

Steven Hatch, MD

USAID PEER/Liberia ID Lecture Series

26 November 2020

Goals

- Consider major pathogens that cause bacteremia and endocarditis in both adults and children
- Discuss pathogenesis
- Review clinical manifestations
- Discuss *basic* treatment strategies
- Highlight useful sources of information

A 34 year-old woman with ongoing fevers

- Generalized malaise & fevers for ~6 weeks
- Also notes some shortness of breath, DOE
- Denies wt loss but clothes more loose
- She has no major PMHx; had two uncomplicated childbirths, children now 12 and 16, healthy
- No recent trauma or prodrome, though does note minor toothache past 2-3 months
- Lives in Duazon with husband & children; has chickens & a dog

A 34 year-old woman with ongoing fevers con't

- Vitals: 38.6 C, HR 106, BP 110/60, RR 22, O2 Sats 94%
- Exam: neck supple; one L upper molar with cavity
- Cardiac/Pulm: IV/VI systolic "whoosh" murmur at apex; lungs clear
- Abd: splenomegaly
- Painless papules on palms

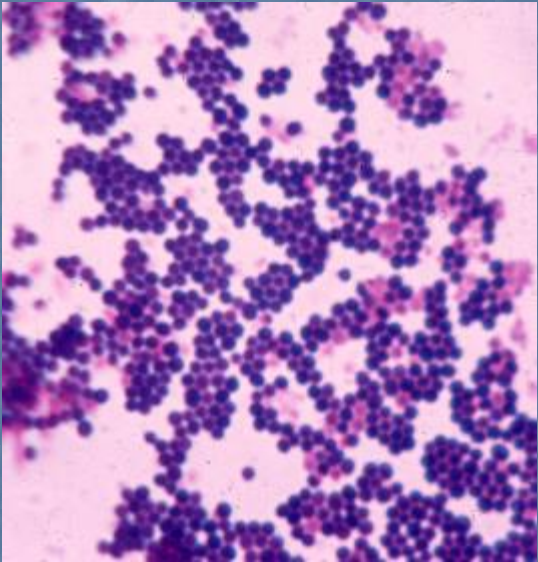


A 34 year-old woman with ongoing fevers con't

- CBC: WBC 14.6 (90% neut), Hct 30.4; Plt 288; Cr. 1.1
- Blood cultures are ordered
- 24 hours later the lab notifies you that a bacteria is growing in both aerobic and anaerobic bottles

#1: which of the following bacteria is the most likely to have grown?

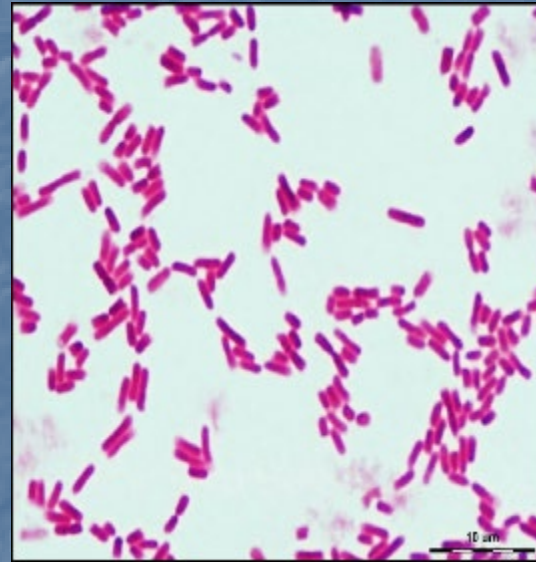
A



B



C



D



#2: which was the most likely cause of the positive blood cultures?

- A. consequences of childbirth
- B. the toothache
- C. the macules on the palms
- D. the chicken
- E. the dog
- F. her husband

#3: What would be an appropriate antibiotic? (May be more than one, choose all effective abx)

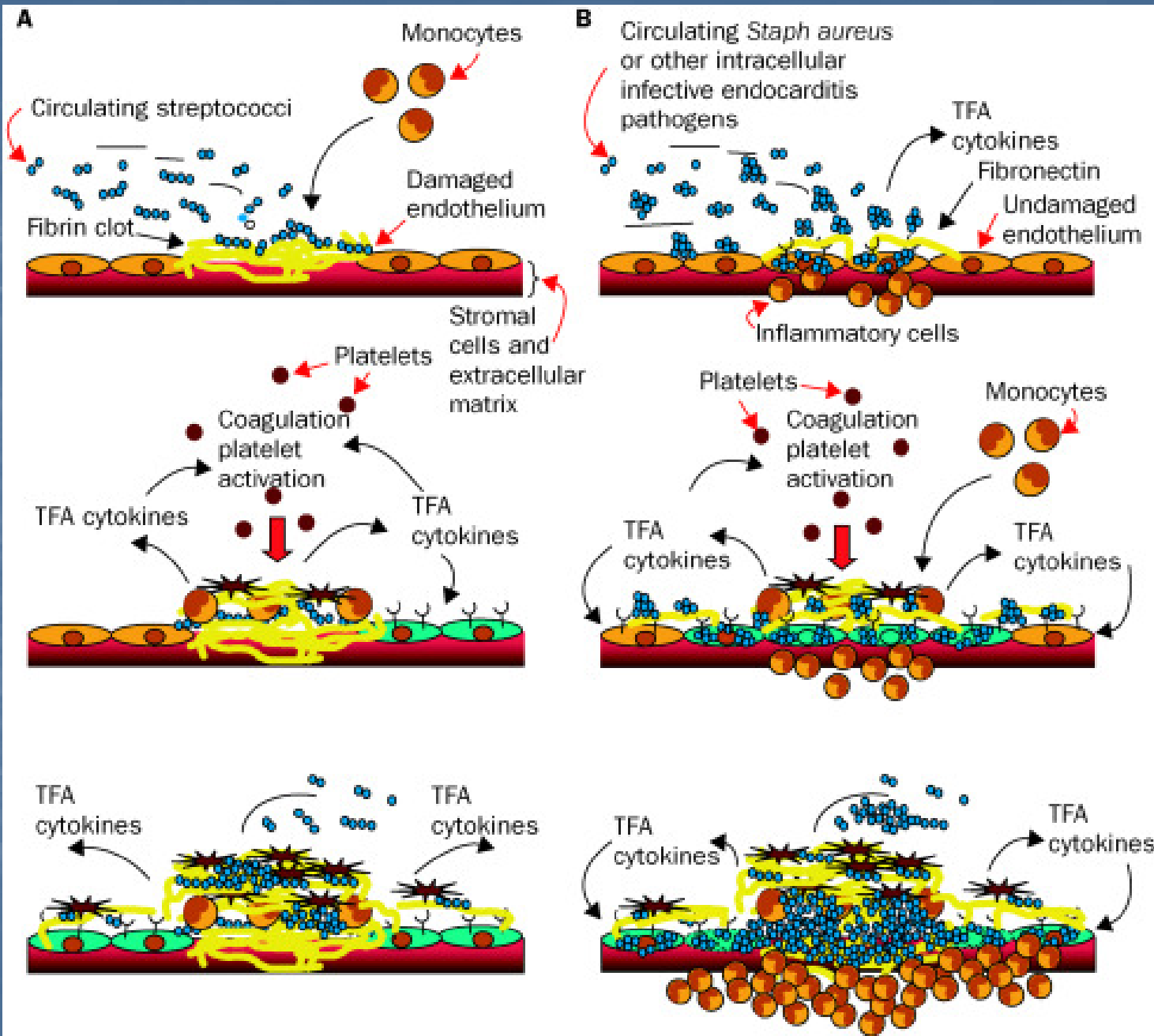
- A. IV penicillin
- B. IV ceftriaxone
- C. IV amoxicillin
- D. Fluconazole
- E. RIF-INH-PZA-EMB-B6
- F. IV gentamicin

Your body is under attack every hour of every day

- Bacteria *always* trying to multiply in, on, around us
- We are commensal clouds of bacteria
- Typical adult has ~10 trillion cells
- There are at least as many bacteria, maybe much more
- Generally these bacteria benefit our lives
- But not so good when they are in bloodstream

Risks for bacteremia and endocarditis

- Anything that violates the skin and/or mucous membranes:
 - Trauma/cuts & jobs that cause them (e.g. butchering, construction)
 - Injection drug use (drugs of *any* kind—heroin or insulin)
 - Dental caries, inflamed gums
 - Animal exposures or bites
- Immune suppression:
 - Diabetes, Type I or Type II, worse with higher A1Cs
 - HIV
- Cardiac valvular abnormalities:
 - Rheumatic heart disease (esp in children)
 - Mitral valve prolapse



How did she develop this disease?

- Infection is a *thrombogenic* process
- Vegetations are mainly aggregations of fibrin & platelet remnants
- Bacteria get into your blood every day, but *constant* seeding of blood with bacteria increases risk of deposition on valves

Not all bacteria are equally likely to cause endocarditis

Frequency ratios†, in rank order, of the indicated taxa in isolates from

endocarditis

purulent disease

bacteraemia

<i>S. mutans</i>	14·2:1	<i>S. milleri</i>	5·1:1	Group A	4·0:1
<i>S. bovis</i> I	5·9:1	Group B	3·3:1	Group G	2·6:1
<i>Dx+ mitior</i>	5·5:1	Miscellaneous streptococci	2·4:1	<i>S. faecalis</i>	2·1:1
<i>S. sanguis</i>	3·0:1	Group A	1·5:1	<i>S. bovis</i> II	1·9:1
<i>S. mitior</i>	1·8:1	Group G	1:1·1	Group B	1·4:1
“Viridans”	1·4:1	<i>S. bovis</i> II	1:1·2	“Viridans”	1·2:1
<i>S. faecalis</i>	1:1·2	<i>S. sanguis</i>	1:2·2	<i>S. mitior</i>	1:1
Miscellaneous streptococci	1:1·3	“Viridans”	1:3·0	<i>Dx+ mitior</i>	1:1·4
<i>S. bovis</i> II	1:1·7	<i>S. faecalis</i>	1:3·7	Miscellaneous streptococci	1:1·9
<i>S. milleri</i>	1:2·6	<i>S. bovis</i> I	1:3·8	<i>S. sanguis</i>	1:2·3
Group C	1:2·9	<i>S. mitior</i>	1:4·5	<i>S. milleri</i>	1:2·3
Group B	1:7·4	<i>Dx+ mitior</i>	†	<i>S. bovis</i> I	1:3·6
Group A	1:32·0	<i>S. mutans</i>	†	<i>S. mutans</i>	1:6·0

Infective Endocarditis: Pathogenesis, complications, and clinical findings

Author:

Sean Spence

Reviewers:

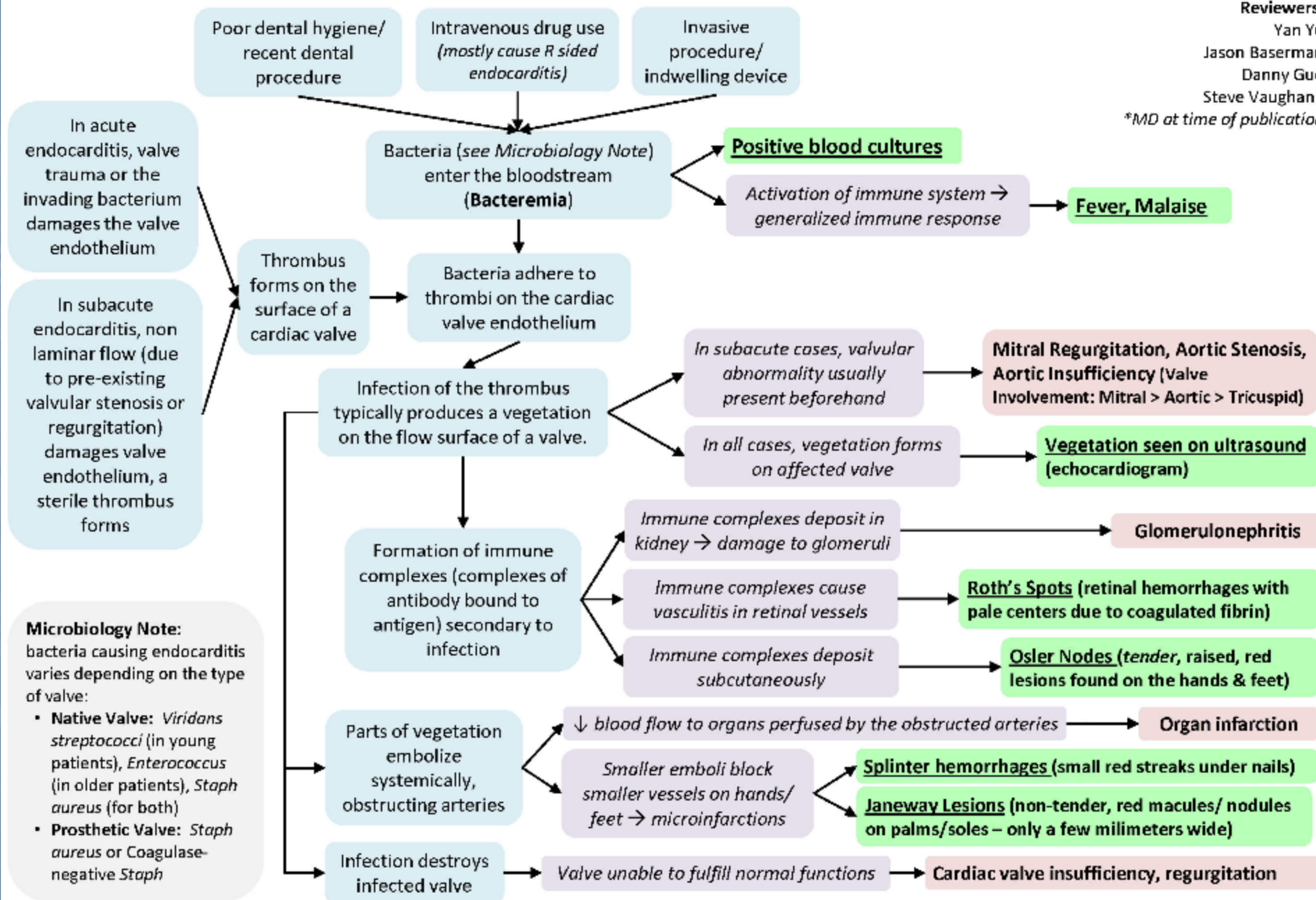
Yan Yu

Jason Baserman

Danny Guo

Steve Vaughan*

*MD at time of publication



Legend:

Pathophysiology

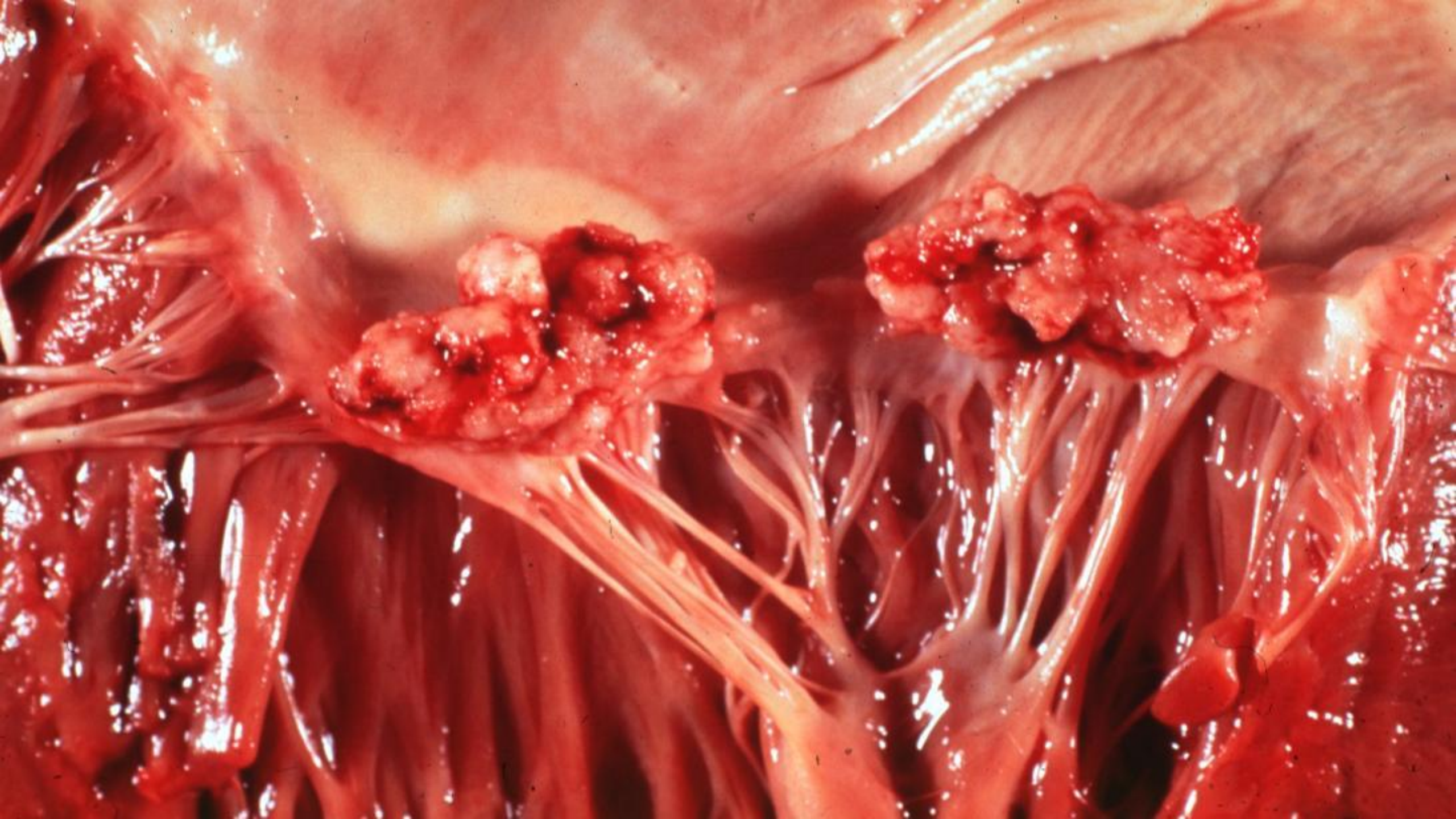
Mechanism

Sign/Symptom/Lab Finding

Complications

Published August 20, 2013 on www.thecalgaryguide.com





on univ.
center

Vegetation

0 93 180

34.05



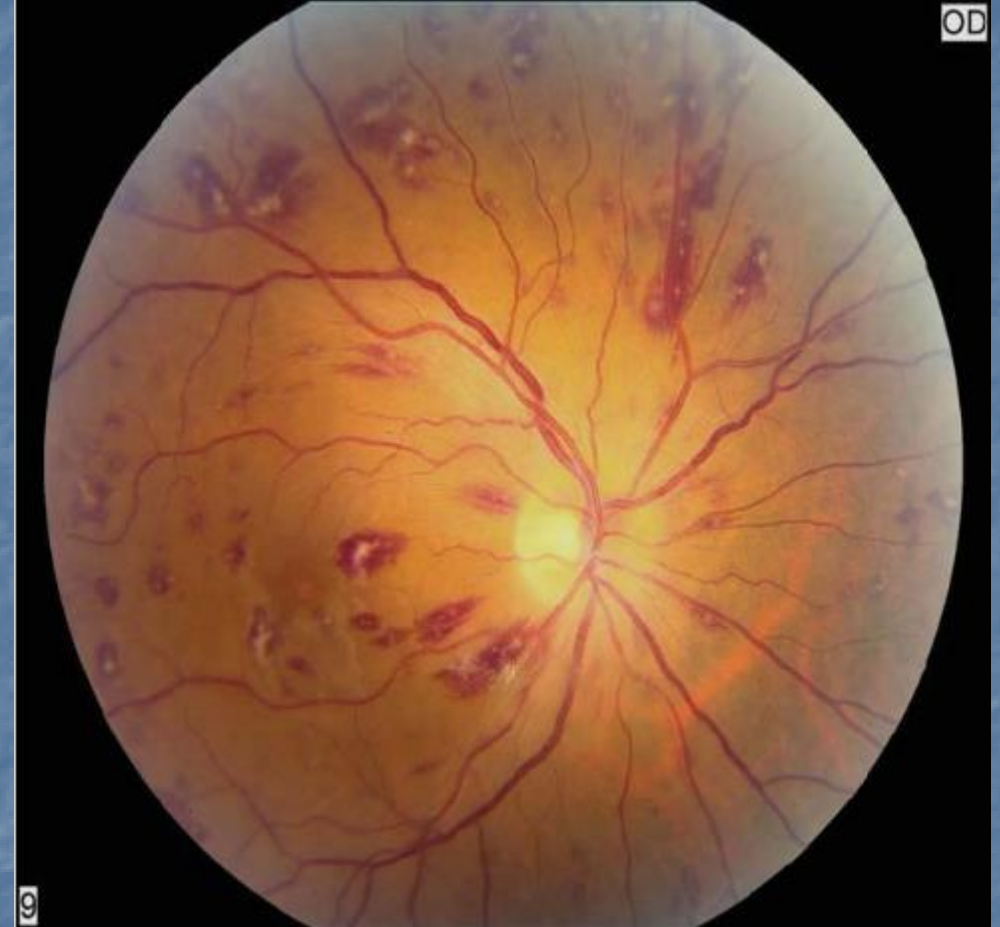
#4: what would be the main sequelae of her infection if left untreated? (check all that apply)

- A. Immunologic phenomena
- B. Renal failure
- C. Hepatotoxicity from bacterial toxins
- D. CVA
- E. Splenic rupture

Once vegetations are established, then what happens?

- Sustained bacteremia, sepsis & septic shock
- Emboli: often cause infarcts of downstream tissue
 - Left: CVA; L main coronary artery; renal & splenic infarcts, toes/fingers (Janeway lesions, Roth's spots); vertebra
 - Right: pulmonary infarcts
- Emboli part 2: metastatic abscesses (mainly w/ *Staph*)
- Valve destruction
 - Left: aortic insufficiency, flash pulmonary edema, congestive hepatopathy
 - Right: less physiologically consequential due to low-pressure system
- Immune phenomena: Osler nodes

Roth's spots



Mimics of Endocarditis

- Noninfectious endocarditis:
 - Libmann-Sacks endocarditis (Lupus)
 - Marantic endocarditis (cancer)
- Acute rheumatic fever
- Thrombi (hypercoagulability)
- Myxoma

#5. Treatment length should be:

- A. 3 days
- B. 7 days
- C. 14 days
- D. 28 days
- E. 42 days
- F. It depends

Further Reading

- De Villiers MC, Viljoen CA, Manning K, Van der Westhuizen C, Seedat A, Rath M, Graham M, Ntsekhe M. The changing landscape of infective endocarditis in South Africa. *S Afr Med J*. 2019 Jul 26;109(8):592-596. doi: 10.7196/SAMJ.2019.v109i8.13888. PMID: 31456555.
- Horliana AC, Chambrone L, Foz AM, Artese HP, Rabelo Mde S, Pannuti CM, Romito GA. Dissemination of periodontal pathogens in the bloodstream after periodontal procedures: a systematic review. *PLoS One*. 2014 May 28;9(5):e98271. doi: 10.1371/journal.pone.0098271. PMID: 24870125; PMCID: PMC4037200.
- Nkoke C, Teuwafeu D, Nkouonlack C, Abanda M, Kouam W, Mapina A, Makoge C, Hamadou B. Challenges in the management of cardiovascular emergencies in Sub-Saharan Africa: a case report of acute heart failure complicating infective endocarditis in a semi-urban setting in Cameroon. *BMC Res Notes*. 2018 Apr 25;11(1):259. doi: 10.1186/s13104-018-3361-2. PMID: 29695277; PMCID: PMC5918907.
- Nkomo VT. Epidemiology and prevention of valvular heart diseases and infective endocarditis in Africa. *Heart*. 2007 Dec;93(12):1510-9. doi: 10.1136/hrt.2007.118810. PMID: 18003682; PMCID: PMC2095773.
- Parker MT, Ball LC. Streptococci and aerococci associated with systemic infection in man. *J Med Microbiol*. 1976 Aug;9(3):275-302. doi: 10.1099/00222615-9-3-275. PMID: 785000.
- Pecoraro AJ, Doubell AF. Infective endocarditis in South Africa. *Cardiovasc Diagn Ther*. 2020 Apr;10(2):252-261. doi: 10.21037/cdt.2019.06.03. PMID: 32420108; PMCID: PMC7225416.