Endocarditis

The term "endocarditis" in general refers to an inflammation of the inner lining of the heart. Most cases of endocarditis are bacterial infections that specifically involve the heart valves.

Bacterial endocarditis is a relatively uncommon condition, with the American Heart Association estimating that 10,000 to 20,000 new cases occur in the United States each year. Most cases of endocarditis that develop outside the hospital occur in patients who have predisposing conditions, such as congenital or degenerative heart disease, presence of a prosthetic heart valve, or injection drug use.

Symptoms of endocarditis are nonspecific, and include fever in most patients, often accompanied by weakness, shortness of breath, muscle and joint pain and other symptoms. These symptoms may develop over just a few days, or sometimes over weeks or months.

Endocarditis is typically diagnosed by a combination of the patient's history and symptoms, a thorough physical examination, blood cultures, and often ultrasound imaging of the heart (echocardiography).

Treatment of endocarditis typically requires a long course (at least 4 weeks) of intravenous antibiotics, and also may require valve replacement surgery - this becomes necessary in approximately 25% of cases.

For more detailed information on endocarditis, see the Centers for Disease Control website at www.CDC.gov, or see the “Questions and Answers” section within this website.

Questions and Answers about Endocarditis

1. What is endocarditis?

In the most general sense, endocarditis refers to any inflammation of the lining of the heart, including its valves. The remainder of these questions and answers will refer to infective endocarditis (IE), which is the most common variety. Other conditions such as cancer and connective tissue diseases can also rarely lead to endocarditis.

2. How common is endocarditis?

Estimates from the American Heart Association place the annual incidence of IE in the United States at 10,000 to 20,000 new cases. Endocarditis accounts for about 1 in every 1000 admissions to U.S. hospitals.

3. Who develops endocarditis?

Most patients who develop IE are over the age of 50. Men are slightly more commonly affected than women. Various studies estimate that between 14% and 28% of IE cases happen in hospitalized patients; the majority occur in patients who are residing in the community. Many patients who develop IE have underlying cardiac disease, especially of the cardiac valves. Types of underlying cardiac disease include a history of rheumatic fever with heart involvement, a variety of congenital heart defects including mitral valve prolapse and bicuspid aortic valve, degenerative changes of heart valves in older persons, and the presence of a prosthetic heart valve.

4. How does endocarditis actually develop?

Before infection settles on a heart valve, it usually arrives there by way of the bloodstream. Infection can get into the bloodstream by a variety of routes. This can include spread of established infection from the skin or other organs into the blood, or spread of a very small number of organisms from seemingly minor trauma to the skin, gums and oral

cavity, or gastrointestinal and genitourinary tracts. Infectious organisms can also enter the bloodstream directly in injection drug users, during hemodialysis treatments, or rarely through other medical procedures that involve direct access to the bloodstream.

5. What types of organisms cause endocarditis?

The vast majority of cases of IE are caused by bacteria, most commonly streptococci ("strep") and staphylococci ("staph"). A large variety of other organisms, including other bacteria, yeasts, molds and possibly viruses, can also cause endocarditis. In about 5% of cases of IE, the infecting organism is not identified, usually due to the use of antibiotics before blood samples are taken or due to infection by unusual organisms.

6. What are symptoms of infective endocarditis?

Fever is the most common symptom seen in IE, occurring 95% of the time. Many other symptoms are non-specific and could represent any number of other illnesses. These other symptoms include chills, weakness, shortness of breath, weight loss, cough, chest pain, nausea and vomiting, and muscle and joint aches. In more aggressive cases of IE, these symptoms may appear suddenly, over just a few days. In other cases, symptoms might build slowly, over weeks or even months.

7. How is endocarditis diagnosed?

A patient's medical history, symptoms, and physical examination will often suggest the diagnosis. On exam, signs of heart valve dysfunction and spread (embolization) of infection from the heart valve to distant sites are looked for. Some laboratory abnormalities such as an elevated white blood cell count and anemia are common, but are non-specific. The mainstay of the laboratory diagnosis of endocarditis is the performance of blood cultures. These are often obtained at 2 or more time points when endocarditis is first suspected, and then sometimes every day or two thereafter until the diagnosis is made and the patient's condition is improving. If routine blood cultures do not identify the infection, but endocarditis is still suspected, additional blood tests looking for antibodies against unusual organisms are often performed.

Ultrasound imaging of the heart (echocardiography or "echo") is also employed to make the diagnosis of endocarditis and to examine the function of the heart. Two main types of echo testing may be used. Transthoracic echo takes simple ultrasound pictures of the heart through the patient's chest, and is a completely safe and painless procedure. Transesophageal echo (TEE) is a more complicated procedure that involves inserting an echo probe into the patient's esophagus through the mouth after sedation, to take more detailed pictures of the heart from within the chest cavity. TEE is sometimes needed if the transthoracic echo test is unrevealing, if specific complications of endocarditis are being looked for, if the patient has a prosthetic heart valve, or if cardiac surgery is being planned. When endocarditis is present, transthoracic echo will find the abnormality 60% to 65% of the time, but TEE will find it approximately 95% of the time. Electrocardiograms (EKGs) are often performed as well; these will not make a diagnosis of endocarditis by themselves, but can help to monitor for complications of the infection.

8. How is endocarditis treated?

The main therapy for IE is a relatively long course (at least 2 weeks, often 4 to 6 weeks) of intravenous antibiotics. Often only one antibiotic is needed, and is dosed as infrequently as once a day (sometimes even less in patients with kidney disease) to as often as every 4 hours. Sometimes 2 intravenous antibiotics will be prescribed, depending on the type of infecting organism. For some cases of prosthetic valve endocarditis, a third (usually oral) antibiotic may also be added. In order to deliver intravenous antibiotics for this long, a special IV catheter will often be needed, inserted into the patient's upper arm or sometimes into a vein in the chest.

9. How will I receive such a long course of IV antibiotics?

Once you are medically stable to leave the hospital, IV antibiotics are typically given in 1 of 3 ways, depending on a number of factors such as your overall medical condition, the frequency of the antibiotic dose, and insurance considerations. Some patients will go to a rehabilitation or nursing facility to finish the remainder of their treatment.

On occasion, patients will be discharged home from the hospital, but will return to the hospital or an office every day to receive a dose of IV antibiotics, if their particular antibiotic can be given once a day. More and more, patients are able to receive much of their IV antibiotics at home. In these cases a special kind of IV catheter called a PICC (percutaneously inserted central catheter) will be placed in the upper arm prior to discharge. A visiting nurse will demonstrate how to care for the catheter and administer the IV antibiotics, so that the patient or family can perform much of this care for themselves, at home. Visiting nurses continue to be available for questions or problems, and they can often draw any necessary follow-up blood tests from the PICC itself.

10. Can I be treated with oral antibiotics alone for endocarditis?

For the vast majority of patients, intravenous antibiotics are the best choice, based on the seriousness of this infection and decades of study of these therapies. In carefully selected cases, a 4-week course of 2 oral antibiotics may be considered. This has only been examined in 2 studies of injection drug users with uncomplicated Staph endocarditis of the right side of the heart. Consultation with an expert in infectious diseases is recommended when deciding on a treatment plan for any case of endocarditis.

11. Do the antibiotics have any side effects?

Yes, as with nearly all medications, there is the potential for side effects from antibiotics. The more common side effects are generally mild, and include nausea, headache, mild diarrhea, and subtle changes in blood test results. Much less commonly, very serious side effects can occur, including anaphylaxis and other serious allergies, organ damage (particularly to the liver or kidneys), development of a severe secondary diarrheal infection, and development of dangerously low blood counts. Additionally there are rare complications from having an intravenous catheter for several weeks, including secondary infection and blood clots.

12. What are the potential complications of endocarditis?

Endocarditis is a very serious infection, and unfortunately, complications are not uncommon. Within the heart, valve damage may occur, patients may develop heart failure, heart rhythms can be affected, and abscesses may form. Infection may spread outside of the heart to any part of the body, and cause a variety of problems from small nodules on the hands or feet to large abscesses of internal organs, bone and joint infections, and stroke. The immune system's reaction to the infection can also lead to complications such as kidney failure. Endocarditis occurring on the right side of the heart (on the tricuspid or pulmonic valves) tends to lead to complications predominantly in the lungs.

13. Are there other therapies that are needed for endocarditis?

Approximately 25% of the time, valve replacement surgery may be required as part of the overall therapy for IE. When this is needed, it is usually because of severe heart valve damage from the infection, spread of the infection into heart muscle tissue, or other complications as listed above. A cardiac surgeon may be involved early in the course of therapy for endocarditis, to help make the decision whether surgery will need to be considered. If surgery is performed, antibiotics are often continued for weeks afterwards, to ensure the best chance of curing the infection.

14. What is the overall prognosis in someone who develops endocarditis?

After diagnosis and 1 week of appropriate treatment, approximately 75% of patients will no longer have fever. Fifteen percent to 20% of episodes are complicated by stroke. About 25% of patients will require valve replacement surgery. Without treatment, endocarditis is uniformly fatal. Even with proper treatment, 20% to 30% of patients will still die from the infection or complications thereof. Thankfully, with timely diagnosis and proper therapy and follow-up, the majority of patients with endocarditis are fully cured.

15. What sort of follow-up is needed during therapy for endocarditis?

Early on, the key areas of follow-up include monitoring of fever and other signs of acute illness, monitoring heart and heart valve function, looking for evidence of spread of infection outside the heart, and watching for potential side effects from therapy. Once the infection is deemed to be under control, close follow-up is still needed for the duration of antibiotic therapy, as late complications can still occur both in and outside of the heart, and side effects from the antibiotics can still appear. Blood tests will often be performed on at least a weekly basis to follow the course of the infection and look for potential antibiotic side effects. Regular physician visits with specialists in infectious diseases, cardiology, and/or cardiac surgery will also be recommended.

16. What sort of follow-up is needed after therapy for endocarditis?

If significant damage to the heart occurred because of the endocarditis, or if valve replacement was performed, close follow-up with a cardiologist and/or cardiothoracic surgeon will be crucial. In selected patients, repeated blood cultures to look for relapse of infection may be performed. This is typically done in patients who have very difficult-to-treat organisms, or who have artificial material in place (such as a prosthetic valve or pacemaker).

17. Can I get endocarditis a second time?

Yes. Having an episode of IE does not provide immunity against later episodes, unlike some other infections such as measles or chickenpox. In fact, people that have had endocarditis once have a much greater chance of getting a second episode of endocarditis, because of the valve damage that may have occurred during the first infection. Additionally, even with long courses of antibiotics (and sometimes even with valve replacement) there is a chance that the original infection may relapse after antibiotics are stopped.

18. Is endocarditis contagious?

No. Since many of the bacteria that cause endocarditis are typically found in the mouth or on the skin, these bacteria can potentially be passed from one person to another by close contact. However, even if bacteria from someone with endocarditis are passed to you, that does not mean that you will develop endocarditis.

19. What can be done to prevent endocarditis?

Since many episodes of endocarditis are caused by bacteria that initially reside in the mouth or on the skin, good oral and skin hygiene and prompt attention to infections in these areas may help to decrease the risk of developing endocarditis in susceptible persons. When people at increased risk for endocarditis undergo a procedure that may lead to bacteria entering the bloodstream (such as extensive dental work or certain gastrointestinal or urinary tract procedures), a dose of prophylactic antibiotics may be recommended just before the procedure is performed. Your physician can help to decide if prophylactic antibiotics are warranted for your specific procedure and your specific heart condition. Additionally, if you have a cardiac condition that places you at high risk for endocarditis, you should take any fever or other serious symptoms very seriously and report them to your physician as soon as possible.