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Chagas Disease: A Dangerous Kiss

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Introduction

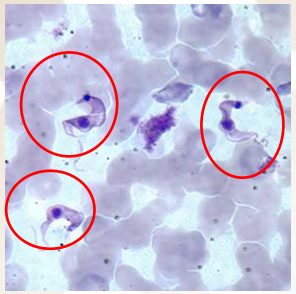
Parasitic infections are a common occurrence worldwide and are often more common in low income countries. While these infections are associated with poor compromised communities outside the United States these diseases effect people within the United States and are more common than realized. One specific parasitic infection infects its human host causing Chagas disease. Chagas disease is an infection that occurs from the parasite *T. cruzi* and was named for the Brazilian physician Carlos Chagas who discovered the disease in 1909 (CDC, 2014). According to the Centers for Disease Control (CDC, 2014), Chagas disease has been targeted as a priority for public health action, and is considered one of the neglected parasitic infections. The CDC (2014) considers Chagas disease a priority due to its severity, the number of people infected, and the ability to prevent and treat the disease. According to Stampert and Montgomery (2010), there is a substantial knowledge deficit among physicians about Chagas disease. This is concerning when one considers the harmful effects of the disease and the amount of people infected in the United States. Chagas disease can be acquired in the United States as there have been cases of *T. cruzi* vector borne infections in Mississippi (Canty et. al., 2012).

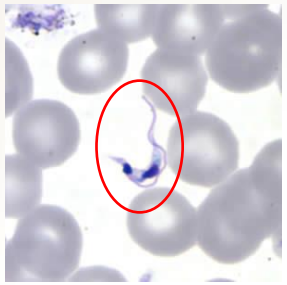
Pathophysiological Processes

Chagas disease is transmitted when the parasite *T. cruzi* enters the body. This entry is done through the triatomine insect also known as the "kissing bug", which hosts the parasite *T. cruzi* (CDC, 2014). The parasites main mode of transmission is through defecation of feces from the triatomine bug to its human host. Being a vector borne disease, it can also be transmitted through food and drink infected by *T. cruzi*. The disease may also be transmitted congenitally, through blood transfusions, or organ transplants (Montgomery, Starr, Canty, Edwards, & Meymandi, 2014). In the human host the acute phase of *T. cruzi* is replicated in most nucleated cell types. The *T. cruzi* will activate cell signaling pathways used during invasion of the human host cells. During the chronic phase of the disease, the *T. cruzi* parasite will primarily live in cardiac and smooth muscle cells. *T. cruzi* can cause hypertrophy, inflammation, and fibrosis, in the cell, which can lead to heart failure and gastrointestinal disorders (Mott, Lenormand, Costales, Fredberg, & Burleigh, 2009).

Currently there are more than 300,000 individuals infected with Chagas disease in the United States (Woodhall, Jones, Cantey, Wilkins, & Montgomery, 2014). The disease is an endemic across Central and South America, but the parasite that carries the illness has been found in the United States and there have been documented cases of vector-borne infection in the United States (Woodhall, et al., 2014). The disease will persist for the life of the patient unless treatment is initiated. If left alone the disease has potential life threatening effects including apical aneurysm, heart failure, megacolon, megaesophagus, and the risk of stroke is increased (Woodhall, et al., 2014). The disease also carries potential congenital effects including hepatosplenomegaly, anemia, or thrombocytopenia. Treatment is indicated for Chagis disease in patients younger than 18 and for most adults younger than 50 who do not have cardiomyopathy. Drugs used to treat Chagas disease are not approved by the Food and Drug Administration but are available through the CDC (Woodhall, et al., 2014).

Above: The triatomine, the vector for the T. cruzi parasite. Copyright 2014 by CDC





Left and Right: The parasite T. Cruzi in peripheral blood smears
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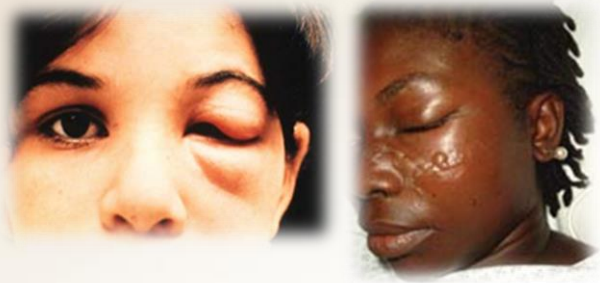
Case Study

A 53 year old female presents to the emergency department with complaints of left eye pain, headaches, daily fevers up to 102°F, dyspnea on exertion, decreased energy, decreased appetite, and a blotchy rash. The patient had just recently returned from a three week stay in Costa Rica. The patient stayed in a small village in Costa Rica that did not have netting to cover the windows and bed. The patient did not have any symptoms until 2 days after her return to the United States. Initially the patient was seen for left eye swelling and pain and was treated for conjunctivitis and an allergic reaction. The patient did not respond to these treatments, which prompted a referral to the emergency department. Upon physical exam at the emergency department the patient vital signs were all within normal limits, temperature 37.1°C, heart rate 91 beats/min, blood pressure 98/62 mmHg, respiratory rate 18 breaths/min, and oxygen saturation 98% on room air. The patient was in no apparent distress. There was periorbital edema and mild erythema of the left eye without visible discharge. The right eye was normal. All other physical examinations were unremarkable (Carter, Juliano, Montgomery, & Qvarnstrom, 2012).



Above: Swelling of one eyelid called Romaña sign is a indicator of Acute Chagas disease
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Diagnostic test for the patient were done and results were as follows. The patient had an abnormal 12-lead echocardiogram (EKG) revealing sinus rhythm with a low voltage QRS complex. In response to the abnormal EKG a transthoracic echocardiogram (TTE) was performed. The TTE showed normal left ventricular ejection fraction (60%), but noted diastolic left ventricular dysfunction, elevated left ventricular filling pressure, dilated left atrium, thickened pericardium, and a small circumferential pericardial effusion. Peripheral blood smear showed trypomastigotes of *T. cruzi*. This finding was confirmed by the CDC, Parasitic Diseases Branch. All other lab values were unremarkable. (Carter, Juliano, Montgomery, & Qvarnstrom, 2012). The patient was treated for Chagas disease using CDC recommendations and the patient returned to normal function including the function of the left ventricle (Carter, Juliano, Montgomery, & Qvarnstrom, 2012).

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Signs and Symptoms

When discussing signs and symptoms of Chagas disease we look at the two phases the disease occurs in, acute and chronic. In the acute phase of Chagas disease caused by T. cruzi symptoms are mild and often not seen. Symptoms include fever, headache, enlarged lymph glands, difficulty breathing, chest pain, and abdominal pain. Some individuals have a purple swelling to the lid of one eye, called Romaña sign, after the initial bite from the triatomine bug (Chagas disease, 2010). In the chronic phase symptoms include gastrointestinal problems and cardiac symptoms. The majority of individuals with chronic Chagas disease will present with cardiac symptoms as the disease process attacks cardiac muscle leading to heart failure (Chagas disease, 2010).

Nursing Implications

It is important for healthcare professionals practicing in different levels to be aware of Chagas disease. Awareness of the disease is important because of the number of infected individuals in the United States and the substantial knowledge deficit among physicians Chagas disease (Stampert and Montgomery, 2010). Understanding at risk populations, immigrants from areas where Chagas disease is endemic, individuals who have traveled to those areas, and areas of poor sanitation here in the United States, can help the healthcare provider recognize Chagas disease and limit the diseases impact on patients. In catching and treating the disease in the acute phase long term effects of chronic Chagas disease can be prevented. Chagas disease has been responsible for 30,000 to 45,000 prevalent cases of cardiomyopathy leading to heart failure (Custer et al, 2012)..

It is also important to recognize the risk posed to the population through donations of blood and solid organs. Blood is now being tested for *T. cruzi* and the testing has been shown to be effective in recognizing the disease. Each donor is tested a single time this process has been shown to decrease the risk of donor derived *T. cruzi* infection (Custer et al, 2012). Individuals who test positive are referred to a physician for further evaluation and treatment as the test is not confirmatory for the disease (Custer et al, 2012). The risk of transmission through organ transmission is low but does exist. In a 2013 study it was shown that only 19 percent of US organ procurement organizations test for *T. cruzi* (Huprikar et al, 2013). Understanding at risk individuals who are potential donors may help to increase the number of organs tested for *T. cruzi*. Individuals may still receive organs from donors infected with *T. cruzi* but need to be monitored closely for effects of Chagas disease (Huprikar et al, 2013).

The public needs to be made aware of diseases such as Chagas disease. This is the responsibility of healthcare providers of all levels. Individuals leaving the country and traveling to areas where Chagas disease is endemic need to be educated on signs and symptoms and methods of prevention. If these individuals become infected by *T. cruzi* they will hopefully understand signs and symptoms and not let acute Chagas disease develop into the chronic form.

Conclusion

Chagas disease represents a burden to the United States health system with over 300,000 individuals being infected (Woodhall et al, 2014). The disease presents severe complications if left untreated. The CDC list Chagas disease as a priority for public health action (CDC, 2014). The designation of being a priority for action implies that we as healthcare professionals need to understand and learn about the disease its processes and risk factors. In doing this we can positively impact the lives of those infected with Chagas disease and prevent long term complications. Understanding diseases such as these are important as the world we live in becomes smaller.

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