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MORBIDITY OF CHAGAS' HEART DISEASE

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The heart is constantly attacked in infections by *Trypanosoma cruzi* (Chagas, 1928). The degree of cardiac involvement varies among individuals and in accord with the evolution of the disease. Also it is not the same in different geographical areas (Prata, 1985). Morbidity will be considered for the two principle clinical phases established by Chagas (1910) namely acute and chronic.

Acute phase

The myocarditis is similar to other types of acute myocarditis and many times the clinical manifestations are not proportionate to the histopathological lesions. Frequently the tachycardia is more than the temperature elevation would produce. In a minority of cases distant heart sounds, discrete arterial hypotension and functional murmurs may be encountered. Arrythmias are rare. In a few cases biventricular insufficiency occurs with congestion in the pulmonary and systemic circuits.

The usual way to detect cardiac involvement is by electrocardiogram (ECG) and chest X-ray (especially serial X-rays). The most frequent cardiac alterations are sinus tachycardia, low QRS voltage, prolonged PR and/or QT intervals and primary alterations of the T wave. Ventricular extrasystoles, auricular fibrillation or complete right bundle branch block are rare in this phase and always occur in the group with a fatal outcome. Radiology shows varying degrees of generalized cardiomegaly which predominates in the left ventricle in some cases.

In a patient from an endemic area with fever, tachycardia, minor lymphadenopathy, splenomegaly detected on deep inspiration and lymphocytosis the diagnosis of acute Chagas' disease is probable, even although there may be no signs at the portal of entry. The origin of the patient and a positive history of living with triatomines are important historical points. However the recognition of *T. cruzi* in the peripheral blood is essential for correct diagnosis.

About 5% of diagnosed patients in the acute phase die from myocarditis or meningoencephalitis. In the other 95% the parasites disappear from the peripheral blood and symptoms resolve in 2-4 months. Concomitantly the X-ray and ECG return to normal although abnormalities persist in the ECG in a few cases. Rarely the disease has a sub acute course. Although millions of chagasic patients have been diagnosed in Brazil only about 800 were in the acute phase. These were mainly in Bambuí, Uberaba, São Felipe and Goiânia where there were groups interested in studying the disease. Generally the acute phase passes unnoticed with few or no symptoms (Teixeira, 1977). In this phase of inapparent Chagas' disease there is immunosuppression (Teixeira, 1981). Dias (1982) believes that patients with a detectable acute phase have a greater chance of developing symptomatic chronic disease in the long term when compared with asymptomatic acute phase patients. Also the evolution, at least to the third decade, appears more favorable when there are no electrocardiographic changes in the acute phase or when acute disease occurs in older patients (Dias, 1982).

Chronic phase

Indeterminate form – After the acute phase the disease has a long latent period. After 20-30 years, 40% of the patients are still in this latent phase. Because there is no clinical characteristic of this phase it is called indeterminate (Villela, 1923). The ECG is normal in this phase. More than half the infected population in endemic areas are in this phase (Dias, 1982; Macêdo, 1973; Pereira, 1983; Castro, 1980). Its prevalence is greater in the first decade of life (Castro, 1980; Coura, 1975) decreasing with age a rate of 2% per year. So Chagas considered this group as potential cardiac patients. Indeterminate clinical form patients in the first decade of infection have an excellent prognosis and there should be no restriction in their activities (Faria, 1978) and there is practically no risk of sudden death. In spite of this, certain aspects deserve consideration. Histopathological examination showed granulomatous inflammation in the myocardium (Chapadeiro, 1978; Lopes et al., 1975). The same changes occur in 61.71% of cardiac biopsies in patients with the indeterminate form of the disease (Barreto, 1982). Some of these patients have atrioventricular conduction abnormalities after pilocarpina (Macêdo, Prata & Silva, 1974) or atropine and propanalol injection (Decourt, Sosa & Pileggi, 1981). On cycloergometric testing some patients present systolic pressure (Bellini et al., 1979) or pulse changes (Macêdo et al., 1979). On echocardiographic (Friedmann et al., 1981), vectocardiographic (Mady et al., 1985), haemodynamic studies (Mady et al., 1982; Garzon et al., 1979) and the evaluation of the autonomic cardiac function (Junqueira & Veiga, 1984) some patients show alterations. Therefore using more sophisticated investigational methods cardiac abnormalities appear. We do not know if these patients have a different prognosis.

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Cardiac form – This clinical form is commonest in individuals 20-50 years old generally 10-30 years after the acute phase. The autopsy findings vary with the symptomatology. When cardiac insufficiency is absent the heart may be anormal or only slightly enlarged. The only macroscopical finding may be a thinning of the left ventricular apex which may present an aneurysmatic dilatation. Chronic myocarditis and fibrosis may be focal or diffuse. Lesions of the conduction system are frequent and usually fibrotic. This picture is encountered in cases of sudden death.

When cardiac insufficiency is present especially after the period of decompensation, the heart is hypertrophied and shows dilatation of all chambers. Passive congestion predominates in the systemic circulation. Thromboembolic phenomena and thinning of the heart apex are common. Myocarditis is intense. There is hypertrophy of the cardiac fibres associated with areas of necrosis and hyaline degeneration, focal or diffuse fibrosis and oedema. The lesions of the excito conductive system of the myocardium can be extensive (Andrade, 1973). The chagasic cardiopathy can present a symptomatic or an asymptomatic form. Most frequent is an asymptomatic without cardiomegaly characterized by the ECG which shows 1st AV block, complete right bundle branch block left anterior hemi-block and disturbances of ventricular repolarization. These patients lead an active life ignoring their disease and are only detected after ECG during routine examination. However sudden death can occur in this situation. About one third of a group of patients dying suddenly were asymptomatic (Prata, Lopes & Chapadeiro, 1985).

Symptomatic chagasic cardiomyopathy represents a more advanced form of the disease. Arrythmias or myocardial insufficiency may predominate. On most occasions the arrythmia occuring is an exaggerated ectopic ventricular activity with frequent extrasystoles and even short periods of ventricular tachycardia. Rarely arrythmias are of atrial origin. In about 10% patients the clinical picture is the result of complete atrioventricular block. The main symptoms in these patients are dizziness (42.8%) dyspnoea and exertion (40%), loss of conciousness (34.2%) and palpitations (31.4%). These patients constitute two thirds of unexpected sudden deaths in Chagas' disease (Prata, Lopes & Chapadeiro, 1985). They are seen more frequently by the coroner than in hospital services.

Hospitalized patients usually have heart failure generally of the biventricular type with systemic congestion. The abundant symptomatology, ECG and radiological abnormalities have been well described (Chagas & Villela, 1922; Laranja, 1953; Rosembaum, 1964; Laranja, 1949).

Prata, Andrade & Guimarães (1974), think that the diagnosis of chronic chagasic cardiomyopathy should be considered in any patient with cardiopathy coming from an endemic area, especially if there is a history of triatomid contact. The following additional points are important for the diagnosis: 1) clinical signs associated with arrythmias, palpitations, dizziness and loss of conciousness with or without heart failure; 2) biventricular insufficiency with signs of peripheral congestion; 3) thromboembolic complications either pulmonary or systemic; 4) positive serology or xenodiagnosis; 5) ECG signs of complete right bundle branch block with left anterior hemiblock, severe ventricular extrasystoles, or total AV block; 6) cardiomegaly; 7) clinical or radiological evidence of the digestive form of Chagas' disease.

The publications regarding hospitalized patients over emphasize the pathology produced by Chagas' disease. Evidently hospitals concentrate severely ill decompensated patients. On the other hand, public health statistics minimise in many countries or even ignore the existence of Chagas' disease.

Clinical epidemiological studies in endemic areas have increased our knowledge of cardiac involvement in Chagas' disease especially related to ECG studies. In a general population of chagasic patients Macêdo (1973) encountered 31.2% with cardiopathy in São Felipe, Maguire et al. (1983) 37% in Castro Alves and Castro (1980) 42.1% in Mambaí. Dubois (1977) in 274 paired patients in the municipality of Virgem da Lapa found cardiopathy in 40.15% of the population with positive serology for *T. cruzi*, an excess of 19.35% over the seronegative group. Laranja et al. (1951) found 37% of cardiopathies in positive seroreactors of 20-40 years in Bambuí – Minas Gerais. Nogueira (1972) found 41% of cardiopathies in similar patients in Cassia dos Coqueiros – São Paulo and Faria (1978) 54.2% in the municipality of Luz – Minas Gerais. Correia-Lima (1976) in a paired study in two localities of Piauí found ECG alterations in 40.3% of seropositive and 22% of seronegative patients. A figure of only 5.7% is registered in Rio Grande do Sul by Brant et al. (1957). In Argentina, Rosenbaum & Cerisola (1957) found chronic chagasic cardiopathy in 20-40% of positive seroreactors. In Venezuela Puigbó et al. (1966) found in Belém 37.2% of patients with evidence or suspicion of cardiopathy compared with only 9.4% with negative serology. In Chile Schenone et al. found 18.4% of ECG alterations among positive seroreactors compared with 8.4% in those with negative serology (WHO, 1983). Corredor found only 4% of ECG alterations in a cross-sectional study in Astilleros – Colombia as be reported at a Meeting on Results and Perspectives of Longitudinal Studies of Chagas' Disease in Salvador – Bahia in 1984 (CNPq, 1984).

Cross-sectional studies in endemic areas show that the great majority of cardiopathies are diagnosed in the early phase. Considering the four stages used to evaluate the severity of cardiac involvement suggested in the meeting of WHO/PAHO, 1971 in Caracas, Macêdo (1973) encountered 6.5% of patients in stages III and IV, Puigbó et al. (1966) 5.5%, Dubois (1977) 2.13% and Correia-Lima (1976) 6.4%. Less than 1% of chagasic patients diagnosed in endemic areas have congestive heart failure in contrast of the situation in hospitals.

Many electrocardiographic alterations are not sufficiently characteristic to be indicators of Chagas' disease. A WHO Report (1983) agreed that the most characteristic ECG changes compatible with Chagas'

myocardiopathy were, in order of importance: – atrioventricular blocks: 1st degree, 2nd degree and complete AV block; – intraventricular blocks, complete right bundle branch block and left anterior hemiblock; – sinus bradycardia: less than 50bpm with extrasystoles or primary and diffuse changes in ventricular repolarization; and ventricular extrasystoles: five or more per minute.

In a meeting on the evaluation of the results and perspective of research in longitudinal studies in Chagas' disease held in Salvador in 1984 by CNPq it was felt necessary to have at least one of these alterations for a certain diagnosis in field surveys. Lafuente in Vallegrade in Bolivia encountered 25% of ECG with at least one of these changes, Manzullo 24% in Argentina, Mota 20.2% in Castro Alves in Bahia, Pereira 18% in Virgem da Lapa in Minas Gerais, and Schenone 7% in Chile (CNPq, 1984).

In longitudinal studies in endemic areas complete right bundle branch block is the ECG change most frequently encountered reaching 16.8% in São Felipe, 21.6% in Bambuí (Dias, 1982), and 18.4% in Virgem da Lapa (Pereira, 1983). This change is associated with left anterior hemiblock in 70% of chagasic patients with right bundle branch block. First degree AV block has a prevalence of 12.4% in São Felipe, 16.9% in Bambuí (Dias, 1982), 6.3% in Virgem da Lapa (Pereira, 1983).

Geographical differences and other factors which condition morbidity

There are marked differences in the frequency of ECG alterations among the different populations studied in Chagas' endemic areas. Various factors could explain this finding such as differences in the criteria for reading ECG and variations in the study group selected. Some of the results cannot be interpreted in this way. As already observed Brant et al. (1957) only found 5.7% of abnormal ECGs in positive seroreactors in Rio Grande do Sul. In the same way Macêdo et al. (1982) found a greater prevalence of chagasic cardiomyopathy in individuals infected with *T. cruzi* in the segment of Brasil extending from Piauí to Paraná passing through Minas, Goiás and Bahia. The results of Schenone in Chile and Corredor in Colombia are even more definite (WHO, 1983).

At times a group of research workers (Prata, 1985) are studying the relation between strains of *T. cruzi* and the clinical and epidemiological variations of disease encountered in different geographical areas.

Morbidity is directly related to the duration of the disease. The longer this time the more chance there is of cardiopathy appearing. The morbidity is greater among males (Dias, 1982); Macêdo (1973); Dubois (1977) and Rassi (1956). Macêdo (1973) suggests that cardiopathy may also be influenced by reinfections. Parasitemia per se does not appear to aggravate cardiopathy, Castro (1980), although both Coura (1975) and Pifano (1977) agree that myocardial lesions are more likely in individuals with high parasitemia. Dias (1982) suggests that the morbidity in chronic chagasic cardiopathy is dependent on conditions occuring in the acute phase of the disease. The medications available to treat acute phase patients can cure and certainly influence morbidity. However when administered in the chronic phase they appear to have little effect on the appearance or course of cardiopathy (Silveira, 1980). Perhaps this is because with these drugs low incidences of cure are achieved in the chronic phase.

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