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ESOPHAGEAL MANOMETRY AND VECTORCARDIOGRAPHY STUDY OF ASYMPTOMATIC PATIENTS WITH CHAGAS' DISEASE

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SUMMARY

The indeterminate form of Chagas' disease is characterized by positive serology for the disease in the absence of clinical findings and in the presence of both normal esophagogram and electrocardiogram. When more sensitive methods were used, abnormalities have been described either in the esophagus or in the heart.

The authors have studied simultaneously the esophagus and the heart in the same subjects. In thirteen adults with diagnosis of indeterminate form and nine adult controls, the esophageal manometry both in basal conditions and after stimulus (bethanecol) and vectorcardiogram were performed.

In the control group none of the subjects presented concomitant esophageal and cardiac alterations while in the chagasic group 92,3% of the patients presented results simultaneously altered.

It is concluded that the studied patients showed indications of parasympathetic denervation manifested by simultaneously esophageal and heart alterations.

KEY WORDS: Chagas' disease-indeterminate form.

INTRODUCTION

Chagas' disease is a common disease in South America affecting, only in Brazil, 5 to 10 million of persons[5]. Produced by *Trypanosoma cruzi*, the infection damages the parasympathetic ganglia[9, 10].

In the indeterminate form of the disease the patients present positive serologic or xenodiagnostic tests in the absence of clinical manifestations. Characteristically, the radiological study of the heart, of the digestive tube and the electrocardiogram reveal normal results[13, 16].

However, procedures which enable a more accurate analysis have showed that cardiac[1, 3, 4, 6, 11] and/or digestive changes[8, 14, 15] may be demonstrated. Nevertheless these manifestations have not been observed simultaneously in the same individuals, a finding which difficults a whole evaluation of the disease.

The objective of the present paper was to study the esophagus and heart of patients with the indeterminate form of Chagas' disease, in

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an attempt to characterize simultaneous changes in the same subjects.

PATIENTS AND METHODS

Twenty two adult subjects were studied. They presented no complaints and normal physical examination. The electrocardiogram, chest X-rays and barium meal X-rays did not show any changes. They were classified into two groups, according to the results of serologic tests for Chagas' disease (indirect immunofluorescence and fixation of the complement reaction):

1. **Control group.** Composed by nine women from the Outpatient Division of the Department of Gastroenterology, ages from 18 to 48 (mean 32.3 years), with negative serologic tests.

2. **Chagas' disease group.** Composed by thirteen patients from the Hospital das Clínicas Blood Bank where they were registered as blood donators and had positive serologic reactions. Eight men and 5 women, ages from 21 to 58 (mean 36.8 years).

Informed consent was obtained. The study was approved by the Department Ethics Committee.

Esophageal manometry.

Determination of basal lower esophageal sphincter (l.e.s.) pressure was carried out during station pull-through with a standard three channel continuous perfusion catheter. Perfusion at 0.6 ml/min was done with a hydraulic infusion system (Univ. S. Paulo, Brazil). Intraluminal pressure was transmitted from the catheter assembly to external transducers and their output recorded on a multichannel recording system (Hewlett-Packard, U.S.A.). The presence and amplitude of the peristaltic waves in the body of the esophagus were also studied.

A. **Study under basal conditions.** The motor recording was initiated with the study of the l.e.s. considering the amplitude of pressure. The sphincteral openings were also studied, being considered complete when the deflection of the registrator pen reached the baseline.

The manometric patterns, in the body of the esophagus, were analysed as follows: a) presence of aperistaltic waves; b) presence of spontaneous waves; c) morphological aspect of the waves, being considered normal those with monophasic aspect, and iterative those with bi or polyphasic aspect.

B. **Study under cholinergic stimulation.** After the esophageal study under basal conditions, bethanecol hydrochloride (Urecholine, Merck Sharp & Dohme) 0.08 mg/kg body weight was administered subcutaneously. The recording of motor activity under stimulation was initiated approximately five minutes after the drug administration, following the same procedures described for the manometric recording under basal conditions.

C. **Classification of esophageal motility alterations.** The esophageal motor changes both basal and after stimulation were classified in "grades", as follows:

0 — **absence** of any motor disturbance in the l.e.s. (amplitude, openings) and in the body of the esophagus (peristalsis, waves);

I — **one alteration** observed either in the lower esophageal sphincter or in the body of the esophagus;

II — **two motor alterations** observed simultaneously in the l.e.s, in the body of the esophagus, or both;

III — **three or more motility alterations** observed simultaneously in the l.e.s., in the body of the esophagus, or both.

Cardiac study

The vectorcardiographic method using the Frank system of corrected leads[7] was used in three plans: horizontal, sagital and frontal. Major importance was attributed to the curve of ventricular depolarization, when rotation, duration and orientation of terminal maximum vector were evaluated in relation to each plan. The curve of ventricular repolarization in relation to each plan was also analysed according to the orientation, magnitude and morphology of the maximum vector. The loop corresponding to atrial depolarization was disregarded.

Statistical study

Student "t" test was used to compare the amplitude of l.e.s., between the control group and the group with Chagas' disease before and after cholinergic stimulation, and the X^2 test to compare the results of the control group and the group with Chagas' disease regarding openings of the l.e.s. and the deglutition waves.

RESULTS

1. Control Group

Esophagus. The results of the manometric study are presented in table 1. In six subjects the esophageal alterations were graded as zero (numbers 2, 3, 4, 5, 7, 8). Three presented esophageal changes grade I (numbers 1, 6, 9).

TABLE 1
Results of manometry in the control group and Chagas' disease group.

	GROUPS	
	Control (n = 9)	Chagas' Disease (n = 13)
Basal conditions		
Lower esophageal sphincter		
Pressure*	23.33 ± 3.61	34.76 ± 14.86
Incomplete openings	1	3
Body of esophagus		
Aperistalsis	0	0
Spontaneous waves	1	9
Iterative waves	0	7
Cholinergic stimulation		
Lower esophageal sphincter		
Pressure*	23.67 ± 3.16	55.23 ± 14.52
Incomplete openings	1	4
Body of esophagus		
Aperistalsis	0	0
Spontaneous waves	1	10
Iterative waves	1	10

Data are mean ± SE (cmH_2O); n = number of cases studied

Heart. Three of nine individuals presented abnormal results on vectorcardiogram: proeminent anterior QRS and/or septal fibrosis and/or left anterior hemi-block and/or septal fibrosis (numbers, 3, 7, 8). Six individuals presented normal results (numbers 1, 2, 4, 5, 6, 9).

2. Chagas' Disease Group

Esophagus. The results of the manometric study are presented in table 1. Esophageal changes were observed in all the patients: two with grade I (numbers 4, 6) and 11 with grades II (numbers 3, 9, 12) and III (numbers 1, 2, 5, 7, 8, 10, 11, 13).

Heart. Twelve patients presented abnormal vectorcardiographic results: ST-T change (numbers 5, 10); ST-T change + final delay of conduction (numbers 2, 12); left ventricular hypertrophy (1, 3, 4, 9); final delay of conduction (7, 8); final delay of conduction + left ventricular hypertrophy (11, 13). Vectorcardiographic examination was not done in one patient (number 6).

3. Comparison between groups

Esophagus

A. **Basal conditions.** Statistically significant differences ($p < 0.05$) were observed between control and Chagas' disease group in the following parameters: amplitude of l.e.s., presence of iterative waves, and presence of spontaneous waves. There was no statistical difference between both groups ($p > 0.05$), as to the presence of incomplete openings of the l.e.s.

B. **Cholinergic stimulation.** Statistically significant differences ($p < 0.05$) were observed between control and Chagas' disease group in the following parameters: amplitude of l.e.s., presence of iterative waves and presence of spontaneous waves. There was no statistically significant difference between the two groups ($p > 0.05$) regarding the presence of incomplete openings of the l.e.s.

Heart

As far as vectorcardiographic changes were concerned, the chagasic group showed a greater number of alterations than the control group ($p < 0.05$).

Esophagus + heart

In the control group there was no concomitant occurrence of esophageal and cardiac changes; in the Chagas' disease group, 12 patients showed alterations in both organs.

DISCUSSION

Previous investigations have shown single involvement either of esophagus[8, 14, 15] or of the

heart[3, 4, 6, 11] in the indeterminate form of Chagas' disease. In the present study, it has been showed that such involvement occurs concomitantly in both organs.

Taking in consideration studies of esophageal motility, it is difficult to stablish a comparison with previous results, since in the present investigation we evaluated the esophageal alterations grading the motor disturbances, whereas this assessment has not been made in previous works. MORAES-FILHO[15] showed that l.e.s. pressure was significantly higher in 75% of the patients with indeterminate form of Chagas' disease. Such authors however did not evaluate the behaviour of the body of the organ: this evaluation could have also indicated the presence of motor disorders as demonstrated here.

The vectorcardiographic results showed alterations in 12 of our patients (92.3%), a finding which is similar to those of MADY et al.[12] and BARRETO et al.[4] who showed changes, respectively in 88.3% and 66.6% of the cases. The vectorcardiographic alterations may be related to the damage of the parasympathetic ganglia[2] whose severity can be lower or higher according to the different evolutionary stages of the disease.

The finding of vectorcardiographic changes under basal conditions indicated that there was no need of cholinergic stimulation in our patients for the detection of cardiac abnormalities. Such fact suggests that, at this stage of the disease, the heart is more susceptible to the damage by *T cruzi* than the esophagus, since in the latter organ some of the motor changes could only be observed under cholinergic stimulation.

The abnormalities described in the present study could not be detected either clinically or through the routine studies. These observations are in accordance with the findings of KÖBERLE & NADOR[10] who found that dilatation of the esophagus, with the development of the megaesophagus occurs only when at least 90% of the cells of the myoenteric plexuses are destroyed. The finding of alterations in different stages both in the esophagus and in the heart suggests that these organs were injured at different grades by *T. cruzi*.

Although the denomination "indeterminate form" has been largely used, we consider that its significance has not been fully understood. What is really indeterminate is the future of the patients in relation to the manifestation of the disease, either cardiac, esophagic or both, among others. Regarding the clinical aspects, the heart and the esophagus are both affected: such manifestations will basically depend on the degree of neuronal destruction and functional overload to which the different organs are subjected, as well as on other factors not yet clearly defined.

RESUMO

Manometria esofágica e estudo vetorcardiográfico em pacientes assintomáticos portadores de Doença de Chagas

A forma indeterminada da Doença de Chagas é caracterizada por sorologia positiva com ausência de manifestações clínicas, na presença de resultados normais aos exames radiológico do tubo digestivo e eletrocardiográfico.

No presente trabalho, os autores estudam simultaneamente o esôfago e o coração, nos mesmos indivíduos. Treze adultos com diagnóstico de forma indeterminada da Doença de Chagas e nove adultos controles foram submetidos ao exame vetorcardiográfico e à manometria esofágica em condições basais e sob estímulo com cloridrato de betanecol (0,08 mg/kg p.c.). No grupo controle nenhum dos indivíduos apresentou concomitância de alterações esofágicas e cardíacas, enquanto no grupo chagásico 92,3% dos pacientes apresentaram exames concomitantemente alterados.

Concluem que os pacientes estudados apresentam evidências de desnervação parassimpática manifestada por alterações simultâneas esofágicas e cardíacas.

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