

Electro-Manometric Studies on Megaesophagus Caused by Chagas' Disease

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Physio-pathological findings of the so-called idiopathic megaesophagus are well known nowadays and have been described by various authors from different parts of the world (Buttin *et al.* 1953, Cohen *et al.* 1964, Hirashima *et al.* 1966). In Brasil, megaesophagus is caused most frequently by Chagas' disease which is prevalent in most of the country, and studies on kinetic changes of the esophagus have been performed by several Brazilian doctors.

Vasconcelos and Botelho (1937) described three types of abnormal motility of the esophagus; i. e. 1) waves of multiple peaks indicating hypermotility, 2) waves similar to those found in patients other than Chagas' disease, 3) very low waves indicating hypomotility. Based on the results obtained by a kymographic method, Brasil (1955) thought that the fundamental disturbance of motility is not the lack of harmony in the relaxing of the cardia at the arrival of a supposed peristaltic wave which, in fact, does not exist at all, but a vagal block which caused, not only achalasia of the cardia, but also esophageal disturbance expressed by the

absence of contraction waves. Using electro-manometric method, Pinotti *et al.* (1961 and 1968) and Bettarello *et al.* (1962 a, b and 1964) studied the disturbances of swallowing and the abnormal behavior of the lower esophageal sphincter in cases of Chagas' disease.

Because of the relatively frequent visits of patients with Chagas' disease to our department, the electro-manometric studies were undertaken to examine principal physio-pathological changes in the patients with megaesophagus.

Materials and Methods

Electro-manometric measurement of the esophagus movement was performed for eleven patients, nine males and two females, who visited Department of Tropical Medicine, Federal University of Pernambuco. Age of the patients ranged from 30 to 66 years old being 44 in average. Prior to the examination, all of these patients had been diagnosed to be Chagas' disease manifesting megaesophagus based on the results of compliment fixation test (Machado-Gerreiro reaction) and the radiological examinations. The stomach catheter was made by tying two parallel length polyethylene tubings (1.2 mm in diameter) at regular intervals with cotton thread. One tube had an opening 5 cm and the other 10 cm from the closed tip. After the patients were starved for 12 hours, the catheter was introduced into the stomach, and were filled with saline. Thereafter the other tips of the catheter were connected to

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the pressure transformers of polygraph (Sanei Model 141-6) previously calibrated. A pneumograph was attached to the thorax and connected to the polygraph by means of an accessory unit (Sanei model 5207). Besides recording of motility of the esophagus by means of catheter described above, laryngomyelogram was also checked by thrusting the muscular mass of anterior part of the larynx with bipolar needle electrode which was connected to the polygraph through the accessory unit. By use of these two methods simultaneously, more precise recording of deglutition was obtained in two different aspects; the swallowing and the respiratory movement.

After the catheter was inserted into the stomach, it was withdrawn carefully until the tip reached at the cardia. After the cardial behavior was checked, measurement of the esophageal movement was made at 5 cm intervals as the catheter was withdrawn. Using this technique, it was possible to determine the intraluminal pressures of the organ at rest and after deglutition, and in addition, to record the changes of the peristalsis in the body of the esophagus as well as the behavior of the sphincter.

The findings obtained were classified by the same criterion used by Bettarello *et al.* (1962b), as shown below.

- 1) Peristaltic disturbances
 - a) Iterative waves (Several peristaltic waves appear following swallowing)
 - b) Synchronous waves (the waves which take place simultaneously along with the whole esophagus. No propulsive nature.)

- c) Spontaneous waves (presence of peristalsis at the absence of deglutition)
 - d) Ineffective deglutition (complete absence of peristaltic waves after swallowing)
- 2) Achalasia of the cardia

No relaxing of the cardia at the arrival of the peristaltic waves

Results

The following types of pathological waves were observed most frequently in eleven cases examined (Table 1); a) synchronous waves in nine cases (81.8%), b) iterative waves in seven cases (63.3%) (Fig. 1). The other pathological findings were also observed in less frequency; spontaneous waves and ineffective swallowing were found in five (45.4%) and three (27.7%) out of 11 cases respectively as they were shown in Fig. 2 and 3.

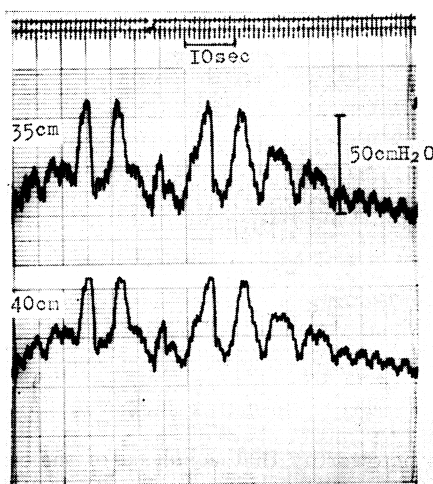


Fig. 1 Synchronous and iterative waves

Table 1 Analysis of the abnormal findings recognized in each case

findings	case No.											number of positive cases (%)	
	1	2	3	4	5	6	7	8	9	10	11		
synchronous waves	+	+	+	+	+	+	+	+	+	+		9	(81.8)
iterative waves	+	+	+	+				+	+	+		7	(63.6)
spontaneous waves	+	+	+				+	+				5	(45.4)
ineffective swallowing				+	+						+	3	(27.2)
achalasia	+	+	+		+	+			+			6	(54.5)

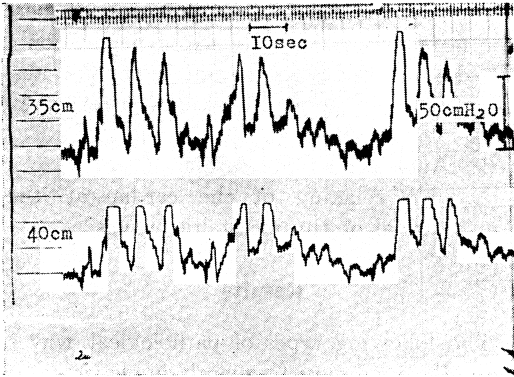


Fig. 2 Spontaneous waves

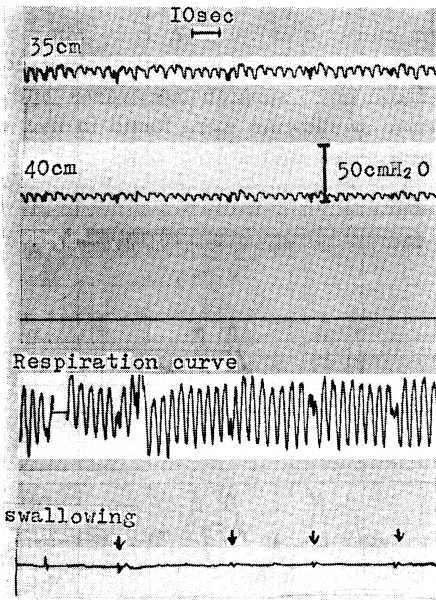


Fig. 3 Ineffective swallowing

It is noteworthy that achalasia of the cardia was recognized in six patients (54.5%) (Fig. 4) and no record was obtained in the remaining cases because the catheter was unable to be inserted beyond the cardia. This fact suggests that the incidence of the pathological condition at the cardia is much higher than that of achalasia cited above.

Combinations of the above pathological findings in each patient were shown in table 1. No case showed all of the findings simultaneously. On the other hand, only two out of 11 cases presented one finding. This fact indicates relatively high frequency

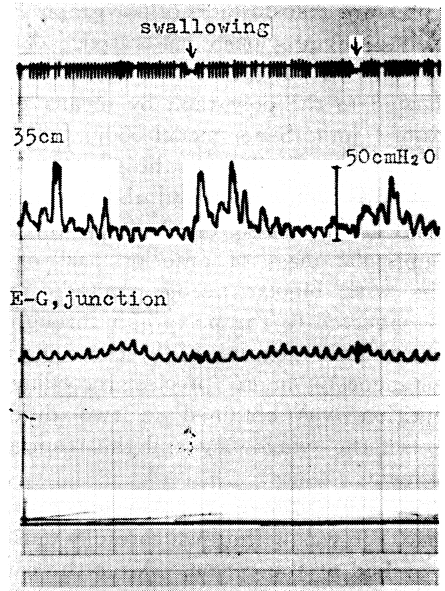


Fig. 4 Failure of the opening mechanism of the cardia

of combination of these pathological findings.

Discussion

As it is well-known, the esophagus in normal person is supposed to have any motile activity in the absence of deglutition. After swallowing, single peristaltic wave of progressive nature is formed and moves along the whole organ at a rate of 3.5 cm/sec. Coordinating to the peristalsis, sphincter action occurs in two portion of the esophagus, i. e. one in the pharyngo-esophageal junction and the other in the esophago-gastric junction.

In the studies on the megaesophagus of unknown etiology (cardiospasm), Buttin *et al.* (1953) recognized two kinds of fundamental differences from normal controls. Those are presence of spontaneous wave which is not related to deglutition and the lack of uniform patterns of waves which occur after the act of swallowing. On the other hand, Cohen *et al.* (1964) found in their studies on cardiospasm that the motility test of the esophagus showed an abnormal peristalsis in the body of the organ, and that the waves occurring after swallowing do not have a peristaltic

nature being low amplitude and a long duration. The same authors recognized spontaneous waves, a high pressure zone in the esophago-gastric junction, as it is usually observed, and no relaxation of the cardia as a response to the act of swallowing.

The pathological changes reported by Hirashima *et al.* (1966) were as follows: Delay of the peristaltic waves, shortening of the waves, absence of peristalsis in advanced cases, lack of transmission of peristaltic waves at the lower part of the esophagus, same amplitude of the wave at the upper, middle and lower part of the organ, tendency of increase of the static pressure at the level of the cardia and esophagus, and abnormal action of closing and opening of the cardia in all case.

In Brasil, Pinotti *et al.* (1961 and 1968) and Bettarello *et al.* (1962 a, b and 1964) have studied this subject by using electro-manometric method. Bettarello *et al.* (1962 a, b and 1968) confirmed that there is a disorganization in the peristalsis and a failure in the opening action of the esophageal sphincter in cases of megaesophagus by Chagas' disease. Pinotti *et al.* (1961 and 1968) attained the same conclusions.

The results obtained by Brazilian doctors on megaesophagus of Chagas' disease are almost same as those in the present studies. On the other hand, the results obtained by foreign investigators on megaesophagus are pretty different from those in Brasil. This discrepancy is probably caused by difference of etiology of the pathological condition. In Brasil, all of the cases used were origin of Chagas' disease, whereas in the foreign countries the cases were of cardiospasm or idiopathic megaesophagus, not parasitic origin.

Summary

An electro-manometric study was performed on movement of the esophagus in

eleven patients suffering from advanced digestive form of Chagas' disease. All of the patients showed marked disturbances of the peristaltic movements of the esophagus. Pathological findings found most frequently were synchronous waves and iterative waves. Other findings such as spontaneous waves, ineffective swallowing and achalasia were also recognized in relatively high incidences.

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シャーガス病に起因した巨大食道の異常運動の分析

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南米に流行するシャーガス病では病型の一つとして巨大食道が現われることはよく知られた事実である。本報告では、巨大食道型シャーガス病患者11名について食道運動をポリグラフを用いて電氣的に観察し、運動の異常性を分析した。同時に呼吸および咽頭筋運動をも記録し、嚥下に続く食道の波動をこれらと比較検討した。

被験11例の全例に著明な異常が認められたが、もつと

も多く認められたのは同調波 (81.8%)、次では反復波 (63.3%) であつた。また嚥下に続く蠕動の欠除および自然波動も認められた。注目すべき変化は全例における噴門部の異常で、6例に噴門の弛緩収縮不良があり、他の5例では噴門部以下にカテーテルを挿入することすら不可能であつた。