

ACID PERFUSION TEST, ENDOSCOPY AND RADIOLOGY IN THE DIAGNOSIS OF OESOPHAGITIS*

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Abstract

Thirty patients with symptoms of oesophagitis and 29 controls were subjected to the acid perfusion test. Fifty-four were endoscoped whereas radiological examination was available only in 20 subjects. A good correlation was shown between the presence or absence of oesophagitis and a positive or negative acid perfusion test respectively. The test was positive in 86.7% of patients and negative in 89.7% of controls.

Endoscopic findings correlated less well with presence of oesophagitis. Of 30 patients 29 were endoscoped and only 17 (59%) had positive endoscopic features of oesophagitis. Twenty-five of 29 controls were endoscoped and all had normal oesophageal mucosa.

Radiologically, 12 out of 17 patients (70.6%) who had a positive acid perfusion test, also had radiological features suggestive of oesophagitis (JPMA 31:62, 1981).

Introduction

Oesophagitis can be a difficult disease to diagnose especially because the symptoms of epigastric or retrosternal distress may mimic conditions such as angina pectoris, peptic ulcer and other intra-thoracic and intra-abdominal disorders (Friedman, 1958). Several tests have been devised and tried by various workers to aid in making this differentiation (Benz et al., 1972; Tuttle et al., 1960). These include oesophageal endoscopy, radiographic studies with barium, histological studies, acid perfusion studies, oesophageal manometry and tests for detecting gastro-oesophageal reflux.

In this study, the results of acid perfusion test, endoscopy and radiology of the oesophagus have been compared to determine their correlation with the presence of oesophagitis.

Material and Methods

Fifty-nine subjects were selected from patients attending the research centre of Pakistan Medical Research Council at Jinnah Postgraduate Medical Centre. Thirty subjects were categorised as patients on the basis of their symptomatology which consisted of retrosternal pain or burning, waterbrash and acid eructations. Twenty-nine individuals having no symptoms referable to the oesophagus, were categorised as controls. The mean age of the patients was 33 years (21 females and 9 males) and that of the control group was 28 years (15 females and 14 males).

Acid Perfusion Test (APT)

Acid perfusion of the oesophagus was done as described by Bernstein and Baker (1958). A naso-gastric tube was passed into the stomach of a fasting subject in a sitting position, gastric contents were aspirated and the tube, was withdrawn to a level at which the tip was 30-35 cms from the nares. The external end of the tube was led over one shoulder of the subject and connected by means of a two-way infusion set to the test solutions viz., 0.9% sodium chloride (NaCl) and 0.1N Hydrochloric acid (HCl), contained in two separate bottles hung behind the patient thereby allowing the infusion of these solutions to be changed without the knowledge of the patient (as shown in the accompanying figure).

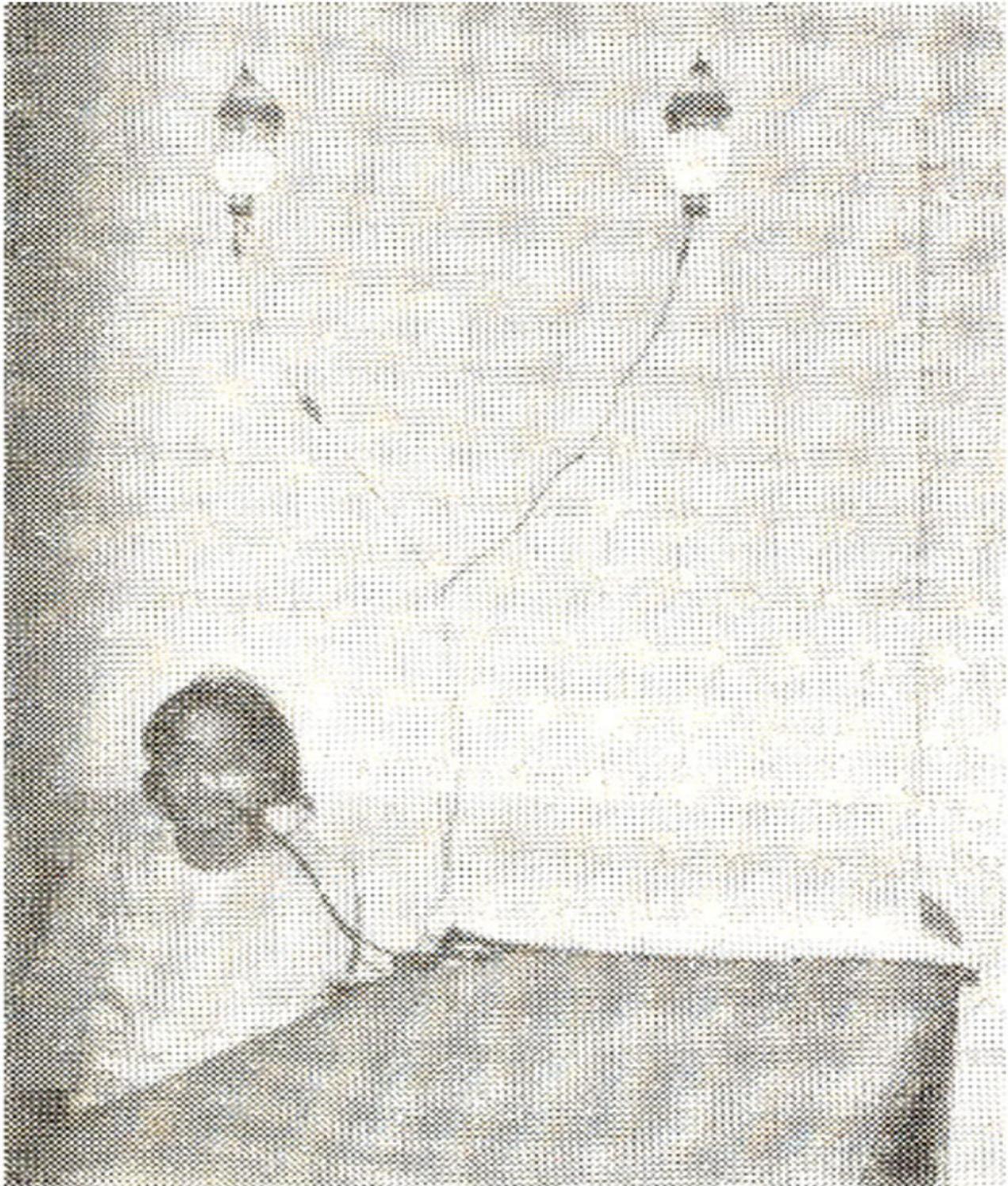


Fig.: Acid Perfusion Test

Initially 0.9% NaCl was perfused for a 10 minute period at the rate of 100 to 120 drops per minute, and then changed to 0.1 N HCL perfused at the same rate for 30 minutes or until typical symptoms of oesophagitis appeared. If no symptoms appeared in the first 15 minutes of acid perfusion, the rate of perfusion was increased to 200 drops per minute for the remaining 15 minutes. Throughout the

procedure the subjective responses were recorded at regular intervals of 5 minutes each. If the individual experienced symptoms during the acid perfusion, the acid infusion was stopped and subsequently alternated with saline.

The responses fell into three categories:

1. Positive: Retrosternal pain or burning with or without waterbrash, nausea or vomiting during administration of acid, but not with saline.

2. Negative: No response to either acid or saline perfusion.

3. Inconclusive: Symptomatic response to both saline and acid infusions.

Endoscopy: Oesophageal endoscopy was performed with an end-viewing Olympus gastro-riberoscope. Fasting subjects were given injections of Pethidine 100 mg and Atropine 0.6 mg intramuscularly and injection Diazepam from 20 to 40 mg intravenously. The oesophageal mucosa was visualised and studied carefully upto the cardiac end. Endoscopy was considered positive if any signs of inflammation such as hyperaemia or congestion and/or changes in the vascular or mucosal pattern of the oesophagus were observed. Definite ulceration were noted in a few cases. Endoscopy was considered to be negative in the absence of the above noted signs.

Radiology:

Skiagrams were available in 18 patients and 2 controls. These consisted of a Barium Swallow meal examination with screening for the presence of any gastro-oesophageal reflux or a hiatus hernia.

Results

Thirty patients with symptoms suggestive of oesophagitis were subjected to the acid perfusion test. The test was positive in 26 and inconclusive in 4 patients. All the 26 patients with positive APT were endoscoped and 17 of them showed a definite lesion in the oesophagus, while in the remaining 9 endoscopy was normal. Three of the 4 patients with inconclusive results had normal endoscopic findings. Radiological studies were available in 17 patients with positive APT and in one patient with inconclusive result. Twelve of the patients with positive APT showed definite radiological features (3 hiatus hernia and 9 gastro-oesophageal reflux) suggestive of oesophagitis while the remaining 5 APT positive patients and one patient with inconclusive result showed no abnormalities in their skiagrams (Table-I).

Table 1: APT, Endoscopy and Radiology in Patients with Oesophagitis

<i>Acid perfusion test</i>	<i>No. of Patients</i>	<i>ENDOSCOPY</i>			<i>RADIOLOGY</i>		
		<i>Positive</i>	<i>Negative</i>	<i>Not done</i>	<i>Positive</i>	<i>Negative</i>	<i>Not done</i>
Positive	26	17	9	—	12	5	9
Negative	—	—	—	—	—	—	—
Inconclusive	4	—	3	1	—	1	3
Total	30	17	12	1	12	6	12

Twenty-nine asymptomatic individuals were also subjected to the APT which was positive in 2, negative in 26 and inconclusive in 1 subject. Both positive controls had normal oesophageal mucosa

on endoscopy, as did the 22 of 26 negative controls who underwent endoscopic examination, and the only control with inconclusive APT. Radiological studies were available in two control subjects only. One of them who had a positive APT showed radiological evidence of oesophagitis in the form of a gastro-oesophageal reflux, while the other subjects with negative APT had a normal skiagram (Table II).

Table II: APT, Endoscopy and Radiology in Control Subjects

<i>Acid perfusion test</i>	<i>No. of Subjects</i>	<i>ENDOSCOPY</i>			<i>RADIOLOGY</i>		
		<i>Positive</i>	<i>Negative</i>	<i>Not done</i>	<i>Positive</i>	<i>Negative</i>	<i>Not done</i>
Positive	2	—	2	—	1	—	1
Negative	26	—	22	4	—	1	25
Inconclusive	1	—	1	—	—	—	1
Total	29	—	25	4	1	1	27

Discussion

The symptomatology of oesophagitis includes heartburn or retro-sternal burning sensation or pain, acid eructations and waterbrash with or without nausea or vomiting. It has been an accepted fact that regurgitation of gastric or intestinal contents usually play a dominant role in causing the lesions associated with oesophagitis (Flood et al., 1955; Giuseffi et al., 1954). There is no diagnostic problem when the clinical features are suggestive of oesophagitis and response to treatment is satisfactory. However atypical symptoms or incomplete response to treatment may leave the diagnosis in question. Many diagnostic methods are available to diagnose oesophageal disease. However, to diagnose the presence of oesophagitis the use of an inexpensive and simple yet reliable method for reproduction of symptoms, as provided by the acid perfusion test, can be invaluable.

In the past, attempts have been made to find a reliable method for the reproduction of oesophageal symptoms objectively, to differentiate them from angina pectoris and other chest pains. Reproduction of oesophageal pain by balloon distention was attempted, but the results were not satisfactory (Bayliss et al., 1955; Kramer and Hollander, 1955; Morrison and Swalm, 1940). The APT was originally introduced by Bernstein and Baker (1958). They tested 55 subjects, of whom 43 were examined endoscopically. A positive test elicited typical clinical symptoms in 9 of 10 patients with endoscopically demonstrable oesophagitis and in 10 of 12 patients with a history suggestive of oesophagitis but a normal endoscopic examination. A negative test was found in 20 out of 21 subjects with neither history nor endoscopic findings of oesophagitis. Tuttle et al (1960) subjected 124 subjects to APT and 64 of 81 who had clinical, endoscopic or radiographic evidence of oesophagitis, responded positively to the test. Forty-one of 43 subjects who were asymptomatic responded negatively. Benz et al (1972) studied 50 subjects in order to determine the diagnostic procedure which correlated well with a history of gastro-oesophageal reflux causing oesophagitis. In addition to other tests all individuals were subjected to the APT. All the 29 symptomatic patients had positive APT (100%), while 18 of 21 asymptomatic subjects had a negative test (86%). They concluded that symptomatic gastro-oesophageal reflux best correlated with a positive APT. Skinner and Booth (1970), employed APT as one of the four

tests in 351 patients with hiatus hernia or gastro-oesophageal reflux. The main value of this test in their experience, was to assist in evaluating patients with atypical symptoms so as to establish their oesophageal origin.

In the present study, 86.7% of symptomatic patients had a positive whereas 89.7% of controls had a negative APT. Similar results were obtained previously by Bernstein and Baker (1958), Tuttle et al (1960) and Benz et al (1972). Endoscopic findings suggestive of oesophagitis were seen in 59% of patients only whereas 100% controls had a normal endoscopy. Nine patients and 2 controls in this study had positive APT, but showed a normal mucosa on endoscopy. This can be explained by the fact that oesophagitis begins in the lamina propria, as ascertained by Palmer (1955), who presented evidence from oesophageal biopsies obtained in 61 patients with oesophagitis that initial lesions occur in the lamina propria and only secondarily involve the epithelial and muscularis layers. This fact has also been considered by Ismail-Beigi et al (1970), in establishing the criteria for the histological diagnosis of oesophagitis. In his study 9 of 34 symptomatic subjects had normal endoscopy, the biopsy however was abnormal in 7. Similar discordant results between histologic and endoscopic studies were reported by Tuttle et al (1961) and Lodge (1955). It can therefore be seen why some patients who had normal mucosa on endoscopy did have clinical symptoms of oesophagitis and as such also had a positive acid perfusion test. It may therefore be assumed that these patients actually had oesophagitis, which would only be demonstrable histologically. The 2 asymptomatic controls who had a positive APT may be suffering from sub-clinical oesophagitis, and one of them who had a radiological examination done subsequently, did show a positive gastro-oesophageal reflux. Another explanation is that their oesophagus may be sensitive to acid, as has been described previously in 3 asymptomatic subjects who had a positive APT (Benz et al., 1972).

Radiological examination was available in 18 patients. Nine of these had both APT and endoscopy positive whereas 8 had a positive APT but a normal endoscopy. Eight i.e., 89% of the former whereas only 4 i.e. 50% of the latter had positive radiological features (Table III)

Table III: Radiological Findings in Twenty Subjects

<i>Investigations</i>	<i>Positive Radiology</i>		<i>Negative Radiology</i>	
	<i>Patients</i>	<i>Controls</i>	<i>Patients</i>	<i>Controls</i>
	Positive acid perfusion test with positive endoscopy	8	—	1
Positive acid perfusion test with negative endoscopy	4	1	4	—
Inconclusive acid perfusion test with negative endoscopy	—	—	1	—
Negative acid perfusion test with negative endoscopy	—	—	—	1

The acid perfusion test can be claimed to be a non-hazardous and a reliable method to diagnose oesophagitis, and its value in a developing country like Pakistan increases all the more because of its being a simple and inexpensive test which can be performed in any hospital or clinic even in remote areas, where sophisticated facilities such as endoscopy and radiology may not be available.

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