Reliability of 24-Hour Home Esophageal pH Monitoring in Diagnosis of Gastroesophageal Reflux

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Twenty-four-hour home esophageal pH monitoring is proposed in order to study gastroesophageal reflux (GER) so that prolonged use of costly hospital equipment and staff can be curtailed and the diagnostic accuracy of the examination improved. Eighty-six patients affected by GER symptoms and 20 healthy volunteers underwent 24-hr home esophageal pH monitoring, x-rays, and endoscopy of the upper gastrointestinal tract to investigate reliability of outpatient recording. Fifteen more patients consecutively underwent out- and inpatient recording to detect possible differences between these methods in the two daily periods. Outpatient monitoring was well tolerated in 94.7% of the patients; 14.3% of them markedly reduced their routine activities. The range of normality of outpatient recording does not differ from that of inpatients. In the 15 patients who consecutively underwent out- and inpatient monitoring, no significant differences were reported. The sensitivity of 24-hr home esophageal pH recording is 0.85, the specificity 1, the accuracy for negative prediction 0.68, and the accuracy for positive prediction 1. The reliability of 24-hr home esophageal pH monitoring is comparable to inpatient recording. It allows hospital cost reduction and is also better tolerated by patients but has not greatly improved the diagnostic accuracy of the gastroesophageal reflux pH monitoring.

KEY WORDS: gastroesophageal reflux; esophageal pH monitoring; gastroesophageal reflux symptoms; gastroesophageal reflux esophagitis.

Prolonged home esophageal pH recording was recently introduced in clinical practice to diagnose and study gastroesophageal reflux (GER) (1–5). The most important aspect of home recording is that it reduces the use of costly hospital equipment and staff (6). However, the main objective of this method is to improve diagnostic accuracy of inpatient esophageal pH recording, assuming that a recording performed in an environment familiar to the patient may allow more accurate assessment of gastroesophageal reflux (5, 7).

After performing prolonged home esophageal pH recording on patients suffering from symptoms allegedly due to gastroesophageal reflux, we attempted to answer the following questions: (1) Can the prolonged home esophageal pH recording be used in clinical practice to diagnose and quantify...
mucosal acid exposure time? (2) Does it improve the accuracy and sensitivity of the esophageal pH monitoring test? (3) Do the data collected by this method highlight new elements concerning gastroesophageal reflux pathophysiology?

MATERIALS AND METHODS

Patients. This study considers 86 patients (56 males and 30 females, average age 47.5 years, range 21–78 years) suffering from symptoms typical of gastroesophageal reflux. Clinical examination of these patients, with laboratory tests, and histological and bacteriological examinations where necessary, excluded the presence of collagen disease, diseases of the central nervous system, severe diabetes, chronic alcoholism, achalasia, diffuse spasm, or other primary motility disorders of the esophagus; caustic lesions of the esophagus; esophagitis secondary to infectious diseases, esophageal mycosis; and granulomatous esophagitis. None of these patients had previously been subjected to surgery of the esophagus or the stomach; four had undergone cholecystectomy.

Before the study, some of the patients had had treatment with occasional symptomatic therapy, in most cases with antacids (13.3%) and four with cimetidine for coexisting duodenal ulcer.

The patients were subjected to clinical examination, radiological and endoscopic examination of the upper digestive tract, histological study of the esophageal mucosa, and 24-hr home esophageal pH monitoring. Esophageal manometry was also done.

Twenty asymptomatic healthy volunteers who had never been subjected to surgery or suffered from any systemic diseases (8 males, 12 females, average age 42.5 years, range 25–68 years) were considered as controls; they underwent the same examinations, plus the standard acid reflux test (8) during esophageal manometry, to rule out the presence of any esophageal or gastroesophageal diseases. The typical GER symptoms were graded as follows: S1, absence of symptoms; S2, retrosternal heartburn or pain, mainly due to postural changes once or twice a day and occasional regurgitation; S3, postural and spontaneous retrosternal heartburn or pain up to a maximum of four times a day, occasional regurgitation, occasional dysphagia and/or aspiration; S4, spontaneous or postural retrosternal heartburn or pain more than four times a day, frequent regurgitation, frequent dysphagia and/or aspiration.

Seventeen patients reported S2 intensity symptoms, 32 intensity of S3, 37 intensity of S4.

GER esophagitis was evaluated as follows: E0, absence of macroscopic and microscopic characteristics of esophagitis; E1, microscopic esophagitis with or without macroscopic hyperemia and edema; E2, nonconfluent erosions; E3, confluent erosions within 360°, ulcer and/or stenosis, Barrett’s esophagus, and acquired short esophagus.

Acquired short esophagus is one of the most severe complications of gastroesophageal reflux (9, 10); for this reason, some patients in whom esophageal shortening has been radiologically ascertained were included in class E3 even without serious peptic lesions of the mucosa.

At least four pinch macrobiopsies (Olympus—FB 24K) were performed routinely under direct vision 3–5 cm above the Z line, two on the anterior and two on the posterior wall of the esophagus. Specimens were oriented before fixation.

The histological characters of GER esophagitis were classified according to the Ismail-Beigi criteria (11): papillae elongation and the presence of polymorphonuclear leukocytes in the lamina propria were investigated to interpret initial GER lesions. The criteria of Paull et al (12) and Savary and Miller (13) were adopted for diagnosis of Barrett’s esophagus.

No macro- or microscopic signs of esophagitis were observed in six patients (E0); in 32 patients E1 esophagitis was found, and in 11 patients E2 esophagitis. In the group E3, 37 patients were included. Of these 37, 10 had confluent erosions or ulcer, 7 had stenosis and ulcer, 4 had Barrett’s esophagus and confluent erosions, 3 had stenosis and erosions, 6 had acquired short esophagus and erosions, and 7 had acquired short esophagus without erosive or ulcerative lesions of the mucosa but with histological signs of reflex esophagitis.

In no case was the stenosis such as to falsify the result of the esophageal pH recording; in five patients suffering from tight stenosis before examination, peroral dilations were done to over 50 French, also keeping surgery in mind.

Particular attention was given to the radiological study of any anatomical alterations in the gastroesophageal junction and, in particular, to recognition of the sliding or fundal gastric hiatus hernia and acquired short esophagus, so as to place the electrodes correctly.

The radiological examination was carried out by the same group of radiologists, first in the prone right anterior position to locate the G-E junction and the hiatus hernia, then in the upright position to study the relationship between the G-E junction and diaphragmatic shadow and to determine acquired short esophagus (14–16).

The following were diagnosed: in group E0, one sliding hernia in of 6 patients; in group E1, 22 sliding hernias in of 32 patients; in group E2, 7 sliding hernias in of 11 patients. Of the 37 group E3 patients, one had a sliding hernia and 36 had acquired short esophagus, more or less accentuated.

Esophageal manometry was carried out according to the standard technique (17, 18), with a six-channel probe (S-5-000-5, MUI Scientific, Mississauga, Ontario, Canada) connected to a continuous perfusion system and a polygraph (EP 12 Polyanalizer, OTE Biomedica, Florence, Italy).

The equipment for 24-hr home esophageal monitoring consists of the recording unit, composed of a mini pH-meter and an electronic timer programmed for intermittent recording (5 sec/25 sec) applied to a low-cost cassette tape recorder. The recorded signal is fed to another standard recorder, demodulated, and put on paper. The esophageal pH recording was read directly from the tracing, by two of us, without any automatic device (19).

At least four days before the pH recording, medical treatments were stopped. After an overnight fast, posi-