Prolonged Clearance is the Primary Abnormal Reflux Parameter in Patients with Progressive Systemic Sclerosis and Esophagitis

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The purpose of this study is to determine if frequent reflux events from an incompetent LES or poor clearance from decreased peristalsis is the predominant abnormality in PSS patients with severe reflux esophagitis. Seven patients with both classic manometric findings of PSS and endoscopic findings of esophageal ulcerations and/or Barrett’s esophagus were compared to nine patients with similar endoscopic findings but with no evidence of a connective tissue disorder. All patients underwent simultaneous intraesophageal pH monitoring and scintigraphy for a total of 40 min after a radiolabeled meal. Four of the PSS patients and all the non-PSS patients had simultaneous manometry. We found that PSS patients had significantly fewer reflux events (P < 0.01), but the reflux events had significantly longer duration (P < 0.01) compared to patients with similar severity of esophagitis and no connective tissue disease. We conclude that decreased smooth muscle peristalsis appears to be the primary contributor to acid exposure and esophageal injury in PSS.

KEY WORDS: esophagus; progressive systemic sclerosis; scintigraphy; pH monitoring; manometry; esophageal reflux.

Progressive systemic sclerosis (PSS) is complicated by esophageal dysfunction in approximately 90% of patients. Since the classic features are an incompetent lower esophageal sphincter and low-amplitude contractions of the smooth muscle portion of the esophagus (1-4), either frequent reflux events and/or poor clearance of reflux events can be anticipated. Thus, a high incidence of erosive esophagitis, occurring in up to 60%, many with strictures (5), is not surprising.

Simultaneous 12-hr pH monitoring and manometry has shown a correlation between acid exposure and the degree of distal esophageal dysmotility. This study (6), along with a scintigraphic report showing a high direct correlation of esophageal transit to distal esophageal peristalsis in PSS patients (7) provide indirect evidence that decreased clearance of acid reflux events may be the primary abnormality responsible for esophagitis in patients with scleroderma.

The purpose of this study is to provide direct evidence that decreased clearance of reflux events and/or increased frequency of reflux events is pre-
dominantly responsible for presence of postprandial refluxant in the esophagus in PSS patients. We do this by detecting individual reflux events and their clearance by simultaneously utilizing scintigraphy (employing 5-sec acquisition intervals to detect individual reflux events rather than cumulative reflux over 30 sec as in most previously published scintigraphic studies of gastroesophageal reflux (7, 8)), pH monitoring, and, in most, esophageal manometry with continuous LES pressure measurement. Nine previously published patients (9) with severe gastroesophageal reflux, esophagitis, and no evidence of PSS are used for comparison.

MATERIALS AND METHODS

The study population consists of two groups. Seven patients with both manometric findings of PSS (ie, lower esophageal sphincter incompetence and no peristalsis) and endoscopic findings of esophageal ulcerations, strictures, and/or Barrett's esophagus are compared to nine patients with similar endoscopic findings but with no evidence of a connective tissue disorder.

All PSS patients met the criteria of the American Rheumatism Association for the diagnosis of systemic sclerosis (10). All had either the sole major criterion of proximal sclerosis or two of the minor criteria: evidence of sclerodactyly, digital pitting scars of fingertips, loss of substance of the distal fingerpad, or bilateral basilar pulmonary fibrosis.

The non-PSS esophagitis group consisted of nine consecutive patients who fulfilled the following criteria: (1) daily heartburn for greater than six months; (2) an acid-sensitive esophagus as determined by a positive Bernstein test and/or heartburn while their intraesophageal pH was less than 4; (3) an LES pressure <5 mm Hg with normal peristalsis on baseline manometry; and (4) endoscopic evidence of severe esophagitis (Barrett's esophagus in four patients; ulcerations in two patients; and ulcerations and strictures in three patients.)

Table 1 summarizes the demographic, manometric, 24-hr pH scores, and endoscopic findings between the two groups. The PSS group tended to be younger (P > 0.05) and more were females than the patients in the non-PSS group (P < 0.05). There was no significant difference in LES pressure, 24-hr pH scores, or endoscopic findings between the two groups. The PSS group had no distal peristalsis and significantly lower amplitudes than the non-PSS group.

Reflex events were simultaneously measured by pH monitoring and scintigraphy. Four of the patients in the PSS group and all the patients in the non-PSS group also had concurrent manometry.

Simultaneous esophageal manometry and pH monitoring was performed in the following manner. A manometry catheter (Arndorfer Medical Specialties, Greendale, Wisconsin) was passed transnasally and positioned such that a 7-cm water-perfused sleeve straddled the lower esophageal sphincter (LES) to continuously record its pressure over 30 sec as in most previously published scintigraphic studies. The manometry catheter ports were connected via transducers (267AC, Hewlett-Packard, Rockville, Maryland) to an eight-channel recorder (7758, Hewlett-Packard) that recorded the patients' swallow. A pH probe (MI, Microelectrodes, Inc., Londonberry, Connecticut) was placed 5 cm above the LES to record reflux episodes. A reference lead (160363, Bard Biomedical, Lombard, Illinois) was placed 5 cm above the LES to record reflux episodes. A gamma camera with a large field of view and a general purpose collimator was used at an energy setting of 140 keV (20% window). The camera was interfaced to

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