



# GERD— even more complicated than you thought

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Carlson *et al.* present a study published in *Neurogastroenterology and Motility* in which they utilized the EndoFLIP<sup>®</sup> device (Crospon, Galway Ireland) to evaluate the esophageal response to distention among 25 patients who had previously undergone esophageal pH monitoring while off acid suppression medications (1). FLIP is short for functional luminal imaging probe technology. Esophageal reflux was measured by the acid exposure time (AET). An AET less than 6 percent was considered to be normal. Topography plots were used to assess esophageal contractility patterns. The distensibility of the esophago-gastric junction (EGJ) was objectively defined using a metric called the distensibility index (DI). The distensibility index is defined as the ‘waist’ of the FLIP bag during distension (minimum cross-sectional area), expressed in mm<sup>2</sup>/mmHg. While the FLIP balloon was distended, esophageal body contractions were identified by a transitory decrease of  $\geq 5$  mm in the measured luminal diameter detected in two or more contiguous impedance channels. Esophageal contractions were considered to be retrograde or antegrade and were described as repetitive when three or more occurred consecutively. Repetitive antegrade contractions (RACs) were induced by distention in 76% of those studied. The AET was significantly lower in patients with RACs when compared to patients without. The correlation between AET and EGJ-DI was not significant.

Gastroesophageal reflux disease (GERD) pathophysiology is complex and multifactorial. Factors such as the presence of a hiatal hernia, a weak lower esophageal sphincter (LES), the presence of what has been termed the ‘acid pocket’, overweight and obesity, impaired and prolonged clearance of the esophagus, delayed gastric emptying, transient lower

esophageal sphincter relaxations (TLESRs), and increased distensibility of the EGJ are all potential causative factors and have been implicated in previous studies (2). Carlson *et al.* have provided further evidence that acid exposure in the esophagus is related to factors that contribute to acid clearance. The fact that EGJ distensibility did not correlate with AET is counterintuitive and speaks to the complexity of GERD.

As a GI surgeon, I find studies like these especially relevant. The vast majority of patients to undergo antireflux surgical procedures have structural defects at the EGJ—most commonly a hiatal hernia. When compared to patients without a hiatal hernia, those with a hiatal hernia have been demonstrated to experience a greater number of reflux events and more esophageal acid exposure (3). Patients with a hiatal hernia have more severe esophagitis (4), and the size of the hiatal hernia has been correlated with the degree of esophageal acid exposure (5). In patients with hiatal hernia, a fundoplication works to correct GERD by addressing these structural defects at the EGJ (repairing the hiatal hernia, moving the EGJ into the abdomen) and by decreasing the distensibility of the EGJ (6). In the Carlson study, patients with a hiatal hernia >3-cm and LA Grade C or D erosive esophagitis were excluded.

In patients with a structurally intact EGJ and normotensive LES (not assessed in the Carlson study), the presumed mechanism for GERD is related to TLESRs. A TLESR is characterized by prolonged LES relaxation in the absence of swallowing and triggered by gastric distention (7,8). While the absolute number of TLESRs does not appear to differ in patients with and without GERD, the percentage of TLESRs that are associated with reflux is reliably

greater in patients with GERD when compared to those without (9,10). It is likely that these patients are unable to effectively clear their esophagus following a TLESR (11). The findings of the study by Carlson *et al.* is consistent with this hypothesis. Unfortunately, it is uncertain if preexisting motor abnormalities lead to the development of GERD, or if GERD eventually leads to motility defects in the esophageal body. In studies where manometry has been conducted both before and after fundoplication, it has been demonstrated that as many as 75% of patients with esophageal dysmotility will improve or even normalize their motility following surgery (12,13). There is clearly much more to learn about the heterogeneous mechanisms and pathophysiology of GERD. Studies like the one conducted by Carlson *et al.* utilize a novel device and a different approach to continue to build our knowledge, and to define pieces to what is effectively the 'GERD puzzle'. While the role of FLIP in evaluating GERD is yet to be defined, the esophageal response to distention appears to be an important component of esophageal function.

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