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Dx-pH Monitoring: How Does It Compare to the Standard pH Probe?

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Purpose:
Physiologic assessment of esophageal acid exposure is often performed utilizing ambulatory pH monitoring. Recently ambulatory Restech Dx- H probe is designed to record pH changes in the oropharynx in patients with suspected extraesophageal reflux symptoms. However, there are no validations of this instrument against the current standards in clinical practice. Thus, we aimed to compare the internal consistency of the new distal esophageal Dx-pH probe with the standard of care Sandhill pH probe.

Methods:
Patients diagnosed with GERD (esophagitis at endoscopy or prior abnormal pH findings off acid suppressive therapy) underwent simultaneous ambulatory esophageal pH monitoring. The Dx-pH and Sandhill pH probes were positioned at 5 cm above the manometrically measured LES in each patient. Based on the inherent property of the devices, Dx-pH monitor recorded esophageal acid exposure every 0.5 seconds compared to a 5 second interval for the Sandhill probes. Outcomes assessed included episodes below pH 6, pH 5, and pH 4 and% time below pH 4, 5, and 6. The # times that pH fell below the cutoff was manually and electronically measured. The values were compared using the Wilcoxon signed rank test on the differences in the paired data.

Results:
A total of 11 patients (5 male and 6 female) with mean (range) age of 40.9 (21–59) constituted the study population. 72.7% and 45.4% of the patients were complaining of daily heartburn and regurgitation, respectively. No statistically significant ($P < 0.05$) differences were found between the Dx-pH and Sandhill devices for the number of times pH < 4, pH < 5, or pH < 6. The Dx-pH probe spent *consistently* more time at pH < 4 ($P = 0.131$), pH < 5 ($P = 0.049$), and pH < 6 ($P = 0.01$) than the Sandhill probe (Table 1.).

Dx-pH catheter vs Sandhill probe performance at different pH cut offs.

Outcomes	Restech (25-75%	Sandhill (25-75%	P Value
# Events pH < 4	37 (20–53)	34 (17–60)	0.31
% Times pH < 4	8.0 (1–15)	6.0 (1–10)	0.13
# Events pH < 5	40 (18–55)	46 (31–62)	0.09
% Times pH < 5	14.0 (2–29)	13.0 (1–24)	0.04
# Events pH < 6	36 (9–62)	41 (15–47)	0.32
% Times pH < 6	43.0 (12–56)	23.0 (6–43)	0.01

Conclusion:
Dx-probe identifies reflux events in the distal esophagus similar to current standard pH catheter but it has less variability. The clinical potential of this diagnostic device will need to be tested in patients with extraesophageal GERD.

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ADHERE Study: Application of Dx-pH Catheters in the Evaluation of Patients without Gastroesophageal REflux Disease (GERD)

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Purpose:
The Restech Dx-pH probe is a new ambulatory pH monitoring device which uses a sensitive sensor to capture liquid and aerosolized acid. Its design allows for convenient placement in the oropharynx above the upper esophageal sphincter (UES) without the need for manometry or endoscopy. Currently, no normative data for this device exists nor has its application been validated for use in patients with GERD or extraesophageal symptoms. Our aim was to provide data for Dx-pH probes in the oropharyngeal and distal esophageal sites in normal subjects.

Methods:
Normal subjects underwent prolonged ambulatory Dx-pH testing in the oropharynx and distal esophagus. The distal probe was placed 5 cm above the manometrically measured LES, and the proximal probe was placed visually into the oropharynx at the level of the uvula at a known distance from the UES. The following reflux parameters were measured using the Mann-Whitney non-parametric procedure: median % time below pH 4, 5, and 6, as well as, mean number of events per 24 hours below each of the above pH cutoffs.

Results:
A total of 31 normal subjects (11 M/ 20 F); mean age 33.2 yrs (range 21–56) comprised the study population. The median (95th percentile) total% time belowpH4, 5, and 6 in the distal esophaguswas 1.0 (5.3), 2.9 (12.6), and 10.4 (46.1), respectively (Table 1). For the oropharyngeal proximal probe, the median (95th percentile)% time below pH 4, 5, and 6 was 0.0 (0.0), 0.0 (2.4), and 1.0 (22.5), respectively. Finally, for the proximal probe, the median (95th percentile) number of events below pH 4, 5, and 6 was 0.0 (0.6), 0.0 (8.4), and 4.1 (197.5), respectively, over a 24 hour period in this normal population.

Table 1. Median Dx-pH probe measurements: oropharynx vs. esophagus

Parameters	Oropharynx (25-75%)	Esophagus (25-75%)
% Time pH < 4	0.0 (0.0–0.0)	1.0 (0.4–3
# of events/24 hrs < pH 4	0.0 (0.0–0.0)	
% Time pH < 5	0.0 (0.0–0.0)	2.9 (1.3–6.6)
# of events/24 hrs < pH 5	0.0 (0.0–0.0)	
% Time pH < 6	1.0 (0.0–11.2)	10.4 (5.2–20.4)
# of events/24 hrs < pH 6	4.1 (0.0–56.9)	

Conclusion:
The normative values for the new Dx-pH catheter probe compares favorably to the accepted gold standard pH monitoring device. Future studies can focus on comparative evaluations between patients with and without GERD using the Dx-pH catheter probe.