

Measurement of Pharyngeal pH: A New Technology and Normal Values

Shahin Ayazi, John C. Lipham, Jeffrey A. Hagen, Andrew Tang, Jessica M. Leers, Arzu Oezcelik, Emmanuele Abate, Steven R. DeMeester, Farzaneh Banki, Tom R. DeMeester

Introduction: Patients with respiratory and laryngeal complaints often have gastroesophageal reflux but classic symptoms are frequently absent and clinical findings are nonspecific. Current methods of measuring pharyngeal acid exposure are often inaccurate due to technical artifacts or probe malfunction. A newly designed pharyngeal pH probe has been introduced which detects aerosolized acid and is placed under direct vision. The aim of this study was to determine normal values for pharyngeal acid exposure using this catheter. **Methods:** Seventy eight asymptomatic volunteers were recruited. All had esophageal manometry and a video esophagogram. Dual channel esophageal pH monitoring was performed with the distal probe 5 cm above the lower sphincter and the proximal probe 1-4 cm below the upper sphincter. Simultaneously, pharyngeal pH was monitored with the new probe positioned 0.5-1 cm below the uvula. Subjects with abnormal distal esophageal acid exposure, a hiatal hernia larger than 2 cm, or a poor technical recording were excluded. Pharyngeal pH was analyzed using the standard components of esophageal pH monitoring at pH thresholds from 4 to 6 in 0.5 increments and a composite score was calculated. A separate analysis was performed for the upright and supine periods and the 95th percentile was determined. **Results:** The study population consisted of 55 subjects (28 M/27F) with a mean age of 31 years (range 19-72). The 95th percentile values for pharyngeal acid exposure are shown (Table). In the upright period, 5.5 is the best pH threshold to define abnormal acid exposure. Pharyngeal acid exposure is considerably higher in the supine period and a lower threshold is necessary. For this period, pH <5.0 would maximize sensitivity and pH < 4.5 would maximize specificity. The 95th percentile values for the composite score were: 9.4 for the upright period, and 4.8 and 6.7 for the supine period at pH < 5 and pH < 4.5 respectively. **Conclusion:** A newly designed pharyngeal pH probe which detects aerosolized acid may overcome the shortcomings of current techniques. Using this probe we have defined normal values for pharyngeal acid exposure in a large series of normal volunteers. These values can now be used to determine if patients with laryngeal or respiratory symptoms have abnormal pharyngeal acid exposure.

Threshold	Upright			Supine		
	% Time	Number of Episodes	Longest Episode (min)	% Time	Number of Episodes	Longest Episode (min)
pH < 4.0	0.0	0.0	0.0	1.26	1.0	5.93
pH < 4.5	0.0	0.0	0.0	1.54	1.2	7.11
pH < 5.0	0.02	1.0	0.12	5.15	4.0	18.97
pH < 5.5	0.13	1.20	0.71	23.86	16.2	52.7
pH < 6.0	6.29	40.2	12.83	55.11	45.0	152.3