

## Original Article

# Supraesophageal Reflux: Correlation of Position and Occurrence of Acid Reflux; Effect of Head-of-Bed Elevation on Supine Reflux

David R. Scott, MD<sup>a</sup>, and Ronald A. Simon, MD<sup>b</sup> *Grand Junction, Colo; and San Diego, Calif*

**What is already known about this topic?** Supraesophageal reflux disease (SERD) is associated with a variety of respiratory symptoms. Historically, SERD is thought to occur predominantly while upright and existing treatment regimens have been poorly defined and often ineffective.

**What does this article add to our knowledge?** This study suggests that supraesophageal reflux often occurs exclusively in the supine position. Our findings also show that elevation of the head of bed results in improvement or resolution of supine SERD in most patients.

**How does this study impact current management guidelines?** When suspected, SERD is often treated with empiric antisecretory agents. However, these are frequently ineffective. Our findings suggest that incorporation of head-of-bed elevation is important in SERD treatment programs.

**BACKGROUND:** Supraesophageal reflux of gastric contents can contribute to perennial nasopharyngitis, cough, and asthma. However, effective treatment strategies for supraesophageal reflux disease (SERD) remain inadequately defined.

**OBJECTIVE:** The purpose of this study is to assess the prevalence and timing of SERD and to investigate the efficacy of head-of-bed elevation in its treatment.

**METHODS:** A retrospective chart review of patients seen at Scripps Clinic Division of Allergy, Asthma and Immunology was performed who had undergone overnight nasopharyngeal pH monitoring with a commercially available nasopharyngeal pH-monitoring device, Dx-pH Measurement System from Restech, San Diego, Calif. Subjects with reflux were classified based on the position of reflux as either supine only, upright only, or both supine and upright. In a subset of subjects with supine-only reflux, pH monitoring was compared before and after elevating the head of bed 6 inches.

**RESULTS:** Adequate nasopharyngeal pH-monitoring data were obtained for 235 patients. Reflux was detected in 113 (48%) patients. The pattern of reflux observed was 62 (55%) supine only, 4 (4%) upright only, and 47 (42%) upright and supine. Sequential overnight nasopharyngeal pH monitoring before and

after head-of-bed elevation was obtained in 13 individuals with supine-only reflux. Ten subjects demonstrated significant improvement, 8 of whom demonstrated complete resolution of supine reflux with 6 inches of head-of-bed elevation.

**CONCLUSION:** This study provides new evidence that SERD frequently occurs in the supine position and that 6 inches of head-of-bed elevation is effective in reducing supine SERD. © 2015 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2015;■:■-■)

**Key words:** Laryngopharyngeal reflux; Rhinitis; Laryngitis; Cough; Postnasal drip; Throat clearing; Head-of-bed elevation

## BACKGROUND

Supraesophageal reflux disease (SERD) is defined as the retrograde flow of gastric contents proximal to the upper esophageal sphincter (UES) and into the laryngopharynx and upper aerodigestive tract.<sup>1</sup> There exists a clear association between SERD and respiratory symptoms, including throat clearing, cough, asthma, postnasal drainage (PND), sinusitis, laryngopharyngitis, and sleep disturbance.<sup>2-5</sup> Many of these are frequent complaints among patients who seek consultation from an allergist. In one study, over half of patients presenting with throat clearing, PND, or excessive throat mucus and normal sinus imaging were found to have SERD by 24-hour pH monitoring.<sup>6</sup> Comparatively, SERD has been documented in 10% of asymptomatic healthy controls.<sup>7,8</sup>

The diagnosis of SERD is made based on clinical suspicion and confirmed with either documentation of acidic reflux with an overnight nasopharyngeal or laryngeal pH monitor or response to empiric treatment with a proton-pump inhibitor (PPI). Most patients with SERD are unaware of their reflux and seldom report classic gastroesophageal reflux disease (GERD)

<sup>a</sup>Allergy and Asthma Center of Western Colorado, Grand Junction, Colo

<sup>b</sup>Scripps Clinic Division of Allergy, Asthma and Immunology, San Diego, Calif  
No funding was received for this work.

Conflicts of interest: The authors declare that they have no relevant conflicts.

Received for publication April 8, 2014; revised November 8, 2014; accepted for publication November 10, 2014.

Available online ■■

Corresponding author: David R. Scott, MD, Allergy and Asthma Center of Western Colorado, 1120 Wellington Ave, Grand Junction, CO 81501. E-mail: [deardrscott@gmail.com](mailto:deardrscott@gmail.com).

2213-2198

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<http://dx.doi.org/10.1016/j.jaip.2014.11.019>

*Abbreviations used**GERD- Gastroesophageal reflux disease**PND- Postnasal drainage**PPI- Proton-pump inhibitor**RSI- Reflux symptom index**SER- Supraesophageal reflux**SERD- Supraesophageal reflux disease**UES- Upper esophageal sphincter*

symptoms.<sup>9</sup> Therefore, SERD is considered a form of “silent reflux” and may be difficult to diagnose clinically.<sup>10</sup>

Supraesophageal reflux (SER) has been described primarily among an ENT patient population, where studies have shown it to be characterized by a different pattern of occurrence than that of classic GERD. In particular, SERD in that population has been described as occurring primarily during brief intervals in the upright position, as opposed to GERD, which is classically associated with prolonged acid exposure in the supine position.<sup>11,12</sup>

When SERD is suspected, patients are often treated with empiric antisecretory agents.<sup>2</sup> Although there is some evidence that prolonged twice-daily PPIs decrease the severity of throat-based symptoms in patients with SERD, the efficacy of this approach has not been consistently demonstrated between studies.<sup>6,13,14</sup> The observed lack of efficacy of PPI for SERD is thought to be due to the fact that acid-suppressing medications do not prevent inflammatory, nonacidic reflux from reaching the supraesophageal mucosa.<sup>1,15-19</sup> For patients with symptomatic refractory SERD, antireflux surgery may be performed, but is associated with increased risk.<sup>20</sup>

It has been postulated that lifestyle modification may be a preferable approach to the treatment of SERD.<sup>21</sup> Although lifestyle interventions have been well studied in GERD, no clinical trials exist that assess this approach in the treatment of SERD. Among the most efficacious lifestyle interventions in GERD is head-of-bed elevation.<sup>22</sup> This is an intuitively attractive treatment modality for SERD given the role of difficult-to-treat nonacidic reflux, which could potentially be prevented by head-of-bed elevation. The purpose of this retrospective chart review is to assess the prevalence and timing of SERD among an allergy clinic referral population and to investigate the efficacy of head-of-bed elevation in preventing SERD as measured by an overnight nasopharyngeal pH monitor.

## METHODS

### Study design

After obtaining permission from the Scripps institutional review board, the authors performed a chart review of all patients seen at Scripps Clinic Division of Allergy, Asthma and Immunology, San Diego, between January 2010 and November 2012 who had undergone nasopharyngeal pH monitoring as part of their routine clinical evaluation. Patients were not included if they took acid-suppressing medication during the study period. Any incomplete pH studies and the first and last 5 minutes of all studies were also excluded, as data recorded at the time of probe placement and removal appeared prone to inaccuracy.

The decision of whether to perform overnight pH monitoring was based on individual practitioner judgment and patient preference as guided by the presence or absence of typical signs and

**TABLE I.** Patterns and prevalence of supraesophageal reflux disease among an allergy clinic population as measured by overnight nasopharyngeal pH monitoring (N = 235)

No acidic reflux measured	122 (52%)
Acidic reflux measured	113 (48%)
Supine reflux only	62 (55%)
Upright reflux only	4 (4%)
Upright and supine reflux	47 (42%)

symptoms of SERD, including evidence of SERD on nasopharyngoscopy, perceived PND, throat-clearing cough, hoarseness, or rhinitis or sinusitis without another explanation. Most referred patients either had no prior suspicion for SERD (ie, had “silent reflux”) or had a history of more typical reflux symptoms that had previously been refractory to PPI. Patients with silent reflux were often too skeptical of an SERD diagnosis to agree to empiric PPI treatment before demonstrating reflux by pH monitoring. For patients with more typical reflux symptoms who previously failed PPI, pH monitoring was essential to differentiate nonacidic SERD versus an unrelated etiology for their symptoms. Specifically, in these patients, the detection of acidic reflux off of antacid served as a surrogate marker to predict nonacidic reflux while taking antacid. Therefore, although all patients were able to choose whether to pursue empiric treatment or pH monitoring, most patients in our study population opted for monitoring. Other common approaches to suspected SERD in our clinic include empiric acid-suppressing medication, lifestyle modification, and referral to ENT or gastroenterology. Patients in whom pH monitoring was not performed were not included in our analysis.

Subjects with reflux were classified based on the timing of the reflux pattern as either supine only, upright only, or both supine and upright. Although initially the goal of the study was limited to assessing the prevalence and pattern of nasopharyngeal reflux, we began to notice that most patients exhibited reflux only in the supine position. This led us to question whether elevating the head of bed might benefit those with supine-only reflux. We therefore began inviting subjects with documented solely supine SERD to return for sequential pH monitoring before and after elevating the head of bed by 6 inches. In this group, the authors performed a descriptive analysis of observed pH data to assess the effectiveness of head-of-bed elevation as a treatment for SERD.

Head-of-bed elevation was defined as sleeping in a conventional bed with either one end raised approximately 6 inches or with a 6-inch wedge pillow. Suggested tools for elevating the head of bed included 4 two-by-fours (1.5" height each), 2 bricks (2.25" height each), or a cinder block turned on its side (6" height). Alternatively, 1-inch stackable bed risers can be purchased in department stores or online that can be stacked to 6 inches. Subjects were specifically asked not to use standard pillows to prop up their head due to the unreliable nature of this technique once asleep. Also using standard pillows can lead to kinking of the thorax and abdomen and thereby potentially worsen reflux. Patients were also specifically asked not to make any other lifestyle change on the night of the repeat study.

### Subject inclusion

Included were all patients 18 years of age or older who underwent pH monitoring during the specified time interval. Subjects were asked to hold all antisecretory medications (PPIs and histamine-2

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