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Globus Pharyngeus and Esophageal Air Shadow: A Retrospective Case-Control Study Using Cervical Computed Tomography

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ABSTRACT

Objective: Globus pharyngeus is frequently encountered in otolaryngological practice but the etiology remains elusive. This study aimed to investigate the relationship between the sensation of globus pharyngeus and the esophageal air shadow as visualized on cervical computed tomography (CT).

Methods: A total of 46 patients with globus pharyngeus (the globus group) and 92 control subjects with cervical lymphadenopathy underwent cervical CT scans. Age and gender matching were conducted between the two groups. Parameters such as the maximum diameter, volume, and location of the esophageal air shadow were measured. The intraclass correlation coefficient (ICC) was calculated for reproducibility assessment in 30 patients who had repeated CT scans.

Results: The maximum diameter and volume of the esophageal air shadow did not show statistically significant differences between the globus and control groups (p=0.895 and p=0.588, respectively). A low ICC indicated poor reproducibility in the measurement of the esophageal air shadow's maximum diam6eter and volume.

Conclusions: Our study found no significant association between globus sensation and esophageal air shadow dimensions on cervical CT. The presence of GERD and the use of medications like proton pump inhibitors and prokinetics could not be adequately accounted for, highlighting the need for more stringent controls in future research. These findings serve as a preliminary foundation for prospective studies and may inform the formulation of hypotheses in the ongoing investigation of globus pharyngeus.

Keywords: Globus Pharyngeus; Esophageal Air Shadow; Cervical Computed Tomography; Gastroesophageal Reflux Disease

INTRODUCTION

Globus pharyngeus is a condition characterized by a sensation of a lump in the throat, reported by approximately 3-4.1% of outpatients [1]. The etiology of globus pharyngeus remains elusive, but functional and anatomical abnormalities of the cricopharyngeal muscle, enlarged tonsils, cervical osteophytes, pharyngeal muscle dysfunction, esophageal abnormalities, psychogenic factors, and gastroesophageal reflux disease (GERD) have been suggested as causative conditions [2]. In the diagnostic process for patients complaining of globus

pharyngeus, various tests such as laryngoscopy, esophagogastroduodenoscopy, esophagography, and cervical radiography are conducted; however, no universal guidelines for these tests have been established. Likewise, there are no standardized guidelines for treatment if organic abnormalities are ruled out, which complicates the management of patients who cannot be attributed any organic causes, and these cases are sometimes simply attributed to psychogenic factors.

One of the symptoms of GERD, a known cause of globus pharyngeus, includes reflux, heartburn, and chronic cough. These symptoms have been reported to significantly differ depending on the size of air shadow observed in the esophagus [3]. In cervical CT, esophageal air shadow is a commonly observed finding, but it is considered abnormal when its diameter exceeds 10-15 mm [4]. However, no literature has discussed the relationship between globus pharyngeus and esophageal air shadow.

In this study, we aimed to elucidate the relationship between globus pharyngeus and esophageal air shadow observed in cervical CT. We evaluated the association between the maximum diameter, volume, and location of the esophageal air shadow and globus pharyngeus. Additionally, we assessed the reproducibility of measuring the diameter and volume of esophageal air shadow in cervical CT.

METHODS

From January 2013 to May 2023, 46 individuals who underwent cervical computed tomography (CT) for the evaluation of globus pharyngeus were selected as the globus group. As a control group, 92 individuals who underwent cervical CT from January 2013 to May 2023 at our otolaryngology department for the evaluation of cervical lymphadenopathy were selected. Age and gender matching were performed between the study and control groups. Cervical CT images were evaluated using a standard mediastinal window (width, 396 HU; level, 44 HU) and a lung window (width, 1465 HU; level, -498 HU) to assess the esophagus from the posterior cricoid lamina to the tracheal carina. The maximum diameter of the air shadow within the esophagus and the distance from the posterior cricoid lamina the air shadow were measured. Additionally, three-dimensional images were constructed using Rapidia® (INFINITT Co., ltd., Seoul, Korea) to measure the volume of the air shadow (Figure 1). If more than one area appeared as an air shadow within the esophagus, data from the largest diameter was used.

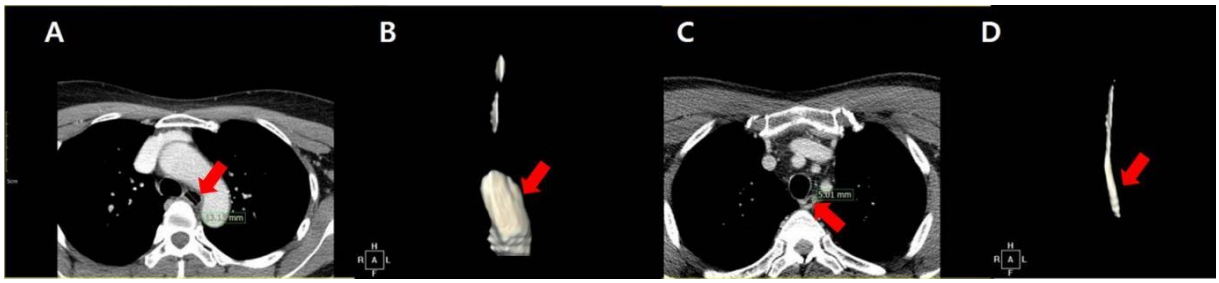

Figure 1: A. Computed tomography (CT) imaging illustrates a pronounced air column within the esophagus of a 48-year-old female subject. The maximum diameter of the esophageal air column is quantified at 13.12 mm. B. A three-dimensional reconstruction, conducted using the Rapidia® software, substantiates the presence of an expansive air column in the esophagus, with a calculated volume of 2045.22 mm^3. C. CT imaging of a 32-year-old male subject reveals minimal esophageal air column visibility. D. A three-dimensional reconstruction using Rapidia® for the same male subject displays a filamentous, streak-like configuration of the air column.

A t-test was performed to verify whether there was a statistically significant difference between the study and control groups in terms of the maximum diameter, volume, and location of the air density in the CT images. For patients who underwent repeated cervical CT scans, the first scan was used in the comparison between the study and control groups.

The reproducibility of measuring the diameter and volume of the air shadow within the esophagus was assessed using the intraclass correlation coefficient (ICC) in 30 patients who underwent repeated cervical CT scans. For patients who underwent CT more than three times, images from two different dates were randomly selected using a random number table.

Additionally, the use of proton pump inhibitors and prokinetics, as well as the presence of a medical history diagnosed as GERD, were checked in both the study and control groups.

RESULTS

The mean age of the subjects in the globus group was 51.13 years, with a male-to-female ratio of 0.26 (12 males, 34 females). In the control group, the mean age was 51.51 years, also with a male-to-female ratio of 0.26 (24 males, 68 females).

In the globus group, 6 individuals (13%) were on proton pump inhibitors, and 3 (6.5%) were on prokinetics. Patients diagnosed with GERD through esophagogastroduodenoscopy were present in 2.2% (2 individuals) of the control group and 2% (1 individual) of the globus group.

The mean maximum diameter of the air shadow was 8.24 ± 4.90 mm in the globus group and 8.37 ± 5.50 mm in the control group (p=0.895). The mean volume of the air shadow was 769.56 ± 983.08 mm^3 in the globus group and 682.18 ± 767.28 mm^3 in the control group (p=0.588). The mean distance between the air shadow and the posterior cricoid lamina was 88.86 ± 28.01 mm in the globus group and 88.34 ± 21.06 mm in the control group (p=0.911). None of the metrics-maximum diameter, volume, and location of the air shadow within the esophagus in the CT images-showed any significant difference between the two groups (Table 1).

Table 1: Association between the Manifestation of Globus Sensation and the Dimensions, Volumetric Properties, and Anatomical Location of Esophageal Air Columns.

	Globus	Control	
Diameter	8.24 ± 4.90mm	8.37 ± 5.50mm	p=0.895
Volume	769.56 ± 983.08 mm^3	682.18 ± 767.28mm^3	p=0.588
Distance from cricoid	88.86 ± 28.01mm	88.34 ± 21.06mm	p=0.911

In a single patient who had repeated CT scans at two different time points, the intraclass correlation coefficient for the volume of the air shadow was 0.146, and for the diameter, it was 0.456, indicating poor reproducibility.

DISCUSSION

Globus pharyngeus is increasingly considered not as a disease due to a single etiology but as a syndrome resulting from various underlying conditions. In particular, gastroesophageal GERD has been cited as a primary causative factor [5,6], and some symptoms of GERD patients have been reported to be related to intraluminal esophageal air [3]. The aim of this study was to investigate the relationship between the sensation of a throat foreign body and esophageal air shadow as observed on cervical CT.

Our results revealed no statistically significant differences in the maximum diameter, volume, and location of the esophageal air shadow between the globus group and the control group.

The control group in this study comprised patients who underwent cervical CT scans for the assessment of cervical lymphadenopathy, and the presence or absence of globus sensation in these patients was not verified. Given that globus sensation is reported to exist in 35% of males and 53% of females [7], It cannot be ruled out that some subjects in the control group might have experienced globus sensation.

Additionally, several months' time gap existed between the timing of the cervical CT scans and the outpatient visits for patients reporting a globus sensation. Thus, it was not possible to confirm whether these patients actually experienced this sensation at the time of CT scanning.

We also reviewed the usage of proton pump inhibitors and prokinetics among our study subjects. However, we could not ascertain whether these medications were being taken at the time of CT scanning, thus we cannot rule out the possibility that medication acted as a confounding variable.

Moreover, low intraclass correlation coefficients were observed in patients who underwent repeated CT scans on different dates for the measurement of the maximum diameter and volume of the esophageal air shadow. This suggests that the measurements for esophageal air shadow may vary over time and should be considered in future research. This study serves as a preliminary investigation for prospective research and is expected to contribute to hypothesis generation for future studies.

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