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CASE REPORT

Esophageal Foreign Body Missed Diagnosis; an Analysis of 12 Cases

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Abstract: Missed diagnosis of foreign bodies in esophagus occasionally results in adverse consequences for patients. This study aimed to analyze the clinical characteristics of esophageal foreign body missed diagnosis in 12 cases. Among the 12 patients, 7 didn't undergo esophagus-related examination due to mild pain; One case didn't report a clear history of swallowing foreign bodies. For one case, computed tomography (CT) examination had not reached the esophageal foreign body level. Two cases were missed diagnosis because the foreign bodies were too tiny to develop clearly on CT. One case showed foreign body in esophagus during initial CT examination, but after subsequent gastroscopy, no foreign body was found. Among the 12 patients, 7 had esophageal perforation, 1 of which developed a neck abscess, and 1 had peri-esophageal abscess. It seems that, if foreign bodies in the pharynx or esophagus are suspected and no foreign bodies are found in the laryngoscope, chest CT scan is necessary. It is best to perform examination of full-length esophagus and pharynx, because foreign bodies may exist in the post-cricoid region or the deep part of the pyriform sinus, especially in older cases with longer retention times.

Keywords: Foreign Bodies; Esophagus; Diagnosis; Failure to Rescue, Health Care; Diagnostic Errors

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1. Introduction

Foreign body in esophagus is common in clinical emergency work, and timely detection and treatment usually lead to good prognosis. However, due to various reasons, delayed surgical treatment time often leads to serious complications such as esophageal perforation, cervical infection or abscess formation, mediastinal, thoracic, and lung infections, and even macrovascular damage, leading to life-threatening consequences (1, 2). If the patients were missed during the diagnosis and treatment process, it is more likely to cause medical disputes. To avoid this situation as much as possible, this cases series report the causes of missed diagnosis and clinical characteristics of 12 cases with esophageal foreign body who were missed, from July 2018 to March 2023, in Shaoxing People's Hospital, China. A retrospective analysis of the reasons for missed diagnosis, disease development process, prognosis, and summary of clinical characteristics was conducted.

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2. Characteristics of studied cases

12 patients with foreign bodies in esophagus, including 4 (33.3%) males and 8 (66.7%) females, with a mean age of 61.58 ± 13.82 (range: 30 - 83) years were studied. 11 cases were missed during their initial visits, in the other 1 case foreign body had been detected in the esophagus during their initial computed tomography (CT) examination, but was missed during subsequent treatment.

All foreign bodies in esophagus were hard bones or cartilages, and all the foreign bodies were in the upper esophagus, with an average foreign body retention time (the foreign body retention time point to the removal time point) of 109.3±121.8 hours.

2.1. Causes of missed diagnosis

Among the 11 patients who were missed in the initial visit, 7 cases did not undergo esophagus-related examination due to mild pain (Numerical Rating Scale (NRS) score ≤ 3 points). Later, due to persistent pain, CT examination revealed foreign bodies in esophagus. For example, one elderly patient (No. 2 in Table 1) came to our emergency department for treatment one hour after swallowing fish bone by mistake, accompanied by dysphagia and pharyngeal pain, which could be tolerated. No obvious foreign body was found after

Table 1: Characteristics of studied cases with esophageal foreign bodies missed diagnosis

Case	Age (years)	Retention time (hours)	Reasons of missed diagnosis	Serious complications
1	72	73	Mild pain without undergoing esophageal examination	None
2	63	77	Mild pain without undergoing esophageal examination	Esophageal perforation, periesophageal abscess
3	30	67	Mild pain without undergoing esophageal examination	None
4	74	139	Mild pain without undergoing esophageal examination	Esophageal perforation
5	54	481	Mild pain without undergoing esophageal examination	Esophageal perforation, neck abscess
6	57	47	The plane where the foreign object was located	Esophageal perforation
7	49	48	Mild pain without undergoing esophageal examination	None
8	73	48	Tiny foreign body leads to no CT display	None
9	59	121	Mild pain without undergoing esophageal examination	Esophageal perforation
10	83	95	The history of swallowing foreign body by mistake	Esophageal perforation
11	64	95	No foreign object found during gastroscopy	Esophageal perforation
12	61	20	Tiny foreign body leads to no CT display	None

CT: computed tomography.

physical examination of the throat and laryngoscopy, the patient was advised to temporary medical observation. 4 days later, she returned with persistent sore throat. Chest CT scan revealed foreign bodies in the upper esophagus combined with esophageal perforation (FIG.1 a, b).

Two cases were missed due to the embedded foreign bodies being too small to be found in the entire esophageal CT scan, among them, one case (No. 8 in Table 1) was suspected to have foreign body in the upper esophagus after re-examination of the esophageal CT (FIG.1 c), while in the other case (No. 12 in Table 1) no obvious foreign body was found after re-examination of the esophageal CT.

Later, a gastroscopy examination revealed one small fish bone in the upper esophagus.

One case (No. 6 in Table 1) complained of pain in the posterior sternum, and no obvious foreign body was found on chest CT examination. After 1 day, the patient still complained of persistent pain. Later, a CT examination of the throat revealed a foreign body at the entrance of the esophagus. Analyzing the CT images, it was found that the upper slice of the esophagus on the first chest CT scan was about 1.5cm away from the lowest segment of the foreign body.

One case (No. 10 in Table 1) did not report a history of obvious ingestion of foreign bodies, but after repeatedly questioning the medical history, it was found that the patient also had the possibility of swallowing foreign bodies by mistake, and CT examination was performed to confirm the diagnosis (FIG.1 d).

One case (No. 11 in Table 1) was initially diagnosed with foreign body in the esophagus on CT examination, but no obvious foreign body was found during gastroscopy treatment. The case was instructed to observe her physical condition temporarily. One day later, the patient was unable to relieve pain, and a follow-up CT examination showed that the foreign body in the upper esophagus still existed. Figure 1 shows the axial cut of chest CT scans with esophageal foreign body.

2.2. Prognosis

Foreign bodies in esophagus were removed in the all patients. The final prognosis was well for all. The foreign body of 1 case was removed under gastroscopy, in 10 cases they were removed via esophagoscopy under general anesthesia, and 1 was removed through external cervical incision due to foreign bodies migrating outside the esophageal cavity. 7 (58.3%), cases experienced esophageal perforation, 1 of which developed cervical cellulitis and abscess, and 1 case developed periesophageal abscess.

3. Discussion

The missed diagnosis of foreign body in esophagus not only increases the duration of the patient's disease, such as pain and swallowing obstruction, but also greatly increases the likelihood of other complications. Some studies have reported that if the foreign body is embedded for more than 24 hours, the incidence of complications will significantly increase (3). Chest CT scan is the preferred method for diagnosing foreign bodies in esophagus (4, 5). In this study, although laryngoscopy was performed in a timely manner, CT scans were not performed due to the patient's mild pain in 7 patients who had a clear history of swallowing foreign bodies. Subsequent examinations also indicated that they were all upper esophageal foreign objects. To investigate the cause, the medical staff was inclined to diagnose the patient as a pharyngeal foreign object, because pharyngeal foreign objects are more common and the patient's symptoms are extremely similar. When no foreign body is found under laryngoscopy, it is considered that the foreign body in the pharynx or esophagus has fallen off by itself, and there is only mu-

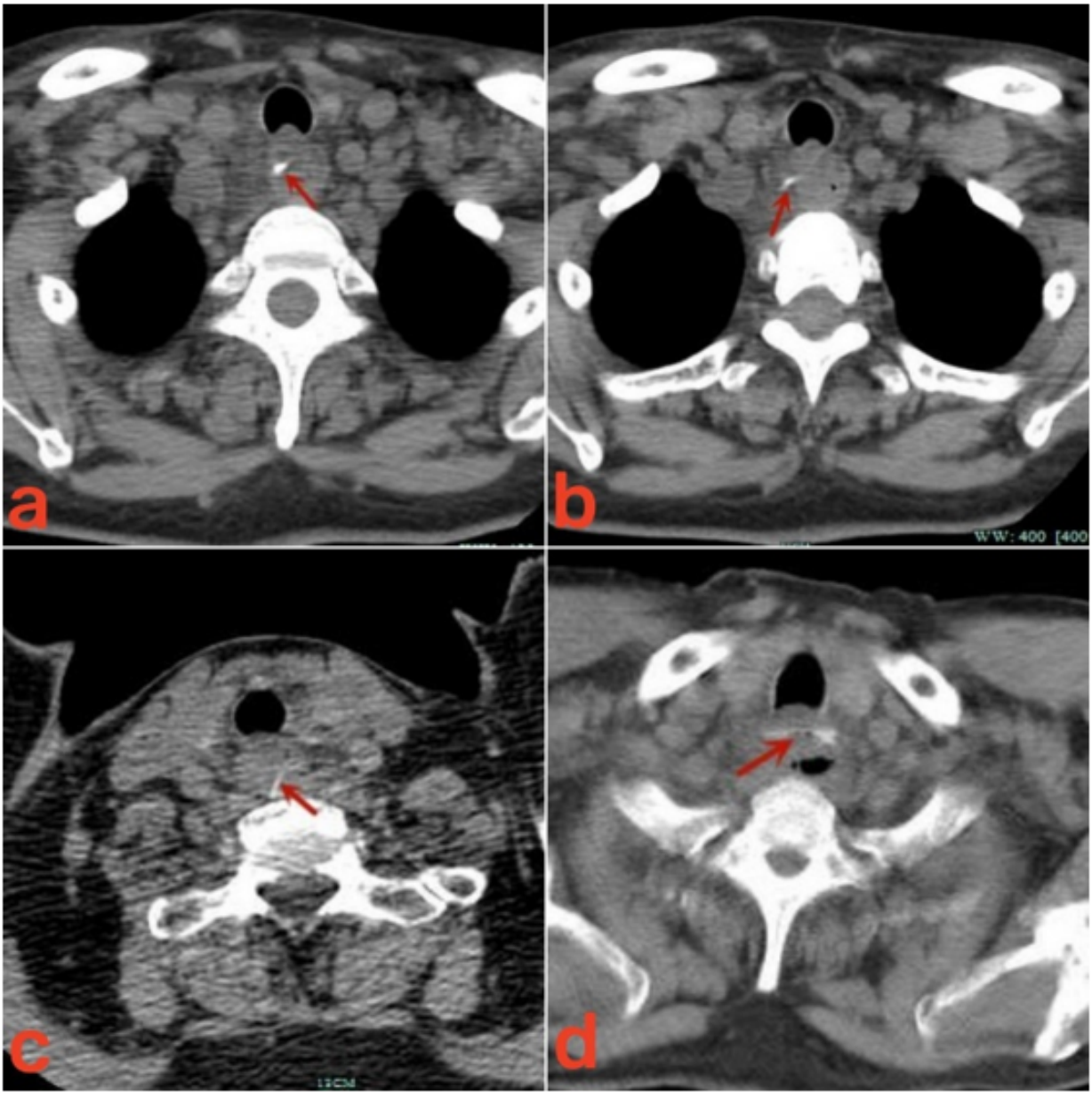

Figure 1: Axial plan of chest computed tomography scans with esophageal foreign body (the red arrows).

cosal injury. However, there are fine differences between foreign bodies in pharynx and esophagus. Firstly, the pain of foreign bodies in the pharynx is lighter and the pain location is higher (6).

Secondly, foreign bodies in the pharynx sometimes have pain on one side, while foreign bodies in the upper esophagus only have pain in the middle (7). Thirdly, in most cases, when pain intensifies during tongue or pharyngeal muscle movement, the possibility of foreign bodies in the pharynx is higher. Due to the different size, shape, and location of incarcerated foreign bodies, as well as individual pain tolerance, it is difficult to make an accurate judgment on each patient. In addition, due to the radiation in the painful area, sometimes the patient's stated area may not necessarily be the true location of the foreign object.

The authors believe that if foreign bodies in the pharynx or esophagus are suspected and no foreign bodies are found in the laryngoscope, chest CT scan is necessary. It is best to perform examination of full-length esophagus and pharynx, because foreign bodies may exist in the post-cricoid region or

the deep part of the pyriform sinus.

The thinner the CT layer, the more conducive it is to the diagnosis and detection of foreign bodies in esophagus. However, although it provides certain diagnostic information for tiny or lower-density foreign bodies, definitive diagnosis is still difficult (8). Small fishbone foreign bodies can sometimes appear as slightly high-density shadows on CT and are difficult to distinguish from surrounding artifacts. The following features are helpful for diagnosis: suspicious foreign body shadows need to be approximately consistent with the patient's pain site and appear on at least two CT cuts, with pathways different from surrounding artifacts.

In addition to CT, gastroscopy and esophagoscopy are also methods for detecting esophageal foreign bodies. They can also serve as treatment aids; however, both also have limitations, and are only able to peek at foreign bodies in the esophageal cavity. Moreover, for foreign bodies in the upper esophagus, the closer it is to the cricoid cartilage, the harder it is to detect through gastroscopy. Since gastroscope is a soft endoscope, it usually enters the esophagus from both sides of the pyriform fossa during examination, which may overlook the upper part of the esophagus under the cricoid cartilage. Additionally, when the gastroscope enters the position of the esophagus from the pyriform fossa, the patient usually has a heavy local reaction, making it difficult to fix the gastroscope and obtain a stable endoscopic view. For esophageal foreign bodies confirmed by CT, if perforation has been indicated before surgery, and the foreign body in the esophageal cannot be detected via gastroscopy or esophagoscopy, CT examination is required to rule out the possibility of foreign bodies migrating outside the esophageal cavity.

In the elderly, the nerve sensitivity is decreased, the contraction ability of the smooth muscle of the esophagus is weakened, and the peristalsis of the esophagus is slow, so the pain caused by foreign body impaction in the esophagus is lower than that of the middle-aged and young people (9). In this article, the average age of missed patients is over 60 years old. For elderly patients, after ruling out the possibility of pharyngeal foreign bodies, it is even more important to be vigilant about foreign body in esophagus. The rate of serious complications due to esophageal foreign bodies is closely related to the retention time of foreign bodies (10). In this article, because of the long retention time of foreign bodies, the esophageal perforation rate of 12 patients reached 58.3%, which is much higher than the 1-6% that was reported for incidence of esophageal foreign body perforation in literature (11), and 2 patients developed severe extraesophageal tissue infection. Therefore, for patients with suspected esophageal foreign bodies, timely thin slice CT examination of the entire esophagus, including the laryngopharynx section, should be performed. When foreign bodies are not detected in the esophagus at the initial diagnosis but the patient experiences persistent pain, it is necessary to recheck the esophageal CT or perform further gastroscopy examination. Especially for elderly patients with persistent pain, caution should be exercised.

4. Limitations

This study has certain limitations. Firstly, the sample size of the study objects is too small, only 12 cases, and the corresponding research data may have certain statistical deviations. Secondly, there is a lack of control studies.

5. Conclusion

If foreign bodies in the pharynx or esophagus are suspected and no foreign bodies are found in the laryngoscope, chest CT scan is necessary. It is best to perform examination of full-length esophagus and pharynx, because foreign bodies may exist in the post-cricoid region or the deep part of the pyriform sinus, especially in older cases with longer retention times.

6. Declarations

6.1. Acknowledgments

Not applicable.

6.2. Conflict of interest

The authors declare that they have no competing interests

6.3. Funding

No funding was obtained for this study.

6.4. Authors' contribution

All authors made a significant contribution to the work reported, whether that is in the acquisition of data, analysis and interpretation, or in all these areas: took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

6.5. Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

6.6. Informed consent

Informed consent was obtained from all patients included in the study

6.7. Using artificial intelligence chatbots

Not used in this article.

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