

Difficulties in Extracting Dentures Stuck in The Esophagus

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ARTICLE INFO : Received, January 21, 2024; Revised, April 22, 2024; Accepted, May 2, 2024; Published, June 25, 2024
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DOI : [10.24815/jds.v9i1.38667](https://doi.org/10.24815/jds.v9i1.38667)

ABSTRACT

Foreign bodies in the esophagus are one of the common problems that ENT doctors often face. One of them is a foreign body with dentures in the esophagus. The diagnosis of a foreign body of dentures in the esophagus is established based on anamnesis, physical examination, radiological examination, and esophagoscopy. The act of esophagoscopy is performed as diagnostic and therapeutic. If not handled immediately and adequately, foreign bodies in the esophagus can cause complications such as esophageal perforation, blockage, and pressure of the foreign body into the airway and other complications. Patient readiness, availability of tools, and the presence of experienced experts are significant factors in overcoming this case. Prompt treatment using esophagoscopy is a safe and effective way to perform foreign body extraction in most cases. Thoracotomy to esophagectomy is performed in cases of foreign bodies in the esophagus that experience difficulties or failure in extracting by esophagoscopy. It was reported that two cases of foreign bodies with dentures in the esophagus were removed by thoracotomy accompanied by esophagectomy.

Keywords: Foreign body in the esophagus, dentures, thoracotomy, esophagectomy

ABSTRAK

Benda asing di esofagus adalah salah satu masalah umum yang sering dihadapi oleh dokter THT. Salah satunya adalah benda asing gigi palsu di esofagus. Diagnosis benda asing gigi palsu di esofagus ditegakkan berdasarkan anamnesis, pemeriksaan fisik, pemeriksaan radiologi dan esofagoskopi. Tindakan esofagoskopi dilakukan sebagai diagnostik dan terapeutik. Benda asing di dalam esofagus bila tidak ditangani dengan tepat dan segera dapat menyebabkan terjadinya komplikasi seperti perforasi esofagus, penyumbatan dan penekanan benda asing ke jalan napas dan komplikasi lainnya. Kesiapan pasien, ketersediaan alat, dan adanya tenaga ahli yang berpengalaman merupakan faktor-faktor yang sangat penting dalam mengatasi kasus ini. Penanganan segera dengan menggunakan esofagoskopi adalah cara yang aman dan efektif untuk melakukan ekstraksi benda asing pada sebagian besar kasus. Torakotomi hingga esofagektomi dilakukan pada kasus benda asing di esofagus yang mengalami kesulitan atau kegagalan dalam melakukan ekstraksi dengan esofagoskopi. Dilaporkan dua kasus benda asing gigi palsu di esofagus yang dikeluarkan dengan tindakan torakotomi disertai esofagektomi.

Kata Kunci : Benda asing di esofagus, gigi palsu, torakotomi, esofagektomi

1. Introduction

Denture impaction in the esophagus is common in otolaryngology and is characterized by difficulty of swallowing, sore throat, and excessive drooling. This problem often arises due to factors related to the dentures themselves, including poor fit caused by mismatched sizing or prolonged wear without adjustment. Inadequate maintenance as dentures loosen further increases the risk of them becoming lodged in the esophagus, leading to potential complications such as obstruction and infection.^{1,2}

The popularity of acrylic radiolucent dentures, valued for their ability to restore oral function and aesthetics, has contributed to increased cases of denture ingestion and subsequent esophageal impaction.² These foreign bodies typically get stuck at specific anatomical narrowings of the esophagus, posing challenges for retrieval and increasing the likelihood of complications like perforation and abscess formation if not promptly managed.^{3,4}

Effective management of esophageal denture impaction requires a multidisciplinary approach involving surgeons, otolaryngologists, and intensive care teams. Prompt diagnosis, timely intervention, and thorough patient education on denture care and regular check-ups are crucial to mitigate risks and ensure favorable outcomes, avoiding long-term severe health consequences such as recurrent laryngeal nerve paralysis and mediastinitis. Understanding these dynamics and

implementing comprehensive care strategies are essential to minimize complications and optimize the treatment of patients with denture impaction in the esophagus.^{5,6}

1.1. Anatomy

The esophagus is a duct in the form of a muscular tube that connects and distributes food from the oral cavity to the stomach. From the pharynx to the stomach, the esophagus passes through three compartments. It is divided according to these compartments, namely the neck (cervical part), which is 5 cm long and runs between the trachea and the vertebral column. The chest (thoracic part), as tall as the manubrium of sternum, is in the posterior mediastinum starting behind the left aortic arch and left main branch bronchus, then bends to the lower right next to the front right of the lower thoracic aorta. The abdomen (abdominal part), enters the abdominal cavity through the esophageal hiatus of the diaphragm and ends in the gastric cardia, ranging in length from 2-4 cm. In the neck region (cervical segment), the esophagus is at the midline and slightly deviates to the left when entering the thorax. The trachea and thyroid gland are in the front part, and in the back, it is bordered by the prevertebral fascia and cervical vertebrae 6-7. A carotid sheath has its contents and neck muscles on both lateral sides, and the craniopharynx sphincter bounds the proximal.^{7,8}

The esophagus also has four physiological constrictions that can cause difficulty for the instrument to enter and become the location where foreign bodies are usually stuck. The first narrowing part is the craniopharynx, located at the height of the VI cervix, with a transverse diameter of about 23 mm in adults and an anteroposterior of 17 mm. The second narrowing part, the aortic arch, as high as the IV thoracic vertebrae, has a transverse diameter of about 23 mm and an anteroposterior of 19 mm. The third narrowing is bronchial, where the left main bronchi crosses in front of the esophagus, as high as the thoracic vertebrae V, with a transverse diameter of approximately 23 mm and an anteroposterior of roughly 17 mm. The fourth narrowing is the diaphragm part located at the place where the esophagus crosses the diaphragm, as high as the thoracic vertebra X, the transverse diameter and anteroposterior is approximately 23 mm. From these narrowing areas, 70% of foreign objects are caught in the first narrowing area.^{7,8}

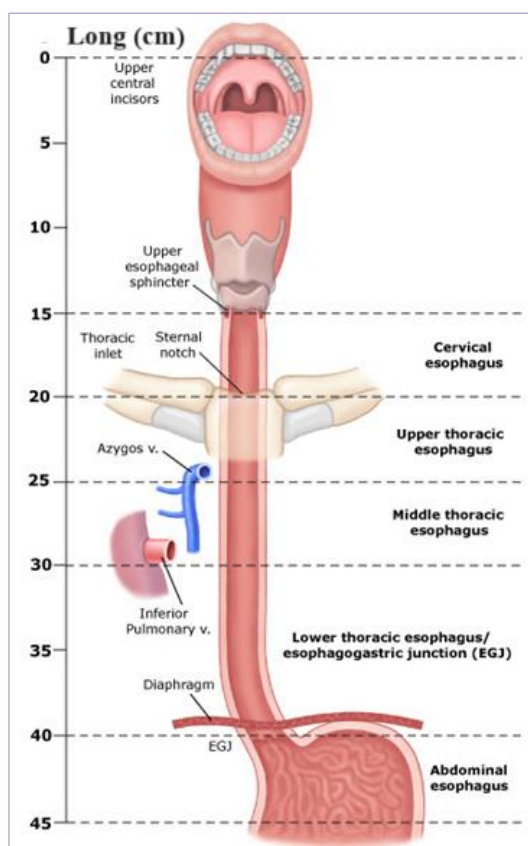


Figure 1. Topography and narrowing of the esophagus.^{7,8}

1.2. Types Of Foreign Objects

Several foreign objects often stuck in the esophagus include bones, fish spines, fruit seeds, coins, dentures, and razors. Children use foreign objects every day, especially those between 3 and 11. Adults commonly use foreign objects such as bones, fish spines, and dentures. Dentures have a wire sticking out at the ends, which is dangerous and can cause lacerations and esophageal perforations.⁵

1.3. Clinical Symptoms

Symptoms of obstruction due to esophageal foreign bodies depend on the size, shape, and type of foreign body, the location of the foreign body being stuck, complications arising from the foreign body, and the length of time the foreign body has been swallowed if the foreign body has been stuck > 24 hours can cause a risk of complications. The symptoms associated with ingesting a foreign body occur in three stages. A severe cough or vomiting occurs in the first stage as an initial symptom. This happens when the first foreign body is swallowed. The second stage is a condition where symptoms are still present but not as severe as the first. The foreign object has become stuck, and the symptoms caused have been slightly reduced. This stage can last for a moment or temporarily. Furthermore, the third stage consists of symptoms caused by complications. There is a possibility of discomfort, dysphagia, blockage, or perforation of the esophagus until mediastinitis occurs.⁴

Symptoms of dysphagia vary depending on the size of the foreign body. Dysphagia is more severe when mucosal edema has occurred that aggravates the blockage, resulting in a persistent sense of esophageal blockage. Other symptoms are odinophagia, which is pain when swallowing food or spit, hypersalivation, regurgitation, spit mixed with blood, and vomiting. Pain symptoms in the back indicate signs of perforation or mediastinitis. Dyspnea, stridor, and cyanosis symptoms occur due to pressure on the trachea by a foreign body.⁴

1.4. Diagnosis

The diagnosis of denture foreign bodies in the esophagus is established based on medical history, clinical picture, radiological examination, and endoscopy. Endoscopic procedures are performed for diagnostic and therapeutic purposes. From the medical history, there is a history of denture ingestion, the shape, and size of dentures, whether there is a protruding wire or not, as well as clinical symptoms of swallowing a foreign object in the esophagus such as complaints of difficulty swallowing to the point of not being able to swallow, regurgitation symptoms when eating, vomiting accompanied by blood spots, and a lot of salivation.^{4,10}

The physical examination does not help much; sometimes, it is found that there is a buildup of saliva in the piriformis sinuses. The presence of fever and subcutaneous emphysema should be suspected of the possibility of esophageal perforation. Supporting examinations in the form of radiological examinations are outstanding in enforcing the diagnosis of foreign objects and determining the location of the foreign objects. Radiological examination in plain AP and lateral cervical photographs should always be carried out on suspicion of foreign bodies in the esophagus. However, the results are sometimes unexpected because dentures are made of acrylic radiolucent. Examination with computed tomography can help to see how far the foreign body is from the aortic arch to determine if it is possible to hit the aortic arch on the denture with wires. Esophagoscopy procedures benefit diagnostics and therapy using rigid and flexible esophagoscopy.^{9,10}

1.5. Management

The foreign body in the esophagus is removed by esophagoscopy action using a tip suitable for the foreign body. If the foreign body has been successfully removed, a re-esophagoscopy must be performed to assess the presence of pre-existing esophageal abnormalities.¹¹⁻¹³ Sharp foreign bodies that cannot be removed by esophagoscopy must be removed immediately by surgery in the form of a cervicotomy, thoracotomy, or esophagotomy, depending on the location of the foreign body.¹⁴

1.5.1. Indications Of Operative Action In Esophageal Foreign Bodies

Diagnostic and therapeutic esophagoscopy is the most important action to extract foreign bodies in the esophagus, especially < 6 hours after ingestion of foreign bodies. Indications of operative action for the extraction of foreign bodies when: (1) Foreign bodies (especially sharp) have been > 24 hours in the esophagus; (2) Difficulties in retrieving foreign objects with esophagoscopy that have used

various maneuvers but have not succeeded, and the impression of foreign objects is stuck; (3) The possibility of perforation of the esophagus > 6 cm is known when an esophagoscopy (indication of esophagectomy) is performed and the patient's clinical presence of hematemesis or not.¹⁵

1.5.2. Posterolateral Thoracotomy

Difficulties when removing dentures in the esophagus often require open surgery, including a thoracotomy. This action is carried out when the extraction process with esophagoscopy is unsuccessful, and the dentures are indicated to tear the esophageal lumen. The thoracotomy consists of four techniques: posterolateral thoracotomy, median thoracotomy, axillary thoracotomy, and anterolateral thoracotomy. A thoracotomy that is often used is posterolateral. Posterolateral thoracotomy provides excellent access to the pulmonary mediastinum, endo-thoracic trachea, and endothelial esophagus, allowing for safe control of the pulmonary blood vessels during pulmonary resection. Posterolateral *thoracotomy* offers more accessibility to all thorax areas than any other incision. Two potential drawbacks of a posterolateral thoracotomy are pain, which can interfere with breathing movements, and a decrease in chest wall mobility. However, these difficulties can be minimized by using modern postoperative care techniques, such as epidural analgesia.^{14,16,17}

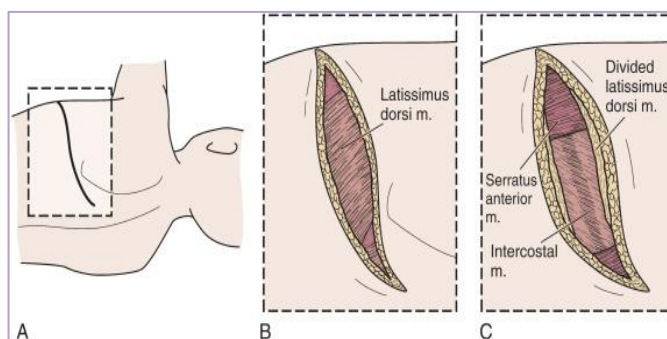


Figure 2. Posterolateral Technique of Thoracotomy¹⁸

1.5.3. Esophagectomy

Esophagectomy is a surgical procedure to remove a part of the esophagus that is performed to remove a malignant tumor of the esophagus and its lymph nodes. This technique is also performed on the part of the esophagus that has undergone a reasonably wide perforation.

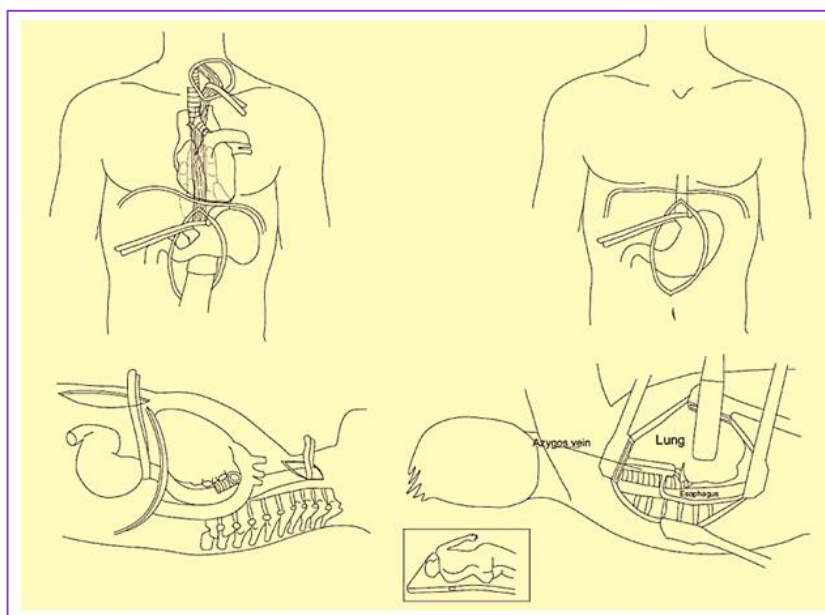


Figure 3. Transhiatal esophagectomy technique (left), transthoracic esophagectomy (right)¹⁹

This technique is carried out through 4 incision approaches, namely transthoracic, Ivor-Lewis (through the 5th intercostal interval), *Three-hole* esophagectomy (small incisions in the chest and

abdomen), and transhiatal (in the middle of the abdomen). This surgery is performed under general anesthesia. There are two types of esophagectomy techniques: 1) transhiatal esophagectomy and 2) transthoracic esophagectomy. In transhiatal esophagectomy consists of a cervicotomy and laparotomy, while in transthoracic esophagectomy, thoracotomy and laparotomy are performed.^{14,18,19}

1.5.4. Esophagotomy

Esophagotomy is a classic surgical technique performed when the esophageal scope has difficulty extracting. In esophagotomy, an incision is made in the esophagus, which aims to remove foreign bodies or manage esophageal achalasia. Indications of esophagotomy on a foreign body in the esophagus, according to Terracol and Sweet are: (1) The foreign body has been stuck in the esophagus for >24 hours, causing infection in the neck area, induration, and pain throughout the carotid; (2) A large, irregularly shaped foreign body that has been > 24 hours inside the esophagus; (3) There are sharp parts on foreign objects; (4) Failure during extraction with an esophagoscopy; (5) Causes severe hematemesis or suspicion of perforation, either clinically or radiologically.²⁰

1.6. Complications

Foreign bodies in the esophagus can cause mild to severe complications. Loh et al reported from 273 cases of foreign bodies in the esophagus, 20 cases (7.3%) were found to have severe complications in the form of esophageal perforation 70%, perforation with mediastinitis 15%, retropharyngeal abscess, esophageal-subclavian fistula, and mediastinitis with pneumonia 7.5% each. Esophago-carotid fistula is a fatal complication. Other complications can arise from parapharyngeal abscesses, bleeding, esophageal strictures, airway obstruction, recurrent laryngeal nerve paresis, and esophageal strictures.^{14,20,21}

2. Case Report

A 53-year-old male patient came to dr. Cipto Mangunkusumo Hospital on January 28, 2020, with complaints of being swallowed by dentures for 3 hours before entering the hospital. Patients accidentally swallow dentures while gargling after eating. The dentures of the swallowed patients used a hook wire on the right side of the acrylic dentures, and there were two dentures in one acrylic, with a size of about 2 cm x 4 cm. The patient had his dentures made at the dentist. The patient has tried to remove dentures by pressing the abdomen and stimulating to vomit by inserting a finger into the throat, but to no avail. Patients complain of sore throat and pain in swallowing (VAS2). In addition, the patient feels that something is blocking around the chest. There were no complaints of saliva mixed with blood, no complaints of a lot of saliva, and no complaints of coughing and shortness of breath. There are no other ENT complaints. The last patient ate and drank 6 hours before entering the hospital. The patient had previously had an anteroposterior thoracic x-ray (AP) with a braces shadow in the esophageal projection, and then the patient was referred to the RSCM.

On physical examination, there were no signs of airway obstruction, fever, or subcutaneous emphysema in the neck or chest region. Throat examination within normal limits. The RSCM blood laboratory examined the patient, and the results were within normal limits. Kabiven fluid 1440 ml/24 hours was given, NaCl 0.9 % 500 ml/12 hours, methylprednisolone 1 x 125 mg intravenously, then the patient was fasted. The results of the surgery tolerance from the Internal Medicine section were obtained with mild risk surgery tolerance, and from the anesthesia section, ASA I was obtained without airway obstruction. The patient underwent a re-thoracic X-ray examination at RSCM on January 28, 2020. The anteroposterior (AP) and lateral positions showed a foreign body with a metal density as high as T3-4, posterior from the trachea, and projection of the esophagus.

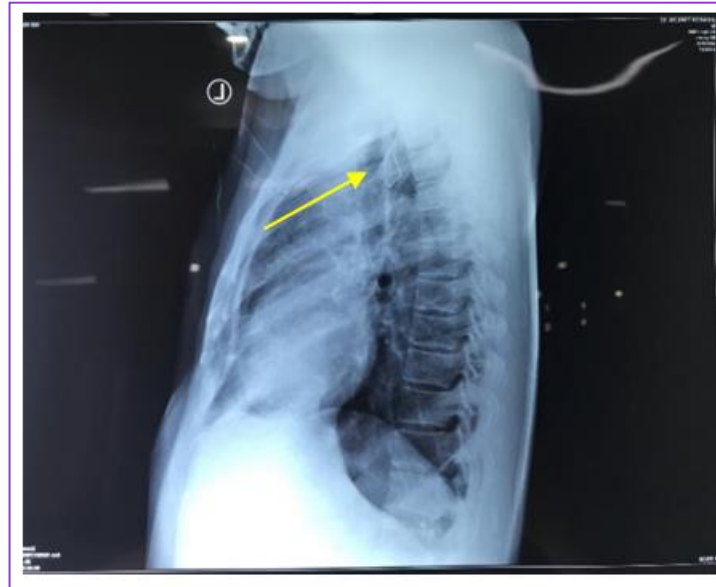


Figure 4. Foreign bodies as high as T3-4 appear on lateral thoracic X-rays

The patient was also examined by a CT scan of the thoracic scan with contrast to see the position of the foreign body against the aortic arch. The result was that a foreign body with a metal density was obtained in the ultraluminous esophageal at the height of the T2-3 vertebrae, just as high as the arch of the aorta, suspected of penetrating the right side adventitious layer accompanied by focal inflammation of the esophageal wall at that level. No bilateral lung abnormalities appeared.

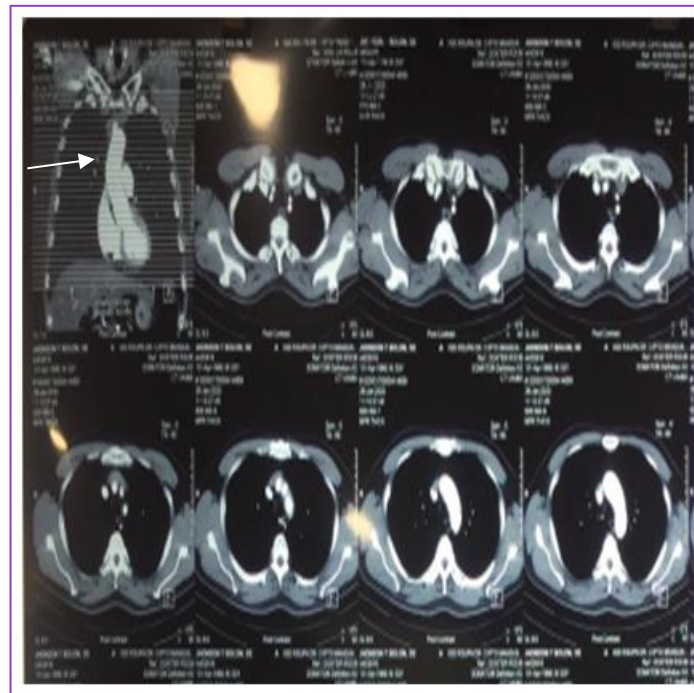


Figure 5. Thoracic CT scan with contrast

On January 29, 2020, an esophagoscopy examination was carried out with a rigid esophagoscopy no. 8 x 30 cm, an esophagoscopy insertion was carried out, and a foreign object was found to be dentures at a depth of 24 cm, and then extraction was carried out with a rotator with a prisoner at a depth of 20 cm. Various maneuvers have been carried out but unsuccessful, and the action has not been continued. The TS continued the cardiovascular thoracic surgery. A posterolateral thoracotomy incision was performed on ICS 5 to penetrate the cuticles, subcutaneous, fascia, and muscles, then identify between the ribs 5, and the thoracic cavity was opened. There was adhesion of the right lung,

and the adhesion was carried out with warm saline. It is found that the corpus alienum is found in 1/3 of the proximal esophagus. There is a laceration 6 cm long, so it is decided for an esophagectomy. An esophageal dissection is carried out from distal to proximal; the distal punctum of the esophagus is cut and sutured, and then the corpus alienum is removed. The proximal apex is directed and stitched with a tile as a marker of esophagostomy. The surgery is continued by a digestive surgeon.

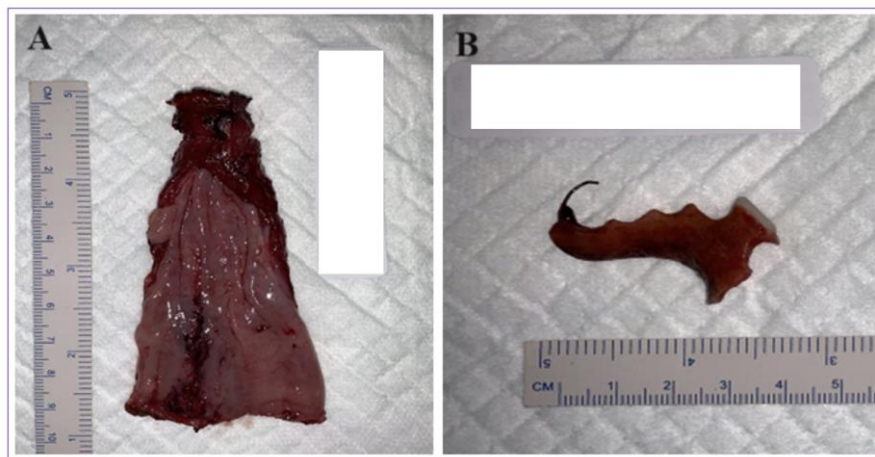


Figure 6. Dentures (1), esophagus (2)

Patients undergo esophagoscopy and gastrostomy for food and beverage routes. The patient has an esophagoscopy bag attached to the neck area and a gastrostomy in the abdomen. After surgery, the patient was admitted to the ICU and received treatment of Ampicillin-sulbactam 4 x 1.5 grams iv, paracetamol 3 x 1 gram iv, metoclopramide 3 x 10 mg iv, ranitidine 2 x 50 mg iv, diet through gastrostomy stoma, ETT attached, esophagostomy bag attached, gastrostomy bag and WSD tube, it condition while in the ICU was relatively stable. There was only a picture of a tachycardial heartbeat, no fever, and the surgical wound was calm. There was no subcutaneous emphysema in the neck area and no signs of infection. Patients are not allowed to eat and drink by mouth during a gastrostomy.

On January 30, 2020, the first day after surgery, the patient underwent a re-thoracic X-ray with no radiologic abnormalities in the heart and lungs and no pneumothorax or pneumomediastinum. The impression of X-ray results is within normal limits. On the 4th day after surgery, the patient was still treated in the ICU and received additional medications in the form of bisoprolol 1 x 125 mg per oral, KCl 3 x 1 per oral, amlodipine 1 x 5 mg per oral, calcium gluconates 3 x 1 iv because there was an increase in blood pressure in patients of 160/80 mmHg and the patient's pulse was still relatively high 140 times/minute.

On February 3, 2020, the 5th day after surgery, the patient was moved to the usual treatment room because the patient's condition was stable. On February 4, 2020, the 6th day after surgery, the patient was allowed to go home with an esophagectomy bag and gastrostomy still attached. A digestive surgeon had educated the patient about treating an esophagectomy bag and gastrostomy. Patients were asked for control to the endoscopic ENT polyclinic and the digestive surgery polyclinic three days later.

3. Literature Analysis

3.1. Clinical Questions

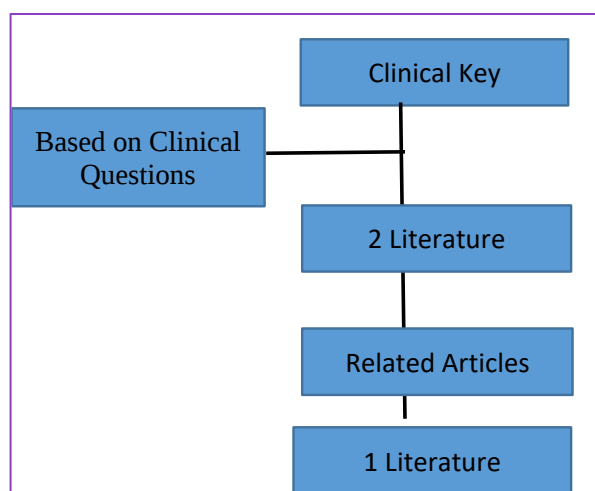
Based on the explanation of the case above, several problems affect determining the management of foreign bodies in the esophagus, so the following clinical questions are prepared; "In this patient, does the long duration of foreign body entanglement in the esophagus, especially dentures, affect the action to be taken for the extraction of the foreign body?"

3.2. Literature Search

From the case, clinical questions can be formulated using the PICO (*Patient or Problem, Intervention or Exposure, Comparison, and Outcome*) model in Table 1. Literature search in the PubMed database was done with keywords: "esophageal AND foreign body AND esophagoscopy AND adult AND 24 hours"

Table 1. PICO Description

Symbol	Description
P	Patients with foreign bodies in the esophagus
I	Duration less than 24 hours
C	Duration of more than 24 hours
O	Operative measures (thoracotomy, esophagectomy)

**Figure 7.** Literature search flow.

The critical analysis uses the Oxford CEBM Appraisal tool to examine, based on clinical evidence, this case following the PICO formulation that was made previously. The search results using the keywords above were obtained from 2 articles from Pubmed. The article was then selected based on the inclusion and exclusion criteria so that 1 article that met these requirements was obtained and was relevant to a formulation or clinical question.

3.3. Analysis

The Zhang et al²² study divided esophageal foreign bodies by duration from ingestion to action, group A < 24 hours and group B > 24 hours. In group A, foreign bodies are more often stuck in the upper part of the esophagus, while in group B, foreign bodies are more often found in the lower esophagus. This is because the symptoms of difficulty swallowing are more dominant in patients where foreign bodies are stuck in the upper esophagus. Hence, patients are more likely to come to the hospital immediately. In this study, using rigid esophagoscopy to extract foreign bodies in the esophagus has high success and low complications, and it can better detect the position of foreign bodies. But if rigid esophagoscopy is unsuccessful, undetectable, and there are already signs of complications such as esophageal aortic fistels, para esophageal abscesses, or mediastinitis, surgical procedures such as cervicotomy or up to thoracotomy are performed. The 221 patients with esophageal foreign bodies, 208 patients successfully performed esophagoscopy extraction, while the remaining three underwent surgery. Namely, one patient underwent a cervicotomy, and the remaining two patients underwent a thoracotomy. The three patients were in group B. Two patients have been found to have esophageal perforation and mediastinitis. From the study of Zhang et al²², there was no significant difference between the duration of the ingestion of the foreign object and the action to be taken.

Table 2. Critical review topics

Point Review	Question	Description
<i>Validity</i>	Is the patient sampled in the early phase of the disease journey?	Yes
	Are patients followed up wholly and regularly?	Yes
	Are the results applied regularly and blindly?	Not specified
	If the prognosis is different, is there an essential adjustment of the prognosis factor needed?	Yes
<i>Importance</i>	Can the prognosis result be taken into account?	Yes
	Can the prognosis of this patient be accurately estimated?	Yes

Point Review	Question	Description
<i>Applicability</i>	Are my patients different so that the results are not applicable?	No
	Are these results clinically meaningful so that I can use them to determine my patient's prognosis?	Yes

4. Discussion

Foreign bodies that are swallowed and stuck in the gastrointestinal tract, especially the esophagus, are frequent cases of ENT. Foreign bodies are often stuck in the upper esophagus, although it is not uncommon for them to get stuck in the lower esophagus. The duration of entangled foreign bodies > 24 hours can risk the displacement of foreign bodies to be further down towards the lower esophagus so that it can be difficult to extract with rigid esophagoscopy and is prone to complications of esophageal perforation, especially in sharp foreign objects such as dentures with wire at the ends.¹⁹

Extraction of foreign bodies with a rigid esophagoscopy is the primary choice for foreign object extraction, especially the duration of foreign body entanglement < 6 hours and no difficulty, detention when the action is performed. The risk of surgical removal of a foreign body can occur when the foreign body has been stuck for > 24 hours, and there are signs of perforation of the esophagus, or there have been complications of esophageal fistula, aortic to mediastinitis.²⁰

In the above case, the patient had been stuck with a foreign object for more than 24 hours, even though no signs of mediastinitis existed. Still, when extraction with rigid esophagoscopy, there was detention at a depth of 20 cm. In addition, when evaluated in patients, it was found that there was an esophageal perforation > 6 cm long. For this reason, it was decided to perform surgery, namely a posterolateral thoracotomy, to be able to remove the foreign object of the stuck denture, followed by an esophagectomy to avoid complications of abscess and mediastinitis.²¹ The patient was not treated for esophagectomy because there was an absolute indication for an esophagectomy. Namely, there was a perforation > 6 cm long, which, if performed esophagectomy, was at risk of complications of mediastinitis in the future.

Esophagectomy is indeed a procedure that has a high morbidity rate but a low mortality rate. Compared to the esophagectomy surgery performed on this patient because there has been a reasonably extensive esophageal perforation. When esophagectomy is performed, it appears to have low morbidity but has a high mortality rate due to the risk of mediastinitis. After that, esophagoscopy bags and gastrostomy were continued to be installed for the patient's eating and drinking routes.²²

5. Conclusion

Foreign bodies in the esophagus generally occur in patients over 20 years old, especially denture foreign bodies. Extraction with rigid esophagoscopy is the primary choice, especially if the duration of the foreign body entanglement is < 24 hours and there are no complications when the procedure is performed. Surgical procedures such as cervicotomy, thoracotomy, and esophagectomy are the following options if the duration of the foreign body is > 24 hours. It is not an absolute criterion to be performed. However, in cases of a wide perforation, they are mandatory. Dentists are expected to be able to monitor and supervise the manufacture of dentures carried out so that there is no risk of ingestion in denture users.

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Authors Contribution

Contribution	Tamin S	Habib H
Concepts or ideas	√	√
Design	√	√
Definition of intellectual content	√	√
Literature search	√	√
Experimental studies	√	√
Data acquisition	√	
Data analysis	√	√
Statistical analysis	√	
Manuscript preparation	√	√
Manuscript editing	√	√
Manuscript review		√



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Citation Format: Tamin S, Habib H. Difficulties in Extracting Dentures Stuck in The Esophagus. *J Syiah Kuala Dent Soc*. 2024; 9(1):1-11.

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