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Esophageal Foreign Body Extraction Marbles With Modified Metal Hook Tool

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ABSTRACT

A 4-year-old boy presented with chief complaint of swallowing a marble 10 hours before being admitted to the hospital. Radiologic examination of the thorax revealed an opacity of metallic density, round-shaped with a smooth edge and diameter of approximately 1.3 cm projecting at the level of 6th-7th cervical vertebrae. Esophageal foreign bodies are usually removed using rigid esophagoscopy. However, foreign bodies that are hard, smooth or round in shape will be more difficult to treat. The tools prepared are modified hook with the hook tip curved to match the shape of the marble. Esophagoscopy was performed under general anesthesia, a marble foreign body was seen surrounded by edematous and hyperemic esophageal mucosa at cricopharynx area. The modification hook that has been prepared was inserted beyond the marble and pulled outward slowly but the marble fell into the hypopharynx. The hypopharynx and nasopharynx were evaluated until the marble was found in the nasopharyngeal area, then the marble was removed using Magill forcep.

Keywords: *Esophagus; Marble; Removal foreign body*

1. INTRODUCTION

Esophageal foreign bodies are objects or food that are stuck in the esophagus and cannot enter the stomach. Esophageal foreign bodies around 80-90% can pass through the digestive tract without problems and do not require any intervention (1). Esophageal foreign body cases are often encountered in daily routine practice, and more often in the pediatric population (2). Esophageal foreign bodies can occur at all ages, from infants, children, to the elderly. Esophageal foreign body impaction most often occurs in the age group of children 6 months to 3 years (3). At Dr. Soetomo Hospital, Surabaya, based on data from the bronchoesophagology division of the Department of ORL-HNS during 2020-2022, it was reported that 125 patients had undergone esophagoscopy and foreign body extraction. The most common age is 0-10 years old as much as 55.2%, age over 10 years-18 years as much as 2.4%, and age over 18 years as much as 42.4%. The comparison between male and female patients is 1.97:1.1

The diagnosis of esophageal foreign bodies is based on a history of foreign body swallowing and AP-lateral plain radiographs (2). Sharp objects or objects with pointed ends are a problem that must be considered. Spherical foreign objects (balls) also need attention because they are not easy to remove and are difficult to grasp with forceps (4). Early removal of foreign objects is important to avoid mucosal edema that will make it difficult to remove foreign objects (2). Thus, patients with a history of foreign body swallowing require proper diagnosis and management because it can cause serious problems and even death (3). Esophageal foreign bodies are usually removed with rigid esophagoscopy under general anesthesia, but for hard, smooth or round foreign objects it will be more difficult to handle. Alternative methods that can be used to extract smooth/slippery objects include Magill forceps, Foley catheters, balloon catheters, esophageal buccalization, and surgery (4).

The purpose of writing this case report is to report a rare esophageal foreign body incident, namely marbles, which was successfully extracted using a modified metal hook.

Case Report

A 4-year-old male patient, 5 months old, living in Surabaya City, East Java, came to the Emergency Room (IGD) of THTBKL Dr. Soetomo Hospital, Surabaya on November 7, 2022. The anamnesis showed that the patient's main complaint was swallowing marbles 10 hours before admission. The patient swallowed marbles while playing with the patient's younger sibling. At that time, the patient complained of pain in the throat area, and was unable to eat and drink. Complaints were accompanied by coughing and vomiting three times after the patient's back was patted by the patient's parents. Vomit contained fluid in the form of ripples, no blood. The patient denied complaints of shortness of breath. The patient last ate breakfast before finally swallowing marbles.

The patient arrived at the Emergency Room of Dr. Soetomo Hospital at 22.00. The results of the physical examination showed that the patient's general condition was quite good, compos mentis consciousness, pulse 95 times per minute, respiration 20 times per minute, temperature 36.8° Celsius, weight 17 kg, and height 100 cm. Examination of the local ENT-KL status found that the ears, nose, and throat were within normal limits. Supporting examination of the postero anterior (PA) chest X-ray showed no abnormalities in the heart and lungs. The results of the radiological reading of the neck (cervical) thorax antero posterior (AP)-Lateral showed opacities with a metal density, round shape with a diameter of approximately 1.3 cm projected as high as the 6-7 cervical vertebrae which could be a foreign object of the esophagus. The results of the laboratory examination showed leukocytosis with a WBC value of 14,590 and other laboratory values within normal limits. The patient was diagnosed with an esophageal foreign body based on the results of anamnesis, physical examination, and supporting examinations.

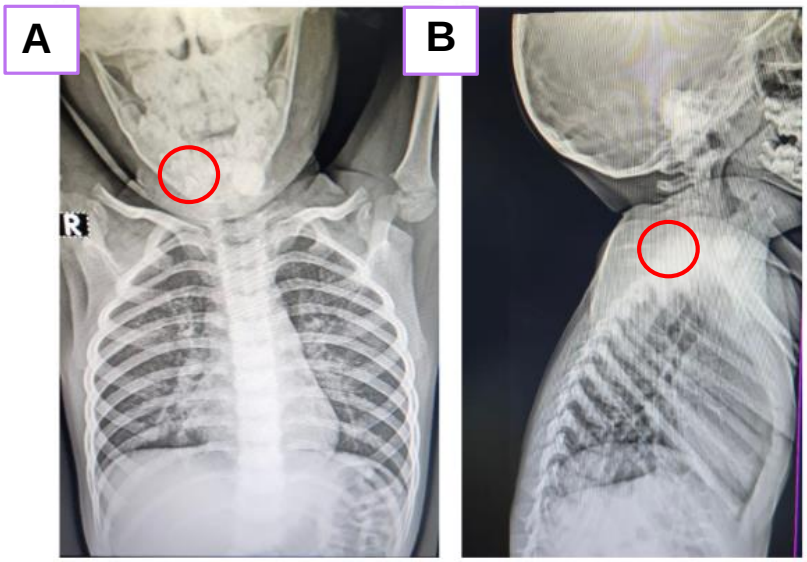

Figure 1. (A) Results of AP thoracic neck radiograph; (B) Results of Lateral thoracic neck radiograph when the patient arrived at the Emergency Room of Dr. Soetomo Hospital, Surabaya, November 7, 2022 at 23.37

The patient was admitted to the inpatient room to undergo preparation for elective esophagoscopy. The tools prepared were modified metal hooks with two different curvatures, as well as several forceps commonly used to remove esophageal foreign objects. Other tools that were also prepared included a pediatric Nelaton catheter. The patient was admitted to the operating room two days later (November 9, 2022) at 07.55, shortly before going to the operating room, a repeat AP-Lateral thoracic neck X-ray was performed and the results were the same as before. On esophagoscopy, a foreign object was found 10 cm from the upper tooth row (DGA). The telescope was inserted through the esophagoscope, marbles were seen surrounded by edematous and hyperemic esophageal mucosa (Figure 1).

Figure 2. Endoscopy results during surgery

The prepared metal hook tool was tried to be inserted until it passed through the marble, then pulled slowly, but the marble fell into the hypopharynx before exiting through the mouth with the esophagoscope. The tool used to hook the marble was a modified long metal hook with a curvature that matched the shape of the marble (Figure 2). Evaluation was carried out in the hypopharynx and nasopharynx until the foreign object marble was found in the nasopharynx. The foreign object marble was found intact, measuring approximately 1.3 cm in diameter. The foreign object marble was removed using Magill forceps (Figure 3).

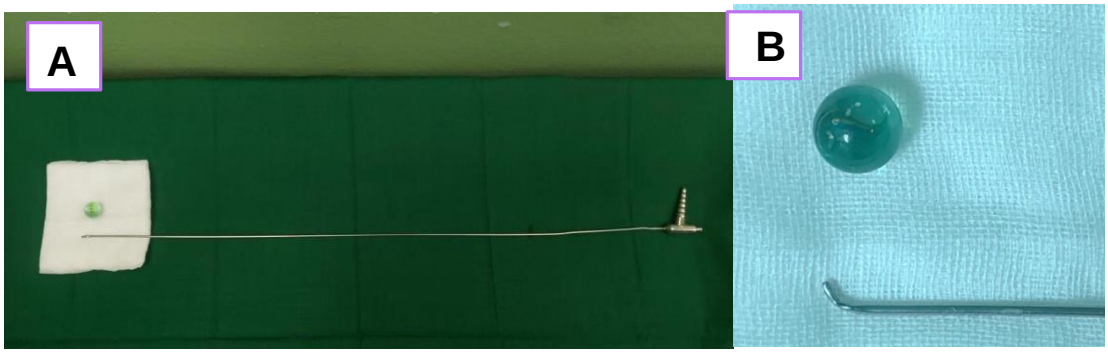

Figure 3 (A) Modified metal hook tool (B) Curvature of the tip of the modified metal hook tool

Figure 4. Magill forceps tool

In post-extraction esophageal exploration, minimal lesions and edema were found at the fixed marble site, namely in the cricopharyngeal area around 10-11 cm from the DGA, there was minimal bleeding of approximately 20 ml, then a Naso

Gastric Tube (NGT) was installed through the right nasal cavity (Figure 4). The antibiotic ceftriaxone was given 400 mg every 12 hours, the anti-pain metamizole 100 mg every 8 hours and the anti-inflammatory dexamethasone 2.5 mg every 8 hours.

Figure 5. Photo of post-operative patient

On the first day after the esophagoscopy procedure, the patient's gastric fluid production was 100 ml per 24 hours of hematin in a clear brown color and the patient complained of slight pain when swallowing. The patient was given nutrition through NGT in the form of milk and soft foods little by little. On the second day, complaints of pain when swallowing decreased, and hematin production decreased to 40 ml per 24 hours with a lighter color than before (clear yellow). The Naso Gastric Tube was still maintained until the patient went home, and the patient was asked to check up 3 days after leaving the hospital for an evaluation with a fiber optic laryngoscope (FOL). On November 15, 2023, the patient checked up at the outpatient unit of Dr. Soetomo Hospital, Surabaya to undergo FOL. The results of the examination showed that the epiglottis area was within normal limits, there was no bleeding from the esophagus, and the NGT was functioning well. The patient had the NGT removed and was declared cured.

2. DISCUSSIONS

Foreign object ingestion is one of the conditions often encountered in the field of THTBKL, especially in the pediatric age group (4,5). Children are 80% of patients who come to the ER with esophageal foreign objects (6). Foreign object impaction in the esophagus most often occurs in the child age group between 6 months and 3 years (3,7). Other literature states that foreign object ingestion cases are more often seen in the child age group aged 6 months to 6 years (8). Conners, (2023) also stated that the highest incidence of foreign object ingestion cases is aged 6 months to 4 years (9). The patient in this case report is a boy aged four years and five months. At this age, children begin to explore the world around them, exploring objects with their hands, thus increasing the risk of swallowing foreign objects (8). Munter, et al., (2018) reported no difference in the incidence of incidents between boys and girls (10). Conners, (2023) also stated that the ratio of incidents of foreign object swallowing in younger boys: girls was 1:1, while in older children and adolescents, boys had a higher incidence than girls (9).

Objects involved in foreign object swallowing cases are differentiated based on age group. Children generally swallow objects/objects that are easy to reach to put in their mouths such as coins, buttons, marbles, crayons, and other similar objects. Adults are more susceptible to swallowing food boluses, fish bones, chicken bones, dentures or toothpicks (10). This case report is an incident of accidentally swallowing a foreign object, marbles, while the patient was playing with the patient's younger sibling. Esophageal foreign bodies can pass through the digestive tract without any problems in 80-90% of cases, but endoscopic foreign body removal can occur in 10-20% of cases and less than 1% of cases require surgery to remove the foreign body or treat complications (1,7). Non-spherical objects with a size of less than or equal to 4 cm and spherical objects with a diameter of less than or equal to 4.5 cm are susceptible to impaction (2). The normal esophagus has 3 main areas of physiological narrowing, namely the upper esophageal sphincter (UES) which includes the cricopharyngeal muscle, the middle esophagus where the esophagus crosses the aortic arch, and the lower esophageal sphincter (LES) (6).

In cases of esophageal foreign body impaction in children, 74% of foreign bodies are trapped at the UES level. In adults, about 68% of obstructions occur in the distal esophagus associated with pathological abnormalities (6). Other literature also mentions common places for obstruction in cases of swallowing esophageal foreign bodies including the cricopharyngeal area, the middle third of the esophagus (at the level of the aorta), and the LES (below the diaphragm) (3,11). This shows that there is a match between the case and the literature that the location of the swallowed esophageal marble foreign body is 10

cm from the upper row of teeth or around the cricopharyngeal area. The patient complained of pain in the throat area, and was unable to eat and drink. Complaints were accompanied by coughing and vomiting three times after the patient's back was patted by the patient's parents. Vomit contains fluid in the form of ripples, no blood. The patient denied complaints of shortness of breath. Children with cases of swallowing foreign objects can show extensive symptoms. Dysphagia, odynophagia, inability to eat, difficulty swallowing saliva are symptoms that appear when impaction occurs (8,12). Oliva, et al., (2020) in other literature stated that symptoms in cases of foreign object swallowing depend on the type of foreign object, its size, and its location along the digestive tract. Additional symptoms usually also appear due to the presence of esophageal foreign objects, including retrosternal pain and vomiting (12). Triadafilopoulus, (2013) stated that dysphagia with acute onset and difficulty swallowing saliva are the main symptoms of esophageal obstruction (11). The various symptoms experienced by patients in this case were obtained in accordance with the existing literature.

Radiographs are the first modality used to evaluate patients with swallowed foreign bodies. X-ray evaluation is indicated for all patients with radiopaque esophageal foreign bodies. Identification of airway landmarks on PA and lateral chest radiographs is important to differentiate between tracheobronchial and esophageal foreign bodies. Flat objects such as coins, bottle caps, or disc batteries, will appear coronal when located in the esophagus, are best seen in the anteroposterior projection, and will appear round on the frontal (PA) projection. Tracheal foreign bodies are best seen in the lateral projection (6,11).

Plain radiographs will help determine the object, location, and possible complications. AP-Lateral chest radiographs are sufficient, but neck (cervical) and abdominal radiographs can be adjusted according to the age and clinical presentation of the patient (6). Eighty-three percent of cases of swallowed foreign bodies show radiopaque density images (8,9). These cases underwent supporting examinations in the form of PA chest radiographs, neck (cervical) and AP-Lateral chest. The results of the PA chest X-ray showed no abnormalities in the heart and lungs. AP-Lateral neck and chest X-rays showed opacities with metal density, radiopaque, round shape with a diameter of approximately 1.3 cm projected at the level of the 6-7 cervical vertebrae which could be a foreign object of the esophagus.

Marbles can be made of various materials, including: clay, marble, glass, and marble. The marbles in this case are made of glass, the appearance of the glass on the radiology photo is radiopaque, according to what is depicted in the patient's photo. If nothing is seen on the routine photo but suspicion of a foreign body remains high, then diagnostic endoscopy or Computed Tomography (CT) scan may be indicated. CT scan examination has high sensitivity to detect foreign bodies and their complications such as perforation (6). Management of esophageal foreign bodies depends on the type of foreign body, location, degree of obstruction, and duration of foreign body ingestion (6). The European Society for Gastrointestinal Endoscopy recommends immediate endoscopic foreign body therapy (less than 2 hours or a maximum of 6 hours after ingestion) for foreign bodies that cause total obstruction, sharp foreign bodies, and magnets. Urgent endoscopy (less than 24 hours) is performed on foreign bodies without total obstruction.7 Scaefer, (2022) divides endoscopic management into emergency, urgent and non-urgent. Emergency cases are performed in cases of total esophageal obstruction with the patient's inability to swallow saliva, battery foreign bodies and sharp foreign bodies in the esophagus. Urgent cases are for blunt esophageal foreign bodies, food impaction with total obstruction, sharp foreign bodies in the stomach and duodenum, objects longer than 6 cm, magnets and coins. Non-urgent cases of foreign objects in the stomach with a diameter of less than 2.5 cm, battery foreign objects that are asymptomatic for up to 48 hours and blunt foreign objects that cannot pass through the stomach for 3-4 weeks.6 In this case, it is a blunt foreign object with a size of less than 2.5 cm so that it can be categorized as an urgent case, but esophagoscopy is performed more than 24 hours because it requires preparation of the equipment in advance considering that this case has never been done before at Dr. Soetomo Hospital, Surabaya.

Esophageal foreign bodies are usually removed by rigid esophagoscopy under general anesthesia. Spherical foreign bodies such as marbles are difficult to remove conventionally due to the inability of the instrument (forceps) to grasp the object requiring different techniques and instruments (2,4). Alternative methods that have been used to extract smooth/slippery objects include using: 1) Magill forceps, 2) Foley catheter, 3) balloon catheter in conjunction with dental forceps, 4) esophageal buccination, 5) buccination to push the foreign body into the abdomen and 6) surgery (4). In this case, several alternative instruments were initially prepared to remove the foreign body, namely the Nelaton catheter and a modified metal hook. This hook is a modification of a metal suction device that is approximately 50 cm long with a diameter of 2 mm. The proximal part of the metal hook has a part that can be used as a handle and guide when using it, while the distal end is modified by being curved to several sizes that are adjusted to the curvature of the marble. The distal end of the hook instrument is smoothed to avoid lesions on the mucosa when the instrument is used.

This patient underwent general anesthesia, then began with the insertion of an esophagoscope until a foreign object was found. A telescope was also used when a foreign object had been found. A marble foreign object was found obstructing the esophageal lumen, it was decided to use a modified metal hook device which was traced through the edge of the esophageal lumen until it passed the marble, then the tip of the hook was rotated 90 degrees to be able to hook the foreign object, then the foreign object was pulled out.

The metal hook device was inserted with the tip of the hook horizontally until it passed the marble, then rotated 90 degrees

in the direction (right or left) using the instructions from the direction of the hook handle in the proximal part. If using a hook device without a handle it would be more difficult to hook the marble because there were no instructions to rotate the device 90 degrees to the right or left. The Nelaton catheter was not used because it was larger than the remaining available esophageal lumen. While other devices such as Foley catheters and balloon catheters were not available.

Complications in the esophageal mucosa can cause lesions, lacerations, granulation tissue and perforation.1 In this patient, lesions were found in the esophageal mucosa which caused bleeding of at least 20 ml. NGT was installed after the procedure and maintained for 5 days to evaluate the bleeding that occurred. The patient was given therapy in the form of antibiotics, painkillers and anti-inflammatories. This is in accordance with Oliva, et al., (2022) who stated that to prevent acute complications, antibiotics and short-term anti-inflammatories can be given (12).

3. CONCLUSIONS

A case of esophageal foreign body in the form of marbles has been reported. The extraction of the foreign body was successfully performed using esophagoscopy in a patient under general anesthesia. The process of removing the marble foreign body used a modified metal hook with a curved tip and Magill forceps.

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