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CASE REPORT OF FATAL DEEP NECK ABSCESS: A COMPLICATION OF AERODIGESTIVE FOREIGN BODIES

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Abstract

***Background**: Ingestion of a foreign body is a typical emergency in the field of health services otorhinolaryngology head and neck surgery. Pharyngooesophageal perforation, aorto-oesophageal fistula, and deep neck infection are all serious consequences, albeit uncommon. Several risk factors for complications that aggravate this condition include time of therapy (> 24 hours after the onset of symptoms), sharp foreign objects such as fish bones, mental illness, and diabetes mellitus are risk factors for complications. Although deep neck abscesses have decreased due to the availability of antibiotics, these infections still occur with high morbidity and mortality rates if the patient is not managed properly.*

Aim: *to report case of fatal deep neck abscess and aerodigestive complications of foreign agency in Dr. Soetomo Teaching Hospital, Surabaya Indonesia.*

***Method:** A retrospective report of 4 cases of ingestion of foreign bodies with complications of deep neck abscess resulted in death in Dr. Soetomo Academic Hospital, Surabaya between the year 2018 and 2020. This case report describes clinical symptoms, result of physical and diagnostic examinations, and therapy of each subject until death.*

***Results:** Between 2018 and 2020, there were four cases at Dr. Soetomo Teaching Hospital, Surabaya with a history of foreign body ingestion that escalated to severe neck abscesses. In all four cases, the subjects died as a result of deep neck abscess complications.*

***Conclusion:** Four cases were recorded, each of which had a history of ingestion of foreign bodies causing complications of deep neck abscess. In addition, the co-morbidities of diabetes mellitus increase the risk of death for the patient.*

Keywords: aerodigestive foreign body; deep neck abscess; infectious disease; complication; mortality

Introduction

In the field of Otorhinolaryngology Head and Neck Surgery (ORL-HNS), foreign body ingestion is one of the most common emergencies. It is common in children and adults alike. In western countries, the most prevalent foreign body is meat (13/100,000 people), whereas fish bone is the most common foreign bodies in Asia [*Kim HU, 2016*]. The palatine tonsils, base of the tongue, piriform sinus, vallecula, and esophagus can all be affected by sharp foreign materials. Deep neck abscess, pharyngeal wall perforation, aorto-oesophageal fistula, and carotid artery rupture are all complications of foreign body ingestion. Timing of therapy (> 24 hours after onset of symptoms), sharp foreign objects such as fish bone, mental illness, and diabetes mellitus are all risk factors for complication [*Costa L et al., 2014*].

Deep neck abscess is a collection of pus in the potential space between the deep neck fascia [*Aynehchi BB et al., 2013*]. Deep neck abscesses

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can be categorized into retropharyngeal, peritonsillar, parapharyngeal, submandibular, parotid, and sublingual abscess [*Suetrong S et al., 2017*]. Philpott, et al., (2018) reported 27 % of cases of retropharyngeal abscess are caused by trauma such as ingestion of a foreign body [*Philpott C, Langstaff L, 2018*]. Deep neck abscess is potentially fatal and requires prompt and appropriate management to avoid life-threatening complications. Complications of deep neck abscess include airway obstruction, necrotizing fasciitis, jugular vein thrombosis, empyema, mediastinitis, aspiration pneumonia, carotid artery thrombosis or aneurysm. The mortality rate can reach 40% to 50% in cases of mediastinitis [*Costa L et al., 2014; Suetrong S et al., 2017; Munifah AP et al., 2020*]. The purpose of this case report is to report four cases of aerodigestive foreign body with complications of deep neck abscess which resulted in death.

Case report

Case 1

A 58-year-old male patient came to the Emergency Department RSUD Dr. Soetomo (RSDS) with the chief complaint of a lump in his throat for 3 days ago after eating fried chicken. The patient vomits whenever he eats or drink. The patient has a history of uncontrolled type 2 diabetes mellitus (DM). Local ear, nose, throat and neck status within normal limits. On plain anteroposterior (AP)/lateral cervical radiographs, no foreign bodies were seen. The patient was diagnosed with chicken meat esophageal foreign body with uncontrolled type 2 diabetes. An esophagoscopy was performed and a foreign body in the form of chicken meat was found at 28 cm from the maxillary central incisor teeth followed by extraction.

Seven days after the operation the patient complained of painful swallowing and it got so bad that the patient could not swallow. Physical examination revealed subcutaneous emphysema in the left neck. The patient was diagnosed with a suspected retropharyngeal abscess. Laboratory results showed leukocytosis (22,550 mg/dl) and hyperglycemia (478 mg/dl). AP/lateral cervical plain X-ray revealed widening of the retropharyngeal space

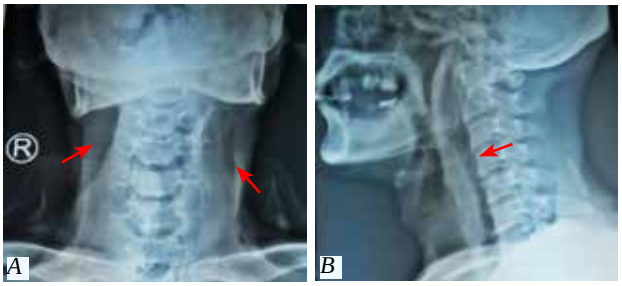

Figure 1. *(A) Widening of the retropharyngeal space with a lucent soft tissue area (red arrow); (B) A projected lucent soft tissue area on the anterior side of the C1-Th1 vertebra (red arrow).*

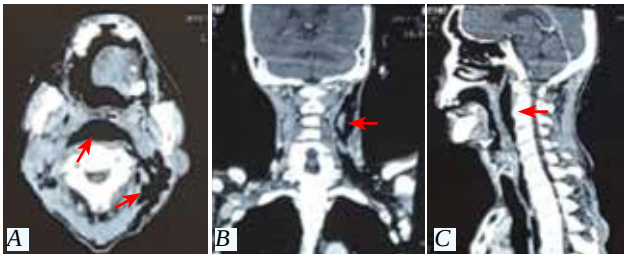

Figure 2. *(A) Free air in the parapharyngeal to retropharyngeal space (red arrow); (B)&(C) Extension to the left posterior thoracic wall (red arrow).*

with right and left lucent soft tissue areas, which on the lateral radiograph projected on the anterior side of the C1-Th1 vertebrae (Figure. 1). Computed Tomography (CT) scan of the head and neck showed free air in the parapharyngeal space to the retropharyngeal space as high as the C1-Th2 level to the deep neck fascia and extending to the left posterior thoracic wall, suspecting a gas forming infection in the deep neck fascia (Figure 2).

A single puncture was performed to remove air in the retropharyngeal space. Following that, the patient was referred to a thoracic and cardiovascular surgeon, internal medicine and cardiology colleague for evaluation. The patient was diagnosed with retropharyngeal, retroesophageal, right/left parapharyngeal emphysema, subcutaneous emphysema, suspected esophageal perfo-

To overcome it
is possible, due to the
uniting the knowledge and
will of all doctors in the world

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ration, unregulated type 2 diabetes mellitus, metabolic acidosis, and sepsis. The patient received therapy with ceftriaxone 2x1 gram, metronidazole 3x500 mg and insulin 3x4 IU. The patient was scheduled for endoscopy but the patient's general condition deteriorated and died 2 days later.

CASE 2

A 13-year-old boy came to the emergency department of the RSDS with complaints of sudden sharp pain in the throat for 7 days. Earlier the patient had swallowed something during lunch (alleged to be tilapia bone). Complaints worsened accompanied by difficulty of eating and drinking, difficulty opening the mouth and swelling in the neck area. Physical examination of the ORL-HNS showed a hyperemic and bulging posterior wall of the oropharynx and trismus ± 2 cm. Laboratory results showed leukocytosis (24,000 mg/dl). A CT scan of the neck revealed a foreign body with a bone density of ± 2 cm that penetrated the posterior wall of the esophagus at the level of the C6 vertebra to form a retropharyngeal abscess measuring ± 5.8 x 8.5 x 4.3 cm (Figure 3).

The initial diagnosis was fish bone foreign body and retropharyngeal abscess, then surgery for abscess drainage and transoral foreign body exploration esophagoscopy was performed but failed to find a foreign body. The patient was given empirical antibiotic therapy (ceftriaxone and metronidazole) while waiting for the results of the pus culture. CT-scan evaluation still showed a bone density foreign body ± 2 cm in the posterior wall of the esophagus as high as C6-C7, the appearance of a left parapharyngeal abscess to the left supraclavicular (Figure 4).

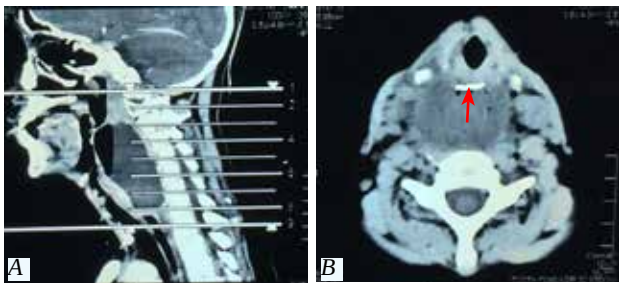

***FIGURE** 3. (A) Sagittal section showing retropharyngeal abscess; (B) Axial section shows a foreign body image (red arrow).*

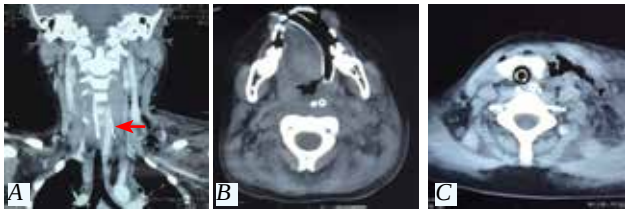

***FIGURE** 4. (A) Overview of foreign bodies (red arrows); (B)&(C) Left parapharyngeal abscess extending to the left supraclavicular.*

The second exploratory esophagoscopy still did not find any foreign bodies or lesions on the esophageal mucosa. The third operation (external exploration) was carried out with the help of C-Arm fluoroscopy and succeeded in finding iron wire foreign body ± 2.2 cm long in the posterior esophageal space at the level of the C6 vertebra. The results of pus culture showed Gram positive bacteria Granulicatella adiacens and the antibiotic ceftriaxone was changed to levofloxacin according to the sensitivity test results. The patient had severe bleeding from the left neck incision 3 days later which was suspected to be due to vasculitis of the carotid artery. Carotid artery ligation surgery was performed immediately to stop the bleeding. The patient fell into a coma after surgery and the patient's condition continued to deteriorate every day until he died 6 days later, presumably due to multiple organ dysfunction syndrome (MODS) related to hemorrhagic shock.

CASE 3

A 39-year-old woman came to the ER with complaints of shortness of breath for 2 days. Pain upon swallowing for 5 days and fever for the past day. The patient admitted that she had swallowed tuna fish bone 5 days ago. The patient is still able open her mouth wide but unable to eat and drink for 5 days. There was no history of DM, hypertension, or asthma. Physical examination of the

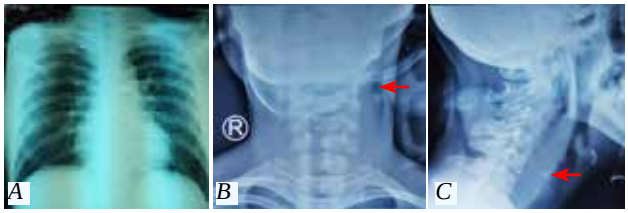

***FIGURE** 5. (A) Chest radiograph shows no cor and pulmonary abnormalities; (B) AP/lateral cervical radiograph shows soft tissue widening with a lucent area in it (red arrow), opacity with irregular shaped bone density at the level of the C5 vertebra, suggesting a corpus alienum (red arrow).*

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FIGURE 6. Visible lesion with fluid with gas forming in it (red arrow) filling the retropharynx, no corpus alienum is seen.

throat revealed a bulging posterior wall of the oropharynx.

Aspiration puncture revealed ± 0.2 ml of pus. Laboratory results showed leukocytosis (13,560 mg/dl) and a non-reactive Covid-19 rapid diagnostic test (RDT). Thoracic plain X-ray examination revealed cast and pulmonary abnormalities, AP/lateral cervical radiographs showed widening of the soft tissue at the level of the C1-C6 vertebrae with an inner lucent area, opacity with irregular bone density at the level of the C5 vertebra, suspicious of a corpus alienum (Figure 5). The patient was diagnosed with suspicion of a fish bone foreign body and retropharyngeal abscess.

The patient underwent surgical abscess drainage incision and exploratory esophagoscopy but no fish bone or foreign body was found. The patient was given ceftriaxone 2x1 gram and metronidazole 3x500 mg. Postoperative laboratory results showed leukocytosis (24,870 mg/dl), thrombocytopenia (100,000 mg/dl), hypoalbuminemia (3,0 mg/dl). The results of pus culture showed that the bacteria were Gram positive Streptococcus constellatus.

FIGURE 7. Plain chest radiograph shows bronchopneumonia

A CT-scan of the head and neck 6 days post-surgery still showed lesions with fluid (14 HU) and gas formation (550 HU) that dominantly filled the left side of the retropharynx at the level of C6-C7 vertebrae, no foreign object was found (Figure 6). Ceftriaxone antibiotic therapy was replaced with levofloxacin according to the results of the sensitivity test and the incision was widened and pus drainage was performed every day. The chest X-ray showed bronchopneumonia (Figure 7). The patient was treated in the Intensive Care Unit (ICU) for approximately 19 days and died of complications from pneumonia.

CASE 4

A 73-year-old woman came to the ORL-HNS RSDS with the chief complaint of painful swallowing for a week after swallowing catfish bone. The neck swells 5 days later and there was difficulty swallowing. The patient has a history of diabetes and controlled hypertension for the past 10 years and is taking Glibenclamide and Amlodipine. Physical examination of the neck revealed a right submandibular mass with tenderness. The patient's initial diagnosis was suspicion of a fish bone foreign body with retropharyngeal and right submandibular abscesses.

The results of the Fiber Optic Laryngoscopy

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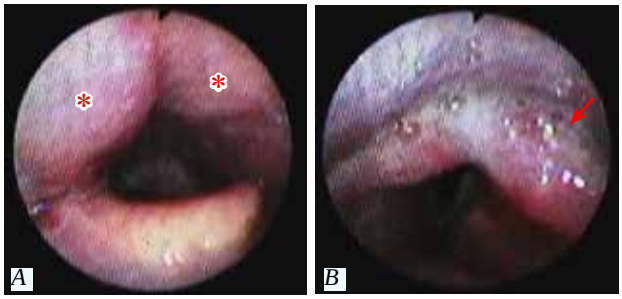

***FIGURE** 8. Fiber Optic Laryngoscopy: (A) Retropharyngeal bombans (red star); (B) Standing secretion in the piriform sinus (red arrow).*

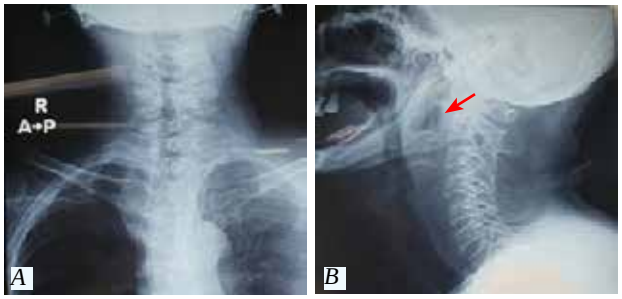

***FIGURE** 9. Multiple lucent areas in soft tissue region colli as high as C1-C4 (red arrows) with widening of the retropharyngeal space, no foreign bodies were seen.*

(FOL) examination revealed a bulging retro pharynx, standing secretions in the vallecula and piriform sinuses, and no foreign body or fish bone (Figure 8). The patient received ceftriaxone 2x1 gram, and metronidazole 3x500 mg. AP/lateral cervical plain radiographs showed multiple lucent areas in the soft tissue of the colli region at C1-C4 level with widening of the retropharyngeal space, no radio-opaque foreign body image (Figure 9). The patient could not undergo a CT scan because of impaired renal function (BUN 81 mg/dl and serum creatinine 3.4 mg/dl).

Laboratory results showed leukocytosis (25,340 mg/dl) and hyperglycemia (333 mg/dl). The results of the Covid-19 Polymerase Chain Reaction (PCR) swab were not confirmed. The patient reffered to cardiologist and internist, and was diagnosed with retropharyngeal abscess, stage 1 hypertension, hyperglycemic DM and pre-renal Acute Kidney Injury (AKI). The patient underwent surgery to drain the abscess and the results of the pus culture revealed Gram positive Streptococcus anginosus. After surgery the patient was treated in the intensive observation room for 4 days with metabolic acidosis, septic shock, electrolyte imbalance, hypoalbuminemia and MODS, until her death.

DISCUSSION

Pharyngeal or esophageal foreign bodies are common cases in hospitals. The four cases above are cases of foreign body ingestion accompanied by complications of deep neck abscess which resulted in death.

The four cases above consisted of 2 men and 2 women. Based on age, the mean was 45.75 years which included 2 elderly patients, 1 young adult patient, and 1 child patient aged 13 (Table 1). 1,338 patients who had a history of ingestion of foreign bodies, there were more women (53.7%) than men (46.3%) with a mean age of 43 years old (age range 7- 98 years) [*Lai ATY et al., 2003*]. A similar study reported that from 326 patients with suspicion of ingestion of foreign bodies, 151 men and 175 women were found with an age range of 14-96 years (mean 50.2 years) [*Wu W-T et al., 2011*].

Commonly, about 80% of patients who seek medical attention after swallowing a foreign body are children with an age range of 6 months to 3 years [*Lee JH 2018*]. Approximately 97% of cases of foreign body ingestion in the adult population are unintentional cases. with the literature that

TABLE 1.

Comparison of cases by age, gender, clinical symptoms, history of ingestion of foreign bodies, and comorbidities

	Sex	Age	Clinical Symptoms	History swallowed the things	Comorbid
Case 1	W	58	A lump in the throat, odynophagia, dysphagia	Chicken meat (3 days)	DM type 2
Case 2	W	13	Odynophagia, trismus, dysphagia, neck swelling	Tilapia bone (7 days)	-
Case 3	M	39	Odynophagia, shortness of breath, fever, dysphagia	Tuna bone (5 days)	-
Case 4	M	73	Odynophagia, dysphagia, neck swelling	Catfish bone (7 days)	DM type 2, hypertension

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there is no difference by sex. The age range in this case is the same as in the literature, namely young to old age. As many as 3% sharp foreign bodies in the pharynx can cause deep neck infections and retropharyngeal abscesses. In general, retropharyngeal abscess rarely affects adults but can occur in immunocompromised patients or due to foreign body complications [*Harkani A et al., 2011; Klein A et al., 2003*]. 2.8% of cases of foreign body ingestion had complications in the form of pharyngeal wall perforation, swelling retropharyngeal soft tissue and retropharyngeal abscess

Clinical symptoms that appeared in the four cases above included a lump in the throat, odynophagia, dysphagia, trismus, swelling in the neck area, shortness of breath and fever (Table 1). The most dominant complaints after swallowing a foreign object were discomfort in the throat, odynophagia and hemoptysis. Almost all patients' complaints of painful swallowing, sensation of a foreign body in the throat, and dysphagia. Acute inflammation and trauma to vocal folds can elicit immunoreactive effects to sensory nuclei in the brain stem. In retropharyngeal abscess, complaints of throat pain, difficulty swallowing, difficulty breathing, and trismus may appear. The most complaint, are namely pain (59.6%) and dysphagia, with signs of abscess appearing between Other symptoms include swelling in the neck (76.5%), fever, and trismus [*Harkani A et al., 2011; Almutairi D et al., 2020*]. This is in accordance with the case above those clinical symptoms due to ingestion of foreign bodies begin with a sensation of discomfort and pain in the throat, followed by dysphagia, odynophagia, which may be accompanied by fever and difficulty breathing.

The foreign bodies ingested in the above cases are chicken meat (case 1) and fish bone were suspected (cases 2, 3, and 4). The four patients came for help after more than 24 hours of ingestion of foreign bodies (Table 1). The most common esophageal foreign bodies in the elderly include bone, flesh, and dentures [*Srihita D et al., 2019*]. The most ingested foreign bodies were fish spines. (62.7%) followed by chicken bones (9.5%), while another study reported that the most common foreign bodies found were food bolus impaction (42.7%), fish bone (33.9%), and chicken bones (11.1%). This indicates a concordance between the cases and the literature that in general, foreign bodies that are often swallowed are fish bones and food boluses. Several investigators reported that esophageal foreign bodies and impacted food boluses should be removed within 24 hours because foreign bodies retained >24 hours can increase the risk of complications, including mucosal ulceration and inflammation. Fish bone foreign bodies are more at risk of causing severe complications and bleeding than other foreign bodies [*Costa L et al., 2014; Kim HU, 2016*]. In accordance with the above case, the patient came to the hospital more than 24 hours after swallowing a foreign object, resulting in an abscess.

Case 1 had comorbidities in the form of uncontrolled type 2 diabetes, while case 4 had a history of hypertension and controlled type 2 diabetes (Table 1). The most common comorbid cases of deep neck abscess are namely DM (31.5%) and hypertension (21.3%) [*Suetrong S et al., 2017*]. Almutairi, et al., (2020) also reported the most comorbidities, namely DM (45.2%) was followed by hypertension (23.7%). Both cases with comorbid DM above are in accordance with the literature reported by several researchers that diabetes mellitus is a major risk factor for mortality and infection-related morbidity.

Diabetes mellitus causes a deficiency in the immune system thus resistance to germs decreases and results in increasingly severe infections [*Rijal S, Romdhoni AC 2018*]. In immunocompromised patients with DM, patients on steroid therapy, chemotherapy, or with HIV infection, the course of the disease can be more severe with a potentially fatal outcome [*Nirmal KJ et al., 2017*]. Infection in DM patients can cause hyperglycemia and diabetic ketoacidosis. Hyperglycemia is caused by increased gluconeogenesis and glycogenolysis, as well as poor glycolysis processes in tissues. Hyperglycemia can impair several humoral defense mechanisms, such as various neutrophil functions: adhesion, chemotaxis, and phagocytosis thereby increasing the severity of infection.

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Table 2.

Comparison of cases of patients with leukocytosis based on investigations and interventions

	Cervical photo AP/lateral	*Head and Neck CT scan*	Endoscope
Case 1	- No radio-opaque foreign body seen - Widening of the retropharyngeal space with soft tissue lucent area	Free air in the parapharyngeal space to the retropharyngeal space as high as the C1-Th2 level, suspect gas forming infection in the deep neck fascia	Chicken meat
Case 2	No treated	A foreign body with a bone density of ± 2 cm that penetrates the posterior wall of the esophagus at the level of the C6 vertebra forms a retropharyngeal abscess.	Iron wire
Case 3	- Opacity with irregular bone density at the level of the C5 vertebra suggests a corpus alienum - Widening of the soft tissue at the level of the C1-C6 vertebrae with a lucent area inside	Opacity with irregular bone density at the level of the C5 vertebra suggests a corpus alienum Widening of the soft tissue at the level of the C1-C6 vertebrae with a lucent area inside	No foreign object found
Case 4	- No radio-opaque foreign body seen - Multiple lucent areas are seen in the soft tissue region of the colli at the level of C1-C4 with widening of the retropharyngeal space	No treated	No foreign object found

Laboratory results in the four cases above showed abnormalities in the form of leukocytosis (Table 2). Fever and leukocytosis generally do not occur in cases of foreign bodies. Patients with a suspected foreign body presenting with painful swallowing, fever with leukocytosis should be suspected of having serious complications until proven otherwise. A full blood analysis with differential count is necessary to confirm neutrophils. The erythrocyte sedimentation rate (ESR) can also be used as an indicator of inflammation if there is no significant increase in neutrophils [*Costa L et al., 2014*; *Philpott C, Langstaff L, 2018*]. In the case of retropharyngeal abscess, in general, an increase in leukocytes was found, in accordance with the four cases above.

Findings on AP/lateral cervical plain X-rays in cases 1 and 4 did not show any foreign bodies but enlarged retropharyngeal space, whereas in case 3 there was opacity with suspicious bone density of a corpus alienum accompanied by widening of the soft tissue at the level of the C1-C6 vertebrae with a lucent area at the level of the C1-C6 vertebrae. in it (Table 2). The sensitivity and specificity of plain films are 39% and 72% in detecting the presence of foreign bodies in the form of fish spines with a false negative rate of 47% [*Klein A et al., 2003*].

Fish bone foreign bodies are difficult to identify on plain radiographs depending on the size, bone calcification and species of fish. Plain radiographs of the AP position very rarely detect foreign bodies in the form of fish bones, whereas the lateral position is better at identifying foreign bodies in the oropharynx and upper esophagus. There are 172 patients, but only 114 of them were properly visible during endoscopy [*Lai ATY et al., 2003*]. This shows that plain radiographs are difficult to identify organic foreign bodies such as fish bones and food boluses, as evidenced in cases 1 and 4 that there were no foreign bodies visible on plain radiographs, while in case 3 foreign body was visible on plain radiograph but not visible on CT scan.

CT-scan examination in case 1 found a gas forming infection, case 2 found a foreign body that penetrated the posterior wall of the esophagus to form a retropharyngeal abscess, case 3 showed a lesion with fluid and gas formation in it while no foreign body was seen. Case 4 had kidney function abnormalities, so a CT scan could not be performed (Table 2).

Computed tomography scan is the standard imaging modality in foreign body cases. The sensitivity and specificity of CT scan for identifying foreign bodies is very high (90% and 93.7%) with

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Table 3.

Comparison of cases based on culture results, antibiotics and complications

	Pus culture results	Antibiotic	Complication
Case 1	No treated	Ceftriaxone	Metabolic acidosis, sepsis
Case 2	Granulicatella adiacens	Metronidazole	Carotid artery vasculitis, MODS
Case 3	Streptococcus constellatus	Levofloxacin	Bronchopneumonia
Case 4	Streptococcus anginosus	Metronidazole	Metabolic acidosis, sepsis, MODS

minimal false-negative rates [*Kim HU, 2016; Klein A et al., 2019*]. Computed tomography scan is very effective for evaluating the depth of neck structures and identifying foreign bodies, as well as analyzing the spread of infection. Furthermore, the progress of the infection to an abscess can be tracked, thus optimizing the treatment plan that will be carried out.

Computed tomography scan with contrast is the imaging modality of choice in determining the presence of an abscess in the involved neck space. The classic picture of an abscess on a CT-scan is a hypodense mass with perfect rim enhancement [*Costa L et al., 2014; Munifah AP et al., 2020*]. Computed tomography scan in this case is done more to diagnose foreign body complications than to look for the foreign body itself, in accordance with the literature that a hypodense mass image is obtained in the form of liquid with gas. forming showing a retropharyngeal abscess.

Exploration and extraction of foreign bodies in cases 1, 2, and 3 used rigid esophagoscopy, while in case 4 used flexible endoscopes. The foreign body found in case 1 was chicken meat, case 2 was suspected of having a fish bone foreign body but iron wire was found, while in cases 3 and 4 no foreign object was found (Table 2).

Endoscopy is the method most often used because it can see foreign bodies as well as evaluate esophageal lesions directly. Endoscopy has a sensitivity of 100% and a specificity of 92% [*Costa L et al., 2014; Soliman AMS et al., 2014*]. Lai, et al., (2003) reported data from 856 patients who had a history of ingestion of foreign bodies and were not visible on plain radiographs, as many as 294 patients (34.34%) were successful. Endoscopic foreign bodies were found. Wu, et al., (2011) found esophageal foreign bodies with flexible endoscopy in 172 of 326 patients (52.7%), while 47.3% were not found foreign bodies [*Lai ATY et al., 2003; Wu W-T et al., 2011*].

Neck exploratory surgery is performed for foreign bodies that have migrated out of the lumen, in patients with abscess formation or for failed retrieval with a rigid endoscope. Endoscopy was followed by extraction, whereas in case 2 an external exploration was performed because the foreign body migrated to the posterior esophagus.

The results of pus culture in cases 2, 3 and 4 showed Granulicatella adiacens, Streptococcus constellatus and Streptococcus anginosus bacteria, while in case 1 no culture was performed because there was only gas formation in the retropharynx (Table 3). In general, the bacteria that cause deep neck abscesses include Streptococcus viridans, Staphylococcus-hemolytic streptococci, Klebsiella pneumonia and anaerobic bacteria, but most cases are polymicrobial (39.3%) and Staphylococcus aureus (21.3%) [*Almutairi D et al., 2020*].

Positive culture result including Klebsiella sp. (46%) followed by Staphylococcus and Streptococcus (15.3%), methicillin-resistant staphylococcus aureus (MRSA), and Enterococcus (7.6%). The most common aerobic bacterial culture result were found in Rijal and Romdhoni study (2018) at RSUD Soetomo, among others, Klebsiella pneumoniae, Streptococcus anginosus, and Staphylococcus aureus [*Srihita D et al., 2019*]. There is a correspondence between the literature and the case above, namely the discovery of gram-positive aerobic and facultative anerobs in pus culture. The four cases above received empirical therapy, namely ceftriaxone and metronidazole, but in cases 2 and 3 the antibiotic ceftriaxone was changed to levofloxacin according to the results of the sensitivity test (Table 3). Antibiotic regiments that can be given in cases

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of abscess include ampicillin/sulbactam, clindamycin, cefuroxime, ceftriaxone, metronidazole, and amoxicillin/clavulanic acid. A combination of antibiotic is required to kill other possible microorganisms (eg ceftriaxone-metronidazole or clindamycin-cefuroxime) [*Philpott C, Langstaff L, 2018*].

Aerobic bacteria are sensitive to ceftriaxone, levofloxacin, and amoxicillin/clavulanic acid. Anaerobic bacteria are sensitive to cephalothin, gatifloxacin, and amoxicillin/clavulanic acid. Metronidazole is effective against anaerobic bacteria in the oral cavity. Antibiotics can be changed to targeted therapy based on culture result [*Philpott C, Langstaff L, 2018; Srihita D et al., 2019*]. Deep neck abscess with adequate antibiotic therapy can still cause high morbidity, ie 10-20% of cases experience life-threatening complications. Antibiotics in the above cases are in accordance with sensitivity test results and there is agreement with the previous literature [*Nirmal KJ et al., 2017*]. Further complications in the four cases above included metabolic acidosis and septic shock (cases 1 and 4), hemorrhagic shock due to carotid artery erosion (case 2), and bronchopneumonia in case 3 (Table 3). Deep neck abscesses can cause severe complications such as airway obstruction, necrotizing fasciitis, jugular vein thrombosis, empyema, mediastinitis, aspiration pneumonia, carotid artery thrombosis or aneurysm, multiorgan failure, shock, and meningitis.

Nirmal, et al., (2017) reported the occurrence of complications due to deep neck abscess as much as 23.5%, including fasciitis, mediastinitis and septic shock. Rijal & Romdhoni (2018) reported complications of deep neck abscess in the form of sepsis (29.63%), upper airway obstruction (6.17%), mediastinis (6.79%) and death (8.02%) [*Nirmal KJ et al., 2017; Rijal S, Romdhoni AC 2018*]. The mortality rate in some cases of deep neck abscess can reach 40-50%, while recurrence occurs in 1-5% of patients. The four patients in the above cases died from advanced complications in which cases 1 and 4 were aggravated by the presence of comorbid diabetes mellitus [*Simonyan K et al., 2012; Nirmal KJ et al., 2017; Philpott C, Langstaff L, 2018*].

CONCLUSION

Four cases have been reported with a history of ingestion of foreign bodies which progressed to deep neck abscess and died from complications. Two out of four cases had comorbid diabetes mellitus which aggravated the course of the abscess and increased the risk of mortality. This case report can be used as an information for patients to immediately check themselves within 24 hours after the initial symptoms appear upon swallowing a foreign object.

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