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## Common Carotid–Esophageal Fistula following Migrated Fish Bone: A Rare Case report

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### Introduction

Accidental ingested fish bone is a quite common problem in emergency department, especially in Asian countries where people consuming delicate un-filletted fish referred to a habbit.<sup>1–3</sup> Normally, ingested fish bone may have passing by through GI tract, but less frequently it may get impacted in esophagus. And in extreme case, it may have migrating extra luminal.<sup>4–10</sup> There are risk factors for this accident, including the use of dentures, extreme ages, excessive alcohol, stroke, anatomical anomalies in the neck area, and mental retardation.<sup>1,2,5,10</sup> Less frequently, particularly those where the diagnosis and management found to be delayed, fish bone may have penetrating the mucosal lining and passing through the wall, and migrated to the deep collar space, results in abscess formation.<sup>1,3,7,10,11</sup> There were reports of rare complications such as internal carotid artery puncture, internal jugular vein thrombophlebitis, brachial plexus injury and thyroid lodgment.<sup>1–3,7,10,12</sup> We reported a case of impacted fish bone complicated with carotid–esophageal fistula and deep neck abscess treated in dr. Cipto Mangunkusumo General Hospital, that was misdiagnosed and mismanaged at the early date.

### Case Report

A 14-year-old mentally retarded and malnourished boy came with a painful reddish lump on his right lateral neck for 6 days before admission. Bigger lump was found by days after swallowing a fish bone 7 day before admission. He had a difficulty in communication and unable to express his complain. His parents had noticed him and tried to take a lot of water for first help. Antibiotic and analgesic were administered as his parents as for help in a community health center. As there was no improvement, his parent took him to dr. Cipto Mangunkusumo General Hospital.

Clinically, he got fever of 38.9°C and tachypnea. Fluctuate red painful lump found on his right lateral neck sized of 7x5x4cm. ENT assessment found no pathology on oral exam. On laboratory exam it showed a leukocytosis of 15,600 and chest x-ray showed no abnormality found. Antero–posterior projection of lateral neck x-ray showed a radio-opaque linear shaped shadow on the right lateral neck at the level of C5–6th vertebra. CT scan showed right common carotid artery was dilated, with sized of 1.99x1.67x2.41 cm at the level of C3–4th vertebra, just beneath the carotid bifurcation. Irregular lesion border with air visualized surround was noted. A linear shaped foreign body of bone like density found at the level of C4 in lateral right side, inferior to the dilatation. Based on history taking and physical exam and imaging, a team in charge in the emergency room strongly suspicious to an abscess due to ingested fish bone. Taking

account to consideration, there was a suggestive carotid pseudo aneurysm due to migrated fish bone with a posterior mediastinal abscess. With such assessment, a team of thoracic, cardiac and vascular in charge set him to an exploratory surgery. Intra operatively, the fish bone was found penetrated esophageal wall and passing through the right common carotid artery and the right internal jugular vein; accompanied with an abscess in loose connecting tissue in cervical region. The fish bone along with 2 cm of the common carotid artery and the internal jugular vein were resected. Abscess was drained, and all identified necrotic tissues were removed.



Figure 1. Clinical presentation and intraoperative management. a) Clinical finding on admission: a pulsatile lump on the right lateral neck (Zone 2) was noted, b) Intraoperative finding the fish bone was found to have perforated the esophageal wall through the right common carotid artery and the right internal jugular vein, c) Resected vascular structure inside carotid sheath, d) 1. Resected internal jugular vein of 2 cm length, 2. Resected common carotid artery.



Figure 2. Post-operative wound care. These figures showing wound progress. (a) Wound on day 7 postoperative, (b) on day 14 postoperative, (c) on discharge, and (d) two months postoperative.

Fortunately, there was no mediastinitis, thus the exploration limited to cervical area until jugular notch. Stump of right internal jugular vein and right common carotid artery were ligated distal and proximally. Esophageal perforation was 1 cm in diameter was left open for healing by secondary intention. Postoperatively, he was then taken care at ICU for 3 days, at HCU for 7 days, and surgical ward for 46 days. On follow up, the fistula spontaneously closed after 56 days postoperative, and he was discharged for outpatient.

## Discussion

There were up to 22 articles focused on fish bone ingestion during past five years (2010–2014) in PubMed. Out of 23 cases reported, there are 15 cases (68%) were Asian: Japan (22%), Malaysia (18%), India (18%) and Korea (9%). This is assumed to be correlated with the eating habits in the region. In reported case, the boy is a West Javanese, where daily fish eating is a culture. Mental retardation is a known risk factor for fish bone ingestion and impaction along with chronic alcoholism, the use of dentures, stroke and other abnormalities of the alimentary tract. This was found in relation to patient's inability to express when there is a fish bone ingested,<sup>12,5</sup> as in our report, even though he is a 14-year-old boy.

Mostly (80–90%), the fish bone may have passing by through the Gastro-intestinal tract, leaving no complication. But in some cases, particularly if ingested fish bone is horizontally positioned, it may get impacted in the alimentary tract.<sup>4–10</sup> This impaction frequently occurs in oropharynx, where there are palatine tonsils, base of tongue, pyriform sinus and the vallecula.<sup>1,5,7,10–14</sup> The other is, the esophagus (28–68% of gastro-intestinal foreign bodies were found impacted here).<sup>10</sup> In this report it was found penetrated to cervical esophageal wall, which is the location of most, i.e. at the cricopharyngeal level, and the thoracic esophagus at the level of aortic arch.<sup>7,13</sup>

Those with impacted fish bone presents a history of ingested fish bone, odynophagia, dysphagia, cervical pain, accompanied with swollen neck, and hypersalivation.<sup>5,3,13</sup> In cases of the bone lead to an aorto-esophageal fistula, chest pain and hematemesis were noted.<sup>11</sup> In other case, pain in upper abdominal right quadrant may be observed in liver abscess secondary to migrated fish bone through the antrum of the stomach wall.<sup>15</sup> As in the literature, in reported boy a history of ingested fish bone, painful lump on the right lateral neck with odynophagia, dysphagia and drooling of saliva was noted. Mohamad and Jaafar (2013) noticed that the site of neck pain pointed out by the individua is an important information and was found very helpful in mapping the possible location of foreign body.<sup>13</sup> We may note that this was found hardly, as the boy who is mentally retarded with inability to communicate and express his complain. In most cases, impacted fish bone in oropharynx may be removed easily through oral approach, particularly when the bone leaves a remaining structure exposed.<sup>12,1</sup> But, when there is no bone identified in oral exam, any ulceration with pooling of saliva may indicate the site of impaction.

In unsuccessful oral retrieval, a direct laryngoscope may be used in assistance. A rigid laryngoscope and/or esophagoscope should be considered in those with consistent symptoms and negative oral exam.<sup>7,10</sup> This reported boy did not preceded a rigid esophagoscopy intervention in the operating theater, since CT imaging showed a clear image. Plain cervical radiograph showed sensitivity of 39–54.8% and specificity of 72–100% in diagnosis a bone impaction.<sup>7,13</sup> In symptomatic patient with a negative x-ray, laryngoscopy exam is to be justified, as radiolucent fish bone is not uncommon. In those with persistent symptoms, in addition to negative endoscopic finding but showed a positive finding in plain radiograph, a migrated of the

fish bone is assumed.<sup>7</sup> Fish bone impaction in the cervical esophagus identified in a plain cervical radiograph, may be expressed as a linear calcified structure. Where the bone is impacted at the tonsils or at the base of tongue, it may not be identified on a plain radiograph. In this case, an imaging using contrast CT scan may be very helpful to visualize foreign body such as fish bone.<sup>1,7,10,13</sup> The sensitivity and specificity of CT scan is up to 100%. Therefore, CT scan is better to define any complication of an impacted fish bone, perforation and migrated fish bone. In addition, CT scan is very helpful in looking for a migrated fish bone. Barium meal is a relatively simple and inexpensive method of diagnosis compared to CT scan. However, barium coats the esophagus and let subsequent planned esophagoscopy extremely difficult to be preceded.<sup>1,5</sup> A plain cervical radiograph was carried out in this boy reported showing a linear shaped with high density feature in the right lateral neck at the level of C5–6 vertebra. A CT scan preceded to confirm the extend of injury to the esophagus and nearby structures showing dilatated right common carotid artery at the level of C3–4<sup>th</sup> vertebra just beneath carotid bifurcation. Irregular lesion border with air visualized surround it. Linear shaped foreign body with bone like density was found at the level of C4 on the lateral right side, inferior to the dilatation. These features suggesting a pseudoaneurysm of common carotid artery and suspicion mediastinitis. By this finding, the procedure of endoscopy is cancelled, and the patient prepared for an emergency exploratory surgery.

In cases where the diagnosis and management were delayed, fish bone may penetrate the mucosal lining and migrated to the deep cervical space results in an abscess formation. The incidence of such a complication found is up to 35%.<sup>10</sup> There were reports of life threatening complications such as vascular-esophageal fistula, esophageal perforation, internal carotid artery puncture, internal jugular vein thrombophlebitis, brachial plexus injury and thyroid lodgment.<sup>1–3,7,10,11</sup> However, there also reports of spontaneous extrusion of the fish bone through the skin in cervical.<sup>3–6,14</sup> Perforated esophagus occurs in 1–4% cases. A migrated fish bone may penetrate the esophageal mucosa and migrated to the soft tissue of the neck in several days after swallowing. Injury to surrounding vascular structures and suppurative complications (deep cervical abscess, mediastinitis) and arterial-esophageal fistulas are predominant cause of death. Formations of aorto-esophageal, subclavian anterior esophageal and carotid esophageal fistulas have been reported.<sup>1,3,10–11,17</sup> Impacted fish bone for more than 24 hours is more likely to lead to major complications. The incidence of complications increases with hours. And the severity of any complication correlates to elapsed time, and the direction of impacted fish bone.<sup>1,10</sup> Lui et al (2003) postulated that impactions for more than 2 days followed by a more severe complication. The fish bone is speculated to be penetrated esophageal mucosa and migrated within several hours.<sup>16</sup>

Although the exact mechanism of a migrated fish bone remains unclear, some believed referred to contribution of cervical muscle contraction as well as esophageal peristalsis. Shape and direction of fish bone is another factor to be considered.<sup>5,27</sup> Initial impaction and combination with local inflammation of esophageal wall and pressure from boluses of food is considered as the mechanism of the formation of tracheoesophageal fistula as reported from Nigeria.<sup>7</sup> This boy reported, who presented in ER seven days after ingestion in addition to deep cervical abscess and a common carotid-internal jugular-esophageal fistula along with pseudoaneurysm of the common carotid artery. This was found in line to those reports, regarding the longer time a fish bone remains impacted, more severe complications occur and requiring an aggressive procedure. Management of esophageal perforation is in vary and referred casuistic. It depends on the etiology, sites of impaction, size of

perforation, the time elapsed between perforation and the diagnosis; underlying esophageal disease, and overall health status. Small sized perforation may heal with no sequelae. Perforation in cervical esophagus may be treated in most cases. Perforation of the intra-thoracic esophagus that are confined to the mediastinum may be treated adequately using conservative measures in most patients.<sup>2,20</sup> There are criteria for non-surgical treatment, namely perforation that is confined to the mediastinum, drainage of the cavity back into the esophagus, clinical stability, perforation with long delay in diagnosis that patient has already tolerated with no need for surgery, and minimal clinical signs of sepsis. This requires a careful patient assessment during the observation. Should there any deteriorated clinical status, the necessity of surgery is indicated.<sup>2,18-20</sup>

There is a place for conservative treatment in children with esophageal perforation. However, children showed an advantage about complication severity, healing rate and mediastinal issue of resistance.<sup>2</sup> Conservative treatment includes the administration of antibiotics, placement of nasogastric tube, acid suppression, and nil by mouth program. Current evidence showed sealing of esophageal perforations by endoluminal prosthesis placement followed by encouraging results. A successful conservative management confirmed by serial contrast esophagogram, showing the healing or reduced number of contained leak.<sup>18-20</sup> Non-operative treatment excludes in case of cervical and/or mediastinal abscess. Multiple drain placed in different sites must be preceded in these cases. Surgical approach depends on the location of the abscess. For posterior and superior mediastinitis, a drainage with cervical approach completed with retropharyngeal dissection is preferred.<sup>2</sup> The principles in surgical management of esophageal perforations are similar regardless the etiology. Eradication of contaminated pleural and mediastinal collections, debriding non-viable tissues and accurate placement mediastinal or pleural drains, is essentials. An NG tube or feeding jejunostomy is placed allowing enteral nutrition. Site of the perforation should be controlled in prevention of post-operative leaks.<sup>2,18-20</sup>

The surgical method of choice in esophageal repair depends on the etiology as well as site of perforation, delay in the diagnosis, degree of contamination as well as preferences of experienced surgeon. The muscular layer is closed over method closure of defect in a tension-free fashion using interrupted sutures provide a healing by primary intention. But, it's not recommended in severe contaminated wound there's a higher risk of leaks and secondary perforation.<sup>9,20</sup>

An alternative to primary healing is to let the fistula established, allowing produced secret to be diverted. To overcome the potential source of the ongoing leaks as a source of infection, esophagectomy and either immediate or delayed reconstruction might be considered; or, esophageal diversion/stoma.<sup>9,22</sup>

Since a cervical abscess was found and development of mediastinitis is of a great potency, an exploratory surgery addressed to drain infectious matter and debriding necrotic tissue as well with cervical approach is carried out. The pus was drained, and the retropharyngeal space had been exposed allowing mediastinal drainage. In this severely contaminated wound, primary healing by first intention is not preferable. Vascular reconstruction, either anastomosis grafts is not also preferred. This is based on concerns of postoperative leaks is of a great potency in this severely contaminated wound. The esophago-cutaneous fistula is left open and conservatively treated for healing by secondary intention.

## Conclusion

Untreated impacted fish bone may be followed by life-threatening complications; where the severity is related directly to period. Early diagnosis and prompt treatment is imperative. Esophageal

perforation management is of casuistic. In case of contaminated environment, delayed repair is preferred. However, conservative management of esophageal perforation with NG tube placement let esophagus healed by secondary intention in this report showed a good outcome.

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