CME ARTICLE

Clinics in diagnostic imaging (142)

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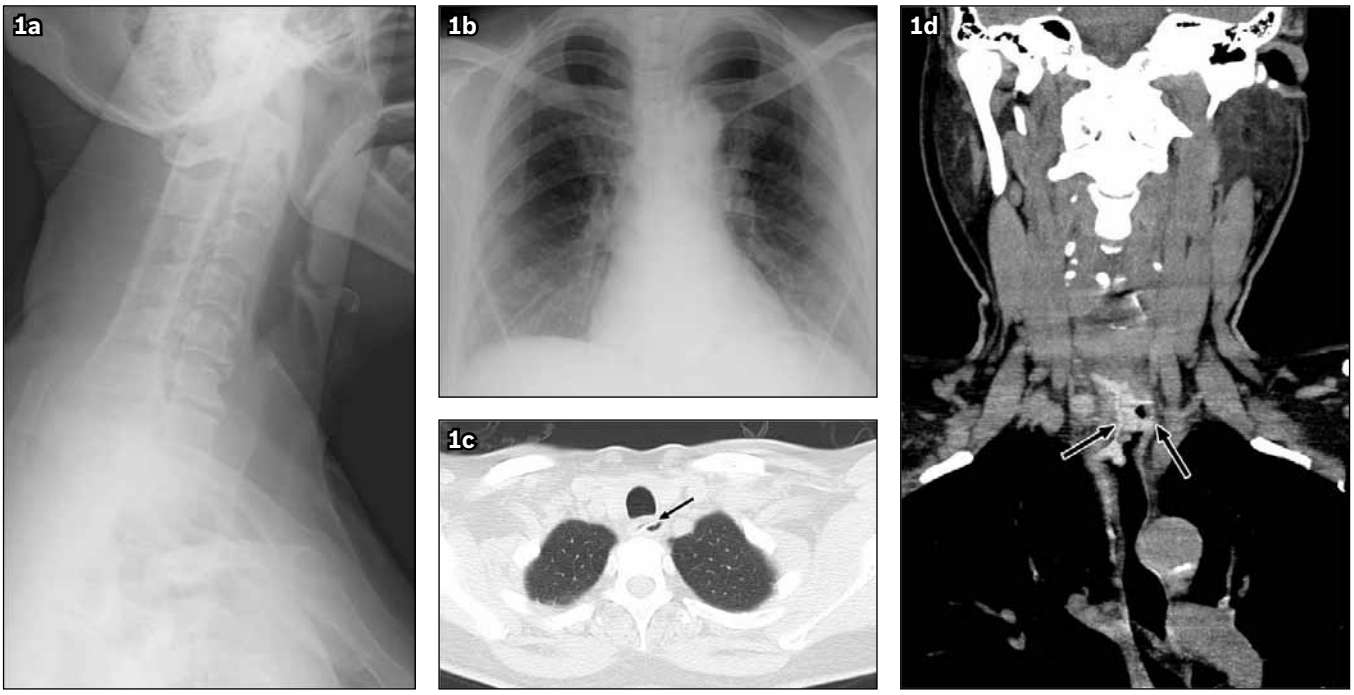

Fig. 1 (a) Radiograph of the neck (Swimmer's lateral view). (b) Chest radiograph (frontal view). (c) Axial CT image taken at T2 (lung window) vertebral level. (d) Coronal reconstructed CT image (thin maximum intensity projection).

CASE PRESENTATION

A 58-year-old man presented to the emergency department with sudden pain and odynophagia after drinking water. The patient thought that part of his lower denture may have fallen into his throat. The subjective pain score was 6/10. He was not dyspnoeic, and no stridor was present. On examination, the patient was alert and not restless, although he was in severe pain. There was moderate tenderness over the lower anterior neck. No abnormality was found on examination of the chest and abdomen. The pharynx and larynx were examined by the otolaryngologist under local anaesthesia, but no foreign body was found.

Radiography of the neck was performed (Fig. 1a). Frontal radiographs of the chest (Fig. 1b) and abdomen, as well as computed tomography (CT) of the neck and upper chest (Figs. 1c & d), were also performed. What do these images show? What is the diagnosis?

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IMAGE INTERPRETATION

The radiographs do not reveal any radio-opaque foreign bodies in the neck (Fig. 1a) or mediastinum (Fig. 1b). There is no widening of the prevertebral soft tissue space in the neck, or evidence of pneumomediastinum or pneumothorax. CT images show an irregular-shaped foreign body measuring 4 cm × 2 cm in the cervical oesophagus at C7–T2 level. No air is seen in the prevertebral soft tissue space or in the mediastinum to suggest perforation. Axial CT image taken at the T2 level (Fig. 1c) shows the impacted oesophageal foreign body (arrow), with no air seen outside the oesophageal lumen. Coronal reconstructed CT image (thin maximum intensity projection [MIP]) (Fig. 1d) shows a mildly dense (80–110 HU) irregularly-shaped foreign body impacted in the upper oesophagus (arrows).

DIAGNOSIS

Cervical oesophagus impacted partial denture.

CLINICAL COURSE

Following CT, rigid endoscopy was performed and the partial denture was removed with difficulty, due to impaction. Recheck endoscopy performed up to 25 cm showed a superficial mucosal laceration at 18 cm. The patient was kept nil by mouth for 12 hours and observed for one day, with gradual resumption of feeds. No complication was noted. The patient was well when discharged the next day.

DISCUSSION

Although foreign body ingestion is a frequently encountered problem among children, it is also not uncommon in the adult population. Prompt management of an ingested oesophageal foreign body is warranted in both children and adults. Most cases of witnessed ingestion are not problematic. The diagnosis of unwitnessed foreign body ingestion can be delayed and complicated, increasing patient morbidity and mortality.[1]

Radiographic evaluation should begin with the acquisition of lateral neck, anteroposterior and lateral chest, and supine abdominal radiographs to localise the position of foreign body from the nasopharynx to the rectum. In symptomatic patients, the radiographs are directed to the region of concern. The limitation of radiographic evaluation is that non-radio-opaque foreign bodies and small foreign bodies can potentially escape detection. CT is an easily accessible investigation and should follow radiographic evaluation for the assessment of a suspected oesophageal foreign body when the radiographs are negative and the presence of an oesophageal foreign body is highly suspected. CT can characterise the foreign body, as well as reveal the presence and extent of complications, such as abscess or mediastinitis.[2] Detection of small-sized foreign bodies, which are difficult to visualise on standard radiographs, is also feasible on CT.[2]

The hypopharynx and cervical oesophagus are especially difficult to evaluate on radiographs for the presence of lodged chicken bones and fish bones. In cases where complications such as perforation are suspected, or a more precise localisation and characterisation of the foreign body is needed, such as prior to an endoscopic intervention, CT may prove to be a useful tool.[3] The advantages of CT imaging are that it is easily available, quick to perform, provides the required information and has a 100% sensitivity for detection of foreign bodies. This makes it the modality of choice for assessment of patients with suspected upper oesophageal foreign body impaction not detected on radiographs.[4] With the advent and increased availablity of multidetector CT, it is possible to acquire fast-speed multisection CT, typically of 1-mm thick sections. This allows isotropic volumetric imaging, high resolution, improved lesion detection, reduced motion artifact and multiplanar reconstructions. Furthermore, high-resolution, three-dimensional reconstruction is possible, enabling virtual endoscopy and MIP images[5] (Fig. 2).

Barium studies were used in the detection of oesophageal foreign bodies in the past.[6,7] However, they may involve a risk of aspiration and can impede subsequent oesophagoscopy, and are thus discouraged in current practice if CT is readily available.[3]

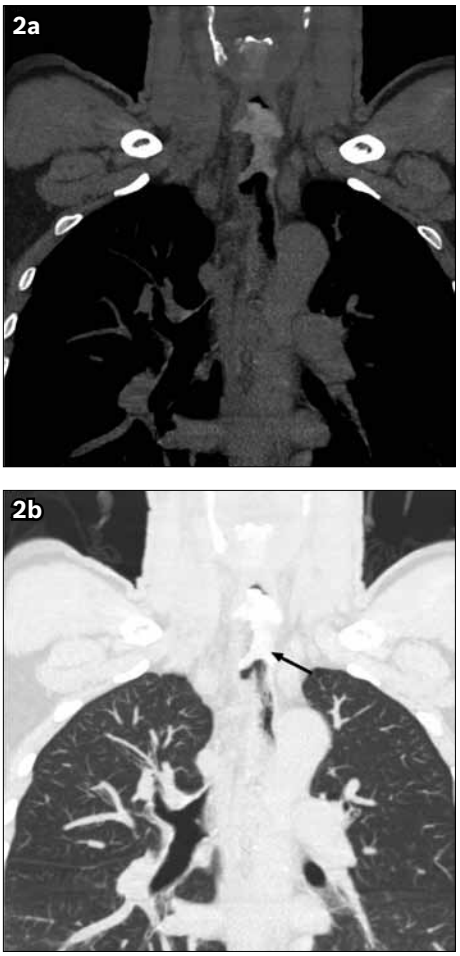

Fig. 2 Impacted denture in the upper oesophagus in a 52-year-old Chinese man who accidentally swallowed his denture, following which he complained of inability to swallow. Coronal thin MIP CT images obtained with (a) narrow and (b) wide window settings show a non-radio-opaque denture located in the upper oesophagus (arrow). No air is seen outside the oesophagus, and there is no pneumomediastinum. The denture was subsequently retrieved by rigid endoscopy. The patient recovered well and was discharged the next day.

Oesophagoscopy is an invasive technique with a certain risk of serious complications, which can be avoided if a satisfactory radiologic assessment can be made.

In a clinical setting where some patients may present with nonspecific symptoms of chest pain, without providing a history of foreign body ingestion, CT evaluation helps to diagnose the cause of pain, whether it is due to an impacted foreign body or due to an alternative chest pathology.[8] CT appearances may vary depending on the nature of the foreign body, the site of impaction in the oesophagus, associated oesophageal abnormality predisposing to the impaction and complications resulting from the offending foreign body.[8]

The areas of physiological narrowing are the most common sites of foreign body impaction, and include the upper oesophagus at the level of the thoracic inlet, in the mid-oesophagus around the aortic arch and the distal oesophagus above the gastroesophageal junction.[2] Other abnormalities, such as stricture, diverticulum, neoplasm, achalasia cardia, scleroderma and diffuse oesophageal spasm, are also potential sites of impaction of foreign bodies.[2] Impaction of foreign bodies in the stomach is highly rare. They usually pass into the small bowel, except for large ones > 6 cm in size, which may be entrapped in the pylorus or duodenum. The ileocaecal junction or rarely, a Meckel's diverticulum, may be the other sites of impaction.[2]

Coins are the most common impacted foreign bodies in children, whereas the most common objects in adults are bones and food boluses.[2] Ingestion of dental prostheses is common among the elderly population. The resin base used in dental prostheses is polymethylmethacrylate (PMMA), which is radiolucent. Due to its radiolucency, these prostheses escape early detection, if one relies solely on radiographs. Even porcelain and plastic artificial teeth are difficult to visualise on radiographs.[9] Attempts to create a resin base that is radio-opaque have been made; however, these materials have not been able to match the physical and aesthetic qualities of PMMA.[10,11] Although implant-supported full dentures and permanent removable partial dentures have metallic-based reinforcement, most complete dentures and some temporary partial dentures do not have a metallic component. Some temporary partial dentures may have metallic clasps to improve retention, and these are radio-opaque. However, patients may have cosmetic concerns, and if the retention is adequate, the metallic component may not be present, as in our case.[12]

Delay in diagnosis and retrieval increases the chances of complications and morbidity. The retained foreign body can cause significant oesophageal wall oedema, leading to obstruction or perforation, or both. Other reported complications include tracheo-oesophageal fistulas, aorto-oesophageal fistulas, distal gastrointestinal complications such as enterocolonic fistula and colonic perforation.[13] In a cross-sectional study of 103 patients with foreign body ingestion, Khan et al reported that the rate of complications was higher in adults (37.1%) than in children (8.8%), with the most severe complications having occurred with ingested dentures.[14]

In conclusion, an initial evaluation with radiographs of the neck, chest, and abdomen should be performed when a history of foreign body ingestion is elicited.[8] This may be followed by CT if the foreign body is not localised, or to characterise the foreign body and look for complications. Dentures are commonly ingested foreign bodies. Since a large proportion of dentures may be radiolucent on radiographs, early CT evaluation can help reduce morbidity.

ABSTRACT A 58-year-old man presented to the emergency department with sudden pain and odynophagia after drinking water. The patient thought that part of his lower denture may have fallen into his throat. There was moderate tenderness over the lower anterior neck. Radiographs of the neck were normal. Computed tomography showed an impacted partial denture in the upper oesophagus, which was removed by rigid endoscopy. Recheck endoscopy showed a superficial mucosal laceration at 18 cm. Ingestion of dental prostheses is common among the elderly population. The role of imaging in the early detection of ingested foreign bodies, particularly non-radio-opaque ones, is discussed.

Keywords: dentures, foreign body, impacted dentures, oesophageal obstruction, oesophagus
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SINGAPORE MEDICAL COUNCIL CATEGORY 3B CME PROGRAMME

(Code SMJ 201210B)

	True	False
Question 1. Concerning radiography of suspected swallowed foreign bodies:		
(a) To localise the position of a suspected foreign body in an asymptomatic patient, initial radiographic evaluation should begin with the acquisition of lateral neck, anteroposterior and lateral chest, and supine abdominal radiographs.	☐	☐
(b) To localise the position of a suspected foreign body in a symptomatic patient, radiographic evaluation should be directed toward the area of concern.	☐	☐
(c) All foreign bodies can be detected by radiographs.	☐	☐
(d) The hypopharynx and cervical oesophagus are easily assessed on radiographs, even for small foreign bodies.	☐	☐
Question 2. Regarding CT of suspected swallowed foreign bodies:		
(a) Following radiographs, CT should be the next investigation for a suspected ingested foreign body if the radiographs are negative.	☐	☐
(b) The advantages of imaging with multidetector CT include fast speed, high-resolution images and decreased motion artefacts.	☐	☐
(c) The CT appearance of all oesophageal foreign bodies is similar.	☐	☐
(d) CT can characterise the nature of impacted foreign body and detect the presence of complications.	☐	☐
Question 3. Concerning impaction of foreign bodies in the gastrointestinal system:		
(a) Ingested foreign bodies rarely lodge in areas of physiological narrowing of the oesophagus.	☐	☐
(b) Impaction of foreign bodies can occur in areas of luminal abnormality, such as stricture, diverticulum, neoplasm and diffuse oesophageal spasm.	☐	☐
(c) The most common foreign bodies to be impacted in children are coins.	☐	☐
(d) Barium studies were previously used for detection of foreign bodies, but they are usually not required in current practice if CT is easily available.	☐	☐
Question 4. Regarding swallowed foreign bodies in adults:		
(a) The common objects that are impacted in adults are bones and food boluses.	☐	☐
(b) Ingestion of dental prostheses is extremely uncommon in the elderly population.	☐	☐
(c) Polymethylmethacrylate, the resin base used in dental prostheses, is radiolucent and escapes early detection if one relies solely on radiographs.	☐	☐
(d) The artificial teeth used in dental prostheses are easily detectable on radiographs.	☐	☐
Question 5. Concerning diagnosis and management of swallowed foreign bodies:		
(a) Prompt management of an oesophageal foreign body is warranted in both children and adults.	☐	☐
(b) Delays in diagnosis and retrieval of an impacted foreign body in the oesophagus increase the chances of complications and morbidity.	☐	☐
(c) Complications of retained foreign bodies include obstruction, perforation and fistula formation.	☐	☐
(d) Virtual endoscopy cannot be performed with the currently available CT scanners.	☐	☐

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