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A 65 mm screwdriver in the trachea of a toddler initially suspected to be an oesophageal foreign body: a case report

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Case Report

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Abstract

Background

Foreign body aspiration is a common airway emergency in children under three years of age. When the family describes the event as swallowing and a radiopaque object projects close to the midline on a single frontal radiograph, it may be taken for an oesophageal one. We report such a case, in which review of the source images also showed that the radiopaque part of a manufactured object substantially understated its true size.

Case presentation

A previously healthy 2-year-4-month-old boy was brought to the emergency department after his family saw him put a small screwdriver in his mouth. He vomited once and then had an intermittent dry cough, but was comfortable, with an oxygen saturation of 99–100% in room air. A supine anteroposterior radiograph of the chest and abdomen showed a nearly vertical metallic opacity over the upper mediastinum, close to the midline, reported as approximately 48 mm long; the lung fields were clear. An oesophageal foreign body was suspected and flexible gastroscopy was performed under intravenous anaesthesia. It reached the horizontal duodenum and found no foreign body, and a subsequent upright abdominal radiograph was also negative. Non-contrast chest computed tomography, obtained about five and a half hours after arrival with a paediatric low-dose protocol, showed a linear metallic object within the tracheal lumen, together with right-sided obstructive emphysema and bronchopneumonia that had not been present on the initial film. The radiopaque component measured 43 mm. Rigid bronchoscopy the same day removed a screwdriver 65 mm long intact from the trachea; the additional 22 mm was a radiolucent plastic handle. The child was discharged on the second postoperative day and was asymptomatic at review 12 days later.

Conclusions

A radiopaque object demonstrated on imaging and then not found at upper gastrointestinal endoscopy should prompt reassessment of the airway rather than a search further down the gastrointestinal tract. A cough that begins with a witnessed choking event and persists retains diagnostic weight even when oxygenation and auscultation are normal. For a composite object the radiopaque component is not the object, and its true length may be considerably greater.

Background

Foreign body aspiration is a frequent airway emergency in young children, especially those younger than 3 years, who explore objects with their mouths and have immature protective airway reflexes [1, 2]. Most

aspirated objects are organic. Non-food objects are less common, but rigid, irregular or sharp items may be more difficult to retrieve safely [3].

The diagnosis is easy to miss. Families often describe the event as swallowing rather than choking, and a child who is not in distress and has a normal chest examination does not obviously need an airway procedure. Atypical presentations and incomplete histories are recognised contributors to delayed or incorrect diagnosis [4, 5], and an object left in the airway can lead to pneumonia, atelectasis, granulation tissue or bronchiectasis [6, 7].

Imaging does not always settle the question either. On a single frontal radiograph the trachea and the oesophagus overlap in projection, so an object lying near the midline can be in either [8, 9], and the route cannot reliably be inferred from the history alone [10].

We report a toddler who aspirated a screwdriver that was first thought to be in the oesophagus, and whose position in the airway became clear only after upper endoscopy failed to find it. In preparing this report we re-measured the object on the source images and found a second problem that we have not seen set out explicitly in the paediatric literature: because the handle was radiolucent, every image available to the team understated the length of the object by about a third. We describe the sequence of care, including the decisions we would now take differently, and the measurement finding.

Case presentation

Presentation and initial imaging

A previously healthy boy aged 2 years and 4 months was brought to the emergency department on 7 September 2023 after his family saw him put a small screwdriver in his mouth at home. They believed he had swallowed it. He vomited a small amount of gastric contents once and then had an intermittent dry cough. There was no cyanosis, stridor, wheeze, dyspnoea, drooling, dysphagia or fever. He had no history of asthma, recurrent pneumonia, neurodevelopmental disorder or previous foreign body event.

On arrival he was alert and comfortable at rest. His temperature was 36.4–36.5°C, heart rate 110–126 beats/min, respiratory rate 22–25 breaths/min and oxygen saturation 99–100% in room air. There was no chest retraction or nasal flaring. Breath sounds were coarse but equal on the two sides, without wheeze or crackles. The abdomen was soft and non-tender. The white blood cell (WBC) count was 17.67 × 10^9/L with 63.7% neutrophils, haemoglobin 139 g/L, platelet count 359 × 10^9/L and C-reactive protein (CRP) below 0.20 mg/L. Coagulation, renal and liver function and electrolytes were within the local reference ranges.

At 08:04 a supine anteroposterior (AP) radiograph of the chest and abdomen was obtained at 76 kVp with a source-to-detector distance (SID) of 1194 mm and a detector pixel pitch of 0.139 mm. It showed a nearly vertical metallic opacity projected over the upper mediastinum, close to the midline (Fig. 1a). The length was reported as approximately 48 mm; re-measurement of the source image for this report gave

49 mm. No radiopaque object was seen in the abdomen. Importantly, the lung fields were clear: there was no hyperinflation, no lobar collapse, no consolidation and no mediastinal shift. The features that later suggested airway obstruction were not present on this examination. Given the history of apparent ingestion and the midline position of the opacity, the object was interpreted as oesophageal. No lateral radiograph was obtained.

Negative upper endoscopy

Because the object was thought to be in the oesophagus, flexible gastroscopy was performed under intravenous anaesthesia later that morning, without endotracheal intubation. The endoscope was advanced to the horizontal part of the duodenum. No foreign body was found. The oesophageal, gastric and duodenal mucosa were smooth, without erosion, and there was no external impression on the oesophageal wall. The larynx and the trachea were not inspected during this procedure. An upright abdominal radiograph obtained afterwards, at 12:10, again showed no radiopaque object within the imaged abdomen and no free subdiaphragmatic gas (Fig. 1b).

Computed tomography

The child continued to cough intermittently and the object remained unaccounted for. Non-contrast chest computed tomography (CT) was therefore obtained at 13:16, about five and a half hours after arrival, on a 256-detector-row scanner using the institutional paediatric chest protocol for children under six years (100 kVp, 215 mA, exposure time 350 ms, detector collimation 0.625 mm, pitch 0.99, iterative reconstruction at 60%, reconstruction field of view 320 mm), with 167 axial images reconstructed at 1.25 mm.

A linear metallic object lay within the tracheal lumen, close to the midline and almost parallel to the long axis of the trachea, with its distal end in the lower trachea near the carina and its proximal end in the mid-trachea (Fig. 2a, b). On review of the images for this report, the radiopaque component measured 43 mm along its principal axis and about 4 mm across, and its long axis was inclined about 14° to the craniocaudal axis. The right lung was more lucent than the left, in keeping with obstructive emphysema, and there was bronchopneumonia with heterogeneous attenuation of both lungs (Fig. 2c). Neither finding had been present on the radiograph five hours earlier. No atelectasis, pneumothorax or pneumomediastinum was seen. The result was reported as a critical value at 13:30 and the child was referred urgently to otolaryngology.

Removal and postoperative course

Rigid bronchoscopy was performed under general anaesthesia from 15:15 to 15:25. With the child supine, the laryngeal inlet was exposed by direct laryngoscopy and a size 3.5 rigid bronchoscope was introduced. After a small amount of secretion had been suctioned, the proximal part of the metallic

object was seen in the trachea. The surrounding mucosa was congested and mildly oedematous and the object was firmly impacted. It was grasped with foreign-body forceps and withdrawn along the axis of the airway together with the bronchoscope, in a single movement, and delivered intact through the glottis.

The object was a Phillips-head screwdriver with a metal shaft and a red plastic handle. It measured approximately 65 mm in total, of which the metal shaft accounted for about 43 mm (Fig. 3). Flexible bronchoscopy after extraction showed focal congestion and mild oedema on the left wall of the trachea, without appreciable narrowing. Both main bronchi and their visible branches were patent. A small amount of viscous secretion was lavaged and aspirated and no residual foreign body was found. Oxygen saturation remained about 99% throughout. Blood loss was nil, and no airway laceration, laryngospasm, bronchospasm or arrhythmia was documented. The child recovered from anaesthesia and returned to the ward without ventilatory or intensive care support.

After the procedure he had an occasional cough but remained afebrile, without wheeze, tachypnoea, dyspnoea or cyanosis. During the short admission he received intravenous cefmetazole and methylprednisolone and nebulised budesonide. By the second postoperative day the cough had decreased, the WBC count was 12.80 × 10^9/L and CRP 1.68 mg/L, and he was discharged in stable condition. At outpatient review 12 days after removal his guardian reported that the cough had resolved and that no new respiratory symptoms had developed. He was in good general condition and no further investigation was considered necessary. The timeline of the episode of care is shown in Table 1.

Table 1
Timeline of the episode of care. Times refer to 7 September 2023 unless otherwise stated

Time	Clinical event
07:50	Emergency assessment after the screwdriver incident: intermittent dry cough and one episode of vomiting, without respiratory distress. Oxygen saturation 99–100% in room air; breath sounds equal.
08:04	Supine anteroposterior radiograph of the chest and abdomen: nearly vertical metallic opacity 48–49 mm long over the upper mediastinum, close to the midline. Lung fields clear, no hyperinflation or consolidation. An oesophageal location was suspected (Fig. 1a).
Late morning	Flexible gastroscopy under intravenous anaesthesia, without a secured airway, to the horizontal duodenum: no foreign body and no mucosal erosion. Larynx and trachea not inspected.
12:10	Upright abdominal radiograph: no radiopaque foreign body in the abdomen (Fig. 1b).
13:16	Non-contrast chest CT with a paediatric low-dose protocol: linear metallic object within the tracheal lumen, radiopaque component 43 mm, with right-sided obstructive emphysema and bronchopneumonia not present on the 08:04 radiograph (Fig. 2).
15:15–15:25	Rigid bronchoscopy under general anaesthesia: a 65 mm screwdriver removed intact from the trachea. Flexible bronchoscopy found no residual foreign body (Fig. 3).
Postoperative day 2	Cough improved, WBC 12.80 × 10^9/L, CRP 1.68 mg/L; discharged in stable condition.
Day 12	Outpatient follow-up: cough resolved, no new respiratory symptoms, no further investigation required.

Discussion and conclusions

Three things pointed us toward the oesophagus. The family had seen the child put the screwdriver in his mouth and described him as having swallowed it. He was comfortable and his chest examination was unremarkable. The radiograph then showed metal close to the midline, and the report favoured an oesophageal position. The finding we gave too little weight to was the cough, which began immediately after the incident and did not settle. Delay in recognising aspiration is common when the event itself is unclear or the symptoms are mild [4–7]. Normal oxygen saturation and symmetric breath sounds do not exclude a foreign body in the airway, and in this child they did not. It is worth stating plainly that the initial radiograph offered no secondary sign of airway obstruction: the hyperinflation and the parenchymal changes appeared only on the CT five hours later, and could not have informed the first decision.

What the radiograph could and could not show

The radiograph told us that there was metal, but not how deep it lay. On a frontal image the trachea and the oesophagus overlap, so an object near the midline can sit in either. A lateral view might have separated them, and its absence was the key omission in this case. Plain films do not always settle the question even when both projections are available [8, 9, 11], but a lateral projection was the cheapest available test and it was not done.

The measured length also differed between examinations. The opacity measured 49 mm on the radiograph and the radiopaque component measured 43 mm on CT. That difference is what a supine AP film would be expected to produce: with an SID of 1194 mm and the trachea of a small child lying roughly 100 mm above the detector, geometric magnification is about 9%, and partial-volume averaging at the tips of a thin object on 1.25 mm sections accounts for the remainder. Because the object was almost parallel to the craniocaudal axis, foreshortening contributed little.

The difference that mattered was the other one. The screwdriver removed from the trachea was 65 mm long and about a third of it was a plastic handle that produced no opacity on either study. Every image available to us understated the object by roughly 22 mm. For a composite object the radiopaque part is not the object. A shorter apparent object lying close to the midline is also more readily attributed to the oesophagus than a 65 mm tool lying along the trachea, so the measurement error probably reinforced the initial interpretation as well. When a manufactured article with metal and plastic components is aspirated, the operator should expect to bring out something longer than the images show, and should size the instruments accordingly.

The negative gastroscopy

The negative gastroscopy was the turning point, or should have been. The endoscope reached the horizontal duodenum and the mucosa was intact, so an object that had been visible on film an hour earlier was now unaccounted for anywhere in the upper gastrointestinal tract. That is not a reassuring result. It is a reason to look again at the original images and at the airway. Instead, a further abdominal radiograph was obtained, on the assumption that the object had passed distally, and the airway was not examined until the CT had been reported.

What we would do differently

Two aspects of the management deserve comment rather than defence. First, the gastroscopy was performed under intravenous anaesthesia without a secured airway at a time when a radiopaque object of unknown location was present. If such an object lies in the airway, instrumentation of the pharynx and oesophagus carries a real risk of displacing it, and of laryngospasm or obstruction. Nothing of the kind occurred in this child, but the risk was accepted without being recognised. Where the position of a radiopaque object has not been established, we would now either secure the airway or ensure that

airway endoscopy is immediately available before upper gastrointestinal endoscopy is begun, and we would inspect the larynx and trachea during that same anaesthetic.

Second, the child received sedation or general anaesthesia three times in one day: for the gastroscopy, for the CT and for the rigid bronchoscopy. Each was justifiable at the moment it was requested, but the sequence as a whole followed from the initial mislocalisation. Establishing the position of the object at the outset, by a lateral projection or by inspecting the airway during the first anaesthetic, would have reduced three exposures to one. The same applies to the CT. It was requested only after the object had failed to appear at endoscopy and on the abdominal film, when its location was genuinely unknown, and it was performed with a paediatric low-dose protocol; but it would not have been needed at all had the airway been inspected earlier. We do not present this sequence as a model. We report it because the decision points are ordinary ones that other teams will meet.

Previously reported cases

Errors of localisation between the airway and the oesophagus are reported in both directions, but reports resembling the present case are uncommon. Ren et al. described a child in whom paired magnetic beads obstructed the oesophagus and the trachea simultaneously, so that the route could not be inferred from the history [12]. In the opposite direction, an unrecognised tracheal foreign body in an infant presented as recurrent pneumonia and growth failure and was eventually complicated by an acquired tracheo-oesophageal fistula [13], and an oesophageal foreign body in an infant with recurrent stridor was initially attributed to an aberrant innominate artery before closer review of the CT identified the object [14]. An oesophageal foreign body presenting with cough, stridor and pulmonary congestion has also been reported to cause months of diagnostic delay [15]. What we have not found described is the measurement problem reported here, in which the radiolucent part of a composite object accounted for a third of its length and was invisible on every examination performed. We would welcome correction on this point from readers with contrary experience.

Imaging and removal

CT settled the question quickly. It placed the object in the trachea and showed its orientation before we started, which mattered for a rigid object of this length. It also showed right-sided obstructive emphysema and bronchopneumonia, neither of which we would have predicted from how well the child looked. CT is accurate in children with suspected aspiration [16], and multiplanar reconstruction helps to show the object against the airway [17]. That does not make it a routine test. Children should not be irradiated to confirm what the history already makes obvious, and when aspiration is clear, bronchoscopy should not wait for a scan.

Rigid bronchoscopy keeps the airway open and leaves a channel to work through [18, 19]. A rigid 65 mm object does not behave like the peanut or seed found far more often at this age. It has to be gripped firmly and brought out along the axis of the airway, in one movement with the scope, or its tip can catch on the trachea or the larynx on the way past [3, 20]. The anaesthetist has to know what is about to

happen and when, which is why this is not a procedure to begin without a shared plan [21]. Flexible bronchoscopy afterwards let us look at the mucosa where the object had been impacted, clear the secretions and satisfy ourselves that nothing had been left behind [22].

The screwdriver had been used on a toy and was left where a two-year-old could reach it. Tools kept for changing batteries or opening toys are easy to overlook when a household is thinking about choking hazards, and they should be put away as soon as they have been used.

Limitations

This is a single case and cannot show how often such errors occur or how best to avoid them. No lateral radiograph was obtained, so we cannot say whether that projection would have corrected the localisation; we can only record that it was not done. No intraoperative photograph of the foreign body in situ was obtained: the procedure was performed as an emergency and image capture was not part of the routine at the time. We regard this as a real limitation, since such an image would have documented the relationship of the object to the tracheal wall and the degree of impaction. Acquisition parameters were retrieved from the image data, but the dose report was not available, so the volume CT dose index and the dose-length product cannot be given. The anaesthetic airway-device sequence was not recorded in sufficient detail to be analysed. Follow-up was clinical and stopped at 12 days, without imaging, so later granulation tissue or a focal narrowing at the site of impaction cannot be excluded.

Conclusions

When a radiopaque object is not where the first images suggested, the safer assumption is that it has been mislocalised rather than that it has passed. In a small child, a cough that starts with the choking event and then persists may be the only sign of aspiration and should not be discounted because the oxygen saturation is normal. Where the position of a radiopaque object is uncertain, the larynx and trachea should be inspected during the same anaesthetic as the upper gastrointestinal endoscopy, and a lateral projection should be obtained before that anaesthetic. Finally, for a manufactured object with metal and plastic parts, the radiopaque component is not the object: its true dimensions should be inferred from the article itself, and the operator should be prepared for something longer than the images show.

Abbreviations

AP
Anteroposterior
CRP
C-reactive protein
CT
Computed tomography
SID

Source-to-detector distance

WBC

White blood cell

Declarations

Ethics approval and consent to participate

This case report was approved by the Ethics Committee of the Women and Children's Hospital Affiliated to Qingdao University (approval number QFELL-YJ-2025-106, 21 August 2025). The Committee waived the requirement for informed consent to participate, as the report is retrospective and based on data collected during routine clinical care. All procedures were carried out in accordance with the Declaration of Helsinki.

Consent for publication

Written informed consent for publication of this case report and the accompanying de-identified images was obtained from the patient's legal guardian. A copy of the signed consent form is available for review by the Editor of this journal on request.

Availability of data and materials

The de-identified data supporting the conclusions of this case report are not publicly available because individual privacy could be compromised, but are available from the corresponding author on reasonable request and with the permission of the institution.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

ZD performed the rigid bronchoscopy and the removal of the foreign body, conceived the report, reviewed the source images, and was a major contributor in writing the manuscript. WY performed the upper gastrointestinal endoscopy, collected and interpreted the clinical data, and revised the manuscript. Both authors read and approved the final manuscript.

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Large language models [OpenAI ChatGPT (GPT-5.6 Sol, https://chat.openai.com) and Anthropic Claude (Opus 5, https://claude.ai)]were used in the preparation of this manuscript. They were used for English-language editing, organisation of the manuscript, literature searching and document formatting. They were not used to generate, analyse or interpret clinical data. The authors reviewed and edited all output, checked it against the source records and the cited references, and take full responsibility for the content of the manuscript. No large language model meets the criteria for authorship and none is listed as an author.

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Figures

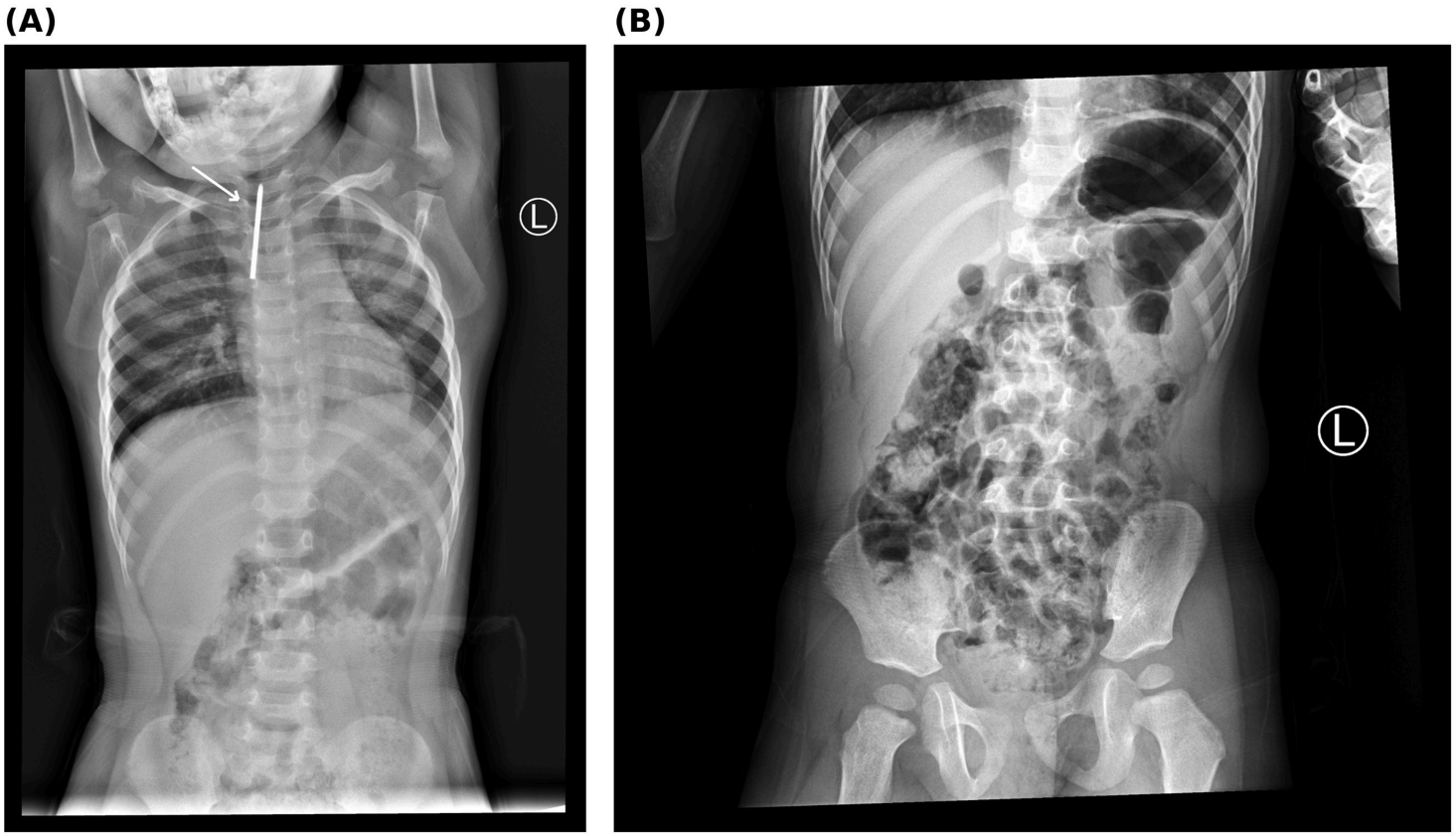


Figure 1

De-identified plain radiographs. **a** Initial supine anteroposterior radiograph of the chest and abdomen at 08:04. The arrow indicates a nearly vertical radiopaque object projected over the upper mediastinum, close to the midline. The lung fields are clear and no radiopaque object is seen in the abdomen. **b**Upright abdominal radiograph obtained after the negative gastroscopy, at 12:10, showing no radiopaque object within the imaged abdomen and no free subdiaphragmatic gas. The circled L on each image is the radiographic laterality marker. No scale bar is shown because the two examinations were acquired at different source-to-detector distances and therefore at different geometric magnifications

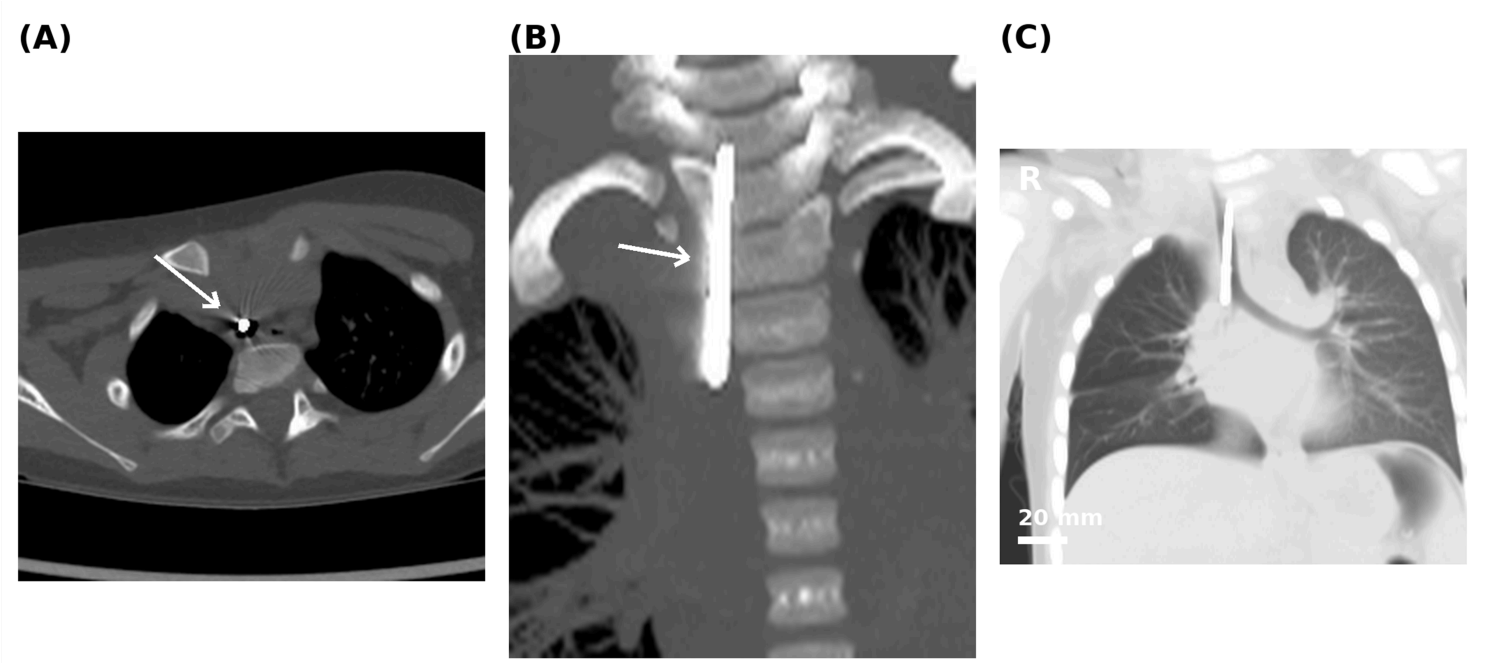


Figure 2

De-identified non-contrast chest computed tomography. **a**Axial image at the level of the mid-trachea; the arrow indicates the metallic foreign body within the tracheal lumen. **b**Coronal thin-slab maximum-intensity projection showing the full length of the radiopaque component, which lies almost parallel to the long axis of the trachea; the arrow indicates the object. **c**Coronal lung-window reformat showing greater lucency of the right lung than the left, in keeping with obstructive emphysema. R right, L left. Scale bar 20 mm. The radiolucent plastic handle, which accounted for about a third of the object, is not visible on any of these images

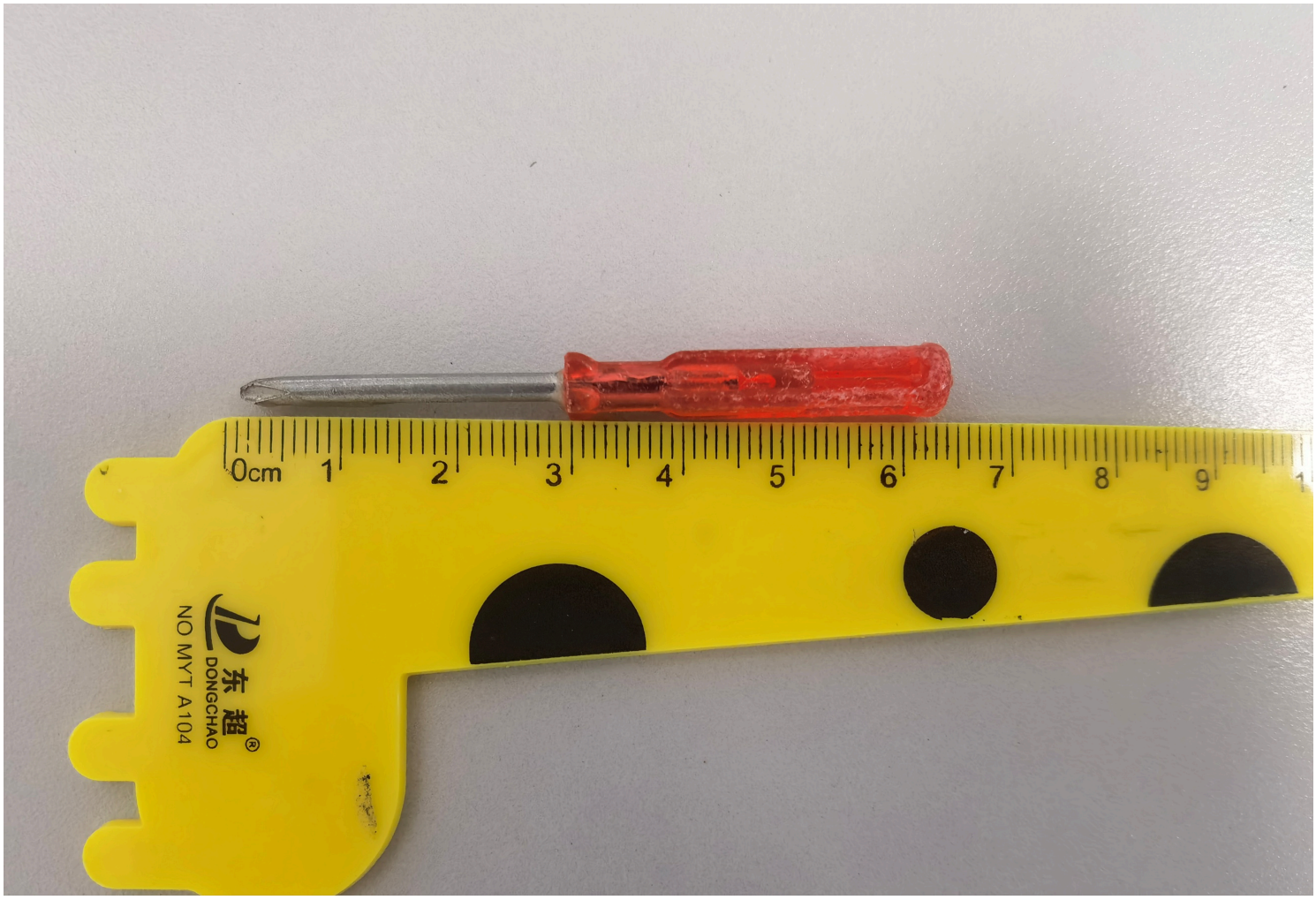


Figure 3

Retrieved Phillips-head screwdriver photographed beside a centimetre scale. The total length was approximately 65 mm, of which the metal shaft accounted for about 43 mm; the plastic handle is radiolucent

Supplementary Files

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