A Round-Shaped, Radio-Opaque Foreign Body on Chest Radiograph, Identified as an Intact Lanthanum Carbonate Tablet

Nuttapat Tungtrongchitr[1], Massupa Krisem[1], Lerkiat Wicharit[2], Supawadee Suppadungsuk[1], Kanin Thammavaranucupt[1]*

[1]*Chakri Naruebodindra Medical Institute, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Thailand*

[2]*Boromarajonani College of Nursing, Nakhon Ratchasima, Faculty of Nursing, Praboromarajchanok Institute, Nakhon Ratchasima, Thailand*

***Correspondence:** Kanin Thammavaranucupt, Chakri Naruebodindra Medical Institute, Faculty of Medicine Ramathibodi Hospital, Mahidol University 111 Moo 14, Bang Pla, Bang Phli, Samut Prakan 10540, Thailand

geng103@hotmail.com

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AUTHORS' CONTRIBUTIONS
NT- contributed to writing and editing the manuscript prior to submission and was involved in patient care.
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SS- contributed to editing the manuscript prior to submission and was involved in patient care.
KT- contributed to writing and editing the manuscript prior to submission and was involved in patient care.
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DISCLOSURES
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CONSENT
Yes, Informed consent was obtained from the patient for the publication of data from her clinical history and the necessary images.

HUMAN AND ANIMAL RIGHTS
This article was approved by the human research ethics committee of the Faculty of Medicine Ramathibodi Hospital, Mahidol University (COA. No. MURA2025/548)

ABSTRACT

Lanthanum carbonate is a phosphate binder in the form of a chewable tablet commonly prescribed in chronic kidney disease patients. We reported an unusual radio-opaque foreign body accidentally found in a chest X-ray of a coronavirus disease 2019 pneumonia patient. Due to awareness of mimicking other conditions (e.g., button battery or coin ingestion), an urgent endoscopy was performed. An intact lanthanum carbonate tablet was found in the upper stomach and was removed successfully. Physicians should be aware of unchewed lanthanum carbonate tablets when a metallic-like object is detected on the chest radiograph of a lanthanum carbonate user.

CASE REPORT

BACKGROUND

Lanthanum carbonate is a phosphate binder used to treat hyperphosphatemia in patients with chronic kidney disease [1,2]. As prescribed as a chewable tablet, patients taking lanthanum carbonate can present with radio-opaque precipitates distributed along the digestive tract on imaging studies [3,4]. Herein, we presented a case of a 60-year-old woman with end-stage kidney disease on hemodialysis who was admitted due to COVID-19 pneumonia. An unusual round-shaped foreign body was accidentally found in the middle esophagus on plain radiography, which was identified as an intact lanthanum carbonate tablet afterward.

CASE REPORT

A 60-year-old woman with a medical history of end-stage kidney disease on chronic hemodialysis, hypertension, diabetes mellitus, and ischemic heart disease presented with fever, cough, and dyspnea for two days. Her previous medication

included lanthanum carbonate, which was prescribed owing to her hyperphosphatemic condition. Coronavirus disease 2019 (COVID-19) pneumonia was diagnosed. An anteroposterior chest radiograph showed a 2-cm coin-shaped, homogeneous radiopaque foreign body located in the theoretical position of the esophagus (Figure 1a). During the hospitalization, the patient underwent a computerized tomography (CT) scan of the chest and upper abdomen, which showed a high-density 3071 Hounsfield units (HU), coin-shaped foreign body lodged in the middle thoracic esophagus at the level of the aortic arch. A beam-hardening artifact was also noted between the object (Figure 1b). A repeat anteroposterior chest radiograph revealed a foreign body moving downward to the distal thoracic esophagus.

Due to awareness of mimicking the button battery, an urgent esophagogastroduodenoscopy was performed the following day. Esophagogastroduodenoscopy (EGD) showed a single round pill, measuring 2 cm in diameter, located in the body of the stomach (Figure 2). Endoscopic removal was done successfully by RESCUENET© without complication. The tablet was later identified as an intact lanthanum carbonate tablet.

DISCUSSION

Lanthanum carbonate is a phosphate binder used to treat hyperphosphatemia in patients with chronic kidney disease [1,2]. As prescribed as a chewable tablet, patients taking lanthanum carbonate can present with radio-opaque precipitates distributed along the digestive tract on imaging studies [3,4]. Herein, we presented a case of a 60-year-old woman with end-stage kidney disease on hemodialysis who was admitted due to COVID-19 pneumonia. An unusual round-shaped foreign body was accidentally found in the middle esophagus on plain radiography, which was identified as an intact lanthanum carbonate tablet afterward.

Lanthanum carbonate is a novel, non-calcium-based phosphate binding agent that forms a water-insoluble compound in the digestive tract [5]. To use the medication properly, patients are instructed to chew or crush the tablets completely before swallowing or after meals [6]. Because lanthanum carbonate has a high atomic number of about 57, closest to barium and iodine, this agent strongly absorbs the x-ray beams, causing radio-opaque on a radiograph, high metallic density (>3000 HU), and beam hardening effect on CT [7]. Consequently, there have been increasing reports of lanthanum carbonate presenting as radio-opaque precipitates located along the digestive tract [8]. According to a systematic review, the common locations of the precipitates included the intestines, stomach, and others. While it is unusual for these deposits to be harmful, lanthanum carbonate had been reported as a cause of intestinal pseudo-colonic obstruction in a single case report [9].

Contrary to the aforementioned reports, a lanthanum carbonate tablet in our patient was imaged as a round-shaped radio-opaque material. Suspicious foreign bodies such as coins, button batteries, and radio-opaque drugs were differential diagnoses because they are round, with similar diameters and radiopacities. A button battery usually comprises two metallic disks, showing a "double rim sign" on the frontal radiograph and a "step-off sign" on the lateral radiograph [10]. Coins and drugs, including lanthanum, are identified as plain and homogeneous opacities instead. Lanthanum carbonate is not the only drug that could present as radio-opaque material on imaging; other medications such as chloral hydrate, heavy metals, iodines, phenothiazines, enteric-coated pills, and solvents should also be considered [11]. Considering the possibility of button battery ingestion, which can lead to catastrophic injuries within hours, urgent removal and rapid identification of the foreign body are required.

The imaging findings in our case implied that the patient did not chew the pill properly before swallowing. It led to concern regarding the medication prescriptions for elderly or neurological deficit patients. There was a report of a bedridden stroke patient who developed a new onset hoarseness and cough due to obstruction of lanthanum carbonate on the oropharynx [12]. Evaluation of chewing capacity should be encouraged before the prescription of lanthanum carbonate. Additionally, the lanthanum carbonate tablet in our patient was located in the middle esophagus, which is considered an unusual location. It could also be mistaken for a button battery, which is more harmful. Differential diagnosis of lanthanum carbonate tablets should be considered when a radio-opaque foreign body was found in chest X-ray, especially among elderly lanthanum carbonate users.

TEACHING POINT

Unchewed lanthanum carbonate tablets can mimic metallic foreign bodies such as coin, button batteries, phenothiazine/heavy-metal drug, or iodine-containing drug on imaging. Physicians should ensure patients—especially the elderly—are instructed and capable of chewing or crushing the tablets before swallowing.

QUESTIONS

Question 1: Which property of lanthanum carbonate best explains its metallic-like radiographic appearance?

A. It is water-soluble and diffuses through soft tissue
B. It has a high atomic number, close to barium and iodine
C. It forms a transparent complex in the digestive tract
D. It generates only low-density signals on CT
E. It contains iron particles absorbed in x-rays

Explanation: Lanthanum carbonate has a high atomic number (57), similar to barium and iodine, making it strongly absorb x-ray beams and appear metallic-like and radio-opaque on imaging [“Because lanthanum carbonate has a high atomic number of about 57, closest to barium and iodine, this agent strongly absorbs the x-ray beams, causing radio-opaque on a radiograph, high metallic density (>3000 HU), and beam-hardening effect on CT”].

Question 2: Which foreign body poses the greatest diagnostic confusion with an intact lanthanum carbonate tablet on chest radiography?

A. Esophageal air bubble
B. Food bolus
C. Enteric-coated pill
D. Button battery
E. Fish bone

Explanation: An intact lanthanum carbonate tablet may mimic a button battery, as both appear round and dense on imaging. Misdiagnosis is dangerous because button batteries can cause catastrophic tissue damage within hours, warranting urgent removal ["Suspicious foreign bodies such as coins, button batteries, and radio-opaque drugs were differential diagnoses… Considering the possibility of button battery ingestion, which can lead to catastrophic injuries within hours, urgent removal and rapid identification of the foreign body are required"].

Question 3: Which imaging feature is most characteristic of a button battery, helping distinguish it from a lanthanum carbonate tablet?

A. Beam-hardening artifact
B. Double-rim sign
C. Smooth homogeneous opacity
D. Peripheral calcification
E. High attenuation >3000 HU

Explanation: Button batteries typically demonstrate a "double-rim sign" on frontal radiographs and a "step-off sign" on lateral radiographs, differentiating them from the homogeneous opacity of lanthanum carbonate tablets ["A button battery usually comprises two metallic disks, showing a 'double rim sign' on the frontal radiograph and a 'step-off sign' on the lateral radiograph"].

Question 4: What is the most important preventive measure for avoiding lanthanum carbonate tablets being misdiagnosed as foreign bodies?

A. Taking the medication with water only
B. Administering after dialysis
C. Chewing or crushing the tablet before swallowing
D. Avoiding prescription in CKD patients
E. Using CT scan instead of radiography

Explanation: Lanthanum carbonate must be chewed or crushed before swallowing. Failure to do so may result in an intact tablet appearing as a suspicious foreign body on imaging ["To use the medication properly, patients are instructed to chew or crush the tablets completely before swallowing"].

Question 5: What clinical precaution should be considered before prescribing lanthanum carbonate to elderly or neurologically impaired patients?

A. Assess swallowing and chewing capacity
B. Perform baseline CT scan
C. Prescribe at half the normal dose
D. Combine with calcium-based binder
E. Replace with aluminum hydroxide

Explanation: Evaluation of chewing ability is essential in elderly or neurologically impaired patients, as failure to chew lanthanum carbonate may result in obstruction or radiographic misinterpretation ["Evaluation of chewing capacity should be encouraged before the prescription of lanthanum carbonate"].

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FIGURES

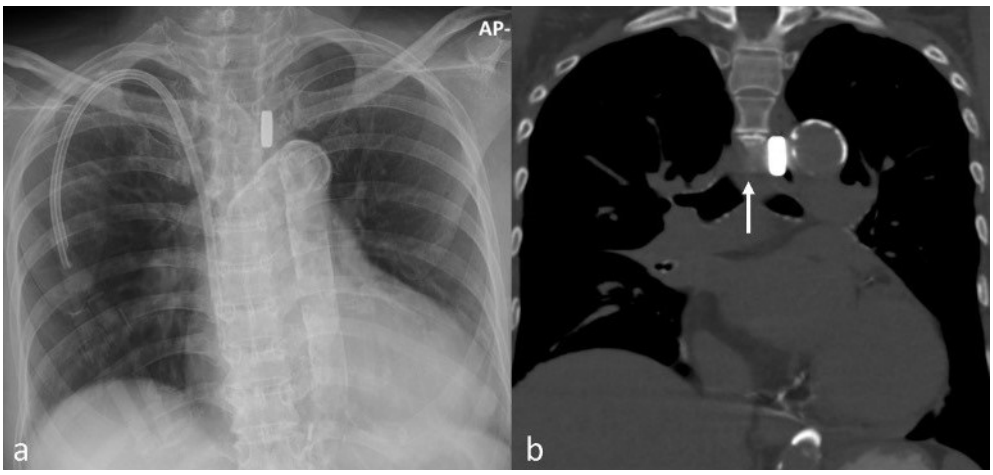

Figure 1: An intact lanthanum carbonate tablet detected on a chest radiograph.

(a) Frontal chest radiograph shows a homogeneous radiopaque coin-shaped foreign body at middle thoracic esophagus. (b) CT image with coronal multiplanar reconstruction shows high density, coin-shaped foreign body with beam-hardening artifact (arrow).

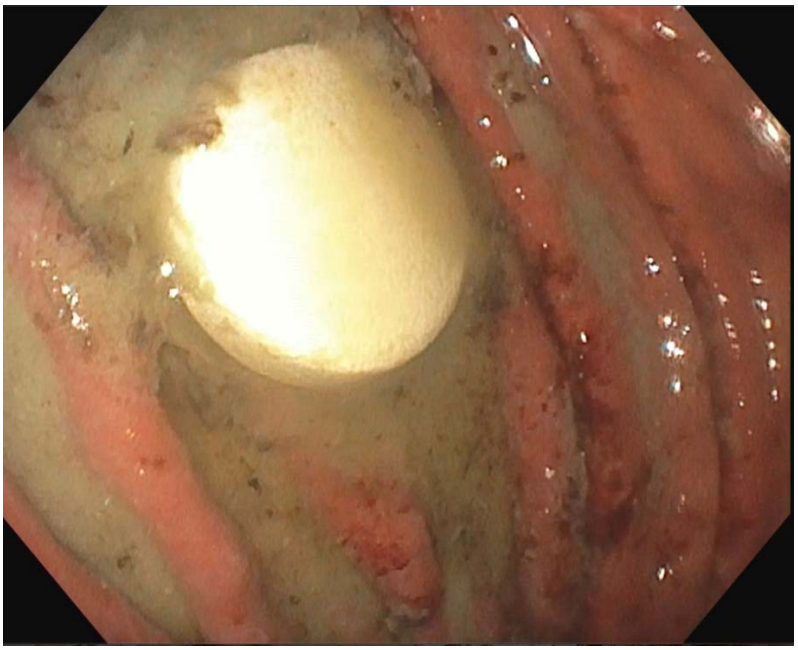

Figure 2: Endoscopic removal of an intact lanthanum carbonate tablet.

Endoscopic view of the body of the stomach. The foreign body was identified as a 2- centimeter tablet single round whitish tablet.

KEYWORDS

Lanthanum carbonate; Dialysis; Foreign body; Radio-opaque; Adverse event

ABBREVIATIONS

CT = Computerized Tomography
COVID-19 = Coronavirus Disease 2019
EGD = Esophago Gastro Duodenoscopy
HU = Hounsfield Units