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**Literature search results**

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**Search details**

When should a CXR be performed for suspected (metal) foreign body ingestion in children?

**Resources searched**

NICE Evidence; TRIP Database; Cochrane Library; AMED; CINAHL; EMBASE; MEDLINE; Google Scholar;

**Database search terms:**

(swallow* OR eat* OR ate OR ingest* OR consume*), (coin* OR metal* OR "foreign object" OR "foreign body") , (child* OR paediatric* OR pediatric* OR infant* OR baby OR babies OR toddler* OR "young person" OR "young people" OR adolescen* OR teenager*), (x-ray* OR "x ray" OR xray* OR radiograph* OR CXR OR imaging OR film* OR radiation), chest

**Evidence / Google Scholar search string(s):**

(child OR children OR baby OR babies OR infant OR infants OR paediatric OR pediatric) (swallow OR swallowing OR swallowed OR ingest OR ingestion OR ingested) (coin OR metal OR "foreign object" OR "foreign body")

**Guidelines and Policy**

Nothing found
Evidence Reviews

BestBETS
Management of Asymptomatic Children with a History of Coin Ingestion (watchful waiting), 2010
Best available evidence suggests that asymptomatic children with no previous oesophageal pathology, who present within 24 h of ingestion with a swallowed coin lodged in the oesophagus, can be safely managed conservatively for a period of up to 24 h.

Children with a history of coin ingestion should have oesophageal impaction ruled out radiologically, 2001
All children with a history of coin ingestion should have further investigation to exclude oesophageal impaction.

Published Research – Databases

Role of plain radiography in the assessment of ingested foreign bodies in the pediatric patients.
Author(s) Pinto, Antonio, Lanza, Cecilia, Pinto, Fabio, Grassi, Roberta, Romano, Luigia, Brunese, Luca, Giovagnoni, Andrea
Citation: Seminars in ultrasound, CT, and MR, Feb 2015, vol. 36, no. 1, p. 21-27 (February 2015)
Publication Date: February 2015
Abstract: Ingestion of various types of foreign bodies (FBs) such as coins, toy parts, jewelry pieces, needles and pins, fish and chicken bones, and button-type batteries is common among children. The curiosity of children and their need to investigate the world around them place them at a higher risk for ingestion of FBs. Fortunately, 80%-90% of ingested foreign objects that reach the stomach will pass uneventfully without intervention. The remainder may become blocked in the esophagus or other region of the alimentary tract, placing the pediatric patient at risk of significant complications such as aspiration, obstruction, bleeding, perforation, fistulization, sepsis, and death. The goals of the initial pediatric patient assessment are to identify the type of object ingested, its location in the gastrointestinal tract, and the presence of associated complications. Factors reported to increase the risk of complications included a sharp FB, a FB with a wide diameter, and symptoms. Plain radiographs still play an important role in the assessment of ingested FBs in the pediatric patient: plain films of the neck, chest, and abdomen are very useful in confirming the diagnosis of FB ingestion because most ingested FBs are radiopaque. Copyright © 2014 Elsevier Inc. All rights reserved.
Source: Medline

An ingested foreign body: two sides of the same coin?
Author(s) Varadharajan, Kiran, Magill, Jennifer, Patel, Kalpesh
Citation: BMJ case reports, Jan 2014, vol. 2014 (2014)
Publication Date: January 2014
Abstract: A 2-year-old child presented to the emergency department with an acute onset of dysphagia and stertor. A plain anteroposterior chest X-ray revealed a single circular opacity in the middle third of the oesophagus consistent with an ingested coin. The child was taken to the theatre for rigid pharyngo-oesophagoscopy and removal of the coin. After the first coin was removed subsequent endoscopic examination revealed a second coin at the same location. This extremely rare case of two ingested coins becoming impacted with perfect radiological alignment emphasises the importance of thorough examination on endoscopy and the potential limitations of an X-ray in initial assessment of an
Ingested Foreign Bodies: A Case Series Demonstrating a Novel Application of Point-Of-Care Ultrasonography in Children.

Author(s) Salmon, Margaret, Doniger, Stephanie J
Citation: Pediatric Emergency Care, 01 July 2013, vol./is. 29/7(870-873), 07495161
Publication Date: 01 July 2013
Abstract: In an era of recognizing the risks of radiation exposure, it is important to develop alternatives to radiographs. Bedside ultrasound has become an important adjunct to clinical diagnoses and procedural guidance in the emergency department. We present a case series of two patients who presented to a pediatric emergency department after witnessed coin ingestions. Point-of-care ultrasonography was able to accurately identify the location of each of the coins, at the thoracic inlet and in the stomach, as confirmed by chest radiography. To our knowledge, point-of-care ultrasonography has not been previously utilized to detect and localize esophageal foreign bodies in the emergency department.

Source: CINAHL

Role of imaging in the assessment of impacted foreign bodies in the hypopharynx and cervical esophagus.

Author(s) Pinto, Antonio, Muzj, Carlo, Gagliardi, Nicola, Pinto, Fabio, Setola, Francesca Rosa, Scaglione, Mariano, Romano, Luigia
Citation: Seminars in ultrasound, CT, and MR, Oct 2012, vol. 33, no. 5, p. 463-470 (October 2012)
Publication Date: October 2012
Abstract: Impaction of foreign bodies in the upper digestive tract is a serious pathologic condition in ear, nose, and throat practice and is particularly common in children, prisoners, and psychiatric patients. Commonly found objects include fish bones, chicken bones, pieces of glass, dental prostheses, coins, and needles. The goals of the initial patient assessment are to identify the type of object, its location in the gastrointestinal tract, the presence of any associated complications, and the presence of any underlying esophageal conditions. Radiographic evaluation is helpful to confirm the location of foreign bodies and associated complications. Plain films of the neck and chest commonly will show the location of radiopaque objects, such as coins. Both anteroposterior and lateral views are necessary, as some radiopaque objects overlying the vertebral column may only be visible on the lateral view. Multidetector row computed tomography is superior to plain radiographs for the detection of pharyngoesophageal foreign bodies and provide additional crucial information for the management of complicated cases especially related to sharp or pointed ingested foreign bodies. Copyright © 2012 Elsevier Inc. All rights reserved.
Source: Medline

Management and treatment of foreign bodies ingestion in childhood

Author(s) Melek M., Cobanoğlu U., Bilici S., Beger B., Kizilyildiz B.S., Melek Y.
Citation: Eastern Journal of Medicine, 2011, vol./is. 16/3(194-198), 1301-0883 (2011)
Publication Date: 2011
Abstract: Ingestion of foreign bodies (FBs) is a significant problem that causes morbidity and mortality in childhood. The aim of this retrospective study was to report our experience of foreign body ingestion in pediatric patients. The medical records of 165 patients who were hospitalized for foreign body (FB) ingestion in pediatric and chest surgery departments between 2005 and January 2010 were evaluated retrospectively. X-ray films and abdominal ultrasound scan were used
for the diagnostic approach of the patients. The common complaints were odynophagia-dysphagia (n=107), hypersalivation (n=81), cough (n=21), vomiting (n=20) and asymptomatic in 34 patients. Radiological examinations showed that FB was located in the esophagus in 81.2% (n=134) of the patients, in the stomach of 6.74% (n=11) patients, in the intestinal segments in 10.4% (n=17), in the rectum in 1.21% (n=2) and in the liver parenchyma 0.6% (n=1) patients. Endoscopic examination performed in 134 (81.2%), FB proceeded uneventfully in 23 (13.9%) in follow up period and 8 (4.8%) patients underwent surgery. The type of ingested FB varied widely. The coins (n=54, 32.7%) and pieces of plastic toys (n=29, 17.5%) were the most frequently ingested FBs. Foreign body ingestion is a major problem in childhood. Management depends on carefully and close follow up for complications and favorable treatment choice.

**Source:** EMBASE
Available in fulltext from Eastern Journal of Medicine at ProQuest
Available in fulltext from Eastern Journal of Medicine at Free Access Content

The utility of handheld metal detector in confirming metallic foreign body ingestion in the pediatric emergency department

**Author(s)** Saz E.U., Arikan C., Ozgenc F., Duyu M., Ozananar Y.

**Citation:** Turkish Journal of Gastroenterology, June 2010, vol./is. 21/2(135-139), 1300-4948 (June 2010)

**Publication Date:** June 2010

**Abstract:** Background/aims: We aimed to identify the presence of ingested metallic foreign bodies with handheld metal detector in the pediatric population.

Methods: All children (n=40) known or suspected to have ingested a MFB and who presented to the Emergency Department of the Children's Hospital of Ege University were prospectively ascertained. All patients underwent both radiographic evaluation and handheld metal detector scanning of the chest and abdomen on their presentation. In the present prospective study, we compared handheld metal detector scanning with plain radiography. Results: The end point of the study compared metallic foreign body findings with handheld metal detector vs radiological findings during an eight-month period. Forty subjects with possible metallic foreign body ingestion were enrolled into the study. The principle investigator scanned all subjects. Disease was defined by the presence of a foreign body in the gastrointestinal tract on radiograph. Radiographically, 35 foreign bodies were found, and handheld metal detector revealed 31 of them. The sensitivity of handheld metal detector was 88.6% (95% confidence interval [CI]: 72.1%-96.5%), specificity 100% (95% CI: 61.8%-100%), positive predictive value (PPV) 100% (95% CI: 85.8%-100%), and negative predictive value 55.5% (95% CI: 34.3%-84.6%). Handheld metal detector revealed that 2 metallic foreign bodies (1 pushpin, 1 coin) were localized to the chest, which was confirmed by radiography, and urgent removal was performed with endoscopy. Conclusions: Handheld metal detector scanning is an accurate, inexpensive, radiation-free screening tool and should be used for evaluation of patients suspected of ingesting metallic foreign bodies.

**Source:** EMBASE
Available in fulltext from Turkish Journal of Gastroenterology at Free Access Content

Evaluation of pediatric foreign body ingestion: Are nose-to-rectum radiographs routinely necessary?

**Author(s)** Costello B.E., DeGuzman M., Abdulrahman E., Alazraki A., Linzer J.

**Citation:** Academic Emergency Medicine, May 2010, vol./is. 17/(S127), 1069-6563 (May 2010)

**Publication Date:** May 2010

**Abstract:** Objective: To evaluate the sensitivity and negative predictive value (NPV) of an anteroposterior (AP) chest radiograph for detecting clinically significant
pediatric radiopaque foreign body (RFB) compared to a nose-to-rectum (NTR) series (lateral view of the face and neck and AP view of the chest and abdomen). Methods: Medical records of consecutive cases with NTR series completed for initial evaluation of suspected foreign body ingestion at a large, urban pediatric emergency department (ED) were retrospectively reviewed for the calendar years of 2007-08. Patients with radiographs obtained at outside facilities were excluded. Presence of RFB on individual films, presenting symptoms, types of object suspected, and clinical outcomes were recorded. RFB ingestions resulting in hospitalization, surgical intervention, and/or definitive outpatient follow-up (e.g., button batteries below the diaphragm) were deemed clinically significant. Results: Of 262 NTRs analyzed, 17.2% demonstrated a clinically significant RFB. Of these clinically significant NTRs, 48.9% were obtained for suspected coin ingestion. An AP chest radiograph was 100% sensitive for identifying clinically significant RFB in suspected coin ingestion (CI 87.3-100%) with an NPV of 100% (CI 95.9-100%). AP chest radiograph was 93.3% sensitive for all significant RFB (CI 82.9-98.3%) with an NPV of 98.6% (CI 98.3- 99.7%). Three clinically significant RFBs were not seen on AP chest radiograph. Two were symptomatic, non-coin ingestions retained in the hypopharynx, and one was a button battery in the intestine. Conclusions: A single AP chest radiograph appears to be a sensitive screening test with high NPV for clinically significant pediatric RFB ingestion, particularly in cases of suspected coin ingestion. While this test minimizes cost and patient radiation exposure, additional screening radiographs may be useful in identifying symptomatic non-coin RFB ingestions and concerning objects with known potential complications.

Source: EMBASE

Available in fulltext from Academic Emergency Medicine at Wiley
Available in fulltext from Academic Emergency Medicine at EBSCOhost

Child with esophageal coin and atypical radiograph.

Author(s) Raney, Laurence H, Losek, Joseph D
Citation: The Journal of emergency medicine, Jan 2008, vol. 34, no. 1, p. 63-66, 0736-4679 (January 2008)
Publication Date: January 2008
Abstract: Aspirated or swallowed coins are a common phenomenon resulting in a pediatric patient presenting to the Emergency Department. The location of the coin (trachea vs. esophagus) is commonly determined by the alignment of the coin on radiographic studies. We present a child who had an esophageal coin but radiographic findings that supported a coin located in the trachea. Our case illustrates the importance of performing radiographic studies that include both anteroposterior and lateral neck/chest views in patients who aspirate or swallow coins.
Source: Medline

The use of a hand-held metal detector for localisation of ingested metallic foreign bodies - a critical investigation.

Author(s) Schalamon, Johannes, Haxhija, Emir Q, Ainoedhofer, Herwig, Gössler, Alja, Schleef, Jürgen
Citation: European journal of pediatrics, Apr 2004, vol. 163, no. 4-5, p. 257-259, 0340-6199 (April 2004)
Publication Date: April 2004
Abstract: Ingested metallic foreign bodies (MFBs) are usually diagnosed by taking X-ray films of the neck, chest and/or abdomen. This study evaluates the use of a hand-held metal detector (HHMD) for the diagnosis and localisation of MFBs. In a prospective study, 53 consecutive paediatric patients with history of a swallowed MFB were examined with X-rays and HHMD. In 47 children, the MFB could be verified radiologically. Coins were most frequently swallowed. The HHMD could detect and locate all coins but only 47% of other MFBs. There were no false-positive results. A HHMD is an effective tool for screening the location of suspected
ingested coins. This method is easy, inexpensive and free of radiation. Very small MFBs cannot be reliably detected. If an innocuous metallic foreign body is clearly identified with a hand-held metal detector in the stomach or lower gastrointestinal tract of an asymptomatic child, additional radiological confirmation is not required.

**Source:** Medline

Available in fulltext from European Journal of Pediatrics at EBSCOhost
Available in fulltext from European Journal of Pediatrics at ProQuest

The use of a metal detector to locate ingested metallic foreign bodies in children.

**Author(s)** Tidey, B, Price, G J, Perez-Avilla, C A, Kenney, I J

**Citation:** Journal of accident & emergency medicine, Sep 1996, vol. 13, no. 5, p. 341-342, 1351-0622 (September 1996)

**Publication Date:** September 1996

**Abstract:** A pilot study to assess whether modern metal detectors can reduce unnecessary radiation in searching for ingested metallic foreign bodies. Over a one year period, 20 children presenting to an accident and emergency department with suspected metallic foreign body ingestion were studied. Using an Adams Electronics AD15 metal detector, the radiographer recorded the location of metallic foreign bodies on a pictorial representation of neck, chest, and abdomen. The child then had plain radiographs of abdomen, chest, and neck in sequential order until the foreign body was located. In seven cases neither metal detector nor radiography revealed a foreign body (true negatives). In the remaining 13 cases where metal detection was positive, subsequent radiography or faecal search was also positive (true positives). The 13 foreign bodies were coins (8), gold ring (1), ball bearing (1), screw (1), staple (1), and washer (1). All were in the stomach or proximal small bowel on radiography except for one coin in the right iliac fossa. The detector can demonstrate ingested metallic foreign bodies reliably in children, thereby reducing unnecessary irradiation.

**Source:** Medline

Available in fulltext from Journal of Accident & Emergency Medicine at EBSCOhost
Available in fulltext from Journal of Accident and Emergency Medicine at National Library of Medicine

Metal detectors: an alternative approach to the evaluation of coin ingestions in children?

**Author(s)** Ros, S P, Cetta, F

**Citation:** Pediatric emergency care, Jun 1992, vol. 8, no. 3, p. 134-136, 0749-5161 (June 1992)

**Publication Date:** June 1992

**Abstract:** Foreign body ingestions constitute a common problem in pediatric emergency medicine. Recent data indicate that, despite current recommendations, most children who ingest coins do not undergo radiologic evaluation. The purpose of this study was to determine the accuracy of a metal detector in locating coins in a model simulating coin ingestions in children. Initially, the distance between the anterior chest wall (ACW) and the esophagus was measured on 17 chest computed tomograms obtained on children between the ages of three months and six years. Subsequently, a distance equal to the mean ACW-to-gastroesophageal junction measurement was marked across the investigator's forearm. A second investigator then attempted to detect the presence of the coin through the forearm by using a Super Scanner (Garrett Security Systems, Inc, Garland, TX) metal detector. The study was conducted in a blinded manner and consisted of 50 attempts equally divided among pennies, nickels, dimes, quarters, and controls (no coin). The accuracy of the metal detector in identifying the presence or absence of coins in our model was 100%. We conclude that the metal detector evaluated by us is highly accurate in identifying coins through human tissues and that it should become a valuable and practical tool in the evaluation of children following a coin ingestion.
Rationalising the management of swallowed coins in children

Author(s) Stringer M.D., Capps S.N.J.
Citation: British Medical Journal, 1991, vol./is. 302/6788(1321-1322), 0959-8146 (1991)
Publication Date: 1991
Abstract: Objective: To assess the management of swallowed coins in children and identify aspects that could be improved. Design: Study of records of three hospital departments for 1986-90. Setting: Accident and emergency, radiology, and operating theatre departments in a children's hospital. Subjects: 50 children reported to have ingested coins. Main outcome measures: Radiological investigations performed, position of coin, symptoms of child, and surgical intervention. Results: 50 children were recorded to have swallowed coins during 1986-90. Five children had only chest radiography, five only abdominal radiography, and 40 had both. A coin was detected in the oesophagus in 15 children, six of whom had symptoms, and below the cardia in 26, none of whom had symptoms; no coin was seen in nine children. Eleven children had further abdominal radiographs despite the absence of gastrointestinal symptoms; one child had a coin removed from the stomach. Conclusions: Children are being unnecessarily exposed to radiation and surgical intervention, and a consensus on management of swallowed coins is needed. Most children require only a single chest and neck radiograph.

Source: EMBASE
Available in fulltext from BMJ: British Medical Journal at EBSCOhost
Available in fulltext from BMJ at Free Access Content
Available in print at Grantham Hospital Staff Library

Coin ingestion: does every child need a radiograph?

Author(s) Hodge, D, Tecklenburg, F, Fleisher, G
Citation: Annals of emergency medicine, May 1985, vol. 14, no. 5, p. 443-446, 0196-0644 (May 1985)
Publication Date: May 1985
Abstract: We studied 80 children who presented to the emergency department (ED) with a complaint of coin ingestion to determine whether radiographs are necessary in all situations and to determine which symptoms or signs are predictive of esophageal coins. Radiographs were considered positive if the coin was in the esophagus. Radiographs were positive in 25 (31%) of patients, of whom 11 (14%) had no symptoms or signs in the ED. Fifty-five (69%) of the 80 patients had subdiaphragmatic foreign bodies (44 [55%]), or no foreign bodies (11 [14%]) seen on films. Fourteen (18%) of the children required removal of the coin. Variables correlating with positive radiograph, in order of significance, included localization, choking at ingestion, drooling in the ED, vomiting, and chest pain (P less than .05). Symptom type was predictive of radiographic findings, and it may be predictive of need for removal. All 14 patients with symptoms or signs in the ED had positive films, as compared to 11 of 66 (16.6%) with no symptoms (chi square = 33.555; P less than .001). Although this relationship is significant, the finding of esophageal foreign body in 17% of patients with no symptoms leads us to recommend that all patients have a chest radiograph if coin ingestion is suspected.

Source: Medline

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