

## Original Article

# Metallic foreign body in esophagus: Are multiple radiographs necessary?

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### Abstract

**Background:** Multiple X-rays required for confirmation and localization of ingested metallic foreign body preoperatively predisposes children to increased radiation exposure. This study aims to highlight the current necessity or otherwise of these X-ray requests.

**Materials and Methods:** This is a retrospective study of patients with ingested metallic foreign bodies over a five-year period in a tertiary health institution. Case notes and X-ray requests were studied.

**Results:** Of 39 cases of foreign body in esophagus, 29 (74.4%) were metallic and the coin accounted for 79.3% of all metallic foreign bodies. There were 20 males to 9 females and 28 children aged 2 months to 11 years to one adult. There were 62 pre-extraction X-rays consisting of 29 (46.8%) initial confirmatory films and 33 (53.2%) repeat films for localization of the foreign body. There were 10 post-extraction films for postoperative complications.

**Conclusion:** More than half of the X-ray films were unnecessary and the radiation exposure was avoidable if alternative methods of localization of the foreign body such as the handheld metal detector were available.

**Keywords:** Metallic foreign bodies, esophagus, X-rays

### Résumé

**Arrière-plan:** Plusieurs radios requis pour la confirmation et localisation d'ingérés corps étranger métallique prédispose preoperatively des enfants à l'exposition de rayonnement accru. Cette étude vise à souligner la nécessité actuelle ou autrement de ces radioscopique demandes.

**Matériaux et de la méthode:** C'est une étude rétrospective des patients avec ingérés corps étrangers métalliques sur une période de cinq ans dans un établissement de santé tertiaires. Affaires des notes et des demandes de rayons x ont été étudiés.

**Résultats:** De 39 cas de corps étrangers dans l'oesophage, 29 (74,4%) étaient métallique, la médaille 79.3% de tous les corps étrangers métalliques. Il y avait 20 hommes à 9 femelles et 28 enfants âgés de 2 mois à 11 ans à un adulte. Il y avait des radiographies pre-extraction 62 consistant à 29 films confirmatives initiales (46,8%) et 33 (53,2%) répéter des films pour la localisation du corps étranger. Il y avait 10 films post-extraction de complications postopératoire.

**Conclusion:** Plus de la moitié des films x étaient inutile et l'exposition aux radiations était évitable si les méthodes alternatives de la localisation du corps étranger tels que le détecteur de métal poche étaient disponibles.

**Mots-clés:** Corps étrangers métalliques, oesophage, radiographies

### Introduction

Foreign body ingestion into the food passage is most commonly seen in children.<sup>[1-5]</sup> Coins and other metallic objects are reportedly the most common ingested foreign objects.<sup>[1-3,6]</sup> Plain cervical, chest

or abdominal X-rays are important in confirming the presence and position of these ingested metallic foreign bodies. Often the patient with ingested foreign body presents to an endoscopy unit hours, days or months later on referral from a peripheral health facility with plain cervical, chest or abdominal

X-rays that established the diagnosis and prompted the referral.

Despite the initial X-ray films confirming the diagnosis, further plain X-rays of the neck soft tissue, chest and abdomen may be obtained to confirm the position of the foreign body before operative extraction is attempted, thus exposing the patient to further doses of radiation. More X-ray requests may be required if initial attempts at extraction failed or postoperative complications occur.

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Radiation doses for diagnostic medical assessment are low and justified with estimated radiation doses from plain films of chest and abdomen placed at between 0.02 and 0.7 mSv.<sup>[7]</sup> Though this may seem low, it is prudent to avoid unnecessary exposure to radiation especially in children.

This study aims to highlight the current use of plain X-rays of the cervical soft tissue, chest and abdomen in the management of metallic foreign body ingestion and suggest possible ways of cutting down on the number of X-ray films obtained. This can reduce unnecessary exposure to radiation.

## Materials and Methods

This is a retrospective study of patients with metallic foreign body ingestion seen at the emergency department and ENT department of Aminu Kano Teaching Hospital, Kano over a five-year period (2001–2006). Case notes were retrieved and studied. Note was made of age, sex and type of ingested foreign body. The number of plain X-ray films of each patient relating to the ingestion incident was noted. Any failed attempt at extraction or any complications that necessitated further X-ray requests were noted. Data obtained was analyzed using simple descriptive method.

## Results

There were 39 cases of foreign body ingestion, 29 (74.4%) of which were metallic foreign bodies and only these were taken into account in this study. Coin was the most common metallic foreign body ingested (79.3%) [Table 1]. There were 20 males and 9 females (M2.2 : 1F). There were 28 children (96.6%) age ranged from 2 months to 11 years (mean 5.5 years) and one 38-year-old adult. Fifty five percent of cases were aged 5 years and below [Table 2].

There were 62 pre-extraction X-rays consisting of 21 X-rays of neck, chest and abdomen the patients

**Table 1: Types of metallic foreign body ingested**

Metallic foreign object	No. of cases (%)
Coins	23 (79.3)
Needle	2 (6.9)
Spring	1 (3.4)
Ring	1
Screw	1
Backcover of wristwatch	1
Total	29

**Table 2: Age distribution of patients seen with metallic foreign body ingestion**

Age (Years)	No. of cases (%)
Less than or equal to 5 years	16 (55.2)
5–10	11 (37.9)
>10	2 (6.9)

arrived with at emergency room or ENT clinic. A further 35 X-rays were carried out on request by either the emergency room doctor or the junior ENT resident doctor in the pre-extraction period. In three patients, extraction of the foreign body failed at initial esophagoscopy and further six films consisting of cervical, chest and abdominal X-rays were obtained to localize the foreign body, and in all the three cases, the foreign bodies were found to have passed into the stomach or further down the lower gastrointestinal tract.

There were 10 post-extraction X-rays consisting of six X-rays of four patients who had difficult extraction and esophageal perforation needed to be excluded. One patient who developed tracheo-esophageal fistula and chest infection postoperatively from a long standing retained coin had four X-ray films..

## Discussion

Metallic foreign bodies were the commonest foreign bodies ingested accounting for 74.4% of cases, and the coin accounted for 79.3% of all metallic foreign bodies in this study. The coin in most studies was the commonest foreign body ingested, accounting for between 56 and 83% of cases.<sup>[1-4,6]</sup>

Children below age 10 years with a mean of 5.5 years were predominantly affected in this study, this is similar to findings in Lagos and Amman.<sup>[1,4]</sup> Some other studies however recorded peak incidence of foreign body ingestion at between 1 and 4 years.<sup>[2,3]</sup>

On average, each patient in this study had between 2 and 3 X-rays taken on account of foreign body ingestion. In the pre-extraction period, when the initial films that confirmed the presence of the foreign body were excluded, all the subsequent films (53.2%) were ordered to ascertain the position

of the foreign body. These subsequent films were usually ordered by the emergency room doctors or the junior resident in ENT. These 33 X-ray films (53.2%) were potentially avoidable if alternative methods of localization were available.

Stringer and Capps reported that 50 children had a total of 90 X-rays of chest and abdomen taken on account of foreign body ingestion and that 11 of these children who showed no symptoms were subjected to further X-rays of the abdomen in an attempt to find the foreign bodies. They concluded that children were exposed to unnecessary X-rays.<sup>[8]</sup>

The number of pre-extraction X-rays and radiation exposure could be significantly reduced if a metal detector was used in localizing the position of the foreign body. The use of a metal detector is cheaper, complication-free and reusable as frequently as required.

Younger and Darrow reported that the handheld metal detector can accurately localize the position of a metallic foreign body.<sup>[9]</sup> In a review of prospective studies of the ability of the handheld metal detector to identify the presence or absence of ingested coin in children, Lee *et al.* found the overall sensitivity of the metal detector at detecting coins to be 99.4% and accuracy at localization was 99.8% and overall specificity was 100%.<sup>[10]</sup> Siekel *et al.* reported that even in the hands of the inexperienced, metal detectors were absolutely accurate in this localization.<sup>[11]</sup>

Handheld detectors therefore obviate the need for repeat X-rays frequently ordered to pinpoint the position of the metallic foreign body which from the findings in this study amounts to cutting down exposure to radiation by 53.2%. However, Schalamon *et al.* found that though handheld metal detector detected 100% of ingested coins in their study, it detected only 47% of other metallic foreign bodies and concluded that very small metallic foreign bodies cannot be reliably detected by the handheld metal detector.<sup>[12]</sup> It is therefore necessary to confirm using plain X-rays whenever a negative result is obtained with the handheld metal detector in the face of history of ingestion of small-sized metallic foreign body such as the pin.

Accident and emergency doctors and ENT residents should have at their disposal handheld metal detectors to ascertain the position of these foreign bodies at initial presentation especially when the patient already has X-rays from the referring center confirming the presence of the foreign body.

The use of metal detectors can also allow for

monitoring of the coin descent in event of trial of conservative management. During the period under study, no trial of conservative management was tried largely to avoid repeated exposure to radiation during monitoring. Several reports show that between 20 and 30% of coins will pass spontaneously especially among older children and when the coins are located at distal third of the oesophagus and recommended a 8–24 h observation period.<sup>[13,14]</sup> Trial of conservative management has the advantages of avoiding general anesthesia, reducing complications and cutting down cost.

Post-operative films after endoscopy for foreign body removal are justifiable to rule out possible esophageal perforation, pneumothorax and other chest complications; however, the use of the computed tomographic (CT) scan has been shown to be superior in diagnosis of these postoperative complications.<sup>[15]</sup>

## Conclusion

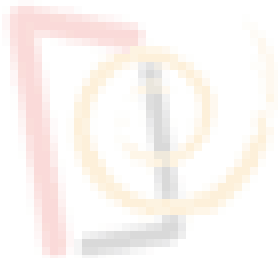
A significant percentage of X-ray requests for localization of ingested metallic foreign body are unnecessary and the associated radiation exposure avoidable. Handheld metal detectors should be made available in endoscopy units to avoid repeat X-rays.

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