‘Hunt the thimble’: a study of the radiology of ingested foreign bodies

A. E. BOOTHROYD,¹ H. M. L. CARTY² AND W. J. ROBSON³

Departments of ¹Paediatrics, ²Radiology and ³Accident and Emergency, Alder Hey Children’s Hospital, Liverpool, England

SUMMARY

The role of radiology in the management of patients with a history of ingested foreign bodies is reviewed in a retrospective study over a 2-year period in a Children’s Hospital. If radiography was confined to those children who have a clinical history suggestive of foreign body impaction in the oesophagus, a foreign body aspiration or having swallowed a button battery, the work load and unnecessary radiation arising from this practice could be halved. This study demonstrates another misuse of radiological services.

INTRODUCTION

Children attending accident and emergency (A & E) departments with a history of ingesting a foreign body are frequently referred for X-rays in order to locate the object. The aims of this retrospective study were to assess the incidence of these requests, the role of the investigation and the subsequent management of the patient.

METHOD

The records of patients who had attended with a history of foreign body ingestion during the years 1982 to 1984 were analysed. Details of their presenting systems, the nature of the object thought to have been ingested, the numbers and type of X-rays

Correspondence: Dr H. M. L. Carty, Consultant Radiologist, Department of Radiology, Alder Hey Children’s Hospital, Eaton Road, Liverpool L12 2AP, England

requested, the timing of the X-rays relative to the time of ingestion and the subsequent clinical management of the patient were recorded.

RESULTS

During the 2-year period, 453 patients were identified as having a history of an ingested foreign body. Three hundred and ninety children presented primarily to the A & E department. Sixty-three children were admitted to hospital, of whom 35 were patients transferred from other hospitals in the region. The age range of the patients was from 10 months to 15 years with a peak incidence in pre-school children (Fig. 1). The sex incidence was equal. A total of 278 (72%) children who presented to the A & E department were referred for X-ray. The stated indications for X-ray referral are shown in Table 1. One hundred and fifty-five of those X-rayed were completely asymptomatic. The discovery of a foreign body on X-ray did not alter their management. In no instance was a foreign body found in the chest.

The films initially requested were views of the neck, chest and abdomen. This necessitated one or two films depending on the size and cooperation of the child. Delayed films of the abdomen were taken in 35 children who had previously been X-rayed at presentation. These films were taken at widely varying intervals which ranged from 24 h to 3 weeks after the time of the initial X-rays. The delayed films were requested by the casualty officers for the monitoring of the progress of the object or

Fig. 1 Age distribution of children attending hospital with a history of an ingested foreign body.

Table 1 Reasons for radiography in 278 patients attending the A & E department

<i>Clinical symptoms/signs</i>	<i>No. of patients</i>
Asymptomatic: no reason given*	155
Choking/coughing	56
Abdominal pain	20
Dysphagia/retrosteral pain	20
Vomiting	11
Details of symptoms not recorded	12
Bleeding from mouth	4

* Symptoms of cough, cynosis, etc., specifically denied.
Information taken from records.

allay parental anxiety when the swallowed foreign body was not found in the stools. No impacted foreign body was demonstrated.

Table 2 lists the foreign bodies ingested. Ninety-four objects were clearly radiolucent, yet one-third of these children who ingested these objects were X-rayed and only 11 children had symptoms suggestive of aspiration. Symptoms which should suggest aspiration of a foreign body are: cyanosis, choking, gasping for breath, coughing and wheezing.

Table 2 Nature of foreign body in 453 patients

Coin	131	Unknown	4
Plastic toy	40	Hairgrip	3
Nail/screw	26	Cigarette filter	3
Fishbone	24	Tooth	3
Marble	23	Ring pin	2
Ballbearing	23	Washer	2
Pin/safety pin	23	Metal wire	2
Glass	18	Pencil lead	2
Ring	18	Toy wheel	1
Food	17	Crayon	1
Sweet	14	Match	1
Pen top	13	Key	1
Button	12	Clothes peg spring	1
Earring	10	Cockroach	1
'Mastermind' peg	6	Meccano	1
Christmas decoration	6	Toy bell	1
Bone	4	Iron ('Monopoly')	1
Battery	4	Whistle	1
Paper clip	4	Cufflink	1
Pebble	4	Razor blade	1

Table 3 Outcome in 453 patients who ingested a foreign body

Home without review	344
Review in A & E Department	30
Medical Outpatient Department	1
Surgical Outpatient Department	4
Admitted	63
Removal of foreign body in A & E Department (then review)	11

The foreign bodies removed in the A & E department were nine fish bones, one piece of curtain wire and a piece of glass. These were all in the oropharynx (Table 3).

Sixty-three patients were admitted to the wards. Twelve children were observed overnight—11 for abdominal pain and/or vomiting. One child was asymptomatic and was only kept in hospital as this child had been referred from another hospital in the region at quite a distance from Alder Hey. He was discharged the following morning.

The children admitted who subsequently required intervention for removal of the foreign body all had symptoms strongly suggestive of the site of obstruction (Table 4). Dysphagia, excessive salivation and/or retrosternal pain were associated with impaction in the oesophagus.

Table 4 Symptoms in patients requiring admission and intervention

<i>Operation</i>	<i>Symptoms</i>	<i>No. of patients</i>
Removal of fishbone from oropharynx	Pain in throat	4
Oesophagoscopy removal or disimpaction from oesophagus	Dysphagia, retrosternal pain, excess salivation	30
Bronchoscopy and removal	Cough and cyanosis	3
	Cough, wheeze, pyrexia	12

Fifteen children had impacted foreign bodies removed from the bronchus. Two cases presented acutely with a short history of coughing and cyanosis. The remaining 13 children gave a history of cough, wheeze and pyrexia days or weeks after the ingestion of a foreign body.

Children who were clinically at risk of impaction of a foreign body having had repair of a tracheo-oesophageal fistula accounted for 10 admissions in the 2 years studied. These admissions related to only three patients. Two of these had had colonic interpositions.

DISCUSSION

In the management of ingested foreign bodies, as in other areas of clinical medicine, it is difficult to change established practice, especially when the patient or parents request

investigation. This is particularly true of children who have ingested a foreign body where the parent will often not rest easy until he has had an X-ray to demonstrate that there is no problem.

The likelihood of impaction of an ingested foreign body seems to be over-estimated by both doctors and parents; this is probably because of case reports of complications in unusual cases appearing in medical journals or, indeed, in the popular press (Banks & Potsic, 1977). Accidental swallowing of sharp foreign bodies due to the loss of touch sensation occurs with wearing dentures and is a problem now confined to adult populations (Kiff & Hulton, 1983). This did not occur in this series. Children swallow sharp objects accidentally, even when they have normal sensations. Illingworth (1982), in her manual for the casualty officer, quotes that 10% of all objects found to be in the stomach do not subsequently pass into the duodenum. She, therefore, advocates that swallowed foreign bodies should not be treated lightly. This did not occur in this series in which only 5% of patients with primary attendance at this hospital subsequently required intervention for removal of a foreign body. In over half of the patients in whom oesophagoscopy was performed, the foreign body had already passed into the stomach and none was found. The true instance of complications following ingestion is, therefore, probably lower than the 5% quoted above, as parents are routinely advised that no treatment is required unless specific symptoms develop.

A history suggestive of aspiration must be taken seriously and correct investigation including either paired inspiration and expiration films or decubitus films is indicated (Gershel *et al.*, 1983; Capitano & Kirkpatrick, 1972). In this series, three children presented with a history of a cough, gagging and respiratory distress, and, therefore, did not present a diagnostic problem. The other 12 children gave no typical history, and this is probably explained by the fact that the aspirating episode was unwitnessed or is over so quickly that the problem was not appreciated. These children presented with classical symptoms of a chest infection which failed to respond to vigorous medical treatment with antibiotics and physiotherapy. In any child in whom consolidation fails to resolve in the expected manner, an aspirated foreign body should be suspected. The authors' experience is in keeping with previous reports emphasizing the lack of early clinical signs in this group (Pyman, 1971; Blazer *et al.*, 1980). There were four children in this series who had swallowed button batteries. The management of children who have swallowed button batteries has been the subject of many recent publications (David & Ferguson, 1986). Numerous complications have been reported, including oesophageal burns, perforation and mercury poisoning (Shabino & Feinberg, 1979; Langkau & Noesges, 1985; Barros & Barros, 1979). While serious complications can occur, they are rare and aggressive management is seldom required. A practical management protocol is fully discussed in the recent article by David & Ferguson (1986). Radiological monitoring is employed to assess impaction in the distal oesophagus and to detect any undue delay in passage through the remaining gastrointestinal tract.

If asymptomatic children were managed expectantly on the basis of a clinical history, 55% of the referrals for X-rays in our series could have been avoided. Non-opaque foreign bodies do not require X-ray unless there is a history suggestive of aspiration. Routine delayed films do not alter the clinical management of the child and should be avoided.

Information sheets available in A & E departments advising parents to return, should specific symptoms develop, would be useful. Asymptomatic children, who later develop signs of impaction, may still be detected.

Recently, there have been several publications reappraising the role of radiology in routine practices (Roberts *et al.*, 1983; de Lacey *et al.*, 1980a&b; Eyes & Evans, 1978).

The results of this study indicate that X-ray examinations for ingested foreign bodies are often misused. The introduction of the measures outlined above would approximately halve the workload arising from the ingestion of foreign bodies and would reduce unnecessary irradiation.

REFERENCES

- Banks W. & Potsic W. P. (1977) Elusive unsuspected foreign bodies in the tracheobronchial tree. *Clinical Paediatrics* **16**, 31–5.
- Barros D'Sa E. A. & Barros D'Sa A. A. B. (1979) Mercury battery ingestion. *British Medical Journal* **1**, 1218.
- Blazer S., Naveh Y. & Friedman A. (1980) Foreign body in the airway. *American Journal of Diseases of Children* **134**, 68–71.
- Capitanio M. A. & Kirkpatrick J. A. (1972) The lateral decubitus film: an aid to air-trapping in children. *Radiology* **103**, 460–2.
- David T. J. & Ferguson A. P. (1986) Management of children who have swallowed button batteries. *Archives of Diseases in Childhood* **61**, 321–2.
- de Lacey G. J., Guilding A., Wignall B., Reidy J. & Bradbrook S. (1980a) Mild head injuries: a source of excessive radiography? *Clinical Radiology* **31**, 457–62.
- de Lacey G. J., Wignall B. K., Bradbrook S., Reidy J., Hussein S. & Craven B. (1980b) Rationalising abdominal radiography in the Accident and Emergency Department. *Clinical Radiology* **31**, 453–5.
- Eyes B. & Evans A. F. (1978) Post-traumatic skull radiography: time for reappraisal. *Lancet* **ii**, 85–6.
- Gershel K., Goldman H. S., Stein R. E. K., Shelov S. & Ziarowski M. (1983) The usefulness of chest radiography in first asthma attacks. *New England Journal of Medicine* **309**, 336–9.
- Illingworth C. M. (1982). *The Diagnosis and Primary Care of Accidents and Emergencies in Children*, 2nd edition, pp. 33–4. Oxford, Blackwell Scientific Publications.
- Kiff E. S. & Hulton N. (1983) Small bowel perforation due to a Christmas cake decoration. *British Medical Journal* **27**, 1923–4.
- Langkau J. F. & Noesges R. A. (1985) Esophageal burns from battery ingestion. *American Journal of Emergency Medicine* **3**, 2265.
- Pyman C. (1971) Inhaled foreign bodies in childhood: a review of 230 cases. *The Medical Journal of Australia* **1**, 62–8.
- Roberts C. J., Ennis W. P., Fowkes F. G. R. & Mitchell M. (1983) Possible impact of audit on chest X-ray requests from surgical wards. *Lancet* **ii**, 446–7.
- Shabino C. L. & Feinberg A. N. (1979) Esophageal perforation secondary to alkaline battery ingestion. *Journal of the American College of Emergency Physicians* **3**, 360–2.

Received 10 July 1986; accepted 2 November 1986