

REVIEW

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Management of ingested foreign bodies in childhood and review of the literature

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Abstract The management of ingested foreign bodies in children is not standardised. During a 15-year period, we recorded 325 consecutive paediatric cases of accidental ingestion of foreign bodies or with symptoms suggesting oesophageal obstruction presented at the emergency department or the paediatric gastroenterology unit. The foreign bodies that had to be removed were, in decreasing order of frequency: coins, toy parts, jewels, batteries, sharp materials such as needles and pins, fish and chicken bones, and “large” amounts of food. Only 54% of the patients had transient symptoms at the moment of ingestion, such as retrosternal pain, cyanosis and dysphagia. A minority (28, 9%) of foreign bodies could be removed with a McGill forceps; 65 (20%) were removed with a magnet probe. Endoscopic removal was performed in 82 cases (25%). In the majority of cases (150, 46%) natural elimination occurred. The outcome of all patients was uneventful.

Conclusion Recommendations for management of children presenting with a history of suspected accidental ingestion of a foreign body for the community paediatrician are proposed.

Key words Dysphagia · Foreign body

Introduction

Accidental ingestion of a foreign body occurs frequently in children, and generally causes in little or no morbidity [9, 15, 24]. However, there are no clear guidelines regarding the management of ingested foreign bodies. Therefore, we reviewed the literature and our own experience between 1985 and 2000 on a series of 325 consecutive cases and propose recommendations for management for community paediatricians.

Patients and methods

All children, between birth and 15 years old, who presented between January 1985 and July 2000, either at the paediatric emergency unit or the paediatric gastro-enterology unit because of

symptoms suggesting oesophageal obstruction or because of a witnessed ingestion of a foreign body, have been reviewed. Children with psychomotor retardation are followed in the paediatric department beyond the age of 15 years. The management and outcome was recorded prospectively.

If endoscopy was performed, it was done under light sedation or general anaesthesia. Midazolam intrarectally (0.4 mg/kg) was used for the sedation; general anaesthesia was performed in the operating room by an anaesthetist. The decision for sedation or anaesthesia was determined by a combination of many factors, mainly by the severity of the symptoms, the age and anxiety of the patient, and the size and nature of the foreign body. In both situations, the patient was cardiopulmonary monitored before, during and after the procedure and discharge was only allowed after full recovery. Whether the anaesthesia and foreign body extraction was performed under optimal conditions (patient fasting, etc.) depended on the severity of the symptoms. Hospital stay was, in the majority of cases, limited to a few hours even in the case of general anaesthesia. Extraction by McGill forceps or by magnet probe was always performed under sedation. “Complication” was defined as any event with a negative impact on the subsequent course of the

patient and included aspiration, perforation, etc. In order to detect any complication following the ingestion, each patient was contacted by telephone about 2 weeks later.

Results

During a period of 15 years, 325 paediatric cases were seen in our hospital because of ingestion of a foreign body or symptoms of acute oesophageal obstruction. In the majority of cases, the foreign body ingestion was witnessed or strongly suspected by a bystander. Three cases, all coins, were discovered by coincidence, on a standard X-ray that was performed as part of a pre-operative routine work-up.

The median age of the children was 2.8 years (Table 1). Coins were by far the most frequently ingested foreign body (Table 2). Amongst the miscellaneous foreign bodies, one psychomotor retarded child managed to ingest a large plastic bag (the type used in supermarkets). Overall, 64% had swallowed a radio-opaque foreign body. Only 12 children had ingested more than one foreign body. Ten children were seen twice because of ingestion of a foreign body.

All children were presented within 36 h after the ingestion (median 3.8 h, range 0.15 h–36 h). Almost 50% of the patients were asymptomatic. Only 176 patients (54%) had transient symptoms immediately after the ingestion. In the patients in whom the ingestion was not witnessed (32/176, 18%), the sudden onset of symptoms (such as acute and severe coughing, pain, etc.) and the

circumstances of this sudden onset indicated a diagnosis of accidental ingestion. Symptoms were in almost all cases pain or discomfort in the pharyngeal or retrosternal region, excessive saliva production, nausea and vomiting, acute coughing and difficulties in breathing. In 28/325 patients (9%), the event was accompanied by more severe manifestations such as cyanosis or severe dysphagia.

In 28 (9%) patients, the foreign body was impacted in the oropharynx on presentation and could be extracted with a McGill forceps. All these children were symptomatic at presentation. Of the 28 patients, 22 (79%) had ingested fish or poultry bones. The rest were glass and one metal object. These foreign bodies were visible on physical examination of the oropharynx. Additionally, it should be mentioned that there were 17 children who became symptomatic whilst eating of fish or poultry, but with a negative inspection and no visualisation of a bone on X-ray. Because symptoms persisted in these children, endoscopy was performed and a (small) laceration of the pharyngeal or oesophageal mucosa could be observed in eight of them.

Endoscopic removal was performed in 25%. In 65 patients (20%), the foreign body was located in the oesophagus. According to the departmental attitude, each oesophageal foreign body should be removed from the oesophagus (preferably), extracted or pushed into the stomach. The timing of the extraction depends on the severity of the symptoms and the fasting state of the patient. In 21 patients, the foreign body was radiolucent, in five cases with a fish or chicken bone that had penetrated the oesophageal mucosa and 16 cases of impaction of a food bolus. Three of these children were psychomotor retarded and the other children had previously undergone surgery for oesophageal atresia and were known to have a residual oesophageal stenosis. Except for the sharp objects, all oesophageal foreign bodies were trapped at the level of the upper or lower oesophageal sphincter. Magnetic foreign bodies were removed with a magnet probe. Sedation and anaesthesia, or oesophageal introduction of the endoscope or magnet probe, caused relaxation of the sphincter in 50% of the patients, resulting in a spontaneous passage of the foreign body into the stomach. If the patient was under anaesthesia, the foreign body was removed. If the patient was only sedated, endoscopy was stopped and the management of gastric foreign bodies initiated. In 29 patients, the foreign body was magnetic and thus extraction was performed with the magnet probe. When the foreign body remained trapped in the oesophagus, extraction was successful in all cases.

The vast majority of the foreign bodies (196, 60%) were located in the stomach at the time of presentation. The recommended attitude is to "wait and observe" if the foreign body is in the stomach, except for long sharp objects such as needles and pins (>3–4 cm) and batteries. Extraction of batteries was attempted with a magnet probe, but failed in 4 out of the 36 patients. Also, all gastric needles and pins could be removed with the magnet probe except for two patients who had

Table 1 Age distribution (mean age 2.8 years, range 5 months to 18 years) of the 325 children, 58% boys and 42% girls, with foreign body ingestion

Age (years)	Patients (<i>n</i>)	Distribution (%)
0–1	36	11
1–2	64	20
2–3	78	24
3–4	55	17
4–5	27	8
5–6	29	9
6–7	12	4
7–8	10	3
8–10	6	2
10–18	8	2

Table 2 Nature and frequency of foreign bodies ingested

Foreign body	Number (<i>n</i>) and frequency (%)
Coins	89 (27%)
Sharp objects (needles, pins etc.)	51 (16%)
Batteries	43 (13%)
Toy parts	38 (12%)
Bones (fish, chicken)	38 (12%)
Large food bolus	37 (12%)
Jewellery	19 (6%)
Miscellaneous	10 (3%)
Total	325 (100%)

swallowed open safety pins. In these cases, endoscopic extraction under anaesthesia was performed. In case there was a gastric foreign body that was not extracted, we advised the parents to observe the stools for 2 weeks. If the foreign body had not been observed in the stools, which was the case in 123 children (62%), a control X-ray was performed. In about 66% of cases, the foreign body appeared to be eliminated spontaneously, although not detected by the parents. In about 33%, the foreign body was still present in the stomach in which case it was actively removed. In one case, where a child had swallowed a ring valued at over 2,000 US\$ in a jewellery shop, the ring was removed immediately!

Some 36 (11%) foreign bodies were already located in the small intestine at first presentation. All these, except three, were eliminated spontaneously. Three foreign bodies were very long sharp metal objects (screws > 5 cm in length) located in the duodenum at presentation. In order to avoid complications, they were endoscopically removed under anaesthesia.

Natural elimination occurred in 46% of the patients. No complication occurred during removal of the foreign body. The telephone survey 2 weeks after ingestion of the foreign body did not reveal any complication.

Discussion

Rapid diagnosis and treatment of foreign bodies trapped in the gastrointestinal tract will decrease morbidity and length of hospital stay [18]. We collected 325 paediatric cases of ingestion of foreign bodies or symptoms of acute oesophageal obstruction over a period of 15 years. Not many large series have been reported in literature: the series of Weissberg included 70 patients (children and adults) [28], Kim et al. [11] reported on 104 Korean paediatric cases, and Olives reported a series of 395 children [21]. The series reported by Olives [21] is in some aspects quite similar to ours (Table 3). The majority of children who ingest a foreign body are younger than 5 years of age [8, 16, 21]. No child in our series or in that of Olives [21] presented with perforation; in the

series reported by Weissberg, no less than 15 perforations occurred in 70 patients [28]. Differences and similarities between the reported series are likely to be related to patient selection [8].

Foreign bodies impacted in the oropharynx are usually sharp, give rise to symptoms, and may cause life threatening complications such as retropharyngeal abscess and perforation [3, 7, 13, 23]. Older patients with oropharyngeal foreign bodies are generally able to describe the location of the foreign body [13]. However, a foreign body was not discovered in all patients with symptoms suggesting the presence of such an oropharyngeal foreign body. In the series of Olives [21], 11% of the swallowed foreign bodies were not found in the gastrointestinal tract. An impacted food bolus in the oesophagus is frequently associated with a history of oesophageal atresia and persisting stenosis. Coins are relatively frequently trapped in the oesophagus, although the reported incidence varies from 5%–60%, mostly at the level of the upper or lower oesophageal sphincter [2, 5]. The child's case history does not help to understand the pathophysiological reason for this trapping. Sphincter manometry has not been performed in these patients. Since oral fluid intake makes the coins move easily into the stomach, a 5-day observation at home is advised [5]. Whether a radiological investigation (X-ray) is recommended in every child suspected of having swallowed a foreign body has long been a topic of controversy [10]. Since oesophageal trapping of a foreign body may remain asymptomatic and since chronic impaction may cause ulceration and necrosis of the mucosa, fluoroscopy or an X-ray is advised. Unnecessary exposure to radiation is less harmful than the consequence of chronic impaction. A simple X-ray or fluoroscopy (less irradiation than an X-ray) is much easier than using metal detectors [1, 22].

Gastric coins do not have to be extracted, since the majority of them will be eliminated spontaneously [5]. We reported that 66% of the parents failed to detect the elimination of the foreign body; this finding is in accordance with that of Macgregor and Ferguson who stated that almost 50% of the foreign bodies were not recovered in the stools [16]. Kim et al. [11] reported a spontaneous elimination of the foreign body in only 22% of cases, whereas we observed this phenomenon in 46% of our patients (46%). The transit time is variable and unpredictable [16]. The mean transit time in the series of children who presented at our emergency department was 3.8 days [8]. According to our experience, about 33% of the gastric coins are still in the stomach 2 weeks after ingestion. This is different to that reported in the literature. Administration of prokinetics has been reported in this indication [16]. Because gastric foreign bodies are frequently eliminated naturally, oesophageal bougienage pushing a foreign body from the oesophagus into the stomach has been recommended [4]. Whether oesophageal extraction or passage into the stomach should be attempted depends largely on the local possibilities and on the condition of the patient, fasting or not.

Table 3 Comparison between our data and the study reported by Olives [21]

	Present study	[21]
Number of patients (n)	325	395
Age distribution	5 Months – 18 years	2 Months – 18 years
Boys/girls	58/42%	60/40%
Radio-opaque foreign body	60%	64%
Asymptomatic	46%	20%
Dysphagia, retrosternal pain	54%	59%
Coins	Most frequent (27%)	Most frequent (40%)
Endoscopic removal	25%	85%
Success rate	99%	64%
Perforation	0	0

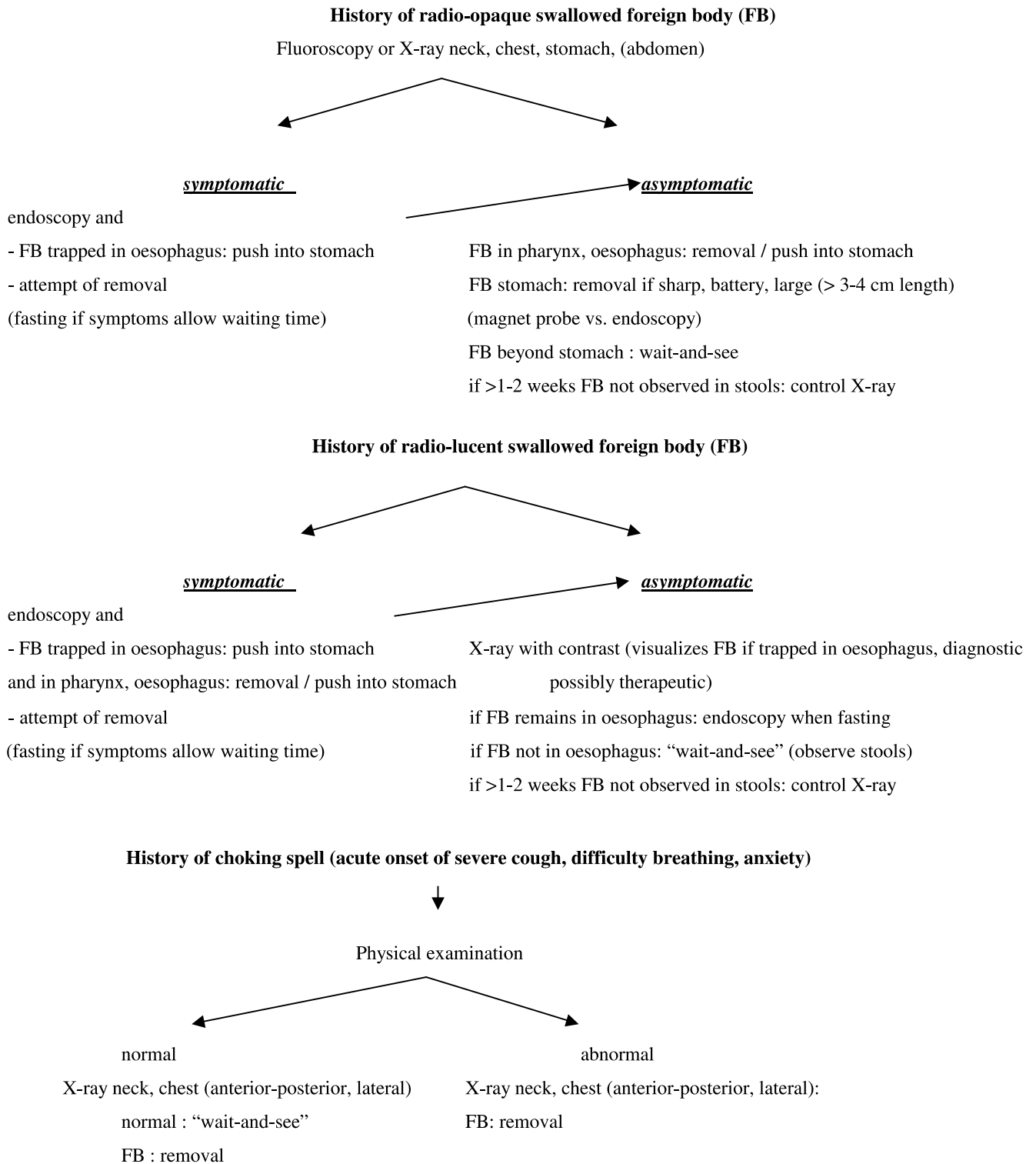


Fig. 1 Schematic recommendations for the investigation of a child who has possibly swallowed a foreign body or presents with symptoms of oesophageal obstruction. (FB foreign body)

Sharp objects and batteries should be removed whenever possible [27]. The incidence of endoscopic removal is as low as 25% in our series, but 77% and 85%

in other series [11, 21], and with a success rate of 99% in our study and that of Kim et al. [11], whereas Olives [21] reported a failure rate of 36%. Batteries contain corrosive substances and may cause necrosis of the mucosa in case of leakage [24, 25, 27]. As a consequence, according to some authors, batteries cause a dilemma between a “wait-and-see” attitude and an urgent laparoscopy [19].

Therefore, the development of a magnet probe is a useful tool, since it enables easy extraction under safe conditions [14, 17, 25, 26].

Foreign bodies only rarely cause jejunal, ileal or colic obstruction, although it has been reported to occur [6]. Obstruction of the appendix with a foreign body is extremely rare [12]. We recommend to extraction of "large" foreign bodies (longer than 3–4 cm) [21]. This attitude may have contributed to the fact we did not observe any case with obstruction.

Non radio-opaque foreign bodies represent a much more difficult diagnostic challenge. A negative radiological investigation does not rule out the presence of a foreign body in the gastrointestinal tract [18]. Indeed, non radio-opaque foreign bodies such as plastic bread-bag clips seem to be relatively frequently swallowed and may cause obstruction and perforation [20]. If a non radio-opaque foreign body is not observed in the stools after a period of 2 weeks, control investigations should be performed. We perform contrast X-ray to detect a gastric foreign body because we consider this less invasive than endoscopy.

In our opinion, it is justified to consider that only a minority of the accidental foreign body ingestions in children are witnessed by a bystander and, as a consequence, the majority of accidental ingestions remain asymptomatic. However, experience shows that oesophageal trapping may be asymptomatic and that a foreign body can remain in the stomach for several weeks. Severe complications such as obstruction or perforation have been reported therefore, management should be balanced, not neglecting the small risk for severe morbidity but also avoiding over-investigations. In Fig. 1, a practical attitude is proposed. These recommendations are limited to swallowed foreign bodies, and do not discuss foreign bodies in the respiratory tract.

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