CASE REPORT

Unusual presentation of a retained foreign body in a child

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SUMMARY

A 4-year-old boy, not known to have any medical illness, presented to several medical facilities reporting right upper quadrant and right flank pain, intermittent fever and chills for 3 months. A CT of the abdomen showed that a swallowed 'bobby pin' had pierced through the right kidney. This finding explained the boy's symptoms. The pin was removed by laparotomy without any subsequent complication. The patient had an uneventful postoperative recovery.

BACKGROUND

Although foreign body ingestion in children is a common problem, the foreign object usually passes harmlessly through the gastrointestinal tract. Complications of intestinal perforation are unusual unless the foreign body is either a sharp, thin object^{1 2} or a disc battery. However, there have been reported cases of ingested bobby pins with subsequent kidney injuries. The repeated incidence of urinary tract infection (UTI) symptoms for 3 months without evidence of peritonitis is an interesting presentation.

CASE PRESENTATION

A 4-year-old boy, not known to have any medical illness, reported right upper quadrant and right

flank pain of 3-months duration. He also had intermittent fever (38–40°C) and chills not concurrent with the pain.

Otherwise, he was normal, with no change in urination, no dysuria and normal-coloured urine. He had no history of vomiting or change in bowel habit, and he did not have jaundice.

His parents repeatedly sought medical advice; subsequently, a diagnosis of recurrent UTI was made elsewhere, based on a urinalysis, with minimal improvement on a full 10-day course of antibiotics. During assessment, an abdominal X-ray was carried out, and showed a foreign body that looked like a 'bobby pin' in the right upper

Figure 1 Erect abdominal X-ray showing two sharp, opaque pieces of a bobby pin located in the right upper quadrant.

Figure 2 Sagittal view of CT of the abdomen with IV contrast demonstrating the bobby pin (short arrow) traversing through the posterior wall of the duodenum (dotted arrows) invading the right kidney (part of series).

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quadrant. The patient disclosed that he had ingested a 'bobby pin' about 1 month before the onset of symptoms. The parents were reassured and told that it would pass spontaneously.

After 3 months of attending multiple medical facilities, for frequent attacks of documented UTI, the patient presented to our hospital. On initial assessment in the emergency department, the patient generally looked well and was not in pain or distress.

The patient's weight was 15 kg (25th centile) and height was 110 cm (95th centile) (WHO growth chart for boys 2–5 years of age).^{3 4}

His vital signs showed an axillary temperature of 36.6°C, pulse rate 119 bpm, respiratory rate 28 breaths/min, blood pressure 107/78 mm Hg and oxygen saturation at 98%.

Abdominal examination showed a soft, lax abdomen with mild tenderness in the right upper quadrant, with no guarding or rigidity. No organomegaly was detected.

INVESTIGATIONS

White cell count was $17.6 \times 10^9/L$, haemoglobin level was 9.6 g/dL and platelet count was $527 \times 10^9/L$. Renal function, electrolyte levels and routine preoperative work up were within normal

ranges. Unfortunately, no urinalysis or culture was obtained in our emergency department.

A plain abdominal X-ray showed two radiopaque foreign bodies in the right hypochondrium. Bowel gas distribution was normal and there was no evidence of pneumoperitoneum (figure 1).

A CT of the abdomen, with oral and intravenous contrast, was carried out and showed a foreign body traversing through the second part of the duodenum posteriorly and impaling the middle zone of the right renal parenchyma (full penetration) with an upward angle of 34° and 40°, laterally reaching the right posterior abdominal wall. No evidence of peritonitis, collection or injury to the collecting system or the vascular structures was noticed (figures 2–4).

No endoscopic intervention was needed in this case.

TREATMENT

After appropriate counselling and consent, the patient was taken for laparotomy. Laparotomy was performed through a supraumbilical transverse incision on the right side of the midline.

Figure 3 Sagittal view of CT of the abdomen with IV contrast demonstrating the bobby pin (short arrow) traversing through the right kidney (part of series).

Figure 4 Sagittal view of CT of the abdomen with IV contrast demonstrating the bobby pin (short arrow) reaching the posterior abdominal wall.(part of series).

Figure 5 An intraoperative photo showing the duodenum adherent to the right kidney. Fistula tract is on the rubber sling.

Medial rotation of the hepatic flexure and Kocherisation of the duodenum were performed. The posterior wall of the second part of the duodenum was attached to the middle zone of the

Figure 6 An intraoperative photo after separating the duodenum from the kidney; the two sharp rusted pieces can be seen migrating from the duodenum and deeply penetrating the right kidney.

Figure 7 The two pieces of the bobby pin (6 cm in length) with rusted and eroded tips.

right kidney with fibrous adhesions and no evidence of extra-luminal inflammation or collection (figure 5). The two rusted, sharp ends of the bobby pin made a pinpoint perforation in the duodenal wall posteriorly and went deep through the right kidney (figure 6).

The pieces were removed (figures 7 and 8) and primary closure of the opening site of the duodenum was carried out. No bleeding from the kidney or any other organ was noticed. The Gerota's fascia was closed. The abdomen was closed without drainage. The Foley's catheter, inserted at the start of the operation, was removed 3 days postoperatively.

OUTCOME AND FOLLOW-UP

The patient made an uneventful recovery and was discharged on day 7 after a negative urine culture. Outpatient visit at 1 month with phone follow-up at 2 months confirmed that the patient had fully recovered. No further urinary symptoms were reported.

Figure 8 An intraoperative photo showing the two sides (black spots on the duodenum and the right kidney) where the bobby pin had penetrated.

DISCUSSION

Most reported cases of foreign body ingestion occur in children younger than 3 years of age.¹ Coins and bones are the most commonly ingested foreign bodies in all age groups.⁵ Fortunately, spontaneous passage is the main outcome regarding most ingested objects, but, a high risk of perforation is associated with sharp, thin objects, ranging from 15% to 35%.^{1 2} Similarly, magnets and disc batteries carry an unusually high rate of complications.

If a sharp object is located in the oesophagus, stomach or proximal duodenum, urgent and careful endoscopic removal should be performed.^{6 7} However if the object has gone past the duodenum and the patient is asymptomatic, it only needs a surgical intervention if it fails to progress.⁸

Some unusual presentations and complications of ingested sharp foreign bodies have been published in the literature. For example, Nusratulloev *et al*⁹ described a case of an ingested toothpick migrating from the intestine to the kidney. A case of a young female woman who had swallowed a needle, subsequently found in the kidney, was reported by Frang *et al*.¹⁰ A 33-year-old man was diagnosed as having a copper wire embedded in his left kidney, described by Singh *et al*.¹¹ Ramaswamy and Picel¹² reported a case of a 90-year-old woman with a linear foreign body piercing the colon wall and entering the right ureter, causing hydronephrosis of the right kidney. Nigri *et al*¹³ described a deeply embedded toothpick in the duodenal wall with a peri-duodenal inflammatory reaction that encased the right ureter causing right hydronephrosis in a 36-year-old man.

As for an ingested bobby pin penetrating the duodenum and reaching the kidney, to our surprise, we found few case reports in the literature, dating back to 1938. We collected these cases in tabulated form (table 1).

Moreover, to have a duodenal perforation without signs of intra-abdominal abscess or peritonitis is really unique. Looking at the table 1, four of the cases did not have any ill effect on the kidney and none presented with peritonitis. This might be explained by the firm adherence of the duodenum to the kidney, preventing free peritoneal soiling.

Table 1 Reported cases of ingested bobby pins causing penetrating kidney injuries

Authors and year	Sex	Age (years)	Side involved	Result
Capon and Wells ¹⁴ —1938	Female	4	Right kidney	Nephrectomy Patient recovered
McEnery and Fox ¹⁵ —1946	Male	2	Right kidney	Extraction through duodenotomy Patient recovered
Mackby ¹⁶ —1948	Female	3	Right kidney	Extraction through duodenotomy Patient recovered
Macaulay and Moore ¹⁷ —1955	Male	3½	Right kidney	Extraction through duodenotomy Patient recovered
Mitnik <i>et al</i> ¹⁸ —1969	Male	2	Right kidney	Extraction through duodenotomy Patient recovered
Abe <i>et al</i> ¹⁹ —1984	female	12	Right kidney	Nephrectomy Patient recovered

Patient's perspective

(Translation of the father's perspective)

First, when my son started to complain, I and most of the doctors who saw him were not worried because he did not show any alarming symptoms. But once I was informed that my son had a 'bobby pin' stuck in his kidney and that he would need an operation, I started to blame myself for that delay in management. I appreciate for the great effort made by the surgical team in treating my little child. Finally, I promise myself to be more aware of my children's behaviour.

Learning points

- Unusual presentation (such as recurrent urinary tract infection in a child) should raise a hint regarding a possible unusual cause (such as foreign body ingestion).
- Some ingested non-sharp pointed objects may be rusted, making the eroded tips especially sharp, to the point of being capable of perforating the bowel.

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Contributors SMA performed the literature search and chart review, and wrote the main part of the manuscript. YAY performed the literature search, revision, correction and final editing of the manuscript and was responsible for the surgical management of the case. AS performed the literature search and initial revision of the manuscript and was responsible for the surgical management of the case.

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