Textile foreign body in a Green Iguana (Iguana iguana): Diagnostic imaging for localisation

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Summary

This case report includes different diagnostic imaging methods for localization of textile foreign bodies in reptiles and shows the limitations and advantages of these methods. A six-year-old, male, green iguana was presented to our clinic after ingesting a sock 5 days earlier. Ultrasound, contrast x-ray, computed tomography and endoscopy were used to locate the foreign body before surgery. Attempts to remove the sock endoscopically failed. The sock was surgically removed via celiotomy and enterotomy.

Keywords: reptiles, lizards, diagnostic imaging, foreign body, gastrointestinal tract

Introduction

This case report includes different diagnostic imaging methods for localization of textile foreign bodies in reptiles and their removal. Foreign bodies in gastrointestinal tracts are common findings in reptiles and cause different clinical signs due to their size, shape and material (Kik and Nickel, 2001; Büker et al., 2010). In pet reptiles given free reign of rooms or whole garden enclosures, foreign bodies are even more common. Ingestion of bedding material, especially sand, gravel and shavings, may cause gastrointestinal obstruction (Rahal et al., 1998). Obstructed animals may present with depression, anorexia and/or vomiting (Anderson, 1992; Wellehan and Happe, 1985). For an adequate interpretation of imaging knowledge about the gastrointestinal anatomy of the green iguana is required (Verson, 1980; Smith et al., 2001). Diagnostic imaging like x-ray, ultrasound, computed tomography (CT) and endoscopy should be combined to reliably diagnose the localization of the foreign body (Hernandez-Divers, 2001; Schumacher and Toal, 2001; Banzato, 2013). Contrast-enhanced study is a common non-invasive diagnostic technique that enables good visualisation of the gastrointestinal tract. Megluminamidotrizoat/Natriumamidotrizoat (Me/Na) (Gastrolux®, Sanochemia Pharmazeutika AG, 1090 Wien, Austria) is an appropriate contrast agent to gain a fast result of the location of obstructions in the gastrointestinal tract via x-ray or computed tomography (Meyer, 1998; Gumpenberger and Henninger, 2001; Long et al., 2010). Gastroscopy is another diagnostic option to locate and even remove foreign bodies still resting in the stomach (Lumeij and Happe, 1985). If removal via gastroscopy is not possible, the foreign bodies have to be removed via celiotomy (Mitchell and Diaz-Figueroa, 2005; Büker et al., 2010).
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History and clinical examination

A six-year-old, 5 kg, male, green iguana (Iguana iguana) was presented after ingesting a sock 5 days earlier. It was kept in a 2 x 2 x 2.3 meters wooden terrarium, containing branches, artificial plants and a large pool on a bed of wood chips. UV lighting was provided and humidity was maintained at 70%. The diet consisted of daily vegetables and occasional fruits. A calcium-vitamin product was provided daily. The iguana had free run in the room during a cleaning session. After the keeper left the room he missed a sock he used for cleaning, so the keeper assumed that the iguana ate the sock while he left the room. The day after suspected ingestion the iguana still accepted its usual food but in the following days it stopped eating completely. Three days later it started vomiting undigested food. Defecation was reduced and could not even be improved with repeated baths. In our clinic no abnormal findings were seen at examination.

Diagnostic imaging (pre surgical)

The laterally recumbent plain x-ray (Bird S/M 60 cm; 50 kV; 5 mAs. Gierth HF 400 A, Gierth X-Ray Int. GmbH, Riesa, Germany) showed a textured, well-filled gastrointestinal tract and a roundish, pleated structure could be differentiated in the middle of the coelomic cavity. Due to the fact that the stomach of the green iguana is located nearly in the middle of the coelom it was not yet clear, whether there was a portion of the ingested foreign body still in the stomach or if it had completely passed to the proximal parts of the intestine. Via ultrasound, a clear view of the suspected foreign body was not possible.

The iguana was hospitalized and a contrast-enhanced x-ray study was started by administering Me/Na (Gastrolux®, Sanochemia Pharmazeutika AG, Wien, Austria) suspension (2 ml/kg, PO). After oral administration the first x-ray was taken immediately, and then repeated after 30 min, 1.5 h and 3.5 h. The contrast agent entered the u-shaped stomach and then passed distally. After 1.5 h and 3.5 h there were still some remains of Me/Na (Gastrolux®, Sanochemia Pharmazeutika AG, Wien, Austria) in the stomach but most of it had accumulated in the right ventral position proximal to and within the textile foreign body (Fig. 1A, B).

Therapy

While the green iguana stayed in our clinic, we started an antibiotic therapy with enrofloxacin (Baytril®, Bayer Vital GmbH, Leverkusen, Germany) (10 mg/kg, SC, q 24 h, 21 days) and carprofen (Rimadyl®, Pfizer, Berlin, Germany) (4 mg/kg, SC, once preoperative, then q 24 h, 5 days after surgery). We also administered a 2.5% glucose infusion (20 ml/kg, SC, q 24 h) in order to stabilise the circulatory system. A blood sample was taken from the vena coccygea ventralis to determine the suitability for anesthesia and whether blood values had already altered. Blood chemistry showed no significant abnormalities (Tab. 1) (Hitachi, cobas C311, F. Hoffmann-La Roche AG, Basel, Switzerland). Me/Na (Gastrolux®, Sanochemia Pharmazeutika AG, Wien, Austria) was orally administered 24 hours before general anesthesia was performed. Anesthesia was induced with intramuscular injection of diazepam (Lipuro®, B. Braun Melsungen AG, Melsungen, Germany) (1 mg/kg, IM) and ketaminhydrochloride (Ketamin®, B. cp-pharma, Burgdorf, Germany) (5 mg/kg, IM) into the forelimbs, followed by exposure to isoflurane (Isofluran-cp®, cp-pharma, Burg-
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Surgical procedure and further diagnostic imaging

Contrast CT (Slice Thickness: 0.72 mm; kV: 120; 781 mAs; Philips Brilliance 64, Philips GmbH, Hamburg, Germany) revealed that the foreign body could be present in the proximal small intestine (Fig. 2A, B; 3A-C) without being able to exclude a portion of it being reachable in the stomach. Therefore while already preparing everything for a celiotomy a trial was made to remove the foreign body via flexible endoscope but it failed. The flexible endoscope (GIFN180 Bronchoscope, length: 1100 mm, working channel diameter: 2 mm, whole bronchoscope: 4.9 mm; Olympus Germany GmbH, 20097 Hamburg, Germany) was inserted through the iguana’s mouth with a 10 ml syringe to protect the endoscope from the iguana’s teeth. After carefully passing the oesophagus and reaching the stomach no sign of the foreign body or ingesta could be visualised and it was impossible to follow the duodenal flexure beyond the stomach. Thus celiotomy was performed using the same anaesthesia. An enterotomy with a right side paramedian approach was performed using a 13 cm longitudinal incision of the skin followed by the muscle of the body wall. The dilated, dark red intestine was then placed outside the coelomic cavity. The intestine was opened by another 8 cm longitudinal incision directly over the textile foreign body and it was removed with difficulty due to its huge mass, suggesting that a further physiological passage was not to be expected. The intestine was closed in two layers using a simple continuous pattern with a synthetic absorbable material on a fineatraumatic needle (Serafit® EP1, HR-12, Serag-Wiessner, Naila, Germany). Closure of the celiotomy was accomplished using a nonabsorbable material with a sharp needle by an interrupted horizontal mattress pattern (Vicryl® Plus 4-0 GEFL FS-2, Johnson

**Table 1:** Preoperative blood values of the iguana and reference values (Harr et al., 2001).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Measured values</th>
<th>Reference values</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT</td>
<td>4 U/l</td>
<td>32 (±21) U/l</td>
</tr>
<tr>
<td>GLDH</td>
<td>0.60 U/l</td>
<td>–</td>
</tr>
<tr>
<td>ALP</td>
<td>19 U/l</td>
<td>39 (±19) U/l</td>
</tr>
<tr>
<td>AST</td>
<td>10 U/l</td>
<td>33 (±14) U/l</td>
</tr>
<tr>
<td>CHE</td>
<td>3,238 U/l</td>
<td>–</td>
</tr>
<tr>
<td>CK</td>
<td>632 U/l</td>
<td>–</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>0.20 mg/dl</td>
<td>0.8 (±0.4) g/dl</td>
</tr>
<tr>
<td>HST</td>
<td>2 mg/dl</td>
<td>–</td>
</tr>
<tr>
<td>URIC</td>
<td>3.64 mg/dl</td>
<td>2.7 (±1.8) mg/dl</td>
</tr>
<tr>
<td>GLUC</td>
<td>201 mg/dl</td>
<td>166 (±45) mg/dl</td>
</tr>
<tr>
<td>FRUC</td>
<td>380 μmol/dl</td>
<td>–</td>
</tr>
<tr>
<td>TP</td>
<td>6.12 g/dl</td>
<td>5.4 (±0.9) g/dl</td>
</tr>
<tr>
<td>ALB</td>
<td>2.49 g/dl</td>
<td>2 (±0.5) g/dl</td>
</tr>
<tr>
<td>Sodium</td>
<td>159.50 mmol/l</td>
<td>157 (±3.7) mEq/l</td>
</tr>
<tr>
<td>Potassium</td>
<td>4.01 mEq/l</td>
<td>4 (±0.9) mEq/l</td>
</tr>
<tr>
<td>TCA</td>
<td>12.04 mmol/l</td>
<td>11.3 (±1.2) mg/dl</td>
</tr>
<tr>
<td>PO4-</td>
<td>1.80 mmol/l</td>
<td>5.3 (±1.2) g/dl</td>
</tr>
</tbody>
</table>

**Figures 2:** Dorsoventral (A) and lateral (B) Multiplanar Reformation of the iguana highlighting the contrast agent in the textile foreign body in right ventral position 24 hours after administration of Megluminamidotrizoat/Natriumamidotrizoat®.
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& Johnson Medical GmbH, Ethicon Deutschland, Norderstedt, Germany). After the surgery another x-ray in lateral recumbency was performed to prove the absence of the contrast enhanced structure seen on the pre-operative radiographs. Recovery was uneventful and post-operative therapy including infusion, antibiotics and analgesics was continued. Sucralfate (Ulcogant®, Merck, Darmstadt, Germany) (1 ml/kg, PO, q 24 h, 10 days) was administered to protect the gastrointestinal tract mucosa. The patient recovered well at home and the owner started feeding carrot mash four days after surgery. Feeding dose was increased and chopped salad was added. Two weeks after surgery ingestion and defecation returned to normal.

At the time of the recent telephone call approximately one year after surgery the iguana was doing well.

Discussion

The uptake of foreign bodies in reptiles is common, especially in green iguanas (Anderson, 1992). Our case shows the importance of localizing it for further procedures with the help of several diagnostic imaging methods (Silverman and Janssen, 2006). The size of the sock, and consequently, the fact that we did not expect it to totally pass the iguana’s stomach by physiological peristalsis alone was a motivation for the attempt to locate and remove the foreign body via gastroscopy (Lumeij and Happe, 1985; Kik and Nickel, 2001). Judging the actual situation of the mucosa endoscopically and following the gastrointestinal tract out of the pylorus was unproblematic. However, as the pylorus is connected to the duodenum bulb followed by a 180° flexure distal to the liver as reported in the literature, it was impossible to pass through with the endoscope (Smith et al., 2001). Therefore, we had to abandon this attempt as there was no part of a sock left in the iguana’s stomach that could be reached and carefully removed. As contrast agents can often accumulate in or proximal to foreign bodies, it is useful to carry out a contrast agent imaging study to locate a foreign body before removal. For that either Me/Na (Gastrolux®, Sanochemia Pharmazeutika AG, Wien, Austria) or a barium suspension can be applied (Long et al., 2010). An earlier study listing the times for barium to pass through the different divisions of the gastrointestinal tract of the green iguana shows a median transit time of 8 h for the stomach, 4 h for the small intestine, and 15 h for the large colon. Normal gastrointestinal passage of herbal food of a green iguana takes 2 to 3 weeks (van Marken Lichtenbelt, 1992; Smith et al., 2001; Silverman and Janssen, 2006). In our case we used Me/Na since we could not exclude a perforation of the gastrointestinal tract. Also, Me/Na has a shorter passing time than barium (Long et al., 2010). In contrast to previously reported small intestinal transit times, it is understandable that a large part of the sock was found inside the small intestine five days after ingestion because the foreign body’s size and structure lead to longer transit and emptying times than herbal food (Smith et al., 2001). If the size of the foreign body is compared to the intestinal lumen it is unlikely that a large sock would pass through the whole small intestine at all. Our contrast agent x-ray study showed a spreading of the Me/Na after 30 minutes but an accumulation after 3½ h. We assumed that it accumulated proximal to and within the textile fibre of the sock after its entrance within the small intestine.

Figures 3: Sagittal (A), transversal (B) and dorsal (C) CT images of the iguana highlighting the contrast agent in the textile foreign body within the small intestine 24 hours after administration of Megluminamidotrizoat/Natriumamidotrizoat.

One can see that there is only poor contrast agent resting within the stomach that increases after the duodenal flexure – the position of the textile foreign body. It cannot be excluded that there is still a portion of it reachable in the stomach via gastroscope.
24 hours proved that at least a large part of the sock was no longer in the stomach but not yet in the large colon, both of which could be differentiated with the computed tomography. It did not show if there was a portion of the sock still available for gastrointestinal removal in the stomach so a trial was made before more invasive surgery. But as it was not, celiotomy had to be performed. In order to expedite removal of the foreign body it can be necessary to prepare for a potential surgery if the foreign body is not surely located in the stomach and cannot be removed via gastroscopy. Blood values were examined prior to anesthetizing the patient in order to determine the suitability for anesthesia and see whether the iguana had any liver or renal dysfunction (Harr et al., 2001). This case shows the combination of diagnostic imaging methods in case of foreign body location and treatment in lizards.

References


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