



Ingestion of a Rubber Glove: A Case Report on Pica-Syndrome

Winterland S¹, Schmidt J¹, Nordhoff D¹, Barthlen W², Hamelmann E¹ and Gaus S^{3*}

¹Department of Pediatrics, Children's Center Bethel, Bielefeld University, University Hospital OWL, Germany

²Department of Pediatric Surgery and Urology, Children's Center Bethel, Bielefeld University, University Hospital OWL, Germany

³Department of Pediatric Emergency, Children's Center Bethel, Bielefeld University, University Hospital OWL, Germany

Abstract

Background: Pica-syndrome describes the developmentally inappropriate ingestion of inorganic or non-nutritive substances. While the etiology remains unclear and a cure is in most cases not achievable, treatment of the numerous possible complications remains a pivotal point in the care of affected patients.

Case Report: We present a case of an autistic teenager with a formerly not known Pica-syndrome, who after ingesting several rubber gloves suffered severe complications due to the curing of the rubber gloves in the intestinal system. Successful removal of the gloves was performed at two different times *via* endoscopy and *via* laparotomy. Fortunately, the patient suffered no long-term consequences.

Conclusion: The ingestion of rubber gloves should be considered a dangerous complication of Pica-syndrome as the material hardens and can form bezoars. In most cases surgical removal of the ingested rubber gloves remains the best course of treatment due to the limited risk of further damage. If an endoscopic removal is the treatment of choice the physician in charge should carefully assess the ingested material and weigh the risk of an endoscopic removal against other surgical options. In these cases, endoscopy still remains a useful diagnostic tool.

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*Correspondence:

Sebastian Gaus, Department of Pediatric Emergency, Children's Center Bethel, Bielefeld University, University Hospital OWL, Grenzweg 10, 33617 Bielefeld, Germany

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Keywords: Pica-syndrome; Rubber glove; Ingestion; Complication

Abbreviations

ABA: Applied Behavioral Analysis Therapy; SSRI: Selective Serotonin Reuptake Inhibitor; i.v.: an apparatus used to administer a fluid (as of medication, blood, or nutrients) intravenously

Background

Pica, also known as allotriophagia, derives from the Latin word Pica, meaning magpie, and was first reported by Hippocrates in the 4th century BC, describing the eating of inorganic or non-nutritive substances [1,4]. As ingesting inorganic substances is considered developmentally appropriate up to the age of 18 months according to Freud's psychoanalytic oral stage, Pica disorder can only be diagnosed as such in older children and adults [1,6]. Whilst the etiology remains unclear to this day, Pica disorder has been linked to various other illnesses and disorders as well as pregnancy [1-3]. Comorbidities have been found with major psychological disorders such as psychosis, obsessive-compulsive disorder as well developmental and neurodegenerative disorders, and nutrient deficiencies [1,3]. In childhood, autism spectrum disorders and intellectual or developmental disabilities are often reported comorbidities for Pica [1,3].

The ingested substances vary on a case-to-case base. To accurately describe these different subtypes, several descriptive terms have been coined, such as acuphagia, the ingestion of sharp objects, coprophagia, eating feces, or more commonly trichophagia, which describes the ingestion of wool or hair [1,6].

The effects on the affected individual's body are dangerous and potentially lethal as complications include bowel obstructions, lead poisoning, perforation and bezoars [1]. Other complications are for example dental erosions and iron deficiency [1].

For many of the above-mentioned complications the treatment of choice is surgical in nature. However, the treatment of the underlying diagnosis of Pica has to be considered separately. In cases where a nutrient deficiency has been reported, Pica can sometimes be cured by treating the deficiency [6]. However, there are also cases where on discontinuation of treatment for the nutrient deficiency, Pica has reoccurred and a causal relationship between nutrient deficiencies and Pica thus seemed unlikely [1,2]. Other treatment options include Applied Behavioral Analysis therapy (ABA) [1] or preventative measures taken by parents or caregivers [3]. Pharmacological trials with Selective Serotonin Reuptake Inhibitors (SSRIs) such as sertraline have shown variable results [1,5].

Case Presentation

We present the case of a 16-year-old male patient with autism spectrum disorder. As a Ukrainian refugee, the patient only understands Russian but is non-verbal and resides in a facility for refugees with disabilities. He had been living in Germany for the last six months at the time of admission to our hospital. No regular or current medication was reported.

In January 2023, the patient presented to our emergency department at around 1 pm accompanied by a caretaker. For the last two and a half days, he had been vomiting bilious. Pica syndrome was suspected, as the patient also regurgitated pieces of string and undefined small plastic objects. The last meal consisting of a few pieces of chocolate at around 9:30 am had not been tolerated as he immediately vomited. The intake of liquids had not been affected. The patient had no known allergies and underwent no prior surgeries. Prior Pica related incidents have not been reported.

On admission, the patient was in a reduced general but good nutritional condition. The physical examination showed no reportable abnormalities. Especially the abdominal examination produced no finding: on manual palpation the abdomen was soft, the auscultation revealed regular peristalsis over all four quadrants.

Because of the personal history of regurgitating foreign objects, the ingestion of non-edible objects was most likely the cause of the patient's current symptoms. A diagnostic esophagogastroduodenoscopy was performed to confirm the diagnosis and to simultaneously remove any such object. During the procedure, a foreign object was observed in the transition from gastric fundus to corpus, which on first sight appeared to be a piece of plastic. On further observation, a disfigured medical or rubber glove used in the intrahospital setting was identified. Hereafter removal of the glove by endoscopic grasping forceps was attempted. The glove was successfully transported from the stomach to the esophagus, but further removal proved



Figure 1: Rubber glove removed from the patient's stomach directly after removal.



Figure 2: Rubber glove removed from the patient's stomach carefully pulled apart with medical tweezers.



Figure 3: Bezoar removed from the patient's intestines containing at least one rubber glove.

challenging as passage over the cricopharyngeal constriction was not possible without excessive force, as the material seemed to have hardened and showed a plaster-like consistency. Because of the complicated situation for removal, the decision was made to intubate the patient to secure the airway. Afterwards muscle relaxation *via* rocuronium (0.9 mg/kg) was administered to reduce the muscle tone of the striated muscle. A careful dislodgement of the cured glove to the esophagus entrance was carried out, so that it became visible via the laryngoscope, while the airway was splinted by an endotracheal tube. Hereafter the glove was successfully removed with the aid of a Magill's forceps. A final examination of the stomach and duodenum was performed. Superficial mucosal erosions were discovered in the proximal stomach. We found no ulceration or further damage. The patient received 2 mg/kg pantoprazole intravenously and was discharged in good general condition on the same day after several hours of surveillance.

After removal we tried to open up the disfigured glove, to prove that it was completely removed. By carefully pulling the structure apart with medical tweezers, the original form could be surmised (Figure 1, 2). No pieces were missing. The gloves consistency remained cured and formed hard, almost sharp edges.

Two days later, the patient was readmitted to our emergency department. He presented with vomiting and abdominal pain which occurred anew after the initial discharge following the removal of the rubber glove. Neither food nor liquid intake was tolerated at this point and his general condition continued to worsen. A *de novo* ingestion of foreign objects was unlikely based on the patient's history as he had been observed one-to-one since his hospital release two days

prior. The physical examination revealed reduced or sparse bowel sounds suggesting an ileus. An ultrasound as well as an X-ray of the abdomen were performed, revealing radiological signs of an ileus of the small bowels. The ultrasound additionally showed a foreign object in the right abdomen not visible on the X-ray. As the X-ray showed a considerable amount of stool in the colon, a laxative enema, intravenous fluids and analgesics were administered. Hereafter the vomiting ceased and the pain got significantly better, therefore no further diagnostics were performed at this time and we continued to monitor the patient closely.

The next day (3 days after the initial visit) the vomiting restarted. During this time period the patient was fasting; he received sufficient fluid replacement *via* i.v. Another ultrasound was performed, showing no considerable change.

On the following day (4 days after the initial visit), the patient complained of increasing abdominal pain. We performed a CT scan, revealing a foreign object measuring 4.1 cm × 2.8 cm × 5.4 cm partially filled with air in the upper left abdomen, blocking the intestinal passage presumably at the jejunum. A diagnostic laparoscopy was performed revealing an unidentifiable foreign object. Because of the size of the foreign object, the incision of the skin in the upper left abdomen had to be widened 8 cm on both sides to perform a mini-laparotomy. Removal of a bezoar later identified as at least one rubber glove was accomplished. The exact number of gloves ingested could not be determined as the bezoar was completely cured and formed hard edges. During the curing of the material, air was trapped inside the gloves, most likely further expanding the size of the bezoar and impeding the removal.

The patient received weight-adapted perioperative antibiotic therapy with ceftriaxone and metronidazole over five days. A step-by-step return to a normal diet was well tolerated and the patient was released in good general condition ten days post-op.

In the following month, our patient was admitted two more times to our emergency department took place. Neither one required surgical intervention. The first of these admissions was due to the observed ingestion of a flower made of cloth. As the patient was asymptomatic, no further action was required. The second admission was due to regurgitation of several woolen strings as well as a refusal to eat. An X-ray was performed showing no sign of an ileus. The patient was given fluids intravenously and an abstinence of food was prescribed. Since the patient's general condition improved significantly under these measures, no endoscopy was performed and the patient was released 2 days later.

Discussion and Conclusions

Pica is a well reported although not well understood disease that has been documented for centuries. Different ingested substances require different treatment approaches and complications vary. Yet the change of consistency of the ingested rubber gloves, that cured when exposed to the intestinal system, is remarkable and in our opinion worthy of communication. The soft and pliable rubber gloves hardened and formed bezoars, making the removal a lot more difficult than expected and increasing the possibility of complications.

It is known that the low pH of gastric acid has effects not only on ingested food, but also on other non-organic substances that it comes in contact with [7]. This effect is vital for the understanding of pica complications but also in other medical specialties such as dentistry

where gastric acid causes demineralization of dental hard tissues and decreases the hardness and surface texture of composite resins [7].

It is also not unheard of, that rubber gloves when ingested harden and form bezoars. Unbeknownst to us at the time of admission of our patient, few cases have been reported over the years where this phenomenon has been documented [8-11]. Yet the question as to why rubber gloves change in the here described way has not yet been sufficiently answered. It has been suggested that the vinyl or more accurately the polyvinyl chloride undergoes a chemical transformation when exposed to gastric acid [10]. A German study was performed in 1977 called "Endangering of Health by Ingestion of Soft-Polyvinylchloride" [12]. In this study, plastic objects containing soft-polyvinylchloride were placed in the stomach of pigs and left there for up to 102 days [12]. The results show us that after spending time in the pig's stomach, the plastic contained significantly less softening agents than before [12]. The retrieved object was cured in the process [12]. This leads us to the conclusion that the gastric acid in our patient's stomach dissolved out the softening agents contained in the rubber glove, forming the hardened object we ultimately retrieved.

To our best knowledge no other case showed a successful endoscopic removal [8-10]. Since in these cases endoscopic removal was highly discouraged [8-10], our treatment plan might have differed in view of this discussion. It is possible that endoscopic removal in our case was only achievable as the glove was located in the transition from gastric fundus to corpus and had not yet been transported any further. We acknowledge, that the risk of further damage is a strong risk factor to endoscopic removal, yet we also assess that under certain conditions where for example the glove or gloves are not yet completely cured, therapeutic endoscopy should not be discarded completely, as the risk of surgical intervention is also considerable.

In addition, endoscopy remains a useful and necessary diagnostic tool [8,10], as not all patients who ingest foreign objects can accurately tell what has been ingested or can understand the difference between edible and inedible objects [3]. In our case, the patient was non-verbal and the ingestion had not been observed. Imaging technics were also flawed in this case, for the presence of a foreign body was detectable but not the nature of it. In those cases, endoscopy is the preferred diagnostically choice as it is less invasive as a surgical approach [8,10].

In summary, we demonstrated in our case report that medical or rubber gloves show a significant risk when ingested. The material, which seems harmless as it is soft and pliable becomes hard and hazardous when it comes in contact with gastric acid. It is therefore vital to know the nature of an ingested object before attempting to remove it.

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