Anesthetic Management of Hypertrophic Pyloric Stenosis

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Learning Objectives

- Identify characteristics of hypertrophic pyloric stenosis, including incidence and typical presentation.
- Discuss the anesthetic management of emesis, including airway management techniques.
- Explain the electrolyte abnormalities caused by hypertrophic pyloric stenosis.

Introduction

Hypertrophic pyloric stenosis is a condition in infants characterized by thickening of the pylorus's circular and longitudinal muscles in the stomach causing gastric outflow obstruction to the small intestine. It presents in 2-5 births annually with a male to female ratio of 4:1. Infants with hypertrophic pyloric stenosis present with projectile nonbilious vomiting. More than half of the patients have a firm non-tender pylorus that can be palpated in the upper right quadrant. This is classically described as an olive. Patients also present with dehydration and hypochloremic hypokalemic metabolic alkalosis due to frequent emesis. However, because of sonography the diagnosis is made earlier, and these laboratory findings are present in less than half the cases.

CASE REPORT

An 8-week-old female, 4.10 kg, neonate presents to the Riley ED. Her parents report that she was born at 38 weeks, has had diarrhea for the past month, and 20 days after birth began vomiting non bilious bile. They had seen the pediatrician on multiple occasion and were told it was normal. They were given a different formula and famotidine which did not help. After increased vomiting and inability to tolerate any oral intake they visited an outside hospital where ultrasound imaging was performed. Imaging showed concern for wall thickness but not stenosis. They were then sent to the Riley ED where a second opinion of the imaging was obtained. Findings showed an elongated and thickened pylorus with a length of 20mm, normal less than 15 mm, and wall width 6 mm, normal less than 3 mm. The impression was positive for hypertrophic pyloric stenosis. Pediatric general surgery was consulted, and surgical intervention was recommended. The patient was admitted to the floor with a laparoscopic pyloromyotomy scheduled for the following day. Overnight the patient vomited at 0000 and 0500 despite being NPO. She also received 82 ml of 0.9% sodium chloride to correct electrolytes. Day of surgery the patient was placed supine and monitors were attached. Her stomach was suctioned in the lateral and supine position, then general anesthesia with an RSI was induced with 14 mg of propofol and 8 mg of rocuronium. She was intubated with a 3.0 cuffed ETT and Miller 1 glidescope. A red rubber catheter was passed. Upon emergence she was reversed with sugammadex and an awake extubation was performed.

DISCUSSION

Hypertrophic pyloric stenosis presents with non bilious emesis and hypochloremic, hypokalemic metabolic alkalosis. These factors prompt the use of an RSI to minimize the risk of aspiration and emphasize preoperative optimization of the the patient's electrolytes. Persistent alkalosis increases the risk of post operative apnea due to a lack of PaCo2 causing CSF pH to rise and fail to stimulate central chemoreceptors in the medulla oblongata. Therefore, careful monitoring of post operative ventilation is vital. In the past an awake intubation was standard, however this can be traumatic especially with a noncompliant patient. The classic RSI model may also have to be adjusted as cricoid pressure can distort view of the airway.

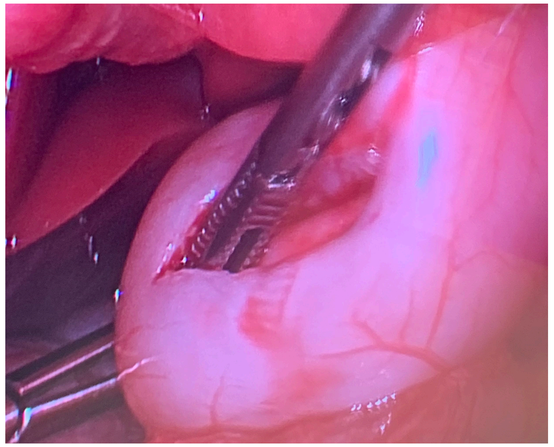

Figure 1: Hypertrophic pylorus.

Discussion Cont'd

It is standard practice to suction the patient's stomach awake in the supine and both lateral positions. This technique will remove 98% of gastric contents. A red rubber catheter was passed after induction to inflate the stomach near the end of the procedure so that the surgical team can look for any leaks. For the aspiration risk, an awake extubation is most appropriate. In a neonate there is no dosing suggestion for sugammadex. Due to the deep block of 2mg/kg of rocuronium used the patient was reversed with 8 mg/kg of sugammadex however, they continued to appear 'floppy' and another 4mg/kg were given. Once grimacing, grasping, and gaging were observed the patient was extubated.

CONCLUSION

Anesthetic management of hypertrophic pyloric stenosis requires aspiration prevention, correction of hypochloremic hypokalemic metabolic alkalosis preoperatively, and care to prevent post operative apnea. This condition is never a surgical emergency and preoperative optimization is vital.

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