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Case Report

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Duodenal Perforation: Unusual Complication of Gastrostomy Tube Replacement

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Feeding gastrostomy is widely used for children with feeding impairment. The replacement of gastrostomy tube is known as an easy and safe procedure. However, various complications associated with replacement of gastrostomy tube were reported, including fistula disruption and colo-cutaneous fistula. For replacement of gastrostomy tube in small children with small stomach, special cautions are needed. Here, we report a rare case of duodenal perforation as an acute complication after the replacement of gastrostomy tube for a 33-month-old girl.

Key Words: Gastrostomy, Replacement, Duodenal perforation, Child

INTRODUCTION

Feeding gastrostomy is a widely used procedure in pediatric ages that have feeding impairments, especially with neurologic disease or dysphagia [1]. Although initial placement of gastrostomy tube was successful, the tube should be replaced to maintain long-term enteral access. Various complications associated with replacement of the gastrostomy tube were reported, such as fistula disruption, colo-cutaneous fistula, gastric outlet obstruction, pancreatitis, cholangitis, hemorrhage, gastric ulcer, small bowel obstruction and esophageal perforation [2-4]. We encountered duodenal perforation as an acute complication of gastrostomy tube replacement with balloon type gastrostomy tube. This is a very rare complication, and here, we report the case with a brief literature review.

CASE REPORT

A 32-month-old girl was consulted for gastrostomy tube replacement. She weighed 10.5 kg and ranked below the 3rd percentile. She was born with hydrocephalus and was suffering from developmental delay and central hypotonia. Due to her underlying disease and recurrent reflux, oral feeding was difficult. Nissen fundoplication and gastrostomy (balloon type replacement gastrostomy tube 20 Fr; Bard Access System Inc., Covington, GA, USA) was performed at

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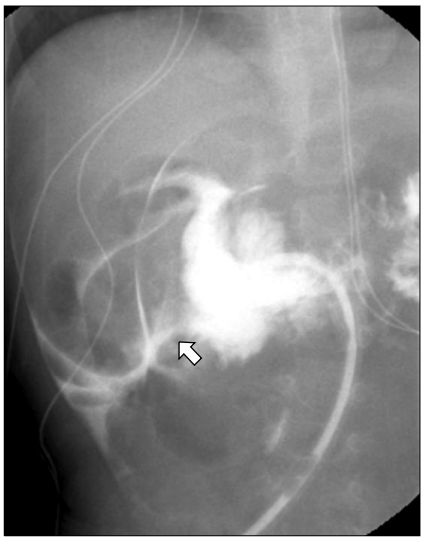

Fig. 1. Fluoroscopic image showed a leakage of contrast, injected via replaced gastrostomy tube, to peritoneal cavity (arrow).

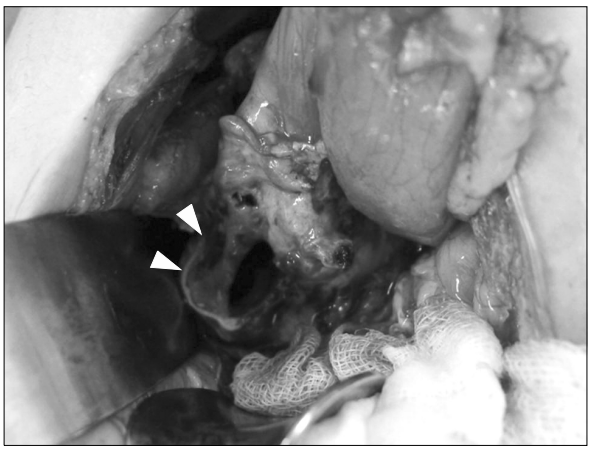

Fig. 2. Operative finding. The first portion of duodenum was perforated (arrowheads).

27-month-old. No problems were encountered using the tube. Five months later, while admitted for neurologic follow-up, she was consulted for the scheduled gastrostomy tube replacement. It was done with the same type of gastrostomy tube, which was then ballooned with 20 mL of saline and secured at 2 cm. After 6 hours, she was presented with high fever and abdominal pain. Laboratory tests showed leukocytosis and upper gastrointestinal series via gastrostomy tube confirmed leakage of contrast to the peritoneal cavity (Fig. 1). Emergency operation was arranged, and intraoperatively, gastrostomy balloon was found tightly inflated at the 1st portion of the duodenum and pulled up to the abdominal wall, causing intussusception of the duodenum into the stomach. The pressure of the balloon had caused necrosis and perforation of the duodenal wall (Fig. 2). Segmental resection and anastomosis was done. During the follow up, 7 days after surgery, she was discharged without problems.

DISCUSSION

Even if replacement of the gastrostomy tube is known as an easy and safe procedure, several complications were reported. The overall reported complication rate of gastrostomy tube replacement is 1.3% [2]. Fistula disruption is the most common complication and known as critical complication that lead to peritonitis. However, even when complications occur during replacement, operation is not always required. In most cases, if the complications are detected early and peritonitis does not develop, just reposition of the gastrostomy tube and conservative care is enough treatment in many cases. On the contrary, if the detection is late and peritonitis occurs, operative procedures are needed and bad results can be obtained [2,5].

Balloon type gastrostomy tube is broadly used for replacement. The balloon of gastrostomy tube prevents accidental removal of the tube and the leakage of gastric contents. However, inflated balloon could transfer spontaneously to the duodenum or ballooning could be done at wrong location, and these conditions caused various complications [6]. The balloon, moved to duodenal papilla, interrupted the flow of bile and pancreatic juice, and thus, caused pancreatits and cholangitis [4]. Gastric outlet obstruction also induced by obstruction of duodenal bulb and duodenal perforation occurred due to chronic compression to the duodenal wall [4,6].

To reduce ballooning associated complications, measuring the thickness of abdominal wall before

insertion the tube would be helpful. With a commercially produced stoma measuring device, it measured easily and safely. According to the measured thickness, the depth of inserted gastrostomy tube should be decided not too deeply. Using low-profile gastrostomy tubes is another way to reduce the ballooning associated complications. They don't have risk the migration of balloon or ballooning at wrong location, due to fixed location of internal bolsters. But other complications, such as buried bumper syndrome, the lodgment of bumper anywhere between the gastric wall and the skin along the gastrostomy tract, and gastric ulcer might be encountered for using low-profile gastrostomy tubes, because of tension between the internal and external bumpers [7].

In pediatric patients, volume of the stomach is smaller than that of adults. In small children, if same size of tube, which used for adults or older children, is applied for replacement, the tube can go deeper and may pass easier through the pylorus than adults. In addition, because this patient was previously performed Nissen fundoplication, which can make the volume of stomach small [8], gastrostomy tube might go to the duodenum much easier than other children. In this case, the tip of gastrostomy tube was passed through the pylorus and ballooning was performed probably at the duodenum, which resulted in excessive expansion of the duodenal wall led to a necrosis and perforation. In small children with special situation like this patient, to avoid this disaster, the size of gastric tube, the volume of balloon and the length of tube inserted into the stomach should be tailored carefully for each patient. Unfortunately, when she was performed initially gastrostomy tube insertion, our center had only 20 Fr-sized tubes. Because of large sized fistulous opening, the size of replaced tube had to be 20 Fr or larger, and for the best fixation and preventing leakage, 20 mL of ballooning was required. This relatively large balloon could be one of the attributing factors for this disastrous complication.

The confirmatory imaging study after the replacement may be helpful for early detection of this complication. Contrast study via replaced gastrostomy tube shows leakage of contrast through perforated bowel or disrupted fistula, and also strange flow of contrast to the other organs, such as colon, not stomach. However, contrast study as a confirmatory study has limitations. Although the radiation from confirmatory imaging is low, patients fed with gastrostomy were performed frequent imaging studies with higher cumulative radiation exposure. The rate of misplacement was very low in the previous study; therefore, the need of a confirmatory study is limited [2,3]. In small children with small stomachs, instead of confirmatory image, replacement with radiologic guide, such as fluoroscopy, can be considered. With radiologic guiding, the length and direction of inserted gastrostomy tube and the safe volume of balloon are easily measured. However, radiologic hazards still pose problems to discuss.

Endoscopy-guided gastrostomy tube change may be the safest way at the aspect of reducing balloon and tube associated complication. Since the replacement could be done under the direct vision, the hazards would be reduced. But, in pediatric patients, when performing the endoscopy, patients should be sedative and sometimes required general anesthesia. For some patients who have associated diseases, these problems would be more dangerous [9,10]. When endoscopy is applied as a confirmatory study, these problems also exist. And, the additional cost for performing endoscopy could not be ignored. When the endoscopy was applied as a guidance or confirmation for replacement, these factors would be considered carefully.

In summary, for the replacement of gastrostomy tube in small children with small stomachs, size of the tube, volume of the balloon and length of the tube inserted into the stomach should be decided carefully. After replacement, when the patients show irritability, fever with unknown origin, sustained abdominal pain, peritonitis must be considered and duodenal perforation should be regarded as one of the possible complication of gastrostomy tube replacement.

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