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Case Series

Accidental acid ingestion in children: case series and literature review

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ABSTRACT

Acid ingestion in children is a common problem in developing countries. Immediate complications of acid ingestion are oesophageal perforation, laryngeal trauma, bleeding and fistula formation but stricture is a delayed complication. Gastric outlet obstruction is known complication of acids and surgery is the mainstay of treatment. Heineke-Mikulicz pyloroplasty was done in five cases without complications and the outcomes were satisfactory.

Keyword: Acid, Children, Gastric outlet obstruction, Heineke Mikulicz pyloroplasty, Pyloric stricture

INTRODUCTION

Accidental acid ingestion is more common in children as compared to adults. It is an important late morbid complication of the upper gastrointestinal tract.[1] The severity of injury usually mild in children because they have tendency to vomit out ingested content immediately. In Indian population alkali ingestion is more common because it is cheaper and easily available in house as toilet cleaners.[2] Immediate complications of corrosive ingestion occur in approximate 10% of cases which are oesophageal perforation, laryngeal trauma, bleeding, and fistula formation but stricture is a delayed complication. Acid ingestion usually cause injury around the antrum and pylorus because of acid stasis which leads to stricture and cause gastric outlet obstruction. Management depending upon severity and location of strictures and options are endoscopic dilatation, gastrojejunostomy, Billroth-1 partial gastrectomy, Heineke-Mikulicz pyloroplasty, Finney pyloroplasty and Antroplasty.[3-5] We wish to report six cases of gastric outlet obstruction due to acid ingestion and five patients managed by Heineke-Mikulicz pyloroplasty and one patient by gastrojejunostomy.

CASE SERIES

Case 1

A 7 years male child presented to emergency with upper abdominal pain and non-bilious vomiting. Child not tolerating oral feed and vomit after each feed. H/o battery water ingestion 20 days ago. No h/o fever, cough and breathing difficulty. On examination child was lethargic, thin built, mild tenderness present in left hypochondrium and lumbar region. Routine blood examination within normal limit. Barium swallow and meal follow through shows stenosis of gastric antrum with outflow obstruction (Figure 1). In upper GI endoscopy, oesophagus was normal, stomach contracted, pyloric opening not seen, scope could not be negotiated beyond pylorus, duodenum not seen. On exploratory laparotomy stomach was dilated, antral wall thickened approx. 3 cm, oedematous and friable. Antral lumen was narrow with fibrotic mucosa. Posterior wall of antrum was fibrotic and thinned out. Subsequently, we conducted Heineken Mikulicz pyloroplasty with feeding jejunostomy was done. The patient was discharged on eleventh postoperative day uneventfully.

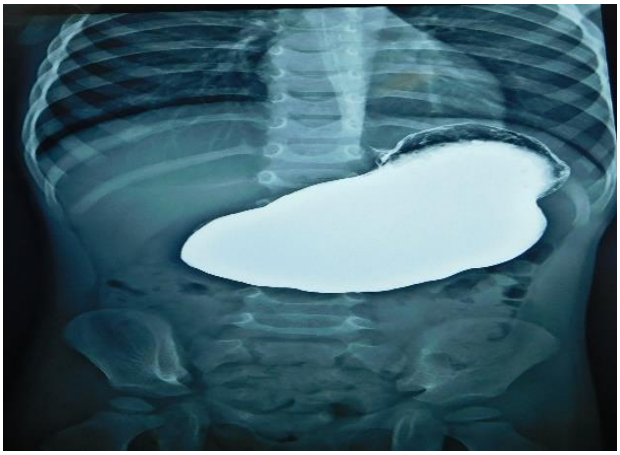

Figure 1: Barium swallow and meal follow through showing stenosis of gastric antrum with outflow obstruction.

Case 2

A 3 years old male child who presented with profuse non bilious recurrent vomiting. Vomitus content was food particles followed by blood in vomitus. h/o accidental ingestion of floor cleaner (acid) at home 2 months ago. No h/o difficulty in breathing and swallowing. On examination vitals stable, abdomen soft, fullness present in epigastric region. Routine blood examination within normal limit. In USG abdomen concentric thickening and lengthening of antrum, antrum measure 2 cm in length and wall 4 mm. In Barium swallow and meal follow through shows severe stenosis of gastric antrum with outflow obstruction, no contrast passed beyond the gastric antrum during 6 hours of examination (Figure 2). On exploratory laparotomy stomach was hugely dilated, pyloric wall thickened approx. 2.5 cm (Figure 3), nearly complete block of antral opening, fibrotic scar of antral mucosa, rest of bowel was normal. Subsequently, we conducted Heineke Mikulicz pyloroplasty with feeding jejunostomy was done. The patient was discharged uneventfully on tenth postoperative day.

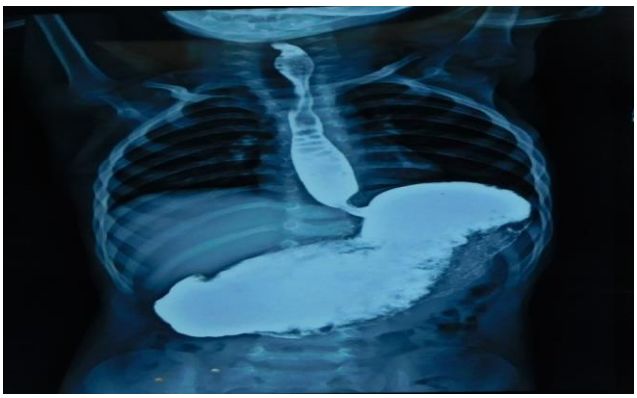

Figure 2: Barium swallow and meal follow through showing severe stenosis of gastric antrum with outflow obstruction, no contrast passed beyond the gastric antrum during 6 hours of examination.

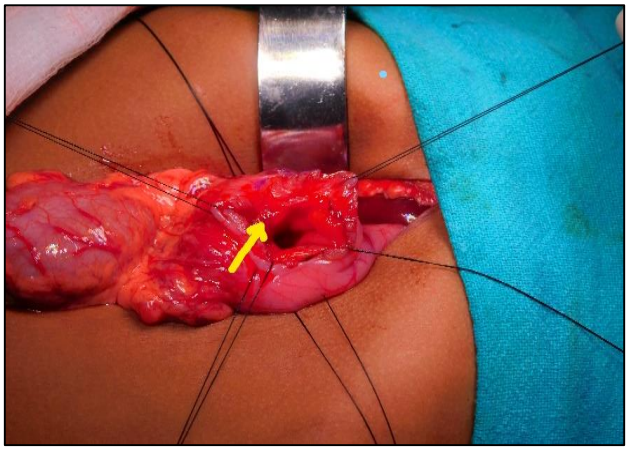

Figure 3: Intra-operative picture showing pyloric wall thickened (Yellow arrow).

Case 3

A 11 years old female child presented with non-bilious vomiting for 7 days. Patient accidently ingested acid one month ago. After ingestion, she vomited multiple times and vomitus was food particle. Vomiting was non projectile and stains with blood. No h/o difficulty in swallowing and respiratory distress. On examination vitals stable, abdomen soft, non-tender, no palpable lump. Routine blood examination within normal limit. In Barium swallow and meal follow through stenosis of gastric antrum with outflow obstruction, no contrast passed beyond the gastric antrum. On exploratory laparotomy pylorus was thickened, scarring present at pyloric antrum, lumen narrowed at pylorus. Heineke Mikulicz pyloroplasty with feeding jejunostomy was done. The patient was discharged on tenth postoperative day uneventfully.

Case 4

A 30 months old male child presented with repeated episodes of non-bilious vomiting immediately after feed. h/o acid ingestion (toilet cleaner) one month ago. Sometimes vomitus was blood-stained food particles. No h/o fever, cough and breathing difficulty. on examination child malnourished afebrile, vitals stable, abdomen distended, mild tenderness in epigastric region. Routine blood examination within normal limit.

In CECT abdomen dilated distal oesophagus and distal stomach upto body, severe narrowing and thickening of pyloric canal. In Barium swallow and meal follow through no contrast passed beyond the gastric antrum. In upper GI endoscopy oesophagus mucosa normal, pyloric lumen could not be identified. On exploratory laparotomy stomach was dilated, constriction noted at pyloric region, pyloric canal hypertrophied circumferentially. we conducted retro colic isoperistaltic gastrojejunostomy. The patient was discharged on eleventh postoperative day uneventfully.

Case 5

A 1 year old female child presented to emergency with complaints of non-bilious vomiting for 7 days. Vomiting associated with feed and it was non projectile, non-bilious in nature. h/o ingestion of toilet cleaner (acid) 20 days ago. No h/o fever, cough and breathing difficulty. on examination child vitals stable. Routine blood examination within normal limit. In Barium swallow and meal follow through shows gastric antrum stenosis. On exploratory laparotomy stomach was dilated, pylorus and mucosa scarred, serial dilatation of pylorus done with urethral dilators upto18. Subsequently, we conducted Heineke Mikulicz pyloroplasty with feeding jejunostomy. The patient was discharged on ninth postoperative day uneventfully.

Case 6

A 5 years old male child was brought to emergency with complaints of recurrent vomiting. Vomiting associated with feed and it was non projectile, non-bilious, non-bloody in nature. h/o ingestion of toilet cleaner (acid) one month ago. No h/o fever, cough and breathing difficulty. on examination child vitals stable. Routine blood examination within normal limit. In USG whole abdomen stomach appears grossly distended with fluid and echogenic contents within pylorus. In Barium swallow and meal follow through shows gastric outflow obstruction. On exploratory laparotomy stomach was dilated, pylorus thickened, pyloric canal irregular and completely obstructed, mucosal scarring present, 1st part of duodenum and stomach mucosa normal, rest of small bowel normal and collapsed. we conducted Heineke Mikulicz pyloroplasty with feeding jejunostomy. The patient was discharged on 11th postop day uneventfully.

Table 1: Case summaries.

Case	Age/ sex (Years)	Symptoms at presentation	Type of ingestion	Upper GI contrast study	Operative procedure	Intra operative findings
1	7/M	Upper abdominal pain, non-bilious vomiting	Battery water	No contrast passed beyond the gastric antrum	Heineke Mikulicz pyloroplasty with feeding jejunostomy	Stomach dilated, approx. 3 cm antral wall thickened, edematous and friable
2	3/M	Profuse non-bilious recurrent vomiting	Floor cleaner	Severe stenosis of gastric antrum with outflow obstruction No contrast passed beyond gastric antrum during 6 hours of examination	Heineke Mikulicz Pyloroplasty with feeding jejunostomy	Pyloric wall thickening approx. 2.5 cm
3	11/F	Non-bilious vomiting	Acid	Stenosis of gastric antrum with outflow obstruction.	Heineke Mikulicz pyloroplasty with feeding jejunostomy	Pyloric wall thickening approx. 3 cm
4	30 months/ M	Repeated episodes of non-bilious vomiting	Toilet cleaner	Gastric outlet obstruction	Gastrojejunostomy	Pyloric canal hypertrophied circum-ferentially
5	1/F	Non-bilious vomiting	Toilet cleaner	No contrast passed beyond the gastric antrum	Heineke Mikulicz Pyloroplasty with feeding jejunostomy	Pyloric wall scarred
6	5/M	Non-bilious vomiting	Toilet cleaner	Stenosis of gastric antrum with outflow obstruction	Heineke Mikulicz pyloroplasty with feeding jejunostomy	Pyloric wall thickening approx. 2.5 cm

DISCUSSION

Acid injuries in children is an important social, medical, and psychological problem in the developing countries. In children accidental caustic material ingestion is common in low socioeconomic family as well as mental disorders child. Acid substances were stored in beverage bottles which is easily accessible to children leads to accidental ingestion. The proper storage of corrosive agents and clear labelling on bottles is important to reduce the incidence of accidental injuries. The extent and degree of oesophageal and gastric involvement depends on amount, concentration, pH of ingested substance, and tissue contact time. However, acidic substances cause coagulative necrosis which limited to deeper penetration. Acids rapidly transits to the stomach

because low viscosity and specific gravity acids pool into prepyloric area and results in gastric injury more than oesophageal injury.[6,7] Stomach is more sensitive to acid injury because of acidic pH whereas alkalis prevented from damaging stomach by its neutralizing effect. The late complication of acid injuries is gastric outlet obstruction, intractable pain, late achlorhydria, metaplasia and carcinoma, gastric outlet obstruction is most common. The antropyloric region is most common site of stricture because it is dependent part of stomach and pyloric spasm leads to concentration of acid in the gastric antrum. Antrum is the most affected which results into cicatrisation causing gastric outlet obstruction.[8] The scarring effect and development of gastric outlet obstruction usually occur within 2 to 8 weeks. The ongoing fibrosis effect of acidic agents may present delayed as long as 6 years after acid ingestion.[9,10] Acid induced gastric outlet obstruction, child's usually present with frequent non bilious vomiting, early satiety, and loss of weight. Barium meal is an initial investigation to look for the site of obstruction. The role of upper GI endoscopy in evaluating the extent and nature of gastric injury. The surgical procedures depend according to site of gastric involvement and extent of lesion. The time and type of operative procedures is still controversial. Chaudry et al. recommended late repair, thought that fibrotic process develops over a period and maximum fibrosis occurs before intervening. We opted for early repair in all six cases because all our patients had total gastric outlet obstruction in contrast study. Early surgical intervention enabled earlier feeding and prevent weight loss and prolonged hospital stays. The surgical procedure depending on the involved segments of stomach and experience of surgeon. We performed Heineke Mikulicz pyloroplasty in our five cases because of the isolated involvement of pylorus. Intra operative we conducted longitudinal incision over thickened antrum and extend proximally toward stomach and distally to duodenum upto normal opening. Transverse full thickness closure done. We performed gastrojejunostomy in one case because of the long segment involvement of pylorus. Heineke Mikulicz pyloroplasty is more physiological procedure and easy to performed as compared to other procedures. The outcomes of Heineke Mikulicz pyloroplasty was satisfactory in our cases without post operative complications. In follow up all patients tolerate full diet and gained good weight.

CONCLUSION

Accidental acid ingestion in children is not uncommon in pediatric age group. There are different surgical procedures for pyloric strictures due to post acid ingestion. Heineke-Mikulicz pyloroplasty is better option in isolated pyloric stricture. which we have used with good results without complication. Heineke Mikulicz Pyloroplasty is more physiological and easier to performed as compared to other procedures.

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