

Acute GI Perforation following Polyol and Diisocyanate (Polyurethane) Ingestion

Dr. Mitesh Savani¹, Dr. Iiyas A. Junjeja²

¹Junior Resident, Department of General Surgery, P. D. U. Medical College and Civil Hospital Rajkot, India

²Associate Professor, Department of General Surgery, P.D.U. Medical College and Civil Hospital Rajkot, India

Correspondence Address: Dr. Mitesh Savani, Junior Resident, Department of General Surgery, 303, new PG Hostel, Jamnagar Road, Rajkot

Abstract: GI perforation occurs commonly after suicidal or accidental corrosive ingestion like acid or caustic agent, but here we report an unusual case of gastrointestinal perforation following suicidal Polyol and diisocyanate ingestion.^{1 3}

Keywords: GI perforation, Polyurethane foam, suicidal

1. Introduction

Gastric perforation due to suicidal corrosive ingestion is common in developing country like india but gastrointestinal perforation due to polyurethane foam which is made by exothermic reaction between polyether polyol and diisocyanate is rare.² Here polyurethane foam primarily causes luminal obstruction and followed by gastric perforation by filling up gastrointestinal lumen by rigid and firm polyurethane foam. Therefore here surgical management is quite different than other case of gastric perforation and obstruction.^{1 3}

2. Case Report

A 21 year old male patient working at polyurethane factory deliberately ingested Polyether polyol and diisocyanate one after another for suicidal purpose. After 2-3 hour, patient admitted to hospital with chief complain of severe abdominal pain, abdominal distention, sweating and cold clammy skin. On admission patients vitals were altered. Pulse 124/min, blood pressure 90/60 mmhg and respiratory rate 36/ min. He was conscious but in state of shock. On palpation, Patients abdomen was distended and rigid. Patient has hb 11.7 mg/dl, leukocyte count of 15800 cells/cu mm, serum sodium 143 mg/dl and potassium 3.8mg/dl. After stabilization of patient, patient sent for chest and abdominal radiograph, which shows free gas under right dome of diaphragm with large fundic hypoechoic shadow.



Figure 1: Chest radiograph showing free gas under right dome of diaphragm with large hypoechoic shadow in left hypochondriac region

Following that patient taken in operation room for emergency exploratory laparotomy. On exploration stomach found distended and hard in consistency and there was a perforation over anterior aspect of greater curvature. Small bowel became rigid and non-pliable upto 20 cm proximal to ileocecal junction. On multiple enterotomy and gastrotomy we found white color rigid foam, which completely occupied respective lumen. Manual piecemeal removal of foam done by gastrotomy, duodenotomy and multiple enterotomy, following that resection of part of unhealthy congested ileum and jejunum done which was followed by ileoileal and jejunojeunal end to end anastomosis and primary repair of gastrotomy, duodenotomy and multiple enterotomy done. Closure of abdomen with drain placement done. In Post op period patients general condition was poor with tachycardia, tachypnoea and hypotension for which patient kept intubated and on ventilator support. Despite of

all resuscitative measures and surgical intervention patient can't be survived expired on pod 1st.



Figure 2: Removal of whitish Polyurethane foam from stomach via gastrotomy



Figure 3: Extracted rigid foam from stomach and small bowel which retain shape of respective lumen



Figure 4: Congested, rigid and non-pliable small bowel loop

3. Discussion

Polyurethane foam made by mixture of equal volume of Polyether polyol and diisocyanate. Which have propensity to formation of rigid Polyurethane foam after 5 min of contact and stirring movement, which is inert, nontoxic and fills gap and this property of Polyurethane used for insulation and other uses. If we put it in closed lumen, initially it takes shape of lumen than it expands and after reaching limit of expansion of lumen, foam perforates it and makes a way out.²

In case of corrosive injury most common site of perforation is antrum because of pyloric spasm due to pyloric irritation by corrosive but in our case gastric perforation found on greater curvature with size of 1.0*0.5 cm. Polyurethane is inert but its precursor diisocyanate and polyol were toxic in nature. Diisocyanate can cause skin and eye irritation, breathing difficulty and wheezing while polyol causes diarrhea and bloating.⁴ There is no any specific antidote or reversal agent is available for reversal or degradation of Polyurethane foam. Patient present with hypotension, tachycardia and tachypnoea for which adequate resuscitation should be done. In present case due to undue expansion of rigid Polyurethane foam inside gastrointestinal cavity, initially stomach and small intestine blocked and due to further expansion it causes gastric perforation. As there is no any promising reversal agent present to degrade the foam, it should be treated with manual piecemeal removal of foam from gastrointestinal cavity. Histopathological examination shows marked congestion, focal necrosis, focal acute inflammation and loss of mucosal lining of small bowel and grossly it shows thinning of bowel wall which was secondary to pressurization by expanding foam.

4. Conclusion

This was rare type of suicidal liquid ingestion which results in luminal obstruction followed by gastric perforation. There is no any specific treatment or antidote present at this time

and no any other case like this occurred in past. Patient with this type of unique perforation due to and mechanical etiology treated primarily with prompt resuscitative measures and emergency surgical exploration to prevent further mechanical damage to gastrointestinal tract.^{1 3}

Conflict of interest: Nil declared

References

- [1] Morgan DR, Musa M. Self inflicted death following inhalation and ingestion of Builders Polyurethane expandable foam. J Forensic Leg Med. 2010 Nov; 17(8):439-40.
- [2] Expanding foam, eHow.co.uk.
- [3] Van de Putte D, Ceelen W, Gillardin JM, Pattyn P, de-Hemptinne B. Attempted suicide by auto injection of polyurethane (PU) foam; report of a case. Journal of Trauma-Injury Infection and Critical Care 2008;65(3):E32e3.
- [4] Dietmann-Moland A, Kopferschmitt-Kubler MC, Meyer PD, Tomb R, Pauli G. Allergic asthma due to domestic use of polyurethane foam. Lancet 1991 Oct 12;338(8772):953.