CASE REPORT

Acute pulmonary oedema complicating polyethylene glycol intestinal lavage

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Polyethylene glycol (PEG) has gained a reputation as safe and well tolerated[1] method of bowel preparation for colonoscopy, colonic surgery, radiological examination, and faecal dysimpaction in intractable constipation. PEG 3350 is a chemically inert polymer of formula $H(OCH_2CH2)_n$ where n = 68–84 with negligible (<0.06%) gastrointestinal tract absorption in normal subjects. This limits the potential for systemic toxicity.[2] PEG causes a substantial flow of faecal water by osmosis, and because volumes required for bowel cleansing are larger than many patients can comfortably drink, it is frequently given through a nasogastric tube.

Reported side effects include transient nausea and vomiting, abdominal fullness, cramps, and anal irritation. Allergic reactions have been reported rarely. Extra care is advised in patients with impaired gag reflex, reflux oesophagitis, and those with diminished levels of consciousness.[3] Pulmonary oedema in response to aspiration of hypertonic contrast material has been reported before,[4] but not with intestinal lavage solutions. We report a case of acute pulmonary oedema secondary to aspiration of PEG.

CASE REPORT

A 7 year old boy with intractable constipation was admitted to hospital for nasogastric PEG (Klean-Prep, Norgine) faecal dysimpaction. Correct tube placement was confirmed by auscultation and litmus testing. PEG infusion was given by gravity feed at a rate of 15 ml/kg/h. In the course of the infusion he intermittently dozed. After 3.5 hours, he coughed, retched, and vomited approximately 150 ml of frothy fluid. Within half an hour, he became pale and unwell with intercostal recession, crackles in both his lung fields, and an oxygen saturation of 88% in air. PEG administration was discontinued and the nasogastric tube removed. Blood pressure was 110/75 mm Hg, and capillary refill time three seconds. He improved with oxygen and frusemide therapy with arterial pH 7.367, pCO_2 5.83 kPa, and pO_2 11.25 kPa. Chest radiograph (fig 1) showed extensive alveolar shadowing throughout both lung fields consistent with pulmonary oedema.

Despite hydrocortisone and antibiotic therapy his condition steadily deteriorated. At 45 minutes, he required continuous positive airway pressure via facial mask and then mechanical ventilation. His chest radiograph showed notable improvement after eight hours, and he was successfully extubated after 36 hours. He made a full recovery.

Subsequent investigations have shown a normal upper endoscopy, echocardiogram, and oesophageal pH probe study with a reflux index of 4.9%, and a ganglionated rectal biopsy.

Figure 1 Chest radiograph showing extensive alveolar shadowing throughout both lung fields consistent with pulmonary oedema

DISCUSSION

We speculate that in our case, vomiting resulted in migration of the nasogastric tube into the oesophagus, where PEG administration overwhelmed normal oesophageal peristalsis, causing aspiration. We had no clinical indication of intestinal dysmotility and the assumption that his motility was normal is supported by our subsequent investigation. This leads us to believe that the risk of this complication in our patient is no greater than that in any other patient undergoing intestinal lavage. The intense osmotic action of the PEG allowed a small aspiration to facilitate pulmonary oedema, and its molecular size prevented pulmonary absorption with a continuing osmotic action and the ongoing requirement for ventilation.

We have become aware of anecdotal reports of four previous cases in two children treated for constipation and two adults receiving PEG lavage for lithium ingestion. While information is limited, recovery was reported in all four, with 48 hours of ventilation in the paediatric cases.

Pulmonary aspiration and pulmonary oedema is an important complication of this commonly used therapy. We now advise active pumping of PEG starting at 5 ml/kg/h, and increasing by 5 ml/kg/h increments as tolerated, to a maximum of 20 ml/kg/h, to avoid vomiting. We advise rechecking the nasogastric tube position after any vomit and discontinuation of the infusion when the patient is not fully awake.

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REFERENCES

1 **DiPalima JA**, DeRidder PH, Orlando RC, *et al*. A randomized, placebo-controlled, multicenter study of the safety and efficacy of a new polyethylene glycol laxative. *Am J Gastroenterol* 2000;**95**:446–50.
2 **Shaffer** *et al*. The absorption and excretion of the solid polyethylene glycols (carbowax compounds). *J Am Pharm Assoc Sci Ed* 1947;**36**:152–257.
3 **ABPI**. *Compendium of data sheets and summaries of product characteristics*. London: Datapharm Publications Ltd, 1999.
4 **Reich S**. Production of pulmonary oedema by aspiration of water soluble nonabsorbable contrast material. *Radiology* 1969;**92**:367–70.

ARCHIVIST

Babies of Asian families in the UK are still smaller at birth

Babies born in developing countries tend to be lighter at birth than babies born in more advantaged countries although within developing countries more affluent mothers have babies whose birthweights are similar to those of babies in the developed world. Emigration to a more advantaged country results in an increase in birthweights. Thus it has been estimated that the average birthweight of babies born in the UK to mothers born on the Indian subcontinent is about 300 g greater than that of babies born in India but about 300 g lighter than that of babies in general in the UK. The birthweight deficit is traditionally ascribed to environmental influences such as infection and poor diet. It is expected that birthweights in immigrant populations will reach those of the indigenous population within one or two generations. Data from Southampton, however, (BM Margetts, *et al. J Epidemiol Community Health* 2002;**56**:684–7) suggest that that has not happened over the last 40 years for babies born to families who immigrated from the Indian subcontinent.

The study included data on 2395 singleton term births to South Asian mothers (identified by name) in Southampton since 1957. Some of the mothers were born outside the Indian subcontinent and birthweight tended to be greater for the babies of Muslim mothers and of mothers born in Pakistan or Fiji. Analysis of birthweight trends was restricted to the babies of 1435 mothers born on the Indian subcontinent (first generation) and 283 born in the UK (second generation). First generation mothers were older and heavier and had more children than second generation mothers. The girl babies of second generation mothers were significantly lighter at birth than those of first generation mothers (mean 2950 vs 3071 g) but there was no significant intergeneration difference in birthweights for boys. The low-birthweight rate was 7.5% (first generation) vs 11.7% (second generation). The differences between generations disappeared after adjustment for gender and mother's ethnic group, age, religion, parity, and weight at booking. There was no clear trend to increasing birthweight with time for either group after adjustment for factors known to influence birthweight. On multiple regression analysis year of birth was not shown to influence birthweight.

There has been no significant increase in birthweight over the last 40 years for the children of first or second generation mothers of families who immigrated from the Indian subcontinent to the UK. The reasons for persisting lower birthweight are not known but it can not be assumed that birthweights in this group will increase spontaneously with time.