Novel treatment (new drug/intervention; established drug/procedure in new situation)

Atropine sulphate: rescue therapy for pyloric stenosis

Richard Peter Owen,¹ Sarah L Almond,² Gill M E Humphrey²¹Department of General Surgery, Arrowe Park Hospital, Liverpool, UK²Department of Paediatric Surgery, Manchester Children's Hospital, Manchester, UK

Correspondence to Richard Peter Owen, richowen83@hotmail.com

Summary

Infantile hypertrophic pyloric stenosis (IHPS) is a common condition which presents with non-bilious vomiting and failure to thrive secondary to gastric outlet obstruction. In the UK, management is by fluid resuscitation followed by pyloromyotomy. Incomplete myotomy complicates 0.3% of cases necessitating further surgery and exposing the patient to further risk. Medical management of IHPS with antimuscarinics to promote pyloric relaxation is a well-described treatment modality that is used as first-line therapy in some countries. The use of this technique is limited by the need for extended hospital admission with parenteral nutrition administration. We describe a case of IHPS complicated by incomplete pyloromyotomy and subsequently managed successfully by atropine sulphate therapy.

BACKGROUND

Atropine was an effective rescue therapy in this circumstance, leading to a rapid resolution of symptoms without the risks of early surgical re-exploration.

CASE PRESENTATION

Baby W was born at term weighing 3.58 kg (>50th centile). At 2 weeks of age he began to have non-bilious vomits following feeds, which persisted despite antireflux therapy. There was no family history of infantile hypertrophic pyloric stenosis (IHPS). At 4 weeks he presented to the emergency department with non-bilious vomiting and weight loss to below the 25th centile. A mass was palpable in the right upper quadrant and biochemical analysis revealed a severe hypochloraemic hypokalaemic metabolic alkalosis (pH 7.53, base excess 30.0 mmol/l, HCO₃⁻ 60.9 mmol/l, Na⁺ 118 mmol/l, K⁺ 3.0 mmol/l, Cl⁻ 53 mmol/l).

INVESTIGATIONS

Ultrasound confirmed a diagnosis of IHPS (pyloric length 16 mm, single wall thickness 6 mm).

TREATMENT

A naso-gastric tube was passed and fluid resuscitation started. The metabolic derangement was corrected by day 3 of admission and Baby W proceeded to pyloromyotomy the same day. An open pyloromyotomy was performed via a supraumbilical approach, and adequacy of the myotomy was assessed by independent movement of the adjacent pyloric segments. Integrity of the mucosa was demonstrated by the absence of air or bile leak following insufflation of the stomach.

Postoperatively, feeds were introduced after 4 h, starting at 10 ml, and increasing by 10 ml with each feed according to standard local protocol. However, Baby W continued to vomit varying volumes of milk intermittently, despite adjustments to feed type, feed frequency, a trial of feed thickeners and acid suppressant therapy. Parenteral nutrition was started on postoperative day 5, to mediate

the effects of prolonged nutritional insufficiency. Contrast study 9 days postoperatively revealed no evidence of perforation and slow passage of contrast through the pylorus with radiological features of pyloric stenosis (figure 1). However, such features are known to persist for several weeks following surgical intervention, and cannot be interpreted as definitive evidence of incomplete myotomy.^{1 2} In view of the ongoing symptoms, a decision was made to treat with adjunctive atropine sulphate in the first instance.

Atropine was started on postoperative day 14, following a protocol devised from published studies,³ and approved by the Trust Medicines Management Council (figure 2).

OUTCOME AND FOLLOW-UP

After 6 days of atropine therapy, Baby W was tolerating full enteral feeds (80 ml 4 h) with no further vomits. At

Figure 1 Contrast study revealing features characteristic of pyloric stenosis including string sign (barium passing through narrowed channel) and pyloric shouldering (filling defect from prolapsed hypertrophic muscle).

this stage, the atropine dose was converted to oral administration, adjusted to reflect the bioavailability of enteral route administration. Two days later, the dose was reduced to 0.012 mg/kg and cardiac monitoring was discontinued. Baby W remained well and was discharged home 9 days after atropine therapy had been started (23 days postoperatively). Following discharge, Baby W was reviewed weekly and the atropine dose decreased incrementally over a 3-week period. A further contrast study undertaken following cessation of atropine (4 weeks from initiation of atropine) demonstrated contrast passing into the duodenum within 30 min. A repeat ultrasound scan at this time showed that the pylorus remained enlarged but normal peristalsis had resumed.

At 6 months of age at last follow-up, Baby W was gaining weight and height between the 25th and 50th centile (7.63 kg, 65.0 cm) with no further symptoms.

DISCUSSION

The use of antimuscarinics in IHPS was first reported by Svensgaard⁴ in 1935. Over the past 20 years,

atropine sulphate has been used increasingly in Japan as primary therapy for IHPS. Kawahara *et al*³ reported an average time from initiation of antimuscarinic therapy to vomiting cessation of 6 days. During this time, parenteral nutrition was initiated to meet the nutritional requirements of the infant. As atropine sulphate is a cardioactive drug, electrocardiographic and pulse-oximetry monitoring was performed during administration at initiation and dose change. Pyloromyotomy was required only in 13% of cases, where vomiting persisted beyond 3 weeks.

In Western countries, medical management of IHPS has remained a controversial issue. Meissner *et al*⁵ examined the use of atropine sulphate versus pyloromyotomy and found the failure rate of medical management to be unacceptable (25%). In addition to this, they argued that the increased cost involved in non-operative management was difficult to justify when a relatively immediate surgical option was available with a low complication rate. In contrast, Yamataka *et al*⁶ found that costs were lower in their medically managed group of patients.

Figure 2 Protocol used for conservative management of failed pyloromyotomy with atropine sulphate (adapted from Kawahara *et al*³).

*Cardiac monitoring consisted of nurse-led three-lead electrocardiography and pulse-oximetry measurement in level 2 (High Dependency Unit) setting.

Learning points

- ▶ Atropine sulphate can be used to manage IHPS; this case illustrates application of this treatment modality in the context of failed surgical treatment.
- ▶ Recognition of failed surgical treatment of IHPS is important to ensure that nutritional demands are met and appropriate further treatment strategy is made.
- ▶ Postoperative radiological findings in IHPS can be misleading due to the persistence of characteristic appearances of IHPS for several weeks.

Competing interests None.

Patient consent Obtained.

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