Endoscopy-guided balloon dilatation for infantile hypertrophic pyloric stenosis

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Abstract. We first introduced endoscopy-guided balloon dilatation (EGBD) as a new method of nonoperative treatment for infantile hypertrophic pyloric stenosis (IHPS) in 1988. Up to now, we have treated 12 patients with this technique. The system used included an Olympus PQ 20 GIF endoscope, a balloon catheter with built-in guide-wire, a pressure gauge, and a home-made inflationary device. The procedure was performed with the patients under general anaesthesia by an experienced paediatric endoscopist. Visualisation of the narrow pylorus was facilitated by a 180° clockwise rotation of the endoscope in the antrum. A 15-mm diameter balloon catheter was introduced after lubrication with silicone spray and inflated to 45 psi for 5-10 min. Of 12 patients, 11 had EGBD as primary treatment; of these, 4 responded completely and surgery was avoided, but 7 had an incomplete response requiring surgery. The remaining patient had EGBD as secondary treatment for an incomplete Ramstedt’s pyloromyotomy and responded satisfactorily. The longest follow-up after successful balloon dilatation was 22 months. Complete disappearance of the pyloric tumour was demonstrated by ultrasound examination 3 months after the procedure. Our experience confirms that balloon dilatation of IHPS is feasible, but at present its results are not consistent enough for recommendation of general use.

Key words: Upper endoscopy – Balloon dilatation – Pyloric stenosis – Ramstedt’s operation

Introduction

Infantile hypertrophic pyloric stenosis (IHPS) is the most common abdominal surgical condition in infancy [6]. The standard treatment of IHPS is Ramstedt’s pyloromyotomy, which gives rapid and complete symptomatic relief. The operative approach to IHPS, however, is not without its problems and even in the mid-1980s a wound infection rate of 11.8% was reported [4]. Other well known complications of Ramstedt’s pyloromyotomy include wound dehiscence (3.8%), incisional hernia (3%), duodenal perforation (11.5%), and bleeding (1%) [1, 8]. Admittedly, most of these complications can be reduced by attention to proper surgical techniques. However, in recent years technological advances have also made endoscopy-guided balloon dilatation (EGBD) of a narrowed upper GI tract a reality [7]. It is therefore tempting to ask the question, “Can EGBD become a plausible alternative to Ramstedt’s pyloromyotomy for the treatment of IHPS?” We introduced this new method of nonoperative treatment of IHPS in 1988 and reported the feasibility of its use in three patients in a brief letter to the Lancet [3]. Since then we have accumulated experience with this procedure in 12 patients and refined our technique. We hereby report details of the technique we use at present and the results we have obtained so far.
Before the procedure, the instrument channel should be lubricated by introducing a cytology brush soaked with silicone spray. The balloon catheter is also lubricated with silicone spray. The child is placed in a left lateral position and the endoscope is introduced under direct vision. Once the antrum is reached, the endoscope is rotated clockwise 180° and on further advancement the narrowed and distorted pylorus will be directly in view. A 15-mm diameter balloon catheter is introduced into the pylorus and inflated with fluid. There is great resistance to inflation, but persistent pressure will result in a partial “give” sensation at 45 psi after 5–10 min. The balloon inflation should be monitored endoscopically as the balloon may slip backwards into the stomach or forward into the duodenum along the line of least resistance. Often the pyloric canal in IHPS is lengthened to 22 mm, and the entire length of the canal may need to be dilated by the balloon in successive segments.

Between 1988 and 1990, the parents of patients with IHPS admitted under the care of one (PKHT) of four consultant surgeons in Alder Hey Children’s Hospital were approached for consent to the procedure. Low-birth-weight infants were exempted. Consent was obtained in approximately one out of three cases. A total of 12 patients underwent EGBD, 11 of which were performed as primary treatment and 1 as secondary treatment for residual pyloric obstruction 2 months after an incomplete Ramstedt pyloromyotomy. The age range was 4–13 weeks. The body weights ranged from 3.1 to 5.4 kg.

Results

Of the 11 patients who had EGBD as primary treatment for IHPS, 4 responded satisfactorily and surgery was obviated. Of these 4 successful cases, 3 required one session of EGBD only and one required two sessions. The median hospital stay after EGBD was 4 days.

The remaining 7 patients were considered EGBD failures. One was a technical failure: the balloon catheter could not be negotiated through the distal half of the pyloric canal. Two had no relief of obstructive symptoms after EGBD. Four had partial relief of vomiting after EGBD, 3 of whom were discharged home only to return 5–21 days later with recurrence of vomiting. All 7 patients has pyloromyotomy from 2 to 28 days after EGBD. The pyloric “tumour” at operation was variously described as “oedematous”, “softer than expected”, and “indistinguishable from a typical tumour”.

The only patient who had EGBD as secondary treatment for residual stenosis after an incomplete Ramstedt pyloromyotomy responded satisfactorily to a single session of EGBD and surgery was obviated.

Follow-up ranged from 5 to 22 months. All patients with IHPS successfully treated by EGBD had remained asymptomatic and had normal growth. Ultrasound examination 3 months after successful EGBD revealed a normal pylorus and complete disappearance of the “tumour”.

Discussion

Dilatation of the pylorus has previously been found to be an effective method of treatment for IHPS: before the introduction of Ramstedt’s operation Nicoll [3] and Burghard [5] achieved up to 80% success with operative dilatation of the pylorus for this condition. The introduction of EGBD has renewed interest in this approach and, in addition, offers the major advantage of avoiding operation. Ramstedt’s operation is undoubtedly effective, but it inevitably results in an abdominal scar and is associated with some short-term complications (mostly avoidable by correct technique) as well as a small long-term risk of adhesion obstruction.

We previously showed in a small series that it was possible to carry out EGBD for IHPS safely and effectively [3]. From our present series, we have found that residual stenosis from incomplete pyloromyotomy responds very well to EGBD and surgery is obviated. Results of EGBD as the primary treatment of IHPS, however, are unpredictable. We have so far achieved success in only 4 out of 11 patients, and this falls far short of the gold standard provided by Ramstedt’s operation. Because of the small numbers involved, we have not been able to identify differences in patient characteristics (duration of symptoms, “tumour” size, etc.) between the “success” group and the “failure” group. In the “failure” group there was often partial relief of symptoms for a variable period after EGBD, suggesting that the response was incomplete rather than absent. The previously reported 80% success rate with operative dilatation of the pylorus [5] implies that a higher success rate for EGBD can be reached if technological advances are made. At present, because of our inconsistent results, we cannot recommend the general use of EGBD as described for primary treatment of IHPS. Refinements in the technique and perhaps innovative changes in the design of the dilators are required if better results are to be obtained with this procedure.