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Pyloric motor abnormality in patients with infantile hypertrophic pyloric stenosis

Abstract There are no published data of manometric studies of pyloric motor function in patients with infantile hypertrophic pyloric stenosis (IHPS). The present study attempted to examine the characteristics of motor abnormality of the pylorus in five children with IHPS. Using a transducer-built-in manometric catheter cannulated through the pylorus under fluoroscopy, the pressure in the pyloric canal was recorded continuously over 3 h during fasting. Clusters of high-amplitude spastic contractions of over 300 mmHg were recorded at intervals. The frequency was 1–3/min (mean 1.7 cpm) and the duration was 7–15 s. These periodic spastic contractions were suppressed temporarily for 20–30 min after intravenous injection of 0.01 mg/kg atropine. After pyloromyotomy, these spastic contractions decreased remarkably in amplitude, but there were no changes in frequency. It is concluded that the underlying motor abnormality observed in hypertrophied pyloric muscle is clusters of high-amplitude contractions, although more precise measurements of basal pyloric pressure are needed to explore the pathophysiology of IHPS in detail. The effect of pyloromyotomy may be related to the decrease in high-amplitude contractions.

Key words Infantile hypertrophic pyloric stenosis · Manometry · Atropine · Pylorospasm · Ramstedt pyloromyotomy

Introduction

The cause of infantile hypertrophic pyloric stenosis (IHPS) is still unknown. Several lines of evidence suggest that a localized deficiency of pyloric autonomic innervation exists in the hypertrophied pyloric muscle [1–5]. However, there are no published manometric studies of pyloric motor function in these patients. We present the first manometric analysis in children with IHPS.

Materials and methods

Five patients with IHPS were studied; their clinical profiles are shown in Table 1. In all cases by ultrasonography (US) confirmed that the pyloric muscle thickness was more than 5 mm and the length of the pyloric canal was over 15 mm. All patients had preoperative infusion therapy, and blood chemistry measurements were within the normal range. Informed consent for surgical treatment as well as manometric studies was obtained from the parents. A Gaeltec manometric catheter (CTO-3, external diameter 2.4 mm, Gaeltec, Scotland) was cannulated transnasally through the pylorus under fluoroscopy (Fig. 1). In this catheter, three built-in transducers are arranged at 3 cm intervals from the tip and had linear pressures ranging from 0 to 300 mmHg. Preoperatively, pressure profiles in the antrum, pyloric canal, and duodenum were recorded continuously for more than 3 h during fasting, sampled at each 1/8 s using a Polygram-upper GI (Synectics Medical). The effect of atropine 0.01 mg/kg i.v. was examined in four patients, and postoperative measurements were carried out on day 1 or 2 following surgery in three patients. The catheter position was confirmed by US or X-ray before it was removed.

Results

In all patients, periodic clusters of high-amplitude spastic contractions of over 300 mmHg were recorded in the pyloric canal at intervals of 3–20 min (Fig. 2). The frequency was 1–3/min (mean 1.7 cpm) and their duration was 7–15 (11.8 ± 2.9 s) (Fig. 3). These contractions did not propagate to the antrum or duodenum. Intravenous administration of 0.01 mg/kg atropine...
sulfate suppressed these periodic spastic contractions temporarily about 20 to 30 min, but they reappeared at longer intervals with the same amplitude (Fig. 2). Compared with the periodic spastic contractions in the pyloric canal, basal pressure changes in the antrum, pyloric canal, and duodenum were not prominent. In four patients examined for the effects of atropine, basal pyloric pressure (BPP) relevant to the antrum was $6.8 \pm 2.8$ mmHg ($n = 4$), and decreased to $3.3 \pm 3.6$ mmHg ($P < 0.05$, paired $t$-test) after administration of atropine.

After Ramstedt pyloromyotomy, these spastic contractions decreased remarkably in amplitude, although their frequency did not change significantly (Fig. 3).