PAPERS

Twenty to 40 year follow up of infantile hiatal hernia

B T Johnston, I J Carré, P S Thomas, B J Collins

Abstract
The aim of this study was to assess clinical and radiological findings of gastro-oesophageal reflux in adults who were diagnosed as having a hiatal hernia in infancy or early childhood. One hundred and eighteen patients with a minimum age of 20 who were diagnosed as having a hiatal hernia in childhood were interviewed; barium meal examination was performed in 96 of these cases. Ninety four patients had not required surgery for their hernia. The hiatal hernia persisted in 53% of these patients and 46% experienced heartburn at least monthly but in only three was this severe. Heartburn was significantly more common in patients in whom reflux was seen on barium meal. The consumption of antacids was significantly lower (20% v 46%) in patients who responded well to treatment as children. Eighteen of 24 patients who underwent surgery as children experienced heartburn monthly but in only one patient was this severe. Two patients underwent endoscopy at their request because of symptoms during this follow up. Both had Barrett’s oesophagus. In conclusion, despite the persistence of the hiatal hernia in half of the non-surgically treated patients, few complained of significant symptoms. Effective treatment in childhood was associated with a significant reduction in antacid consumption for heartburn as adults. The finding of Barrett’s oesophagus in two patients highlights a possible role for endoscopic screening in this patient group.

Keywords: Barrett’s oesophagus, childhood, gastro-oesophageal reflux disease, hiatal hernia.

It is nearly 70 years since Morrison published the results of his radiological study of adult stomachs. He observed a ‘congenital hernia of a portion of the fundus of the stomach through the oesophageal hiatus’ in roughly 1% of subjects. Despite Morrison’s speculation that the origin was congenital, only in the 1950s did references begin to appear concerning the presence of a hiatal hernia (partial thoracic stomach) in children. After verification of the existence of the lower oesophageal sphincter interest in the hiatal hernia in adult gastroenterology. Its presence has been shown to delay the clearance of acid from the oesophagus, increasing oesophageal acid exposure, and causing oesophagitis. Such a relation has also been found in children, the presence of a hiatal hernia being associated with longer episodes of reflux and with endoscopic oesophagitis. There is also evidence that a hiatal hernia has an adverse effect on the prognosis of children with reflux disease.

The aim of this study was to follow such children to adulthood. It was hypothesised that those with a persisting infantile hiatal hernia would be likely to suffer from gastro-oesophageal reflux disease as adults.

Methods
Recruited to this study were all index cases presenting to the Royal Belfast Hospital for Sick Children between 1945 and 1972. This ensured that all subjects were at least 20 years of age at follow up. All subjects had presented as children with vomiting or regurgitation, or both. Excluded from the study were all those who were mentally disabled. In total there were a possible 192 such patients. These patients had been clinically assessed and their progress monitored during early childhood by one of the authors (IJC) as part of an ongoing clinical study of children with hiatal hernia. Adequate postural treatment entailed nursing infants sitting up in a seat at an angle of at least 60° throughout both day and night. A good response to treatment was defined as cessation of symptoms within three months of commencing therapy. Details of the childhood illness were withheld from the interviewing investigator (BTJ) until all the data

TABLE 1  Assessment of gastro-oesophageal reflux disease as adults

<table>
<thead>
<tr>
<th>Heartburn frequency</th>
<th>Antacid consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = None/less than once per month</td>
<td>0 = None/less than one day per month</td>
</tr>
<tr>
<td>1 = At least once per month</td>
<td>1 = At least one day per week</td>
</tr>
<tr>
<td>2 = At least once per week</td>
<td>2 = At least one day per week</td>
</tr>
<tr>
<td>3 = At least once per week and interferes with daily activities</td>
<td>3 = Daily</td>
</tr>
</tbody>
</table>

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had been collected. At interview patients were questioned regarding current symptoms of gastro-oesophageal reflux and what treatment they were receiving (Table I).

Barium radiology was carried out by PST who along with one of the other authors (IJC) had carried out the original examinations more than 20 years previously. Each study was examined for the presence or absence of a locus of gastric mucosa above the diaphragm (Figure) and for gastro-oesophageal reflux, either spontaneous or after drinking water.

Patients who underwent childhood surgery are reported separately from those with no surgical intervention. Those with no childhood surgery were divided by the timing of postural intervention and also by their response to such treatment. Comparison was then made regarding symptoms and radiological appearances as adults.

**Results**

Of the initial 192 patients, 14 had died before follow up, all of unrelated causes. One hundred and eighteen (66%) of 178 patients still living were traced and interviewed. Of those traced 64 were male and the overall median (range) age was 27 (20–47) years. Ninety six (81%) of those interviewed agreed to a barium meal examination.

### Childhood details

Forty six of 118 patients presented within the first six months of life and were placed on postural therapy (Table II). Thirty three (72%) of these patients made a good response to treatment. Three did not respond and had surgery. Twenty four were started on postural therapy when between six and 18 months of age. Only seven (29%) of these patients had a good response, significantly fewer than in those treated early (p<0.001). One partially responsive patient and two of the non-responders had surgery. Forty eight of the patients presented too late for effective postural treatment and 18 of these patients required surgery.

### Non-surgical cases

Of 94 non-surgical cases, 43 were treated before six months of age, 21 between six and 18 months, and 30 not at all. Seventy six were examined by barium meal; a hiatal hernia was still demonstrable in 40 (53%). No statistically significant difference was noted between the three treatment groups regarding current symptomatology (Table IIIA). Forty three of the 94 patients (46%) complained of heartburn at least once per month. Though a frequent finding, in only three did heartburn interfere with daily activities. Of these three, one had gone on to develop a stricture as an adult requiring surgery, one had developed Barrett’s oesophagus, and the third declined gastroscopy. Only one other patient (from the surgery group) underwent endoscopy during the course of this study and he too had Barrett’s oesophagus.

Comparing those who did and did not respond to postural treatment in childhood, the number requiring antacids as adults was significantly lower in the responsive group (20% v 46%, p<0.05, Table III B). This was despite there being no significant difference in the prevalence of heartburn (38% v 50%, NS). Heartburn was significantly more common in patients in whom reflux could be shown with a barium meal (Table IV).

### Surgical cases

Twenty four of the traced patients had been treated surgically as children. The number of operations on each child ranged from one to five, the median being two. A number of different operative procedures were used. Eighteen had a stricture before surgery; 14 of these were over four years of age when they first presented.

At interview, 18 (75%) patients experienced heartburn at least once a month, 13 weekly but in only one patient did it interfere with daily activities. Seventeen patients were taking antacids at least once monthly. Six patients complained of dysphagia. Of the 20 who agreed to barium radiology, a hiatal hernia was still present in 17, reflux was shown in 10, and some degree of stricture was present at the site of surgery in eight.

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**Table II** Timing of postural treatment and response to it

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number</th>
<th>Response</th>
<th>Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within 6 months</td>
<td>46</td>
<td>Good</td>
<td>33*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Partial</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None</td>
<td>3 3</td>
</tr>
<tr>
<td>6-18 Months</td>
<td>24</td>
<td>Good</td>
<td>7*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Partial</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None</td>
<td>5 2</td>
</tr>
</tbody>
</table>

*p<0.001.
TABLE III. Large amounts of gastro-oesophageal reflux related to timing of childhood treatment for non-surgical cases

<table>
<thead>
<tr>
<th>Number</th>
<th>Heartburn &gt;1/month</th>
<th>Antacids &gt;1/month</th>
<th>p Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good response</td>
<td>Partial/no response</td>
<td></td>
</tr>
<tr>
<td>Heartburn &gt;1/month</td>
<td>15 (38%)</td>
<td>12 (50%)</td>
<td>NS</td>
</tr>
<tr>
<td>Antacids &gt;1/month</td>
<td>8 (20%)</td>
<td>11 (46%)</td>
<td>0.029</td>
</tr>
</tbody>
</table>

Discussion

It has been estimated that only 35% of untreated patients with an infantile hiatal hernia will be clinically well at one year whereas 90% of those appropriately treated within three months of birth will be better by one year. In an early study improvement was noted in 30 of 34 (88%) patients started with adequate postural treatment before three months of age. This compared with five of nine (55%) whose treatment was delayed until after six months. In this study, good improvement was seen in 72% of those treated within six months but in only 29% for those treated between six and 18 months. In keeping with the previous studies, early treatment did offer a significantly better chance of a good outcome. The relevance of this statistic is tempered by the fact that many of those successfully treated early represent a more benign group whose symptoms may improve with weaning alone.

The number of subjects experiencing heartburn on a monthly basis is similar to the figures of 20% to 44% quoted for the general population. Heartburn occurred significantly more frequently in patients in whom reflux could be shown radiologically. It was not associated with the continued presence of the hiatal hernia.

It is noteworthy that only three patients described their symptoms as severe enough to interfere with daily activities. These three had experienced symptoms for as long as they could remember. One had developed a stricture and required surgery and a second had free reflux on barium meal and had developed a Barrett’s oesophagus confirmed by endoscopy and biopsy. Only one other patient underwent endoscopy during the course of this study. He had experienced daily heartburn for many years and he too was shown to have a Barrett’s oesophagus by endoscopy and biopsy. Barrett’s oesophagus is not uncommonly found in adults with mild or even absent reflux symptoms. It is not known how many of these may have had an infantile hiatal hernia. Our findings highlight a need to study more formally the association between a hiatal hernia of childhood and Barrett’s oesophagus in adults. Despite difficulties associated with endoscopy currently asymptomatic patients, further endoscopic screening of some or all such patients could justifiably be evaluated.

Antacids were consumed at least once a month for heartburn by 33% of the study group. This result is similar to the 27–32% figures quoted in published works for antacid use in the community. The need for antacids in adult life was less for those patients who had responded well to childhood postural treatment. This may imply some longer disease modifying effect of childhood treatment or simply reflect a more benign subgroup of patients.

The persistence of the hiatal hernia into adult life in 53% of patients is the same as was found in the only other longterm follow up study carried out nearly 20 years ago. As already noted, its persistence did not seem to be relevant to either symptoms or antacid consumption.

A meaningful analysis of surgical results has not been possible because of the comparatively small number of patients so treated and the variety of operative procedures used. By comparison with the non-surgically treated patients symptomatic results may seem disappointing. It has, however, to be remembered that those who required surgery in childhood represent the severe end of the disease spectrum. With the majority presenting with a stricture already present it is difficult to envisage how their treatment might have been changed. Where possible, early intervention with carefully supervised postural treatment should be introduced, accompanied by appropriate acid suppressing drugs and treatment to improve oesophageal sphincter tone. This may reduce the likelihood of surgery in these cases.

In summary, the finding of an infantile hiatal hernia in symptomatic children has an excellent prognosis overall despite the fact that it persists into adult life in half the non-surgically treated patients. Early treatment with postural therapy significantly increases the chance of a good recovery and those who respond seem to require fewer antacids for heartburn as adults. Symptoms in adult life are generally mild and no more frequent than in the general population. The presence of Barrett’s oesophagus, however, in both the patients endoscoped does give cause for concern. The role of screening endoscopy in adults with a history of infantile or childhood hiatal hernia needs formal evaluation.

TABLE IV. Association of current radiological findings and clinical data in 76 radiologically examined non-surgical cases

<table>
<thead>
<tr>
<th>Cases (%)</th>
<th>Heartburn &gt;1/month (%)</th>
<th>Antacids &gt;1/month (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heartburn hernia</td>
<td>40 (21%)</td>
<td>21 (52%)</td>
</tr>
<tr>
<td>No hernia</td>
<td>36 (15%)</td>
<td>15 (42%)</td>
</tr>
<tr>
<td>x² test</td>
<td>0.89</td>
<td>0.02</td>
</tr>
<tr>
<td>p Value</td>
<td>0.345</td>
<td>0.0006</td>
</tr>
</tbody>
</table>

During the course of this research BTJ was in receipt of research fellowships from the Royal Victoria Hospital, Belfast and the Ulster Hospital, Dundonald.

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