Pneumatic Dilatation in the Management of Achalasia: Experience of 45 Cases

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SUMMARY

A 15-year experience of the management of achalasia is described. Forty-five patients were managed by pneumatic dilatation after sedation with intravenous diazepam. The mean period of observation was 47.1 months. Eighty-six per cent of patients had either no symptoms or only minor symptoms following the procedure. Perforation occurred in four patients (8.8 per cent) and one of these required surgical intervention. The others were managed conservatively. Four cases (8.8 per cent) developed reflux. One patient died of myocardial infarction. Eighty-four per cent of patients needed one dilatation only and no patient required cardiomyotomy. The method is simple and rapid and most patients were discharged within 24 h of the procedure.

INTRODUCTION

Achalasia is a disorder of oesophageal motility characterised on swallowing by incomplete relaxation of the lower oesophageal sphincter, which may be either normotensive or hypertensive, and loss of oesophageal peristaltic activity. Management is directed towards the disruption of the lower oesophageal sphincter by surgical cardiomyotomy or forced pneumatic dilatation. Medical treatment with anticholinergic agents or calcium antagonists is disappointing and bougienage produces only transient relief with a reported six per cent incidence of perforation of the oesophagus (1). In Britain cardiomyotomy is practised almost to the exclusion of pneumatic dilatation but in this unit the treatment of choice has been by the latter technique. Preliminary experience has been reported (2) and this paper describes further experience over a period of 15 years.

METHODS

Forty-five consecutive patients, 23 men and 22 women were studied. No patient was considered unfit for the procedure. Their ages ranged from nine to 80 years (mean 43 years) (Table 1). Duration of symptoms at the time of presentation ranged from months to more than 22 years with eight patients having had symptoms for over 10 years (Table 2). Of these patients only two did not experience dysphagia. Twenty-three of the remainder complained of dysphagia for
TABLE 1. *Age of patients with achalasia (45 patients)*

<table>
<thead>
<tr>
<th>Years</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>5*</td>
</tr>
<tr>
<td>21–30</td>
<td>11</td>
</tr>
<tr>
<td>31–45</td>
<td>10</td>
</tr>
<tr>
<td>46–60</td>
<td>6</td>
</tr>
<tr>
<td>61–70</td>
<td>6</td>
</tr>
<tr>
<td>70</td>
<td>7</td>
</tr>
</tbody>
</table>

* Nine, nine, 15, 17, 20 years.

TABLE 2. *Duration of symptoms (years)*

<table>
<thead>
<tr>
<th>Duration</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>10</td>
</tr>
<tr>
<td>1&lt;2</td>
<td>13</td>
</tr>
<tr>
<td>2&lt;5</td>
<td>6</td>
</tr>
<tr>
<td>5&lt;10</td>
<td>8</td>
</tr>
<tr>
<td>&gt;10</td>
<td>8</td>
</tr>
</tbody>
</table>

solids only, four for liquids only and a further 16 patients complained of dysphagia for both solids and liquids. Regurgitation was a prominent feature and occurred in 27 patients (Table 3). Four patients had had a previous cardiomycotomy. The diagnosis of achalasia was established radiologically, endoscopically and in most cases manometrically. In all the patients a barium swallow showed the typical changes of achalasia and in four a sigmoid deformity of the oesophagus was also demonstrated. Manometry was performed in 41 of the 45 patients using a triple lumen tube with three distal orifices 5 cm apart perfused with normal saline at a rate of 1 ml/min. This was connected to Statham’s transducers and a Devices four channel recorder. In 34 patients there was failure or impaired relaxation of the lower oesophageal sphincter and deranged peristaltic activity in the body of the oesophagus. One of these patients exhibited vigorous achalasia. In seven other patients recordings were not obtained from the sphincter region because of difficulty experienced in negotiating the area but the expected abnormalities were present in the body of the oesophagus. In the four patients who had undergone previous cardiomycotomy the results of the motility studies were characteristic of achalasia.

Oesophageal lavage was performed in all patients on the day before dilatation using a large-bore tube positioned in the oesophagus. They then fasted overnight. Pre-medication was with atropine and papaveretum following which an upper alimentary endoscopy was performed.

TABLE 3. *Symptoms at presentation*

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Numbers (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysphagia</td>
<td></td>
</tr>
<tr>
<td>Solids</td>
<td>23 (51.1)</td>
</tr>
<tr>
<td>Liquids</td>
<td>4 (8.8)</td>
</tr>
<tr>
<td>Both</td>
<td>16 (35.5)</td>
</tr>
<tr>
<td>Weight loss</td>
<td>15 (30.0)</td>
</tr>
<tr>
<td>Pain</td>
<td>12 (26.6)</td>
</tr>
<tr>
<td>Regurgitation</td>
<td>27 (60.0)</td>
</tr>
<tr>
<td>Aspiration</td>
<td>3 (6.6)</td>
</tr>
</tbody>
</table>
under sedation with intravenous diazepam using a forward viewing fibre-optic endoscope. This excluded any organic lesion of the oesophagus and permitted assessment of the adequacy of oesophageal toilet. A modified Brown-McHardy oesophageal dilator (Pilling) (3), which consists of a mercury-filled bougie with a radio-opaque hour glass balloon at the distal end, was inserted under fluoroscopic control until the waist of the balloon was seen to be at the gastro-oesophageal junction. The balloon was inflated to a pressure of 15 p.s.i. for 15 to 20 s. In the two children both aged 9 years reduced pressures of 7.5 p.s.i. were used though at further dilatations these were increased to full adult pressures. In the patients who had had previous cardiomyotomy reduced pressures of 10 to 12 p.s.i. were used to reduce the risk of perforation. Endoscopy was not repeated after dilatation as this might have aggravated the clinical problems should leakage have occurred. The surgeon member of the team was aware of the timing of the procedure and was available.

Following the procedure patients were returned to the ward and a chest radiograph was taken after three to four hours. Oral fluids were allowed overnight providing the radiograph was satisfactory and food was introduced the following day. Any suspicion of leakage led to a gastrografin examination. A second barium swallow was carried out within six months.

**RESULTS**

The period of observation ranged from six months to 14 years (mean 47.1 months). In one patient dilatation was abandoned for technical reasons and he was subsequently lost to the study. This patient had had previous gastric surgery and the combination of the long tip of the mercury bougie and the distorted anatomy did not enable satisfactory placement of the pneumatic bag at the gastro-oesophageal junction. One further patient was lost to the study. This was the patient who underwent surgical repair of the perforation.

<table>
<thead>
<tr>
<th>TABLE 4. Overall results of dilatation</th>
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</thead>
<tbody>
<tr>
<td>Numbers (percentage)</td>
</tr>
<tr>
<td>No symptoms</td>
</tr>
<tr>
<td>Mild symptoms</td>
</tr>
<tr>
<td>Severe symptoms</td>
</tr>
<tr>
<td>Lost to study because of surgery</td>
</tr>
<tr>
<td>Dead</td>
</tr>
<tr>
<td>Technical failure</td>
</tr>
</tbody>
</table>

Twenty-four patients have remained asymptomatic and 14 have mild symptoms of whom 13 have occasional problems with dysphagia (less than once per week); one has mild reflux. One patient has developed an oesophageal stricture requiring Eder–Puestow dilatation and three other patients have troublesome reflux. In the 44 patients in whom dilatation was completed 86 per cent are either asymptomatic or have only mild symptoms (Table 4).

A total of 51 dilatations was performed. 38 patients (84 per cent) requiring one dilatation

<table>
<thead>
<tr>
<th>TABLE 5. Number of dilatations per patient</th>
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</thead>
<tbody>
<tr>
<td>No. of dilatations</td>
</tr>
<tr>
<td>No. of patients</td>
</tr>
</tbody>
</table>
only. The two children required two and three dilatations respectively but reduced pressures had been used initially (Table 5).

The second barium studies showed that abolition of the hold-up of barium was achieved in all cases and was associated in most with a reduction in the maximal diameter of the oesophagus.

One death occurred during the study 21 h after dilatation. This concerned a 77 year old lady with severe dysphagia for both liquids and solids, and ischaemic heart disease as manifested by angina and rest pain. Post-mortem examination revealed a myocardial infarction thought to be approximately five days old. The dilatation itself was uncomplicated. Other complications are listed in Table 6 including perforation of the oesophagus in four patients. In one of these patients a large tear was demonstrated at gastrografin swallow permitting the escape of air into the pleural cavity and this was repaired successfully. The remainder of the perforations were treated conservatively with nasogastric suction, parenteral feeding and chemotherapy with good results. These three patients spent 9, 14 and 15 days respectively in hospital after dilatation and most of the others were discharged the day after the procedure.

**TABLE 6. Complications after procedure**

<table>
<thead>
<tr>
<th></th>
<th>Numbers</th>
<th>Percentage of patients</th>
<th>Percentage of dilatations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Early</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perforation</td>
<td>4</td>
<td>8.8</td>
<td>7.8</td>
</tr>
<tr>
<td>Aspiration</td>
<td>1</td>
<td>2.2</td>
<td>2.0</td>
</tr>
<tr>
<td>pneumonia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basal atelectasis</td>
<td>1</td>
<td>2.2</td>
<td>2.0</td>
</tr>
<tr>
<td>Pyrexia</td>
<td>1</td>
<td>2.2</td>
<td>2.0</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>2</td>
<td>4.4</td>
<td>3.9</td>
</tr>
<tr>
<td>Death</td>
<td>1</td>
<td>2.2</td>
<td>2.0</td>
</tr>
<tr>
<td>Technical failure</td>
<td>1</td>
<td>2.2</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Late</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reflux</td>
<td>4</td>
<td>8.8</td>
<td>7.8</td>
</tr>
<tr>
<td>Stricture</td>
<td>1</td>
<td>2.2</td>
<td>2.0</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Opinion varies as to the relative advantages and disadvantages of cardiomyotomy and pneumatic dilatation in the management of achalasia. There have only been two studies comparing these methods (4, 5) but direct comparison is difficult because of the variety of methods and instruments used for dilatation, and the variety of modifications to cardiomyotomy. Indeed the end result, relief of dysphagia is subjective rather than objective but appears to be roughly equal with both methods reporting a 65 to 90 per cent success rate (6-12). In this study 86 per cent of patients were either asymptomatic or had only minimal symptoms following dilatation. Csendes et al. in a prospective randomised trial reported better long-term results with surgery (4) and Okike et al. in a retrospective uncontrolled study of 889 patients also favour cardiomyotomy (5).

Pneumatic dilatation is simpler and quicker than cardiomyotomy. General anaesthesia has not been used in this study (13) as the impression is that patient recollection is poor and similar in fact to that after any other endoscopic procedure carried out under diazepam sedation. Fluoroscopy is an important part of the procedure as it is easy during inflation for the bag to slide into the stomach or even into the oesophagus.

The mortality after pneumatic dilatation is 0 to 0.8 per cent compared with 0 to 1.4 per cent
after cardiomyotomy (12). In this series the mortality of 2.2 per cent represents a single death from myocardial infarction in an elderly patient with severe dysphagia who would not have been considered fit for cardiomyotomy.

The risk of oesophageal perforation is the principal disadvantage of pneumatic dilatation and is reported to occur in four per cent of cases overall (5). Vantrappen et al. reported an incidence of this complication in 2.6 per cent of patients or in 0.7 per cent of dilatations (12). In the present series perforation occurred in 8.8 per cent of patients or in 7.8 per cent of dilatations. This may reflect a more forceful initial dilatation as our patients required fewer subsequent dilatations than those in the series reported by Fellows et al. (13) or Vantrappen et al. where incremental dilatation was the preferred method, and most patients required three to four dilatations (12). Four per cent of patients reported by Fellows et al. (13) had more than four dilatations and 10 per cent of patients required cardiomyotomy. No patient in the present series required four dilatations and only 2.2 per cent required three dilatations. No patient required referral for cardiomyotomy.

It is important to emphasise that perforation can usually be managed conservatively. Perforation would in fact seem to amount to no more than transitory leakage of air during the procedure. Apart from one case leakage of gastrografin was not demonstrable in these cases and indeed it was this one patient that required surgery. Only one patient in each of the recently published series has required surgery (12, 13). It is possible that the incidence of leakage is under-estimated and might explain some of the pleural reactions and pyrexial episodes in this and other series. In this context the importance of a clean oesophagus before the procedure cannot be over-emphasised. We have not encountered haemorrhage as a complication (12).

Fellows et al. report that symptomatic relief is more difficult to achieve with pneumatic dilatation in patients under 45 years of age (13) and this view is shared by Vantrappen et al. (12). The two 9 year olds treated in this unit required two and three dilatations respectively but it cannot be concluded that this is due to a more severe type of achalasia because lower pressures were used at the first dilatation. Here the advice of the available literature in this field was followed (14). Subsequently adult pressure levels were used in these as in the other two young patients of 15 and 17 years. The other patients in this series who have required repeated dilatation were aged 25, 62 and 73 years. Indeed over 50 per cent of the patients were under 45 years of age and their response to the technique used here suggests that they do as well as older patients. Again with this method, if repeat dilatation was going to be necessary this has always been apparent from clinical and radiological assessments carried out at or before the first check, that is within six months. Patients do not appear to have relapsed subsequently.

Apart from its simplicity and rapidity an important advantage of pneumatic dilatation over cardiomyotomy is the low risk of reflux oesophagitis and stricture formation. Symptomatic reflux occurs in approximately 20 per cent of patients after cardiomyotomy (1, 15). This occurred in 9 per cent of patients in this series, one of whom developed an oesophageal stricture. Vantrappen and his colleagues report an incidence of symptomatic reflux of less than one per cent (12). Yon et al. report a seven per cent incidence of symptomatic reflux following pneumatic dilatation compared with that of 25 per cent following cardiomyotomy without hiatal repair (1). Black et al. suggest that hiatal repair should be performed routinely with cardiomyotomy but this view is disputed (6, 15).

In conclusion pneumatic dilatation can achieve relief of dysphagia comparable with that obtained after cardiomyotomy but with a reduced risk of subsequent reflux. The method described here may be more vigorous than that described in two recent series (12, 13) and this may explain the higher incidence of perforation and reflux. However the need for repeated dilatation was reduced. If a second dilatation was required the need was apparent early. The method allows patients to be treated rapidly and they can usually be discharged within 24 h.
Perforation is a risk and though usually treated conservatively, the procedure should not be carried out without ready access to surgical help.

REFERENCES