Endoscopic Dilation of Benign Esophageal Strictures: Report on 1043 Procedures

J. C. Pereira-Lima, M.D., Ph.D., R. P. Ramires, M.D., I. Zamin, Jr., M.D., A. P. Cassal, M.D., C. A. Marroni, M.D., and A. A. Mattos, M.D., Ph.D.

Department of Gastroenterology, Santa Casa University Hospital, Porto Alegre Medical School, Porto Alegre, Brazil

OBJECTIVE: Endoscopic dilation is considered the best treatment for most cases of benign esophageal stricture, although the best dilation technique and the kind of stricture is the most amenable to treatment is still controversial. We report on our experience on a large series of patients treated by dilation without the aid of fluoroscopy and compare the results of this therapy among patients with strictures from different causes.

METHODS: Between 1992 and 1997, we performed 1043 dilation sessions on 153 patients. Treatment was considered adequate if the esophageal lumen could be dilated up to the size of a 42F catheter. If the stricture recurred after initial successful treatment, the stricture was dilated again up to a 42F catheter.

RESULTS: One hundred forty patients (96 men, 44 women; mean age, 54.1 yr) were followed-up for a mean of 20.5 months (4 to 62 months). Stricture’s etiology was postsurgical in 80 patients, peptic in 37, caustic in 12, and from other causes in 11 patients. Adequate dilation was achieved in 93.5% of the patients (131 of 140). Patients with peptic strictures needed a median of three sessions to be adequately dilated during follow-up in comparison to five sessions among patients with postsurgical or caustic strictures ($p = 0.07$). There were four perforations, with one death (2.8% and 0.7% per patient and 0.4% and 0.1% per session, respectively).

CONCLUSIONS: Endoscopic dilation without the aid of fluoroscopy is safe and effective in relieving dysphagia caused by benign strictures of different causes, although repeated sessions are necessary because of stricture recurrence. (Am J Gastroenterol 1999;94:1497–1501. © 1999 by Am. Coll. of Gastroenterology)

INTRODUCTION

Endoscopic peroral dilation is considered the initial treatment of choice for patients with benign esophageal strictures (1, 2). The endoscopic dilation procedures can be performed with mercury-weighted rubber blunt-tipped (Hurst type) or tapered-tipped (Maloney type) bougies, wire-guided polyvinyl bougies (Savary-Gilliard type), wire-guided metal olives (Eder-Puestow type), or endoscopically oriented balloons (3, 4).

Although endoscopic esophageal stricture dilation is the chief cause of the most dreaded complication of a diagnostic or therapeutic upper digestive endoscopy, i.e., perforation, this technique remains considered the safest, and perhaps the most efficient method to mitigate both dysphagia and malnutrition caused by benign esophageal stenoses (5, 6). In this study, we report our experience on a prospectively assessed series of 153 patients with 1043 dilation sittings.

PATIENTS AND METHODS

Patients

A total of 153 patients with benign esophageal stenosis seen consecutively between May 1992 and July 1997 were enrolled in the study. All patients presented with dysphagia of varying grades and the benign etiology of the stricture was confirmed by means of endoscopy with biopsies and by the clinical outcome.

Endoscopic Dilation

The dilation sessions were done as an outpatient procedure in the vast majority of the patients. A barium esophagogram was performed before the first dilation sitting only when the endoscopist suspected the existence of a tortuous stenosis (e.g., all cases of caustic and some cases of peptic strictures). Dilation was done using Savary-Gilliard dilators (Wilson Cook Medical Inc., Winston-Salem, NC) or Eder-Puestow dilators (Key Medical Inc., Essex, UK). Bougies or metal olives of increasing size were passed over a guide-wire, which had been positioned with the help of an endoscope (GIFXQ20, CV-1 Video Endoscope or CV-100 Video Endoscope, Olympus, Corp., Tokyo, Japan). Usually, one to four dilators were passed during each session, depending on patient tolerance and stricture tightness. Fluoroscopic control of the procedure was never performed. Dilation sessions were done on a weekly basis until a lumen size of 42 to 45F (14 to 15 mm) was obtained. Afterward, dilation was repeated whenever dysphagia recurred. Patients who had strictures caused by peptic esophagitis were advised to use proton pump inhibitors, such as omeprazole or lansoprazole,
together with other antireflux measures such as raising the head of the bed.

After each dilation session, patients were carefully observed for any complication such as perforation or bleeding. If perforation was suspected, an urgent chest x-ray and an esophagogram using a water-soluble contrast medium were done. If perforation was confirmed, an immediate surgical consultation was sought and the patient was put on intravenous fluids, parenteral antibiotics and was advised to take nothing by the oral route.

Response to Treatment
Response to treatment was judged on the basis of improvement in dysphagia, which was graded as follows: 0, taking a normal diet, no dysphagia; 1, unable to swallow certain solid foods (e.g., grilled beef); 2, able to swallow only semisolid soft foods; 3, able to swallow just liquids; 4, unable to swallow liquids in adequate amounts.

The response to endoscopic management was considered good if the stricture could be dilated up to a diameter of 42 to 45F with complete or almost complete relief of dysphagia (grade 0 and 1, respectively). When the stenosis could not be dilated adequately until this bougie diameter, or there was minimal or no improvement in the symptoms even if the stricture was dilated up to 45F, the response to treatment was considered “poor” (grades 2, 3, and 4).

Treatment Follow-up
After the initial adequate dilation, patients were instructed to return to our Endoscopy Unit for a control endoscopic examination 1 month and 3 months after the last endoscopic procedure or whenever dysphagia recurred. One year after the last dilation session, patients were contacted to assess response to treatment.

Statistics
Kruskal-Wallis test was applied to verify the significance of correlations between cause and the number of sessions needed to achieve adequate response and dysphagia grade versus number of sessions. \( \chi^2 \) Test was used to assess correlation between etiology and pretreatment dysphagia grade and cause versus response to treatment. Differences were considered significant only when a \( p \) value of <0.05 was achieved.

RESULTS
We prospectively studied 153 patients, in whom we performed 1043 dilation sittings. Thirteen patients were lost to follow-up or did not wish to complete treatment and were excluded from analysis. One hundred forty patients, who underwent 978 dilation sessions (mean, 6.98 per patient), completed the follow-up (mean, 20.5 months; 4–62 months). Of these, 96 were men and 44 women with a mean age of 54.1 years (median, 57 yr; age range, 3 to 78 yr); 126 were white and 11, nonwhite. The cause of the esophageal strictures of the 140 followed-up cases is shown in Table 1.

<table>
<thead>
<tr>
<th>Cause</th>
<th>No. of Patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postsurgical</td>
<td>80</td>
<td>57.1</td>
</tr>
<tr>
<td>Peptic</td>
<td>37</td>
<td>26.4</td>
</tr>
<tr>
<td>Caustic</td>
<td>12</td>
<td>8.5</td>
</tr>
<tr>
<td>Ring or web</td>
<td>4</td>
<td>3.0</td>
</tr>
<tr>
<td>Postradiotherapy</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Caustic</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Unknown</td>
<td>3</td>
<td>2.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stricture Etiology</th>
<th>Dysphagia Grade</th>
<th>Peptic</th>
<th>Postoperative</th>
<th>Caustic</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>0</td>
<td>27</td>
<td>73</td>
<td>45</td>
<td>56</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>16</td>
<td>17</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>≥2</td>
<td>4</td>
<td>11</td>
<td>18</td>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>80</td>
<td>80</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

\( p > 0.05, \chi^2 \) test.
Although endoscopic esophageal dilation is considered the best initial therapeutic approach for benign esophageal strictures, the best technique and the best type of dilator to perform the procedure remains to be determined (3, 4).

Yamamoto et al. (7) have compared prospectively the results after Eder-Puestow or Medi-Tech balloon dilatation in 123 patients. They noted similar results with both types of dilators, whereas a previous comparison between Savary-Gilliard bougies and through-the-scope balloons also encountered no significant difference (8). On the other hand, Cox et al. (9) in the final analysis of a 1-year prospective comparison of two dilation techniques found that Eder-Puestow dilators passed over an endoscopically placed guidewire produced a greater increase in esophageal lumen size at the end of the follow-up, a greater decrease in dysphagia grade at 5 months, and a lower redilation rate than did nondendoscopic balloon dilation.

Every esophageal stricture seems to have its own characteristics and some individualized variation in technique may be needed for a successful therapy. Maloney dilators (the preferred dilator type in the United States) work well for short strictures, but are difficult to use for the initial dilation stages in more complex cases (10, 11). Eder-Puestow metal olives have been largely abandoned for Savary-Gilliard bougies in most endoscopy units around the world, although no study have proved advantages in terms of safety and efficacy for the latter type of dilator over the former one (3, 4). In our own experience, Savary-Gilliard bougies seem to be easier to manipulate than Eder-Puestow metal olives, although with the latter the endoscopist may “feel” better the stricture. Indeed, differences in the results of endoscopic therapy is in a large measure operator dependent, and although defined guidelines for the use of these devices are available, interoperator variations in technique will likely result in individual biases among endoscopists and will tend to favor one type of dilator over another (3, 10, 12).

In our series, we did not use fluoroscopic control of guidewire and dilator position and path. The use of fluoroscopy in placement and maintenance of the guidewire has been emphasized in the literature (13, 14). The American and the German Societies of Gastrointestinal Endoscopy recommend the use of fluoroscopy at least in the initial dilation sessions (2, 10). On the contrary to both societies’ guidelines, Ho et al. (11), in a prospective study evaluating 80 patients, found that fluoroscopy is not necessary for Maloney dilation of benign esophageal strictures. Esophageal dilation using Savary-Gilliard bougies without the aid of fluoroscopy was also reported to be safe (15). Several other recent studies focused on this subject and reached similar conclusions, as the one by Marshall et al. (16) who performed 606 wire-guided dilation sessions on 354 patients (4, 17). In cases of tortuous strictures as the ones produced by lye ingestion or cancer, the passage of a very flexible guidewire of the type used to insert biliary endoprostheses can be used as a recourse to “cannulate” these strictures with safety (18).

In this series, we observed one case (of a total of four) of perforation that was attributable to guidewire injury to the stomach. Even with the aid of fluoroscopy, this complication would not be avoided, thus the injury occurred because the assistant did not properly hold the portion of the guidewire outside the patient i.e., a fault in technique performance. Indeed, fluoroscopy is time consuming, results in exposure to radiation and x-ray equipment is not available in most endoscopy units because of its expense. In our opinion, fluoroscopy does not add safety to the vast majority of the procedures and even in cases of tortuous strictures, blind guidewire passage can be performed safely, when performed with care.

In our study, although not statistically significant, there was a trend toward more frequent recurrences, and consequently, dilation sessions, among patients with both postoperative and caustic strictures. Patients with peptic stenosis needed a median of three dilation sessions to be free of dysphagia during a mean follow-up time of 20 months, in comparison with five sittings among the cases with caustic or postoperative strictures. These nonstatistically significant figures are probably due to a type II error.

Broor et al. (19) found that the number of treatment sessions required to achieve adequate dilation was significantly higher among patients with corrosive (median, 8; range, 1 to 35) than in cases with peptic strictures (median, 1; range, 1 to 33). Dysphagia recurrence was also higher in the corrosive group than in the peptic stricture group. Undoubtedly, lye ingestion-induced esophageal strictures are technically more difficult to dilate and, on account of this, physicians may dilate these strictures more carefully than

### Table 3. Number of Dilation Sessions Required According to Dysphagia Grade

<table>
<thead>
<tr>
<th>Dysphagia Grade Before Treatment</th>
<th>Patients (n)</th>
<th>Number of Sessions (Median)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>26</td>
<td>3 (1–17)</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>2 (1–42)</td>
</tr>
<tr>
<td>3</td>
<td>58</td>
<td>5 (1–28)</td>
</tr>
<tr>
<td>4</td>
<td>48</td>
<td>6 (2–46)</td>
</tr>
</tbody>
</table>

$p < 0.0005$, Kruskal-Wallis test.
usual, which would result in more sessions per patient than
in esophageal dilations for stricture of other causes.

In our series, an esophageal stenosis after surgical anastomosis was the most common indication for endoscopic esophageal dilatation. This is a referral bias, because our hospital is a regional center for the surgical treatment of esophageal cancer. Benign anastomotic strictures after esophagectomy and cervical esophagogastrectomy or total gastrectomy and jejunoesophagostomy tend to be tighter than reflux esophagitis-induced stenoses. Although nonsignificant, 30% of our patients with peptic esophageal stenosis presented with mild dysphagia (11 of 37) in comparison with 14% (11 of 80) of the patients with anastomotic stricture. The vast majority of these patients were operated on for an esophageal or gastric cancer and these patients typically die within a few months due to their primary disease. Although recurrence should not be a problem in the long term, due to the malignant nature of the primary disease, the tightness of their strictures usually demands more dilatation sittings at the primary setting. Our data of a median of five sessions needed to alleviate dysphagia is according to the wide variation found in the literature (between 2 and 9.5 sessions per patient) (20–22).

Although dysphagia caused by peptic esophageal strictures tend to be milder and easier to manage in the short term, recurrent strictureting necessitating repeat endoscopic dilatation is a significant problem in the long term due to the chronic nature of gastroesophageal reflux disease (23). For instance, Smith and collaborators, (24) report that redilatation was required in 30% of the patients taking 20 mg of omeprazole a day within 1 year of successful treatment of the stricture.

Absence of dysphagia—the goal of therapy—was achieved at the end of follow-up in about two-thirds of our patients, although adequate dilation was achieved in 93% of the cases; 17.8% of the cases remained with some degree of tightness of their strictures usually demands more dilatation sessions at the primary setting. Our data of a median of five sessions needed to alleviate dysphagia is according to the wide variation found in the literature (between 2 and 9.5 sessions per patient) (20–22).

The incidence of perforation per dilation session in the present study (0.38%) is comparable to other large series such as the one published by a Dutch group (22) (0.4%) or by the guidelines of the German Society of Gastrointestinal Endoscopy (2) (0.5%). Other investigators report more extreme results, such as Marshall et al. (16), who observed no perforation in a series of 606 wire-guided dilations on 354 patients with hollow-core polyvinyl dilators. These researchers stated that the strictures were dilated to their maximal target size in one session in 77% of the cases, demonstrating that the majority of their patients had a mild disease. Lahoti and colleagues (25), dealing with corrosive strictures, which are more difficult to dilate, report four cases of perforation in 115 dilatation sessions (3.5%).

In summary, our results show that endoscopic dilation is a safe and effective treatment for the short-term relief of dysphagia produced by benign esophageal strictures, even without the aid of fluoroscopic monitoring. In the long term, strictures tend to recur and repeated sessions of dilation are demanded to alleviate dysphagia.

Reprint requests and correspondence: Júlio C. Pereira-Lima, M.D., Ph.D., Rua Eng. Álvaro Nunes Pereira, 400/1003, Cep: 90.570-110, Porto Alegre, Brazil.

Received June 1, 1998; accepted Nov. 13, 1998.

REFERENCES

13. Tulman AB, Boyce HW. Complications of esophageal dila-