

# Dilatation Treatment for Esophageal Strictures

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## ABSTRACT

A patient with adjustment disorder and depression had experienced a suicide temptation by ingesting corrosive substance since 6 months before her hospital admission. On the first day care, she only can swallow "soft-fluid diet" which is given very slowly. Subsequently, the patient had a series of dilatation treatment guided by fluoroscopy and demonstrated a very impressive result.

On the first dilatation, a 7 mm dilator was used, and then respectively 9, 10, 5, 12, 8 and 14 mm dilator was applied. We needed to perform three sessions of dilatation until the 9 mm dilator can be inserted. After the second dilatation, the patient had started to be able to eat refine porridge and subsequently rice porridge with soft vegetables and side dishes. At the end of treatment, she had already been able to eat normally. The general management of esophageal stricture by using dilator will be discussed in this article.

**Keywords:** stricture, corrosive substance, dilatation treatment, dysphagia

## INTRODUCTION

Esophageal dilatation is performed when there is an esophageal stricture, anatomical or functional, caused by various conditions of both benign and malignant conditions. Benign stricture is caused by the production of fibrotic tissue and collagen deposition stimulated by deep ulceration and chronic inflammation. About 80% cause of stricture is correlated to gastroesophageal reflux. Stricture due to malignancy may develop due to either intra or extra-lumen tumor growth.<sup>1</sup>

There are 5,000–15,000 cases of stricture due to ingestion of corrosive substance in United States every year. Approximately 50%-80% cases occur in children. The male to female ratio is 2 : 1. The predominant factor in children is usually unintentional, in contrast to adults.<sup>1,2</sup> The following case demonstrates an esophageal stricture due to corrosive substance in a suicide temptation experienced by a patient with

adjustment disorder and depression. The stricture has been corrected by dilatation treatment in several stages, which has shown significant improvement. There are several things that should be prepared in dilatation management.

## CASE ILUSTRATION

A 25-year-old woman who had not been married had complaining of difficulty in swallowing food since 6 months before her hospital admission. She had been formerly diagnosed as a patient with paranoid schizophrenia and the suspected inducer is her problem with boyfriend. She had been hospitalized in a mental hospital for 2 weeks. During her treatment out of the hospital 6 months before her hospital admission, she still frequently heard strange voices; and one of those voices encourage her to attempt suicide by ingesting floor cleanser (Porstex®) in amount of approximately 300 cc. The cleanser could be vomited out after being incited by milk. The patient was brought to hospital for first aid care. After being hospitalized for 3 weeks, endoscopy was performed and the result demonstrated an esophageal stricture due to corrosive substance. A month later, she underwent treatment by

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using balloon dilator. Dilatation treatment was performed twice with 1-month interval, which was not in accordance with the schedule (2 weeks) due to economical reason.

Approximately 4 months later, she came back again to the hospital to have the next dilatation treatment. On the first day care, she could only swallow soft-fluid food such as mung beans porridge, milk, fruit juice, and rice powder porridge. She swallowed very slowly in order to prevent choking or vomiting the food out. She had no nausea, vomiting or abdominal pain. The symptom of fever was denied, defecation and urination were still normal. On the physical examination, the vital signs were within normal limit, with adequate nutritional status, her height was 158 cm and her weight was 48 kg. The heart and lungs were within normal limit. The abdomen was flat, supple, with no liver and spleen enlargement, no abdominal pain on palpation. The bowel sound was positive normal. The extremities were warm and no edema was found. The endoscopy result demonstrated a stenosis on middle esophagus, approximately 20 cm of the mouth and accompanied by diverticle.

The patient underwent a series of dilatation treatment guided by fluoroscopy in Cipto Mangunkusumo Hospital, and demonstrated vigorous improvement. On the first dilatation, 7 mm dilator was used, and then respectively 9, 10, 5, 12, 8 and 14 mm dilator was applied. During the procedure, dormicum for anesthetics was being administered. We needed to perform three sessions of dilatation until 9 mm dilator can be inserted. After the second dilatation, the patient had started to be able to eat refine porridge and subsequently rice porridge with soft vegetables and side dishes. On the next treatment, she gradually could eat coarse porridge and subsequently soft rice. After having 8 times dilatation treatment guided by fluoroscopy, the patient underwent dilatation treatment at the Gastroenterology outpatient clinic. During hospitalization, her mental and psychological status was under good control by using haloperidol and trihexyphenidil.

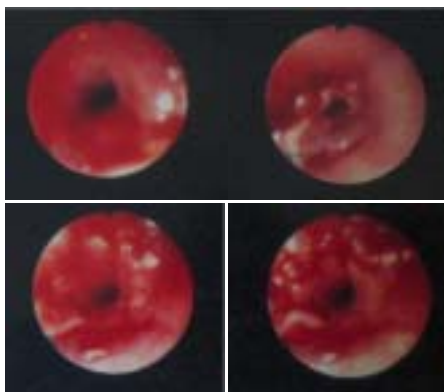


Figure 1. Esophageal appearance before dilatation therapy

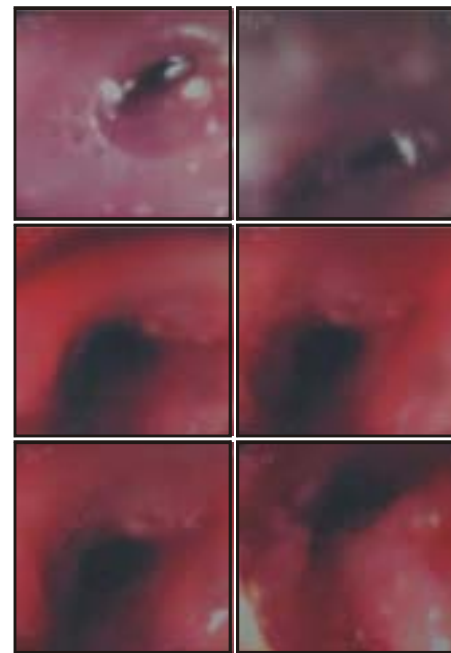


Figure 2. Esophageal appearance after dilatation with 7 mm dilator

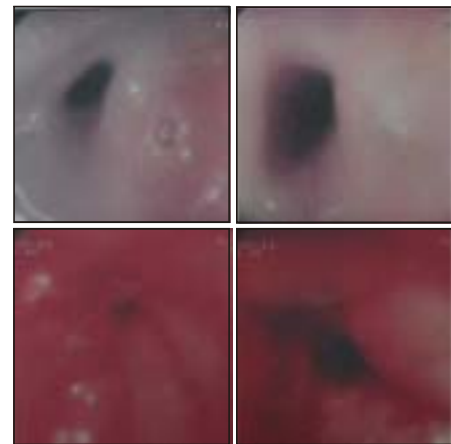


Figure 3. Esophageal appearance after the last dilatation

## DISCUSSION

Esophageal dilatation is performed as a management of anatomic and functional abnormalities causing esophageal stricture.<sup>1,2,3</sup> These abnormalities resulting from various causes, either benign or malignant condition. Based on its structure, esophageal stricture can be categorized into 2 groups, i.e. simple and complex. Simple stricture is defined when the lesion is symmetric or concentric with diameter  $\geq 12$  mm or when the endoscope can easily pass through the stricture. In addition, complex stricture is considered when there is one or more following symptoms, i.e. asymmetric lesion, diameter  $\leq 12$  mm or the endoscope hardly pass through the lesion.<sup>1,3</sup>

It is believe that benign stricture is caused by the formation of fibrotic tissue and collagen deposition stimulated by deep ulcer or chronic inflammation. The most common form is peptic stricture, a sequel of

reflux esophagitis. The other causes including Schatzki's ring, radiation therapy, congenital stricture, anastomosis stricture and ingesting corrosive substance as occur in the presented case.<sup>1</sup> The patient ingested floor cleanser (Porstex®) which contains hydrochloride acid. Such chemical trauma causes coagulated necrosis on the affected area; this coagulation is intended to prevent further penetration. On the other hand, there is liquefaction necrosis, i.e. a process that cause protein and collagen dissolution, lipid saponification, tissue dehydration and thrombosis of blood vessels which finally damage to deeper tissues. Approximately 85.4% patients who have ingested corrosive substance have abnormalities on distal esophagus and 44.4% further complication such as pyloric or antrum stenosis.<sup>4</sup>

The characteristic symptom felt by the patients with esophageal stricture is difficulty in swallowing solid food but no complaint when swallowing fluid-food. This is different from motility disorder which has difficulty in swallowing either solid food or fluid. During hospitalization care, the patient could not swallow solid food, she could only eat porridge and fruit juice, which is in consistent with dysphagia grade 1.<sup>5</sup>

The main indication of esophageal dilatation treatment is to restore the symptoms of difficult swallowing. Moreover, the oral nutrition has run well and it decreases the risk of pulmonary aspiration. There are two types of esophageal dilator, i.e.:<sup>1-3, 5-7</sup> (1) Push dilators: it can be equipped by weighted bougie (by mercury or tungsten filled rubber bougie) or wire guided (metal olive, Celestine type dilators or polyvinyl bougie). Weighted bougie is available in 7-20 mm of diameter. It can be blindly inserted by using local anesthetics, the patient in sitting position and in some patients, they can be taught to perform the dilatation by themselves. Polyvinyl dilator has become more popular recently. The Savary Gillard dilators consist of polyvinyl tube with 5-20 mm diameter, having a radio-opaque band at the widest point. Savary or American dilator is inserted through a guidewire which has been position at the tip of antrum, with or without fluoroscopy. The Maloney type has a pointed tip, it can be performed blindly by using guided fluoroscopy. The fluoroscopy technique can provide better result with minimal side effect. It can be used for simple stricture with 12-14 mm diameter; (2) Balloon dilators: it has been widely used and it can be inserted through the scope (TTS) or wire guided. The size of balloon varies, from 6 to 40 mm and the large size is usually used for akalasia treatment. The new version of TTS balloon is able to perform expansion in 3 different sizes (1.5 mm increase) without changing the balloon. The only disadvantage is its higher cost.

Preparation before performing the procedures,

includes:<sup>1,2</sup> (1) Examination prior to the procedures. The cause of stricture should be determined, endoscopy and radiology examination with contrast are both necessary and will mutually completed the evaluation. Most of stricture can be passed by standard and small-diameter gastroscope; however, the location and mucosa feature should be first observed. Some conditions may cause more dangerous dilatation such as stricture angulation, the presence of diverticle, hiatus hernia, and small stomach. If there is a stricture which is hardly passed by endoscope, the barium enema examination may demonstrate the anatomy needed meticulously. It will be very helpful in patients with long and narrow complex stricture. It is technically more difficult to be performed and it has greater risk; (2) Informed consent. The patient should be clearly informed about the dilatation treatment prior to the procedure is carried out. It is very important that the patient realize about the risk of perforation may occur every time and it will need surgery. The alternatives other than dilatation treatment should also be informed; (3) Fasting. All patients should have at least 4-6-hour fasting prior to the procedure to confirm that the esophagus and stomach are in empty condition during the procedure is carried out. Patient with achalasia who have greater risk of stasis needs a longer fasting period; (4) Pre-medication. Some patients may tolerate the use of local anesthetics; however, most of the procedures are inconvenient thus sedation is usually necessary. It should be noticed that the combination of topical anesthetic and intravenous sedatives may increase the risk of aspiration; combination of intravenous sedatives and analgesics is correlated to cardiovascular side-effect. Elderly patients, patient with cardiorespiratory disorder, liver and renal dysfunction are considered as the high-risk group; (5) Patients who use oral anticoagulant and antiplatelet agents: in these patients bleeding can occur, therefore, patients with small-risk of thromboemboli shall discontinue their drugs prior to the procedure; (6) Patients with risk of endocarditis. Antibiotics should be given in patients with prosthetic heart valve, history of endocarditis, synthetic vascular graft in 12 month period prior to dilatation, patients with systemic pulmonary shunt, as well as patients with neutropenia ( $< 100 \times 10^9/L$ ).

In dilatation technique, there are five important points that should be considered by the operator prior to the procedures carried out, i.e.:<sup>2,3,6,7</sup> (1) How large the diameter will be achieved for an obstruction is patient with benign stricture will have satisfying result if the lumen esophagus has achieved 13-15 mm diameter. This size has been recommended; nevertheless, it is still possible to perform dilatation with higher diameter target for patients who have

persistent symptoms. In malignant stricture, it is best to prevent using the large diameter dilator considering the possibility of perforation and dilatation. It is rarely regarded as definitive treatment; (2) How fast the dilatation will be achieved is; for each procedure session. The level of dilatation increment is performed based on the grade of stricture. 'rule of three' is the conservative approach that may reduce the risk of perforation. Initial dilator is selected based on the estimation of stricture diameter. Subsequently, a series of procedures is performed with increased diameter not more than 3 times in a session and there is 1 mm diameter difference. Several dilatation sessions will be necessary to achieve adequate result. If there is a delay between the sessions, sometimes smaller diameter is needed. For simple stricture, dilatation by single balloon with 15 mm diameter or with increased diameter up to 3 mm is still safe. For the hard and narrow stricture or for complex stricture, the procedure should be performed very carefully; (3) The type of dilator that will be used: balloon dilator generally will only provide radial pressure, while push dilators also have longitudinal pressure effect. However, in most cases, both dilators demonstrate similar effectiveness; (4) The need of guide wire or endoscopic control: in most cases wire guided or endoscopically controlled techniques is necessary. Almost most of writers agree that dilatation by unguided weighted bougies should be limited to patients who have stricture induced by reflux. Weighted bougies is also not appropriate for narrow stricture and it shall not be used for complex stricture. Dilatation by using guided wire provides greater confidence that the dilator has been inserted in line with the esophageal lumen, therefore reducing the risk of perforation. Through the scope balloon is performed by visualization endoscopy, the balloon is placed precisely in the middle of the narrowest point of the lumen. The standard balloon is inflated by using air in addition to air and contrast substance. The recommended time is 20-60 seconds; (5) The need of radiographic screening. Using radiographic screening will provide greater convenience to the operator and he/she will be to perform better control of dilatation process. It may confirm that the wire has pass through the are of stricture smoothly and the wire is not bent either at the stricture area or distal area. Thus, the dilator can pass through the lumen well. During the balloon dilation, it may demonstrate either there is a slip during the inflation or the stricture dilation has been successfully performed. Such radiographic procedure will be helpful for twisting stricture or complex stricture or for patients with large hiatus hernia or diverticle.

## POST-PROCEDURE MANAGEMENT<sup>2</sup>

Following the procedures, the patients should receive strict monitoring on their vital signs. Chest X-ray is necessary for certain patient who has persistent pain, short of breath, fever or tachycardia. When the patient is about to be discharged from hospital, she/he at least should be able to tolerate the fluid-food.

In our case, the patient has esophageal stricture due to corrosive substance and she has already had balloon dilatation treatment in 2 months following the event. Based on stricture classification, the patient is categorized as patient with complex stricture (diameter < 12 mm). The barium-enema test was also performed to clarify the anatomy thoroughly. The next dilatation was performed by using Savary Guillard sparkplug with fluoroscopy. Guided fluoroscopy is performed since the stricture was quite wide and the esophageal lumen became very narrow due to diverticle. It was performed in order to minimize the risk of perforation and to have better control of the procedure. Dormicum was administered as anesthetics so that the patient could tolerate the procedure. Repeated procedures were carried out every 2 weeks to obtain optimal result.

Dilatation was performed step by step until the lumen reached 14 mm diameter and showed significant result, i.e. she could gradually swallow more solid food. We used the procedure with 'rule of three' approach and it was performed with high meticulousness.

Significant clinical improvement is found in almost all of patients who have such treatment; however, the recurrence rate very depends on the main underlying disease. If the esophageal lumen has reached the diameter of 13-20 mm, the success rate is about 85-93%. In benign stricture, less satisfying response may occur for balloon treatment when the stricture length > 8 cm and there is small diameter lesion. There are some clinical condition correlated to the outcome, such as smaller diameter of lumen, the presence of hiatal hernia > 5 cm, the presence of burning sensation on the chest after dilatation, and some procedures that may improve dysphagia; all conditions are associated with recurrence. The administration of proton-pump inhibitor agents following the procedured has been reported in some studies and it may decrease the recurrence rate for peptic stricture and Schatzki's ring.<sup>2</sup>

Main complications that may occur are perforation, bleeding and aspiration and the most dangerous is perforation. The incidence rate of perforation following dilatation treatment in esophageal stricture is about 0.1-0.4%. The risk is lower in simple stricture and it may increase when there is pharyngeal or cervical deformity. Perforation usually occurs at the

location of stricture, either intra-abdominal or intra-thoracic. Such complication should be considered when there is persistent pain, short of breath, tachycardia and increased temperature of fever. Esophagogram by double contrast or CT thorax with contrast may display the occurrence of perforation. Esophageal dilatation should be performed carefully in patients with history or who had just recovered from perforation or gastrointestinal surgery. Absolute contraindication is considered when there is esophageal active perforation since it may exaggerate the defect and it may develop edema of mediastinum. Severe cardiorespiratory disease is a relative contraindication; therefore, the advantages and disadvantages should be carefully considered. Massive bleeding rarely occurs following the dilatation treatment, it is likely to be more frequent in patients with coagulopathy and in patients who had anticoagulant treatment. In contrast, patients who are having radiotherapy are not considered as contraindication.<sup>2,5</sup>

In some cases, it may be recurrent; therefore, it calls for repeating dilatation procedure or even operative treatment. Some studies have demonstrated the advantage of intralesion steroid injection, triamcinolon, which is believed that it may prevent contracture on the lesion area.<sup>9</sup>

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