

# Effectiveness and Safety of Wire Guided Savary Dilatation in Corrosive Esophageal Stricture

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## ABSTRACT

**Background:** Corrosive esophageal stricture is a type of esophageal stricture caused by the ingestion of corrosive substances, such as caustic soda or battery acid. This can cause injury to the lining of the esophagus, leading to scarring and narrowing of the esophagus. Treatment typically involves dilating the stricture using an endoscope, or surgery to remove the scar tissue. The conservative treatment of strictures generally seems to be effective and safe for relieving dysphagia both in the short and long term. **Objective:** To determine the mean number of dilatations of corrosive esophageal strictures to achieve adequate dilatation (up to 14mm). **Study Design:** Descriptive case series study. **Settings:** Department of Gastroenterology, Shalamar Hospital, Lahore Pakistan. **Duration:** 6 months, from February 2021 to July 2021. **Methods:** Esophageal dilatation was performed as an ambulatory procedure using conscious sedation and topical pharyngeal anesthesia. Dilatation was done under fluoroscopic guidance using Savary Gilliard dilators over the guide wire. All the outcomes were noted. The collected data was entered and analyzed on SPSS 21. **Results:** The mean age of the patients was 36.67±15.56 years, Male to female ratio of the patients was 1.4:1. 1-2 dilatations was in 24(20%) patients, 2-3 dilatations in 32 (26.7%), 3-4 in 32 (26.7%) and >4 dilatation were in 32(26.7%) patients. A statistically insignificant difference was found between the adequate dilatation with, age, gender, and marital status, i.e., ( $p > 0.05$ ). **Conclusion:** Wire guided savary dilatation was observed to be the safe, effective and non-invasive technique. The successful adequate dilatation for corrosive esophageal stricture achieved in 50.83% of the case. Although a significant proportion of patients (26.7%) required multiple dilatations.

**Keywords:** Adequate dilation, Corrosive esophageal, Stricture.

## INTRODUCTION

Esophageal stricture is a narrowing of the esophagus due wall fibrosis,<sup>1</sup> the muscular tube that connects the mouth to the stomach. Because of the significant impact it has on patients' quality of life, esophageal stenosis is a significant medical issue that necessitates therapeutic remedies that, on their own, have the potential to negatively impact patients' essential conditions as well as their quality of life permanently.<sup>2</sup>

Corrosive esophageal stricture is a type of esophageal stricture caused by the ingestion of corrosive substances

that are commonly accessible,<sup>3</sup> such as caustic soda or battery acid. This can cause injury to the lining of the esophagus, leading to scarring and narrowing of the esophagus. Intake of corrosive compounds has been overlooked as a major threat to public health in several regions of the world for a very long time.<sup>4</sup> Studies conducted in western nations found a higher proportion of unexpected alkaline accidents, with 80% of cases occurring in pediatric populations.<sup>4,5</sup> However the intake of corrosive substances is one of the most prevalent factors in the development of strictures of upper GI among children.<sup>6</sup>

In developing nations, these chemicals are available for a low price, can be purchased over the counter, without a license, and are frequently not labelled with warnings regarding potential biosafety risks.<sup>6</sup> The problem is made worse by low literacy rates and widespread ignorance. It is believed that alkaline chemicals seem to be more accountable for the development of esophageal stricture in around 41.5% of cases, as contrasted to acids as 30.7% of cases.<sup>7</sup> Symptoms of corrosive esophageal stricture may comprise the swallowing difficulty, the sensation of food becoming lodged in the throat, chest pain, and weight loss. Management for esophageal stricture is typically lengthy and challenging, and the likelihood of successful treatment typically depends on the features of the patient's esophageal stricture.<sup>7</sup> The majority of medical experts believed that endoscopy was the most important step in establishing a diagnosis of caustic ingestion. Early endoscopy is recommended in every case of CSI and should be performed within 24 to 48 hours after the time of ingestion. This test is accurate for identifying the formation of strictures in the future.<sup>7,8</sup> However, the conservative administration's approach to strictures is viewed as an effective and risk-free approach for the reduction of dysphagia in the short term as well as the long term.<sup>9</sup> The preferred treatment approach for benign esophageal strictures is endoscopic dilatation, however, the most appropriate dilatation technique and the type of stricture that can be effectively treated remain a topic of debate.<sup>9</sup> Endoscopic dilatation seems to be the primary treatment that is suggested, and surgery is only performed when endoscopic dilatation has failed.<sup>10</sup> Push kind dilators and balloon dilators are the kind of dilators that are utilized in the dilatation by endoscopy. Mercury- or tungsten-loaded bougies or wire-guided bougies are the components of a push type dilator (Savary-Guilliard).<sup>11</sup> Esophageal dilatation with the use of wire-guided dilators is the primary component of the treatment.<sup>12</sup> Therefore this study has been conducted to determine the effectiveness of savary guided dilatation of corrosive esophageal stricture in terms of number of dilatations to achieve adequate dilatation (up to 14mm) in our population.

## METHODS

The descriptive case series study was conducted at the department of gastroenterology, Shalamar Hospital, Lahore Pakistan. The study duration was six months, from February 2021 to July 2021. Non-probability consecutive sampling technique was used. All the patients of age between 13 to 65 years, both gender, history of intake of corrosive with dysphagia and patients who took corrosive in last 2 years and in dilatation program were included.

Patients who are suffering from malignancy or terminal illness, mentally handicapped/retarded patients and

who did not agree to participate in the study were excluded. A sample size of 120 cases was calculated with a 95% confidence interval, 75 marginals of error, and an expected percentage of adequate dilatation of 8.4%.<sup>13</sup>

Informed and written consent was taken. Detailed information about the type of corrosive agent, intent, and amount was taken. Endoscopic and radiological investigations were done to pinpoint the exact location of the stricture and measure its duration. Dilatation of the esophagus was carried out as an outpatient procedure under the supervision of a physician using procedural sedation and local pharyngeal anesthesia. Six hours before the surgery, cases were instructed to avoid eating or drinking anything by mouth in order to maintain a clear view and reduce the risk of aspiration. Following fluoroscopic supervision, Savary Gilliard dilators were passed across the guide wire in order to perform the dilatation. The placement of a standard guide wire is facilitated using fluoroscopy and an endoscope, reaching up to the antrum. Once the guide wire was securely in place, the endoscope was removed, and dilatation was carried out after every two weeks by Savary Gilliard dilators of progressive size in multiple sessions until the esophagus was dilated up to 14 mm. Adequate dilatation was considered when the lumen was dilated up to 14 mm as per the endoscopic examination. It was assessed at the time of the intervention. The collected data was analyzed using SPSS version 21.0.

## RESULTS

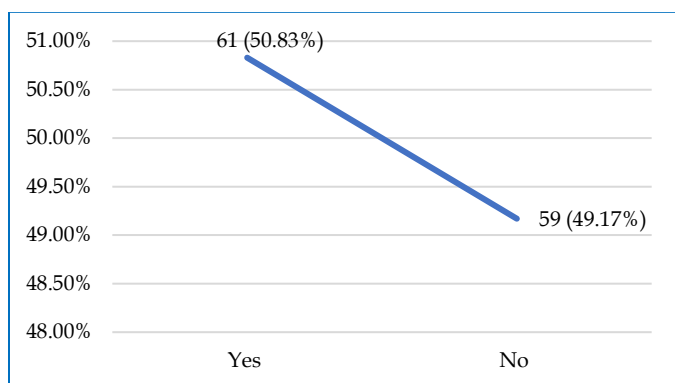
The mean age of the patients was 36.67±15.56 years. Out of all, males were 58.33% and females were 41.67% and male to female ratio of the patients was 1.4:1. 69(57.5%) patients were married, 40(33.3%) patients were unmarried and 11(9.2%) patients were divorced/widowed. According to our study, the bleach type of corrosive agent was found in 31(25.8%) patients, the toilet cleaner type was present in 30 (25%), the drain cleaner was present in 18(15%) patients, the window cleaner type was present in 22(18.3%) patients, and other types were found in 19(15.8%) patients. Distance from incisor <10cm and 10-20 cm was noted in 31(25.8%) patients respectively, 20-30 & 30-40 cm distance was noted in 29(24.2%) patients. 1-2 dilations were in 24(20%) patients, and 2-3 in 32(26.7%), 3-4 in 32(26.7%), and >4 dilations were in 32(26.7%) patients, respectively. (Table 1)

Adequate dilation was found in 61(50.83%) patients, and inadequate dilation was found in 59(49.17%) patients. (Figure 1)

Adequate dilation was statistically insignificant according to age, gender, and type of corrosive agent ( $p > 0.05$ ), while it was statistically significant according to distance from incisors ( $p = 0.058$ ). (Table 2)

**Table 1: Descriptive statistics of demographic characteristics of patients (n=120)**

Variables		Statistics
Age (mean ± SD)		36.67 ± 15.56 years
Gender	Male	70 (58.33%)
	Female	50 (41.67%)
Marital status	Married	69 (57.5%)
	Unmarried	40 (33.3%)
	Divorced / Widow	11 (9.2%)
Type of corrosive agent	Bleach	31 (25.8%)
	Toilet cleaner	30 (25.0%)
	Drain cleaner	18 (15.0%)
	Window cleaner	22 (18.3%)
	Others	19 (15.8%)
Distance from incisors	<10cm	31 (25.8%)
	10-20cm	31 (25.8%)
	20-30cm	29 (24.2%)
	30-40cm	29 (24.2%)
Number of dilatation	1-2	24 (20.0%)
	2-3	32 (26.7%)
	3-4	32 (26.7%)
	>4	32 (26.7%)

**Figure 1: Patients distribution of adequate dilation****Table 2: Comparison of adequate dilatation with age (years)**

Variables		Adequate Dilatation			P-value
		Yes	No	Total	
Age (years)	≤ 40	35	36	71	0.685
	>40	26	71	49	
Gender	Male	39	31	70	0.206
	Female	22	28	50	
Type of corrosive agent	Bleach	15	16	31	0.869
	Toilet cleaner	14	16	30	
	Drain cleaner	11	7	18	
	Window cleaner	12	10	22	
	Other	9	10	19	
Distance from incisors	<10cm	13	18	31	0.058
	10-20cm	15	16	31	
	20-30cm	21	8	29	
	30-40cm	12	17	29	

## DISCUSSION

Corrosive esophageal stricture is a medical condition that occurs when the esophagus, the muscular tube that connects the mouth to the stomach, becomes narrowed due to injury from the ingestion of corrosive substances. Treatment for corrosive esophageal strictures typically involves dilating, or widening, the structured area. This can be done using a variety of techniques, including balloon dilatation, bougie dilation, or the placement of stents. In severe cases, surgery may be required to remove the damaged portion of the esophagus and reconstruct it. This study has been done to evaluate the mean number of dilatations of corrosive esophageal strictures to achieve adequate dilatation (up to 14mm). Both the guide wire's implantation and dilation must be done correctly for the esophageal dilation to be successful. The long-term outcome for patients following adequate initial dilatation is unclear, and there is a lack of knowledge regarding the long-term achievement of dilatation. In this study, adequate dilation was found in 61(50.83%) patients, 1-2 dilations were in 24(20%) patients, and 2-3, 3-4, and >4 dilations were done in 32(26.7%) patients, respectively. In the comparison of this study, Isa HM *et al*<sup>13</sup> observed that endoscopic dilatation is an efficient and safe treatment option for children who have esophageal strictures. However, the rate of success varies depending on the operator.<sup>13</sup> In the study by Pietet E *et al*<sup>14</sup> observed that the Savary-Gilliard technique was able to perform pharyngeal and esophageal dilations without causing any adverse effects. In the study by Khan SH *et al*<sup>15</sup> reported that the Savary-Gilliard dilator was used to widen the airways of one hundred fifty individuals who had a dysphagia score of two or above, and there was a significant reduction in dysphagia in 132 participants. One study<sup>16</sup> includes 47 patients and shows adequate dilatation in 93.6% with a mean number of dilatations of 8, while another study<sup>17</sup> includes only 16 patients and shows adequate dilatation in 81.4% with a mean number of dilatations of 6.06±5.06). But no local study available regarding this issue. In the line of this series Ahmad M *et al*<sup>11</sup> conducted the study to determine the efficacy and safety of Savary-Guilliard dilators in the treatment of caustic esophageal strictures there in absence of fluoroscopic evaluation and they observed that the use of Savary Guilliard dilators to dilate the corrosive esophageal strictures does not require the use of a fluoroscope, and this method is both effective and safe. Our findings were also in accordance with the studies.<sup>18,19</sup>

In this study, the patients' average age was 36.67±15.56 years, and males were in the majority 58.33%, while females were 41.67%. Male to female ratio of the patients was 1.4:1. On the other hand, Ahmed M *et al*<sup>11</sup> reported that the patients' average age was 28.7 ± 2.31 years, and inconsistently, they found females in the majority 66.1%

compared to males 33.9%. In the study by Khan SH *et al*<sup>15</sup> reported that the average age of the individuals was 26.72 ± 5.61 years and female were in majority 78.7%. Both males and females can develop corrosive esophageal strictures. However, the risk of developing this condition may vary based on factors such as age, overall health, and the type and amount of the corrosive substance ingested. It is important to note that the treatment and prognosis of corrosive esophageal strictures depend on several factors, including the type and severity of the corrosive substance ingested, the length and location of the stricture, and the individual's overall health of the individual. To prevent the development of corrosive esophageal strictures, it is important to avoid ingesting corrosive substances, and to seek immediate medical attention if it is suspected that any has ingested a harmful substance.

## CONCLUSION

Wire guided savary dilatation was observed to be the safe, effective and non-invasive technique. The successful adequate dilation for corrosive esophageal stricture achieved in 50.83% of the case. A significant proportion of patients (26.7%) required multiple dilations >4. Certain forms of strictures remained difficult to treatments and required multiple dilation procedures to be performed. However, its effectiveness can vary depending on the severity and complexity of the stricture and the skill of the operator.

## LIMITATIONS

The procedure can be uncomfortable and painful, and patients may experience significant discomfort during and after the procedure. The procedure requires specialized training and expertise, and the success of the procedure may be limited by the skill of the operator. Practitioner should discuss the risks and benefits of the procedure to determine the best course of action.

## SUGGESTIONS / RECOMMENDATIONS

Further large-scale studies are recommended specially at local level to prove the findings

## CONFLICT OF INTEREST / DISCLOSURE

None.

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