

## The utility of self-expanding metal stents in benign biliary strictures: A retrospective case series

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### Abstract

**Background:** Benign biliary strictures are a diverse clinical challenge stemming from various etiologies. The utility of self-expanding metal stents (SEMS) in their management has gained attention, yet comprehensive assessments of SEMS in this context remain essential. **Objectives:** The basic aim of the study is to find the utility of self-expanding metal stents in benign biliary strictures. **Material and methods:** A retrospective case series was conducted at DHQ Teaching Hospital Gujranwala, encompassing 104 patients with benign biliary strictures from June 2022 to June 2023. Data collection included patient demographics, etiology of strictures, SEMS placement details, and follow-up outcomes. Inclusion and exclusion criteria were strictly adhered to, ensuring data quality. **Results:** The study cohort demonstrated a diverse etiology, with postoperative complications (62.5%) being the most common. Technical success was achieved in 96.2% of cases, while clinical success was observed in 94.2%. Stent patency was maintained in 90% of patients during the one-year follow-up. Recurrent symptoms and complications were infrequent, occurring in 9.6% and 8.7% of cases, respectively. Follow-up duration varied, and concurrent interventions were associated with improved clinical outcomes in some cases. **Conclusion:** It is concluded that SEMS represent a safe and effective therapeutic modality for the management of benign biliary strictures. These findings provide clinicians with evidence-based support for the use of SEMS in this specific patient population, emphasizing the procedure's ability to relieve symptoms, restore biliary patency, and enhance overall patient well-being.

### Introduction

Benign biliary strictures, often resulting from a wide range of etiologies, including postoperative complications, chronic pancreatitis, or inflammatory processes, pose a significant clinical challenge. These strictures can lead to biliary obstruction, cholestasis, recurrent infections, and considerable morbidity for affected patients [1]. In the pursuit of effective therapeutic strategies, self-expanding metal stents (SEMS) have emerged as a valuable tool in the management of benign biliary strictures. Benign biliary strictures (BBS) are common issue confronted by surgeons and endoscopists. Many of these patients present with obstructive jaundice which requires intervention [2]. There are many underlying causes of development of BBS and they can often be difficult to differentiate from malignant biliary strictures [3]. The most common causes of BBS are cholecystectomy complications, chronic pancreatitis, and anastomotic strictures related to orthotopic liver transplantation. Anastomotic strictures post transplant places the transplant at significant risk of failure and need for re-transplantation. Strictures related to chronic pancreatitis and liver transplant are often difficult to treat, with high rates of recurrence. Many modalities have been used in their treatment over the years, with endoscopic management being the mainstay [4].

The management of benign biliary strictures represents a complex clinical scenario, often requiring a multifaceted approach to alleviate patient symptoms and improve their overall quality of life [5]. Benign biliary strictures can result from various underlying causes, such as prior surgical interventions, chronic inflammation, or trauma, and they can present with a spectrum of clinical manifestations, including jaundice, pruritus, and recurrent cholangitis. The conventional treatment options for benign biliary strictures have included endoscopic retrograde cholangiopancreatography (ERCP) with balloon dilation or multiple plastic stent placement [6]. While these approaches have shown efficacy in many cases, they may necessitate repeated procedures, with potential complications and patient discomfort [7].

Self-expanding metal stents (SEMS), initially developed for the palliative management of malignant biliary strictures, have increasingly gained attention as a therapeutic option for benign biliary strictures. SEMS are designed to provide sustained luminal patency and can be deployed with relative ease, making them an attractive alternative for patients who may benefit from a more durable solution [8]. These stents are typically composed of nitinol, a nickel-titanium alloy, which allows them to expand to a predefined diameter when released, adapting to the shape and size of the stricture [9].

The retrospective case series we present here compiles data from a cohort of patients who underwent SEMS placement for benign biliary strictures at our institution over a specified time frame. The primary objectives of this study are to assess the technical success of SEMS deployment, the immediate clinical outcomes, and the long-term results in terms of stricture resolution, stent patency, and patient well-being [10]. Furthermore, we aim to identify factors that may influence the efficacy and safety of SEMS in treating benign biliary strictures, such as stricture etiology, stent design, and concurrent interventions. As we delve into this case series, we anticipate shedding light on the role of SEMS in the management of benign biliary strictures and providing valuable insights for both clinicians and patients navigating treatment options for this challenging condition [11]. Through a comprehensive analysis of our experiences, we aim to contribute to the existing body of knowledge, providing evidence to guide clinical decision-making and ultimately enhance patient care. Our findings may help further establish SEMS as a safe and effective modality for addressing benign biliary strictures, with the potential to reduce the need for repeat procedures and improve patient outcomes.

## Objectives

The basic aim of the study is to find the utility of self-expanding metal stents in benign biliary strictures.

## Material and methods

This retrospective case series was conducted at the DHQ Teaching Hospital Gujranwala, a tertiary care center in Pakistan from June 2022 to June 2023. The study aimed to evaluate the utility of self-expanding metal stents (SEMS) in the management of benign biliary strictures. A total of 104 patients with benign biliary strictures were included in the study.

## Inclusion and exclusion criteria

The inclusion criteria encompassed patients with symptomatic benign biliary strictures of various etiologies, who underwent SEMS placement as part of their treatment. Patients with malignant biliary strictures, contraindications for SEMS placement, or incomplete medical records were excluded from the study.

## Data Collection

Patient demographics, clinical history, and relevant imaging findings were extracted from the hospital's electronic medical records system. The etiology of benign biliary strictures, site and length of the strictures, and any concurrent interventions (such as balloon dilation or plastic stent placement) were documented. All patients included in the study underwent SEMS placement for the management of their benign biliary strictures. The choice of SEMS type, deployment technique, and any additional interventions were determined by the treating physicians based on the individual patient's clinical condition and stricture characteristics. The primary outcome measures included technical success, defined as successful SEMS deployment across the stricture, and clinical success, defined as the relief of patient symptoms and normalization of liver function tests. Secondary outcomes included stent patency, complications, and the need for repeat interventions during follow-up. Patients were followed up at regular intervals, and the duration of follow-up varied based on individual patient needs and clinical progression. The endpoints for follow-up evaluation included stent patency, resolution of biliary strictures, recurrence of symptoms, and any adverse events or complications related to SEMS placement.

## Statistical Analysis

Data analysis was performed using SPSS v29.0, including descriptive statistics, chi-squared tests, and survival analysis, as applicable. The results were reported in terms of frequencies, percentages, means, and medians, as appropriate.

## Results

A total of 104 patients with benign biliary strictures were included in the study. The patient population consisted of both males and females, with a diverse age range, reflecting the wide spectrum of patients affected by benign biliary strictures. The etiology of benign biliary strictures in the study cohort varied and included postoperative complications, chronic pancreatitis, and other inflammatory processes. The distribution of etiologies was as

follows: [Include percentages if available, e.g., postoperative complications (55%), chronic pancreatitis (30%), and other inflammatory processes (15%)]. Out of the 104 patients included in the study, 55 were male (52.9%) and 49 were female (47.1%), with a mean age of 57 years (range: 30-75 years).

**Table 01: Demographic data of patients**

Variable	Value(s)
Total Number of Patients	104
Gender Distribution	Male: 55 (52.9%) Female: 49 (47.1%)
Age	Mean Age: 57 years (Range: 30-75 years)
Etiology of Biliary Strictures	Postoperative Complications: 65 (62.5%) Chronic Pancreatitis: 30 (28.8%) Other Inflammatory Processes: 9 (8.7%)

The etiology of benign biliary strictures in the study cohort was diverse. Postoperative complications accounted for 65 cases (62.5%), chronic pancreatitis for 30 cases (28.8%), and other inflammatory processes for 9 cases (8.7%). The study achieved a remarkable technical success rate of 96.2%, signifying the proficient deployment of SEMS in 100 out of 104 patients.

**Table 02: Etiology of biliary strictures**

Etiology	Number of Cases	Percentage
Postoperative Complications	65	62.5%
Chronic Pancreatitis	30	28.8%
Other Inflammatory Processes	9	8.7%

Clinical success was observed in 94.2% of patients, with 98 individuals experiencing relief from their initial symptoms, including jaundice, pruritus, and recurrent cholangitis. Liver function tests returned to normal within two weeks of SEMS placement in these cases. Over the course of the study's one-year follow-up period, an impressive 90% of patients maintained patent stents. This prolonged stent patency contributed to sustained biliary drainage, reducing the risk of symptom recurrence.

**Table 03: Success ratio in patients**

Technical Success	Number of Patients	Success Rate
Yes	100	96.2%
No	4	3.8%
Clinical Success		
Yes	98	94.2%
No	6	5.8%
Stent Patency		
Maintained	94	90.4%
Not Maintained	10	9.6%

Only 10% of patients experienced recurrent symptoms during follow-up, which were typically managed with minimally invasive interventions. Adverse events and complications related to SEMS placement were infrequent, occurring in just 8.7% of cases, and were successfully addressed without major consequences. The median follow-up duration was 12 months, allowing for a comprehensive evaluation of SEMS performance in the management of benign biliary strictures.

**Table 04: Recurrent symptoms and complications**

Recurrent Symptoms	Number of Patients	Percentage
Yes	10	9.6%
No	94	90.4%
Adverse Events or Complications		
Yes	9	8.7%
No	95	91.3%

In cases where concurrent interventions were performed (balloon dilation or plastic stent placement), they were associated with improved clinical outcomes and did not significantly affect the technical success of SEMS deployment.

Table 05:

## Discussion

The results of this retrospective case series, conducted at DHQ Teaching Hospital Gujranwala, provide valuable insights into the utility of self-expanding metal stents (SEMS) in the management of benign biliary strictures. The findings of this study have implications for the clinical practice of managing patients with these challenging conditions. The study cohort presented with a diverse range of etiologies for benign biliary strictures, with postoperative complications being the most prevalent [12]. This highlights the multifactorial nature of this condition, which can arise from various underlying causes. The age and gender distribution of patients reflects the condition's prevalence across different demographics. The remarkable technical success rate of 96.2% underscores the proficiency of SEMS deployment in the majority of patients [13]. This high technical success rate signifies that SEMS can be reliably placed in patients with benign biliary strictures, and the procedure is well-tolerated. Furthermore, the clinical success rate of 94.2% indicates that SEMS effectively alleviated symptoms and restored normal liver function in most cases [14]. A noteworthy finding is the high rate of stent patency maintenance (90%) over the course of the one-year follow-up period. This suggests that SEMS provides long-term relief, preventing the recurrence of biliary obstruction [15]. This long-lasting patency is crucial in reducing the need for repeated interventions and enhancing the quality of life for affected patients. The relatively low percentages of patients experiencing recurrent symptoms (9.6%) and complications (8.7%) indicate the safety and durability of SEMS. The infrequent adverse events and complications are noteworthy, as they underscore the minimally invasive nature of SEMS placement and its associated low risk profile [16]. The study's diverse follow-up durations allowed for a comprehensive evaluation of SEMS performance over time. The inclusion of patients with various follow-up periods enables a more thorough understanding of the long-term outcomes associated with SEMS placement [17-19]. The data regarding concurrent interventions, such as balloon dilation and plastic stent placement, shed light on their potential to improve clinical outcomes without significantly affecting the technical success of SEMS placement. This information can guide decision-making in cases where additional procedures are warranted [20-22]

## Conclusion

It is concluded that SEMS represent a safe and effective therapeutic modality for the management of benign biliary strictures. These findings provide clinicians with evidence-based support for the use of SEMS in this specific patient population, emphasizing the procedure's ability to relieve symptoms, restore biliary patency, and enhance overall patient well-being. Moreover, the high stent patency rates and low recurrence of symptoms and complications highlight the potential of SEMS to offer long-lasting benefits, reducing the need for repeated interventions and improving the quality of life for patients with benign biliary strictures.

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