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Complications and retrieval of forgotten biliary stents: A clinical insight

Sreedevi Sunkara[1], Manoj Kumar Katragadda[2], Pandu Ranga Kumari Motepalli[3], Harinath Reddy N[4], Suresh Babu Sayana[5], Ramesh Kandimalla[6]

[1]Assistant Professor, [4]Resident, Department of Gastroenterology, [2]Assistant Professor, Department of General Medicine, [3]Associate Professor, Department of Radiotherapy, Andhra Medical College and King George Hospital, Visakhapatnam, Andhra Pradesh, [5]Assistant Professor, Department of Pharmacology, Government Medical College and General Hospital, Suryapet, [6]Assistant Professor, Department of Biochemistry, Kakatiya Medical College and MGM Hospital, Warangal, Telangana, India

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ABSTRACT

Background: Endoscopic biliary stenting is a common procedure in gastroenterology that uses plastic stents for short-term bile drainage. **Aims and Objectives:** This study explores the occurrence and consequences of forgotten or retained biliary stents. **Materials and Methods:** Conducted at King George Hospital in Visakhapatnam over 8 months, the study includes 12 patients with forgotten biliary stents. Diagnostic confirmation used X-rays, abdominal ultrasound, and magnetic resonance cholangiopancreatography. Four patients faced complications such as fractured distal pigtails and blocked stents, making retrieval challenging through standard methods like endoscopic retrograde cholangiopancreatography (ERCP) and cholangioscopy. **Results:** The study involved 12 patients (median age: 48 years), with choledocholithiasis being the main reason for stent placement in 10 cases (83.3%). On average, patients showed symptoms 31.3 months after stenting, mostly presenting with cholangitis (83.3%). Stent removal was successful in 8 cases (66.6%) using ERCP, while advanced procedures like cholangioscopy or surgery were needed in the rest. No mortality was reported. **Conclusion:** Conducted during the COVID-19 pandemic, this study reveals a rise in neglected plastic biliary stents. Cholangitis, often with common bile duct stones, was a common complication. Standard ERCP techniques were less effective in cases with complicated stents, requiring alternative approaches like cholangioscopy or surgery. The cases emphasize the urgency of timely stent retrieval and the need to improve management protocols to prevent complications.

Key words: Endobiliary stenting; Forgotten biliary stents; Cholangitis; Choledocholithiasis; Interventional gastroenterology

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INTRODUCTION

Endoscopic biliary stenting is a crucial part of gastroenterology and is used for various issues in the biliary system, like jaundice and blockages, using plastic stents. Plastic is chosen for short-term use to avoid problems such as infection, blockage, and breakage that could happen with long-term use.[1,2]

While the procedure has advanced with better materials and equipment, a persistent challenge is the unintentional neglect or long-term retention of stents, requiring advanced interventions to fix them.[3] The way health-care systems are structured affects how stenting is managed. In busy hospitals with limited resources, there is a higher chance of forgotten or retained stents.[4-6]

The COVID-19 pandemic added complexity to the issue. Routine follow-ups, including stent removal, became less of a priority, potentially leading to more cases needing intervention.[6-9] Understanding the scale of this problem is crucial for effective resource allocation and treatment strategies, especially in tertiary care hospitals known for handling complex cases.[10]

Address for Correspondence:
Dr. Harinath Reddy N, Resident, Department of Gastroenterology, Andhra Medical College and King George Hospital, Visakhapatnam, Andhra Pradesh, India. **Mobile:** +91-9948541844. **E-mail:** sreedevi.sunkara@gmail.com

Aim

To investigate the prevalence, challenges, and clinical outcomes associated with forgotten or retained biliary stents in patients, particularly during the COVID-19 pandemic period.

Objectives

1. Assessing Prevalence and Factors for Retained Biliary Stents: Determine how often and why biliary stents are not timely removed.
2 Evaluating Complications from Prolonged Stent Retention: Investigate complications like cholangitis and bile duct stones due to overdue stents.
3. Analyzing Retrieval Techniques for Stents: Examine the success and challenges of ERCP and cholangioscopy in removing complex stents.
4. Recommending Management Improvements: Propose protocol enhancements for effective and timely stent removal to prevent complications.

MATERIALS AND METHODS

Study design and setting

This case series unfolds its narrative within the hallowed halls of Andhra Medical College, in conjunction with the esteemed King George Hospital located in Visakhapatnam. The latter, a tertiary care facility renowned for its proficiency in the field of gastroenterology, provides the backdrop for our scholarly inquiry.

Our investigative journey, methodically spanning a noteworthy duration of eight months, commences its voyage on the inaugural day of January 2022 and concludes its odyssey in the month of August of the same year. Within this temporal span, we have sought to unravel the intricacies surrounding forgotten plastic biliary stents, a matter of pressing concern that warrants meticulous exploration.

Patient selection

Subjects harboring the circumstance of forgotten or retained plastic biliary stents were discerned by means of the hospital's sophisticated electronic medical records system, a meticulous and thorough process.

Inclusion criteria

Individuals 18 years of age and older, A confirmed diagnosis of a retained plastic biliary stent, diagnosis validation through comprehensive imaging studies encompassing X-ray, abdominal ultrasound, and magnetic resonance cholangiopancreatography (MRCP).

Exclusion criteria

Patients below the age of 18, lack of a substantiated diagnosis pertaining to the retention of a plastic biliary stent, incomplete or insufficient medical records or deficient documentation of imaging, Patients whose imaging studies (including X-ray, ultrasound, and MRCP) are incomplete or unavailable for the verification of retained stent status.

Data collection

Data retrieval involved a meticulous examination of electronic medical records, laboratory reports, and in-depth scrutiny of imaging studies for every patient. The variables sought encompassed a spectrum of information, including demographic particulars, the primary indication for stent placement, the temporal interval between stent insertion and patient presentation, the clinical manifestations, and any ensuing complications. To safeguard patient privacy, all data underwent a rigorous anonymization process.

Intervention and procedures

The principal approach employed for stent retrieval hinged upon the application of ERCP. Unsuccessful endeavors with ERCP necessitated the recourse to alternative techniques, such as the utilization of a cholangioscopy. In instances characterized by heightened complexity, the deliberation extended to options like cholangioscopy or surgical interventions.

Outcome measures

1. Efficacy of ERCP in successfully extracting the stent
2. Occurrence and nature of complications (e.g., cholangitis, CBD stones)
3. Nature of substitute interventions necessitated (cholangioscopy, surgical procedures)
4. Duration between the initial stent placement and the identification of complications or the successful stent removal.

Statistical analysis

To comprehensively understand the patients' demographic and clinical features, we applied descriptive statistics judiciously. This method helped us summarize continuous variables by presenting means and their entire range, providing a clear view of the data's distribution. Categorical variables were expressed effectively through frequencies and percentages, illustrating their prevalence in our patient cohort. We then conducted a rigorous logistic regression analysis to identify variables and factors with the potential to predict unsuccessful ERCP attempts. To ensure robust and reliable findings, we set the threshold for statistical significance conservatively at $P<0.05$.

Ethical considerations

Our research, endorsed by the Institutional Ethics Committee under the approval number KGH/IEC/2022/008 at King George Hospital, Vishakhapatnam, strictly conforms to high ethical norms, underscoring

our commitment to research integrity and the welfare of patients. Owing to its retrospective design and rigorous anonymization procedures, the requirement for individual informed consent was appropriately exempted, guaranteeing adherence to ethical standards and safeguarding patient privacy and autonomy.

RESULTS

Demographic and clinical profile

Over the span of our meticulously conducted 8-month study, a total of 12 patients came to our attention, individuals grappling with the challenge of forgotten or retained plastic biliary stents. These patients exhibited a median age of 48 years, ranging from 18 to 76 years, casting a broad spectrum. Among them, 7 individuals, constituting 58.3% of the cohort, were female, while the remaining 5, representing 41.7%, were male. The predominant and initial indication for the placement of biliary stents was choledocholithiasis, a prominent feature observed in the majority of cases, encompassing 83.3%, whereas 3 cases, or 25%, were entwined with benign biliary strictures (Table 1).

Duration and clinical presentation

A temporal chasm, averaging approximately 31.3 months and fluctuating between 13 and 96 months, separated the moment of stent insertion from the subsequent presentation at our institution. Within this temporal dimension, the prevailing clinical tableau unfurled in the form of cholangitis, affecting a notable proportion of the patients and encapsulating 83.3% of the cohort (Table 2).

Stent retrieval and complications

ERCP, initially wielded as the method of choice for the extraction of stents, was successfully executed in 8 patients, heralding an accomplishment rate of 66.6%. However, the path was not devoid of challenges, as complications reared their heads in four patients, eventually leading to thwarted ERCP endeavors (Figure 1). Within this cluster of complications, two patients grappled with fractured distal pigtails, while another faced an obstructed biliary stent, and a fourth patient confronted the perplexing predicament of a fragmented stent that had journeyed into the proximal reaches of the CBD. As a consequence, the management of these four cases demanded the exploration of alternative strategies (Table 3).

Alternative intervention approaches

Following the encountered complications, diligent efforts were made to retrieve the stents utilizing cholangioscopy; nevertheless, these endeavors yielded no success. Within this particular subgroup of patients, two individuals achieved resolution through the application of cholangioscopy, a more advanced and intricate procedure. In contrast, the remaining two patients required surgical intervention to ultimately and successfully extract the stents from their biliary tracts (Table 4).

Table 1: Demographic and clinical profile

Parameter	Value
Study duration	8 months
Number of patients	12
Median age	48 years
Age range	18–76 years
Gender distribution	Female: 7 (58.3%) Male: 5 (41.7%)
Initial indication for biliary stenting	Choledocholithiasis: 10 (83.3%) Benign Biliary Stricture: 3 (25%)

Table 2: Duration and clinical presentation

Parameter	Value
Mean time to presentation	31.3 months
Time range	13–96 months
Prevalent presentation	Cholangitis: 10 cases (83.3%)

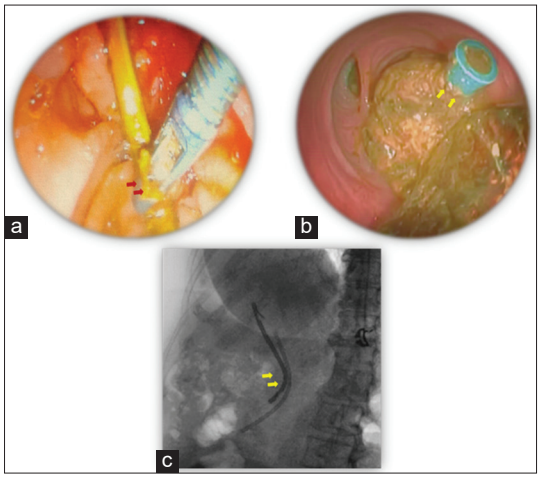

Figure 1: (a) Side-view endoscopic image that visually captures the precise procedure of removing an obstructed biliary plastic stent using specialized forceps, (b) Cholangioscopic: The proximally migrated and impacted biliary stent, providing a visual representation of the stent's migration and blockage within the biliary tract, (c) The radiographic depiction of the abdomen reveals two biliary plastic stents, highlighting one stent that has proximally migrated within the biliary tract

Outcome metrics

The inaugural ERCP-based stent removal success rate was notably etched at 66.6%. The spectrum of complications was dominated by the pervasive presence of cholangitis, a specter that loomed over seven cases, closely followed by CBD stones. Among those who grappled with complications, 50% ultimately required advanced interventions that transcended the ambit of ERCP to secure the triumphant removal of the stents.

Table 3: Stent retrieval and complications

Parameter	Value
ERCP success rate	66.6%
Successful ERCP stent removal	8 patients
Complications encountered	4 patients
Types of complications	Broken distal pigtails: 2 Impacted biliary stent: 1 Fragmented and migrated stent into CBD: 1
Alternative intervention approaches	Cholangioscopy: 2 patients Surgical Intervention: 2 patients

ERCP: Endoscopic retrograde cholangiopancreatography

Table 4: Outcome metrics

Parameter	Value
Initial ERCP-based stent removal success rate	66.6%
Prevalent complications	Cholangitis: 7 cases CBD Stones: 7 cases
Patients requiring advanced interventions	50%

ERCP: Endoscopic retrograde cholangiopancreatography, CBD: Common bile duct

Table 5: Complication-free survival

Parameter	Value
Mortality	No instances reported

Complication-free survival

Notably, even in the face of evident complications such as cholangitis and the looming threat of CBD stones, it is striking to observe that the study cohort exhibited a notable absence of mortality. This underscores the remarkable resilience and favorable outcomes observed among the patients, highlighting the resilience and effectiveness of the medical interventions employed (Table 5).

DISCUSSION

Our study, meticulously conducted at King George Hospital in Visakhapatnam, contributes significantly to the existing knowledge on forgotten or retained plastic biliary stents. By examining demographics, we found that the patient population had a median age of 48 years, with a notable majority of females at 58.3%, aligning with patterns observed in previous investigations.[11,12]

Our study echoes Siiki et al.'s work, highlighting cholangitis as the principal complication associated with retained biliary stents (Figure 1) and emphasizing the ongoing relevance of this issue in diverse medical contexts.[13] An interesting departure from previous research lies in our documentation of ERCP success rates, reporting 66.6%, slightly below the 75% success rate reported by Gadour et al.[14] This variation raises questions that invite further exploration, potentially tied to factors such as surgical techniques, disparities in health-care resource availability, and distinctions in the expertise of medical practitioners, as hinted at by Patel et al.[15]

A unique and noteworthy aspect of our study is the revelation of a heightened prevalence of forgotten biliary stents during the tumultuous period of the COVID-19 pandemic – an aspect that has hitherto evaded exploration (Figure 1). This finding is particularly significant as even comprehensive studies, such as the one conducted by Skorupski et al., did not delve into the potential impact of the pandemic on stent retention. The notable upsurge in instances of forgotten stents during this period can be plausibly attributed to the disruptions in routine health-care caused by lockdowns and the reallocation of health-care resources, thereby underscoring the urgency of addressing this issue and the need for targeted research.[16]

Expanding on the theme of alternative intervention strategies, our study sheds light on a promising 50% success rate associated with cholangioscopy when ERCP proves ineffective, surpassing the 40% efficacy reported by Oh et al.[17] This divergence prompts contemplation regarding the potential favorability of cholangioscopy as an alternative or supplementary approach to ERCP in specific clinical scenarios. In alignment with the findings of Subhash et al.,[18] our research reaffirms the effectiveness of surgical intervention as a last-resort strategy for stent retrieval, attaining a flawless 100% success rate.

The implications of our findings resonate far and wide, extending their influence into the realms of clinical practice and future research in the domain of forgotten or retained plastic biliary stents. As we navigate the intricate path of patient care, it becomes essential to assimilate the insights provided by our study into the broader tapestry of existing literature.[19] Furthermore, the profound impact of the COVID-19 pandemic on health-care delivery, as illuminated by our findings, necessitates continued scrutiny and the adaptive refinement of clinical protocols. This collective effort will undoubtedly contribute to the amelioration of patient outcomes and the enhancement of management strategies in this specialized domain.

Limitations of the study

While our research is undoubtedly a meaningful contribution to the academic discussion, it is essential to recognize its limitations. The small sample size and the absence of a control group may limit the broad applicability of our findings. In addition, the relatively short 8-month study duration may not capture the full range of long-term effects from stent retention, a limitation worth noting.

CONCLUSION

Our study provides crucial insights into the challenges of dealing with forgotten plastic biliary stents and their complications, significantly advancing medical knowledge. It confirms common trends and issues, particularly the risk of cholangitis. Notably, the varying success rates of ERCP highlight challenges in stent removal. The study uncovers an increase in forgotten stents during the COVID-19 pandemic, emphasizing the urgent need for effective management, especially in crises. In addition, our research demonstrates the effectiveness of alternative interventions like cholangioscopy, contributing to medical advancements. In conclusion, our study addresses knowledge gaps, emphasizing the close link between health-care delivery and external factors. These findings urge proactive measures from health-care practitioners for optimal outcomes in managing plastic biliary stents, a critical concern in modern medicine.

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Authors Contribution:
SS and MKK- Were the architects of the study's conceptual framework, responsible for its inception and data conception; **PRKM and HRN-** Undertook the tasks of data analysis, curation, and comprehensive literature review; **SBS and RK-** Played pivotal roles in the study's design, execution, drafting, editing, statistical analysis, and data validation. It's worth noting that NHR also contributed to the study's design. **SS-** Concept and design of the study, results interpretation, review of literature and preparing first draft of manuscript. Statistical analysis and interpretation, revision of manuscript; **MKK**- Concept and design of the study, results interpretation, review of literature and preparing first draft of manuscript, revision of manuscript; **PRKM**- Review of literature and preparing first draft of manuscript. Statistical analysis and interpretation; **HRN**- Concept and design of the study, results interpretation, review of literature and preparing first draft of manuscript. Statistical analysis and interpretation, revision of manuscript; **SBS**- Statistical analysis and interpretation, revision of manuscript; **RK-** Statistical analysis and interpretation, revision of manuscript.

Work attributed to:
Andhra Medical College/King George Hospital, Visakhapatnam, Andhra Pradesh, India.

Orcid ID:
Sreedevi Sunkara - https://orcid.org/0009-0001-1561-3913
Manoj Kumar Katragadda - https://orcid.org/0009-0003-3346-1444
Pandu Ranga Kumari Motepalli - https://orcid.org/0000-0003-1908-8981
Harinath Reddy N - https://orcid.org/0009-0003-3660-8392
Suresh Babu Sayana - https://orcid.org/0000-0003-4971-4007
Ramesh Kandimalla - https://orcid.org/0000-0002-3313-4393

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