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# Personalized Palliative Management in Advanced Klatskin Tumors: A Case Report on Multiduct Stenting and Chemotherapy

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***Authors' contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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***Case Report***

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## ABSTRACT

Klatskin tumors, a subtype of cholangiocarcinoma, arise at the hepatic bile duct bifurcation, leading to significant biliary obstruction and often late-stage diagnosis. A 62-year-old woman with a Bismuth type 3b Klatskin tumor presented with complaints of progressive jaundice, pruritus, and

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fatigue. Laboratory tests showed elevated bilirubin and cholestasis markers. Imaging revealed a 3.5 cm hilar mass, confirmed as cholangiocarcinoma. Due to advanced disease and impaired liver function, surgical resection was not an option. A palliative strategy involving endoscopic retrograde cholangiopancreatography (ERCP) with stent placement, followed by gemcitabine and cisplatin chemotherapy, resulted in symptom relief and disease stabilization after four cycles. This case not only highlights the importance of personalized, minimally invasive approaches in managing advanced Klatskin tumors but also inspires with the potential role of emerging therapies, such as targeted treatments for genetic mutations, in the future management of unresectable cholangiocarcinomas.

*Keywords: Hilar cholangiocarcinoma; CBD; common bile duct dilatation; ERCP; cholestasis.*

## 1. INTRODUCTION

Klatskin tumors, also known as hilar cholangiocarcinomas, represent a rare yet aggressive subset of extrahepatic bile duct cancers that arise at the junction where the right and left hepatic ducts converge. These tumors fall under the broader category of cholangiocarcinomas, which can be classified into intrahepatic, perihilar, and distal types. Among these, perihilar cholangiocarcinomas (Klatskin tumors) account for approximately 60-70% of extrahepatic biliary malignancies [1,2]. The Bismuth-Corlette classification system divides hilar cholangiocarcinomas into five categories (Types I, II, IIIa, IIIb, and IV) based on the extent of bile duct involvement [2,3]. Type IV lesions, involving bilateral invasion of second-order biliary branches, are associated with poorer surgical outcomes and survival compared to Types I-III [2,3].

Early diagnosis of Klatskin tumors is challenging due to their slow and often asymptomatic progression. By the time they obstruct bile drainage, symptoms like jaundice, pruritus, dark urine, and pale stools are typically present [3,4]. Other associated clinical features may include abdominal discomfort, weight loss, and hepatomegaly [3,4]. The underlying risk factors for developing cholangiocarcinoma include conditions such as primary sclerosing cholangitis, chronic viral hepatitis, liver fluke infections, cirrhosis, and chronic biliary inflammation [5]. Moreover, genetic mutations have been linked to tumorigenesis and progression, particularly in the IDH1/2 and FGFR2 genes [4,5].

Specific clinical investigations essential for diagnosis include elevated bilirubin, alkaline phosphatase, and gamma-glutamyl transferase levels, all indicative of cholestasis [4,5]. Imaging modalities such as magnetic resonance cholangiopancreatography (MRCP) and multiphasic computed tomography (CT) are instrumental in determining the location and spread of the tumor [5,6]. Additionally, endoscopic retrograde cholangiopancreatography (ERCP) not only aids in diagnosis but also serves therapeutic purposes, such as stent placement, to relieve bile duct obstruction [6].

Surgical resection remains the primary treatment with curative intent for patients diagnosed early [7,8]. However, for those with advanced or unresectable disease, palliative interventions like ERCP with biliary stenting or external biliary drainage via interventional radiology (IR) are essential to managing symptoms and improving quality of life [7,8]. Emerging endoscopic techniques, including fully covered self-expandable metal stents (FCSEMS), offer extended biliary drainage and have demonstrated promise in enhancing patient outcomes [7,8]. In this case report, we describe the successful management of a 62-year-old female diagnosed with a Bismuth type 3b Klatskin tumor. The patient was treated using a multi-duct stent placement via ERCP, emphasizing the importance of personalized, minimally invasive strategies for managing malignant hilar strictures. This case underscores the role of early, targeted intervention in preventing complications such as cholangitis and liver failure while highlighting the potential of advanced endoscopic techniques in providing effective palliative care.

## 2. CASE PRESENTATION

A 62-year-old female presented with progressive obstructive jaundice, pruritus, dark urine, and generalized fatigue for over one month. She initially noticed yellowing of skin and eyes, itching, and fatigue before seeking medical advice. Although initially gradual in onset,

symptoms gradually worsened over several weeks despite this individual experiencing no abdominal pain or fever. The patient had well-controlled hypertension on amlodipine and a 30-year history of smoking, with no history of diabetes, alcohol abuse, or liver disease. The presence of hypertension and a long history of smoking are significant as they are potential risk factors for the development of Klatskin tumors. On examination, the patient appeared jaundiced, with yellowing skin and sclera. She was afebrile with stable vital signs. The abdominal exam revealed mild right upper quadrant tenderness without palpable masses or hepatomegaly; no ascites or Courvoisier signs were evident. The patient underwent different relevant laboratory investigations to diagnose the disease. Table 1 depicts the results of these laboratory investigations. An ultrasound imaging of the abdomen revealed a hilar mass suggestive of biliary obstruction, prompting further evaluation with MRCP and CT. These confirmed a 3.5 cm lesion consistent with a Bismuth type 3b Klatskin tumor at the confluence of the right and left hepatic ducts, as shown in Figs. 1 and 2. There was significant dilation of intrahepatic bile ducts without evidence of distant metastasis, and the tumor extended into the right anterior and posterior sectoral ducts. Figs. 1 and 2 show the hepatic mass on ultrasound and contrast-enhanced CT abdomen pelvis.

Diffusion-weighted MRI supported the malignant nature, while PET-CT verified no lymph node involvement. A liver biopsy confirmed cholangiocarcinoma with moderate differentiation and positivity for CK7, CK19, and CA19-9 immunohistochemical staining; there were no indications of metastatic disease present; thus, the diagnosis of Klatskin tumor could be made with certainty. A multidisciplinary team (MDT) meeting was convened, comprising gastroenterology, oncology, surgery, and radiology specialists. According to current guidelines for advanced perihilar cholangiocarcinoma, treatment options include surgical resection, endoscopic stenting, or palliative care. However, due to advanced-stage tumor growth and declining liver function, surgical resection was ruled out due to high risk. Palliative stenting was suggested instead to relieve obstruction and improve quality of life. The patient underwent an ERCP procedure, during which cannulation was achieved in both the left hepatic duct and right anterior and posterior sectoral ducts. Fig. 3 shows the plastic stents being placed to relieve obstruction.

Hilar stricture was identified using a Sohendra dilatation catheter, and three 7Fr plastic stents were placed to facilitate drainage from involved ducts due to the complexity of stricture, advanced disease state, and complexity of stricture itself; 3 FCSEMS were considered but ultimately were chosen over these more adaptable plastic stents due to complexity of obstruction present throughout. Fig. 4 shows the cholangiogram of the duodenoscope and stent placement in the left and right hepatic ducts.


**Fig. 1. Mass in the Liver on Ultrasound Abdomen**

**Table 1. Laboratory Investigations**

| Test | Result | Normal Range |
|---|---|---|
| Total Bilirubin | 15.2 mg/dL | 0.2-1.2 mg/dL |
| Direct Bilirubin | 10.8 mg/dL | 0-0.3 mg/dL |
| Alkaline Phosphatase (ALP) | 920 U/L | 44-147 U/L |
| Gamma-glutamyl transferase (GGT) | 800 U/L | 9-48 U/L |
| Aspartate aminotransferase (AST) | 98 U/L | 10-40 U/L |
| Alanine aminotransferase (ALT) | 112 U/L | 7-56 U/L |
| CA 19-9 | 520 U/mL | 0-37 U/mL |
| Hemoglobin | 12.5 g/dL | 12.0-15.5 g/dL |
| White Blood Cell Count | 7,800/mm³ | 4,500-11,000/mm³ |
| Platelets | 250,000/mm³ | 150,000-450,000/mm³ |

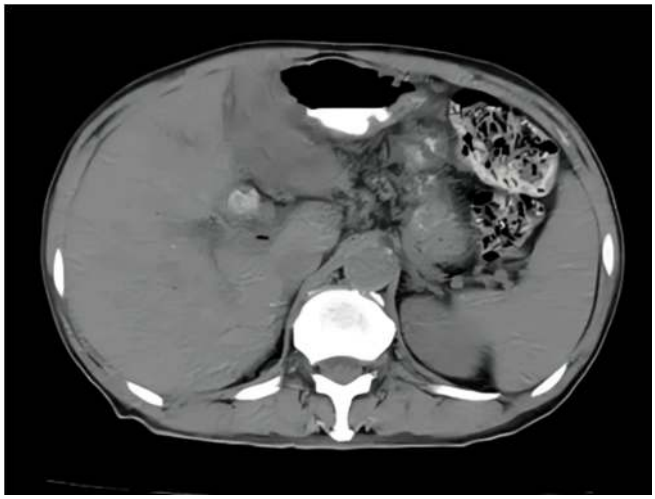

**Fig. 2. CT Scan of Perihilar Cholangiocarcinoma (Klatskin Tumor) in a 62-year-old Female Patient showing a Mass**

*CT: Computerized Tomography*

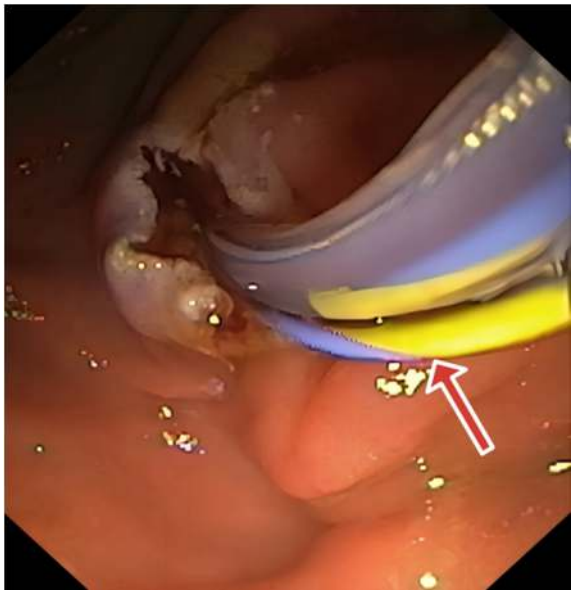

**Fig. 3. Endoscopic Image showing Placement of Plastic Stents**

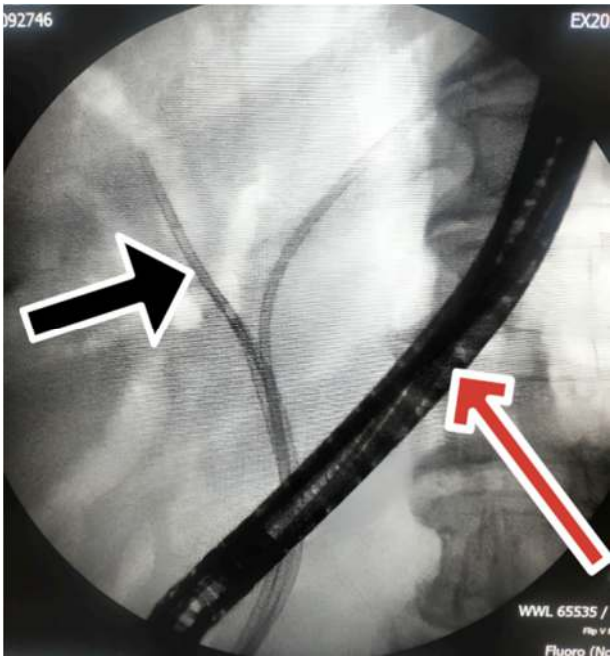


**Fig. 4. Cholangiogram showing the Duodenoscope and Stents in the Right and Left Hepatic Ducts**

Our patient was carefully monitored post-procedure for complications, including cholangitis and stent occlusion, although none were immediate; instead, her jaundice and pruritus improved significantly over the subsequent days, with her bilirubin levels declining from 15.2 mg/dL at day five post-procedure to 6.4 mg/dL by day five post-procedure; she remains at risk for recurrent obstruction/cholangitis, thus needing regular check-up appointments post-procedure to check her health status. Following stenting, the patient was referred to oncology for further management. She started on adjuvant chemotherapy with gemcitabine and cisplatin, receiving 1000 mg/m2 gemcitabine on days 1-6 and 8 plus 25 mg/m2 cisplatin on day 1, repeating every 21 days; this regimen has been recommended based on current evidence for treating unresectable cholangiocarcinomas with unresectable margins by prolonging survival while improving quality of life. Our patient experienced gradual clinical improvement, with a marked reduction in jaundice and disappearance of pruritus. After four cycles of chemotherapy, her tumor markers (CA 19-9) dropped, as did follow-up imaging, which demonstrated stable disease without further progression. She remains on palliative chemotherapy as her overall condition remains stable without major complications; ongoing monitoring will focus on her stent patency status as well as her response to treatment.

## 3. DISCUSSION

Klatskin tumors, also known as perihilar cholangiocarcinomas, are rare yet aggressive malignancies that pose significant challenges in diagnosis and management [1,2]. These tumors often develop slowly, with symptoms like jaundice, pruritus, and fatigue typically manifesting only when the tumor obstructs the bile ducts [3,4]. Our patient, a 62-year-old female with a Bismuth type 3b Klatskin tumor, mirrors the findings reported in the literature. Management strategies for Klatskin tumors largely depend on the stage at diagnosis [4,5]. In this case, the patient's advanced stage and poor liver function precluded surgical resection, leaving palliative stenting and chemotherapy as the primary treatment options. Surgical resection remains the only potentially curative option for Klatskin tumors, though it is only feasible in 20-30% of cases due to late presentation [4,5]. Even with negative margins (R0 resection), recurrence rates exceed 50% [5,6]. For unresectable cases, liver transplantation may be considered, although its efficacy is debatable due to high recurrence rates and stringent selection criteria [6,7]. In this case, the tumor's involvement of both the right anterior and

posterior sectoral ducts led to the choice of plastic stents over FCSEMS, as plastic stents offer greater flexibility in managing multi-duct obstruction. While metal stents generally provide longer-term patency with fewer reinterventions, plastic stents are better suited for complex cases [6,7]. Biliary drainage through ERCP is essential in such cases, with studies showing high success rates in relieving biliary obstruction and reducing bilirubin levels, which was also observed in our patient [7,8]. Chemotherapy with gemcitabine and cisplatin is the current standard for unresectable cholangiocarcinomas [8]. Clinical trials have demonstrated that combinational chemotherapy regimens provide better outcomes than gemcitabine alone [8,9,10,11]. Our patient responded well to chemotherapy, showing a favorable tumor marker response and stable disease on follow-up imaging after four cycles. Adjuvant chemotherapy has shown improved overall and progression-free survival in unresectable cases. A contrasting case by Dr. Christopher T. Chen highlighted a 34-year-old woman with relapsed, metastatic intrahepatic cholangiocarcinoma [12,13]. Despite aggressive chemotherapy, rapid disease progression was noted, illustrating the variability in treatment responses and emphasizing the need for personalized approaches [13].

Similarly, a case by Dr. Zhang involving laparoscopic surgery for hilar cholangiocarcinoma demonstrated reduced postoperative complications, but the long-term survival benefits of minimally invasive techniques remain under evaluation [14]. Emerging targeted therapies and immunotherapies, particularly for patients with genetic mutations such as FGFR2 fusions and IDH1 mutations, are showing promise in cholangiocarcinoma management. Although our patient did not undergo genetic testing, the identification of genetic drivers in such tumors is becoming increasingly crucial. FGFR inhibitors, such as pemigatinib, have shown efficacy in patients with FGFR2 fusions, as demonstrated in clinical trials. This case underscores the importance of an integrative approach to Klatskin tumors. Palliative stenting and chemotherapy provided significant symptomatic relief and disease stabilization in our patient. Although the prognosis for advanced Klatskin tumors remains poor, emerging therapies and advancements in biliary stenting offer hope for improved outcomes. Further research into personalized treatment strategies and novel systemic therapies is needed to combat this aggressive malignancy [15].

## 4. CONCLUSION

This case report illustrates the clinical importance of early and precise intervention when managing Klatskin tumors. The successful use of ERCP and multi-duct stent placement on a patient with a Bismuth type 3b Klatskin tumor highlights how personalized, minimally invasive strategies may improve patient outcomes. While surgical resection remains the gold standard for early-stage disease, advanced endoscopic techniques offer palliative care options for those who cannot be removed surgically. As technology improves, endoscopic and imaging technologies will continue to advance, providing hope for better prognosis and quality of life for affected individuals.

## DISCLAIMER (ARTIFICIAL INTELLIGENCE)

At this moment, the author(s) declare that generative AI technologies, such as Large Language Models, have been used during the writing or editing of this manuscript. The explanation below includes the name, version, model, and source of the generative AI technology, as well as all input prompts provided to the generative AI technology.

Details of the AI usage are as follows:

1. The patient's research, study design, materials, and findings are based entirely on factual data and original research.
2. Generative AI was used solely to enhance the language, grammar, and overall quality of the manuscript.
3. The specific AI tool used was OpenAI's ChatGPT, Version 4 (GPT-4), accessed via the OpenAI platform. Prompts were provided for refining sentence structure and improving clarity without altering the content or meaning of the original research.

## ETHICAL APPROVAL

The author (s) have collected and preserved written ethical approval as per international standards or university standards.

## CONSENT

The author (s) have collected and preserved the patient's (s) written consent as per international or university standards.

## COMPETING INTERESTS

The authors have declared that no competing interests exist.

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