

Mobiliary Sheath

Team: Sheila Iyer, Andy Tang, Bruce Lee, Stella Park, Bryan Ho, Anishka Bartiya, Ana Rosu, Pranavi Gullamodi
Faculty Mentor: Dr. Elizabeth Logsdon (Department of Biomedical Engineering)
Clinical Mentor: Dr. Christopher Bailey (Department of Radiology and Radiological Science)

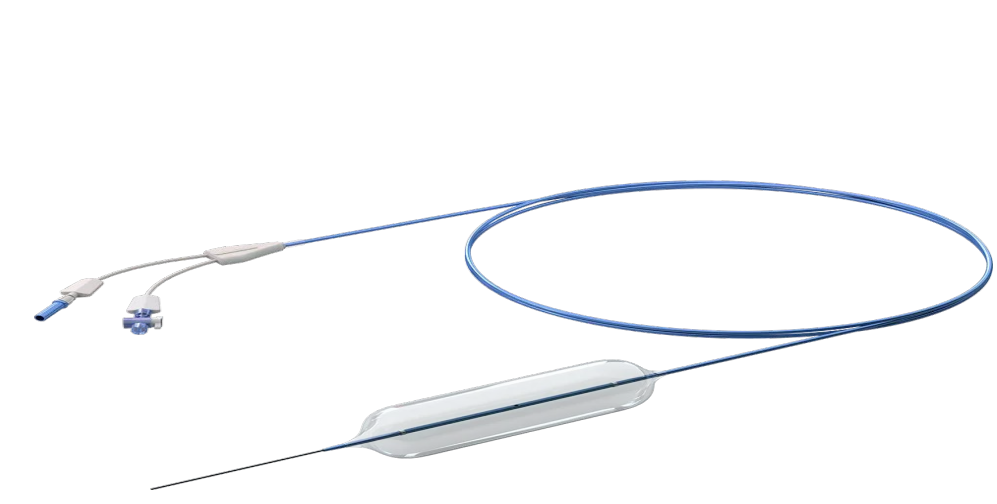


Biliary Strictures Cause Biliary Obstruction and Can Cause Many Health Complications

Biliary strictures are abnormal narrowings of the bile duct. They are either benign, caused by iatrogenic injury or scarring from prior intervention, or malignant, caused by a variety of GI malignancies or metastases¹. Damage and trauma to the bile duct causes inflammation and scarring of tissue, which causes a narrowing of the duct, preventing bile flow.

Strictures can lead to biliary stones, liver abscesses, and biliary cirrhosis as a result of cholangitis (bile duct inflammation) and scarring¹. If bile does not drain properly, it can accumulate in the liver and cause liver damage and jaundice.

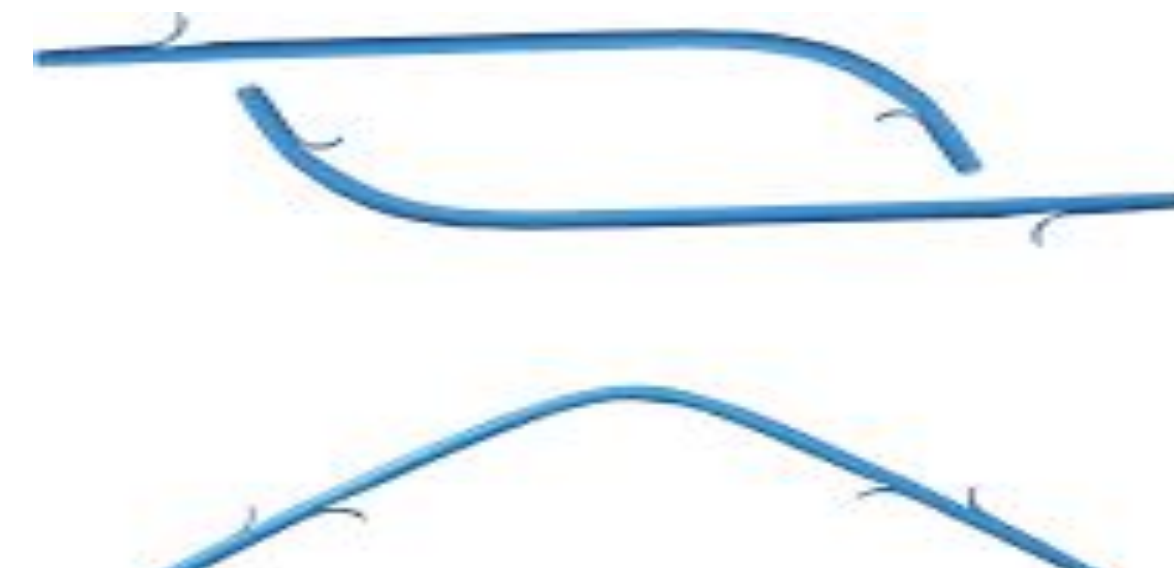
Problems with Current Treatments



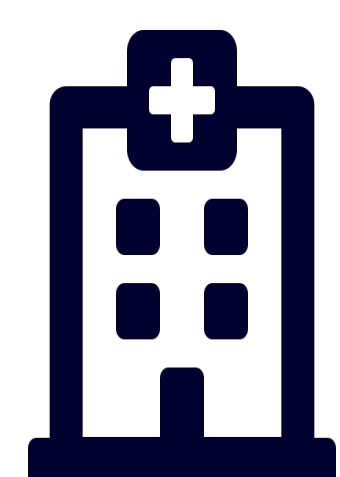
Balloon Dilation



Drainage Catheters



Stents



Repeat procedures to dilate balloon and upsize drains²



Solutions are not long lasting



Stents can epithelialize and occlude, making replacement difficult.

Market Size and Recurrence

101,245

Biliary dilation procedures in 2019⁵

\$5,029

Average cost of procedure⁴

30.6%

Patients require repeat procedures³

48%

Recurrence after 5 years³

Need

Interventional radiologists need a method to dilate biliary strictures long-term while minimizing damage to the liver parenchyma or biliary tree, in order to reduce repeat procedures and increase procedure effectiveness.

Our Solution - Mobiliary Sheath

Easily removable

Enables targeting of balloon to stricture site

Stricture dilation completed in a single procedure

Adaptive to different biliary tree morphologies

Drainage and securement mechanisms allow for long-term deployment

Visualizable under fluoroscopy

Opportunity to Expand to Additional Markets

Ureteral strictures treatment also needs dilation to be permanent and completed in a single-procedure → ~\$600 million market size

Acknowledgements

We would like to thank our committee members, Dr. Harjit Singh, Dr. David Gullotti, and Dr. Gray Lyons, for their valuable input.

Sources

[1] Singh, A., Gelrud, A., & Agarwal, B. (2014). Biliary strictures: Diagnostic considerations and approach. *Gastroenterology Report*, 3(1), 22–31. <https://doi.org/10.1093/gastro/gou072>

[2] Lee, T. H., Kim, T. H., Moon, J. H., Lee, S. H., Choi, H. J., Hwangba, Y., Hyun, J. J., Choi, J.-H., Jeong, S., Kim, J. H., Park, D. H., Han, J.-H., & Park, S.-H. (2017). Bilateral versus unilateral placement of metal stents for inoperable high-grade malignant hilar biliary strictures: A multicenter, prospective, Randomized Study (with video). *Gastrointestinal Endoscopy*, 86(5), 817–827. <https://doi.org/10.1016/j.gie.2017.04.037>

[3] Kapoor, B. S., Mauri, G., & Lorenz, J. M. (2018). Management of biliary strictures: State-of-the-art review. *Radiology*, 289(3), 590–603. <https://doi.org/10.1148/radiol.2018172424>

[4] Biliary stents market size & share: Forecasts report, 2023–2032. Global Market Insights Inc. (n.d.). Retrieved April 20, 2023, from <https://www.gminsights.com/industry-analysis/biliary-stents-market#:~:text=Biliary%20stents%20market%20size%20surpassed,CAGR%20between%202022%20and%202028>