



ERCP PROCEDURE

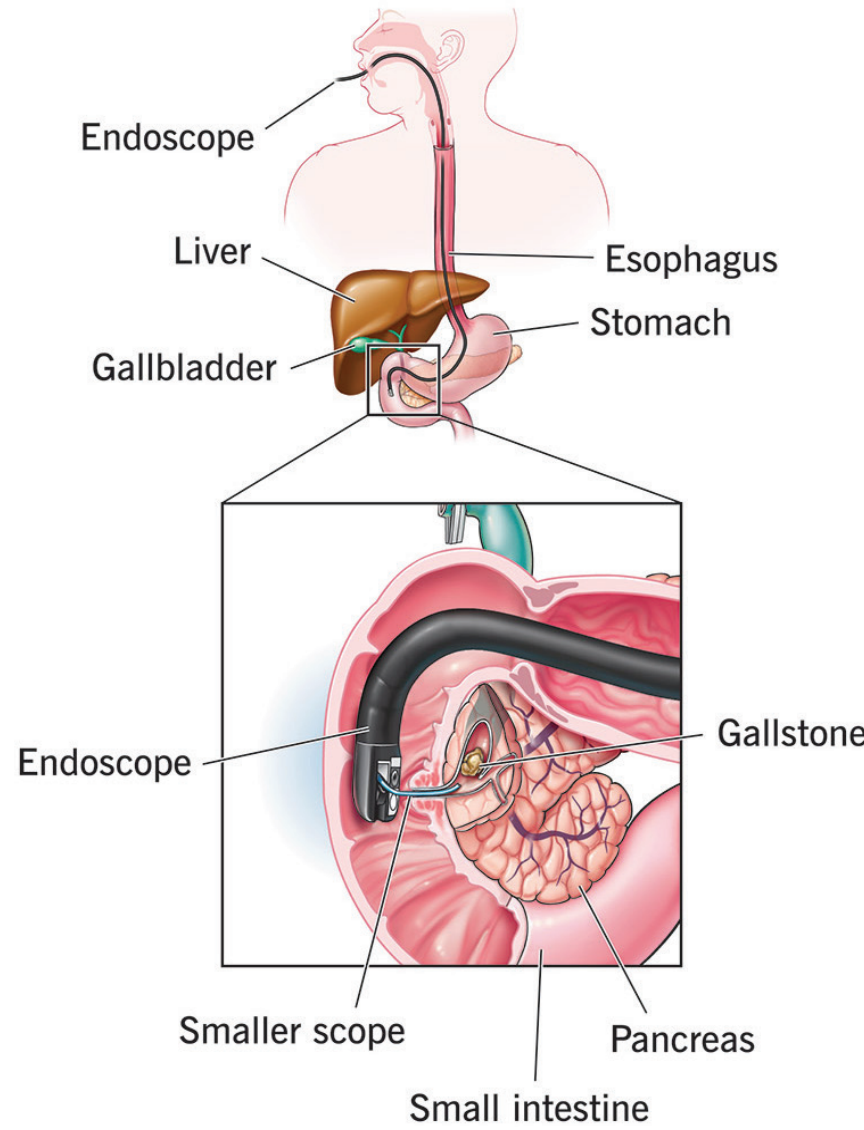
Limited Field of View Requires Uncomfortable Physician Movement

Endoscopic Retrograde Cholangiopancreatography (ERCP) is a minimally invasive procedure for diagnosing and treating bile and pancreatic duct diseases. ERCP is performed using a duodenoscope.

The physician navigates the duodenoscope through the esophagus and stomach to the papilla.

Currently existing scopes often reach the the papilla while it is outside the view of the camera, making it difficult to access.

Physicians must use strained, uncomfortable movements to position the duodenoscope, often causing unintended motion and making precise access to the biliary system difficult.

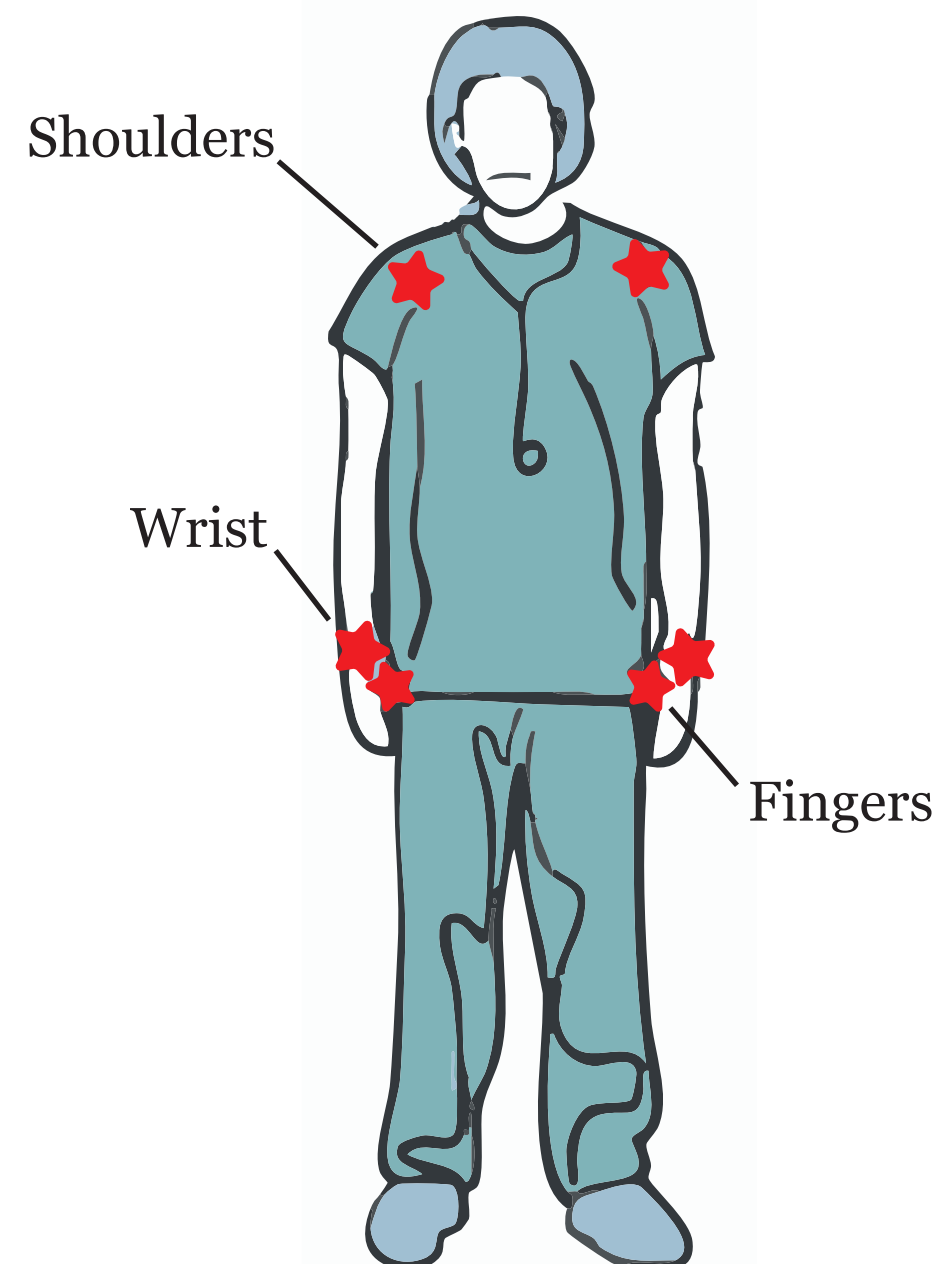


ERCP procedure diagram via Cleveland Clinic, 2023

OUR GOAL

Reducing Strain on Physicians

We aim to create better methods of visualizing and accessing the papilla while providing stability during the procedure, thus reducing physician strain.



Common pain points for physicians as a result of handling the scope

Over 650,000
ERCP procedures are performed every year in the U.S. alone

42 minutes
is the average procedure length, with some lasting over 3 hours

75.2%
of endoscopists report having sustained an endoscopy-related injury

Yung, Hsui-Yu et al. "Global trends of ERCP research in the last 25 years: A bibliometric study." *Medicine* vol. 101,32 (2022): e09424. doi:10.1093/med/101.32/e09424
Mishra, Parul P et al. "Association of procedure length on outcomes and adverse events of endoscopic retrograde cholangiopancreatography." *Gastroenterology* report vol. 11,2 (2021): 149-154. doi:10.1093/gastro/ggab002
Khalil, Faragouba R et al. "Impact of Patient Positioning and Endotracheal Intubation During ERCP: Insights from a Large Database." *Digestive diseases and sciences*, 10.1007/s12080-022-02428-0. 25 Nov. 2022. doi:10.1007/s12080-022-02428-0
Parks, Stuart et al. "The All Endoscopy Related Musculoskeletal Injuries Created Equal? Results of a National Gender-Based Survey." *The American journal of gastroenterology* vol. 116,12 (2021): 230-238. doi:10.14309/ajg.2021.116.12.230

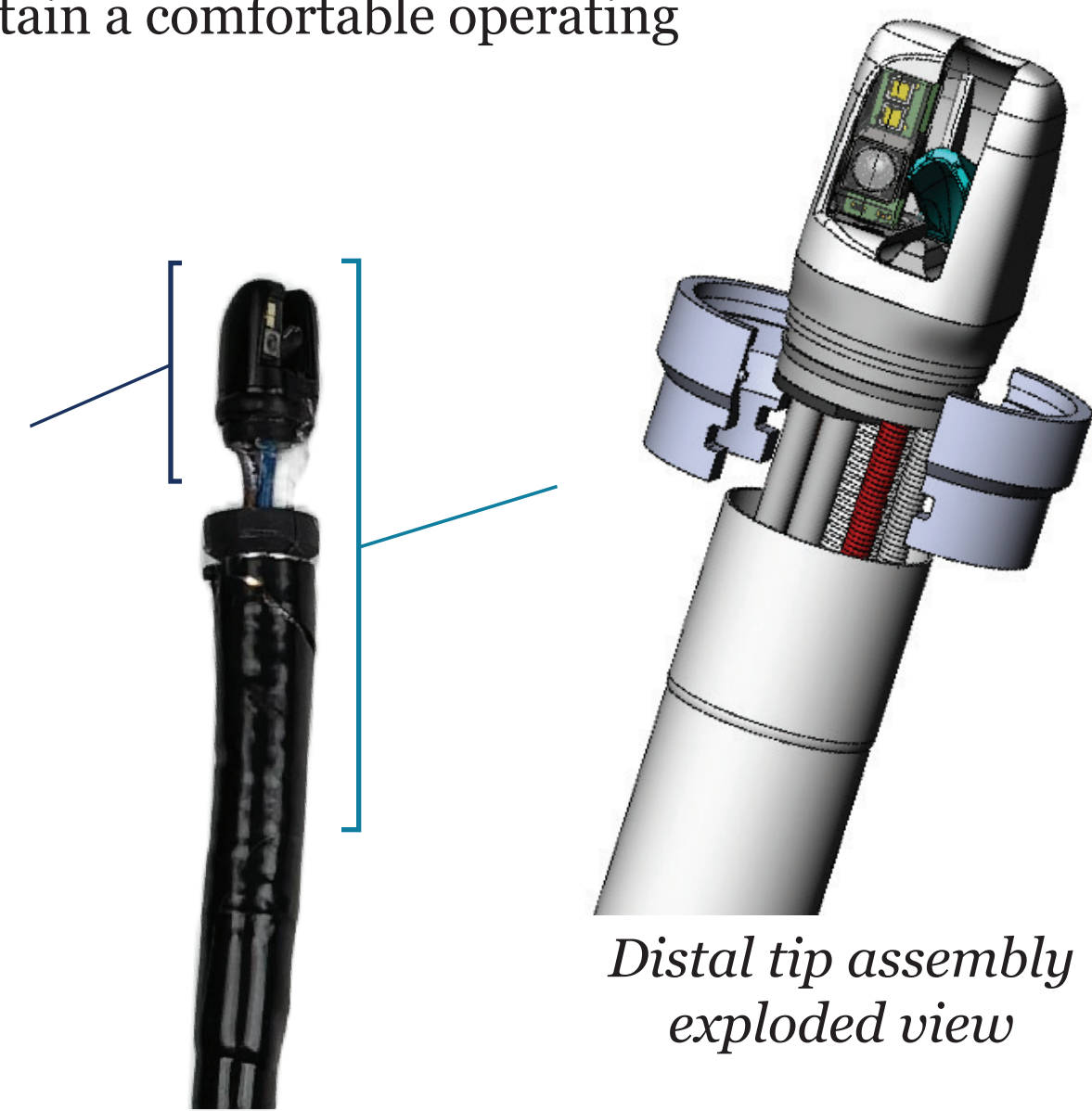
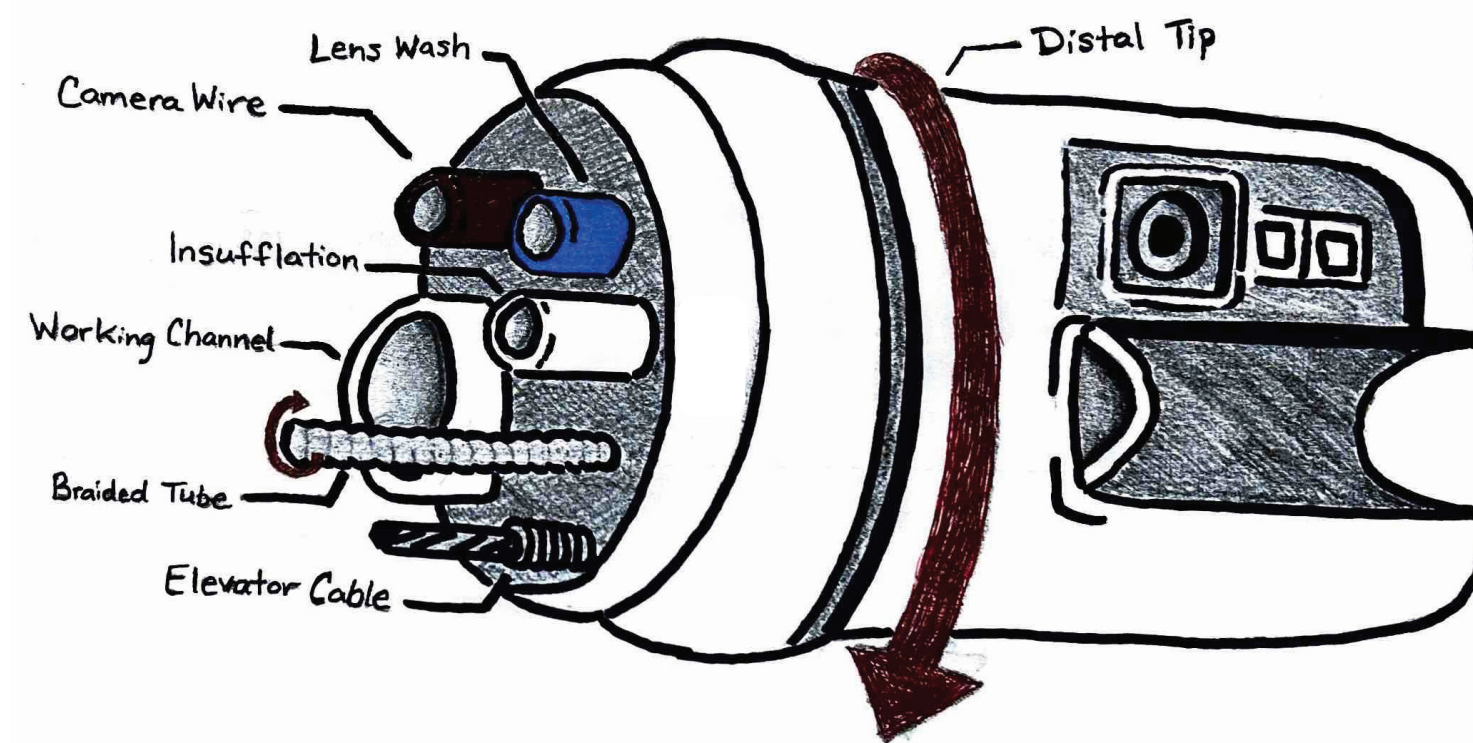
OUR FINAL PROTOTYPE

Tip Rotation Reduces Physician Strain

Tip rotation enables physicians to navigate to and access anatomy without causing unintentional strain.

Our final prototype uses a braided tube to transmit torque from the proximal end to the distal tip. The physician presses the buttons on the handle to control the motor, which twists the braided tube mounted directly to the bottom of the distal tip.

Our custom bushing allows the distal tip to rotate in place, increasing the field of view of the camera and improving tool access range while allowing physicians to maintain a comfortable operating position throughout the procedure.



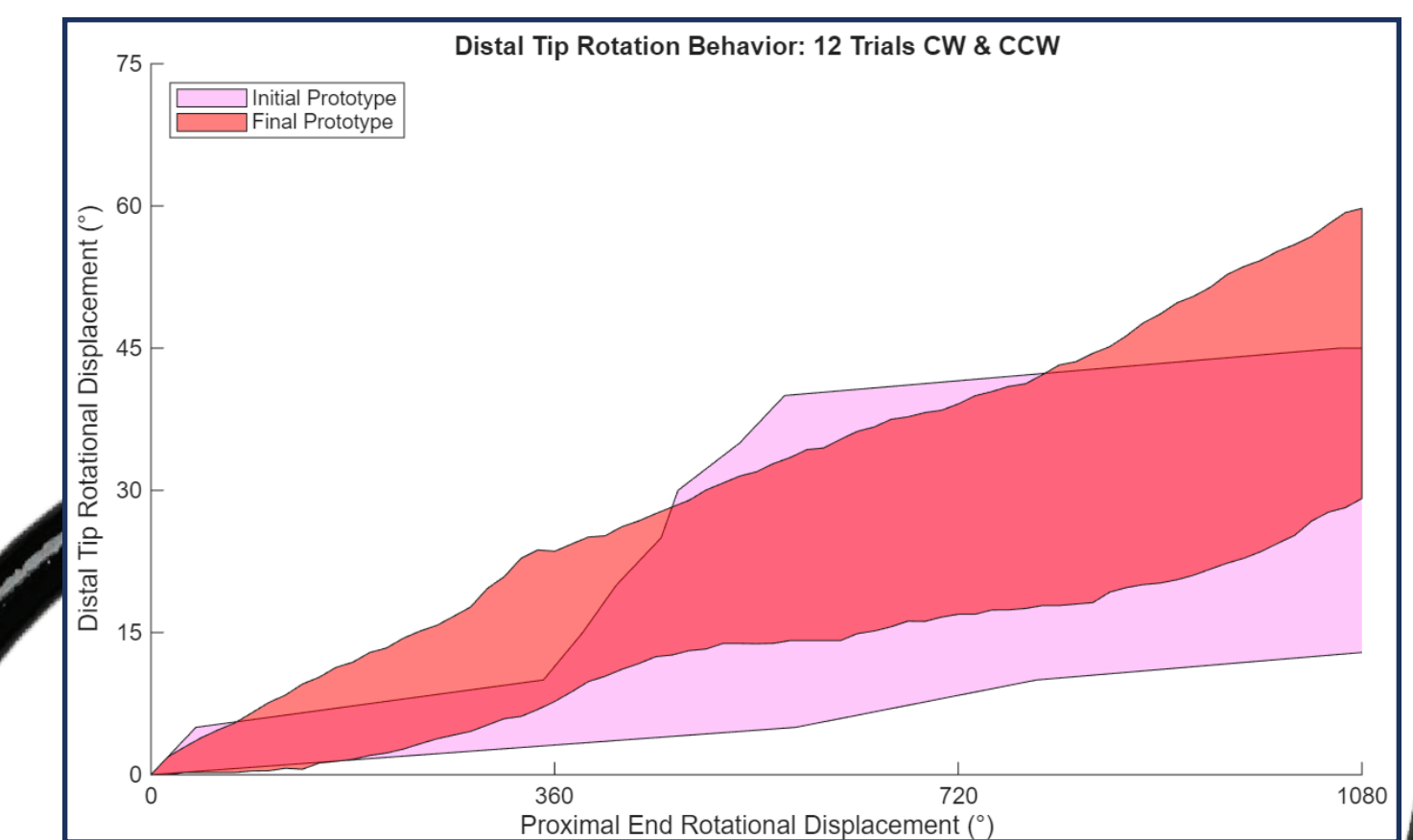
Distal tip assembly exploded view

VALIDATION AND REFINEMENT

Increasing Predictability During Physician Use

In our initial prototype, we identified whip and lag as the main contributors to unpredictable tip rotation. We proceeded to develop and test four additional embodiments, resulting in our final prototype, which out-performed the others by:

- Increasing the rotation ratio by 60%
- Lowering lag by 37%
- Decreasing whip by 31%
- Reducing trial-to-trial variance by 23%



NEXT STEPS

Four Patent-Pending Designs

Upon submission, there is a high potential for our designs to be refined and brought to market in a variety of products.

Our design gives Boston Scientific significant competitive advantage by creating product differentiation.

Meet the Team



Advisor: Jessica Townsend
Liaisons: Sean Powell & Collin Murray