

Arterial Coupler Re-Design: Adjustable Stent/Cuff Anastomosis

Progress Report 2: 9/18/2025

Client: Dr. Jasmine Craig

Advisor: Prof. Darilis Suarez-Gonzalez

Team:

- Leader: Allison (Ally) Rausch
- Communicator: Jacqueline (Jackie) Behring
- BWIG: Sofia Decicco
- BPAG: Arshiya (Ria) Chugh
- BSAC: Daniel Pies

Problem Statement: Microsurgical arterial anastomosis is a cornerstone of reconstructive surgery, enabling tissue transfer and limb salvage. Current techniques are highly time consuming, technically demanding, and are highly dependent on surgeon expertise. Suturing vessels as small as 1 mm can take even the most experienced surgeons 30-60 minutes, extending operating times and jeopardizing tissue viability. Existing stent-based approaches introduce complications by contracting the vessel lumen and lack adaptability across the wide range of vessel diameters encountered in clinical practice. There is a critical need for a biocompatible, adjustable, and easy-to-use device that can reliably reduce operative time while maintaining vessel integrity and minimizing complications.

Brief Team Status Update: The team completed the Product Design Specifications and continued research on the problem and proposed solutions.

Summary of Weekly Individual Design Accomplishments:

- Allison (Ally) Rausch:
 - Completed assigned sections of the PDS
 - Researched competing designs, safety protocols and standards, and competing devices
 - Updated my LabArchives
- Jacqueline (Jackie) Behring:
 - Completed assigned sections of PDS.
 - Conducted additional research on ischemia thresholds, arterial stiffness, and current coupler data.
- Sofia Decicco:
 - Researched the standards and specifications, sterilization requirements, and operating room requirements of device
 - Completed assigned sections within PDS
 - Documented additional research on competing devices/existing devices within Labarchives
- Arshiya (Ria) Chugh:
 - Researched stent design considerations, including reliability factors, Poiseuille's law for adaptability, patency rates, and arterial healing timelines.
 - Reviewed patents and standards to ensure design compliance with regulatory requirements and constraints.
- Daniel Pies:
 - Researched approved, common biomaterials used in stents and anastomosis procedures

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- Completed assigned sections of PDS
- Conducted research on competing designs in LabArchives

Weekly/Ongoing Difficulties: No notable difficulties.

Upcoming Team Goals: This week, the team will continue research while brainstorming designs. The team will meet with our client on Wednesday to propose preliminary ideas. The team will begin preparation for preliminary presentations and reports.

Upcoming Individual Goals:

- Allison (Ally) Rausch:
 - Begin design ideas and brainstorming
 - Research dilation mechanisms
 - Continue to update LabArchives with research and PDS
 - Begin to prepare for Preliminary Presentation
- Jacqueline (Jackie) Behring:
 - Continue to research and make additions to Lab Archives
 - Brainstorm and discuss design ideas to create a design matrix with three design ideas
 - Schedule meeting with client to discuss design ideas and receive feedback
 - Begin working on the preliminary presentation
- Sofia Decicco:
 - Research material that can mimic an arterial wall to test future prototype on
 - Design a few ideas/sketches that we can present in next client meeting
 - Continue to research requirements of an arterial anastomosis device
- Arshiya (Ria) Chugh:
 - Expand research on arterial biomechanics and coupler mechanisms, while studying competing designs to see what works well and what doesn't.
 - Plan to sketch out design ideas and brainstorm with the team.
- Daniel Pies:
 - Continue preliminary research on biomaterials, competing designs, and other factors in anastomosis procedures
 - Begin brainstorming preliminary designs

Project Timeline

Project Goal	Deadline	Team Assigned	State of Completion
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Initial Research	9/8	All	The team will continuously research throughout the semester.
Product Design Specification (PDS) Draft	9/19	All	Complete
Design Matrix Criteria and Design Ideas	9/26	All	
Preliminary Oral Presentation	10/3	All	
Final Design Selection	10/10	All	
Poster Presentations	12/5	All	

Expenses

Item	Description	Manufacturer	Part Number	Date	QTY	Cost Each	Total	Link
Component 1								
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL:								\$0.00