Arterial Coupler Re-Design: Adjustable Stent/Cuff Anastomosis
Progress Report 3: 9/25/2025

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 brainstormed preliminary design ideas and met on Monday (09/22) to create a design matrix. The team is continually doing research on mechanisms and design considerations to continue iterating the design matrix. The team has been preparing for preliminary presentations and reports.

Summary of Weekly Individual Design Accomplishments:

- Allison (Ally) Rausch:
    - Helped think of design criteria for the preliminary design matrix, identifying key performance, safety, and usability factors to compare designs.
    - Prepared background materials and questions for the client meeting on Wednesday, September 24th.
    - Brainstormed dilation mechanisms for the device.
    - Brainstormed lock mechanisms for the device.
- Jacqueline (Jackie) Behring:
    - Continued research on different designs and procedures
    - Brainstormed and sketched design ideas for the design matrix
    - Prepared for client meetings by adding additional questions to the document.
- Sofia Decicco:
    - Drafted three design proposals for preliminary design
    - Continued research on competing device and current limitations for arterial couplers
    - Worked with team on design matrix and criteria setting
- Arshiya (Ria) Chugh:
    - Developed and shared design concepts for the design matrix during team discussions.
    - Researched competing designs and explored coupler implementation strategies.
    - Refined and updated criteria for evaluating the design matrix.

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- Daniel Pies:
    - Contributed to preliminary design matrix, identifying and defining key metrics for determining the feasibility of each design
    - Created preliminary design utilizing a collet locking system
    - Continued procedural and biomaterial research

Weekly/Ongoing Difficulties: No notable difficulties.

Upcoming Team Goals: Next week, the team will continue research to iterate design ideas. The team will begin fabrication protocols and will draft out testing plans. The team will define FDA protocols that the product must adhere to.

Upcoming Individual Goals:

- Allison (Ally) Rausch:
    - Continue to iterate and refine preliminary designs.
    - Begin to model designs on SolidWorks
    - Incorporate client feedback from Wednesday's meeting into design ideas.
- Jacqueline (Jackie) Behring:
    - Prepare preliminary presentation and incorporate client feedback
    - Begin to research and order materials for prototyping
    - Choose and make adjustments to design.
- Sofia Decicco:
    - Find companies the team can source nitinol stents from
    - Finalize material research of leading device in final design
    - Start organizing data and progress into preliminary presentation slide deck
- Arshiya (Ria) Chugh:
    - Complete preliminary design drafts and incorporated client feedback through iterative updates.
    - Start development of 3D models to visualize and validate design concepts.
    - Conduct research on testing protocols and identified materials that meet compliance requirements.
- Daniel Pies:
    - Refine preliminary designs
    - Continue research as needed
    - Begin creating and contributing to preliminary presentation/preliminary report

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Project Timeline

Project Goal	Deadline	Team Assigned	State of Completion
Initial Research	9/8	All	The team will continuously research throughout the semester.
Product Design Specification (PDS) Draft	9/19	All	Completed
Design Matrix Criteria and Design Ideas	9/26	All	In progress
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**