



Improved Method of Securing Surgical Drains

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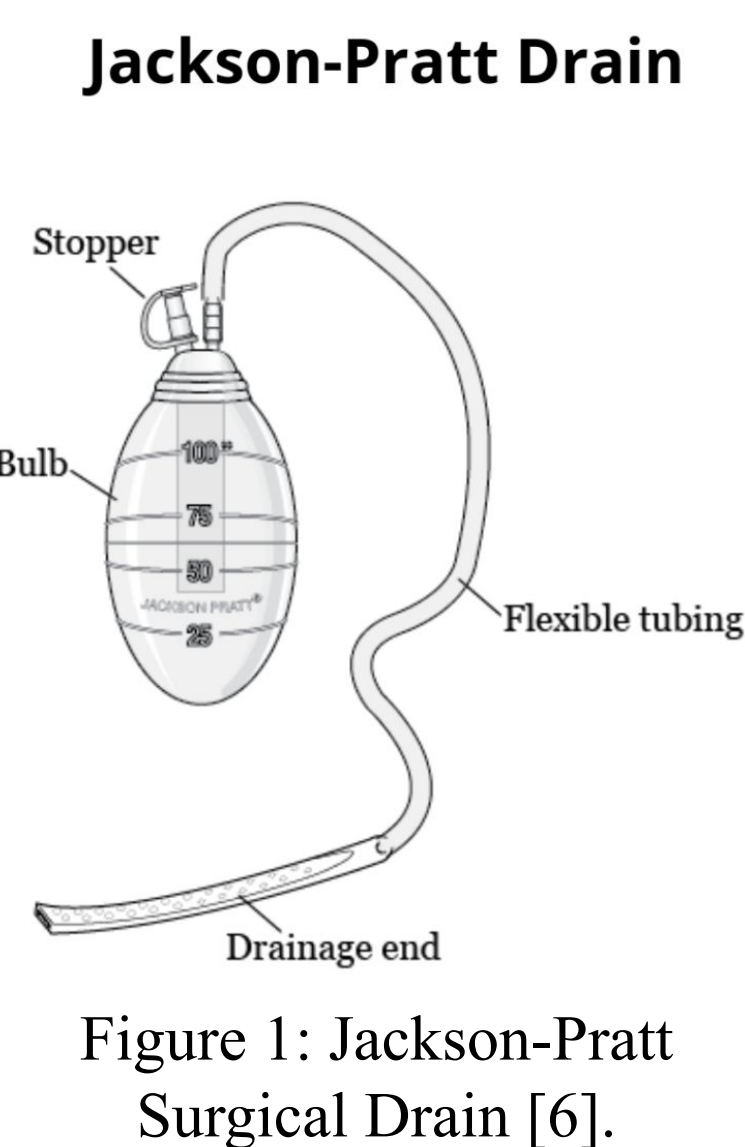
Background

Motivation:

- Surgical drain usage is increasing with a rise of prevalent chronic diseases [1]
- Market projection increase from 75.5 million units to 95.5 million units in 2030 [1]
- Current methods to secure surgical drains involve a single suture that aims to prevent dislodgement of the drain from a body [2]
- Tugging or brushing over the suture site creates significant discomfort to patients, and can potentially result in disruption of the drainage process [3]

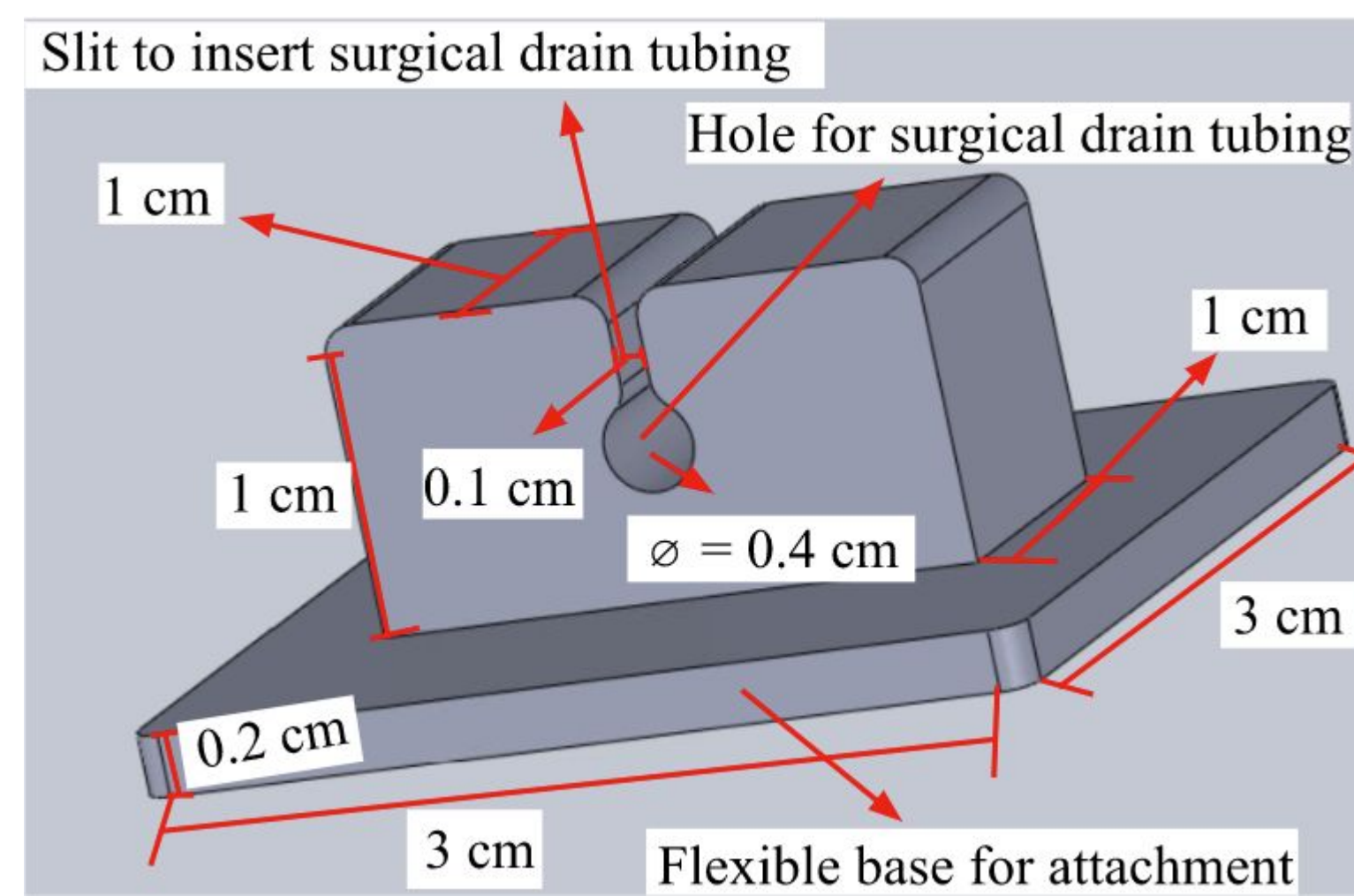
Clinical Significance:

- Surgical drains are used to prevent accumulation of blood, pus, and other fluids following a surgical procedure [2]
- Drainage bulbs must be emptied and fluid measurements are taken to determine proper removal time [4]
- Drain site must be kept clean, and drain tubing must be stripped twice daily to prevent clotting in the tube [5]



Previous Work

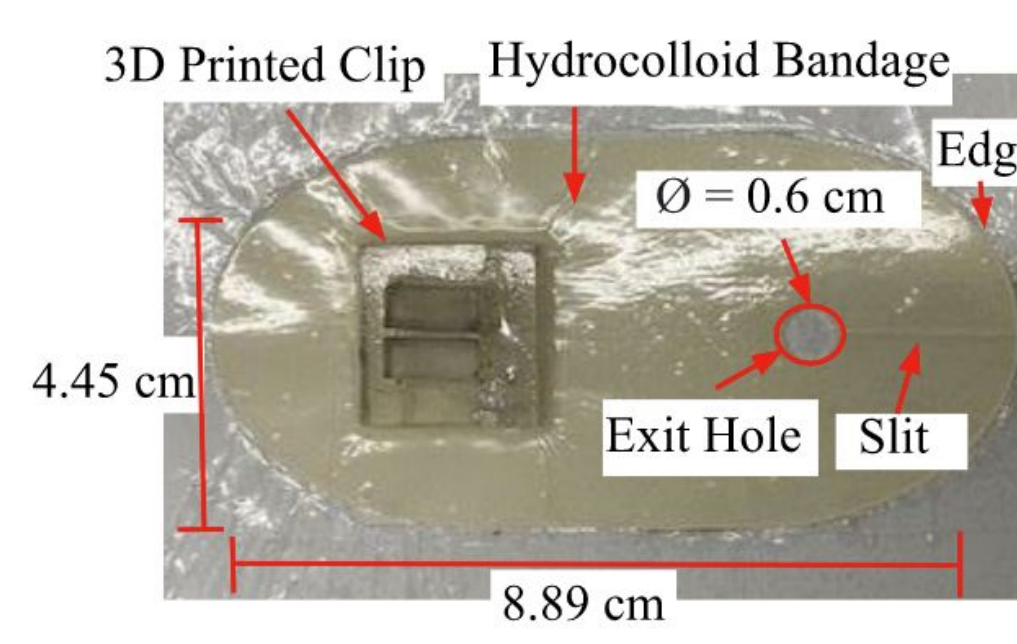
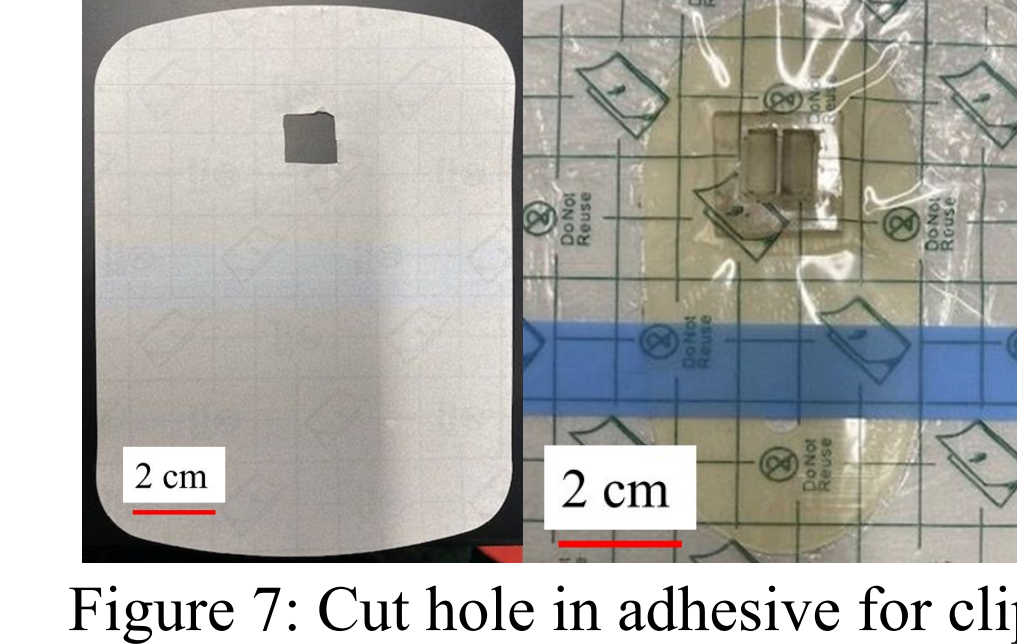
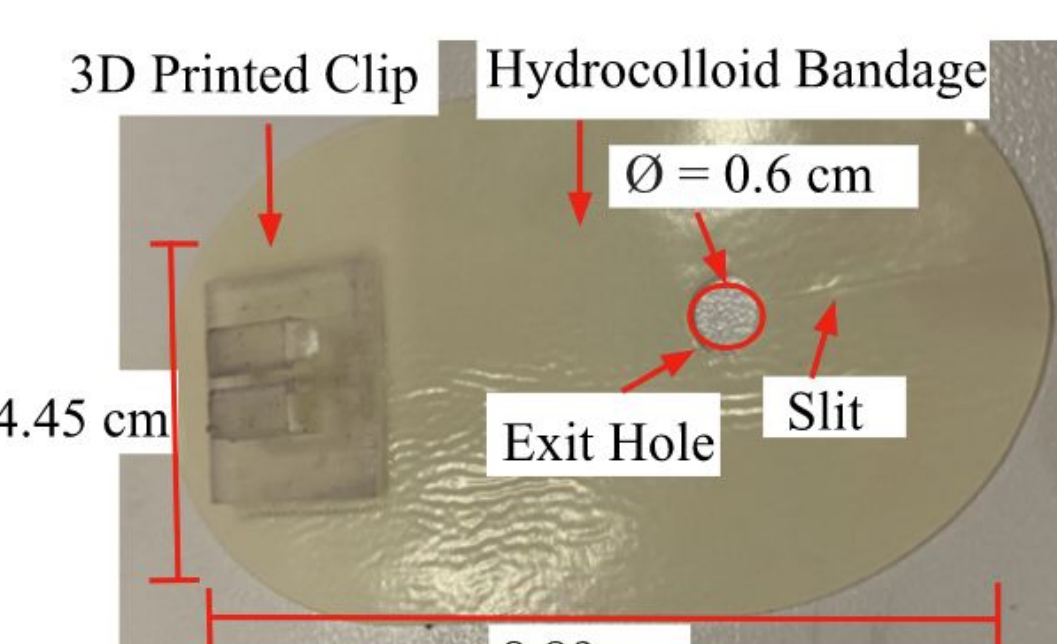
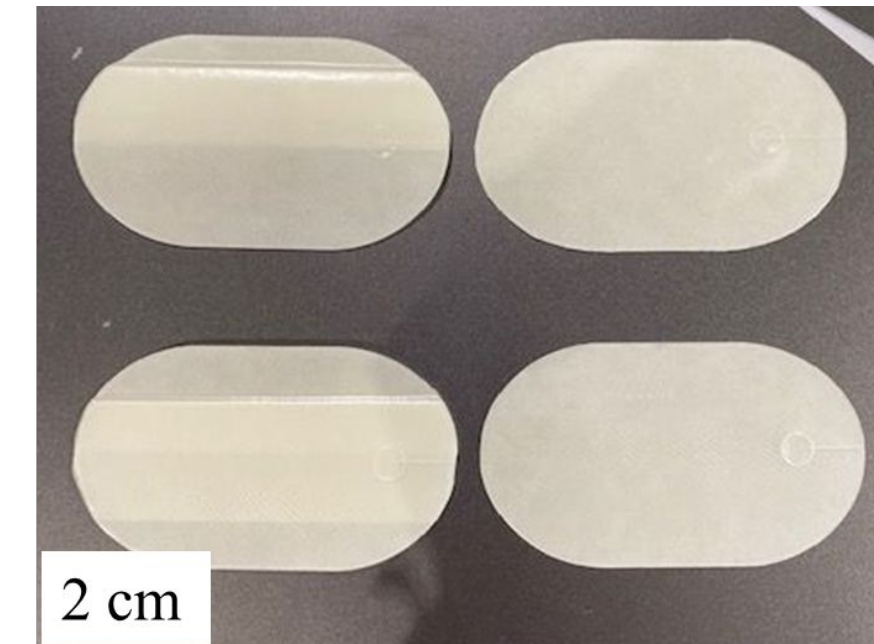
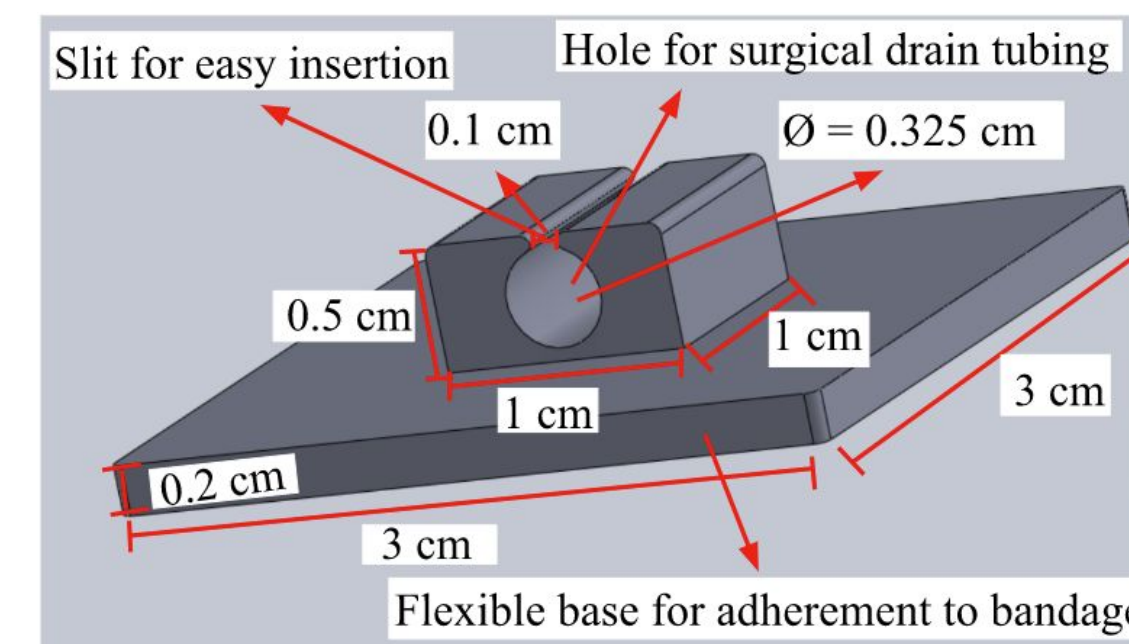
- Created and tested clip design to hold surgical drain tubing
- Tested different bandage materials and shapes for bandage base



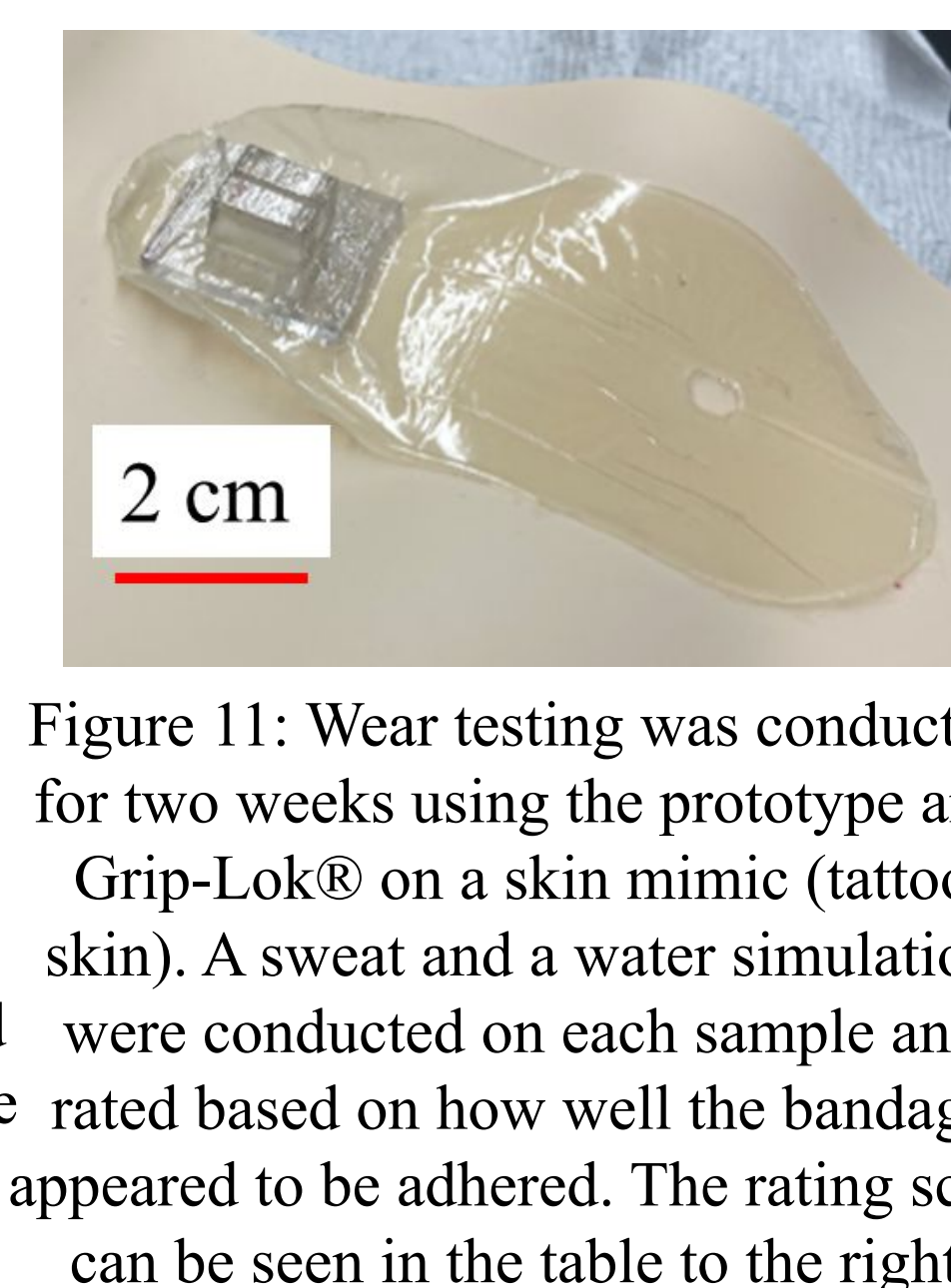
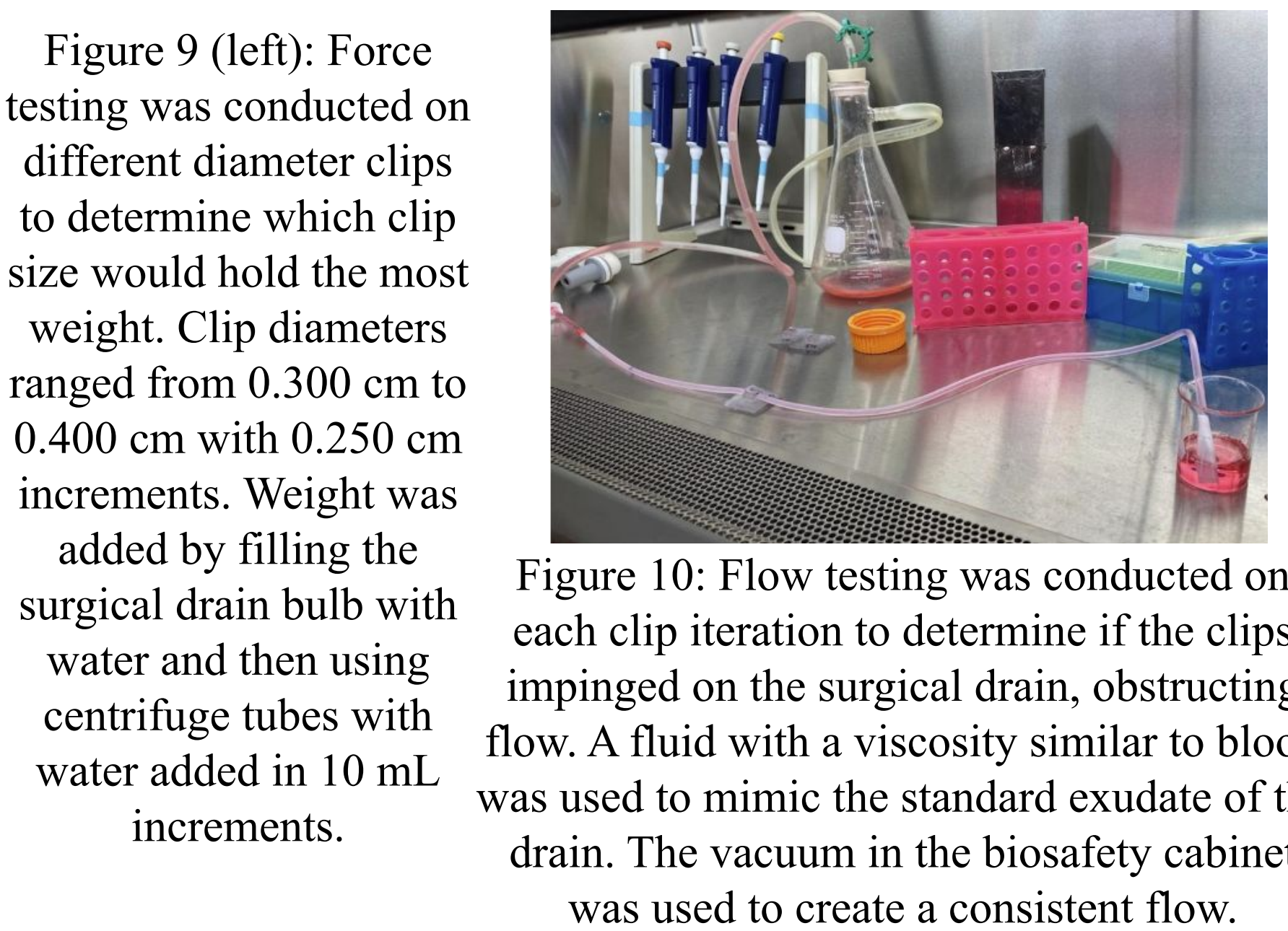
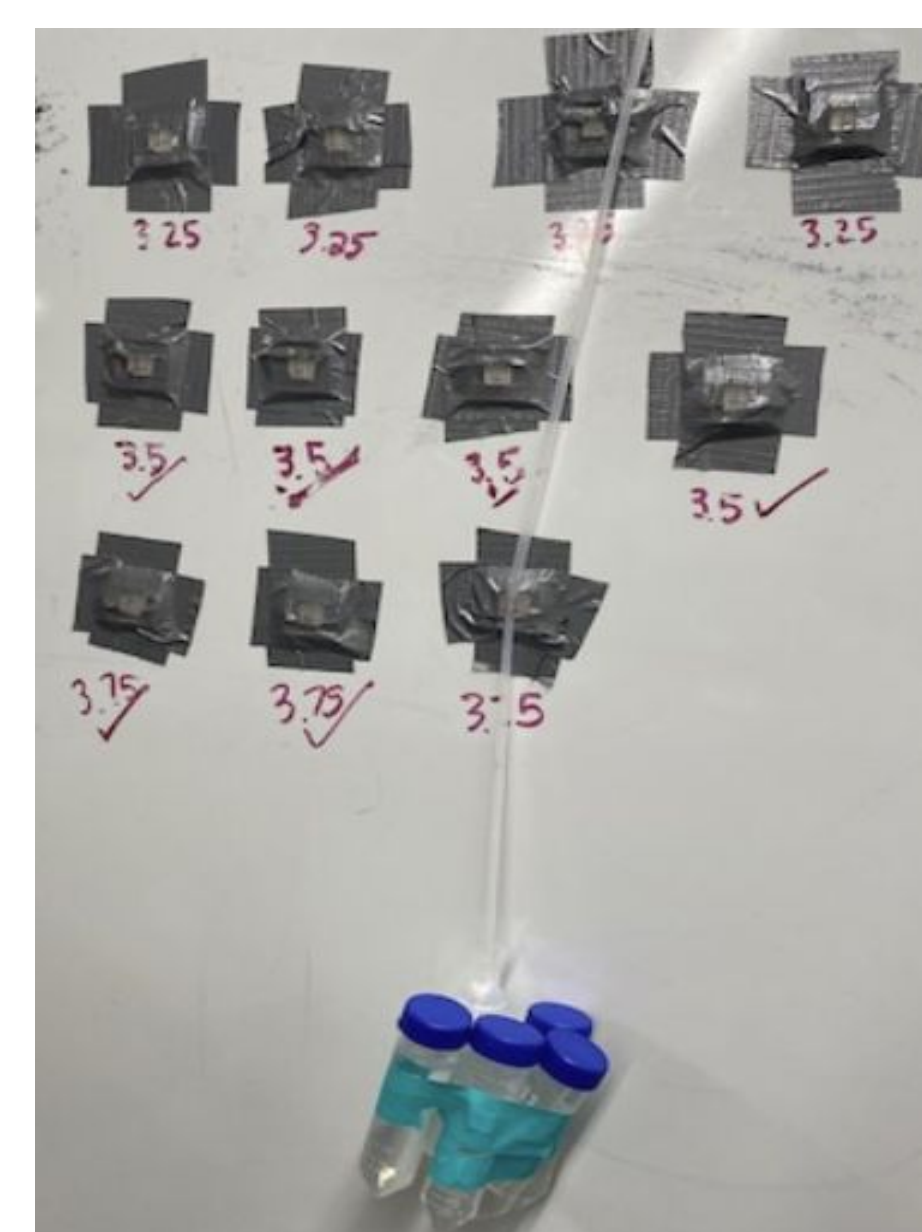
Design Criteria

- Compatible with surgical drain tube diameter 0.400 cm [7]
- Allow for continuous use for up to 1 week
- Prevent tube displacement greater than 3.6 ± 1 cm [8]
- Water resistant design
- Allow for access to entire length of external drain tube
- Allow for the patient to do daily activities
- Prevent tugging of the sutures

Fabrication

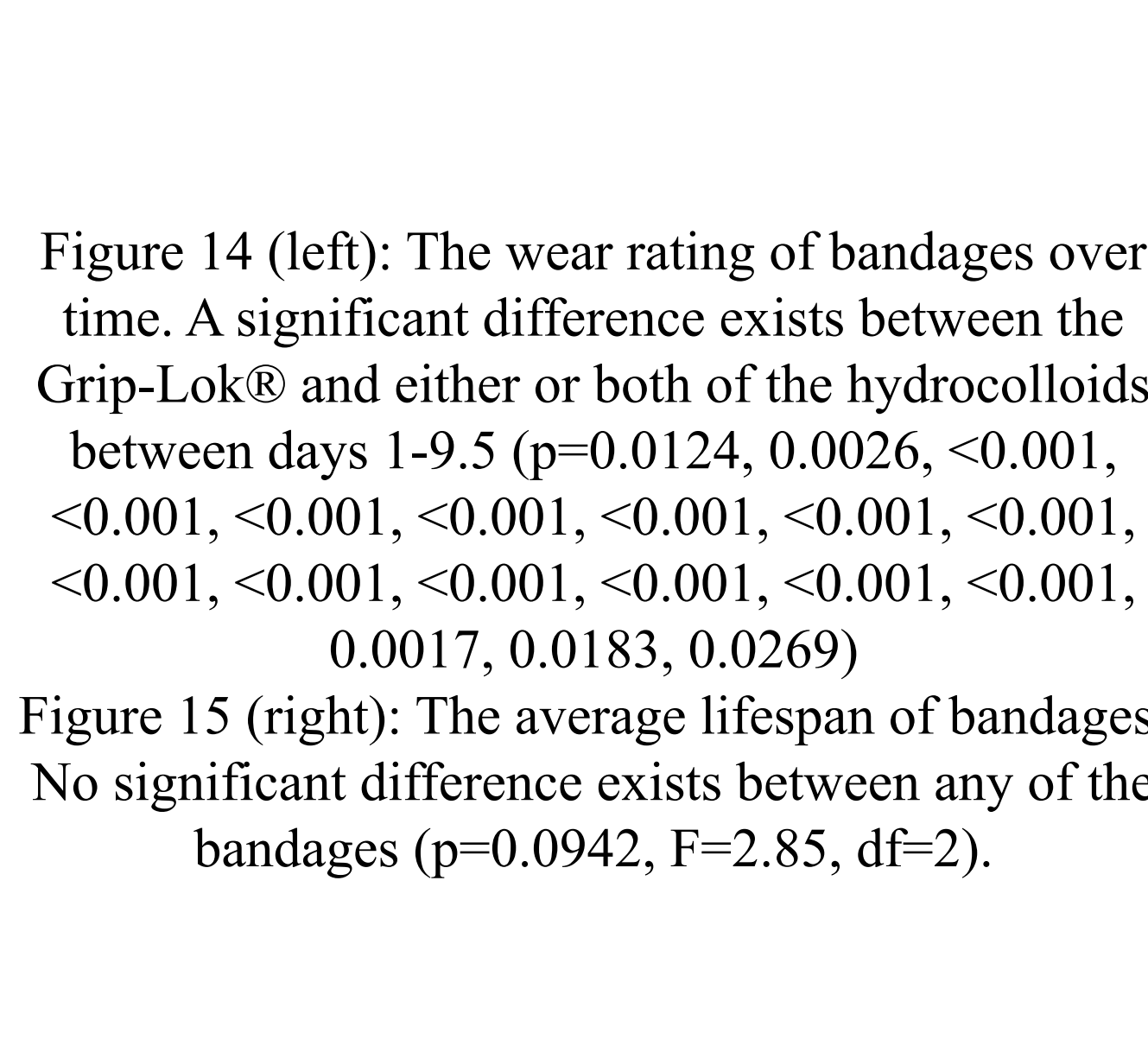
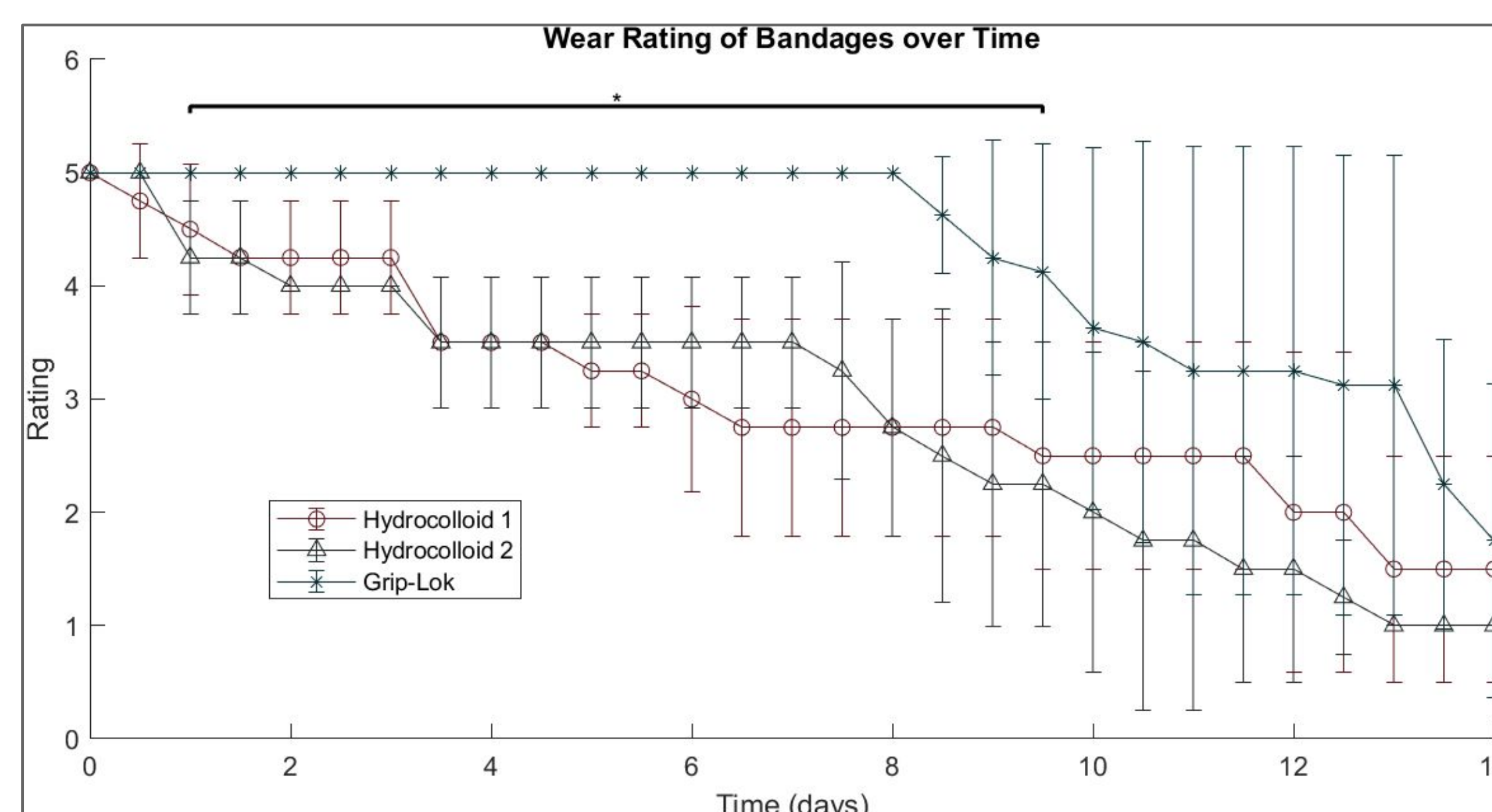
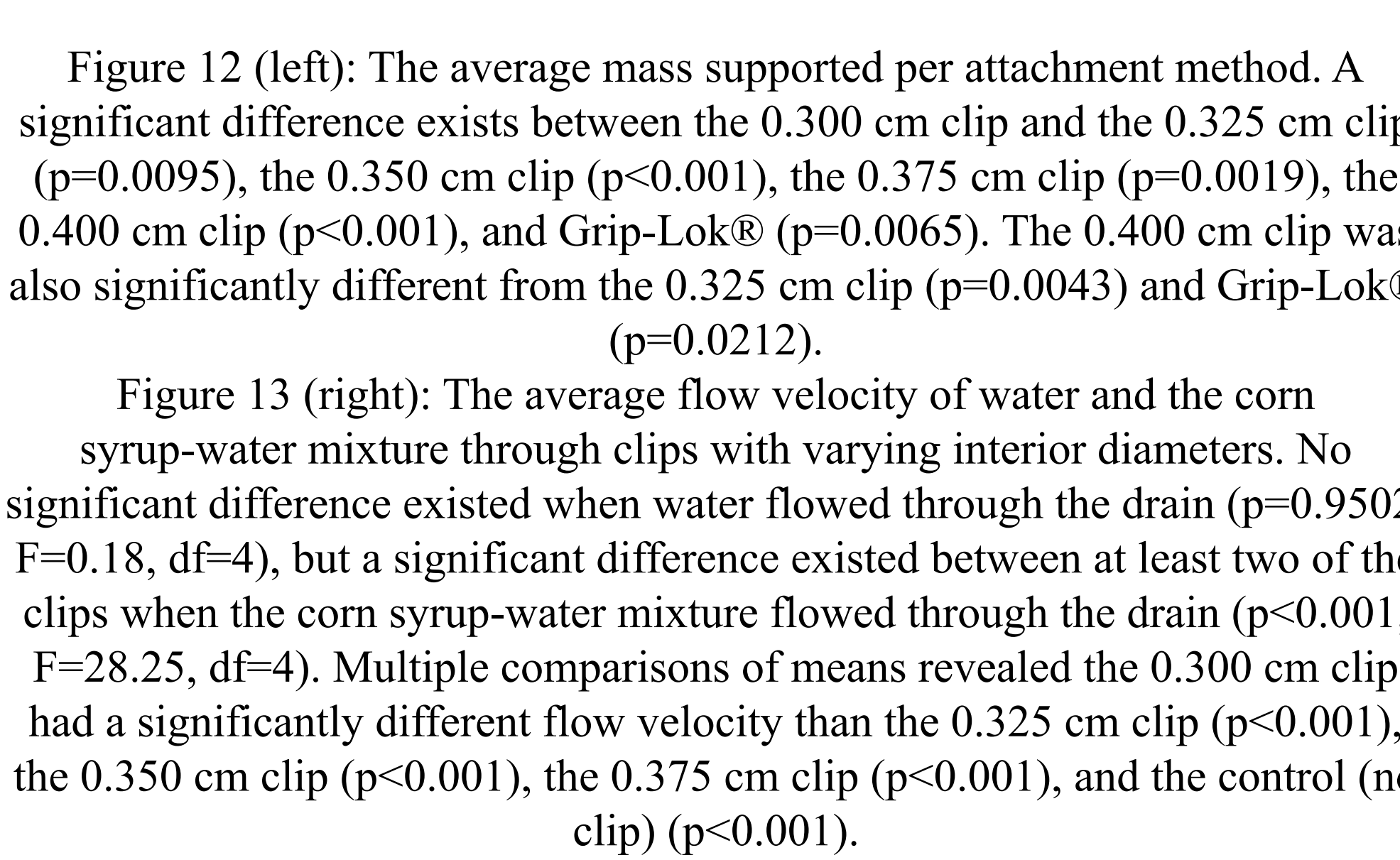
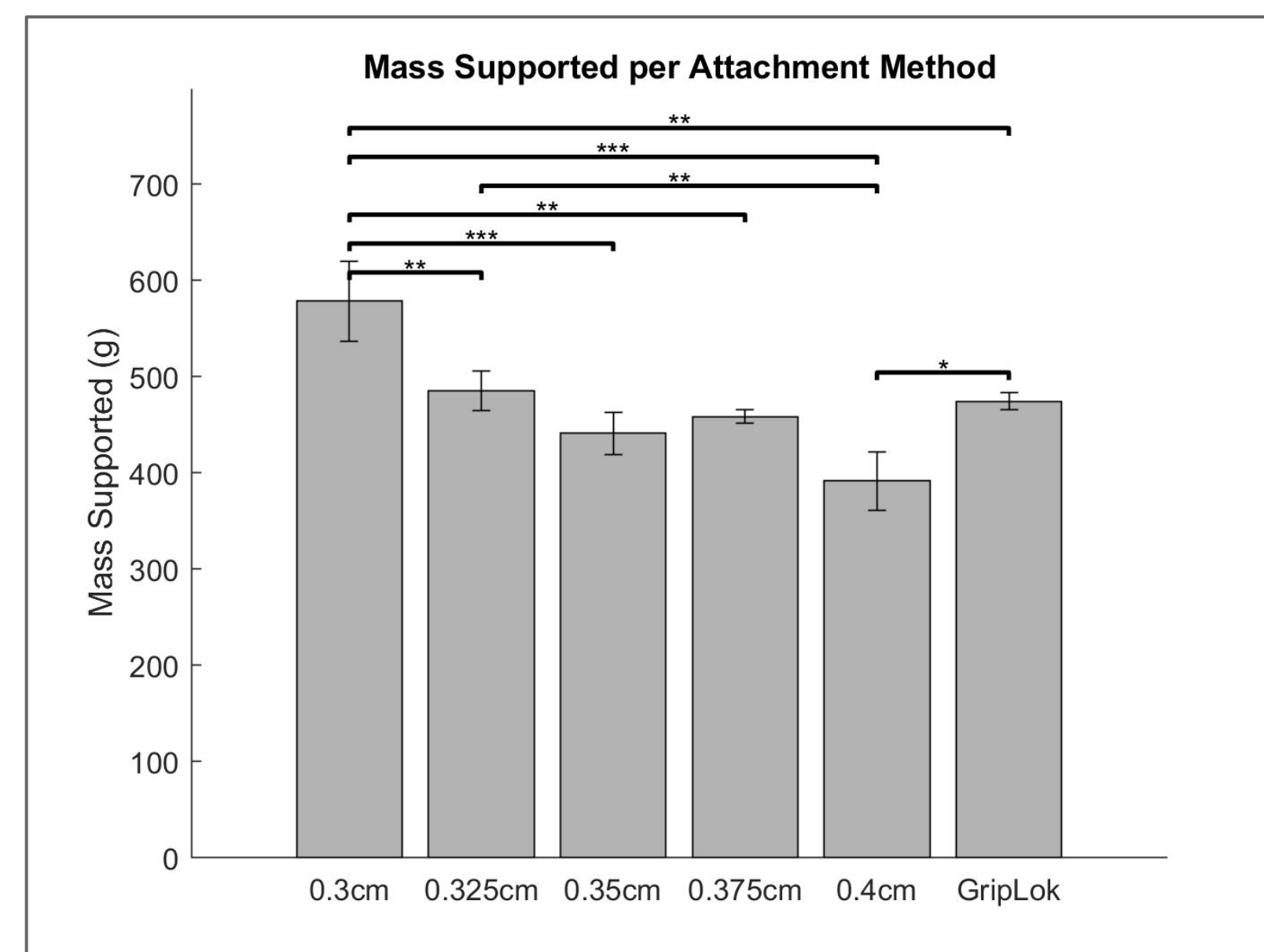


Testing



1	Bandage has completely fallen off.
2	Obvious signs of wear and peeling on the bandage. Decreased functionality.
3	Moderate signs of wear and peeling on the bandage. Edge of the bandage begins to lift.
4	Small signs of wear and peeling on the bandage. Bandage looks like it was just placed.
5	No signs of wear or peeling on the bandage. Bandage looks like it was just placed.

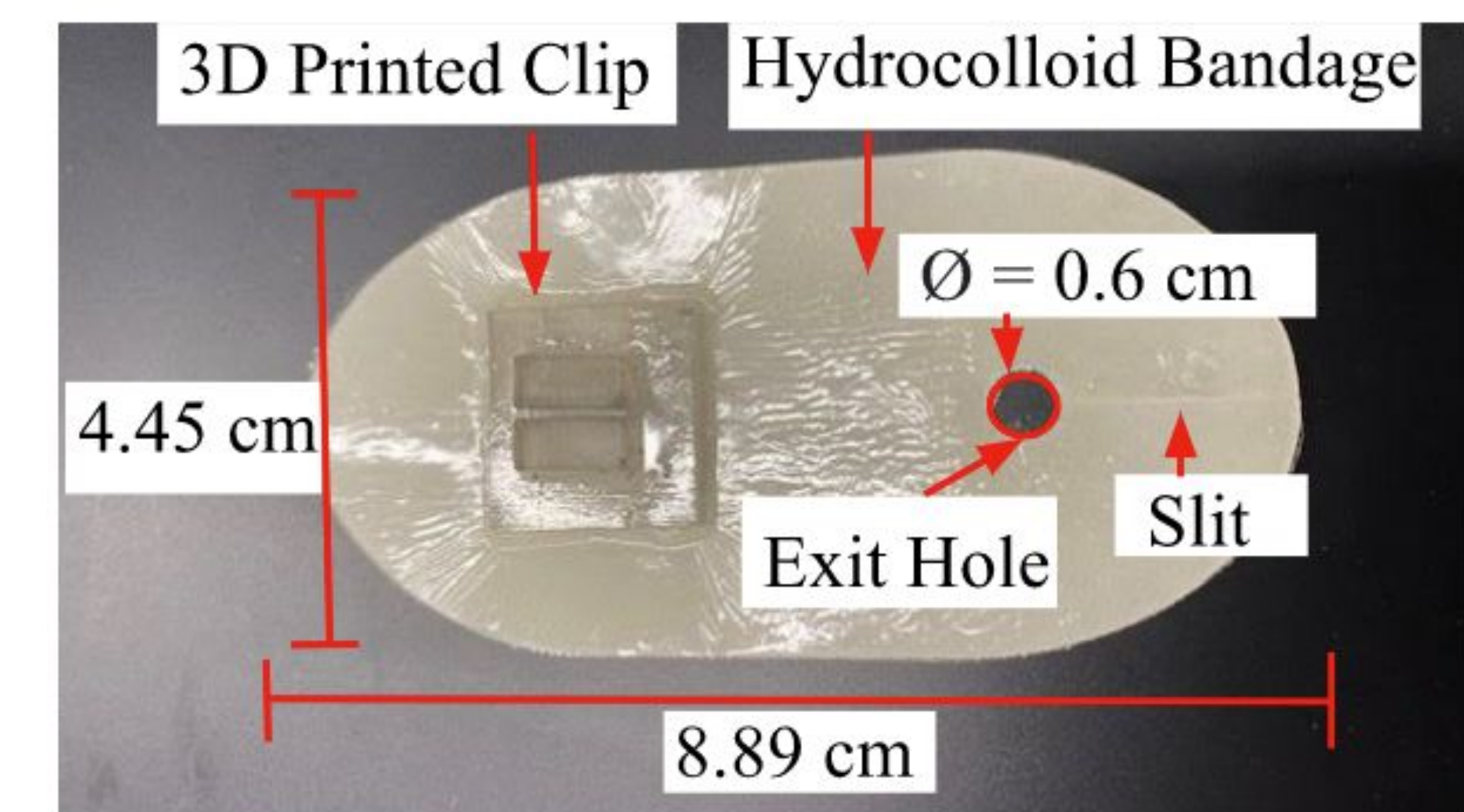
Results



Final Prototype

Features:

- Hydrocolloid bandage base
- Waterproof Adhesive Layer
- 3D printed clip to secure drain tube
- Exit hole for drain tube
- Slit to easily place bandage



Future Work

- Conduct additional testing of fully assembled prototype
 - Human testing, heat testing, sterilization testing
- Streamline fabrication of the prototype
- Determine Packaging
 - Cost
 - Quantity
 - Customization
- Determine sterilization technique
 - Autoclaving, ethylene oxide, radiation

Acknowledgements

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- Dr. Lee Wilke

References

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[5] "Patients & families: UW health," Health and Nutrition Facts for You | Patients & Families | UW Health. Available: <https://patient.uwhealth.org/healthfacts/4603>.

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