The Blue-Blood Infused Porcine Chest Wall as a Novel Microsurgical Training Model of Internal Mammary Artery Preparation and Anastomosis

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Introduction

- Preparation of the internal mammary artery (IMA) as a recipient vessel is crucial in microvascular free flap breast reconstruction
- Limited opportunity to practice intraoperatively
- Existing chicken thigh models provide realistic simulation for vessel anastomosis, but translation to the OR is limited
- Live pig models provide highly realistic vessel and preparation simulation but are expensive and inconvenient

OBJECTIVE: Create a simple, inexpensive, and realistic training model for resident training of IMA preparation and anastomosis.

Materials and Methods

Anatomic Study
- Five Wisconsin miniature swine chest walls dissected
- Measurements taken included:
  - Width of ribs and intercostal spaces (ICS)
  - Size and location of IMA and IMV at each level

Materials
- Minipig chest wall
- Two plastic mannequin torso shells
- 12×12×1 in. layer of upholstery foam
- Blue-blood perfusion system

Model Assembly
- Assembled in 15 minutes
- One-time cost of 55 USD
- Release of SC joint allows chest wall to lay flat
- IMA and IMV easily cannulated to connect to blue-blood perfusion system

Resident Training
- Use model in microsurgical training curriculum to assess model fidelity

Results

- Overall anatomy and vessel size similar to humans
- Slight differences in rib shape
- Six ribs per specimen suitable for training purposes

Model Assembly
- Assembled in 15 minutes
- One-time cost of 55 USD
- Release of SC joint allows chest wall to lay flat
- IMA and IMV easily cannulated to connect to blue-blood perfusion system

Conclusions

1. This novel simulator for resident training of IMA preparation is:
   - Inexpensive
   - Easily assembled and stored
   - Highly realistic and translates well to the OR
2. This model also allows for real-time feedback of anastomosis quality
3. Effectiveness of training model to be evaluated in an upcoming study