



Preoperative Vascular Mapping Reduces Major Complications After DIEP Flap Breast Reconstruction: A Causal Machine Learning Analysis

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1. BACKGROUND

- Deep inferior epigastric perforator (DIEP) flap breast reconstruction relies on perfusion from perforators of the deep inferior epigastric vessels
- Preoperative vascular mapping with computed tomography angiography (CTA) or magnetic resonance angiography (MRA) is increasingly used to identify perforator location, quantity, and quality
- Evidence on whether vascular mapping reduces **unplanned reoperation within 90-days (major complications)** is limited

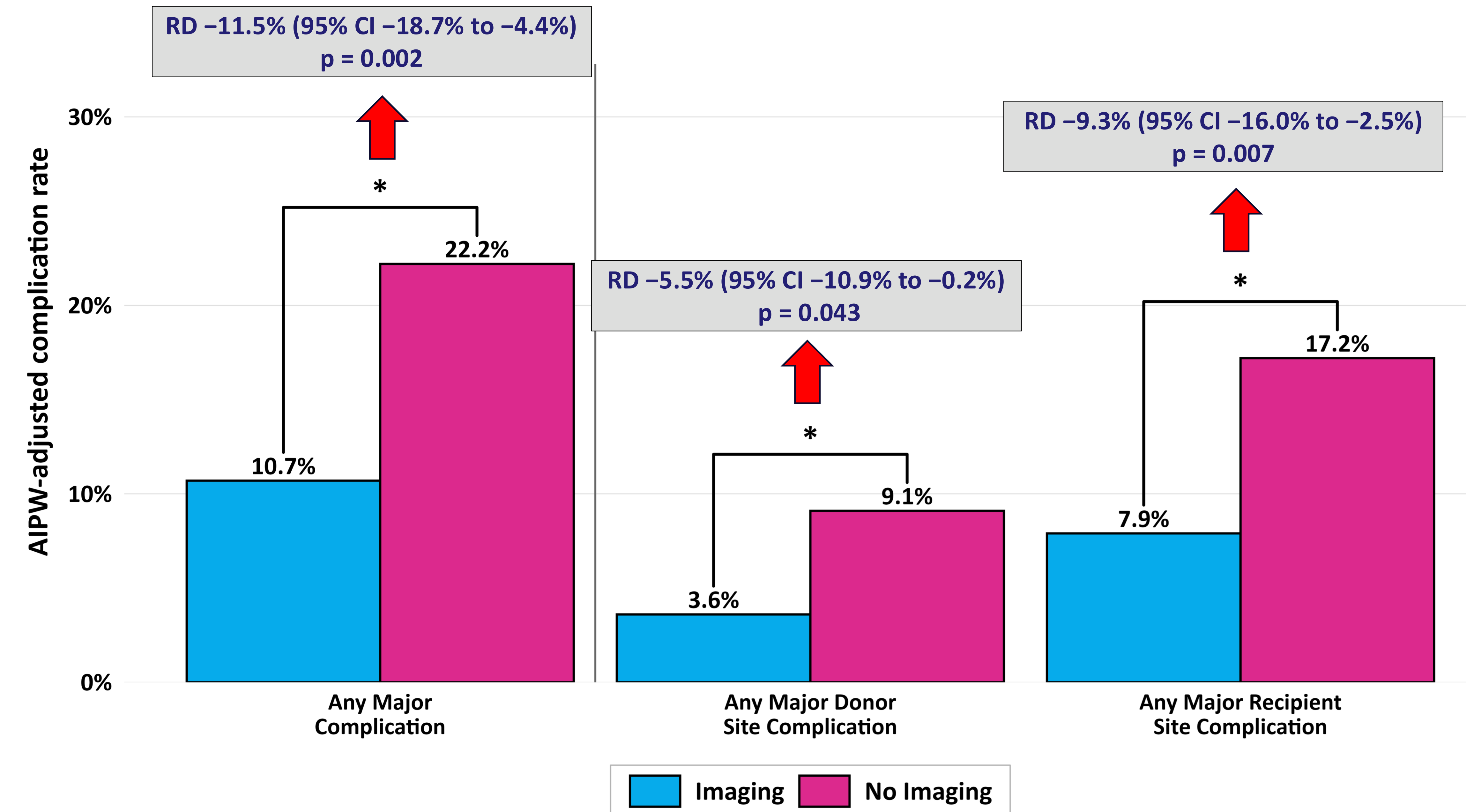
2. OBJECTIVE

To determine whether preoperative vascular mapping (CTA or MRA) reduces major complications following DIEP flap breast reconstruction

3. METHODS

- Single-institution retrospective review of DIEP flap patients (Mar 2017 – Jun 2024)
- Imaging group:** preoperative CTA or MRA
- No imaging group:** no preoperative vascular imaging
- Primary outcome:** any major complication;
- Secondary outcomes:** any major donor site complication; any major recipient complications
- Doubly robust causal inference via augmented inverse probability weighting (AIPW) adjusting for demographics, comorbidities, oncologic and operative characteristics to calculate average treatment effect with SuperLearner machine learning ensemble
- Risk differences (RDs) with 95% CIs reported
- Statistical significance (*) set to $p < 0.05$

4. RESULTS



- Imaging group (n=522) | No Imaging group (n=163)
- Patients who had imaging had **11.5% lower risk** of any major complication ($p = 0.002$)
 - 5.5% lower risk** of a major donor site complication ($p = 0.043$)
 - 9.3% lower risk** of a major recipient site complication ($p = 0.007$)

5. CONCLUSION

Across the **full population** of DIEP flap breast reconstruction patients, preoperative vascular mapping **reduced major complications** at both **donor and recipient sites**

6. CLINICAL RELEVANCE

Reconstructive surgeons should **strongly consider routine preoperative vascular mapping** before DIEP flap breast reconstruction to reduce risk of major complications