



Effect of Menopause on Microvascular Free Flap Complications

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ABSTRACT

Objective: Microvascular free flap (MFF) reconstruction relies on adequate healing and vascularization of the graft. While estrogen is known to accelerate the healing process via matrix deposition and rapid epithelization, it is also associated with a pro-thrombotic state. The purpose of this study is to examine the success of MFF between age groups within male and female cohorts given the variability of the hormonal environment across the life course.

Study Design: Retrospective database study.

Methods: The 2005-2018 National Surgical Quality Improvement Program (NSQIP) database was queried for patients undergoing MFF reconstruction of the head and neck. Preoperative albumin was categorized as normal (≥ 3.2 g/dL) or low (< 3.2 g/dL). Cases were grouped into premenopausal females (PRMF) (< 45 years), postmenopausal females (POMF) (> 55 years), younger men (YM) (< 45 years) and older men (OM) (> 55 years). Association between cohorts, albumin levels, and postoperative medical, wound, and clotting complications was assessed.

Results: A total of 3,395 patients met inclusion criteria. 293 (8.6%) patients were PRMF, 957 (28.1%) were POMF, 494 (14.6%) were YM, and 1651 (48.6%) were OM. PRMF were more likely to be African American compared to the POMF cohort. The complication rate in male and female patients was 37% (n=745) and 25% (n=415), respectively. Low albumin was associated with medical complications in all groups except PRMF. PRMF had a significantly higher flap failure rate compared to POMF (1.7% vs 0.40%, $p=0.022$); there was no age-related difference in men ($p=0.973$). Smoking association was absent in both younger cohorts, but unequally affected the older cohorts. OM smokers experienced wound dehiscence ($p<0.001$), while POMF smokers experienced more overall and medical complications ($p=0.004$ and $p<0.001$).

Conclusion: Age is a known risk factor for surgical complications in MFF. Our analysis suggests that post-menopausal females (particularly smokers) may be at risk for different complications compared to their male counterparts. Meanwhile, PRMF may paradoxically be at increased risk of flap failure. We encourage future studies to consider age and hormonal effect when evaluating complications of MFF.

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INTRODUCTION

- Microvascular free flap reconstruction is considered the gold standard in head and neck reconstruction due its potential to supply various tissue including skin, muscle, bone, and nerve¹.
- Inadequate blood supply can lead to flap failure and inadvertently lead to postoperative complications like thrombosis, wound infection, wound edge necrosis, venous congestion, seroma formation, and postoperative bleeding².
- Free flap reconstruction has shown great benefits in the general population, however there is a dearth of literature examining outcomes in women based on age and hormonal status.
- The purpose of this study is to examine the success of MFF between age groups within male and female cohorts given the variability of the hormonal environment across the life course.

METHODS AND MATERIALS

- The 2005-2018 National Surgical Quality Improvement Program (NSQIP) database was queried for patients undergoing microvascular free flap reconstruction of the head and neck.
- Cases were grouped into premenopausal females (PRMF) (< 45 years) and postmenopausal females (POMF) (> 55 years).
- Association between cohorts, postoperative medical, wound, and clotting complications were assessed. Complications included postoperative pneumonia, reintubation, acute renal failure, urinary tract infection, cardiac arrest, myocardial infarction, sepsis, deep vein thrombosis (DVT), and pulmonary embolism (PE).
- Univariable chi square analysis, independent sample t-test, and multivariable logistic regression were performed appropriately using the SPSS software.

RESULTS

Figure 1. Chi Square Analysis of Female Age and Postoperative Complications

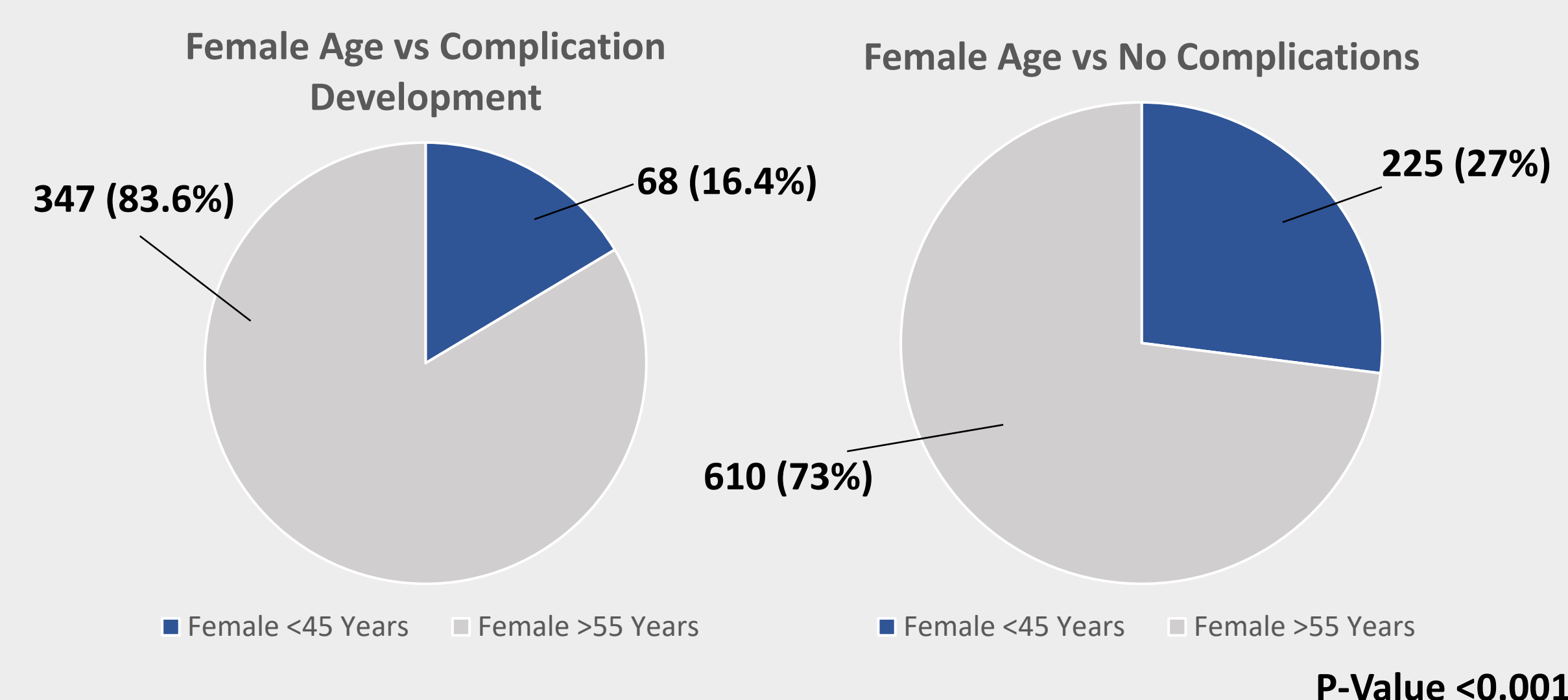


Table 2. Chi Square Analysis of Female Age and Free Flap Failure Complications

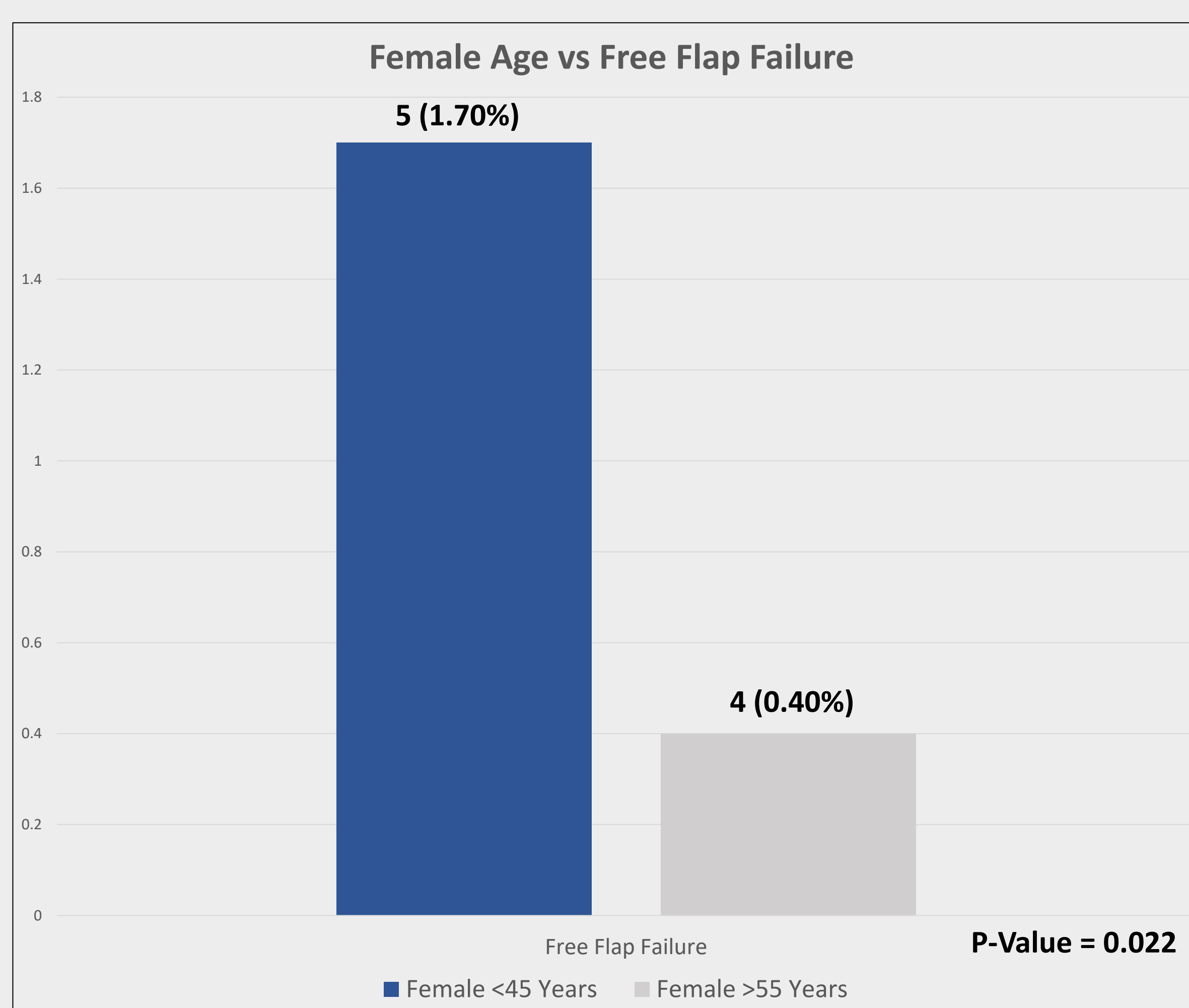
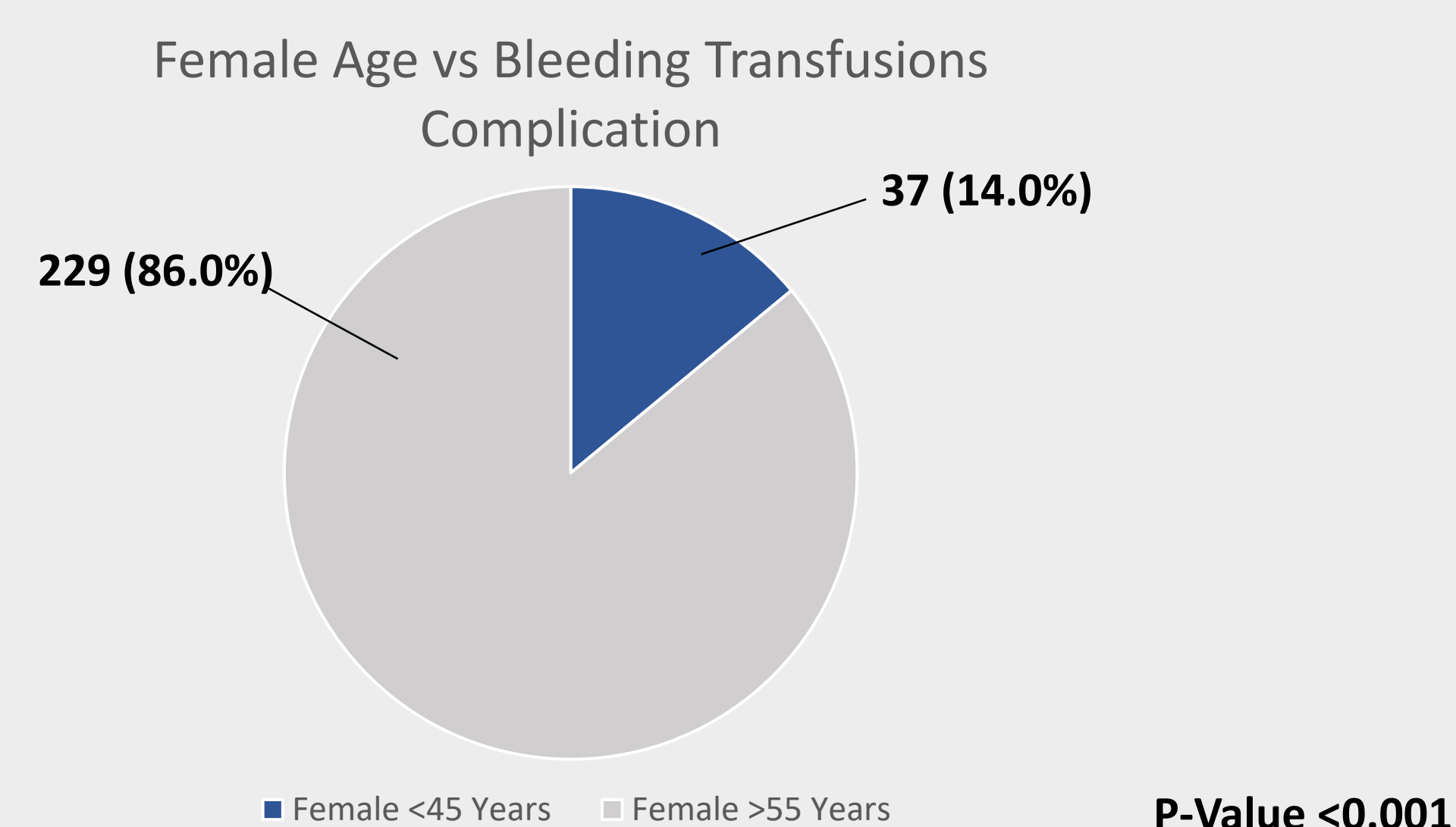


Table 1. Chi Square Analysis of Female Age and Clotting Complications

Female Age vs Clotting Complications			
Cohort	Yes Complication (N=276)	No Complication (N=974)	P-Value
Female <45 years N (%)	38 (13.0)	255 (87.0)	0.674
Female >55 years N (%)	238 (24.9)	719 (75.1)	
Female Age vs DVT Complications			
Cohort	Yes Complication (N=13)	No Complication (N=1237)	P-Value
Female <45 years N (%)	2 (0.70)	291 (99.3)	0.744
Female >55 years N (%)	11 (1.10)	946 (98.9)	
Female Age vs Pulmonary Embolism Complications			
Cohort	Yes Complication (N=5)	No Complication (N=1245)	P-Value
Female <45 years N (%)	0 (0.00)	293 (100.0)	0.597
Female >55 years N (%)	5 (0.50)	952 (99.5)	

Chart 3. Chi Square Analysis of Female Age and Requiring Bleeding Transfusion



DISCUSSION

- Age is a known risk factor for surgical complications in microvascular free flap complications, however men and women are impacted differently³.
- Older women experienced more complications than younger women, complying with other studies showing age associated with postoperative complications following head and neck microvascular free flap reconstruction.³⁻⁵
- Paradoxically, premenopausal women experience increased rates of microvascular free flap failure compared to postmenopausal women. Estrogen is known to promote a hypercoagulable state and has an increased risk for clot formation⁴⁻⁷. Clotting can occlude small blood vessels and reduce vascular supply to the free flap, plausibly explaining our finding.
- Postmenopausal women received increased blood transfusions postoperatively, indicating a possible hypocoagulable state, which may further support our claim above.

CONCLUSIONS

Age is a known risk factor for surgical complications in MFF. Our analysis suggests that post-menopausal females (particularly smokers) may be at risk for different complications compared to their male counterparts. Older male smokers experienced wound dehiscence, while postmenopausal female smokers experienced bleeding transfusion. Meanwhile, PRMF are paradoxically at increased risk of flap failure. We encourage future studies to consider age and hormonal effect when evaluating complications of MFF.

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