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유두보존 유방절제술 후 대흉근 전면 즉시 보형물 재건에서 피판 괴사의 예측 인자 분석

(Predictive Factors for Flap Necrosis after Nipple-Sparing Mastectomy with Prepectoral Direct-to-Implant Breast Reconstruction)

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Purpose:
- Prepectoral direct-to-implant (DTI) breast reconstruction following nipple-sparing mastectomy (NSM) has gained popularity due to favorable aesthetic and reconstructive outcomes.
- However, mastectomy flap necrosis remains a clinically significant complication that can compromise both surgical outcomes and implant viability.
- This study aimed to identify predictive factors for flap necrosis and establish clinically relevant cut-off values.

Methods:
- A retrospective analysis was conducted on 339 breasts undergoing NSM with prepectoral DTI reconstruction between 2018 and 2024.
- The primary outcome was mastectomy flap necrosis, categorized as major (requiring debridement) or minor (managed conservatively).
- Collected variables included: Patient factors (age, BMI, smoking, comorbidities), oncologic factors (histology, adjuvant therapies), surgical factors (incision type, mastectomy weight, implant size, flap thickness)
- Flap thickness was measured intraoperatively as both minimum (typically near the nipple–areola complex) and maximum thickness.
- Univariate and multivariable logistic regression analyses were performed to identify independent predictors.
- Receiver operating characteristic (ROC) curve analysis in the lateral radial incision cohort was used to determine clinically relevant threshold values.

Surgical Technique:
- All mastectomies were performed through either an inframammary fold or lateral radial incision.
- Prepectoral direct-to-implant reconstruction was performed, with implant size determined based on mastectomy weight and intraoperative sizer assessment.
- The implant was wrapped with acellular dermal matrix using an anterior coverage technique and fixed to the pectoralis major fascia to ensure stability.
- The inframammary fold was reconstructed, and quilting sutures were selectively applied to reduce dead space and prevent implant displacement.
- A closed-suction drain was placed, followed by layered closure and postoperative compressive garment application.

Results:
- Major flap necrosis occurred in **18.0%** of cases, while minor necrosis occurred in **3.2%**.
- Multivariable analysis identified: **Mastectomy weight, Minimum flap thickness** as independent predictors of flap necrosis ($p < 0.01$).
- **Hypertension** was also significant when considering overall necrosis.
- Minimum flap thickness differed significantly by incision type ($p < 0.001$)
  - Lateral radial: **3.68 mm**
  - Inframammary fold: **4.84 mm**
- Although incision type was associated with necrosis in univariate analysis, it was not significant in multivariable models, suggesting that **differences are primarily mediated by flap thickness**.
- ROC analysis in the lateral radial cohort identified:
  - **350 g** as the threshold for mastectomy weight
  - **5 mm** as the threshold for minimum flap thickness

Conclusion:
- **Mastectomy weight** and **minimum flap thickness** are key determinants of flap necrosis in prepectoral DTI breast reconstruction.
- Maintaining a flap thickness of at least **5 m**m and exercising caution in cases with mastectomy weight exceeding **350 g** may help reduce the risk of necrosis and related complications.
- These findings provide practical intraoperative guidance for improving reconstructive outcomes.