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복부 유리피판 유방재건에서 피판높이-상복부 길이 비율 (FEL ratio)을 이용한 공여부 합병증 예측

(The Flap-to-Epigastric Length Ratio (FEL Ratio) as a Predictor of Donor Site Complications in Abdominal Free Flap Breast Reconstruction)

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INTRODUCTION

- Flap height is often determined subjectively and may increase donor-site tension when excessive. The epigastric length (EL) reflects abdominal anatomy but has not been systematically incorporated into flap design.
- This study evaluates the relationship between EL and flap height and investigates whether a higher flap-to-epigastric length (FEL) ratio is associated with increased donor-site complications.

METHODS

- Patients undergoing DIEP or SIEA flap breast reconstruction (2023–2025) were retrospectively reviewed.
- Epigastric length and flap height were measured, and the flap-to-epigastric length (FEL) ratio was calculated and stratified by quartiles (Low/Intermediate/High)
- Donor-site complications were analyzed in relation to the FEL ratio, with predictive performance assessed using ROC analysis.

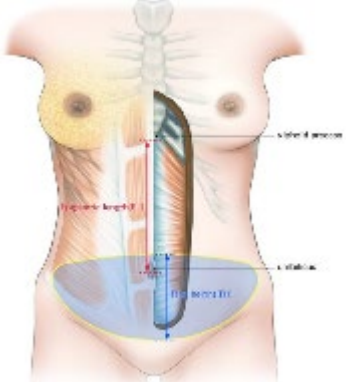

Fig. 1. Definition of epigastric length (EL) and flap height (FH).

RESULTS

- Seventy cases (64 DIEP and 6 SIEA flaps) were included.
- Flap height demonstrated a modest correlation with CT-based epigastric length ($r = 0.263$, $p = 0.030$) and a strong correlation with clinically measured epigastric length ($r = 0.579$, $p < 0.001$)
- Patients in the high FEL ratio group (upper quartile) demonstrated significantly higher overall donor-site complication rates than those in the low FEL ratio group (lower quartile) (58.8% vs. 17.6%, $p = 0.045$), with seroma being the most frequent complication.
- On logistic regression analysis, a high FEL ratio was independently associated with an increased risk of abdominal complications (odds ratio, 6.67; $p = 0.018$).
- Receiver operating characteristic analysis demonstrated significant diagnostic performance of the FEL ratio (area under the curve, 0.673; $p = 0.016$), with an optimal cutoff value of 66.81%.

Table 1. Comparison of rates of donor site complications of the three groups.

Complication profiles	Overall (n = 68)	Low FEL ratio (n = 17)	Intermediate FEL ratio (n = 34)	High FEL ratio (n = 17)	p-value
Donor complication	28 (41.2%)	3 (17.6%)	15 (44.1%)	10 (58.8%)	0.045*
Delayed wound healing	13 (19.1%)	0	9 (26.5%)	4 (23.5%)	0.067
Seroma	11 (16.2%)	1 (5.9%)	3 (8.8%)	7 (41.2%)	0.005*
Hematoma	1 (2.9%)	1 (6.7%)	0	0	
Hypertrophic scar	5 (7.4%)	1 (5.9%)	3 (8.8%)	1 (5.9%)	0.898

Table 2. Univariable and multivariable analysis to identify predictors for development of donor complication.

Variables	UVA OR (95% CI)	Unadjusted P value	MVA OR (95% CI)	Adjusted P value
BMI	1.167 (1.00, 1.36)	0.052	1.144 (0.96, 1.36)	0.131
Flap-Epigastric Length ratio				
Low FEL ratio	Ref		Ref	
Intermediate FEL ratio	3.684 (0.89, 15.22)	0.072	2.84 (0.66, 12.32)	0.162
High FEL ratio	6.667 (1.38, 32.28)	0.018*	4.92 (0.97, 25.03)	0.055

Table 3. Diagnostic Performance of FEL ratio for predicting abdominal complications.

Variable	AUC	95% CI	Cutoff	Sensitivity	Specificity	p-value
FEL ratio	0.673	0.54-0.80	0.6681	0.82	0.50	0.016*

CONCLUSION

- A short epigastric length combined with a disproportionately tall flap height is associated with increased donor-site morbidity.
- Epigastric length may serve as a simple and practical reference for flap height determination to reduce abdominal complications.