Early Oncologic Outcomes of Robot-Assisted versus Conventional Nipple-Sparing Mastectomy : A Propensity Score Matching Analysis

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Background

- Robot-assisted nipple-sparing mastectomy (R-NSM) was developed to minimize visible scarring and improve cosmetic outcomes.
- Despite increasing adoption, evidence on its oncologic safety remains limited.
- Conventional nipple-sparing mastectomy (C-NSM) remains the standard surgical approach, but comparative long-term outcome data are scarce.
- This study compared early **oncologic outcomes** of **R-NSM vs C-NSM** in patients undergoing nipple-sparing mastectomy (NSM) with immediate breast reconstruction (IBR).

Methods and Materials

Study Design

- Retrospective cohort study at Samsung Medical Center (2019–2022).
- Included patients undergoing NSM with IBR (**R-NSM vs C-NSM**).

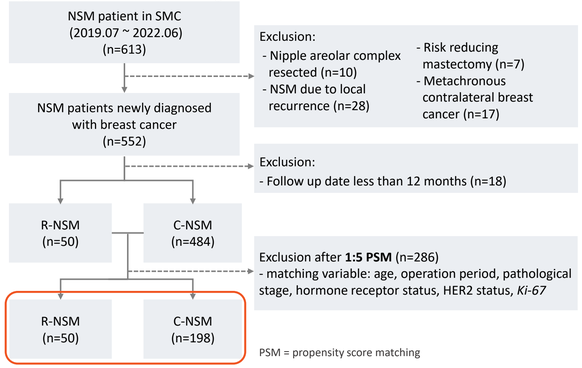
Data Collection

- Extracted clinical/pathologic variables: age, BMI, menopausal status, histology, grade, HR/HER2 status, *Ki-67*, NAC use.

Statistical Analysis

- **1:5 propensity score matching** variables : age, operation period, pathologic stage, HR/HER2 status, *Ki-67*.
- Matched cohort: **R-NSM (n=50) vs C-NSM (n=198)**.
- Endpoints: **LRFS, DFS, DMFS**.
- Kaplan–Meier with log-rank test; Cox regression for prognostic factors.

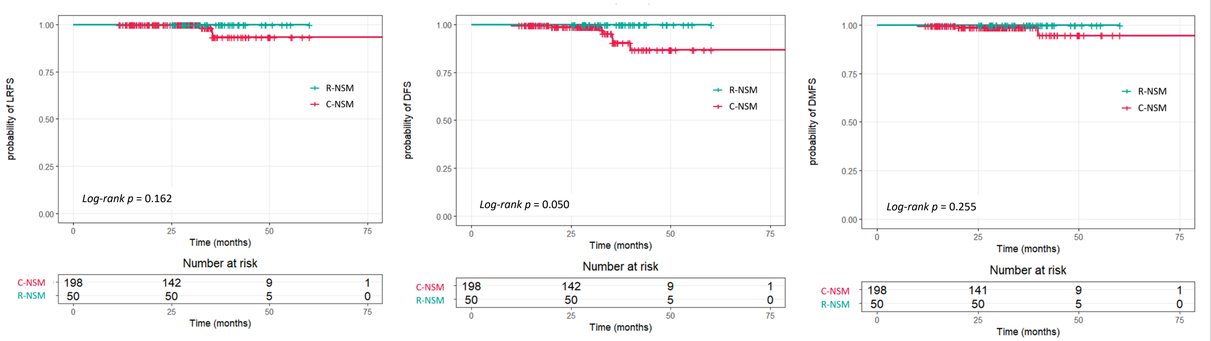
Figure 1. Schematic Diagram



Results

- After **1:5 PSM**, **248 patients** were analyzed (R-NSM 50; C-NSM 198) with well-balanced clinicopathologic variables.
- **Follow-up**
  - Median 37.5 months (R-NSM) vs 42.6 months (C-NSM)
- **Oncologic outcomes**
  - **R-NSM:** 0 recurrences, 0 deaths
  - **C-NSM:** 7 recurrences (3.5%), 1 death
  - Recurrence difference significant (P = 0.002).
- **Survival analysis**
  - No significant difference in LRFS, DFS, or DMFS.
  - All adverse events occurred only in C-NSM.
- **Cox regression**
  - Age >40 reduced recurrence risk
  - Higher nodal stage increased risk
  - R-NSM showed lower but non-significant recurrence tendency.

Figure 2. Kaplan–Meier Curves for LRFS (Local Recurrence-Free Survival), DFS (Disease-Free Survival) and DMFS (Distant Metastasis -Free Survival) According to Operation Type



R-NSM = Robot-assisted nipple-sparing mastectomy; C-NSM = conventional nipple-sparing mastectomy

Table 1. Key Prognostic Factors Associated with DFS

Variable	Hazard ratio (95% CI)	p-value
Operation type		
C-NSM	1	
R-NSM	0.12 (0.01 – 2.6)	0.177
Age (years)		
≤40	1	
>40	0.14 (0.02 – 1.0)	0.040
Pathologic N stage		
N0	1	
N1	4.7 (1.0 – 22.1)	0.051
N2-3	31.9 (0.87 – 1174.1)	0.060

Conclusions

- R-NSM showed **no recurrence or mortality** during a median 37.5-month follow-up, whereas all oncologic events occurred in the C-NSM group.
- Kaplan–Meier curves showed **comparable LRFS, DFS, and DMFS,** supporting that oncologic safety is not compromised by the robotic approach.
- Pathologic nodal status—not surgical approach—was the primary predictor of recurrence, underscoring the greater impact of **tumor biology** over technique.
- These findings, supported by one of the **longest follow-up durations** among published R-NSM cohorts, reinforce that R-NSM is a **feasible and oncologically safe option** for appropriately selected early breast cancer patients.

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