Optimising Sentinel Lymph Node Detection in Breast Cancer: Evaluating the Impact of BMI and Breast Size on Magnetic Tracer Performance

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Background: Sentinel lymph node biopsy (SLNB) is a cornerstone in staging clinically node-negative breast cancer, offering reduced morbidity compared to axillary lymph node dissection. The Sentimag technique, using superparamagnetic iron oxide nanoparticles, has emerged as a safe and reproducible alternative to traditional radioactive tracers. However, its performance in populations with higher body mass index (BMI) and larger breast volumes remains underexplored.

Objective: This study aimed to evaluate whether BMI and breast size influence the accuracy and outcomes of the Sentimag procedure in detecting sentinel lymph nodes.

Methods: A retrospective audit of SLNBs performed at Groote Schuur Hospital and New Somerset Hospital from January 2017 to December 2023 was conducted. Data collected included patient demographics, tumour characteristics, SLNB technique, and outcomes. BMI and breast volume (measured via mammography) were analysed in relation to sentinel node identification rates.

Results: Among 391 patients, the median BMI was 33 kg/m² and median breast volume was 887 cc. Sentinel nodes were successfully identified in 377 cases (96.4%) using Sentimag. No significant correlation was found between elevated BMI or larger breast volume and SLNB failure. Factors contributing to unsuccessful node detection included prior axillary surgery and equipment malfunction.

Age (years)		**52(44-63)**
Localization in the breast	Upper Outer Quadrant	198
	Upper Inner Quadrant	50
	Lower Inner Quadrant	38
	Lower Outer Quadrant	29
	Central	54
	Multifocal	18
	Data Missing	4
Primary Systemic Treatment	No	286
	Yes	98
	Missing data	7
Histological type	DCIS	49
	IDC	252
	ILC	26
	Other	64
Receptor status	ER + HER2-	263
	ER + HER2+	30
	ER-HER2+	26
	ER-HER2-	62
	Not assessed	10
Primary tumour size (mm)		22 (13.5-28.1)

Conclusion: The Sentimag technique demonstrates high reliability across a range of BMIs and breast sizes, supporting its use in diverse patient populations. These findings reinforce the robustness of magnetic tracer-based SLNB and highlight the need to address logistical and procedural variables to optimise outcomes further.