



Pregnancy Associated Breast Changes After Nipple Sparing Mastectomy

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Introduction:

- Increasing numbers of women are having children after mastectomy, and 37% of patients diagnosed with breast cancer and of reproductive age report wanting to have children after completing treatment¹.
- While nipple sparing mastectomy (NSM) has been shown to have superior cosmetic results with good oncologic safety, few data evaluate what breast exam changes women can normally expect during a post NSM pregnancy.
- Patients often assume that since their breast tissue has been removed, any subsequent breast changes are related to the reconstruction. Therefore, plastic surgeons are often the first physician consulted to evaluate physical changes after reconstruction.
- We present our experience with patients who became pregnant after NSM particularly with respect to breast changes and recurrence risk to determine a pattern of change a patient might expect to occur in order to better counsel them with respect to further work-up, potential treatment, and follow-up.

¹ Ruddy KJ, et al. *Journal of Clinical Oncology* 2014;32(11):1151-1156.

Methods:

- Retrospective review of all patients that underwent NSM and reconstruction by a single plastic surgeon at a large academic medical center from 2007 to 2020.
- Reproductive age was defined as any patient 45 years of age or younger at the time of NSM, and patients were prospectively monitored to identify patients who subsequently became pregnant.
- Various demographic, operative, tumor, treatment, reconstructive information, as well as complications, breast cancer recurrences, presence or absence breast exam changes in setting of pregnancy after NSM were recorded. For patients found to have changes on their breast exam in the setting of pregnancy, the location, description, findings on imaging, and any associated tissue pathology were reviewed and documented.
- Analyses were completed using Mann-Whitney tests, Fisher's exact tests, and chi-squared analyses. A p-value <0.05 was considered significant.

Results:

From 2007 to 2020, 194 patients of reproductive age underwent NSMs with subsequent reconstruction (Fig. 2). 36 patients became pregnant after NSM and 158 patients did not become pregnant after NSM.

Table 1. Demographics	Pregnant	36	Not Pregnant	158	p-value
Age at NSM					<0.01
Median	34		41		
Q3, Q1	36.75, 28		43, 37		
BMI, kg/m ²					0.35
Median	20.66		20.91		
Q3, Q1	22.30, 18.69		22.70, 19.40		
Smoking Status	Count	%	Count	%	>0.99
Yes or Quit	10	27.8	45	28.5	
No	26	72.2	113	71.5	
First Degree Family History	Count	%	Count	%	>0.99
Yes	12	33.3	53	33.5	
No	24	66.7	105	66.5	
BRCA mutation	Count	%	Count	%	0.42
Yes	12	33.3	42	26.6	
No	24	66.7	116	73.4	

There were no significant differences in tumor pathology at time of mastectomy, with majority of cases in both groups yielding infiltrating ductal carcinoma (p=0.66). Cancer staging was not significantly different (p=0.15). There were no significant treatment differences, with most patients in both groups not receiving chemotherapy (p=0.80). There was no significant difference in rates of hormonal therapy (p=0.58), nor postoperative radiotherapy (p=0.48). Most patients in both groups had two-stage reconstruction with tissue expander placement with final implant exchange at a later date (p>0.99). Both groups had follow-up for an average of 4 years (p=0.65).

Table 2. Recurrence Characteristics		Pregnant		Not Pregnant		p-value	
		Count	%	Count	%	0.26	
Recurrence		2	5.6	22	13.9		
Severity of Recurrence		Pregnant		Not Pregnant			
Local		1	50.0	10	45.5		
Metastatic		1	50.0	12	54.5		



Fig. 1: Bilateral axillary enlargement at the end of pregnancy, spontaneously resolved two weeks postpartum



Fig. 2: Example of patient with raised plaque developed during pregnancy

Table 3. Clinical and Radiological Findings of Pregnant after NSM Patients			
Clinical Findings	# Pregnancies = 36	Radiological Findings	
Yes	17	Yes	9
No	19	No	4
Characteristics	Count (>17 due to overlap)	No imaging	5
Palpable masses	7	Characteristics	Count
Swelling	5	Ovoid hypoechoic	6
Nipple discharge	5	Dilated duct	1
Skin change	1	Solid nodule	2

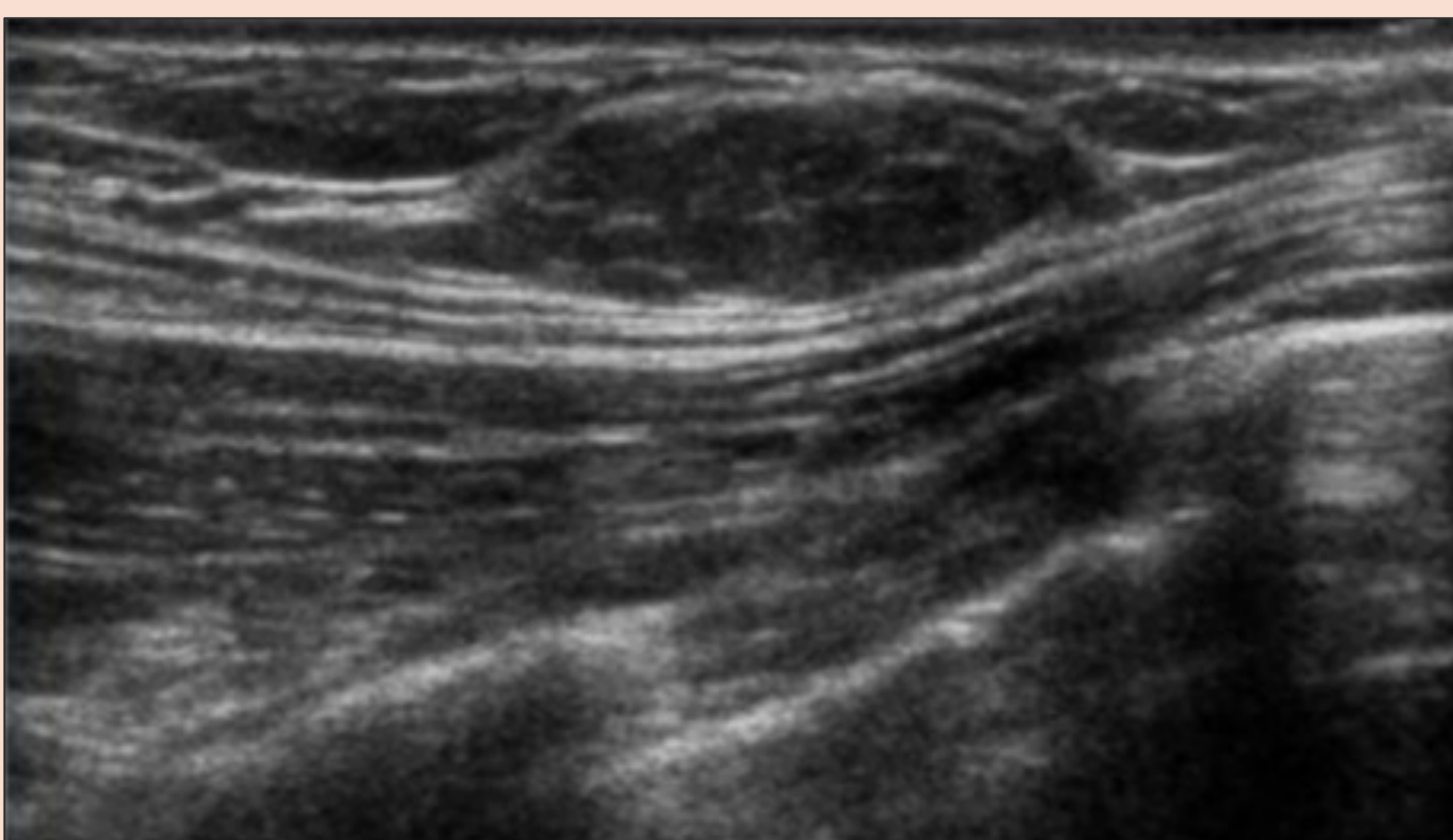


Fig. 3: Ultrasound finding of post NSM lactational hyperplasia

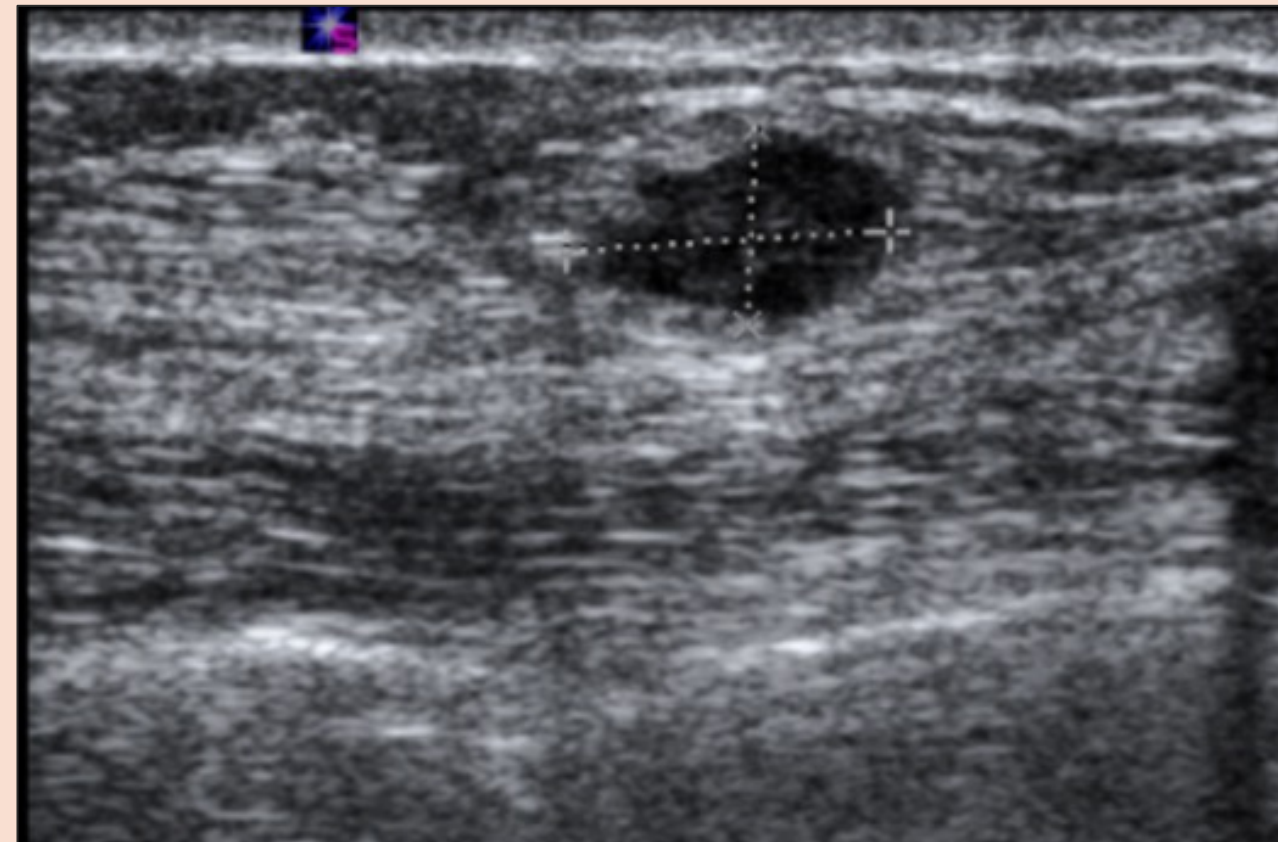


Fig. 4: Post NSM breast cancer recurrence detected during pregnancy. Typical ultrasound findings of a taller rather than broader measurements of the mass.

Conclusion:

- Breast cancer recurrence rates were not significantly different between patients that became pregnant and those that did not.
- Of the pregnant patients who recurred, both presented in the second or third trimester of their pregnancies.
- Patients who became pregnant after NSM commonly had clinical breast exam changes ranging from pigmentary changes of the skin to milky or clear nipple discharge to palpable mass. Palpable findings tended to be in the sub-areolar and axillary areas.
- Further radiologic evaluation and biopsy results demonstrated that **majority of these changes were found to be benign.**

Significance:

- After NSM, the breast skin envelope and nipple areolar complex with terminal ducts remain and can continue to respond to hormonal stimuli. In pregnancy, breast exam findings can change due to hormonal changes, and we present our findings for normal pregnancy associated breast changes and changes associated with cancer recurrence.
- Ultrasound is an appropriate first line investigation of changes which can include hyperplasia of remaining ductal and glandular tissue.**
- Our findings can help clinicians discuss NSM as a cosmetically preferable and safe option for treating breast cancer with patients who are of reproductive age. Women should be advised to undergo clinical follow-up with their surgeons at the end of their pregnancies, or soon after they deliver.