

Breast Cancer Surgery and Stage Change During the COVID-19 Pandemic: An Observational Cohort

Daisy L. Spoer, MS; Samuel S. Huffman, BS; Lauren E. Berger, BA; Marcus H. Cunningham, BS; Amanda C. Foshag, BS; Nisha J. Gupta, MS; Abigail Tirrell, MD; Paige Dekker, MD; Karen K. Evans, MD; Lucy De La Cruz, MD; Marc Boisvert, MD; Patricia Wehner, MD; Ian Greenwalt, MD; Kenneth Fan, MD

1. Department of Plastic and Reconstructive Surgery, MedStar Georgetown University Hospital; Washington, District of Columbia.
2. Georgetown University School of Medicine; Washington, District of Columbia
3. Division of Plastic and Reconstructive Surgery, Icahn School of Medicine at Mount Sinai, New York, NY
4. Division of Plastic and Reconstructive Surgery, Department of Surgery, Keck School of Medicine, University of Southern California, Los Angeles, California

Introduction

The COVID-19 pandemic restricted non-emergent surgery and increased time to surgery.¹⁻⁴

Resultant changes in medical and surgical breast cancer treatment during this time warrant further characterization to optimize care.⁵

Objective

- We thus sought to assess the implications of the COVID-19 pandemic on the progression of (tumor, nodal, metastasis) TNM stage in patients surgically treated for primary breast cancer.

Methods

Study Design:

- Multicenter retrospective chart review
- January 2018 through July 2022

Inclusion criteria:

- Diagnosis of cancer after 2018

Cohorts:

- pre-COVD (Jan 2018 - Dec 2019) and COVID (Jan 2020 – July 2022)

Retrospective Review:

- Patient demographics and comorbidities
- Oncologic characteristics
- Nonoperative management
- Operative management
- Oncologic Outcomes

Primary Outcomes:

- Time to Surgery (TTS)
- Change from clinical to pathologic TNM stage

Results

- The study population included **1040 patients**
 - Pre-COVID patients (n=307)
 - COVID patients (n=733)
- Average age and body mass index of **61 (13) years** and **30 (10) kg/m²** respectively with no differences between groups

Patient and Oncologic Characteristics

Variable	Pre-COVID (n = 307)	COVID (n = 733)	P value ^a
Socioeconomic Characteristics			
Insurance			0.012^b
Medicare	103 (34)	265 (37)	
Medicaid	23 (8)	75 (10)	
Private	164 (54)	369 (51)	
Other	11 (4)	16 (2)	
NA	6	8	
Average Income, Median (IQR)	84892 (67163-109318)	84892 (66343-108686)	0.7
	85 (67-109) (n = 301)	85 (66-109) (n = 730)	
Driving distance from Hospital, Median (IQR)	8.9 (4.9-19) (n = 303)	10 (5.2-20) (n = 726)	0.5
Comorbidities			
CCI, Median (IQR)	3 (2-4)	4 (3-5)	<0.001
ECOG			0.001^b
0	248 (83)	549 (77)	
1	38 (13)	137 (19)	
2	4 (1.3)	22 (3)	
3	10 (3)	3 (<1)	
4	0	2 (<1)	
NA	7	11	

COVID-19 Disease

- 13 patients (1%)** preoperatively COVID-19 positive
- Median time from COVID-19 to breast resection: **154 (99-264) days**
- 476 patients** had vaccination records with a median of **3 doses** per patient

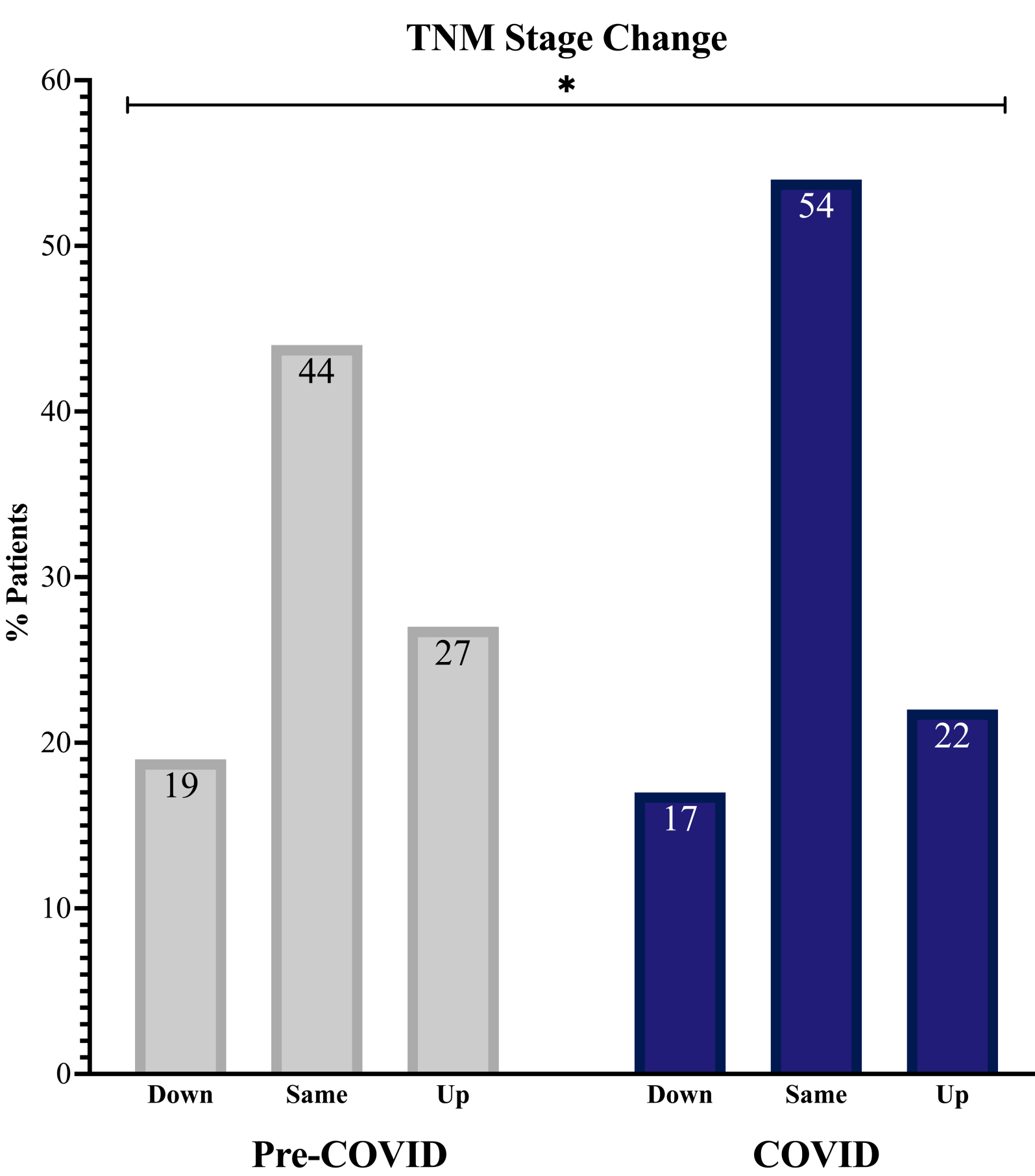
Breast Cancer Disease

- Mostly **clinical stage 1A (n=416), Invasive Ductal Carcinoma** (n=630),that was **hormone positive** [ER+ (n=813), PR+ (n=709)] and **HER2 negative** (n=792)
- There were no significant differences between groups

Variable	Pre-COVID (n = 307)	COVID (n = 733)	P values
Oncologic Characteristics			
cTNM			0.438
1A	124 (40)	292 (40)	
1B	0 (0)	3 (0)	
1C	1 (0.3)	0 (0)	
2A	60 (20)	140 (19)	
2B	26 (8.6)	51 (7)	
3A	8 (2.6)	29 (4)	
3B	1 (0.3)	8 (1)	
3C	2 (0.7)	4 (0.5)	
4	4 (1.3)	4 (0.5)	

Oncologic Management & Outcomes

Variable	Pre-COVID (n = 307)	COVID (n = 733)	P values
Non-operative Management			
Neoadjuvant	306 (99.7)	729 (99)	0.001
Chemotherapy	295 (96)	713 (97)	0.007
None	177 (57.7)	452 (61.7)	0.007
Neoadjuvant	31 (10.1)	85 (11.6)	
Adjuvant	69 (22.5)	107 (14.6)	
Both	5 (1.6)	8 (1.1)	
Endocrine therapy	297 (97)	705 (96)	
None	82 (26.7)	225 (30.7)	
Neoadjuvant	3 (1.0)	19 (2.6)	
Adjuvant	207 (67.4)	427 (58.3)	
Both	5 (1.6)	34 (4.6)	
Radiation	302 (98)	695 (95)	
None	107 (34.9)	268 (36.6)	
Neoadjuvant	5 (1.6)	6 (0.8)	
IORT	16 (5.2)	27 (3.7)	
Adjuvant	169 (55.0)	386 (52.7)	
Both	5 (1.6)	8 (1.1)	
Surgical Management			
Time to Surgery, Median (IQR)	70 (51-128)	93 (173-59.5)	<0.001
Mastectomy type			0.002
BCS	181 (59)	412 (56)	
NSM	42 (14)	82 (11)	
SSM	29 (9.4)	70 (10)	
Simple	37 (12)	153 (21)	
MRM	16 (5.2)	15 (2)	
Nodal Dissection			<0.001
None	48 (15.6)	165 (22.5)	
SLNB	221 (72.0)	408 (55.7)	
ALND	19 (6.2)	95 (13)	
Both	19 (6.2)	60 (8.2)	
Breast Reconstruction	288 (94)	432 (59)	<0.001



Oncologic Management

- The COVID cohort had:**
- more** neoadjuvant therapy
- more** simple mastectomies
- fewer** breast reconstructions
- longer median time to surgery (P < 0.001)**

Oncologic Outcomes

- COVID cohort had fewer changes** between clinical and pathologic/post-treatment **TNM stage (P = 0.0280)**

Conclusions

This multicenter, retrospective cohort of 1040 consecutive patients undergoing oncologic resection of breast cancer demonstrates that the COVID pandemic may have influenced breast cancer progression and regression as measured by the TNM stage change.

The divergence in treatment patterns may have influenced these changes.

Limitations

- Findings are limited by the differences in patient populations comprising the Pre-COVID vs. COVID cohorts.

- Further characterization of this study group will add to the reported literature on evidence-based strategies for breast cancer treatment.

References

- Johnson, B. A., et al. (2021). "A systematic review and meta-analysis of surgery delays and survival in breast, lung and colon cancers: Implication for surgical triage during the COVID-19 pandemic." The American Journal of Surgery 222(2): 311-318.
- Dietz, J. R., Moran, M. S., Isakoff, S. J., Kurtzman, S. H., Willey, S. C., Burstein, H. J., Bleicher, R. J., Lyons, J. A., Sarantou, T., Baron, P. L., Stevens, R. E., Boolbol, S. K., Anderson, B. O., Shulman, L. N., Gradishar, W. J., Monticciolo, D. L., Plecha, D. M., Nelson, H., & Yao, K. A. (2020). Recommendations for prioritization, treatment, and triage of breast cancer patients during the COVID-19 pandemic. the COVID-19 pandemic breast cancer consortium. Breast cancer research and treatment, 181(3), 487–497. <https://doi.org/10.1007/s10549-020-05644-z>
- Kapp, K. A., et al. (2022). "Impact of COVID-19 Restrictions on Stage of Breast Cancer at Presentation and Time to Treatment at an Urban Safety-Net Hospital." Annals of Surgical Oncology.
- Vanni, G., et al. (2020). "Delay in Breast Cancer Treatments During the First COVID-19 Lockdown. A Multicentric Analysis of 432 Patients." Anticancer Res 40(12): 7119-7125.
- Minami, Christina A., et al. "Association Between Time to Operation and Pathologic Stage in Ductal Carcinoma in Situ and Early-Stage Hormone Receptor-Positive Breast Cancer." Journal of the American College of Surgeons, 6 Aug. 2020, doi:10.1016/j.jamcollsurg.2020.06.021.