

The Role of Radiation Therapy on Postmastectomy Breast Reconstruction Patients

Megan Rodriguez, BS^{1,2}, Melissa Mitchell, MD², Wendy Woodward, MD/PHD²

McGovern Medical School¹, Houston, TX

Radiation Oncology Department, The University of Texas MD Anderson Cancer Center², Houston, TX

Introduction

Postmastectomy radiation therapy (PMRT) following breast reconstruction is among the leading choices of treatment in patients with breast cancer. However, various reconstruction complications have been linked to this approach. These include infection, wound dehiscence, skin flap necrosis, implant exposure, capsular contracture, seroma, and hematoma. While some research has sought to identify potential covariates, which influence the rate of complications among this demographic, there lies a gap in explaining the role of radiation therapy (RT) on reconstruction complications among postmastectomy patients receiving implant-based reconstruction. Our research aims to assess the impact of radiation therapy on reconstruction complications for patients undergoing implant-based reconstruction.

Materials and Methods

A retrospective cohort study was conducted in patients who underwent mastectomy followed by breast reconstruction from October 2016 to December 2019. We reviewed charts from 548 patients undergoing mastectomy in 765 breasts, who were planned for immediate delayed implant-based breast reconstruction using tissue expanders. The identified breasts were separated into 4 groups:

1. Postmastectomy reconstruction without RT (n=566)
2. Mastectomy with tissue expander (TE) removed prior to RT (n=20)
3. Mastectomy with TE in place during RT (n=156)
4. TE in prior radiated breast (n=23)

Categorical variables were compared using the Chi-squared test. P-values less than 0.05 were considered statistically significant.

Results

In this study, infection was the most common reconstruction complication among all patients, followed by seroma.

Figure 1 illustrates the frequency of each type of reconstruction complication among the total patients who faced complications.

Figure 1
COMPLICATION TYPE BREAKDOWN

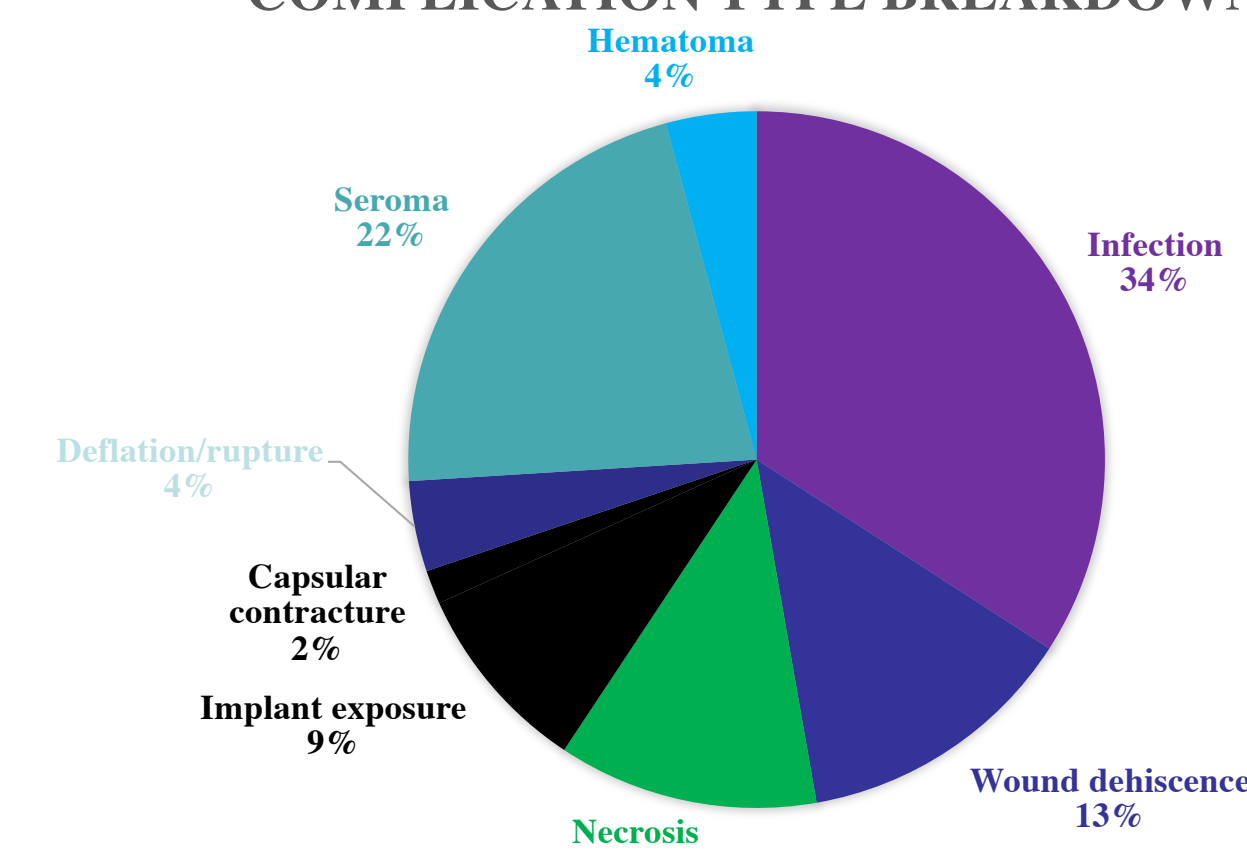
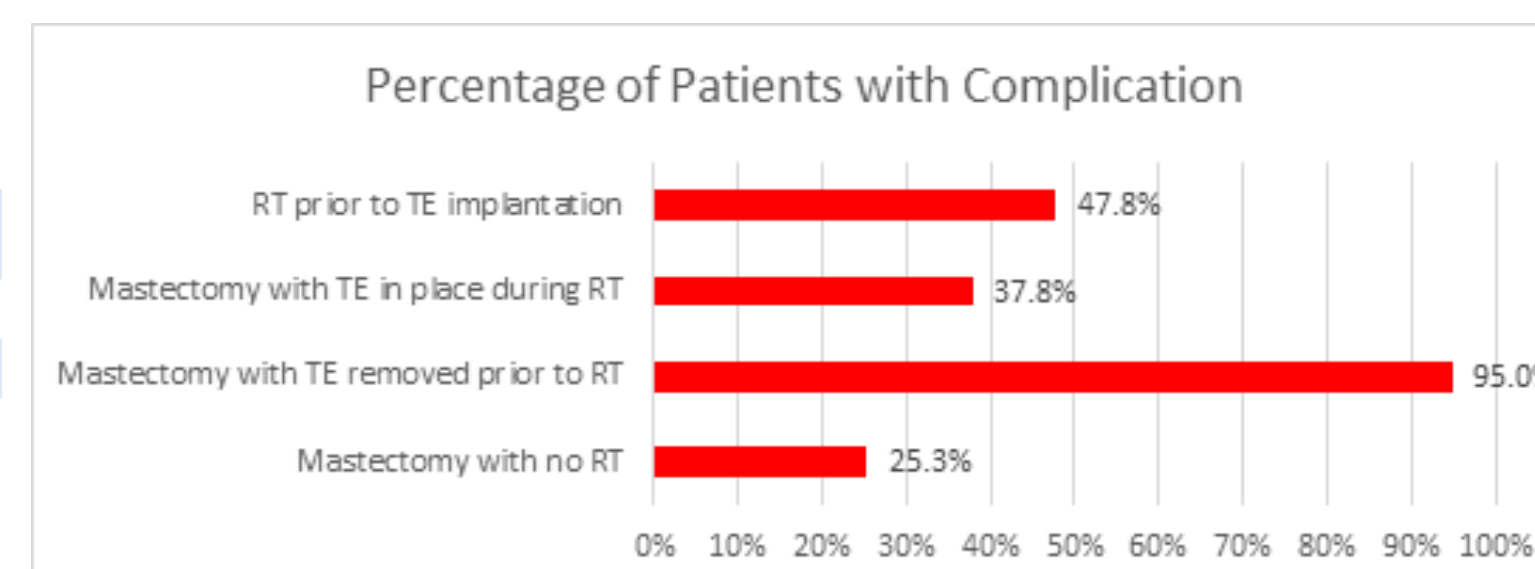


Table 1

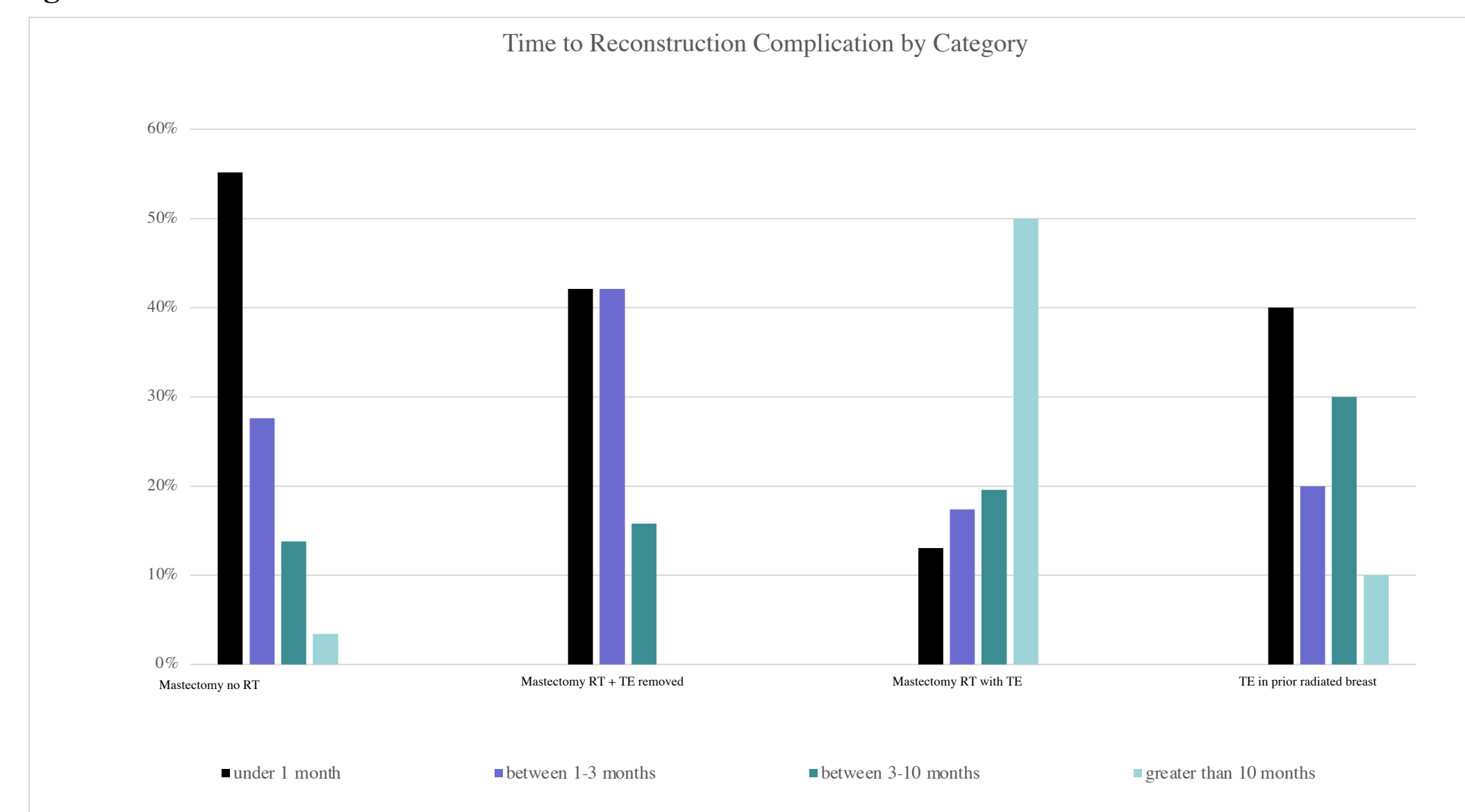
Reconstruction complication	Total, n (%)	Mastectomy no RT, n (%)	Mastectomy RT + TE removed, n (%)	Mastectomy RT with TE, n (%)	TE in prior radiated breast, n (%)	P value
Yes	232 (30.3)	143 (25.3)	19 (95.0)	59 (37.8)	11 (47.8)	.000
No	533 (69.7)	423 (74.7)	1 (5.0)	97 (62.2)	12 (52.2)	
Time to reconstruction complication, postmastectomy						
						.000
Under 1 month	104 (39.1)	80 (55.2)	8 (42.1)	12 (13.0)	4 (40.0)	
Between 1-3 months	66 (24.8)	40 (27.6)	8 (42.1)	16 (17.4)	2 (20.0)	
Between 3-10 months	44 (16.5)	20 (13.8)	3 (15.8)	18 (19.6)	3 (30.0)	
Over 10 months	52 (19.5)	5 (3.4)	0	46 (50.0)	1 (10.0)	

Figure 2



The reconstruction complication rate was highest among patients who underwent TE removal prior to RT and lowest in patients who underwent mastectomy without RT. These complication rate differences between category are statistically significant (P < .001).

Figure 3



In patients who received RT, half of reconstruction complications occurred over 10 months following the procedure. In contrast, postmastectomy patients who did not receive RT had the majority (55.2%) of complications take place within one month of the procedure. (P < .001).

Figure 4

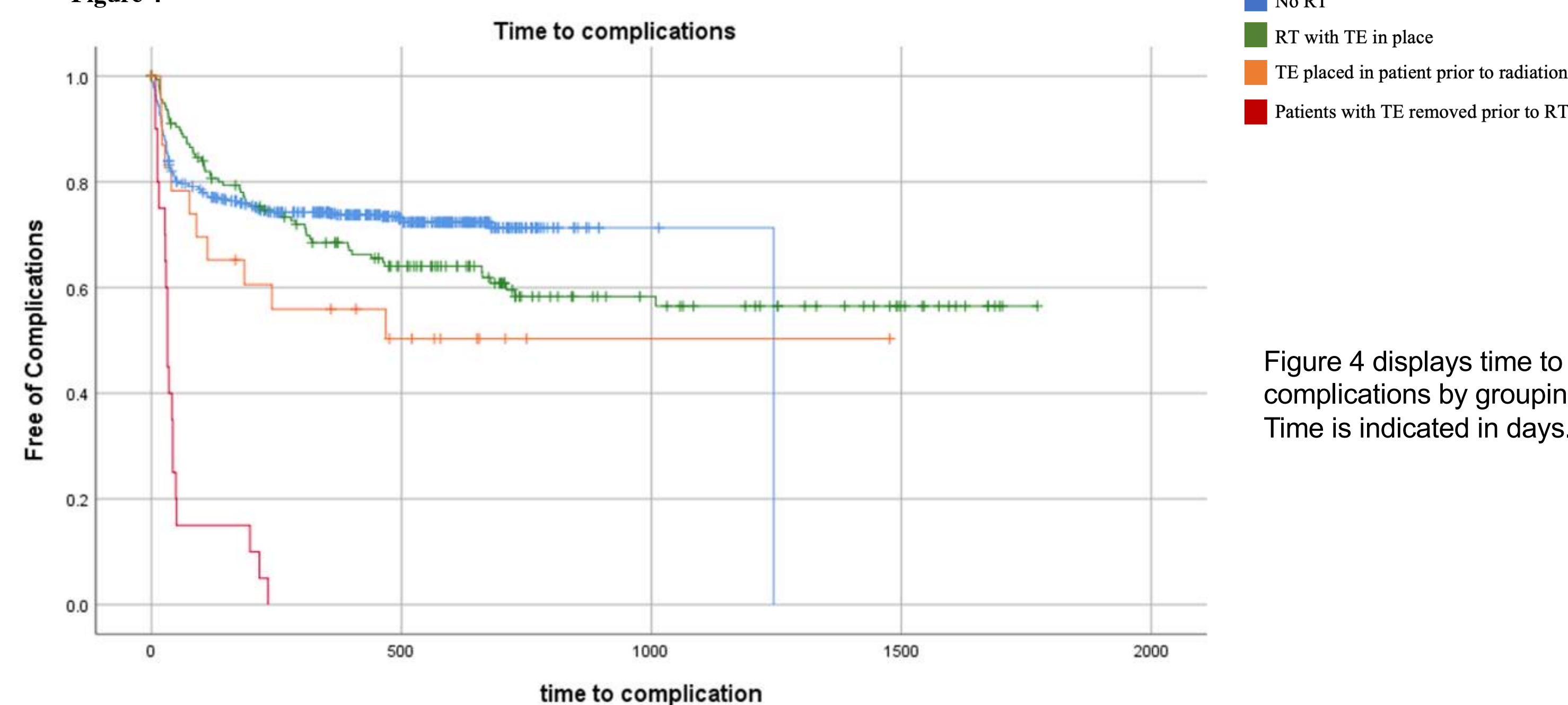


Figure 4 displays time to complications by grouping. Time is indicated in days.

Results, continued

Table 2

Complication	Total, n (%)	Mastectomy, no RT, n (%)	Mastectomy RT + TE removed, n (%)	RT with TE in place, n (%)	TE after RT, n (%)
Infection	130 (17.0)	65 (12.2)	14 (70.0)	41 (26.3)	10 (43.5)
Seroma	83 (10.8)	51 (9.6)	6 (30.0)	24 (15.4)	2 (8.7)
Wound dehiscence	50 (6.5)	33 (6.2)	4 (20.0)	12 (7.7)	1 (4.3)
Capsular contracture	6 (0.8)	4 (0.7)	N/A	1 (0.6)	1 (4.3)
Deflation/rupture	16 (2.1)	13 (2.3)	1 (5.0)	2 (1.3)	0
Necrosis	48 (6.3)	32 (5.7)	4 (20.0)	10 (6.4)	2 (8.7)
Hematoma	16 (2.1)	12 (2.2)	2 (10.0)	2 (1.3)	0
Implant exposure	34 (4.4)	17 (3.2)	4 (20.0)	10 (6.4)	3 (13.0)

Table 3: Complication rates among all patients

Covariate	Complication rate with covariate	Complication rate without covariate	P value
Categorical factors			
Smoking history	8/28 (28.6%)	224/737 (30.4%)	.000
Diabetes mellitus (DM)	22/49 (44.9%)	210/716 (29.3%)	.022
Hypertension	64/154 (41.6%)	168/611 (27.5%)	.001

Intervention	Complication rate	P value
Radiation technique		
CW+RNI photon/e-	62/133 (46.6%)	.088
VMAT	4/9 (44.4%)	
PWT	6/16 (37.5%)	
All e-	1/2 (50.0%)	
Tangents only	7/14 (50.0%)	
Protons	1/2 (50.0%)	
Boost type		
e- skin only, single field/split field	36/88 (41.0%)	.095
VMAT	1/2 (50.0%)	
Mini tangents	0	
e- to CW, single field/split field	23/53 (43.3%)	
3D photon +/- e- plan	2/3 (66.7%)	

Conclusions

Our findings indicate that radiation therapy in the setting of postmastectomy breast cancer patients with implant-based breast reconstruction is linked to a higher reconstruction complication rate compared to those patients who did not receive RT. Certain covariates such as DM and hypertension increase the risk of complications among this demographic. Varying the radiation technique does not influence complication rates.

Future Directions

Ongoing research with these data aims to analyze the effects that different dosimetric factors and deflation of the tissue expander has on complication rates among PMRT patients.