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1023 - Functional Outcomes for Breast Cancer Survivors Following an Intense Resistance Training Program Based on Surgical Management of the Breast and Axilla

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Background/Objective: Traditional postoperative guidelines have long discouraged upper extremity resistance training in patients undergoing mastectomy (Mx) or axillary lymph node dissection (ALND) due to concerns for impaired recovery. However, emerging evidence supports exercise as both safe and beneficial for patient survivorship. However, the extent to which breast and axillary surgery influences objective functional recovery after a structured resistance training program remains unclear. The purpose of this study is to identify if such a structured program affects recovery.

Methods: We performed a secondary analysis of a prospective cohort of 197 breast cancer survivors completing a 3-month in person and supervised resistance training regimen utilizing dose-escalation of compound movements and exercise volume to promote hypertrophy. Participants were stratified by Mx (n=85) versus lumpectomy (Lx) (n=112) and ALND (n=26) versus no ALND (n=171), the latter encompassing patients who either underwent sentinel lymph node biopsy (SLNB) or omission of axillary staging. Baseline clinical, physical, and functional parameters were assessed via ultrasound and bioimpedance analysis (for body composition), Functional movement Screen (FMS), hand grip strength, Godin activity surveys, and Y-balance test. Weight lifted was measured via load (repetitions x sets x weight) during split squat, dumbbell bench press, dumbbell rows, and hex bar deadlifts. These variables were compared using Welch's t-test, chi-square, and Mann–Whitney U tests. Pre- to post-regimen changes were assessed using paired t-tests, and multivariable linear regression identified predictors of both baseline and pre- to post-regimen change in functional movement screen (FMS) score.

Results: At baseline, Mx patients were younger, more likely to have received ALND or chemotherapy, and less likely to have received radiation (all $p < 0.05$). Specifically, the Mx group had a median age of 51 years old versus 59 years old in the Lx group; 21 patients (24.7%) in the Mx group underwent ALND compared with 5 (4.5%) in the Lx group; 38 (44.7%) in the Mx group received chemotherapy versus 30 (26.8%) in the Lx group; and 55 (64.7%) in the Mx group received radiation therapy compared with 94 (83.9%) in the Lx group. No significant baseline differences were observed in body composition or functional parameters. Both Mx and Lx groups demonstrated significant pre- to post-regiment improvements in BMI, muscle mass percentage, body fat percentage, phase angle, FMS score, composite load lifted, and load lifted for each movement pattern (all $p < 0.001$). The magnitude of improvement across all parameters did not differ by Mx or ALND status, except for greater Y-balance gains in patients without ALND (Table 1). In multivariable models, older age ($\beta = –0.09$, 95% CI: –0.124 to –0.055) and receipt of radiation ($\beta = –0.86$, 95% CI: –1.709 to –0.011) were associated with lower

baseline FMS ($p < 0.05$), while age alone predicted smaller FMS improvement ($\beta = –0.05$, 95% CI: –0.087 to 95% CI: –0.015, $p = 0.006$). While Mx trended with less improvement in bench press load lifted, it was not significant ($p = 0.19$). Baseline clinical and treatment factors explained 18.5% of the variability in FMS scores ($R2 = 0.185$), indicating a modest influence on initial functional status. In contrast, these factors accounted for only 6.7% of the variability in pre- to post-program FMS improvement ($R2 = 0.067$), suggesting that functional gains were largely independent of surgical or treatment history and primarily driven by the exercise intervention.

Conclusion: Participation in a 3-month supervised resistance training regimen yielded meaningful functional gains in breast cancer patients, regardless of surgical management of the breast and axilla. Mx and ALND were not independent predictors of either baseline or pre- to post-regimen improvement in FMS or load lifted, even with bench press movements. The findings of this secondary analysis support the broad applicability of dose-escalated resistance training across surgical modalities for breast cancer.

Table 1. Comparison of the Magnitude of Changes Across Pre- and Post-Regimen Parameters for Participants Across (A) Receipt of Mastectomy and (B) Receipt of Adjuvant Lymph Node Dissection (ALND).

A.

Parameter	Lumpectomy (n=112)	Mastectomy (n=85)	P-value
Change in Composite Load	2144.70 [1610.75 - 2960.40]	2031.00 [1422.90 - 2987.10]	0.922
Change in BMI (kg/m2)	-0.11 [-0.64 - 0.36]	-0.26 [-0.97 - 0.13]	0.269
Change in Inbody Bodyfat (%)	-1.50 [-2.50 - -0.10]	-1.50 [-2.80 - -0.10]	0.992
Change in Inbody Muscle Mass (%)	0.98 [0.17 - 1.72]	1.03 [0.20 - 1.86]	0.446
Change in Bone Mineral Content	0.02 [-0.09 - 0.19]	0.00 [-0.11 - 0.11]	0.169
Change in Whole Body Phase Angle	0.20 [0.00 - 0.35]	0.20 [0.00 - 0.40]	0.755
Change in Inbody RMR	16.00 [-1.25 - 36.00]	14.00 [-1.00 - 28.00]	0.387
Change in Grip Strength	3.50 [0.00 - 6.00]	2.50 [0.00 - 6.00]	0.900
Change in Godin Score	21.00 [8.75 - 28.25]	20.00 [10.00 - 34.00]	0.601
Change in FMS Score	2.00 [0.00 - 3.00]	2.00 [1.00 - 4.00]	0.217
Change in Y Balance	10.06 [4.58 - 16.11]	8.99 [4.89 - 16.28]	0.318

B.

Parameter	No ALND (n=171)	ALND (n=26)	P-value
Change in Composite Load	2110.60 [1551.40 - 2977.90]	2384.00 [1324.00 - 2942.00]	0.504
Change in BMI (kg/m2)	-0.13 [-0.72 - 0.32]	-0.30 [-0.65 - 0.18]	0.985
Change in Inbody Bodyfat (%)	-1.50 [-2.75 - -0.10]	-1.30 [-2.28 - 0.07]	0.099
Change in Inbody Muscle Mass (%)	1.03 [0.19 - 1.79]	0.85 [0.11 - 1.46]	0.172
Change in Bone Mineral Content	0.02 [-0.09 - 0.14]	-0.04 [-0.16 - 0.07]	0.915
Change in Whole Body Phase Angle	0.20 [0.00 - 0.30]	0.26 [0.10 - 0.40]	0.840
Change in Inbody RMR	16.00 [-1.00 - 32.50]	9.00 [-11.50 - 28.00]	0.243
Change in Grip Strength	3.00 [0.00 - 6.00]	1.75 [-0.38 - 3.75]	0.325
Change in Godin Score	21.00 [9.00 - 30.50]	17.50 [12.50 - 33.00]	0.908
Change in FMS Score	2.00 [1.00 - 4.00]	1.00 [0.00 - 2.75]	0.123
Change in Y Balance	9.93 [4.77 - 16.39]	7.11 [3.41 - 14.12]	0.036