Control Number: 60

Abstract Category: Clinical Science in Cardio-Oncology

Title: Early Changes in Physical Activity and Quality of Life with Thoracic Radiation Therapy for Breast Cancer, Lung Cancer, and Lymphoma

ABSTRACT BODY

Background

The effects of thoracic radiation therapy (RT) on physical functioning and quality of life (QoL) are unknown. The purpose of this study was to examine the associations between thoracic RT dose volume metrics, physical activity, and QoL.

Methods

133 participants with breast cancer, lung cancer, or mediastinal lymphoma initiating therapy with chemoradiation were enrolled in a prospective, longitudinal cohort study from 2015-2018. Data were collected at three timepoints: pre-RT, immediately post-RT, and 5-9 months post-RT. At each timepoint, self-reported physical activity was assessed via the Godin-Shephard Leisure-Time Physical Activity Questionnaire (GSLTPAQ), and QoL metrics of fatigue and dyspnea were assessed via Functional Assessment of Chronic Illness Therapy Fatigue and Dyspnea Scales. Stratified analyses were performed using the following subgroups: (1) breast cancer alone and (2) lung cancer and lymphoma combined. Changes over time were evaluated by two-sided paired t-tests. Generalized estimating equations were used to determine the association between RT dose-volume metrics and changes in these measures.

Results

The median age was 54 years and 78.2% were female (Table 1). In breast cancer (n=81), the median mean heart dose (MHD) was 1.36 Gy. In lung cancer or lymphoma (n=52), the median MHD was 8.78 Gy. Breast cancer participants reported a significant increase in physical activity score (mean score change 6.94, (standard deviation (SD) 22.80), p=0.011) and decrease in fatigue (2.81 (SD 7.90), p=0.005) over time (Figure 1). In contrast, lung cancer and lymphoma participants reported an increase in fatigue (-5.95 (SD 12.00), p=0.001) and dyspnea (2.00 (SD 5.08), p=0.008) immediately post-RT which later improved (Figure 2). In lung cancer and lymphoma, each 1 Gy increase in MHD was associated with decreased GSLTPAQ (-0.68 (95% confidence interval -1.28,-0.7), p=0.029). In the breast cancer group, there was a non-significant trend towards increased fatigue with increasing radiation dose.

Conclusion

Increased radiation dose to the heart was associated with increased fatigue and dyspnea, as well as decreased physical activity, particularly in lung cancer or lymphoma.

Clinical Implications

Strategies to decrease cardiac RT dose may result in improved physical functioning and less fatigue.

Table

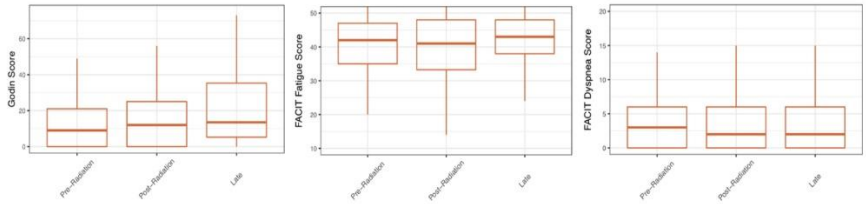
Table 1. Baseline Characteristics

	Overall (n=133)	Breast Cancer (n=81)	Lung Cancer and Lymphoma (n=52)	P-value*
Age (y)	54 [42–62]	54 [44–62]	54.5 [33.5–66.0]	0.835
Sex, n (%)				
Female	104 (78.2)	81 (100.0)	23 (44.2)	<0.001
Race, n (%)				
Caucasian	104 (78.2)	58 (71.6)	46 (88.5)	0.037
Black or African American	25 (18.8)	20 (24.7)	5 (9.6)	
Asian/Pacific Islander/Other	4 (3.1)	3 (3.7)	1 (1.9)	
BMI (kg/m2)	28.75±6.52	29.06±6.85	28.26±5.99	0.492
Past Medical History				
Hypertension, n (%)	43 (32.3)	28 (34.6)	15 (28.8)	0.491
Hypercholesterolemia, n (%)	41 (30.8)	22 (27.2)	19 (36.5)	0.253
Diabetes, n (%)	15 (11.3)	10 (12.3)	5 (9.6)	0.627
Current or Prior Smoking, n (%)	60 (45.1)	32 (39.5)	28 (53.8)	0.105
Treatment Characteristics				
Anthracycline as part of current treatment, n (%)	50 (37.6)	36 (44.4)	14 (26.9)	0.042
Past Anthracycline Exposure, n (%)	10 (7.5)	2 (2.5)	8 (15.4)	0.006
Trastuzumab as part of current treatment, n (%)	19 (14.3)	19 (23.5)	0 (0.0)	<0.001
Carboplatin and/or Taxol as part of current treatment, n (%)	55 (41.4)	29 (35.8)	26 (50.0)	0.105
Primary Radiation Technique, n (%)				<0.001
Protons (passive scattering)	11 (8.3)	4 (4.9)	7 (13.5)	
Protons (scanning)	31 (23.3)	9 (11.1)	22 (42.3)	
3D Conformal	59 (44.4)	57 (70.4)	2 (3.8)	
IMRT	32 (24.1)	11 (13.6)	21 (40.4)	
Total Radiation Dose, Gy	52.6 [50.4–60.0]	52.6 [50.4–60.0]	50.4 [36.0–66.6]	0.589
MHD, Gy	2.6 [1.2–6.9]	1.4 [1.0–2.4]	8.8 [5.8–15.8]	<0.001
V5, %	10 [2.2–26.8]	2.8 [1.3–8.1]	36.5 [20.5–59.2	<0.001
V30, %	0.9 [0.0–7.3]	0.1 [0.0–0.9]	11.9 [4.6–23.3]	<0.001

Abbreviations: BMI = body mass index; 3D = 3-dimensional; IMRT = intensity modulated radiation therapy; MHD = mean heart dose; V5 and V30 indicate the percent volume of heart receiving 5 Gy and 30 Gy, respectively.
Normally distributed continuous variables summarized with the mean ± standard deviation, non-normally distributed continuous variables were summarized with the median [interquartile range].
*P-values for categorical variables are from Pearson's chi-squared tests. P-values for continuous variables are from non-parametric K-sample tests of the equality of medians or T-tests of the equality means.

Image 1

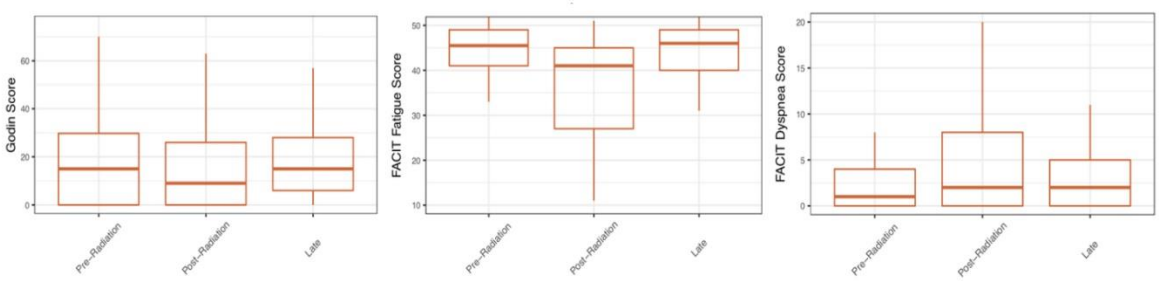
Figure 1. Changes Over Time in Physical Activity as measured by Godin-Shephard Leisure-Time Physical Activity Questionnaire (GSLTPAQ), and Quality of Life Metrics as measured by Functional Assessment of Chronic Illness Therapy Fatigue (FACIT-F) and Dyspnea (FACIT-Dyspnea) among Participants with Breast Cancer Receiving Thoracic Radiation Therapy.



NB: Higher GSLTPAQ scores imply greater physical activity, lower FACIT fatigue scores imply greater fatigue, higher FACIT dyspnea scores imply greater dyspnea.

Image 2

Figure 2. Changes Over Time in Physical Activity as measured by Godin-Shephard Leisure-Time Physical Activity Questionnaire (GSLTPAQ), and Quality of Life Metrics as measured by Functional Assessment of Chronic Illness Therapy Fatigue (FACIT-F) and Dyspnea (FACIT-Dyspnea) among Participants with Lung Cancer or Lymphoma Receiving Thoracic Radiation Therapy.



**NB: Higher GSLTPAQ scores imply greater physical activity, lower FACIT fatigue scores imply greater fatigue, higher FACIT dyspnea scores imply greater dyspnea.*