



External Beam Radiotherapy and Radioactive Iodine for Treatment of Well-Differentiated Thyroid Cancer

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Introduction

- Well-differentiated thyroid cancer (WDTC) is a common malignancy that is typically treated surgically with radioactive iodine (RAI) given post-operatively for unfavorable pathologic factors.
- External beam radiation (EBRT) is used infrequently, but when employed is usually in the setting of locally or regionally advanced disease.
- In such cases of heavy locoregional disease burden, there is clinical equipoise on the order between RAI and EBRT and there is a paucity of literature examining treatment details, such as time between these modalities and how these impact oncologic outcomes.

Methods and Materials

We performed a multi-institutional retrospective chart review from two academic tertiary care centers of patients with well-differentiated thyroid cancer who received both RAI and EBRT over the past 20 years. Cases were excluded for anaplastic, medullary, and poorly differentiated histology or for receiving radiation only to distant metastatic sites and not the neck. Clinicodemographic, pathologic, and treatment variables were manually extracted via chart review. The time between different treatment modalities was calculated and descriptive statistics were performed.

Table 1. Case clinico-demographic and disease characteristics			
Characteristic	No.	%	
Gender			
	F	8	67%
	M	4	33%
Ethnicity			
	Hispanic	1	8%
	Non-Hispanic	11	92%
Race			
	White	5	42%
	Asian	4	33%
	Other/Unknown	3	25%
Age at Dx (yrs)			
	Under 45	1	9%
	45-55	3	27%
	Over 55	7	64%
Histology	PTC	12	100%
T-classification			
	3,3a,3b	6	60%
	4,4a,4b	4	40%
N-classification			
	0	2	20%
	1a	2	20%
	1b	6	60%
M-classification			
	0	9	90%
	1	1	10%
Stage			
	I	1	10%
	II	0	0%
	III	3	30%
	IVA	5	50%
	IVB	1	10%

Table 2. Treatment characteristics, timing between modalities, and outcome		
Characteristic	No.	%
RAI 1 Dose (mCi)	avg 141	range 100 - 211
EBRT 1 Dose (Gy)	avg 56	range 18 - 70
Type of salvage surgery		
	Local (central neck)	3 25%
	Regional (lateral necks)	6 50%
	Distal	1 8%
	None	2 17%
Setting for RAI 1		
	Initial adjuvant	10 83%
	Recurrence	2 17%
Setting for EBRT		
	Initial adjuvant	2 17%
	Recurrence/Persistence	10 83%
First radiation modality received		
	RAI	11 92%
	EBRT	1 8%
Time between modalities (mo)		
	RAI first (n = 11)avg 51	range 1 - 129
	EBRT first (n = 1)avg 5	range 5 - 5
Length of follow-up from dx (yrs)	avg 6.5	range 1 - 15
Vital status at last follow-up		
	Alive with disease	4 33%
	(RAI first)	3
	(EBRT first)	1
	Alive, no evidence of disease	1 8%
	Deceased	2 17%
	Lost to follow-up	4 33%

Results

A total of 12 patients met inclusion criteria for this study, and all 12 patients received both EBRT and RAI. Most patients were female (67%), over 55 years old (64%), and had papillary thyroid carcinoma histology (100%). Tumor classifications were T3 (60%) or T4 (40%), regional nodal classification N0 (20%), N1a (20%), and N1b (60%), and only 1 patient had distant metastasis on presentation. The average RAI dose was 141 mCi and average EBRT dose was 55.8 Gy. Fourteen percent of patients were treated with EBRT for primary disease presentation and the rest were treated for recurrent disease. 86% of patients underwent a salvage surgery for local, regional, or locoregional recurrence. Overall, six cases (43%) received EBRT within one year of a surgical procedure, but only one of these six received RAI in the interim. Statistical testing comparing survival between groups getting RAI or EBRT first could not be performed because only 1 patient received EBRT before RAI.

Conclusions

The patients in the series tended to be treated with EBRT for recurrent disease and not in an adjuvant early post-operative manner. Only 1 patient received EBRT before RAI. While we are unable to draw definitive conclusions regarding ideal timing or sequence of RAI with EBRT in WDTC, this initial analysis supports further investigation on this topic.

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