TITLE

Role of early ^{18}F-FDG PET/CT in the management of differentiated thyroid cancer patients with negative ^{131}I scan and elevated thyroglobulin levels

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OBJECTIVES

Early detection of residual or recurrent cancer in patients with differentiated thyroid cancer (DTC) is important, especially, when they do not uptake ^{131}I uptake because these tumors do not likely benefit from radioiodine therapy (RAIT). We aimed to evaluate the usefulness of FDG-PET/CT as an early diagnostic work up in DTC patients with negative radioiodine whole body scan (I-WBS) and elevated stimulated Tg (sTg) levels.

METHODS

This was a retrospective study. There were 48 consecutive patients with negative I-WBS and elevated sTg level (>5ng/mL) or positive Tg antibodies (TgAb). FDG-PET/CT was performed within 12 months after first remnant ablation. True positive rate and positive predictive value was calculated according to different sTg levels (ng/ml). [5 ≤ sTg < 10 (n=11), 10 ≤ sTg < 20 (n=14), ≥20 (n=19)] and positive anti-thyroglobulin antibodies (n=4).

RESULTS

Table 1. Baseline characteristics

Variables	Value
Age	41.5±13.8
Sex, n% **Male/Female**	16(28%)/42(72%)
Tumor size(cm)	2.0±1.6
Multifocal tumor	28(47%)
Lymph node metastasis central lateral	49(82%) 35(58%)
Gross extrathyroidal extension	25(42%)
Tg with TSH stimulation during ^{131}I or DWBS median, IQR	19(14.9-50.9)
Cumulative ^{131}I dose, (median, IQR)	180(130-250)
Median follow up (months)	26(13-92)

Table 2. Locations of recurrence or metastasis

Recurrence or metastasis	PET/CT			
	TP	FP	FN	TN
Positive				
Thyroidectomy bed (ThB)	6		1	
Cervical LN (cLN)	4	4	3	
ThB + cLN		1		
Mediastinal LN (mLN)	1			
cLN + mLN	1			
Lung metastasis	4			
cLN + lung metastasis	1	1	1	
ThB + lung metastasis	1			
Unidentified lesion			7	22
Total	18	6	12	22

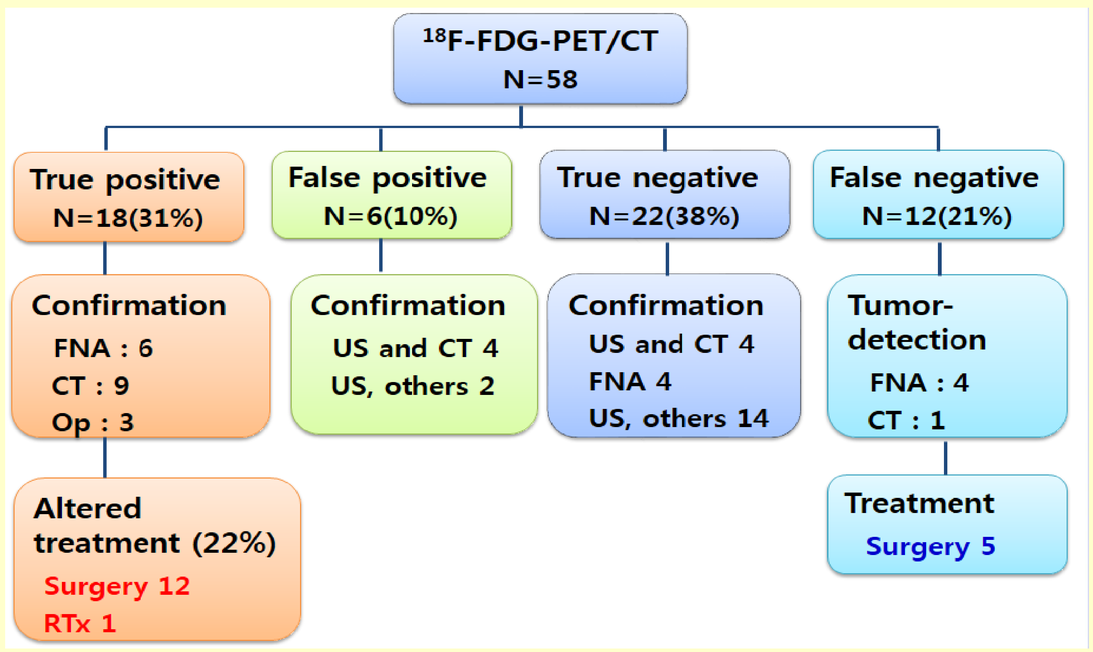

Figure 1. Clinical outcome of patients based on PET/CT results

Table 3. PET/CT findings and serum sTg levels

sTg levels (ng/mL)	Total cases	PET/CT True positive (%)	Positive - predictive value
5-10	8	0	0
10-20	21	5(24%)	71%
>20	26	12(46%)	85%
Anti-Tg Ab+	3	1(33%)	100%
Total	58	18(31%)	75%

CONCLUSIONS

Early FDG-PET/CT is useful tool for tumor detection in DTC patients with negative I-WBS and increased sTg levels and may change a treatment plan, especially when sTg during I-WBS was greater than 20ng/mL.

References

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2. Lee, J.W., et al., *Clinical utility of 18F-FDG PET/CT concurrent with 131I therapy in intermediate-to-high-risk patients with differentiated thyroid cancer: dual-center experience with 286 patients.* J Nucl Med, 2013. **54**(8): p. 1230-6.

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