

Selecting the optimal preoperative imaging for differentiated thyroid cancer surgery, a multicenter study



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Introduction - Well-differentiated thyroid cancer (WDTC) has an excellent prognosis and long-term survival. The main pre-operative imaging are ultrasonography (US) and computed tomography (CT). The utility and accuracy of these different imaging modalities for detecting central compartment nodal disease remains debatable. Therefore, we seek to examine the sensitivity and specificity of the different imaging modalities used preoperatively, in the management of patients with WDTC.

Methods - We conducted a dual center retrospective study. All patients diagnosed with WDTC who underwent total thyroidectomy with or without central neck-dissection between January 1998 and December 2015 were included in this study. The sensitivity and specificity of the different imaging modalities were calculated using their pre-operative evaluation compared to pathology reports.

	Pathology		
	Positive	Negative	
Positive	287	5	292
Negative	68	28	96
	355	33	388

Table 1. US pre-operative evaluation of the central compartment
Sensitivity 80.85%, Specificity 84.85%, PPV 98.29%, NPV 29.17%

	Pathology		
	Positive	Negative	
Positive	21	1	22
Negative	80	10	90
	101	11	112

Table 2. CT pre-operative evaluation of the central compartment
Sensitivity 20.79%, Specificity 90.91%, PPV 95.45%, NPV 11.1%

	Pathology		
	Positive	Negative	
Positive	174	4	178
Negative	44	23	67
	218	27	245

Table 3. US pre-operative evaluation of the central compartment – Stratified by gender – Females
Sensitivity 79.82%, Specificity 85.19%, PPV 97.75%, NPV 34.32%

	Pathology		
	Positive	Negative	
Positive	113	1	114
Negative	24	5	29
	137	6	143

Table 3. US pre-operative evaluation of the central compartment – Stratified by gender – Males
Sensitivity 82.48%, Specificity 83.33%, PPV 99.12%, NPV 17.2%

	Pathology		
	Positive	Negative	
Positive	66	3	69
Negative	26	19	45
	92	22	114

Table 4. US pre-operative evaluation of the central compartment – Stratified by age – >55 years of age
Sensitivity 71.74%, Specificity 86.36%, PPV 95.65%, NPV 42.22%

	Pathology		
	Positive	Negative	
Positive	221	2	223
Negative	42	9	51
	263	11	274

Table 5. US pre-operative evaluation of the central compartment – Stratified by age – <55 years of age
Sensitivity 84.03%, Specificity 81.82%, PPV 99.1%, NPV 17.64%

Results – Out of 412 patients treated during the study period 306 met the inclusion criteria. The mean age was 45.37 (ranging 18-89 years of age) and 65% (119 patients) were women. All patients had a pre-operative US examination and 86 (28.1%) had a pre-operative CT scan. For the entire cohort, the pre-operative US scan showed sensitivity of 80.85%, specificity of 84.85% and positive predictive value (PPV) 98.29%, negative predictive value (NPV) 81.1% for detecting central compartment nodal disease. The pre-operative CT scan showed a surprising sensitivity of 20.7% superior specificity of 90.91% PPV 84.1%, NPV 42.5%. When stratified for sex – women had a better specificity 85.19% vs 83.33% but compromised sensitivity 79.82% vs 82.48%. Young age (<55 years of age) demonstrated a significant difference in sensitivity – 84.03% vs 71.74% and a specificity of 81.82 compared to 86.36% in the older age group.

Discussion –When planning central compartment dissection during thyroidectomy, a combination of imaging modalities should be considered, benefiting from the high sensitivity of US and high specificity of CT scan. Female sex and younger age showed superior specificity and sensitivity respectively.

Conclusions

Preoperative US can be a very helpful diagnostic tool for central compartment analysis with high sensitivity and PPV.