

**ULTRASOUND PREDICTORS FOR MALIGNANCY OF THYROID NODULES –
“POSTERIOR ACOUSTIC SHADOWING AND ENHANCEMENT”**

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ABSTRACT

Introduction: The current clinical approach to diagnosis of thyroid nodules is based on the results of the ultrasound examination combined with data from fine-needle aspiration biopsy of the thyroid (FNAB). Ultrasound characteristics associated with malignancy have been widely discussed in scientific literature but the significance of posterior acoustic phenomena for the risk stratification of thyroid nodules is sparsely studied.

Objective: To evaluate the prognostic significance of the ultrasound features – posterior acoustic shadowing and enhancement for the risk of malignancy of thyroid nodules.

Patients and Methods: 275 patients with thyroid nodules were included in the study, mean age 48.95 ± 0.76 years; m:f = 1:12.10. An ultrasound evaluation and FNAB of a total of 334 nodules had been performed. Cytological evidence of malignancy was identified in 28 cases in which the diagnosis differentiated thyroid cancer was confirmed histologically.

Results: Posterior acoustic enhancement was found in 70 nodules and acoustic shadowing in 32 nodules. The analysis found that the posterior acoustic shadowing is a predictive sign of malignancy (OR = 8.782; 95 % CI - [3.648,21.138]). It was observed in 11 out of 28 malignant nodules. Posterior acoustic enhancement seems to be a protective feature, but due to the small number of malignant nodules bearing this sign (n=2) definitive conclusions can not be drawn.

Conclusion: The presence of posterior acoustic shadowing indicates an increased risk of malignancy of thyroid nodules and should be taken into account in an integrated assessment of the risk profile of thyroid nodules.

Key words: *thyroid nodules, ultrasound examination*

Introduction: The current clinical approach for the diagnosis of thyroid nodules is based on the results of the ultrasound examination in combination with the data from the fine-needle biopsy of the thyroid (FNAB) /1/. Ultrasound characteristics associated with malignancy have been widely discussed in order to early identify the risk nodules. However, the significance of acoustic phenomena - posterior acoustic shadowing and enhancement for the risk stratification of thyroid nodules is sparsely studied.

Objective: To evaluate the prognostic significance of the ultrasound features posterior acoustic shadowing and enhancement for the risk of malignancy of thyroid nodules.

Patients and methods: 275 patients with thyroid nodules of mean age 48.89 ± 0.77 years were included in the study (tab. 1). An ultrasound evaluation and FNAB of a total of 334 nodules had been performed. Cytological evidence of malignancy was identified in 28 cases in which the diagnosis of differentiated thyroid cancer was confirmed histologically

Table 1. Characteristics of the studied patients

		N	%
Patients	male	22	8.00%
	female	253	92.00%
	total	275	100%
Age	(years) range	48.95 ± 0.76 (20-83)	
Nodules	solitary	163	48.80%
	multiple	171	51.20%
	total	334	100%
Autoimmune thyroid disease	yes	29	8.68%
	no	305	91.32%

Results: Posterior acoustic enhancement was found in 70 nodules and acoustic shadowing in 32 nodules (table 2, fig. 1). The analysis found that the posterior acoustic shadowing is a predictive sign of malignancy (OR=8.782; 95 % CI [3.648,21.138]). It was observed in 11 out of 28 malignant nodules. Posterior acoustic enhancement seems to be a protective feature, but because of the small number of malignant nodules bearing this sign (n=2) definitive conclusions can not be drawn (OR=0.269; 95 % CI [0.062,1.163]).

Table 1. Incidence of the posterior acoustic phenomena in the studied nodules

	benign	malignant	total
Posterior acoustic enhancement	68	2	70
Posterior acoustic shadowing	21	11	32
No posterior acoustic phenomena	217	15	232
total	306	28	334

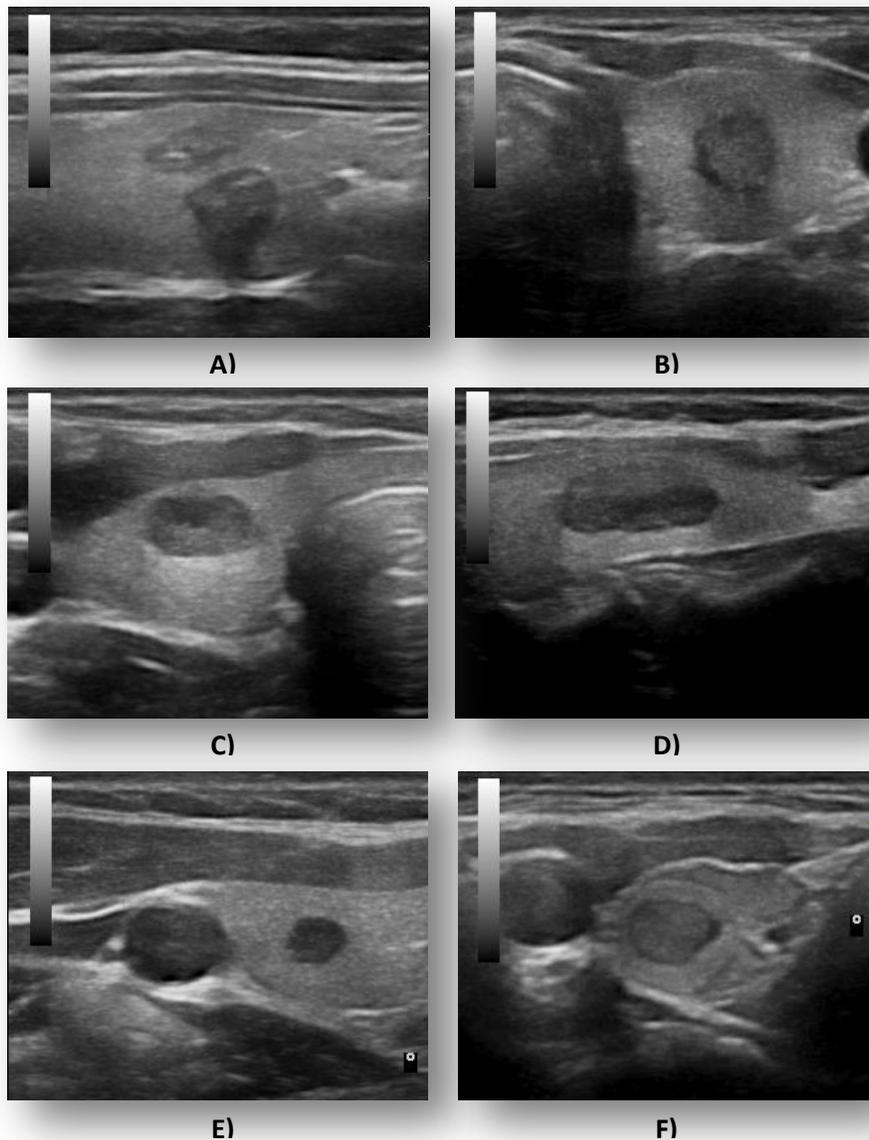


Figure 1. Ultrasound images of selected nodules: A) and B) nodules with posterior acoustic shadowing /papillary cancers/; C) and D) nodules with posterior acoustic enhancement; E) and F) - nodules without posterior acoustic phenomena.

Discussion: The main goal in the management of a thyroid nodule is to identify the small group of patients with a malignancy who warrant timely definitive treatment while avoiding unnecessary investigations and treatment in the majority of patients with benign nodules /5/. High-resolution ultrasonography (US) plays an essential role in providing the risk assessment of thyroid nodules. In addition, in patients with a high risk of tumor recurrence, US imaging is an indispensable tool in the post-treatment surveillance. Suspicious US features may be useful for the selection of patients for fine-needle aspiration biopsy when incidental nodules are discovered and when multiple nodules are present /1/. Gray-scale characteristics such as marked hypoechogenicity, taller than wide shape, irregular margin, absence of halo, microcalcification, solid nature of a nodule and intranodular blood flow are useful in identifying the malignant nodules /2,3/. One must bear in mind that no single sonographic

feature has 100 % accuracy and in the routine clinical practice a combination of features will help in distinguishing benign from malignant disease /2,3/.

The parenchyma of some solid and most of the cystic nodules conducts the ultrasound with very little attenuation, resulting in increased intensity of the signal behind the object in comparison with adjacent structures. This artifact is known as posterior acoustic enhancement. The opposite phenomenon called posterior acoustic shadowing is observed in nodules with increased cellularity and cell compactness - a hallmark of many papillary cancers.

The results of the present study show that the presence of posterior acoustic shadowing is highly predictive for malignancy. Similar results were obtained from Sharma et al., who reveal posterior acoustic shadowing as the most important factor in the prediction of malignancy of subcentimeter nodes (OR 25.9, specificity 92 %) /4/. It seems that posterior acoustic enhancement is a protective feature, but because of the small number of malignant nodules having this sign (n=2) no statistically significant results have been obtained.

Conclusion: The presence of posterior acoustic shadowing indicates an increased risk for malignancy of thyroid nodules and should be taken into account in an integrated assessment of the risk profile of thyroid nodules.

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