

DIAGNOSTIC PERFORMANCE OF SHEAR WAVE ELASTOGRAPHY AND PRO-INFLAMMATORY CYTOKINES IN THE DIFFERENTIAL DIAGNOSIS OF PAPILLARY THYROID CARCINOMA

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Background. Papillary thyroid carcinoma (PTC) is the most common malignant thyroid neoplasm. Despite advances in ultrasound diagnostics and fine-needle aspiration biopsy, differential diagnosis between malignant and benign thyroid lesions remains challenging, particularly in patients with autoimmune thyroiditis (AIT). Shear wave elastography (SWE) and inflammatory cytokines are considered promising non-invasive diagnostic markers.

Objective. To evaluate the diagnostic significance of shear wave elastography parameters and pro-inflammatory cytokines in the differential diagnosis of papillary thyroid carcinoma, autoimmune thyroiditis, and nodular goiter.

Materials and Methods. A comparative single-center observational study included 90 patients with thyroid diseases: 30 patients with PTC, 30 with AIT, and 30 with nodular goiter. All participants underwent thyroid ultrasound examination with TI-RADS assessment, shear wave elastography (SWE), strain ratio (SR) measurement, and laboratory evaluation of thyroid hormones, thyroid autoantibodies, and serum levels of IL-1 β , IL-6, IL-8, and TNF- α . Statistical analysis was performed using non-parametric methods with effect size estimation.

Results. Patients with PTC demonstrated significantly higher thyroid tissue stiffness and elevated cytokine levels compared with the AIT and nodular goiter groups ($p < 0.001$). SWE values increased progressively from nodular goiter to AIT and reached the highest levels in PTC (15.3, 31.6, and 82.0 kPa, respectively; $\epsilon^2 = 0.889$). Among laboratory markers, IL-8 showed the strongest discriminatory ability ($\epsilon^2 = 0.851$). High TI-RADS categories, irregular margins, and microcalcifications were significantly associated with PTC. A clear inflammatory gradient (PTC > AIT > nodular goiter) was observed for all investigated cytokines.

Conclusions. Combined assessment of SWE and pro-inflammatory cytokines demonstrates high diagnostic value in papillary thyroid carcinoma. SWE was the most informative instrumental parameter, while IL-8 emerged as the most promising laboratory biomarker. The integration of elastographic, ultrasonographic, and

immunoinflammatory markers may improve the accuracy of non-invasive differential diagnosis and facilitate earlier detection of thyroid malignancies.