

CONTRAST-ENHANCED APPROACH TO PARATHYROID LESIONS

Sergejs Pavlovics¹, Maija Radziņa², Rita Niciporuka³, Madara Ratniece⁴, Madara Mikelsonē⁵, Māra Liepa⁶, Peteris Priedītis¹, Arturs Ozolins³, Zenons Narbutis³

¹Radiology Research Laboratory, Rīga Stradiņš University; Faculty of Medicine, University of Latvia; Institute of Diagnostic Radiology, Pauls Stradins Clinical University Hospital

²Department of Radiology, Pauls Stradins Clinical University Hospital; Radiology Research Laboratory, Rīga Stradiņš University; Faculty of Medicine, University of Latvia

³Department of Surgery, Faculty of Medicine, Rīga Stradiņš University

⁴Faculty of Medicine, Rīga Stradiņš University; Radiology Research Laboratory, Rīga Stradiņš University

⁵Statistics Unit, Rīga Stradiņš University

⁶Department of Radiology, Pauls Stradins Clinical University Hospital; Radiology Research Laboratory, Rīga Stradiņš University

Objectives. Despite the improvement in B-mode ultrasound (US) imaging quality, it may still be challenging to distinguish between different parathyroid lesions. The objective was to evaluate the findings of contrast-enhanced ultrasound (CEUS) in parathyroid lesions and to determine whether CEUS and CEUS post-processing can help to differentiate between hyperplastic and neoplastic parathyroid glands.

Materials and Methods. In this prospective study, 88 patients (18–83 years, F:M = 74:14) with hyperparathyroidism were recruited before parathyroid surgery. Multiparametric ultrasound – US, Colour Doppler, Superb Microvascular Imaging (SMI), CEUS (SonoVue) images were acquired and quantitative postprocessing was performed (VueBox). Results were compared with postsurgical morphology.

Results. The most common US characteristics of parathyroid adenoma (PA) vs hyperplasia (PH) were: well defined, hypoechoic lesions with increased echogenicity in centre (67% and 52%, respectively), cystic components (54% and 59%, respectively) with afferent vessel (93% for both), PA's were larger on average ($p = 0.001$). CEUS showed peripheral hypervascularity in early arterial phase (median = 10s), quickly reaching peak contrast concentration (median = 15s), following early washout (median = 27s) in PA and homogenous dynamics in PH with rapid washout ($p = 0.001$). The most prevalent morphological subtype of adenoma was chief-cell adenoma (79%, $n = 59$). Number of adenomas (61% of oxyphil subtype) displayed different pattern – preponderantly central enhancement. Fall time was shorter in PH's compared to PA's (8s vs. 11s). CEUS sensitivity for parathyroid pathology prior to postprocessing vs after postprocessing – 90% vs 98.2% and specificity 72.2% vs 85.3% ($p = 0.1$).

Conclusions. CEUS is valuable and powerful tool for the preoperative assessment of parathyroid pathology with high sensitivity and specificity in differentiation of parathyroid lesions, including subtypes of adenoma – majority of those are distinguished by peripheral uptake, central washout and slower hemodynamics, compared to hyperplasia with homogeneous enhancement and rapid washout, whereas oxyphilic adenomas showed predominantly central enhancement.