Ultrasound Diagnostics of Thyroid Diseases

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Preface

Thyroid disease is the second most common type of endocrine pathology, only surpassed in prevalence by diabetes mellitus. Thyroid abnormalities are found in 8–20% of adults worldwide. In the endemic regions, the prevalence of such abnormalities is thought to be higher and exceeds 50%. Thyroid malignancies constitute 1–3% of all cancers with an average incidence in the world of 1.1 in 100,000 men and 3.8 in 100,000 women in 2008. Among the population of radionuclide polluted regions, this figure reaches 14 in 100,000. Recent research reveals a trend toward an increased incidence of thyroid pathology, including thyroid cancer, practically in all regions of the globe.

The diagnosis of thyroid diseases has been constantly improving due to the scientific development and technological advances in diagnostic equipment. The diagnostic value of visualization of the thyroid gland is method-dependent. In this regard, proper selection of a diagnostic procedure permits precise diagnosis while minimizing the cost and reducing the time to diagnosis. Minimally invasive surgical intervention is a promising tool in the treatment of thyroid diseases. Its feature is selective manipulation of the thyroid lesions and concomitant avoidance of damage to the surrounding tissue. The use of US guidance during such procedure allows to assess the operation course, predict the efficacy, and provide patient follow-up.

In this book we presented and analyzed certain debatable and unresolved problems and prospects of early, specific, and differential diagnosis of thyroid disease with the use of complex US. Our findings are based on the literature data and our extensive experience. We conducted analysis of more than 100,000 US examinations with the pathology of the thyroid and parathyroid glands, performed during 1995–2008, as well as the results of over 5,000 diagnostic and 2,000 therapeutic US guided minimally invasive manipulations with correlation to surgical findings and morphological structure. This analysis allowed us to generate a weighted opinion regarding the current role and limitations of a sonographic study of the thyroid, which we present here.

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Abbreviations

AIT	Autoimmune thyroiditis
AITD	Autoimmune thyroid disease
AT	Acute thyroiditis
ATC	Anaplastic thyroid carcinoma
BSA	Body surface area
CCA	Common carotid artery
CDI	Color Doppler imaging (Color flow imaging, CFI; Color flow mapping, CFM)
CEUS	Contrast-enhanced ultrasound
CPD	Color pixel density
CT	Computed tomography
EDV	End-diastolic velocity
FNAB	Fine needle aspiration biopsy
FTC	Follicular thyroid carcinoma
HPT	Hyperparathyroidism
HU	Hounsfield unit
ICD	International Classification of Diseases
IJV	Internal jugular vein
ITA	The inferior thyroid artery
MIM	Minimally invasive modality
MRI	Magnetic resonance imaging
MTC	Medullary thyroid carcinoma
PDI	Power Doppler imaging (mapping)
PEI	Percutaneous ethanol injection
PET	Positron emission tomography
PGA	Percutaneous glucocorticoid administration
PI	Pulsatility index
PI	Pulsatory index
PLA	Percutaneous laser ablation
PSV	Peak systolic velocity
PTC	Papillary thyroid carcinoma
PTH	Parathyroid hormone
PW	Pulse wave Doppler
RI	Resistance index
4D	Real time three-dimensional image reconstruction
RSI	Relative signal intensity

SAT	Subacute thyroiditis
SI	Solbiati index
SPECT	Single photon emission computed tomography
3D	Three-dimensional reconstruction of the image
3DPD	Three-dimensional reconstruction of the image in vascular regimen (3D power Doppler imaging)
THI	Tissue harmonic imaging
TSH	Thyroid stimulating hormone
US	Ultrasound
UTA	The upper thyroid artery