

Contents

1	Embryonic Development and Anatomic and Histological Structure of the Parathyroid Glands	1
1.1	The History of Methods of Examination of the Parathyroid Glands	1
1.2	General Characteristics	1
1.3	Formation of the Parathyroid Glands During Embryogenesis	2
1.4	Localization: Congenital and Acquired Parathyroid Ectopias	5
1.4.1	Superior Parathyroid Glands	5
1.4.2	Inferior Parathyroid Glands	6
1.4.3	Accessory Parathyroid Glands	7
1.4.4	Acquired Ectopias	7
1.5	Blood Supply and Innervation	8
1.6	Histological Structure of Normal Parathyroid Glands	8
1.6.1	Stroma	10
1.7	Age-Related Alterations	11
2	Preoperative Imaging of the Parathyroid Glands	13
2.1	Radionuclide Imaging	14
2.1.1	Indications for Radionuclide Imaging	16
2.1.2	Subtraction Dual-Isotope (Binuclide) and Dual-Phase Scintigraphy	18
2.1.3	Assessment of the Scintigraphic Results	24
2.1.4	Single-Photon Emission Computed Tomography	28
2.1.5	Positron Emission Tomography	31
2.2	Ultrasound Examination	39
2.2.1	Indications for Parathyroid US	39
2.2.2	The Protocol of Neck US in Suspicion of Primary Hyperparathyroidism	42
2.2.3	Ultrasound Imaging of Normal Parathyroid Glands	48
2.2.4	Ultrasound Diagnosis of Parathyroid Pathology	50
2.2.5	Difficulties and Limitations of US of Parathyroid Abnormalities	67

2.3	Computed Tomography and Magnetic Resonance Imaging	68
2.3.1	Indications for Computed Tomography	70
2.3.2	Protocol of Computed Tomography of the Neck and Upper Mediastinum in Primary Hyperparathyroidism	72
2.3.3	Assessment of CT Results	76
2.3.4	Magnetic Resonance Imaging	78
2.4	Clinical Examples of the Combination of Different Modalities for Topical Diagnosis in PHPT	82
2.5	Supplement	91
3	Intraoperative Imaging of the Parathyroid Glands	107
3.1	Preoperative and Intraoperative Ultrasound of Abnormal Parathyroid Glands	107
3.1.1	Preoperative Ultrasound	107
3.1.2	Intraoperative Ultrasound	108
3.2	Stains (Dyes) in Intraoperative Diagnosis of Parathyroid Tumors	110
3.3	Intraoperative Detection of the Parathyroid Hormone Level in Parathyroidectomy	114
3.3.1	The History of the Technique of Intraoperative Parathyroid Hormone Assessment	114
3.3.2	Basic Modalities of Quantitative Assessment of Intact PTH Level in Human Serum and Plasma	116
3.3.3	Dynamics of Parathyroid Hormone During Parathyroidectomy	121
3.4	Intraoperative Gamma Detection During Operations for Hyperparathyroidism	121
4	Image-Guided Minimally Invasive Modalities in Surgical Treatment of Parathyroid Diseases	125
4.1	Selection of Patients for Minimally Invasive Modalities	126
4.2	Ultrasound-Assisted Percutaneous Administration of Calcitriol	127
4.3	Ultrasound-Assisted Percutaneous Ethanol Injections	128
4.4	US-Assisted Percutaneous Laser Ablation in Parathyroid Hyperplasia	131
4.4.1	US Guidance for PLA in Different Locations of the Parathyroid Glands	133
4.4.2	The Technology of US-Assisted PLA in Parathyroid Hyperplasia	134
4.4.3	Patient Management After PLA and Assessment of PLA Effectiveness: Criteria and Terms of Repeated Interventions	138
Conclusion		145
Index		155