

Voice Disorders

Scope of Theory and Practice

Second Edition

Carole T. Ferrand
Hofstra University



330 Hudson Street, NY NY 10013

Contents

List of Illustrations xv

Preface xix

1 *Anatomy and Physiology of the Respiratory and Laryngeal Systems* 1

Structures of the Lower Respiratory System and Mechanics of Respiration	2
Structures of the Respiratory System	3
Pleural Linkage	6
Muscles of Respiration	6
Respiratory Cycle	8
Lung Volumes and Capacities	10
Resting Expiratory Level	11
Percentage of Vital Capacity	11
Respiratory Patterning for Speech	12
Location of Air Intake	13
Ratio of Time for Inhalation Versus Exhalation	13
Volume of Air Inhaled and Exhaled	13
Muscle Activity for Exhalation	14
Chest-Wall Shape	14
Nervous System Control of Respiration	15
Laryngeal Functions and Structures	16
Functions of the Larynx	16
Anatomy and Physiology of the Laryngeal System	17
True Vocal Folds	29
Muscles of the Larynx and Myoelastic Aerodynamic Theory of Vocal Fold Vibration	37
Extrinsic Muscles	38
Intrinsic Muscles	42
Myoelastic-Aerodynamic Theory	47
Nervous System Control of the Larynx	55
Cortical Areas Involved in Phonation	56

Laryngeal Reflexes	62
Blood Supply to the Larynx	63
Inflammation and Wound Healing in the Larynx and Vocal Folds	63
Inflammation	63
Extracellular Matrix Proliferation	65
Scar Remodeling	65
Vocal Registers	66
Modal Register	67
Pulse Register	67
Loft Register	68
Chapter Summary	68
Review Questions	69

2 *Lifespan Changes in the Respiratory and Phonatory Systems* 71

Fetal Development of the Respiratory and Laryngeal Systems	71
Respiratory Development	72
Laryngeal Development	73
Respiratory Function in Infants, Children, and Adults	73
Laryngeal Changes over the Lifespan	76
Structure and Function of the Larynx in Infancy and Childhood	76
Childhood	81
Puberty	81
The Adult Voice	83
The Aging Voice	84
Effects of Menopause on Voice	85
Structural Changes of the Larynx Due to Aging	86
Acoustic Effects	87
Perceptual Findings	90
Health Status and Age-Related Vocal Diseases	90
Chapter Summary	92
Review Questions	92
Appendix 2A	94
Appendix 2B	95
Appendix 2C	97

3 *Diagnosis and Evaluation of Voice Disorders* 99

Causes of Voice Disorders	100
Team Approach to Diagnosis and Evaluation of Voice Disorders	100
Core and Collateral Members of a Multidisciplinary Team	100
Normal Voice and Perceptual and Acoustic Terminology Used to Describe Dysphonic Vocal Qualities	104
Normal Voice	104
Dysphonia	105
Components of the Evaluation Process	106
Case History Interview	106
Patient-Reported Outcomes Measures	112
Auditory-Perceptual Evaluation	118
Instrumental Measures of Vocal Function	124
Indirect Laryngoscopy	124
Direct Laryngoscopy	132
High-Speed Digital Imaging	132
Acoustic Analysis	132
Electroglottography	139
Aerodynamic Measures	143
Laryngeal Electromyography	144
The Diagnostic Report	145
Portion of a Diagnostic Report and Related Questions	146
Chapter Summary	149
Review Questions	150
Appendix 3A	151
Appendix 3B	154
Appendix 3C	156
Appendix 3D	159

4 *Clinical Management and Clinical Considerations* 161

Prevention of Voice Disorders	162
Primary Prevention	162
Secondary Prevention	165
Tertiary Prevention	165

Indirect and Direct Therapy Approaches	165
Indirect Approaches	166
Direct Approaches	172
Phonosurgery	187
Thyroplasty	187
Arytenoid Adduction	191
Injection Laryngoplasty/Vocal Fold Augmentation	191
Airway Widening Procedures	197
Laser Microsurgery	199
Laryngeal Reinnervation	200
Considerations in the Provision of Clinical Services	201
Patient Compliance	201
Counseling as a Component of Voice Therapy	204
Treatment of Children with Voice Disorders	207
Voice Therapy in the School Setting	207
Treatment for Children	209
Multicultural Factors in Clinical Management of Voice Disorders	211
Cultural Views on Disability	213
Cultural Factors and Vocal Health	214
Chapter Summary	215
Review Questions	216
Appendix 4A	217

5 *Structural Pathologies of the Larynx* 219

Epithelial and Lamina Propria Abnormalities of the Vocal Folds	220
Nodules	220
Polyps	223
Laryngoceles and Laryngeal Cysts	227
Leukoplakia	230
Contact Ulcers and Granulomas	231
Vocal Fold Scar	234
Sulcus Vocalis	234
Recurrent Respiratory Papillomatosis	237
Subglottic Stenosis	247
Laryngeal Web/Glottic Stenosis	255
Laryngomalacia	258
Vascular Lesions of the Vocal Folds	262
Chapter Summary	264
Review Questions	264

6 *Inflammatory Conditions of the Larynx* 267

Acute and Chronic Laryngitis	267
Causes	268
Acute Laryngitis	268
Chronic Laryngitis	269
Gastroesophageal Reflux Disease and Laryngopharyngeal Reflux	270
GERD/LPR in Children	272
Clinical Profile of LPR	273
Quality of Life	273
Inflammatory Autoimmune Diseases	281
Systemic Lupus Erythematosus	281
Relapsing Polychondritis	281
Rheumatoid Arthritis	282
Chapter Summary	284
Review Questions	284

7 *Neurologic Disorders Affecting Voice* 285

Peripheral Nervous System Pathology	286
Vocal Fold Paresis	286
Vocal Fold Paralysis	287
Myasthenia Gravis	293
Movement Disorders Affecting the Larynx	295
Spasmodic Dysphonia	295
Essential Tremor	303
Central Nervous System Disturbances	305
Amyotrophic Lateral Sclerosis	305
Parkinson's Disease	308
Pseudobulbar Palsy	313
Multiple Sclerosis	314
Cerebellar Disorders	316
Huntington's Disease	317
Chapter Summary	319
Review Questions	320

8 *Voice Disorders Related to Self, Identity, and Lifestyle* 321

Features of Voice Disorders Related to Self, Personality, and Identity	322
Stress	323
Vocal Fatigue	325
Physiology of Fatigue	326

Muscle Tension Dysphonia	329
Primary Muscle Tension Dysphonia	329
Secondary Muscle Tension Dysphonia	330
Functional Neurological Symptom Disorder	332
Diagnostic Criteria	332
The Role of Stress	332
Clinical Profile	333
Mutational Dysphonia	334
Clinical Profile	335
Transgender Voice	336
Transsexual	336
Standards of Care	337
Female-to-Male Transsexuals	338
Male-to-Female Transsexuals	338
Chapter Summary	344
Review Questions	345

9 *Disorders Related to Airway Problems and Respiration* 347

Airway Difficulties	347
Dyspnea	349
Stridor	350
Pulmonary Function Testing	351
Spirometry	351
Pulse Oximetry	353
Asthma	355
Clinical Profile	356
Episodic Laryngeal Breathing Disorders	359
Paradoxical Vocal Fold Motion	359
Links between PVFM, Asthma, and GERD	363
Chronic Cough	369
Chapter Summary	377
Review Questions	377

10 *Laryngeal Cancer* 379

Incidence of Laryngeal Cancer	380
Staging of Laryngeal Cancer	382
Risk Factors for and Symptoms of Laryngeal Cancer	382
Symptoms	386

Multidisciplinary Approach	386
Medical Treatment for Laryngeal Cancer	387
Radiation Therapy	388
Chemotherapy	389
Voice and Swallowing Following Organ Preservation Treatment	389
Surgical Options for Laryngeal Cancer	390
Resection	390
Vertical Partial Laryngectomy	392
Supraglottic Laryngectomy	393
Supracricoid Laryngectomy	394
Near Total Laryngectomy	396
Total Laryngectomy	396
Problems Related to Surgery	399
Voice Restoration	403
Chapter Summary	418
Review Questions	418
<i>Glossary</i>	419
<i>References</i>	431
<i>Name Index</i>	497
<i>Subject Index</i>	515