

Contents

Videos.....	xxiv
Preface.....	xxv
Contributors.....	xxvi

Section I Introduction

1	Pediatric Anatomy.....				3
	<i>Roy Hod, Najjar Esmat</i>				
1.1	Introduction	3	1.6.1	Cartilages of the Larynx.....	16
1.2	Fasciae of the Neck.....	3	1.6.2	Ligaments and Membranes of the Larynx.....	16
1.3	Muscles of the Neck.....	3	1.6.3	Muscles of the Larynx	18
1.3.1	Superficial Muscles.....	3	1.6.4	Anatomical Differences Between Pediatric and Adult Larynx.....	20
1.3.2	Middle Muscles or Muscles of the Hyoid Bone	5	1.7	Facial Nerve	20
1.3.3	Deep Muscles	7	1.7.1	Components and Branches	20
1.4	Topography of the Neck	9	1.8	The Organ of Hearing	22
1.4.1	Muscles of the Head.....	9	1.8.1	The External Ear	22
1.4.2	Muscles of Mastication	9	1.8.2	The Tympanic Membrane	24
1.4.3	Blood Supply of the Head and Neck.....	10	1.8.3	The Middle Ear	24
1.5	Major Salivary Glands	13	1.8.4	The Inner Ear	25
1.6	The Larynx.....	15	1.9	Thyroid Gland	27
2	The Distinctive Anatomical Features of the Pediatric Skull Base				28
	<i>Oren Cavel, Dan M. Fliss, Irit Duek</i>				
2.1	Introduction	28	2.8	Sphenoid Sinus Development	30
2.2	Cranial Fossae	28	2.9	Lateral Skull Base	30
2.3	Anterior Skull Base.....	29	2.10	The External Auditory Canal.....	30
2.4	Paranasal Sinus Development	29	2.11	The Tympanic Membrane	31
2.5	Maxillary Sinus Development	29	2.12	The Middle Ear Cleft.....	31
2.6	Ethmoid Sinus Development	30	2.13	Highlights	32
2.7	Frontal Sinus Development	30			
3	Special Considerations in Pediatric Anesthesia and Pain Control				34
	<i>Uri Amit, Ron Flaishon, Avi A. Weinbroum</i>				
3.1	Introduction	34	3.3	Perioperative Anesthesia Considerations in the ENT Child.....	35
3.2	Perioperative Considerations.....	34	3.3.1	Preoperative Evaluation and Preparation for Anesthesia	35
3.2.1	Airway Risks versus Safety.....	34	3.3.2	Trauma Patients	37
3.2.2	Detriments in the ENT Pediatric Population	35	3.3.3	Intraoperative Anesthesia and Analgesia Regimens.....	43

3.3.4	Postoperative Patient-Tailored Management	46	3.4.2	Pain Assessment.	49
3.3.5	Postoperative Complications	46	3.4.3	Specific Pain Assessment Tools	50
3.4	Pain Management in ENT-Operated Children	48	3.4.4	Analgesia Modus Operandi	52
3.4.1	Pain Handling Highlights	48	3.4.5	The WHO's Two-Step Pain Strategy ...	54
			3.4.6	Late Pain Control	54
4	Imaging of the Pediatric Head and Neck	62	3.5	Conclusion	54
	<i>Shelly I. Shiran</i>				
4.1	Introduction	62	4.3.1	Ultrasound	63
4.2	Pediatric Imaging Safety	62	4.3.2	Cross-sectional Imaging	65
4.2.1	Radiation Safety	62	4.3.3	Radiography and Fluoroscopy	68
4.2.2	Sedation	63	4.3.4	Nuclear Medicine	70
4.3	The Imaging Modalities	63	4.4	The Imaging Diagnostic Workup ...	72
Section II Head and Neck					
5	Surgery of Head and Neck Infection	81			
	<i>Roy Hod, Eyal Raveh</i>				
5.1	Introduction	81	5.6	Site-Specific Surgical Technique	84
5.2	Anatomy	81	5.6.1	Retropharyngeal Infection.	84
5.3	Clinical Presentation and Preoperative Evaluation	81	5.6.2	Parapharyngeal Space (Lateral Pharyngeal Space)	85
5.4	Pathogens	83	5.6.3	Peritonsillar Abscess.	86
5.5	Treatment	83	5.6.4	Atypical Mycobacterium	87
			5.7	Conclusion	87
			5.8	Highlights	88
6	Thyroidectomy	89			
	<i>Vaninder K. Dhillon, Jonathon O. Russell, Ralph P. Tufano</i>				
6.1	Introduction	89	6.6.4	Incision and Flap Elevation	92
6.2	Preoperative Evaluation	89	6.6.5	Mobilization of Thyroid Gland	92
6.3	Outcomes	90	6.6.6	Key Maneuvers	92
6.4	Multidisciplinary Team	91	6.6.7	Identifying the Recurrent Laryngeal Nerve and Parathyroid Glands.	92
6.5	Pediatric Anesthesia for Thyroidectomy	91	6.6.8	Medialization of Thyroid Gland over Trachea	92
6.6	Surgical Technique/Operative Planning	91	6.6.9	Removal of the Specimen, Reimplantation, and Re-evaluation of Nerves.	93
6.6.1	Goals	91	6.6.10	Closure of Wound	93
6.6.2	Anesthesia	91	6.7	Postoperative Management	93
6.6.3	Preparation/Planning the Incision.	92	6.8	Conclusion	93
			6.9	Highlights	94

7	Neck Dissection for Thyroid Cancer in Children.....	95		
	<i>Vaninder K. Dhillon, Jonathon O. Russell, Ralph P. Tufano</i>			
7.1	Introduction	95	7.6	Postoperative Considerations
7.2	Guidelines for Pediatric Neck Dissection in Thyroid Malignancy ...	95	7.7	Surgical Technique.....
7.3	Anatomy of a Neck Dissection	95	7.7.1	Central Neck Dissection.....
7.4	Considerations for Neck Dissection in the Pediatric Population	96	7.7.2	Lateral Neck Dissection
7.5	Intraoperative Considerations	96	7.7.3	Postoperative Surveillance
			7.7.4	Parathyroid Autoimplantation
			7.8	Conclusion
			7.9	Highlights
8	Pediatric Parotidectomy	101		
	<i>Darrin V. Bann, Meghan Wilson</i>			
8.1	Introduction	101	8.3.7	Acquired Lesions
8.2	Anatomy and Embryology	101	8.3.8	Infectious Conditions.....
8.3	Patient Evaluation	103	8.3.9	Inflammatory and Autoimmune Conditions
8.3.1	History and Physical Examination.....	103	8.4	Parotidectomy
8.3.2	Laboratory Evaluation	103	8.4.1	Procedure
8.3.3	Imaging Studies	103	8.4.2	Postoperative Management
8.3.4	Sialendoscopy.....	105	8.4.3	Complications
8.3.5	Pediatric Parotid Gland Disorders.....	105	8.5	Conclusion.....
8.3.6	Congenital Lesions.....	105	8.6	Highlights
9	Parapharyngeal Space Surgery in the Pediatric Population	115		
	<i>Aviyah Peri, Dan M. Fliss</i>			
9.1	Introduction	115	9.3	Parapharyngeal Space Tumors in the Pediatric Population
9.2	Infectious Disease of the PPS	117	9.3.1	Preoperative Evaluation and Anesthesia
9.2.1	Preoperative Evaluation.....	118	9.3.2	Surgical Technique.....
9.2.2	Surgical Technique.....	119	9.4	Postoperative Treatment
9.2.3	Postoperative Treatment.....	121		
10	Submandibular Gland Excision.....	131		
	<i>Sam J. Daniel</i>			
10.1	Surgical Anatomy.....	131	10.3.3	Endoscopic Approach
10.2	Preoperative Evaluation	132	10.3.4	Complications
10.3	Surgical Approaches	133	10.4	Postoperative Management.....
10.3.1	Transcervical Approach	134	10.4.1	Pearls to Avoid Intraoperative Complications
10.3.2	Intraoral Approach.....	135	10.5	Highlights

11	Pediatric Endoscopic Salivary Gland Surgery	138			
	<i>Oded Nahlieli</i>				
11.1	Introduction	138	11.9	Differential Diagnostics with Rare Nonsurgical Conditions	143
11.2	General Anatomical Considerations	138	11.10	Surgical Technique	144
11.3	Preoperative Evaluation and Anesthesia	139	11.10.1	Irrigation.....	144
11.3.1	Clinical Evaluation	139	11.10.2	Sialoendoscopic Sialolithotomy	144
11.4	Salivary Imaging	140	11.11	Combination of ESWL and Sialoendoscopic Approach	147
11.4.1	Submandibular Gland	140	11.12	The Author's Approaches to Various Cases	147
11.4.2	Parotid Gland	141	11.12.1	Surgical Approach to Specific Disorders	148
11.4.3	Magnetic Resonance Sialography	142	11.12.2	Location Statistics	150
11.5	The Thallium Scan for All Salivary Glands	142	11.12.3	Acute Suppurative Parotitis.....	150
11.6	Laboratory Data	142	11.13	The Sjögren's Syndrome	151
11.7	Sialoendoscopy	142	11.13.1	Postoperative Treatment.....	151
11.8	Pediatric Anesthesia	143	11.14	Highlights	152
12	Salivary Gland Ductal Diversion, Botulinum Toxin Injection, and Salivary Ductal Ligation	155			
	<i>Sam J. Daniel</i>				
12.1	Pathophysiology of Drooling and Surgical Anatomy	155	12.6	Surgical Options	159
12.2	Mechanism of Action of Botulinum Toxin	156	12.7	Operative Techniques	160
12.3	Preoperative Evaluation	157	12.7.1	Salivary Diversion Procedures.....	160
12.3.1	Clinical Evaluation	157	12.7.2	Salivary Reduction Procedures	162
12.3.2	Anesthetic Considerations.....	157	12.7.3	Submandibular Duct Ligation	163
12.4	Other Investigations	159	12.8	Botulinum Toxin Injection in the Salivary Glands	164
12.5	Treatment Options for Sialorrhea ...	159	12.9	Conclusion	166
12.6	Surgical Options	159	12.10	Highlights	166
12.7	Operative Techniques	160			
12.7.1	Salivary Diversion Procedures.....	160			
12.7.2	Salivary Reduction Procedures	162			
12.7.3	Submandibular Duct Ligation	163			
12.8	Botulinum Toxin Injection in the Salivary Glands	164			
12.9	Conclusion	166			
12.10	Highlights	166			
13	Thyroglossal Duct Cyst Excision	169			
	<i>Oshri Wasserzug, Ari DeRowe, Dan M. Fliss</i>				
13.1	Introduction	169	13.4	Surgical Technique—Revision	171
13.2	Preoperative Evaluation and Anesthesia	169	13.5	Postoperative Treatment	171
13.3	Surgical Technique—Sistrunk Procedure	170	13.6	Complications	172
			13.7	Highlights	172

14	Branchial Cleft Anomalies, Sinuses, and Cysts	173		
	<i>Oshri Wasserzug, Ari DeRowe, Dan M. Fliss</i>			
14.1	Introduction	173	14.3.3	Postoperative Treatment..... 177
14.2	First Branchial Cleft Anomalies	173	14.3.4	Complications
14.2.1	Preoperative Evaluation and Anesthesia	173	14.4	Pyriform Fossa Anomalies (Formerly Third and Fourth Branchial Cleft Anomalies)
14.2.2	Surgical Technique.....	174	14.4.1	Preoperative Evaluation and Anesthesia
14.2.3	Postoperative Treatment.....	175	14.4.2	Surgical Technique.....
14.2.4	Complications	175	14.4.3	Postoperative Treatment.....
14.3	Second Branchial Cleft Anomalies ...	175	14.4.4	Complications
14.3.1	Preoperative Evaluation and Anesthesia	176	14.5	Highlights
14.3.2	Surgical Technique.....	176		
15	Preauricular Anomalies	180		
	<i>Lindsey Moses, Max M. April</i>			
15.1	Introduction	180	15.3	Surgical Technique
15.2	Preoperative Evaluation and Anesthesia	180	15.4	Postoperative Treatment
			15.5	Highlights
16	Surgery for Lymphatic Vascular Malformations	186		
	<i>Sonia Kumar, Ben Hartley</i>			
16.1	Introduction	186	16.8	Anesthesia
16.2	Hemangiomas	186	16.9	Operative Technique
16.3	Vascular Malformations	187	16.10	Postoperative Management
16.4	Surgery for Neck Disease	188	16.11	Evidence-based Management
16.5	Preoperative Investigations	188	16.12	Lymphatic Malformations of the Tongue and Floor of Mouth
16.6	Preoperative Considerations	188	16.13	Highlights
16.7	Contraindications and Risks	188		
17	Cervical Lymph Node Biopsy in Children	193		
	<i>Barak Ringel, Gadi Fishman</i>			
17.1	Introduction	193	17.3	Surgical Technique for Lymph Node Biopsy of Level III
17.2	Preoperative and Anesthesia Considerations	194	17.3.1	Skin Incision
17.2.1	History	194	17.3.2	Elevation of Subplatysmal Flaps
17.2.2	Physical Examination	194	17.3.3	Dissection along the Lymph Node in Level III
17.2.3	Laboratory Studies.....	194	17.4	Postoperative Treatment
17.2.4	Imaging Studies	194	17.5	Highlights
17.2.5	Needle Biopsy.....	195		
17.2.6	Final Presurgical Preparations	195		

18	Pediatric Maxillectomy	199		
	<i>Gilad Horowitz, Anton Warshavsky, Ahmad Safadi, Avraham Abergel, Dan M. Fliss</i>			
18.1	Introduction	199	18.2.2	Combined Approach
18.2	Surgical Approach to Pediatric Maxillectomy	199	18.2.3	Hemi-degloving
18.2.1	Midfacial Degloving	201	18.3	Endoscopic Maxillectomy
			18.4	Highlights
19	Vagal Nerve Stimulation	207		
	<i>Oded Ben-Ari, Gilad Horowitz, Itzhak Fried, Dan M. Fliss</i>			
19.1	Introduction	207	19.3	Surgical Technique
19.2	Preoperative Evaluation and Anesthesia	207	19.4	Postoperative Treatment
			19.5	Highlights
20	Pediatric Hypoglossal Nerve Stimulation	210		
	<i>Gillian R. Diercks, Christopher Hartnick</i>			
20.1	Introduction	210	20.3.5	Impulse Generator Pocket Placement
20.2	Preoperative Evaluation and Anesthesia	211	20.3.6	Sensing Lead Placement
20.3	Surgical Technique	212	20.3.7	Lead Tunneling
20.3.1	Incision Placement and Preparation ...	212	20.3.8	Impulse Generator Placement
20.3.2	EMG Monitoring	212	20.3.9	Device Testing
20.3.3	Preparation	213	20.3.10	Wound Closure
20.3.4	Sensing Lead Placement	213	20.3.11	Postoperative Treatment
			20.4	Highlights
21	Lingual Tonsillectomy	220		
	<i>Sanjay R. Parikh, Craig Miller</i>			
21.1	Introduction	220	21.4	Avoiding Complications
21.2	Indications for Surgery	220	21.5	Postoperative Care
21.3	Surgical Technique	220	21.6	Highlights
22	Tonsillectomy and Adenoidectomy	224		
	<i>Marisa Earley, Max April</i>			
22.1	Introduction	224	22.3.2	Complete Tonsillectomy
22.2	Preoperative Evaluation and Anesthesia	224	22.3.3	Powered Intracapsular Tonsillectomy and Adenoidectomy
22.3	Surgical Technique	224	22.4	Postoperative Treatment
22.3.1	Adenoidectomy	224	22.5	Highlights

23	Pediatric Transoral Robotic Surgery	231
	<i>Gabriel Gomez, Carlton J. Zdanski</i>	
23.1	Introduction	231
23.2	Preoperative Evaluation and Anesthesia	231
23.3	Exposure, Setup, and Instrumentation	232
23.4	Select Cases in Pediatric Robotic Surgery	233
23.4.1	Laryngeal Cleft Repair	233
23.4.2	Supraglottoplasty: Epiglottopexy	233
23.4.3	Expansion Laryngotracheoplasty with a Posterior Cricoid Graft	234
23.4.4	Laryngeal Cyst Excision	236
23.4.5	Pharyngeal Lymphatic Malformation Excision	236
23.4.6	Scar Band Lysis and Flaps	237
23.5	Postoperative Treatment	237
23.6	Highlights	238

Section III Skull Base and Craniofacial

24	Management of Periorbital Abscess	241
	<i>Narin N. Carmel Neiderman, Dan M. Fliss, Oshri Wasserzug, Gadi Fishman, Avraham Abergel</i>	
24.1	Prevalence and Pathophysiology of Periorbital and Orbital Complications of Sinusitis	241
24.2	Classification	243
24.3	Microbiology of Orbital Complications Associated with Sinusitis	243
24.4	Imaging Role in the Management of Orbital Complications of Sinusitis	246
24.5	Systemic Antibiotic Treatment vs. Surgery—When to Treat Conservatively?	246
24.6	Endoscopic versus Open Surgical Approach	247
24.7	Highlights	248
25	Orbital Surgery for Tumors	252
	<i>Shay Keren, Igal Leibovitch</i>	
25.1	Introduction	252
25.1.1	Benign Tumors	252
25.1.2	Malignant Lesions	253
25.2	Preoperative Evaluation and Anesthesia	255
25.3	Surgical Approach	256
25.3.1	Surgical Planning	256
25.3.2	Orbital Surgical Planes	256
25.3.3	Exenteration	259
25.4	Postoperative Treatment	259
25.4.1	Local Treatment	259
25.4.2	Systemic Management	260
25.4.3	Complications and Management	260
25.5	Highlights	260
26	Endoscopic Sinus Surgery in Children for Benign Lesions	262
	<i>Shahaf Shilo, Dan M. Fliss, Avraham Abergel</i>	
26.1	Introduction	262
26.2	Limitations and Special Considerations	262
26.3	Preoperative Evaluation	264
26.4	Congenital Midline Lesions	264
26.4.1	Nasal Dermoid Cyst	264

26.4.2	Glioma	265	26.6.4	Papilloma	267
26.5	Middle Skull Base Lesions	266	26.6.5	Juvenile Nasopharyngeal Angiofibroma	268
26.5.1	Pituitary Adenoma	266	26.7	Surgical Technique	268
26.5.2	Craniopharyngioma	266	26.8	Surgical Approaches	268
26.5.3	Rathke's Cleft Cyst	266	26.8.1	Transnasal Approach	268
26.6	Other Sinonasal and Skull Base Lesions	267	26.8.2	Sagittal Plane	269
26.6.1	Schwannoma	267	26.8.3	Coronal Plane	271
26.6.2	Neurofibroma	267	26.9	Highlights	272
26.6.3	Hemangioma	267			
27	Endoscopic Treatment of Juvenile Angiofibroma: Surgical Technique	274			
	<i>Ahmad Safadi, Alberto Schreiber, Dan M. Fliss, Piero Nicolai</i>				
27.1	Introduction	274	27.4	Surgical Settings	277
27.2	Diagnosis and Preoperative Management	275	27.5	Surgical Instrumentation	277
27.3	Indications and Contraindications for Endoscopic Endonasal Approach	275	27.6	Surgical Technique	277
			27.6.1	Bleeding Control	280
			27.7	Highlights	281
28	Juvenile Angiofibroma with Intracranial Extension	282			
	<i>Philippe Lavigne, Carl H. Snyderman, Paul A. Gardner</i>				
28.1	Introduction	282	28.3.1	Staging of Surgery	286
28.2	Preoperative Evaluation and Anesthesia	282	28.3.2	Outcomes	286
28.3	Surgical Technique	284	28.4	Postoperative Treatment	287
			28.5	Highlights	287
29	Expanded Endonasal Approaches for Treatment of Malignancy in Children ...	289			
	<i>Meghan Wilson, Carl H. Snyderman, Paul A. Gardner, Elizabeth C. Tyler-Kabara</i>				
29.1	Introduction	289	29.4.1	Anterior Cranial Fossa: Transfrontal/ Transcribriform/Transplanum Approach	291
29.1.1	Chordoma	289	29.4.2	Posterior Cranial Fossa: Transclival Approach	294
29.1.2	Chondrosarcoma	289	29.5	Postoperative Management	297
29.1.3	Sarcomas	290	29.6	Outcomes	298
29.1.4	Ewing Sarcoma	290	29.7	Complications	298
29.1.5	Olfactory Neuroblastoma	290	29.8	Highlights	298
29.1.6	Germinoma	290			
29.1.7	Lymphoma	290			
29.2	Preoperative Evaluation	290			
29.3	Perioperative Management	291			
29.4	Surgical Technique	291			

30	Open Approaches to the Anterior Skull Base in Children	300		
	<i>Oshri Wasserzug, Ari DeRowe, Barak Ringel, Dan M. Fliss</i>			
30.1	Introduction	300	30.5.1	Surgical Technique 304
30.2	Bilateral/Unilateral Subfrontal Approach	300	30.6	The Combined Subcranial–Midfacial Degloving Approach
				304
30.2.1	Surgical Technique	300	30.7	The Subcranial–Transorbital Approach
				305
30.3	The Subcranial Approach	301	30.8	Subcranial–Le Fort I Approach
				306
30.3.1	Surgical Technique	301	30.8.1	Reconstruction
				306
30.4	Subcranial–Transfacial Approach ...	303	30.9	Highlights
				306
30.5	Midfacial Degloving Approach	304		
31	Surgical Approach to the Lateral Skull Base	308		
	<i>Omer J. Ungar, Dan M. Fliss, Yahav Oron</i>			
31.1	Introduction	308	31.3.7	Mandibular Condylectomy
				313
31.2	Preoperative Evaluation and Anesthesia	308	31.3.8	Exposure of the Subtemporal Trapezoid Muscle
				313
31.3	Surgical Technique	310	31.3.9	Otologic Exposure
				313
31.3.1	Preparation	310	31.3.10	Craniotomy
				314
31.3.2	Incision	310	31.3.11	Carotid Dissection and Eustachian Tube Resection
				315
31.3.3	External Auditory Canal Obliteration ..	311	31.3.12	Cavernous Sinus Resection
				315
31.3.4	Internal Carotid Artery and Internal Jugular Vein Exposure	311	31.3.13	Dura and Brain Resection
				316
31.3.5	Temporalis Muscle Elevation	311	31.3.14	Reconstruction
				316
31.3.6	Zygomatic Osteotomy	312	31.4	Postoperative Treatment
				317
31.5	Highlights	318		
32	Lateral Skull Base Surgery in a Pediatric Population	319		
	<i>Golda Grinblat, Abdelkader Taibah, Alessandra Russo, Mario Sanna, Gianluca Piras</i>			
32.1	Introduction	319	32.1.6	Surgical Considerations
				322
32.1.1	Anatomical Considerations in Pediatric Population	319	32.1.7	Surgical Procedures
				322
32.1.2	Demography	319	32.1.8	Functional Preservation
				334
32.1.3	Clinical Features	319	32.1.9	Complications
				335
32.1.4	Pathology	320	32.2	Conclusion
				335
32.1.5	Preoperative Workup	322	32.3	Highlights
				335
33	Surgery of Skull Base Meningoencephalocele	337		
	<i>Paolo Castelnovo, Stefania Gallo, Jacopo Zocchi, Jessica Ruggiero, Davide Locatelli</i>			
33.1	Definition and Historical Notes	337	33.4	Clinical Presentation
				340
33.2	Classification and Distribution	337	33.5	Diagnosis
				341
33.3	Etiology and Embryological Considerations	338	33.6	Treatment
				342

33.7	Step-by-Step Endoscopic Transnasal Approach	343	33.9.1	Timing of Repair.	345
33.8	Endoscopic Transnasal Surgical Corridors	344	33.9.2	Anatomical Aspects	346
33.9	Technical Consideration in Pediatric Endoscopic Transnasal Surgery	345	33.9.3	Intraoperative Image Guidance.	346
			33.9.4	Nasoseptal Flap	346
			33.10	Complications and Long-term Outcomes.	346
			33.11	Highlights	347
34	Brain Stem Implantation	350			
	<i>Baishakhi Choudhury, David R. Friedmann, J. Thomas Roland Jr</i>				
34.1	Introduction	350	34.3	Surgical Technique	351
34.1.1	History	350	34.4	Postoperative Treatment	353
34.1.2	Anatomy	350	34.4.1	Implant Activation	354
34.1.3	Auditory Brain Stem Implant Device	351	34.4.2	Surgical Complications	354
34.2	Preoperative Evaluation and Anesthesia	351	34.4.3	Outcomes	355
			34.5	Conclusion	356
			34.6	Highlights	356
35	Excision of Fibro-osseous Lesions of the Craniofacial Skeleton	358			
	<i>Shahaf Shilo, Dan M. Fliss, Avraham Abergel</i>				
35.1	Introduction	358	35.7	Imaging	363
35.2	Patient Evaluation	358	35.8	Management of Ossifying Fibroma	363
35.3	Fibrous Dysplasia	358	35.9	Osteoma	364
35.4	Imaging	359	35.10	Imaging	365
35.5	Management of Fibrous Dysplasia ..	360	35.11	Management of Osteoma	365
35.5.1	Facial Bones	361	35.12	Acknowledgment	366
35.5.2	Paranasal Sinuses	361	35.13	Highlights	366
35.5.3	Optic Canal	362			
35.5.4	Temporal Bone	362			
35.6	Ossifying Fibroma	363			
36	Repair of Pyriform Aperture Stenosis	368			
	<i>Robert F. Ward, Marisa Earley</i>				
36.1	Introduction	368	36.3.2	Sublabial Approach	371
36.2	Preoperative Evaluation and Anesthesia	369	36.3.3	Rapid Maxillary Expansion (RME) (Collares et al)	371
36.3	Surgical Techniques	370	36.4	Postoperative Treatment	371
36.3.1	Transnasal Approach	370	36.5	Highlights	371

37	Rhinoplasty: Secondary Cleft Nasal Deformity	373		
	<i>David Leshem, Sivan Zissman</i>			
37.1	Introduction	373	37.5	Surgical Approach
37.2	Anatomy of the Nose	373	37.6	Surgical Technique
37.3	Preoperative Assessment	374	37.7	Complications
37.4	Timing of Surgery	374	37.8	Highlights
38	Bilateral Choanal Atresia Repair	379		
	<i>Reema Padia, Sanjay R. Parikh</i>			
38.1	Introduction	379	38.3	Discussion
38.2	Surgical Technique	379	38.4	Highlights
39	Cleft Lip and Palate	382		
	<i>Yaniv Ebner</i>			
39.1	Introduction	382	39.3.3	Surgical Technique
39.2	Unilateral Cleft Lip Repair	382	39.3.4	Postoperative Care
39.2.1	Introduction	382	39.4	Highlights of Cleft Lip Repair
39.2.2	Preoperative Evaluation and Anesthesia	382	39.5	Cleft Palate Repair
39.2.3	Surgical Technique	383	39.5.1	Introduction
39.2.4	Postoperative Care	384	39.5.2	Preoperative Evaluation and Anesthesia
39.3	Bilateral Cleft Lip Repair	384	39.5.3	Surgical Technique
39.3.1	Introduction	384	39.5.4	Postoperative Care
39.3.2	Preoperative Evaluation and Anesthesia	384	39.6	Highlights of Cleft Palate Repair
40	Mandibular Distraction Osteogenesis	393		
	<i>Craig Senders, Mary Roz Timbang, Mohammad Abraham Kazemizadeh Gol</i>			
40.1	Micrognathia and Pierre Robin Sequence	393	40.5	Postoperative Care and Distraction Monitoring
40.2	Mandibular Distraction Osteogenesis	393	40.6	Complications
40.3	Preoperative Evaluation and Management	393	40.7	Conclusion
40.4	Surgical Technique	395	40.8	Highlights

Section IV Airway, Voice, and Swallowing

41	Surgery for Velopharyngeal Insufficiency			405	
	<i>Gadi Fishman</i>				
41.1	Introduction	405	41.5	Surgical Procedures	406
41.2	Patterns of Velopharyngeal Closure	405	41.5.1	Superiorly Based Pharyngeal Flap.....	406
			41.5.2	Sphincter Pharyngoplasty	409
41.3	Velopharyngeal Assessment	405	41.5.3	Posterior Pharyngeal Wall Augmentation	410
41.4	Surgical Treatment Options	405	41.5.4	Furlow Palatoplasty	411
			41.6	Highlights	412
42	Pediatric Tracheostomy			414	
	<i>Blake Smith, Paul Krakovitz</i>				
42.1	Introduction	414	42.6.5	Infection	418
42.2	Indications	414	42.7	Late Complications	418
42.3	Surgical Technique	414	42.7.1	Granulomata	418
42.3.1	Anatomy	414	42.7.2	Airway Stenosis or Collapse.....	419
42.3.2	Traditional Tracheostomy	415	42.7.3	Peristomal and Tracheal Erosion	419
42.3.3	Bjork Flap	416	42.8	Mortality Rate	419
42.3.4	Starplasty Tracheostomy.....	416	42.9	Home Care	419
42.4	Intraoperative Complications	417	42.10	Surveillance	420
42.5	Postoperative Complications	417	42.11	Decannulation	420
42.6	Early Complications	418	42.12	Tracheocutaneous Fistula	420
42.6.1	Tube Obstruction.....	418	42.12.1	Technique—Repair of Tracheocutaneous Fistula	420
42.6.2	Air Leak	418	42.13	Highlights	420
42.6.3	Hemorrhage.....	418			
42.6.4	Accidental Decannulation	418			
43	Tracheocutaneous Fistula Repair			422	
	<i>Christine Fordham, Anna H. Messner</i>				
43.1	Introduction	422	43.3.2	Primary Closure	423
43.2	Preoperative Evaluation for TCF repair	422	43.4	Complications of Tracheocutaneous Fistula Repair	424
43.3	Tracheocutaneous Fistula Repair	423	43.5	Highlights	424
43.3.1	Secondary Closure—Description of Procedure	423			
44	Pediatric Bronchoscopy			426	
	<i>Annabelle Tay Sok Yan, Christine Barron, Tulio A. Valdez</i>				
44.1	Introduction	426	44.2.2	Bronchoscopes.....	427
44.2	Instruments	427	44.2.3	Ancillary Tools	428
			44.2.4	Imaging System	428
44.2.1	Laryngoscopes	427	44.3	Technique	428

44.3.1	Types of Anesthesia	428	44.7	Flexible Endoscopy.....	431
44.4	Surgical Technique.....	429	44.7.1	Introduction	431
44.5	Indications.....	429	44.7.2	Instrument	433
44.6	Limitations	431	44.7.3	Indications	433
44.6.1	Disadvantages	431	44.7.4	Technique	433
44.6.2	Complications	431	44.7.5	Complications	433
45	Surgery of Laryngomalacia	435	44.8	Highlights	433
	<i>Yoram Stern, Moshe Hain</i>				
45.1	Introduction	435	45.9	Stages of Surgery.....	436
45.2	Pathophysiology.....	435	45.10	Type of Supraglottoplasty	437
45.3	Presentation	435	45.10.1	Type 1	437
45.4	Symptoms	435	45.10.2	Type 2	438
45.5	Indications for Surgery	436	45.10.3	Type 3	438
45.6	Preoperative Evaluation and Anesthesia.....	436	45.11	Postoperative Treatment	439
45.7	Supraglottoplasty	436	45.12	Complications.....	439
45.8	Airway Safety	436	45.13	Surgical Results.....	439
			45.14	Highlights	440
46	Unilateral and Bilateral Vocal Fold Paralysis.....	442			
	<i>Carol Nhan, Jean-Paul Marie, Karen B. Zur</i>				
46.1	Part 1 Unilateral Vocal Fold Paralysis	442	46.2	Part 2 Bilateral Vocal Fold Paralysis.....	447
	<i>Carol Nhan, Karen B. Zur</i>			<i>Carol Nhan, Karen B. Zur, Jean-Paul Marie</i>	
46.1.1	Introduction	442	46.2.1	Bilateral Selective Recurrent Laryngeal Nerve Reinnervation.....	447
46.1.2	Preoperative Evaluation.....	442	46.2.2	Highlights	449
46.1.3	Surgical Options.....	442			
46.1.4	Injection Medialization Laryngoplasty.....	442			
46.1.5	Highlights.....	443			
46.1.6	Unilateral Ansa Cervicalis to Recurrent Laryngeal Nerve Reinnervation.....	444			
46.1.7	Highlights.....	446			
47	Endoscopic Airway Surgery.....	450			
	<i>K. A. Stephenson, M. E. Wyatt</i>				
47.1	Introduction	450	47.2	Preoperative Evaluation and Anesthesia.....	451
47.1.1	History and Evolution	450	47.2.1	History and Examination	451
47.1.2	Relationship of Endoscopic to Open Airway Surgery.....	450	47.2.2	Investigations	452

47.2.3	Anesthesia	453	47.3.3	Endoscopic Airway Surgery.....	455
47.3	Surgical Techniques	454	47.4	Postoperative Treatment	461
47.3.1	Preparation and Positioning	454	47.5	Highlights	461
47.3.2	Endoscopic Airway Evaluation.....	454			
48	Surgical Approach to Juvenile Onset Recurrent Respiratory Papillomatosis....	463			
	<i>Seth M. Pransky, Jeffrey D. Bernstein</i>				
48.1	Introduction	463	48.4	Intraoperative Approach.....	468
48.1.1	General	463	48.4.1	General Treatment Principles	468
48.1.2	Pathophysiology.....	463	48.4.2	General Technique “Pearls”.....	468
48.1.3	Epidemiology	464	48.4.3	Adjuvant Therapy	469
48.1.4	Presentation	464	48.4.4	Note on Adjuvant Treatment.....	469
48.1.5	Clinical Assessment	464	48.4.5	Technique of Intralesional Injection ...	469
48.1.6	Patient Discussion	465	48.4.6	Cidofovir	469
48.2	OR Preparation	465	48.4.7	Safety Concerns	472
48.3	OR Setup	465	48.4.8	The Future of JORRP Management	473
48.3.1	Tools for Removal of Papilloma.....	465	48.5	Highlights	473
49	Laryngotracheal Reconstruction.....	475			
	<i>Diego Preciado, George Zalzal</i>				
49.1	Introduction	475	49.5.1	Anterior Cricoid Split	477
49.2	Definition and Classification.....	475	49.5.2	LTR with Cartilage Grafting	477
49.3	Evaluation, Preoperative, and Anesthesia Considerations	475	49.5.3	Anterior Grafts	477
49.3.1	Timing of Reconstruction	476	49.5.4	Posterior Grafts	479
49.4	Surgical Management	476	49.5.5	Use of Stents	480
49.4.1	Role for Endoscopic Treatment.....	476	49.5.6	Cricotracheal Resection	481
49.5	Open Surgical Techniques.....	477	49.5.7	Decannulation	481
			49.5.8	Postoperative Considerations	482
			49.6	Highlights	482
50	Partial Cricotracheal Resection	486			
	<i>Ian N. Jacobs</i>				
50.1	Indications	486	50.6	Extended CTR	491
50.2	Relative Contraindications	486	50.7	Combined LTR and CTR	491
50.3	Comparison to LTR Best Handles	486	50.8	Postoperative Care.....	491
50.4	Grades of Stenosis III, IV	486	50.9	Results	492
50.4.1	Diagnostic Evaluation	486	50.10	Complications.....	492
50.4.2	General Surgical Approach	487	50.11	Conclusion.....	492
50.4.3	Major Pearls of the Surgery	489	50.12	Highlights	493
50.5	Single Stage verses Double Stage ...	489			

51	Harvesting Costal Cartilage for Laryngotracheal Reconstruction	494		
	<i>Anat Wengier, Ari DeRowe</i>			
51.1	Introduction	494	51.4	Donor Site Postoperative Care
51.2	Indications and Contraindications ..	494	51.5	Donor Site Complications
51.3	Surgical Technique	494	51.6	Highlights
52	Laryngotracheal Cleft Repair	498		
	<i>Nikolaus E. Wolter, Reza Rahbar</i>			
52.1	Introduction	498	52.4.2	Preoperative Medical Management ..
52.2	Embryology of Laryngotracheal Clefts	498	52.4.3	Anesthetic Considerations
52.3	Presentation	499	52.5	Surgical Technique
52.4	Preoperative Evaluation and Management	500	52.5.1	Endoscopic Repair
52.4.1	Investigations	500	52.5.2	Open Repair
			52.6	Postoperative Treatment
			52.7	Highlights
53	Slide Tracheoplasty	509		
	<i>Michael Rutter, Claudia Schweiger</i>			
53.1	Introduction	509	53.3.2	Cervical Slide Tracheoplasty
53.2	Preoperative Evaluation and Anesthesia	510	53.3.3	Slide Tracheoplasty for Tracheoesophageal Fistula
53.3	Surgical Techniques	510	53.4	Postoperative Treatment
53.3.1	Intrathoracic Slide Tracheoplasty	510	53.5	Highlights

Section V Pediatric Trauma

54	Facial Trauma in Pediatric Patient	519		
	<i>Amir Laviv, Amir Shuster, Vadim Reiser</i>			
54.1	Introduction	519	54.5.1	Frontal Bone, Frontal Sinus, and Superior Orbital Fractures
54.2	Growth and Development	519	54.5.2	Naso-Orbito-Ethmoid Fractures
54.3	Epidemiology	520	54.5.3	Orbital Floor and Blowout Fractures ..
54.4	Preoperative Evaluation	521	54.5.4	Nasal Fractures
54.5	Fractures Sites and Surgical Treatment (by Fracture Site)	521	54.5.5	Midface and Zygomaticomaxillary Complex Fractures
			54.5.6	Mandibular Fractures
			54.5.7	Resorbable Plates
55	The Management of Temporal Bone Fractures	531		
	<i>Gil Lahav, Ophir Handzel</i>			
55.1	Introduction	531	55.1.2	Pathophysiology
55.1.1	Epidemiology	531	55.1.3	Classification

55.2	Diagnostic Approach	531	55.4.1	Choice of Management	535
55.2.1	Initial Evaluation	531	55.4.2	Surgical Technique	536
55.2.2	Temporal Bone Fracture	532	55.5	Hearing Loss	536
55.2.3	Management	534	55.6	External Ear Injury	537
55.3	CSF Leak	534	55.7	Other Complications	537
55.4	Facial Nerve	535	55.8	Highlights	537

Section VI Reconstruction

56	Regional and Local Flaps in Children	541			
	<i>Justin Loloj, Meghan Wilson, Jessyka G. Lighthall</i>				
56.1	Introduction	541	56.7.1	Tongue Flap	545
56.2	Local and Regional Flaps	542	56.7.2	Facial Artery Myomucosal Flap	545
56.3	Cervicofacial Flap	542	56.7.3	Abbé–Sabattini Cross-Lip Flap	547
56.4	Scalp Rotation Flap	543	56.7.4	Pharyngeal Flap	547
56.5	Geometric Flaps	544	56.8	Temporoparietal Fascia Flap	547
56.5.1	Bilobe Flap	544	56.9	Pericranial Flap	548
56.5.2	Rhombic Flap	544	56.10	Submental Island Flap	549
56.6	Interpolated Flaps for Cutaneous Defects	544	56.11	Pectoralis Major Muscle or Myocutaneous Flap	549
56.6.1	Paramedian Forehead Flap	544	56.12	Conclusion	550
56.7	Oral and Perioral Flaps	545	56.13	Highlights	550
57	Facial Paralysis in the Pediatric Patient	552			
	<i>Eyal Gur, Daniel J. Kedar</i>				
57.1	Introduction	552	57.7	Nerve Grafting: Ipsilateral and Cross-Facial	554
57.2	Etiology and Epidemiology	552	57.7.1	Indications	555
57.2.1	Congenital Facial Nerve Palsy	552	57.7.2	Technique	555
57.2.2	Möbius Syndrome	552	57.8	Innervated Free Flaps	556
57.2.3	Acquired Facial Nerve Palsy	552	57.8.1	Indications	557
57.3	Prognosis	553	57.8.2	Technique	558
57.4	Treatment	553	57.8.3	Second-Stage Free Gracilis Transfer ...	558
57.5	Surgery	553	57.8.4	One-Stage Free Gracilis to Masseter Facial Reanimation	561
57.6	Primary Repair	554	57.9	Conclusion	561
57.6.1	Indications	554	57.10	Highlights	561
57.6.2	Technique	554			

58

Free Flap Transfers in Head-and-Neck Reconstructions of Pediatric Patients...

564

David Ben-Nun, Ravit Yanko, Arik Zaretski, Dan M. Fliss, Nidal Muhanna

58.1

Introduction

564

58.2

Soft Tissue Free Flaps.

565

58.2.1

Anterolateral Thigh Flap

565

58.2.2

Radial Forearm Free Flap

567

58.2.3

Rectus Abdominis Flap

567

58.2.4

Latissimus Dorsi Free Flap

568

58.2.5

Parascapular Fasciocutaneous
Free Flap

569

58.2.6

Osteocutaneous Free Flaps

569

58.3

Highlights

573

59

Otoplasty

576

David Leshem, Sivan Zissman

59.1

Introduction

576

59.2

Anatomy of the Ear

576

59.3

Preoperative Assessment

576

59.4

Timing of Surgery

577

59.5

Nonsurgical Treatment

577

59.5.1

Ear Molding

577

59.6

Otoplasty Surgical Technique.

577

59.7

Complications.....

579

59.8

Highlights

579

Index.....

581