

# Contents

<b>Videos</b> .....	xi
<b>Foreword</b> .....	xiii
<b>Preface</b> .....	xv
<b>Contributors</b> .....	xvii
<b>The History of Surgery for Colloid Cysts</b> .....	xxi

## Part I: Development, Anatomy, and Neuroimaging

<b>1.</b>	<b>Developmental Origins of the Cerebral Ventricular System and Colloid Cysts</b> .....	3
Albert Isaacs, Sonika Dahiya, Sean D. McEvoy, Keith M. Rich, and David Limbrick		
1.1	<b>Background</b> .....	3
1.2	<b>Neurodevelopment and the Cerebral Ventricles</b> .....	3
1.2.1	Ependyma Development .....	5
1.2.2	Choroid Plexus Development .....	5
1.2.3	Development of Colloid Cysts .....	6
1.3	<b>Conclusion</b> .....	9
<b>2.</b>	<b>Anatomy of the Third Ventricle</b> .....	11
Eduardo Carvalhal Ribas, Andre Felix Gentil, and Guilherme Carvalhal Ribas		
2.1	<b>Introduction</b> .....	11
2.2	<b>Lateral Walls</b> .....	11
2.3	<b>Anterior Wall</b> .....	11
2.4	<b>Posterior Wall</b> .....	12
2.5	<b>Floor</b> .....	12
2.6	<b>Roof</b> .....	13
<b>3.</b>	<b>Neuroimaging of Colloid Cysts</b> .....	19
Franz J. Wippold II		
3.1	<b>Introduction</b> .....	19
3.2	<b>CT Imaging</b> .....	20
3.3	<b>MR Imaging</b> .....	21
3.3.1	Cisternography .....	32
3.3.2	Positron Emission Tomography .....	32
3.3.3	Angiography .....	32
3.4	<b>Imaging Differential Diagnosis</b> .....	34

## Part II: Natural History, Clinical Decision-Making, and Treatment Overview

<b>4.</b>	<b>Natural History of Colloid Cysts of the Third Ventricle</b> .....	41
Thomas L. Beaumont and Ralph G. Dacey, Jr.		
4.1	<b>Introduction and Historical Perspective</b> .....	41
4.2	<b>The Colloid Cyst Risk Score</b> .....	42
4.2.1	Incidental Patients .....	42
4.2.2	Symptomatic Patients .....	43
4.2.3	Risk Factors for Hydrocephalus .....	44

## Contents

4.2.4	Acute Hydrocephalus and Death .....	44	4.3	Conclusion.....	45
4.2.5	Clinical Decision-Making and the CCRS .....	44			
<b>5.</b>	<b>Overview of Surgical Management for Colloid Cysts of the Third Ventricle .....</b>				<b>47</b>
	<i>Peter Nakaji</i>				
5.1	<b>Introduction.....</b>	47	5.4	<b>Transcranial Open Microsurgical Approaches.....</b>	48
5.2	<b>Management of Obstructive Hydrocephalus and Cerebrospinal Fluid Dynamics .....</b>	47	5.5	<b>Endoscopic Surgery .....</b>	48
5.3	<b>Stereotactic Drainage.....</b>	48	5.6	<b>Comparative Analysis.....</b>	50
			5.7	<b>Conclusion.....</b>	50
<b>6.</b>	<b>Consensus Panel Regarding the Diagnosis and Surgical Management of Colloid Cysts....</b>				<b>51</b>
	<i>Thomas L. Beaumont, Ralph G. Dacey, Jr., Arthur Day, Costas Hadjipanayis, Peter Nakaji, Henry W.S. Schroeder, and Robert Spetzler</i>				
6.1	<b>Historical Perspective.....</b>	51	6.6.3	External Ventricular Drain Placement after Surgery .....	55
6.1.1	General Points.....	51	6.7	<b>Extent of Resection and Cyst Wall Remnants.....</b>	55
6.2	<b>Surveillance Imaging for Asymptomatic Patients.....</b>	52	6.8	<b>Follow-Up and Outcome Measures .....</b>	55
6.3	<b>Indications for Surgery.....</b>	52	6.9	<b>Cases Reviewed .....</b>	56
6.4	<b>Timing of Surgery .....</b>	53	6.9.1	Case 1.....	56
6.5	<b>Approach Selection .....</b>	53	6.9.2	Case 2.....	57
6.5.1	Interhemispheric Transcallosal Approach.....	53	6.9.3	Case 3.....	57
6.5.2	Transcortical Transventricular Approach .....	53	6.9.4	Case 4.....	58
6.5.3	Single Burr Hole Endoscopic Approach.....	54	6.9.5	Case 5.....	58
6.6	<b>Surgical Adjuncts .....</b>	54	6.9.6	Case 6.....	59
6.6.1	Septostomy .....	54	6.9.7	Case 7.....	59
6.6.2	Transchoroidal Approach.....	55	6.9.8	Case 8.....	60
			6.9.9	Case 9.....	60
			6.9.10	Case 10 .....	61
			6.9.11	Case 11 .....	61

## Part III: Open Microsurgical Management of Colloid Cysts

<b>7.</b>	<b>The Microsurgical Resection of Colloid Cysts of Third Ventricle: Transcallosal Approach.....</b>				<b>65</b>
	<i>Vinayak Narayan, Simon Hanft, Gaurav Gupta, and Anil Nanda</i>				
7.1	<b>Introduction.....</b>	65	7.5	<b>Indications for Surgery .....</b>	66
7.2	<b>Epidemiology and Clinical Features .....</b>	65	7.6	<b>Surgical Anatomy of Third Ventricle and Technique of Transcallosal Approach .....</b>	66
7.3	<b>Clinical Evaluation and Radiological Diagnosis .....</b>	65	7.7	<b>Advantages, Limitations, and Complications of the Anterior Transcallosal Approach.....</b>	67
7.4	<b>Surgical Planning and Approach Strategies .....</b>	66	7.8	<b>Illustrated Clinical Case of CCTV—How I Do It? .....</b>	67

<b>7.9</b>	<b>Nuances in Clinical Decision-Making and Approach toward Management.....</b>	67	<b>7.12</b>	<b>Postoperative Course and Follow-Up.....</b>	70
<b>7.10</b>	<b>Surgical Plan and Preparation.....</b>	70	<b>7.13</b>	<b>Future Trends .....</b>	70
<b>7.11</b>	<b>Step-by-Step Techniques in Anterior Transcallosal Approach and Excision of CCTV .....</b>	70	<b>7.14</b>	<b>Conclusion .....</b>	72
<b>8.</b>	<b>The Transcortical Approach .....</b>				73
<i>Hussein A. Zeineddine, David M. Panczykowski, and Arthur Day</i>					
<b>8.1</b>	<b>Introduction.....</b>	73	<b>8.2.3</b>	<b>Lesion Resection .....</b>	75
			<b>8.2.4</b>	<b>Closure and Postoperative Care .....</b>	76
<b>8.2</b>	<b>Surgical Technique.....</b>	73	<b>8.3</b>	<b>Rationale and Advantages.....</b>	76
8.2.1	Access to the Lateral Ventricle.....	73	<b>8.4</b>	<b>Conclusion .....</b>	77
8.2.2	Transventricular Access to the Lesion via the Foramen of Monro .....	75			
<b>9.</b>	<b>Transcortical Transventricular Approach for Colloid Cysts and Salvage Approaches by Converting to Open Resection .....</b>				79
<i>Jacob S. Young, Roberto Rodriguez Rubio, and Michael W. McDermott</i>					
<b>9.1</b>	<b>Introduction.....</b>	79	<b>9.4</b>	<b>Review of the Literature for Colloid Cyst Resection: Comparison of Endoscopic, Transcallosal, and Transcortical/Transventricular Approaches .....</b>	84
<b>9.2</b>	<b>Anatomy .....</b>	79	<b>9.5</b>	<b>Conversion from Endoscopic to Open Resection .....</b>	86
<b>9.3</b>	<b>Surgical Techniques.....</b>	81	<b>9.6</b>	<b>Conclusion .....</b>	86

#### Part IV: Endoscopic Management of Colloid Cysts

<b>10.</b>	<b>The Endoscopic Resection of Colloid Cysts .....</b>				91
<i>Sascha Marx and Henry W.S. Schroeder</i>					
<b>10.1</b>	<b>The Evolution of Neuroendoscopy in Colloid Cyst Removal .....</b>	91	<b>10.8</b>	<b>Technique of Colloid Cyst Resection.....</b>	93
<b>10.2</b>	<b>Anterolateral Entry Point .....</b>	91	<b>10.9</b>	<b>Selection of the Best Approach Tailored to Each Individual Patient.....</b>	93
<b>10.3</b>	<b>Cyst Evacuation .....</b>	91	<b>10.10</b>	<b>Case Presentation: "How I Do It" .....</b>	94
<b>10.4</b>	<b>Bimanual Sharp Dissection .....</b>	92	10.10.1	Clinical Presentation, Nuances of Clinical Decision-Making, and Endoscopic Management .....	94
<b>10.5</b>	<b>Use of the Endoscopic Sheath.....</b>	92	10.10.2	Surgical Procedure .....	95
<b>10.6</b>	<b>Gross Total Resection .....</b>	93	10.10.3	Postoperative Course .....	99
<b>10.7</b>	<b>Small Chamber Irrigation Technique and Dry Field Technique for Hemostasis .....</b>	93			

<b>11.</b>	<b>Pure Endoscopic Resection of Colloid Cysts</b>	.....	101
<i>Nikita Lakomkin and Costas Hadjipanayis</i>			
11.1	<b>Introduction</b>	.....	101
11.2	<b>Advantages and Disadvantages of Endoscopic Approach</b>	.....	101
11.3	<b>30-Degree Working Channel Neuroendoscope</b>	.....	101
11.4	<b>The Anterolateral Approach to Endoscopic Resection</b>	.....	102
11.4.1	Instrument Preparation	.....	102
11.4.2	Patient Positioning and Neuronavigation	.....	102
11.4.3	Incision, Burr Hole, and Ventricular Entry	.....	102
11.4.4	Colloid Cyst Capsule Cautery and Excision	.....	102
11.4.5	Restoration of CSF Dynamics	.....	102
11.5	<b>Clinical Outcomes</b>	.....	104
11.6	<b>Illustrative Example: Endoscopic Approach for Resection of a Recurrent Colloid Cyst in the Foramen of Monro</b>	.....	104
11.6.1	History of Present Illness, Physical Examination, and Imaging	.....	104
11.6.2	Clinical Decision-Making	.....	104
11.6.3	Operative Setup and Preparation	.....	105
11.6.4	Burr Hole Placement and Ventricular Entry	.....	105
11.6.5	Choroid Plexus and Cyst Cauterization	.....	105
11.6.6	Cyst Removal	.....	105
11.6.7	Closure and Follow-Up	.....	106
<b>12.</b>	<b>Endoscopic Resection of Colloid Cysts of the Third Ventricle: 20 Years at Washington University</b>	.....	109
<i>Thomas L. Beaumont, Keith M. Rich, and Ralph G. Dacey, Jr.</i>			
12.1	<b>Introduction</b>	.....	109
12.2	<b>Endoscopic Technique</b>	.....	110
12.3	<b>Clinical Outcomes</b>	.....	111
12.4	<b>Complications</b>	.....	111
12.5	<b>Cyst Wall Remnants and Recurrence</b>	.....	112
12.6	<b>Total Inpatient Cost</b>	.....	112
12.7	<b>Discussion and Current Strategy</b>	.....	112
<b>Part V: Atlas of Illustrated Clinical Cases</b>			
<b>13.</b>	<b>Case Vignette: The Interhemispheric Transcallosal Approach for Resection of Colloid Cysts</b>	.....	117
<i>Sean D. McEvoy</i>			
13.1	<b>Clinical Course</b>	.....	117
13.2	<b>Surgical Technique</b>	.....	117
<b>14.</b>	<b>Principles of Surgical Management: Transcortical Approaches</b>	.....	121
<i>Hussein A. Zeineddine, David M. Panczykowski, and Arthur Day</i>			
14.1	<b>History and Physical Examination</b>	.....	121
14.2	<b>Imaging</b>	.....	121
14.3	<b>Operative Procedure</b>	.....	121
14.4	<b>Postoperative Course</b>	.....	122
<b>15.</b>	<b>Colloid Cysts of the Third Ventricle: The Tubular Retractor Approach</b>	.....	123
<i>Thiago Albonette-Felicio, Douglas A. Hardesty, Johnathan Engh, and Daniel M. Prevedello</i>			
15.1	<b>Introduction</b>	.....	123
15.2	<b>Illustrative Case</b>	.....	123
15.3	<b>Operative Technique</b>	.....	124
15.4	<b>Conclusion</b>	.....	128

<b>16.</b>	<b>Endoscopic Resection of Colloid Cyst of the Third Ventricle Using a Suction-Morcellation Device .....</b>	129
<i>Thomas L. Beaumont</i>		
16.1	<b>Introduction .....</b>	129
16.2	<b>Case Description and Surgical Decision-Making .....</b>	129
16.3	<b>Surgical Technique .....</b>	130
16.4	<b>Surgical Outcome .....</b>	131
16.5	<b>Discussion .....</b>	131
<b>17.</b>	<b>Bimanual Endoscopic Technique Using an Anterolateral Approach for the Resection of Colloid Cysts .....</b>	135
<i>Roland Jabre and Peter Nakaji</i>		
17.1	<b>Introduction .....</b>	135
17.2	<b>Preoperative Planning .....</b>	135
17.3	<b>Technique .....</b>	135
17.4	<b>Conclusion .....</b>	138
<b>18.</b>	<b>Resection of Colloid Cysts Using Flexible Endoscopy: How I Do It? .....</b>	139
<i>Islas-Aguilar Mario Alberto and Jaime Gerardo Torres-Corzo</i>		
18.1	<b>Introduction .....</b>	139
18.2	<b>Surgical Technique .....</b>	139
18.3.1	<b>Preoperative Plan .....</b>	141
18.3.2	<b>Endoscopic Findings .....</b>	141
18.3.3	<b>Results .....</b>	142
18.3	<b>Clinical Case .....</b>	140
<b>Index .....</b>		145