

# Contents

## Part I General Considerations for the Assessment and Treatment of Thoracic Injuries

Chapter 1	Initial Considerations in the Management of Severe Thoracic Injury	3
I.	The Ten Vital Questions in the Initial Evaluation of Severe Thoracic Injuries	4
II.	Evaluation After Initial Management	7
Chapter 2	The Patient with Additional Injuries in Other Parts of the Body	11
I.	Craniocerebral Injuries	12
II.	Intra-abdominal Injuries	13
III.	Injuries of the Extremities	14
IV.	Maxillofacial Injuries	14
V.	Injuries to the Vertebral Column and Spinal Cord	15
Chapter 3	Interpretation of the Chest Roentgenogram	16
I.	Basic Considerations	16
II.	Opacities	20
III.	Accumulation of Air	22
IV.	The “Widened Mediastinum”	24
Chapter 4	Respiratory Insufficiency	29
I.	Basic Considerations	29
II.	Assessment of Respiration in Patients with Thoracic Injuries	29
III.	Respiratory Insufficiency Caused by the Thoracic Injury Itself	37

IV.	Aspiration . . . . .	38
V.	Adult Respiratory Distress Syndrome (ARDS) . .	40
VI.	Fat Embolism . . . . .	47
VII.	Other Forms of Respiratory Insufficiency Among the Injured . . . . .	49
VIII.	Lung Damage Caused by Therapeutic Measures	50
IX.	Conclusions and Consequences for Prophylaxis and Therapy . . . . .	55
Chapter 5 Indications for Operation in Blunt Thoracic Trauma . . . . .		57
I.	Indications for Immediate or Early Operation . .	57
II.	Indications for Subsequent Operations . . . . .	59
III.	Contraindications to Operative Intervention . . .	60
Chapter 6 Operative Approaches . . . . .		61
I.	Anterolateral Thoracotomy . . . . .	61
II.	Posterolateral Thoracotomy . . . . .	64
III.	Median Sternotomy . . . . .	66
IV.	Approach to the Great Vessels of the Superior Thoracic Aperture . . . . .	66
V.	Thoracoabdominal Approach . . . . .	69
Chapter 7 Special Considerations in Penetrating Chest Injuries . . . . .		70
I.	Causes of Injury and Intrathoracic Injuries . . .	70
II.	Evaluation and Therapeutic Procedure . . . . .	72
III.	Prognosis. . . . .	76
Chapter 8 Aspects of Intensive Care of Patients with Thoracic Injuries . . . . .		78
I.	Basic Considerations . . . . .	78
II.	Monitoring and Evaluating the Patient with Thoracic Injuries in Intensive Care . . . . .	79
III.	Mechanical Ventilation . . . . .	81
IV.	Principles for the Infusion of Fluids . . . . .	81
V.	Subsequent Pulmonary Complications . . . . .	83

Contents	IX
Chapter 9 Physiotherapy of Patients with Thoracic Injuries	91
I. Basic Considerations . . . . .	91
II. General Measures . . . . .	92
III. Forced Expiration . . . . .	93
IV. CO <sub>2</sub> -Induced Increase in Ventilation . . . . .	94
V. Intermittent Positive Pressure Breathing (IPPB) . . . . .	95
VI. Maximal Voluntary Inspiration . . . . .	96
<b>Part II Diagnosis, Clinical Significance, and Treatment of Specific Injuries</b>	
Chapter 10 Rib and Sternum Fractures . . . . .	101
I. General Considerations . . . . .	101
II. Specific Types of Fractures . . . . .	104
III. Diagnosis . . . . .	108
IV. General Considerations for Therapy in Rib and Sternal Fractures . . . . .	110
V. Pain Control . . . . .	113
VI. Therapy of Flail Chest . . . . .	115
Chapter 11 Pneumothorax and Hemothorax . . . . .	122
I. Pneumothorax . . . . .	122
II. Tension Pneumothorax . . . . .	126
III. Open Pneumothorax . . . . .	130
IV. Hemothorax . . . . .	131
V. Clotted Hemothorax, Fibrothorax . . . . .	133
VI. Thoracentesis . . . . .	135
VII. Intercostal Tube Drainage . . . . .	136
Chapter 12 Traumatic Emphysema . . . . .	149
I. Subcutaneous Emphysema . . . . .	149
II. Mediastinal Emphysema . . . . .	152
Chapter 13 Lung Injuries from Blunt Trauma . . . . .	155
I. General Considerations . . . . .	155
II. Lung Laceration, Lung Rupture . . . . .	157

III. Intrapulmonary Hematoma . . . . .	159
IV. Traumatic Lung Pseudocysts (Pneumatoceles) . . . . .	160
V. Lung Contusion . . . . .	161
VI. Blast Injuries . . . . .	165
Chapter 14 Tracheal and Bronchial Injuries . . . . .	167
I. Injuries to Trachea and Bronchi Caused by Blunt Trauma . . . . .	167
II. Old Bronchial Ruptures . . . . .	171
III. Penetrating Injuries to Trachea and Bronchi . . . . .	172
Chapter 15 Injuries to the Esophagus . . . . .	174
I. Rupture of the Esophagus, Penetrating and Iatrogenic Esophageal Injuries . . . . .	174
II. Traumatic Esophagotracheal Fistula . . . . .	178
Chapter 16 Injuries to the Heart by Blunt Trauma . . . . .	180
I. Basic Considerations . . . . .	180
II. Pericardial Injuries, Luxation of the Heart . . . . .	182
III. Hemopericardium, Cardiac Tamponade . . . . .	184
IV. Posttraumatic Pericarditis . . . . .	189
V. Cardiac Contusion . . . . .	191
VI. Heart Wall Ruptures . . . . .	204
VII. Traumatic Septal Defects . . . . .	205
VIII. Heart Valve Injuries . . . . .	205
IX. Injuries of the Coronary Arteries . . . . .	206
X. Traumatic Cardiac Aneurysm . . . . .	207
Chapter 17 Penetrating Wounds of the Heart . . . . .	208
I. Penetrating Cardiac Injuries . . . . .	208
II. Late Sequelae of Penetrating Cardiac Injuries . . . . .	217
III. Foreign Bodies in the Heart . . . . .	219
Chapter 18 Injuries of the Great Intrathoracic Vessels . . . . .	222
I. Rupture of the Aorta . . . . .	222
II. Penetrating Injuries of the Aorta . . . . .	236
III. Closed Injuries of the Supra-aortic Arteries . . . . .	238

IV. Injuries of the Great Veins and Pulmonary Vessels . . . . .	239
V. Penetrating Injuries of the Vessels of the Superior Thoracic Aperture . . . . .	240
VI. Posttraumatic Late Sequelae in the Great Vessels . . . . .	242
Chapter 19 Injuries of the Diaphragm . . . . .	246
I. Diaphragmatic Ruptures . . . . .	246
II. Penetrating Diaphragmatic Injuries . . . . .	256
Chapter 20 Other Injury Patterns and Consequences of Injury in Thoracic Trauma . . . . .	258
I. Traumatic Asphyxia . . . . .	258
II. Injuries of the Thoracic Duct, Chylothorax . . . . .	261
III. Chlothorax . . . . .	264
IV. Traumatically Induced Hernias of the Chest Wall . . . . .	265
V. Arterial Air Embolism . . . . .	266
Bibliography . . . . .	270
Subject Index . . . . .	295