Fourth Edition

# Athletic Injury Assessment

James M. Booher & Gary A. Thibodeau



## CONTENTS

Preface iii Acknowledgements v

UNIT



Introduction and Anatomic Basis for Athletic Injury Assessment 1

CHAPTER 1

## **Introduction to Athletic Injury Assessment 3**

Sports Medicine 4 Athletic Training 4 Websites 6

CHAPTER 2

## The Body as a Whole 7

Somatotype 8
Body Composition 8
Body Fat Distribution Patterns 9
Assessing Body Composition 9
Body Mass Index 12
Generalizations About Body Structure 12
Bilateral Symmetry 12
Body Regions 13
Anatomic Position 13
Directional Terms 13
Body Planes (Sections) 13
Abdominopelvic Quadrants and Regions 14
Surface Anatomy 14

CHAPTER 3

## Review of Anatomy 17

Osteology 18

Functions of the Skeleton 18

Classification of Bones 18

Features of a Typical Bone 19 Bone Markings 19 Organization of the Skeleton 20 Differences Between Male and Female Skeletons 26 Arthrology 26 Classification of Joints 28 Myology 32 Muscles and Bony Levers 32 Anatomy of Skeletal Muscles 33 Muscle Action 33 Origins, Insertions, Functions, and Innervations of Representative Muscles 33 Neurology 44 The Nervous System 45 Neurologic Assessment 46

UNIT



## Athletic-Related Trauma 53

CHAPTER 4

# The Body's Response to Trauma and Environmental Stress 55

The Body's Response to Physical Trauma 56
Acute Inflammatory Process 56
Pain-Spasm Cycle. 59
The Immediate Care of Athletic Injuries 61
Follow-Up Treatment Procedures 62
Chronic Inflammation 63
Summary 63
Shock 63
Types of shock 64
Body's Response to Thermal Exposure 65
Physiologic Basis of Heat Exposure 65

Heat-Related Conditions 68
Preventive Measures 70
Summary 73
Body Response to Cold Exposure 73
Physiologic Basis of Cold Exposure 74
Cold-Related Conditions 74
Summary 76

#### CHAPTER 5

## Athletic Injuries and Related Skin Conditions 77

Skin 78

Visual Inspection 78

Color, Temperature, and Texture 78

Anatomy and Structure 78

Accessory Organs 79

Functions 80

Exposed Athletic Injuries 80

Open Wounds 80

Abrasions 81

Lacerations 82

Incisions 82

Puncture Wounds 83

Avulsions 84

Common Skin Lesions 84

Unexposed Athletic Injuries 95

Contusions 95

Strains 97

Sprains 100

Dislocations 101

Fractures 103

#### CHAPTER 6

## Psychological Aspects of Injury 107

Predisposition to Injury 108

Life Stress and Daily Hassles 108

Personality Factors 109

Situational Factors 110

Attitudes 110

Self-Concept and Self-Esteem 111

Preventive Measures 112

Psychological Consequences of Injury 112

The Grief Response 112

Cognitive Appraisal 113

Fear 113

Alienation 114

Depletion of Coping Resources 114

Psychological Considerations in Treatment and

Rehabilitation 114

The Athlete as Human Being 114

Social Support 114

Psychological Rehabilitation Strategies 115

Summary 116

UNIT



## Athletic Injury Assessment Process 119

CHAPTER 7

## Factors Related to Athletic Injury Assessment 121

Athletic Injury Assessment Considerations 122

When to Assess 122

Where to Assess 122

Personal Assessment Skills 122

Referral Skills 124

Plan of Action 124

Summary 124

Athletic Injury Assessment Process 125

Anatomy 125

Athletic Injuries 125

Evaluative Techniques 125

Signs and Symptoms 126

Diagnostic Procedures 126

Radiology 126

Laboratory Evaluations 133

Electroencephalography 135

Electrocardiography 135

Echocardiography 137

Electromyography 138

Arthroscopy 138

Pulmonary Function Tests 141

Summary 141

#### CHAPTER 8

#### Assessment Procedures 143

Primary Survey 144

Secondary Survey 145

History 146

Observation 149

Physical Examination 151

Evaluations of Findings 158

UNIT



## Athletic Injuries of the Axial Region 159

CHAPTER 9

## The Unconscious Athlete 161

Unconsciousness 162

Causes of Unconsciousness in Athletic
Activity 162

Seizures 162

Athletic Injury Assessment Process	162
Primary Survey 162	
Secondary Survey 165	
Evaluation of Findings 171	

#### CHAPTER 10

## Head Injuries 173

Head Injuries 174 Scalp 174 Skull 175 Brain 177 Athletic Injury Assessment Process 186 Primary Survey 187 Secondary Survey 187 History 187 Observation 189 Physical Examination 190 Movement Procedures 194 Evaluation of Findings 194

#### CHAPTER 11

### Face Injuries 197

Anatomy of the Face 198 Soft-Tissue Injuries 198 Jaw 199 Nose 201 Ear 203 Ear Injuries 204 Teeth 206 Eye 208 Evaluation of Findings 213

#### CHAPTER 12

## Spine Injuries 217

Anatomy of the Spine 218 Intervertebral Discs 218 Ligaments of the Vertebral Column 218 Spinal Cord 219 Spinal Nerves 219 Muscles Acting on the Vertebral Column 220 Cervical Spine 220 Thoracic Spine 223 Lumbar Spine 224 Sacrum and Coccyx 227 Athletic Injury Assessment Process 228 Primary Survey 228 Secondary Survey 228 History 230 Observation 230 Physical Examination 235

Evaluation of Findings 244

#### CHAPTER 13

Throat, Chest, Abdomen, and Pelvis Injuries 247 Throat (Anterior Neck) 248 Neck Muscles 248 Anatomic Structures of the Neck 249 Throat Injuries and Conditions 249 Chest 250 Topographic Anatomy of the Thorax 250 Thoracic Viscera 252 Lungs and Pleura 252 Mechanism of Pulmonary Ventilation 252 Chest Injuries and Conditions 253 Chest Wall Injuries 253 Intrathoracic Injuries 255 Conditions Affecting the Respiratory Tract 256 Abdomen and Pelvis 257 Anatomic Mapping 257 Surface Anatomy 257 Muscles of the Abdominal Wall 257 Abdominal and Pelvic Anatomy 258 Abdominal Injuries and Conditions 258 Abdominal Wall Injuries 259 Intra-Abdominal Injuries 260 Gastrointestinal Conditions 262 Additional Abdominal Conditions 263 Eating Disorders 264 The Genitalia 264 Male 264 Female 264

Genitalia Injuries and Conditions 265 Menstrual Dysfunctions 267 Sexually Transmitted Diseases 267 Athletic Injury Assessment Process 268 Primary Survey 268

Secondary Survey 268 History 268 Observation 269 Physical Examination 270 Evaluation of Findings 273

UNIT



## Athletic Injuries of the Lower Extremities 277

## CHAPTER 14

## Foot, Ankle, and Leg Injuries 279

Anatomy of the Foot and Ankle 280 Accessory Bones 280 Arches 280

Joints 282 Foot Types 283 Ankle Joint 285 Ankle Ligaments 286 Foot and Ankle Injuries/Conditions 286 Foot Conditions 286 Contusions 288 Strains 288 Sprains 289 Dislocations 291 Fractures 291 Anatomy of the Leg 293 Tibia and Fibula 293 Muscles of the Leg 293 Circulation and Nerve Supply 299 Leg Injuries 300 Contusions 301 Strains 301 Fractures 303 Athletic Injury Assessment Process 305 Secondary survey 305 History 306 Observation 308 Physical Examination 309 Evaluation of Findings 324

#### CHAPTER 15

## Knee Injuries 326

Anatomy of the Knee 327

Movements 327

Structures 327

Athletic Injury Assessment Process 339

Secondary survey 339

History 339

Observation 340

Physical Examination 343

Evaluation of Findings 361

#### CHAPTER 16

#### Thigh and Hip Injuries 363

Anatomy of the Thigh and Hip 364

Hip Joint 364

Articular (Fibrous) Capsule 365

Ligaments 366

Muscles 366

Movements 367

Injuries to the Thigh and Hip 372

Contusions 372

Strains 374

Sprains 375

Dislocations 376

Fractures 376

Athletic Injury Assessment Process 377

Secondary Survey 377
History 377
Observation 378
Physical Examination 379
Evaluation of Findings 387

#### UNIT



# Athletic Injuries of the Upper Extremities 389

#### CHAPTER 17

## Shoulder Injuries 391

Anatomy of the Shoulder 392 Sternoclavicular Joint 392 Acromioclavicular Joint 393 Glenohumeral Joint 394 Shoulder Muscles 396 Brachial Plexus 396 Anatomic Relationships 396 Injuries to the Shoulder 398 Contusions 400 Strains 400 Sprains 402 Dislocations 403 Fractures 403 Other Conditions of the Shoulder 404 Athletic Injury Assessment Process 405 Secondary Survey 405 History 406 Observation 406 Physical Examination 408 Evaluation of Findings 423

#### CHAPTER 18

#### Elbow and Forearm Injuries 426

Anatomy of the Elbow 427

Articular Capsule and Collateral

Ligaments 428

Synovial Membrane and Subcutaneous

Bursae 428

Elbow Muscles and Movements 429

Muscles of the Forearm 431

Interosseous Membrane 432

Injuries to the Elbow and Forearm 433

Contusions 433

Strains 434

Sprains 435

Dislocations 435

Fractures 436

Nerve Involvement 437

Athletic Injury Assessment Process 438
Secondary Survey 438
History 438
Observation 440
Physical Examination 441
Evaluation of Findings 450

#### CHAPTER 19

#### Hand and Wrist Injuries 452

Phalanges 459

Anatomy of the Wrist 453 Carpals 453 Distal Radioulnar Articulation 454 Radiocarpal Articulation 454 Midcarpal Articulations 454 Carpometacarpal Articulations 455 Ligaments 455 Anatomic Snuffbox 456 Injuries to the Wrist 456 Contusions 456 Strains 457 Sprains 457 Dislocations 457 Fractures 458 Carpal Tunnel Syndrome 459 Anatomy of the Hand 459 Metacarpals 459

Metacarpophalangeal Articulations 460

Palmar Region 460 Dorsal Region 460 Fingers 460 Muscles of the Hand 460 Sensory Innervation of the Hand 461 Motor Innervation of the Hand 461 Injuries to the Hand 461 Contusions and Abrasions 461 Lacerations and Punctures 463 Infections 464 Strains 464 Sprains 465 Dislocations 466 Fractures 467 Athletic Injury Assessment Process 468 Secondary Survey 468 History 468 Observation 469 Physical Examination 470 Evaluation of Findings 478

Interphalangeal Articulations 460

## **Appendix: Internet Resourses 481**

Glossary 483

Credits 499

Index 501