
Table of Contents

Chapter 1	Foot and Ankle Motion Analysis: Evolutionary Perspectives and Introduction	1
------------------	---	----------

Gerald F. Harris and Michael D. Jenders

Part 1		
Clinical Applications and Opportunities		17

Section A		
Pediatric Foot and Ankle		19

Chapter 2	Clinical Applications of Foot and Ankle Motion Analysis in Children.....	21
------------------	---	-----------

Peter A. Smith, Sahar Hassani, Adam N. Graf, and Gerald F. Harris

Chapter 3	Functional Gait Analysis in Children Following Clubfoot Releases	47
------------------	---	-----------

Michael Khazzam, J.Y. Roh, Jason T. Long, Peter A. Smith, Sahar Hassani, Gerald F. Harris, Adam N. Graf, and Ken N. Kuo

Chapter 4	Dynamic Plantar Pressure Characteristics and Clinical Applications in Patients with Residual Clubfoot	63
------------------	--	-----------

Xue-Cheng Liu and John Thometz

Chapter 5	Three-Dimensional Magnetic Resonance Imaging Modeling of Normal and Surgically Treated Clubfeet	79
------------------	--	-----------

Chester Tylkowski, Vishwas Talwalkar, David Pienkowski, Christopher Roche, and Brain Mattingly

Chapter 6	Dynamic Foot Pressure in the Early Evolution of Foot Deformities in Children with Spastic Cerebral Palsy	93
------------------	---	-----------

Chris Church, Nancy Lennon, Scott Coleman, John Henley, Mary Nagai, and Freeman Miller

Chapter 7	Plantar Pressure-Based Quantitative Assessment of Subtalar Arthrodesis in the Rehabilitation of the Planovalgus Foot Deformity	105
	<i>Ziad O. Abu-Faraj, Gerald F. Harris, and Peter A. Smith</i>	
Chapter 8	Chemodenervation and Motion Assessment.....	131
	<i>Susan Sienko Thomas and Jeffrey D. Ackman</i>	
Chapter 9	Equinovarus Foot: Electromyography Analysis and Clinical Outcome	145
	<i>Michael Aiona, Robin Dorociak, Molly Nichols, and Rosemary Pierce</i>	
Chapter 10	Lower Extremity Characterization of Walker-Assisted Gait in Children with Spastic Diplegic Cerebral Palsy.....	159
	<i>Kelly M. Baker, Lucy Lu, Stephen S. Klos, Kathy Reiners, Jeffrey D. Ackman, John Klein, Jeffrey P. Schwab, and Gerald F. Harris</i>	
Chapter 11	Response to Balance Perturbation: A Strategy for Pediatric Assessment.....	173
	<i>Adam N. Graf, Joseph Krzak, and Gerald F. Harris</i>	
Section B		
Adult Foot and Ankle.....		195
Chapter 12	Gait Analysis in Posterior Tibial Tendon Dysfunction: Pre- and Postoperative Analysis Compared to a Normal Population.....	197
	<i>Richard M Marks, Jason T. Long, and Gerald F. Harris</i>	
Chapter 13	Hallux Valgus: A Pre- and Postoperative Analysis of Gait.....	215
	<i>Anne Gotstein Frea, Jason T. Long, Michael Khazzam, Richard M. Marks, and Gerald F. Harris</i>	
Chapter 14	Hallux Rigidus: A Pre- and Postoperative Analysis of Gait.....	231
	<i>Joseph Schwab, Michael Khazzam, Jason T. Long, Richard M. Marks, and Gerald F. Harris</i>	

Chapter 15 Preoperative and Postoperative Gait Analysis of the Rheumatoid Forefoot	249
---	-----

Kristen Maskala, Jason T. Long, Richard M. Marks, and Gerald F. Harris

Chapter 16 Foot and Ankle Motion Analysis of Patients with Ankle Arthritis.....	263
--	-----

Michael Khazzam, Jason T. Long, Richard M. Marks, and Gerald F. Harris

Chapter 17 Total Ankle Arthroplasty: A Pre- and Postoperative Analysis of Gait	281
---	-----

James W. Brodsky, Fabian E. Pollo, and Brian S. Baum

Chapter 18 Dynamic Poly-EMG in Gait Analysis for the Assessment of Equinovarus Foot	291
--	-----

Alberto Esquenazi

Chapter 19 The Challenge of the Diabetic Foot	301
--	-----

Michael S. Pinzur

Chapter 20 The Biomechanics of the Diabetic Foot.....	317
--	-----

William Ledoux

Chapter 21 Three-Dimensional Finite Element Analysis of the Fifth Metatarsal Jones Fracture	347
--	-----

Eric S. Rohr, Jeffrey E. Johnson, Linping Zhao, and Gerald F. Harris

Part 2	
Technical Developments and Emerging Opportunities	363

Section C

Foot and Ankle Modeling	365
--------------------------------------	------------

Chapter 22 A System for the Analysis of Foot and Ankle Kinematics during Gait	367
--	-----

Steven M. Kidder, Faruk S. Abuzzahab, Gerald F. Harris, and Jeffrey E. Johnson

Chapter 23 Validation of a Multisegment Foot and Ankle Kinematic Model for Pediatric Gait.....	383
<i>Kelly A. Myers, Mei Wang, Richard M. Marks, and Gerald F. Harris</i>	
Chapter 24 Measurement of Foot Kinematics and Plantar Pressure in Children Using the Oxford Foot Model.....	403
<i>Julie Stebbins, Marian Harrington, Tim Theologis, Nicky Thompson, Claudia Giacomozzi, and Velio Macellari</i>	
Chapter 25 The Design, Development, and Initial Evaluation of a Multisegment Foot Model for Routine Clinical Gait Analysis.....	425
<i>Roy B. Davis, III, Eugene G. Jameson, Jon R. Davids, Lisa M. Christopher, Benjamin M. Rogozinski, Jason P. Anderson</i>	
Chapter 26 Reliability of a Clinically Practical Multisegment Foot Marker Set/Model	445
<i>John Henley, James Richards, David Hudson, Chris Church, Scott Coleman, Lauren Kersetter, and Freeman Miller</i>	
Chapter 27 A Multisegment, 3D Kinematic Model of the Foot and Ankle	465
<i>Kenton R. Kaufman, Harold P. Kitaoka, Diana K. Hansen, Duane A. Morrow, and Brian R. Kotajarvi</i>	
Chapter 28 A Spatial Linkage Model of the Ankle Complex	471
<i>Dragomir C. Marinkovich</i>	
Chapter 29 Multisegment Foot Biomechanics in Dynamic Hindfoot Varus	489
<i>Matthew R. Walker, Frank L. Buczek, Kevin M. Cooney, Neil A. Sharkey, and James O. Sanders</i>	
Section D	
Technical Advances in Foot and Ankle Motion Analysis	509
Chapter 30 The Accuracy and Utility of Virtual Markers	511
<i>Michael H. Schwartz and Adam Rozumalski</i>	

Chapter 31 Determination of Subject-Specific Ankle Joint Axes from Measured Foot Motion.....	523
<i>Stephen J. Piazza and Gregory S. Lewis</i>	
Chapter 32 Dynamic Radiographic Measurement of Three-Dimensional Skeletal Motion	543
<i>J. D. Yamokoski and Scott A. Banks</i>	
Chapter 33 Exploring the Frontiers of <i>In Vivo</i> Multibody Ankle Dynamics Using Fast-Phase Contrast Magnetic Resonance Imaging.....	557
<i>Frances T. Sheehan, Andrea R. Seisler, and Karen Lohmann Siegel</i>	
Chapter 34 Kinetic Measures of the Foot: Overcoming Current Obstacles	573
<i>Bruce A. MacWilliams</i>	
Chapter 35 Triaxial Plantar Force Sensor: Design, Calibration, Characterization, and Subject Testing	585
<i>Emily J. Miller, Dean C. Jeutter, Robert J. Stango, and Gerald F. Harris</i>	
Chapter 36 Quasi-stiffness of the Ankle during Able-Bodied Walking at Different Speeds: Implications for Design of Prostheses	599
<i>Andrew H. Hansen, Steven A. Gard, and Dudley S. Childress</i>	
Chapter 37 Development of an Advanced Biofidelic Lower Extremity Prosthesis	613
<i>Moreno White, Brian J. Hafner, and Walter J. Whatley</i>	
Chapter 38 The Role of Robotic Technology in Gait Simulation and Foot Mechanics	639
<i>James C. Otis</i>	
Section E	
Research Support	655
Chapter 39 Supporting Rehabilitation Research on Foot and Ankle Motion Analysis	657
<i>Louis A. Quatrano and Hameed Khan</i>	
Index	667