



**University of
Zurich**^{UZH}

**Zurich Open Repository and
Archive**

University of Zurich
Main Library
Strickhofstrasse 39
CH-8057 Zurich
www.zora.uzh.ch

Year: 2016

Physical Therapy for Intervertebral Disk Disease : A Practical Guide to Diagnosis and Treatment

Broetz, D; Weller, M

Abstract: Patients with pain emanating from their spines represent some of the most frequent and challenging cases for physical therapists. Here is a comprehensive and practical introduction to the management of back pain and restricted spinal function caused by intervertebral disk damage. The authors provide evidence-based, clinically oriented strategies for the diagnosis and therapeutic treatment of disk injury in the lumbar, thoracic, and cervical spinal regions. The text gives an overview of research studies on the effects of physical therapy on back pain, step-by-step guidance on examination and conservative and postoperative physical therapy procedures, and detailed discussion of rehabilitation and prevention of further disk damage. **Key Features:** • Extensive coverage of examination, from patient history to tests for assessing spinal movement to nerve conduction • Precise instructions and useful pointers on treatment methods aid in daily practice • Chapter on basic principles of anatomy, physiology, and epidemiology offer foundational knowledge • Crucial information on approaches for rehabilitation and injury prevention, including strengthening, coordination exercises, and conditioning • Case studies present clinical examples that guide the reader through the full course of therapy • 70 clear line drawings illustrate how to maintain correct posture; avoid poor posture; and protect and train muscles, nerves, and joints **Physical Therapy for Intervertebral Disk Disease** is a complete guide to the diagnosis and physiotherapeutic treatment of problems resulting from intervertebral disk damage. Practitioners and students of physical therapy, rehabilitation medicine, and occupational therapy will read this book cover to cover and refer to it regularly when working to relieve back pain and restore full capacity in their patients.

Posted at the Zurich Open Repository and Archive, University of Zurich

ZORA URL: <https://doi.org/10.5167/uzh-124241>

Monograph

Originally published at:

Broetz, D; Weller, M (2016). *Physical Therapy for Intervertebral Disk Disease : A Practical Guide to Diagnosis and Treatment*. Stuttgart-New York-Delhi-Rio de Janeiro: Thieme.

Physical Therapy for Intervertebral Disk Disease

A Practical Guide to Diagnosis and Treatment

Doris Broetz
Michael Weller



Physical Therapy for Intervertebral Disk Disease

A Practical Guide to Diagnosis and Treatment

Doris Broetz, PT

Physical Therapist
Private Practice;
University Hospital
Tübingen, Germany

Michael Weller, MD

Professor of Neurology and Director
Department of Neurology
University Hospital Zürich
Zürich, Switzerland

160 illustrations

Thieme
Stuttgart · New York · Delhi · Rio de Janeiro



Library of Congress Cataloging-in-Publication Data is available from the publisher.

This book is an authorized translation of the 3rd German edition published and copyrighted 2008 by Georg Thieme Verlag, Stuttgart. Title of the German edition: Diagnostik und Therapie bei Bandscheibenschäden

Translator: Gertrud G. Champe, Surry, Maine, USA
Illustrators: Doris Brötz, Tübingen, Germany;
Angelika Kramer, Stuttgart, Germany

© 2016 Georg Thieme Verlag KG

Thieme Publishers Stuttgart
Rüdigerstrasse 14, 70469 Stuttgart, Germany
+49 [0]711 8931 421, customerservice@thieme.de

Thieme Publishers New York
333 Seventh Avenue, New York, NY 10001, USA
+1-800-782-3488, customerservice@thieme.com

Thieme Publishers Delhi
A-12, Second Floor, Sector-2, Noida-201301
Uttar Pradesh, India
+91 120 45 566 00, customerservice@thieme.in

Thieme Publishers Rio, Thieme Publicações Ltda.
Edifício Rodolpho de Paoli, 25º andar
Av. Nilo Peçanha, 50 – Sala 2508
Rio de Janeiro 20020-906 Brasil
+55 21 3172 2297 / +55 21 3172 1896

Cover design: Thieme Publishing Group
Typesetting by Thomson Digital, India

Printed in Germany by AZ Druck und Datentechnik,
Kempten

5 4 3 2 1

ISBN 978-3-13-199761-6

Also available as an e-book:
eISBN 978-3-13-199771-5



Important note: Medicine is an ever-changing science undergoing continual development. Research and clinical experience are continually expanding our knowledge, in particular our knowledge of proper treatment and drug therapy. Insofar as this book mentions any dosage or application, readers may rest assured that the authors, editors, and publishers have made every effort to ensure that such references are in accordance with the state of knowledge at the time of production of the book.

Nevertheless, this does not involve, imply, or express any guarantee or responsibility on the part of the publishers in respect to any dosage instructions and forms of applications stated in the book. **Every user is requested to examine carefully** the manufacturers' leaflets accompanying each drug and check, if necessary in consultation with a physician or specialist, whether the dosage schedules mentioned therein or the contraindications stated by the manufacturers differ from the statements made in the present book. Such examination is particularly important with drugs that are either rarely used or have been newly released on the market. Every dosage schedule or every form of application used is entirely at the user's own risk and responsibility. The authors and publishers request every user to report to the publishers any discrepancies or inaccuracies noticed. If errors in this work are found after publication, errata will be posted at www.thieme.com on the product description page.

Some of the product names, patents, and registered designs referred to in this book are in fact registered trademarks or proprietary names even though specific reference to this fact is not always made in the text. Therefore, the appearance of a name without designation as proprietary is not to be construed as a representation by the publisher that it is in the public domain.

This book, including all parts thereof, is legally protected by copyright. Any use, exploitation, or commercialization outside the narrow limits set by copyright legislation, without the publisher's consent, is illegal and liable to prosecution. This applies in particular to photostat reproduction, copying, mimeographing, preparation of microfilms, and electronic data processing and storage.

Contents

Foreword	viii
Author Biographies	ix
Chapter 1: Introduction.....	1
Chapter 2: General Principles	3
2.1 Anatomy of the Spine and Nervous System	3
2.2 Pathophysiology of Disk Damage	16
2.3 Pain	24
2.4 Functional Limitation: Objective and Subjective Aspects and Questionnaires	29
2.5 Epidemiology and Risk Factors.....	33
Chapter 3: Medical Diagnosis and Treatment	36
3.1 Medical History and Clinical Examination	37
3.2 Technical Diagnostic Procedures.....	40
Chapter 4: Diagnosis in Physical Therapy	49
4.1 Medical History.....	49
4.2 Diagnosis by Observation	50
4.3 Movement Tests of the Spine	52
4.4 Examination of Nerve-gliding Capacity.....	53
4.5 General Instructions for Filling out Diagnostic Assessment Forms	54
4.6 Diagnosis.....	57
Chapter 5: Therapy	63
5.1 Overview	63
5.2 Course of Treatment.....	66
5.3 Basic Procedure in Physical Therapy for Patients with Disk Damage	68
5.4 Mechanical Effect of the Therapy on the Disk Injury	70
5.5 Mobilization of the Nervous System	71
5.6 Assessment of the Therapy and Evaluation of a Possible Change of Treatment Strategy.....	73
5.7 Indications for Surgery.....	74
5.8 Postoperative Therapy.....	74

Chapter 6: Lumbar Spine	7
6.1 Diagnostic Assessment Form for the Lumbar Spine	7
6.2 Diagnosis by Observation	7
6.3 Diagnostic Tests.....	7
6.4 Establishing the Diagnosis	8
6.5 Therapeutic Procedure with a Diagnosis of Disk Damage	11
6.6 After an Operation.....	11
6.7 Case Study.....	11
Chapter 7: Thoracic Spine	1
7.1 Diagnostic Assessment Form for the Thoracic Spine.....	1
7.2 Diagnosis by Observation	1
7.3 Diagnostic Tests.....	1
7.4 Establishing the Diagnosis	1
7.5 Therapeutic Procedure with a Diagnosis of Disk Damage	1
7.6 After an Operation.....	1
Chapter 8: Cervical Spine	1
8.1 Diagnostic Assessment Form for the Cervical Spine.....	1
8.2 Diagnosis by Observation	1
8.3 Diagnostic Tests.....	1
8.4 Establishing the Diagnosis	1
8.5 Therapeutic Procedure with a Diagnosis of Disk Damage	1
8.6 After an Operation.....	1
8.7 Case Study.....	1
Chapter 9: Rehabilitation and Prevention	1
9.1 Posture Training.....	1
9.2 Stability	1
9.3 Mobility	1
9.4 Sitting.....	1
9.5 Lifting	1
9.6 Strength	1
9.7 Coordination and Balance.....	1
9.8 Cardiovascular Fitness.....	1
9.9 Individual Compensatory Movements	1

.....	76
.....	76
.....	76
.....	78
.....	88
.....	90
.....	105
.....	106
.....	112
.....	112
.....	113
.....	113
.....	120
.....	121
.....	131
.....	133
.....	133
.....	133
.....	133
.....	142
.....	144
.....	151
.....	153
.....	162
.....	163
.....	164
.....	167
.....	167
.....	168
.....	170
.....	172
.....	172
.....	173

Chapter 10: Diseases Occurring in Association With Prolapsed Disks	177
10.1 Additional Diseases With Mechanical Effects on the Spine.....	177
10.2 Nonmechanical Additional Diseases.....	179
Chapter 11: Psychosocial Risk Factors.....	180
Chapter 12: Selected Studies on the Topic of Spinal Disorders.....	183
12.1 Breig A, Troup JDG. Biomechanical considerations in the straight-leg-raising test. Cadaveric and clinical studies of the effects of medial hip rotation. Spine. 1979;4:242–250.....	184
12.2 Maigne JY, Deligne L. Computed tomographic follow-up study of 21 cases of nonoperatively treated cervical intervertebral soft disk herniation. Spine. 1994;19:189–191	185
12.3 Donelson R, Aprill C, Medcalf R, Grant W. A prospective study of centralization of lumbar and referred pain. Spine. 1997; 22:1115–1122.....	186
12.4 Brötz D, Küker W, Maschke E, Wick W, Dichgans J, Weller M. A prospective trial of mechanical physiotherapy for lumbar disk prolapse. J Neurol. 2003;250:746–749.....	188
12.5 Weinstein JN, Tosteson TD, Lurie JD, Tosteson ANA, Hanscom B, Skinner JS et al. Surgical versus nonoperative treatment for lumbar disk herniation. The Spine Patient Outcomes Research Trial (SPORT): a randomized trial. JAMA. 2006a;296:2441–2450	190
12.6 Functional Investigation of the Lumbar Spine and the Spinal Canal in Flexion, Extension, and Neutral Position in Patients with Lumbar Disk Prolapse, Using Magnetic Resonance Tomography: Capture of Morphological Changes	192
Chapter 13: Significance, Types, and Objectives of Clinical Studies	196
Glossary.....	199
Bibliography/References.....	202
Index	213