

R. K. Weber, R. Keerl, S. D. Schaefer, R. C. Della Rocca (Eds.)

**Atlas of Lacrimal Surgery**

R.K. Weber R. Keerl S.D. Schaefer R.C. Della Rocca (Eds.)

# Atlas of Lacrimal Surgery

With 232 Figures and 20 Tables

 Springer

**Rainer K. Weber, MD**  
Professor and Head  
Division of Paranasal Sinus and Skull Base Surgery,  
Traumatology  
Department of Otorhinolaryngology  
Hospital Karlsruhe  
Moltkestraße 90  
D-76133 Karlsruhe, Germany  
rainerweber@rainerweber.de

**Rainer E. Keerl, MD**  
Assistant professor and Chief  
Department of Otorhinolaryngology  
St.-Elisabeth-Hospital  
St.-Elisabeth-Straße 23  
D-94315 Straubing, Germany  
rainer.keerl@klinikum-straubing.de

**Steven D. Schaefer, MD, FACS**  
Professor and Chair  
Department of Otolaryngology  
New York Eye and Ear Infirmary  
New York Medical College  
310 East 14th St.  
New York, NY10003, USA  
sschaefer@nyee.edu

**Roberto C. Della Rocca, MD, FACS**  
Professor and Chief  
Division of Oculoplastic and Orbital Surgery  
New York Eye and Ear Infirmary  
New York Medical College  
Chairman  
Department of Ophthalmology  
St Luke's Roosevelt Hospital Center New York, NY  
310 East 14th St.  
New York, NY10003, USA  
rdellaro@chpnet.org

Library of Congress Control Number: 2003937345

ISBN-10 3-540-26255-5 Springer Berlin Heidelberg New York  
ISBN-13 978-3-540-26255-8 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilm or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permissions for use must always be obtained from Springer. Violations are liable for prosecution under the German Copyright Law.

**Springer is a part of Springer Science + Business Media**  
springer.com

© Springer-Verlag Berlin Heidelberg 2007

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Product liability: The publishers cannot guarantee the accuracy of any information about dosage and application contained in this book. In every individual case the user must check such information by consulting the relevant literature.

Editor: Gabriele Schröder, Heidelberg, Germany  
Desk Editor: Martina Humberger, Heidelberg, Germany  
Cover design: Frido Steinen-Broo, eStudio Calamar, Spain  
Reproduction and Typesetting: am-productions GmbH, Wiesloch, Germany  
Production: LE-TEX Jelonek, Schmidt & Vöckler GbR, Leipzig, Germany

Printed on acid-free paper 27/3100 – YL – 5 4 3 2 1 0

# Preface

To dry people's eyes – that's one of the great challenges in lacrimal surgery. Different localizations of the stenosis, lesions after tumor surgery or trauma, and epiphora in children or adults are different conditions that need various operative procedures to treat a patient individually and successfully.

The close relationship between the eyes and nose demands an interdisciplinary approach to lacrimal surgery. Therefore, ophthalmologists, otorhinolaryngologists as well as plastic surgeons are invited to contribute in solving a patient's problem.

This book is intended to serve as a practically oriented reference. In the first part, it contains chapters on pertinent surgical anatomy, physiology and pathophysiology as well as basic clinical and radiological evaluation. In the second part, well-known authorities from all over the world present their experience in all operative procedures currently available to dry

patients' eyes. The accompanying DVD contains video clips of different operations highlighting key portions of these procedures.

I would like to express my gratitude to Springer, especially to Ms. Marion Philipp and Ms. Martina Humberger, and would also like to thank Alan Bellingier for reading and improving the manuscript. Additionally, I owe many thanks to my editorial colleagues, who did a great job working together on this book and to the authors who prepared excellent articles.

Finally, I wish all readers much pleasure while working through the chapters and hope that it helps them reach the goal of satisfied patients with dry eyes.

**Rainer K. Weber**

# Contents

<b>1</b>	<b>Anatomy and Physiology of the Nasolacrimal Ducts</b> . . . . . 1	<b>8</b>	<b>Complications of Endoscopic DCR</b> . . . . . 87
	F. Paulsen		M. Bernal-Sprekelsen, I. Alobid and J. Mullol Miret
<b>2</b>	<b>Pathophysiological Aspects of PANDO, Dacryolithiasis, Dry Eye, and Punctum Plugs</b> . . . . . 15	<b>9</b>	<b>Nasolacrimal System Injuries</b> . . . . . 91
	F. Paulsen		D.A. Della Rocca, S. Ahmad, P. Preechawi, S.D. Schaefer and R.C. Della Rocca
<b>3</b>	<b>Diagnostics</b> . . . . . 29	<b>10</b>	<b>Microsurgery of the Lacrimal System: Microendoscopic Techniques. Minimally Invasive Diagnostics and Therapy in Lacrimal Surgery</b> . . . . . 105
	P. Komínek, R.C. Della Rocca and S. Rosenbaum		K.-H. Emmerich, R. Ungerechts and H.-W. Meyer-Rüsenberg
<b>4</b>	<b>Nasolacrimal Probing and Intubation</b> . . . . . 53	<b>11</b>	<b>Conjunctivorhinostomy</b> . . . . . 119
	L. Pierroth, D.A. Della Rocca and R.C. Della Rocca		W. J. Heppt
<b>5</b>	<b>Dacryocystorhinostomy Surgical Technique</b> . . . . . 61	<b>12</b>	<b>Conjunctivodacryocystorhinostomy with the Insertion of a Jones Tube</b> . . . . . 127
	M. Bernal-Sprekelsen, I. Alobid, M. Tomás-Barberán, R.C. Della Rocca and S.D. Schaefer		P. Komínek
<b>6</b>	<b>Dacryocystorhinostomy in Children</b> . . . . . 69	<b>13</b>	<b>Interventional Radiology</b> . . . . . 143
	Manuel Bernal-Sprekelsen, Isam Alobid, Ferran Ballesteros, Manuel Tomás-Barberán, David A. Della Rocca and R.C. Della Rocca		K. Wilhelm
<b>7</b>	<b>Laser-Assisted Dacryocystorhinostomy</b> . . . . . 73		<b>Subject Index</b> . . . . . 155
	S. Mirza and N. Jones		

# List of Contributors

## **S. Ahmad**

Department of Ophthalmology  
Oculoplastic and Orbital Surgery  
New York Eye and Ear Infirmary/  
St. Luke's – Roosevelt Hospital Center  
New York, NY 10003, USA

## **I. Alobid**

Department of ENT Hospital Clinic, Barcelona  
University of Barcelona  
08036 Barcelona, Spain  
E-mail: 32874iao@comb.es

## **F. Ballesteros**

Department of ENT Hospital Clinic, Barcelona  
University of Barcelona  
08036 Barcelona, Spain  
E-mail: ferran.ballesteros@gmail.com

## **M. Bernal-Sprekelsen**

Department of Otorhinolaryngology  
Hospital Clinic, Barcelona  
University of Barcelona  
08036 Barcelona, Spain  
E-mail: mbernal@clinic.ub.es

## **D.A. Della Rocca**

Department of Ophthalmology  
Oculoplastic and Orbital Surgery  
New York Eye and Ear Infirmary/  
St. Luke's – Roosevelt Hospital Center  
New York, NY 10003, USA

## **R. C. Della Rocca**

Department of Ophthalmology  
Oculoplastic and Orbital Surgery  
New York Eye and Ear Infirmary/  
St. Luke's – Roosevelt Hospital Center  
New York, NY 10003, USA  
E-mail: rdellaro@chpnet.org

## **K.-H. Emmerich**

Department of Ophthalmology  
Hospital Darmstadt  
Heidelberger Landstraße 379  
64297 Darmstadt, Germany  
E-mail: Augenklinik@Klinikum-Darmstadt.de

## **W.J. Heppt**

Department of Otorhinolaryngology  
Head and Neck Surgery  
Hospital Karlsruhe  
Moltkestraße 90  
76133 Karlsruhe, Germany  
E-mail: HNOKlinik@klinikum-karlsruhe.com

## **N. Jones**

Department of Otorhinolaryngology  
Head and Neck Surgery  
Queen's Medical Centre  
University Hospital  
Nottingham NG7 2UH, UK  
E-mail: Nick.Jones@nottingham.ac.uk

## **R. Keerl**

Department of Otorhinolaryngology  
St. Elisabeth Hospital Straubing  
St.-Elisabeth-Straße 23  
94315 Straubing, Germany  
E-mail: keerlr@klinikum-straubing.de

## **P. Komínek**

Clinic of Otorhinolaryngology  
Faculty Hospital  
Tr.17. Iistopadu Str. 1790  
70852 Ostrava-Poruba, Czech Republic  
E-mail: kominek@nemfm.cz

**H.-W. Meyer-Rüsenberg**

Department of Ophthalmology  
St.-Josefs-Hospital Hagen  
University of Hagen  
Dreieckstraße 17  
58097 Hagen, Germany  
E-mail: info@kkh-hagen.de

**S. Mirza**

Department of Otorhinolaryngology  
Head and Neck Surgery  
Queen's Medical Centre  
University Hospital  
Nottingham NG7 2UH, UK

**J. Mullol Miret**

Department of ENT Hospital Clinic, Barcelona  
University of Barcelona  
08036 Barcelona, Spain

**F. Paulsen**

Department of Anatomy and Cell Biology  
Martin Luther University of Halle-Wittenberg  
Große Steinstraße 52  
06097 Halle (Saale), Germany  
E-mail: friedrich.paulsen@medizin.uni-halle.de

**L. Pierroth**

Oculoplastic and Orbital Surgery  
Ophthalmic Hospital Dardenne  
Bonn, Germany

**P. Preechawi**

Department of Ophthalmology  
Oculoplastic and Orbital Surgery  
New York Eye and Ear Infirmary/  
St. Luke's – Roosevelt Hospital Center  
New York, NY 10003, USA

**S. Rosenbaum**

Department of Ophthalmology  
New York Eye and Ear Infirmary/  
St. Luke's – Roosevelt Hospital Center  
New York, NY 10003, USA

**S. D. Schaefer**

Department of Otolaryngology  
and Communicative Sciences  
New York Eye and Ear Infirmary/  
New York Medical College  
310 East 14th Street  
New York, NY 10003, USA  
E-mail: sschaefer@nyee.edu

**M. Tomás-Barberán**

University Hospital Son Dureta  
07014 Palma de Mallorca, Spain  
E-mail: mtomas@hds.es

**R. Ungerechts**

Department of Ophthalmology  
Hospital Darmstadt  
Heidelberger Landstraße 379  
64297 Darmstadt, Germany

**R. K. Weber**

Division of Paranasal Sinus  
and Skull Base Surgery, Traumatology  
Department of Otorhinolaryngology  
Hospital Karlsruhe  
Moltkestraße 90  
76133 Karlsruhe, Germany  
rainerweber@rainerweber.de

**K. Wilhelm**

Department of Radiology  
University Hospital Bonn  
Sigmund-Freud-Straße 25  
53127 Bonn, Germany  
E-mail: wilhelm@uni-bonn.de