

CRC CRC Press
Taylor & Francis Group

WITH VITALSOURCE®
EBOOK 

Clinical Head and Neck Anatomy for Surgeons

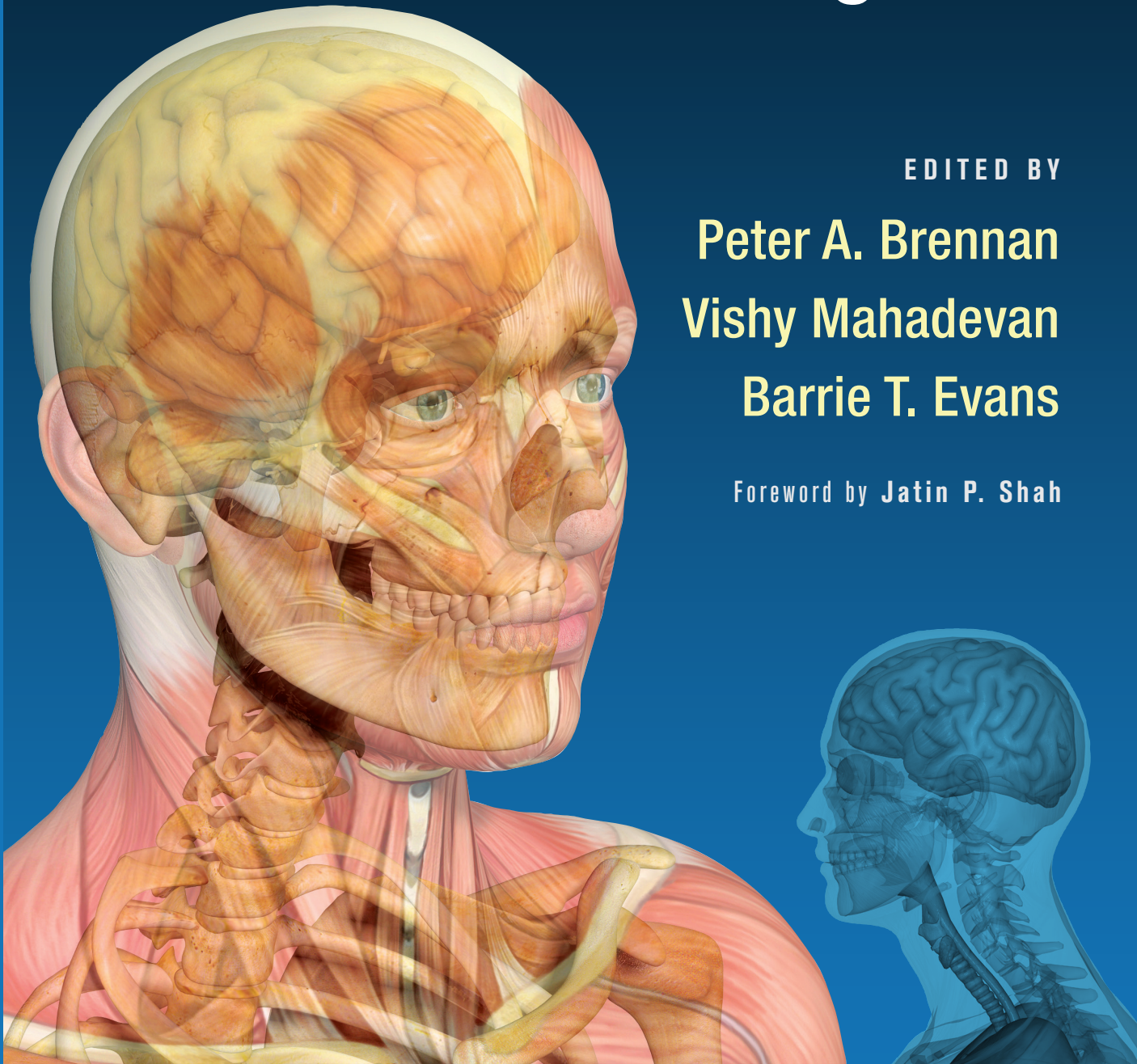
EDITED BY

Peter A. Brennan

Vishy Mahadevan

Barrie T. Evans

Foreword by **Jatin P. Shah**



Clinical Head and Neck Anatomy for Surgeons

Clinical Head and Neck Anatomy for Surgeons

EDITED BY

Peter A. Brennan

Chairman, Intercollegiate Committee
for Basic Surgical Examinations (MRCS and DOHNS);

2016 President,
British Association of Oral and Maxillofacial Surgeons;
Consultant Oral and Maxillofacial Surgeon,
Honorary Professor of Surgery,
Queen Alexandra Hospital,
Portsmouth, UK

Vishy Mahadevan

Barbers' Company Professor of Anatomy,
Royal College of Surgeons of England,
London, UK

Barrie T. Evans

Past President,
British Association of Oral and Maxillofacial Surgeons;
Formerly Consultant Oral and Maxillofacial Surgeon,
Southampton University Hospitals,
Southampton, UK

Foreword by **Jatin P. Shah**



CRC Press

Taylor & Francis Group
Boca Raton London New York

CRC Press is an imprint of the
Taylor & Francis Group, an **informa** business

CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742

© 2016 by Taylor & Francis Group, LLC
CRC Press is an imprint of Taylor & Francis Group, an Informa business

No claim to original U.S. Government works
Version Date: 20150820

International Standard Book Number-13: 978-1-4441-5738-3 (eBook - PDF)

This book contains information obtained from authentic and highly regarded sources. While all reasonable efforts have been made to publish reliable data and information, neither the author[s] nor the publisher can accept any legal responsibility or liability for any errors or omissions that may be made. The publishers wish to make clear that any views or opinions expressed in this book by individual editors, authors or contributors are personal to them and do not necessarily reflect the views/opinions of the publishers. The information or guidance contained in this book is intended for use by medical, scientific or health-care professionals and is provided strictly as a supplement to the medical or other professional's own judgement, their knowledge of the patient's medical history, relevant manufacturer's instructions and the appropriate best practice guidelines. Because of the rapid advances in medical science, any information or advice on dosages, procedures or diagnoses should be independently verified. The reader is strongly urged to consult the relevant national drug formulary and the drug companies' and device or material manufacturers' printed instructions, and their websites, before administering or utilizing any of the drugs, devices or materials mentioned in this book. This book does not indicate whether a particular treatment is appropriate or suitable for a particular individual. Ultimately it is the sole responsibility of the medical professional to make his or her own professional judgements, so as to advise and treat patients appropriately. The authors and publishers have also attempted to trace the copyright holders of all material reproduced in this publication and apologize to copyright holders if permission to publish in this form has not been obtained. If any copyright material has not been acknowledged please write and let us know so we may rectify in any future reprint.

Except as permitted under U.S. Copyright Law, no part of this book may be reprinted, reproduced, transmitted, or utilized in any form by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying, microfilming, and recording, or in any information storage or retrieval system, without written permission from the publishers.

For permission to photocopy or use material electronically from this work, please access www.copyright.com (<http://www.copyright.com/>) or contact the Copyright Clearance Center, Inc. (CCC), 222 Rosewood Drive, Danvers, MA 01923, 978-750-8400. CCC is a not-for-profit organization that provides licenses and registration for a variety of users. For organizations that have been granted a photocopy license by the CCC, a separate system of payment has been arranged.

Trademark Notice: Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

Visit the Taylor & Francis Web site at
<http://www.taylorandfrancis.com>

and the CRC Press Web site at
<http://www.crcpress.com>

For Rachel, Ellie, Katie and Rosalind.

(PAB)

For Neila, Janaki, Tom, Arjun and Olivia.

(VM)

Contents

Foreword	xi
Introduction	xiii
In memoriam	xv
Contributors	xvii
PART 1	1
<hr/>	
1 The scalp	3
<i>Siavash Siv Eftekhari and R. Bryan Bell</i>	
2 Anatomy of the ageing face	11
<i>Parkash L. Ramchandani</i>	
PART 2	25
<hr/>	
3 External nose	27
<i>Shan R. Baker and Parkash L. Ramchandani</i>	
4 Internal nose and paranasal sinuses	37
<i>Tawakir Kamani and Anshul Sama</i>	
5 External ear	45
<i>David Richardson</i>	
6 Temporal bone, middle ear and mastoid	53
<i>Michael Gleeson</i>	
PART 3	59
<hr/>	
7 Parotid gland	61
<i>Luke Cascarini and Zaid Sadiq</i>	
8 Submandibular triangle	69
<i>Daryl Godden and Barrie T. Evans</i>	
9 Oral cavity	77
<i>Madan G. Ethunandan</i>	
10 Alveolar process	89
<i>Niall McLeod</i>	
11 Anatomy of cleft lip and palate	99
<i>Serryth Colbert and Chris Penfold</i>	

PART 4	109
12 Orbital skeleton <i>Barrie T. Evans and Simon Holmes</i>	111
13 Orbital contents and periorbita <i>Antony Tyers</i>	119
14 Mandible <i>Barrie T. Evans, Darryl Coombes, Peter A. Brennan and Vishy Mahadevan</i>	133
15 Maxilla and zygoma <i>Barrie T. Evans, Darryl Coombes, Vishy Mahadevan and Peter A. Brennan</i>	141
16 Infratemporal fossa, pterygopalatine fossa and muscles of mastication <i>Barrie T. Evans</i>	151
17 Temporomandibular joint <i>Andrew J. Sidebottom</i>	167
PART 5	179
18 Pharynx <i>Anthony D. Cheesman</i>	181
19 Superior and posterior mediastinum <i>Vishy Mahadevan</i>	195
20 Tissue spaces of the head and neck <i>Daren Gibson and Curtis Offiah</i>	201
21 Larynx, trachea and tracheobronchial tree <i>Emma V. King and Vishy Mahadevan</i>	209
22 Thyroid gland <i>Vishy Mahadevan and James N. Crinnion</i>	221
23 Parathyroid glands <i>James N. Crinnion and Tom Wiggins</i>	233
PART 6	241
24 The neck <i>Peter A. Brennan, Vishy Mahadevan and Barrie T. Evans</i>	243
25 Posterior triangle and its contents <i>Rolfe Birch</i>	253
26 Thoracic outlet <i>Vishy Mahadevan</i>	261
27 Cervical spine <i>Hitesh Dabasia and Jason Harvey</i>	267
PART 7	277
28 Neuroanatomy for the head and neck surgeon <i>Peter C. Whitfield</i>	279
29 Skull base <i>Peter C. Whitfield</i>	287

30	Osteology of the skull <i>Susan Standring</i>	295
31	Overview of the cranial nerves <i>Susan Standring</i>	309
32	Autonomic system in the head and neck <i>Susan Standring</i>	317

Foreword

Mastery of the complex anatomy of the head and neck region is an essential requirement for all surgeons involved in surgical procedures in this area, regardless of their specialty. Navigating with ease through this complex maze of vital structures requires familiarity with anatomic relationships, to anticipate the presence and proximity of vital structures for smooth and safe conduct of surgical procedures. Lack of the knowledge of relevant surgical anatomy can lead to inadvertent injuries during operations, and disastrous functional and esthetic sequelae. Professor Peter Brennan, Professor Vishy Mahadevan, and Mr Barrie Evans are to be complimented for taking the challenge of compiling an authentic text book of surgical anatomy of the head and neck to aid students, trainees and practitioners of surgery in the head and neck region. This book is a much needed resource in this specialty.

The Editors have done an outstanding job in attracting leading surgeons and teachers of anatomy to contribute to this book and share their knowledge, expertise, experience and wisdom in making this a user-friendly and valuable reference volume. Accurate details of clinically relevant anatomic features and relationships at each site with emphasis on surgical anatomy, complemented by line drawings and actual intraoperative photographs, make this a unique compilation of

topics regularly encountered in day-to-day practice of head and neck surgery. Tips recommended by experienced surgeons to avoid injury to vital structures are valuable features. The surgeon's perspective of operative regional anatomy is evident throughout, which is the very focus of this book.

In summary, the publishers and editors have produced a unique text book, which would be of tremendous value to students, trainees and practitioners in the fields of head and neck surgery, maxillofacial surgery, otolaryngology, facial plastic and reconstructive surgery, oral surgery, dentistry and allied surgical specialties. This would be a ready reference for surgeons not familiar with the field to brush up on anatomy, prior to embarking upon a surgical procedure. To that end, this book will have a definite place, in the libraries, of medical schools, training programs, and operating rooms, as well as the book shelves of students, trainees and practicing surgeons.

Jatin P Shah, MD, MS(Surg), PhD(Hon),
DSc (Hon), FACS, FRCS(Hon), FDSRCS(Hon),
FRCS(SD)(Hon), FRACS(Hon)
Professor of Surgery
EW Strong Chair in Head and Neck Oncology
Memorial Sloan Kettering Cancer Center
New York, NY

Introduction

PETER A. BRENNAN

The head and neck is one of the most complex parts of the body, with so many structures found in a relatively small area. It contains specialized sensory organs that allow us to see, hear, smell and taste, and is the start of both the respiratory and alimentary tracts. The thyroid and parathyroid glands are also located in the neck and form part of the endocrine system. Approximately 300 of the 800 or so lymph nodes that form part of the lymphoreticular system are found in the head and neck region, together with extra-nodal lymphoid tissue such as the palatine tonsils and adenoids. It is therefore not surprising that many lymphoid-related diseases present to head and neck specialists.

The face itself – with its large number of muscles of expression arising from the many bones that form the facial skeleton – conveys emotion, and in most societies is not hidden by clothing (and therefore always in view), so problems whether caused by disease, trauma or surgery are difficult to conceal.

The embryology of the head and neck is fascinating and explains many of the particularly interesting anatomical findings. An appreciation of the embryology is also important for understanding disease processes such as branchial cleft and thyroglossal cysts, and cleft lip and palate.

The diverse group of structures that make up the head and neck region are intimately related. Many nerves and blood vessels pass through other anatomical structures and have complicated relations. The area is richly innervated with sensory and motor nerves. All of the 12 cranial nerves have at least one or more functions in the head and neck, with two of them (vagus and accessory) passing through the neck to additionally innervate

remote structures. Other important nerves arising from the cervical part of the spinal cord, including the phrenic nerve and brachial plexus, pass through the neck.

With all these structures found in such a small area, a detailed knowledge of the relevant surgical anatomy is essential for surgeons operating in this region. Unlike body cavity surgery where most of the important anatomy is located much deeper to the skin and protected by, for example, the ribs or anterior abdominal wall musculature, in the head and neck many structures are superficial. For example, it is relatively easy to permanently damage one or more branches of the facial nerve or the parotid duct with a knife or even a broken glass assault to the face, with potentially serious consequences for the patient's future quality of life (Figures 1 and 2). Major blood vessels are also quite superficial when compared to other anatomical areas. Sensory nerves pass through the facial bones en route to supplying the facial skin – in most other regions of the human body, sensory nerves do not enter bony canals. Finally, the teeth are attached to the mandible and maxilla in a unique way.

Head and neck anatomy is a difficult subject to learn, and just when junior doctors think that they may have mastered it, they often become confused and frustrated when trying to apply the knowledge gained from a textbook and cadaveric dissections to the operating room. Given the complexity of the head and neck, this is not surprising. Furthermore, some parts of the head and neck (such as the complex infratemporal fossa area) are not readily familiar to even the most experienced of surgeons, who may have to refer to anatomy texts and a dried skull before operating in this region.