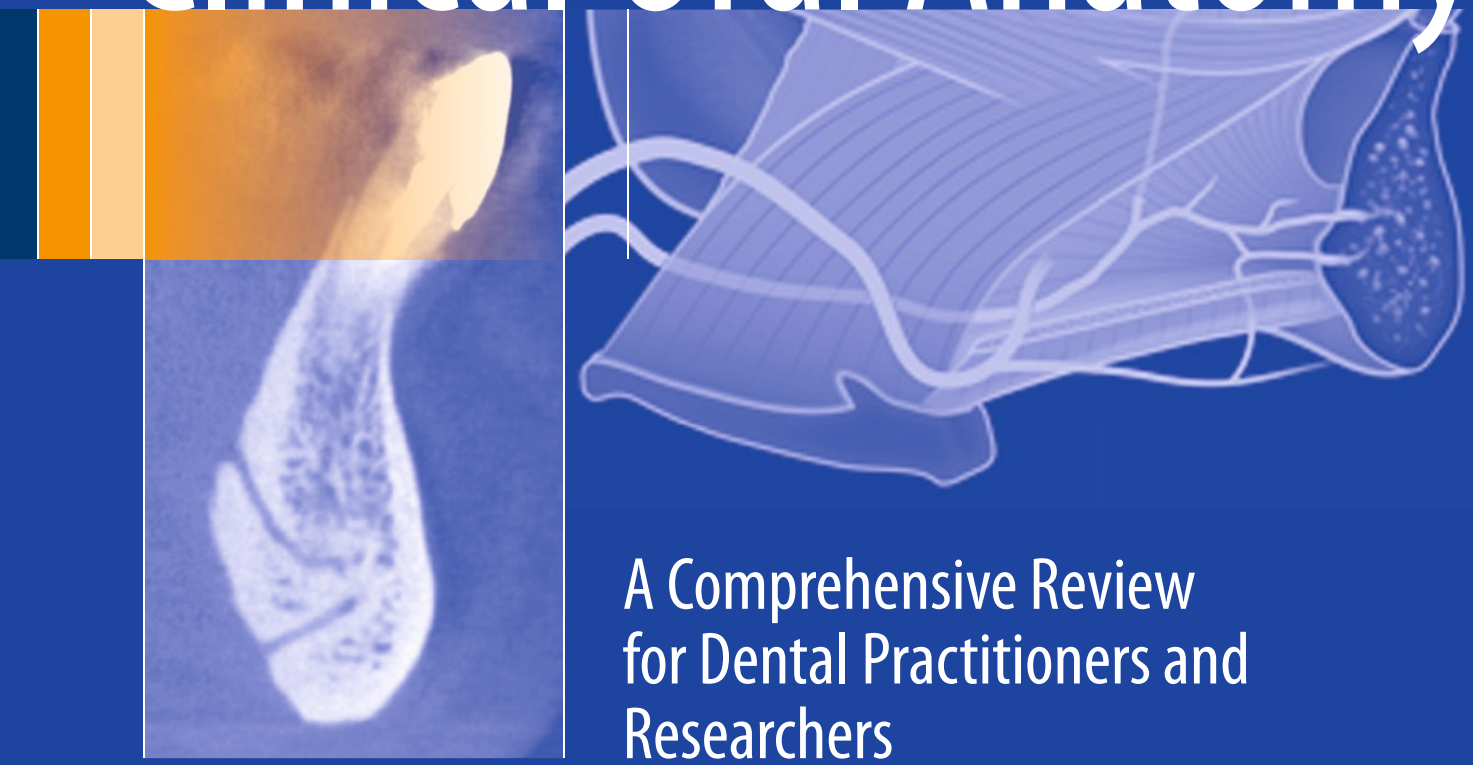
Thomas von Arx
Scott Lozanoff

Clinical Oral Anatomy



A Comprehensive Review for Dental Practitioners and Researchers

Springer

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Thomas von Arx
University of Bern School of Dental Medicine
Department of Oral Surgery and Stomatology
Bern
Switzerland

Scott Lozanoff
Department of Anatomy Biochemistry &
Physiology
John A. Burns School of Medicine
Honolulu
Hawaii
USA

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I dedicate this book to my wife Fränzi and our children Yannick, Dennis, and Joya
for supporting my academic career and for being such a wonderful family.

Thomas von Arx

I want to dedicate this book to my parents, Paul and Peggy, for instilling within me a passion for knowledge through scientific pursuit.

Scott Lozanoff

Foreword

The authors – Thomas von Arx and Scott Lozanoff – have in their introduction presented a citation that clearly points to the importance of present-day anatomy: namely, its clinical relevance. For oral- and maxillofacial surgeons, dentists, and ENT and plastic surgeons, the clinical and functional anatomy of the head (and neck) is of prime significance and importance for successful and acceptable outcomes of their surgical procedures. Detailed and firm knowledge of orofacial anatomical structures therefore is absolutely mandatory for all those dental and medical specialists who are "active" in the oral cavity and face.

The productive academic partnership of Thomas von Arx, an experienced oral surgeon, and Scott Lozanoff, an authority in orofacial anatomy, is ideal in combining their knowledge and expertise in the field of clinical anatomy.

In 26 chapters, the authors have written down and illustrated clinical anatomical features of musculature, orofacial nerves, facial bones, and other important anatomical structures in an extremely clear and didactic way. The text is precise and to the point. The illustrations including schematic drawings and photographs of anatomical specimens are easy to understand, informative, and of excellent quality.

The present book is an update of oral anatomy not only for those who have been in their dental and medical profession for a long time but also for medical and dental students.

This book on clinical oral anatomy is a marvel and has great promise!

Charité, Berlin, Germany — Peter A. Reichart
May 2016

Preface

Oral anatomy provides the basis for oral diagnosis, treatment, and care. A firm understanding of anatomical structures and their spatial relationships is critical for all dental specialists to remedy patient maladies and ensure holistic health. Recent innovations in dental research have provided far greater anatomical resolution and information than was previously available. The dental sciences have witnessed an explosion of scientific investigation over the recent years with a dizzying array of new data to improve all aspects of clinical dentistry. With such a dramatic increase in information, reduction in curricular time for craniofacial anatomy is inevitable. However, curriculum reduction belies a fundamental fact – to achieve successful diagnosis and treatment, the practitioner must learn and understand basic oral anatomical relationships. An anatomical knowledge base must be portable and translatable in the clinic in spite of reduced instructional time. We believe that there is a need for an oral anatomy textbook that provides fundamental information in a descriptive fashion but also utilizes a presentation style that enables the interested reader to effectively obtain anatomical information required to understand clinical intervention. Thus, we have written a textbook that focuses on fundamental anatomical relationships presented in a concise fashion so that the most relevant information can be found rapidly and reliably. We have endeavored to address the most important anatomical information in various presentation styles, enabling the interested reader to either read sequentially or utilize the book as a reference and identify information for a specific purpose.

Clinical Oral Anatomy: A Comprehensive Review for Dental Practitioners and Researchers concentrates on the oral cavity and structures that are directly contiguous. Detailed descriptions are provided, focusing on spatial relationships among anatomical structures that are particularly compelling for the clinician. The descriptions are written to be direct and informative, ensuring that the reader comprehends the information as efficiently as possible.

The written descriptions of oral anatomy are accompanied by elegantly simple illustrations that are designed to reflect critical relationships in a visual fashion that emphasizes ease of use and understanding. The illustrations and captions have been devised in a manner that should enable the reader to understand the corresponding anatomical relationship without necessarily reading the full text. Additionally, detailed cadaveric dissections were undertaken to emphasize anatomical relationships in situ. In addition to the information provided in textual form, this book also is intended to serve as an anatomical atlas.

Knowledge of anatomical variation of the oral region is critical for understanding symptoms, interpreting images, planning treatment, and providing operative management. A significant number of malpractice cases have resulted directly from a misunderstanding of anatomical variation. Sadly, near fatal and in some cases fatal complications arise due to a lack of appreciation of atypical anatomy. There are likely genetic and ethnic components to the preponderance of certain variations in specific populations. We have attempted to incorporate reports of anatomical variation patterns and occurrence with the intention of providing a reference source for the student and practicing clinician. In addition to qualitative descriptions of reported variations, we have painstakingly delineated quantitative descriptions of variants so that the reader has access to the most complete information regarding possible variations within their own clinical context.

The operational field for dental clinicians is miniature in scale where the difference between success and failure is literally measured in millimeters. Precision is imperative, and to this end, we have meticulously reported quantitative assessments of anatomical relationships directly from the publications in the primary literature. These values as well as their derivative citations are summarized in tabular form. The tables provide a quick reference for the interested reader and reflect a novel perspective of anatomical variation.

Among the numerous and varied research breakthroughs in basic and clinical dental sciences in recent years, dramatic progress has occurred in dental imaging. In particular, image procurement using cone beam computed tomography (CBCT) has become a critical tool in various dental specialties for assessment and treatment paradigms. We have incorporated as many of these studies as possible and assessed the usefulness of CBCT in various settings for recognizing anatomical spatial relationships. Imaging with CBCT is compared to anatomical resolution utilizing other visualization methods whenever possible. Several original clinical and radiological images are included from the Department of Oral Surgery and Stomatology at the University of Bern School of Dental Medicine.

Cadaveric dissection provides one of the most direct and dynamic approaches to test hypotheses concerning anatomical spatial relationships. Several meticulous dissections were undertaken and included in this book. In many cases, the photographs provide direct evidence for oral anatomical features that are described in the text. Many of these photographs are unique and were included because they have not been available, to our knowledge, in the literature. They provide novel perspectives of complex features and should serve to illuminate previously unappreciated anatomical arrangements.

The anatomical information presented in this text ultimately is intended to improve clinical problem-solving skills. Thus, all chapters include a “clinical relevance” section highlighting the importance of the anatomical topic within a clinical context. These sections largely reflect the considerable clinical and anatomical experience of the authors and underscore the importance of a solid foundation in anatomy.

It may seem unusual to write an orofacial anatomy book without including teeth. After significant consideration and discussion, it was decided to leave this complex and broad topic to other textbooks. However, we frequently refer to the many aspects of tooth morphology and their relationship to the tissue and structures described in the text.

With all of these factors in mind, we have compiled a comprehensive guide to oral anatomy emphasizing the most recent findings regarding quantitative assessment, advanced imaging, and anatomical variations. We have attempted to maximize new research relevancy so the literature cited covers the period from 1990 to 2015 with some earlier landmark articles cited where appropriate. We are hopeful that this book will provide a valuable reference guide for dental practitioners, clinical researchers, orofacial research scientists, and craniofacial anatomy instructors among others eventually serving to improve oral anatomical problem solving within a clinical context.

Bern, Switzerland — Thomas von Arx
Honolulu, HI, USA — Scott Lozanoff

Acknowledgments

Anatomy has played a critically important role in our 30-year experience in oral surgery (TvA) and basic oral biology research (SL). The lack of continuing education courses focusing specifically on clinical oral anatomy has triggered our interest in writing a book on oral anatomy. Furthermore, the introduction of CBCT in dentistry has increased the need for understanding detailed spatial relationships between anatomically relevant structures. Taken together, complimentary interests have deepened our curiosity to learn and teach collaboratively.

Cadaveric dissections of the orofacial region serve as possibly the most direct and dynamic method to test hypothesis concerning anatomical spatial relationships. This philosophy provided the primary motivation to write this book. TvA undertook a sabbatical at the University of Hawai'i School of Medicine. The main objective was to benefit from mutual and complementary academic interests as well as to undertake comprehensive orofacial cadaveric dissections in preparation for this book. Many of these dissections are included in this book. Faculty, staff, and students of the Department of Anatomy, Biochemistry and Physiology at JABSOM are thanked for their helpfulness and hospitality (the famous *aloha* spirit of Hawai'i). In particular, Steven Labrash is thanked for providing outstanding assistance as well as outstanding anatomical specimens, Beth Lozanoff for graphical ideas, and Tricia Yamaguchi for administrative support.

From a broader perspective, several current and former faculty and students at the University of Hawai'i School of Medicine provided intellectual input serving to expand our anatomical knowledge base necessary for writing this book. Faculty include Dr. Chris Stickley, Dr. Kaori Tamura, Dr. Yukiya Oba, Dr. Takashi Matsui, Dr. Vernadeth Alarcon, Dr. Cadie Buckley, Dr. Selcuk Tunali, Dr. Julie Rosenheimer, Dr. Beth Jones, Dr. Sara Doll, Dr. Marita Nelson, and the late Dr. Vince DeFeo, while vital medical students include Ms. Trudy Hong, Mr. Greg Atkinson, Mr. Chih-wei Chang, and Dr. Niket Ghandi.

Back in Bern, the most important persons to get this book on track were Bernadette Rawyler who provided all the fantastic illustrations and Ines Badertscher who provided critical assistance with image preparation that is greatly appreciated. We would also like to thank TvA's personal assistant, Lena Dänzer, for patient management in order to obtain clinical pictures and for assisting literature searches and obtaining selected articles. We also greatly acknowledge the staff of the University of Bern Dental Radiology Section for taking and providing the two- and three-dimensional radiographs used in this book.

Special thanks go to Prof. Dr. Daniel Buser, Chair of the Department of Oral Surgery and Stomatology, School of Dental Medicine, University of Bern, Switzerland, for mentoring the academic career of TvA and supporting TvA's interest in orofacial anatomy; special thanks also to Prof. Dr. Michael Bornstein, Associate Professor, Section of Radiology, Department of Oral Surgery and Stomatology, School of Dental Medicine, University of Bern, Switzerland, for intellectual input and collaboration in many radiographic-anatomical studies.

We thank the staff of Springer for bringing this book to life, especially Mrs. Tanja Maihöfer and Mrs. Wilma McHugh for their assistance and patience.

Last but not least, our thoughts are with the thousands of people who donate their bodies annually for health education and research. Their contribution to the study of anatomy forms the foundation of medicine and dentistry underscoring the maxim – Anatomy: The Oldest Child of Mother Medicine (Tubbs S, Editorial, *Clinical Anatomy* 2014;27:805).

Thomas von Arx, Bern
Scott Lozanoff, Honolulu
May 2016

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