Color Atlas of the Anatomy and Pathology of the Epitympanum
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In collaboration with H. Ramsay, C. Northrop

Color Atlas of the Anatomy and Pathology of the Epitympanum

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The Temporal Bone Foundation has generated a
3D video model of one of the temporal bones
described in Chapter 2. This model is available on
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Preface

In many different fields of research progress has been made so rapidly that the most advanced knowledge of today may be old-fashioned in a few year’s time, and the established procedures and techniques need constant modernization. This fast progress is also obvious in many areas of medicine where, for example molecular biology and gene research have opened entirely new horizons for both diagnosis and treatment. On the other hand, notably in macroanatomy, previous generations have already done the basic studies, and their results can rarely be fundamentally improved upon.

The knowledge of human anatomy and pathology, obtained at autopsies and complemented by light-microscopic examination, has remained essentially unchanged for many decades, even if at a molecular level many new discoveries are being made. In modern otology, after the Second World War, clinicians have been able to take advantage of the superb magnification of the surgical field provided by the operation microscope, which has increased the knowledge of the anatomy based solely on the naked eye. The magnified view, nevertheless, has not rendered conventional microscopic anatomy redundant for those who wish to understand the nature of the structures they are dealing with. In this area the work of the early anatomists, even without our sophisticated tools for magnification, still contains many valuable observations. Especially in the latter part of the 19th century the anatomy and pathology of the ear was a topic favored by many prominent scientists and clinicians.

During the latter part of my 40 active clinical years, ending in the early 1990s, I became more and more dissatisfied with the articles discussing the anatomy of the epitympanum and was convinced that some of the described features did not reflect the facts. The contemporary authoritative descriptions, for example, of the anatomy and aeration of Prussak’s space, and of the structure of the major epitympanic compartments, contained features that I was at a loss to understand. Some sketches of the epitympanic folds were so elaborate that they appeared to preclude all effective aeration and drainage.

I finally went back to the original writing of Prussak and this experience made me reread other related original works, for example, by von Tröltsch, Politzer, Wittmaack and many others. However, only after a perusal of Hammar’s study of the fetal development of epitympanic folds did I feel close to understanding the epitympanic compartments and their origin. This was followed by going personally back to the dissection laboratory and beginning with the microdissection of temporal bones in an effort to verify the folds and basic compartments that Hammar had described.

These data obtained by microdissection have during the last 10 years been published in otological periodicals and have helped to clear up many earlier misconceptions, the epitympanic anatomy has emerged as a sensible and logical arrangement. I had enormous help in elaborating and deepening of the knowledge I obtained through microdissection by having the continuing cooperation with Clarinda Northrop of the Temporal Bone Foundation in Boston who permitted me to use their magnificent collection of serially sectioned newborn and infant temporal bones. Hans Ramsay, my former resident, who has now taken over my surgical work in the Department of Otolaryngology in Helsinki, made the material and facilities for microdissection available to me. After my retirement from clinical activity we have continued to enjoy fruitful joint research activity, now over a period of 10 years.

During the last decade I have led the department seminars of anatomy, pathology and surgery of the ear. It appeared that the initial level of knowledge of the residents regarding epitympanic anatomy and pathology was not sufficient for a future ear surgeon. It also became clear
that for self-education there were no reliable books which would cover the entire area without the need to peruse individual reports from periodicals. Furthermore, it appeared that the earlier literature did not contain anatomic documents but showed mostly sketches which often did not conform with reality. For these reasons I decided to write the present atlas which summarizes the work of our research groups during the last decade. In order to obtain maximal clarity it was decided to use only colored photographs for the description of the anatomy and pathology.

Part 1 of this atlas was compiled in the hope that it would, by ample documentation, help both the younger people in training as well as experienced specialists to have in one volume all data necessary for an understanding of the mysteries of the epitympanum. We hope that reading it would stimulate the otologists to go personally to the dissection laboratory and practise the microdissection approaches we have advocated, to become familiar with the structures forming the epitympanic compartments. We are convinced that afterwards work in the operation theater becomes even more interesting, when structures discovered and understood as a result of microdissection are once again encountered. The procedures for improving aeration and drainage we have outlined in Part 3 are not difficult and are likely to lead to better functional results once the surgeon becomes accustomed to them.

In Part 2 of this atlas we present in compact form the present knowledge of the spread of the amniotic fluid cellular content into the different compartments of the middle ear. We also present a great deal of documentation of the intensive foreign body-type tissue reaction caused by amniotic fluid cellular content, at times combined with infection, on the soft tissue structures of neonates and infants. These sometimes massive reactions were already well known to the investigators at the end of the 19th century, and both Aschoff and Wittmaack produced voluminous documents, the contents of which are still valid today. We believe that part of the long-standing problem of middle ear infection in infancy is initially related to this forgotten cause.

The photographs of serial sections shown in the atlas were made by Mauri Laakso, Ari Aalto and Richard Cortese.

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