VOLUME

3

MERRILL'S ATLAS OF

RADIOGRAPHIC POSITIONS and RADIOLOGIC PROCEDURES

EIGHTH EDITION

Philip W. Ballinger

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EIGHTH EDITION

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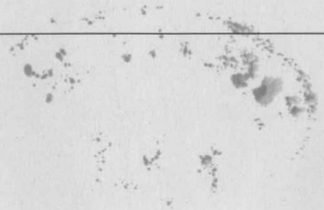

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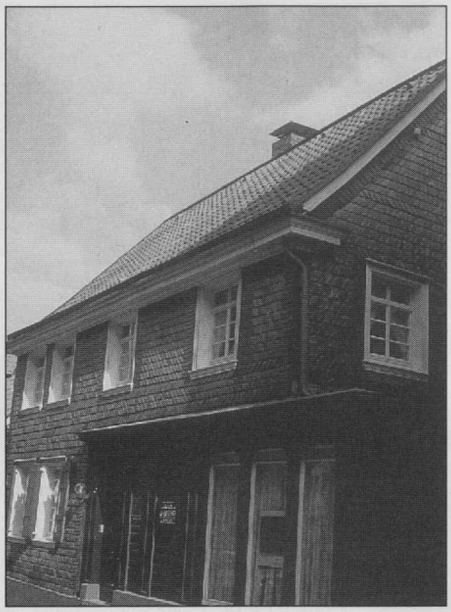

The birthplace of
Dr. Wilhelm Conrad Roentgen
in Lennep, Germany.

PREFACE

With the 1995 centennial of the discovery of x-radiation, radiography students and practitioners throughout the world are reflecting on our history, celebrating our profession's contributions, and speculating about our future in the changing health care environment. *Merrill's Atlas of Radiographic Positions and Radiologic Procedures* has quite a history of its own. It has been recognized as a classic text in the field for almost half a century. In the eighth edition we believe we have successfully built on the pioneering work begun forty-six years ago by Vinita Merrill in the first edition of the atlas. Readers familiar with the atlas will find many improvements. For those using the atlas for the first time, our hope is that you will find it a highly reliable, comprehensive resource that will serve you well for many years to come.

The planning process for the new edition included soliciting input from *Merrill's Atlas* users and from many educators, who were teaching anatomy and positioning. In response to their insightful suggestions, we have made some significant improvements.

Standardization of terminology

The use of the important radiography terms, projection and position, has been standardized throughout the atlas. In particular, the comments of Eugene D. Frank, Radiography Program Director at Mayo Clinic/Foundation, provided the catalyst for these terminology changes. After many hours of discussion with Gene, who served as a special consultant on the revision, as well as Curt Serbus, who contributed greatly to our efforts, we worked out terminology we believe will be easier for students, radiographers and physicians to understand and use. The terminology continues to be in agreement with the American Registry of Radiologic Technologists and the Canadian Association of Medical Radiation Technologists. Chapter 3 provides a complete explanation of the modified terminology, and headers throughout the text reflect the improvements.

Essential projections

As a result of surveying all radiography programs in the United States and Canada, we identified 176 essential competency projections. These projections are the ones most frequently performed and are deemed necessary for competency of entry-level practitioners.

We have designated these with a special icon to alert students and instructors that these positioning skills are essential knowledge for the beginning radiographer. Instructors may, of course, modify the list of essential competency projections as appropriate to their specific geographic locations.

Bulleted positioning descriptions

Descriptions of positioning of patient and body part have been reformatted in bulleted lists for ease of reading and understanding.

Second color

Readers will notice that headings are set in color for emphasis. The second color has been incorporated in anatomic illustrations and is also used for demonstration of central ray angle and cassette positioning.

New and modified illustrations

The new edition has hundreds of new illustrations. Of particular note are the new photographs for cranium positioning. Also important is the inclusion of degree angulation information on most illustrations involving angulation of the x-ray tube to assist the reader in quickly identifying the degree of central ray angulation or the degree of body rotation.

Historical photographs

In recognition of the 1995 centennial of the discovery of x-radiation, we have included historical photographs on the opening page of each chapter. Many are from the first edition of the atlas published in 1949, some were taken during a visit to the Röntgen Museum and birthplace of Dr. Röntgen in Lennep, Germany, and a few are from other credited sources. These photographs provide a historical perspective on the evolution of radiography and help us appreciate its significance.

Ancillaries

For the first time, the atlas has a comprehensive set of ancillaries. In addition to the third edition of *Pocket Guide to Radiography,* also available are an anatomy and positioning instructional program in slide/audiotape or CD-ROM format, student workbooks, instructor's manuals, and a 1000-question test bank on floppy disk and in bound form.

Anatomic terminology

With each new edition, anatomic terminology is updated to reflect the latest information from the International Congress of Anatomists. As in previous editions, this information is printed on the inside covers of the atlas for easy reference.

We hope you find this new edition the very best ever. Your comments and suggestions are always welcome. We are constantly striving to improve the atlas and are dependent on your input to help us in that process.

Philip W. Ballinger

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To the professional staff of the medical illustrators, medical photographers and staff of the Biomedical Communications Division in the School of Allied Medical Professions at The Ohio State University. Thanks to you the quality of the illustra-

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To my son and daughter, **Eric and Monica Ballinger,** now that you are in college I hope you find professions that you will enjoy as much as I do radiology. There were many times I was not available to spend time with you because "I was working on the book." I hope you understand that in spite of my sometimes absence, I do love you.

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P.W.B.

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*For a complete description of the anatomy of the facial bones, see Chapter 20 of this volume.

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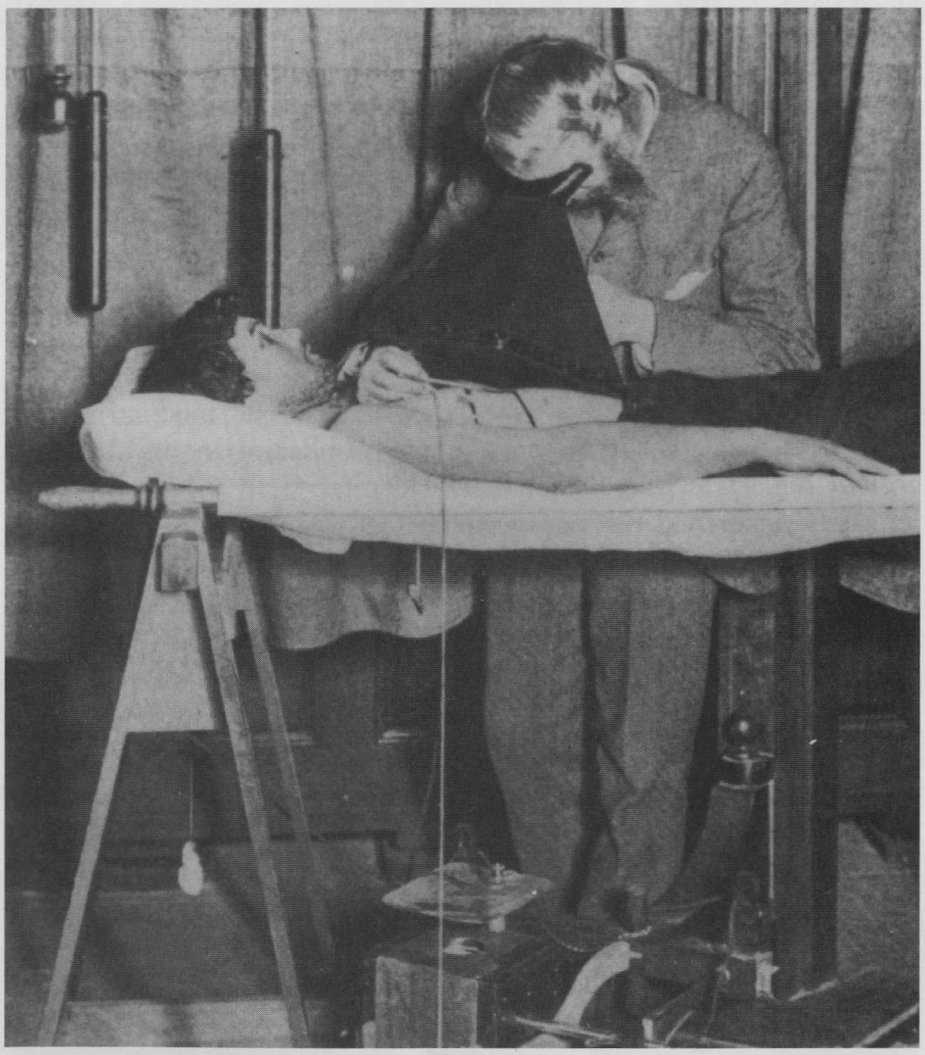
Chapter 28

PEDIATRIC IMAGING

DEIRDRE A. MILNE



A fluoroscopist drawing outlines of the lungs on a patient's skin while looking through a hand-held fluoroscope; 1901. "The fluoroscope is held farther away from the patient than is necessary in practice in order that the pencil which is under it may be shown in the picture."

Reprinted from Eisenberg, RL. Radiology: An Illustrated History, Ed 2, Mosby, 1995. Original from Pusey WA and Caldwell EW: The practical application of roentgen rays in therapeutics and diagnosis. Philadelphia, WB Saunders, 1904.

Respecting the fact that *children are not just small adults* and appreciating that they need to be approached on their level is the recipe for successful encounters with children in the imaging department. Many good cooks will agree that simply being able to read does not make one a great chef. As with any challenging recipe, the basic steps can be explained, but they must also be practiced. In pediatric radiography, radiographers often lack confidence in two main areas—communication skills and immobilization techniques.

While there are many similarities to adult radiography—such as basic positioning and film critique or assessment skills—there are some significant differences. *Approaching* the child tops the list of differences. It may help novice pediatric radiographers to think about children of various ages whom they know, and to imagine for a moment how they would explain to those children what is involved in a particular radiographic examination. This strategy, along with the descriptions that follow, will prove quite effective. An open mind, patience, creativity, and the willingness to learn and to look at the world through the eyes of a child are all that is needed to work successfully with children.

Fig. 28-1. The Atrium of the Hospital for Sick Children (Toronto), which provides inpatient care and directly related support services.

Atmosphere

The environment in which patients recover plays a significant role in the recovery process. Studies have compared the recovery course of patients whose hospital rooms looked out over parks with the recovery course of those whose view was that of a brick wall. Those patients who faced the park had a much shorter hospital stay than the other patients, and they required considerably fewer pain killers. With these differences in mind, the patient care center at the Hospital for Sick Children (Toronto) was designed and built as an atrium (Fig. 28-1). Each patient room receives natural light, from either the rooms facing outside or the rooms overlooking the atrium, where natural light comes from the glass roof. While it is easy to see how children can be amused by Miss Piggy and the barnyard animals that fly across the atrium, the environment does not have to be this elaborate to be appreciated by children. Small things can be done at relatively little cost to make a child's stay more comfortable.

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DEDICATION

To Alexander, Andrew, Erik, Richard, and the many other children who depend on us. They are our best teachers—and our future.

WAITING ROOM

Parents of the pediatric patient often arrive at the reception desk feeling anxious. They may be worried about what is involved in the procedure because they have not had the specifics explained to them or because they *didn't hear* all that was explained to them. They may also be worried about how much time the care of their child will take, not to mention the outcome.

Feelings of anxiousness or tension are often transferred between parent and child—the child senses a parent's tension through the parent's tone of voice or actions. A well-equipped waiting room (this does not have to be expensive) can reduce the tension. Children are attracted to and amused by the toys, while parents are free to check in or register and ask any pertinent questions.

Gender-neutral toys or activities are most appropriate, such as a small table and chairs with crayons and coloring pages. (Children should be supervised to prevent them from putting the crayons in their mouths.) Books or magazines for older children are good investments also. Any hospital's child life department could provide advice or recommendations.

IMAGING ROOM

Time can pass quickly for lengthy procedures if age-appropriate music or videos are available. A child who is absorbed in a video often requires little or no immobilization (other than the usual safety precautions designed to prevent him or her from rolling off the table). Upon request, charitable or fund-raising organizations are often happy to donate TVs and VCRs for this purpose.

Experience has shown that children are less likely to become upset or agitated if they are brought into a room which has been prepared before they enter. This preparation should include placement of the film, approximate centering of the tube to the film, and placement of all immobilization tools likely to be needed at one end of the table.

Young children are often afraid of the dark; they dislike having the lights turned out but are often comfortable with low levels of illumination. Dimming the lights enough to easily see the collimator light before the child enters can prevent the need to explain why the lights have to be dimmed. Busy radiographers often turn the lights down without explanation, causing unnecessary anxiety.

Once the procedure is completed, take a moment to emphasize, *even overemphasize,* how helpful the patient was and explain where he or she should wait or what he or she should do next, *ensuring that the parent is comprehending the instructions.*

Approach

APPROACHING THE PARENT

No discussion on dealing with children is complete without mention of how to approach the parent(s). Although children are sometimes brought for medical care by someone other than the parents, for the purposes of this discussion the caregiver is referred to as the parent.

In many cases, when performing a procedure on a child we find that we are, in fact, dealing with two patients—the parent is the second patient. The problem may then be to decide whom to speak with. The answer, however, is easy.

- If the child is capable of understanding, direct the explanation to him or her, using age-appropriate language (discussed below). The parents will listen and, consequently, understand what is expected. Communicating in this way puts the parents more at ease and increases their confidence in the radiographer's skills. They appreciate the fact that their child has been made the focus of attention.
- For children too young to comprehend, direct the explanation to the parent, explaining in simple sentences what is going to happen and what is expected of them. The importance and value of simple sentences cannot be emphasized enough. People in stress-filled situations do not think as clearly as they normally would, and many parents in this setting are under a certain amount of stress. Successful communication involves the use of short sentences, repeated once or twice in a soothing tone.

Dealing with the agitated parent

When approaching the agitated parent, the radiographer should observe the following guidelines:

- Remain calm and speak in an even tone, remembering that fear and frustration may be the cause of the agitation.
- Use phrases such as "My name is . . . . I can identify with how you must be feeling and can appreciate your concern," followed by "Let me explain to you what is happening."
- If possible, escort the parent to a nearby room or office to continue the explanation. This can avoid an unwanted scene in the waiting room.

Parent participation

The degree of parent participation is dependent on several factors:

1. The general philosophy of the department
2. The wishes of the parent and patient
3. The laws of the province or state regarding radiation protection.

For all concerned—the patient, parents, radiographers, and departmental administration—the advantages of parent participation can be many. Experience has shown that it is vital both parents have the basic procedure explained to them. However, it is advisable that only *one* parent be present in the actual imaging room. The presence of both parents often causes the room to become too crowded and is too distracting, and it can actually lengthen the procedure. Many provincial or state laws permit only one additional person in the room, and this serves nicely as the rationale when explaining this policy to parents. It is also helpful to post signs to this effect in strategic locations.

Parental participation is insisted upon by many parents and advocated by many pediatric radiographers because:

1. The parent can watch the child if the radiographer's or radiologist's attention is directed to the equipment or the fluoroscopic monitor.
2. The radiographer may need to leave the room.
3. The parent can assist with immobilization if needed (where permitted).
4. The parent who witnesses the entire procedure has little room for doubt about professional conduct.

This last point illustrates a benefit to parents as well as to medical personnel. The parent's presence ensures that no action, explanation, or question is misinterpreted by the child or adolescent. At the same time, the parent can take comfort in seeing that the child is being cared for in a professional manner. While parental participation is perhaps less controversial now than in the past, it can be put into perspective by imagining yourself in the position of the parent and asking whether or not you would want to be present. With increasing public knowledge, and the threat of litigation ever present, parents are participating in more and more procedures.

Informed parents, whether physically present in the imaging room or not, can usually help to explain the procedure to the child. Some hospitals and commercial organizations have prepared pamphlets which describe the procedure and answer many of the commonly asked questions.

It should also be noted here that in some cases parental presence is not advised (e.g., situations in which children are further agitated by their parents' presence or in which the procedures are too disturbing for the parents, such as in the angio/interventional suites).

Whenever a parent is in the room during the radiographic exposure, he/she should be protected from scatter radiation. The parent should also be given lead gloves if his/her hands will be near the primary radiation beam.