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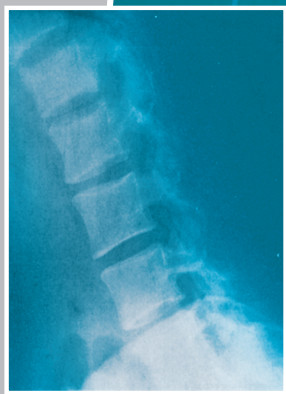
Pocket Atlas of Radiographic Positioning

Including Positioning for Conventional
Angiography, CT, and MRI

Torsten B. Moeller
Emil Reif

2nd edition

clinical sciences



Thieme

Pocket Atlas of Radiographic Positioning

Including Positioning
for Conventional Angio-
graphy, CT, and MRI

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storage.

For my brother Lars

-Torsten Moeller

For my sister Cornelia

-Emil Reif

Medicine is fortunately in a constant state of flux. New technological developments in particular—for example, in the field of multislice computed tomography—are constantly leading to changes in procedures. In this new edition, we have taken account of this and have completely revised the section on CT. We have also omitted several positioning techniques, such as the intravenous gallbladder examination, as they are no longer up to date, and have included new ones on the basis of the many suggestions that we were delighted to receive from readers of the previous edition.

As always, we have benefited from considerable help in revising the book. Special thanks are due here to the technical assistants in our department, Sabrina Eisenbarth, Anna-M. Kettenis, Lilia Otto, and Andrea Wahl for their resourceful assistance. Our team of authors and experts has also been expanded, and this will certainly have led to a further improvement in quality. We have also made an effort to take account of the relevant guidelines issued by the specialist societies.

We are continuing our efforts to improve this volume even more for later editions and would be most grateful to receive any criticisms and suggestions from readers.

Dillingen, fall 2008
*Torsten B. Moeller and
Emil Reif*

The book is about radiographic imaging—how to produce images of good quality to provide the diagnostic basis for evaluating and interpreting normal and abnormal or pathological anatomic findings. The arrangement of the material in this *Pocket Atlas of Radiographic Positioning* parallels the arrangement used in the *Pocket Atlas of Radiographic Anatomy*, and in part the arrangement used in the *Pocket Atlas of Cross-Sectional Anatomy* in the same series. This standard arrangement of the content should make it easy for radiologic technologists, as well as physicians with an interest in radiology, to cross-check and compare a correctly exposed radiographic view with normal anatomic findings.

Many good books are available on this topic. What was missing previously was a handy paperback listing at a glance, distinctly, and with a clear arrangement, all the important details that are needed for a good radiographic film—a book that in addition to clearly showing ordinary findings also provides information about variations, offers practical tips and tricks, and presents at a single glance all the criteria needed to produce a well-exposed radiographic image.

More than 200 drawings were also included in order to clarify the essential information for quick reference. The drawings have a two-color design to make them easier to grasp. Details such as projection, central ray, and cassette position are easily seen.

For added clarity, the text is systematically structured into paragraphs describing imaging parameters, positioning and technique, and variations. Where appropriate, tips and tricks are listed separately, as are the criteria for a good radiographic view, which are shown on original radiographs. This presentation should also help direct the attention of less experienced radiologists to the essential information.

We are delighted that some of the best radiologic technologists from various institutions have been willing to collaborate on this project. Their contributions to this book have ensured that there is no undue emphasis on “in-house” techniques from any one institution and that the techniques and variations shown are applicable anywhere. The book includes approaches and techniques used both in Germany and in the English-speaking world, in order to ensure universal applicability. Fruitful and detailed discussions of many issues have certainly also added to the quality and usefulness of this book as a teaching manual for training technologists, and to its value for use in everyday practice.

Extensive collaboration of this kind is unique in the field, and we would therefore like to express our sincere thanks to Dyan Attwood-Wood, Monika Braun, Beate Hoffmann, Sabine Figus, Michaela Knittel, Sabine Mattil, Christa

Riegler, Brigitte Schild, Claudia Zimmer, and Hans Werner Oetjen. Sincere thanks are also due to Drs. Markus Bach, Horst Bertram, Albert Schmitt, Patrick Rosar, Wolfgang Theobald, Stephan Knittel, Beate Hilpert, and Ute Marquardt, and to the radiologic technologists in our own practice for their friendly and knowledgeable critique and advice. Thanks also go to the first author's mother, Friedel Möller, for her support and advice regarding the artistic layout.

Dillingen, August 1996

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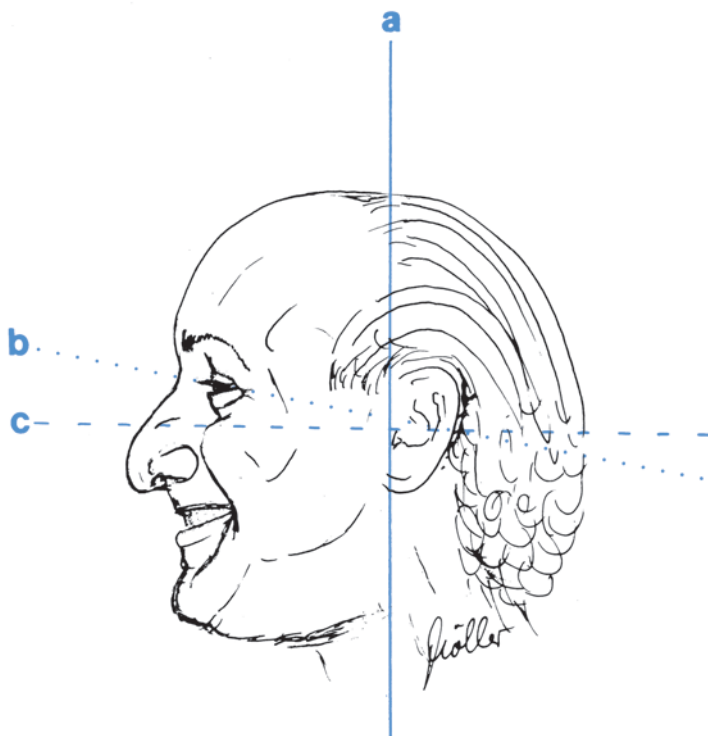
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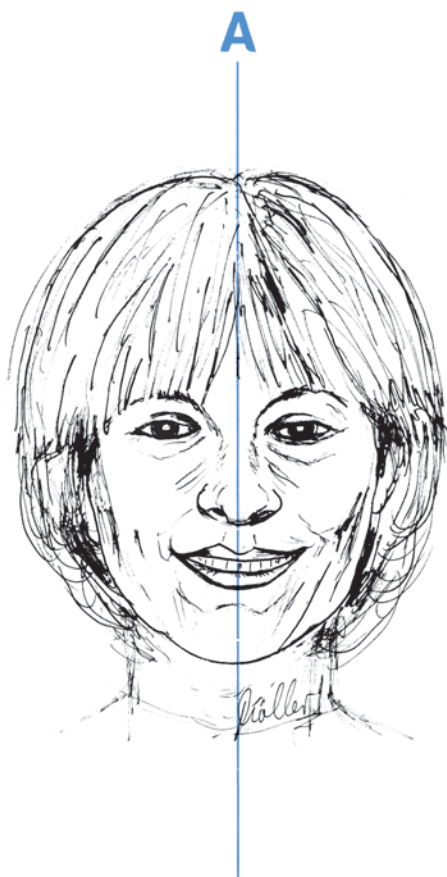
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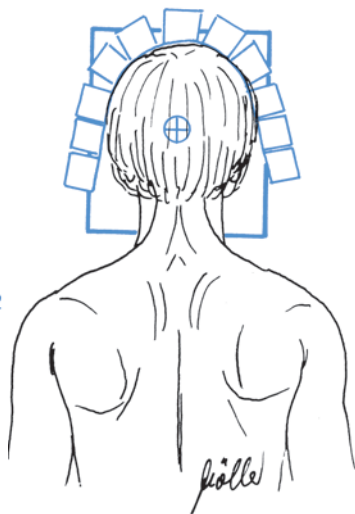
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- a** Vertical auricular line (connects the two external auditory meatus, divides skull into two halves)
- b** Eye-ear line (orbitomeatal line, extends from the outer canthus of the orbit to the external auditory meatus)
- c** Horizontal infraorbitomeatal line (from the bony inferior orbital rim to the external auditory meatus)

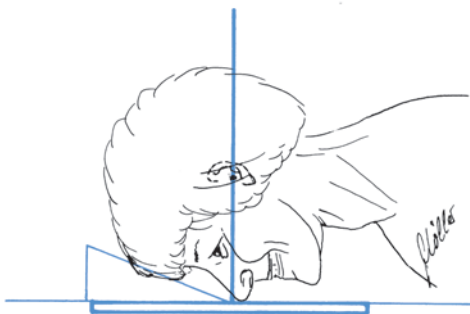


A = Median line



► Criteria for a Good Radiographic View

- Skull symmetrical and completely visualized
- Skull PA: superior petrous ridge (1) projects into mid-orbit (2)
- Skull AP: superior petrous ridge projects into the lower third of the orbit
- Outer table of the skull visible



◆ Imaging Technique

Image receiver (e.g., film): size 24×30 cm (10×12"), portrait

Image receiver dosage (sensitivity class): ≤5 μGy (SC 400)

SID: 115 cm (40")

Bucky: yes (under the table, r 8 [12])

Focal spot size: large (focal spot nominal value: 0.6 [≤1.3])

Exposure: 70–85 kV, automatic, center cell

■ Patient Preparation

- Remove dentures, glasses; open braids
- Remove jewelry (necklace, earrings, hairpins, glasses, hearing aid)
- Open clothes (buttons, zipper)

▲ Positioning

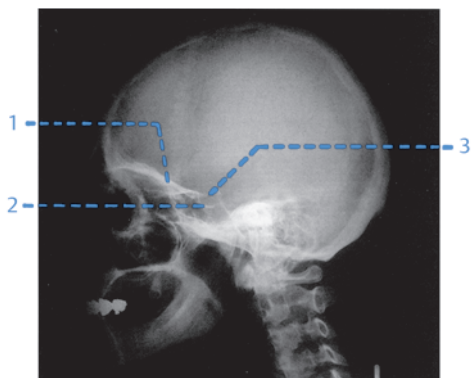
- Prone, arms along sides of the body
- Forehead supported on a sponge wedge, tip of the nose rests on the table, chin is flexed (horizontal infraorbitomeatal line is vertical)
- Supine position, head flexed so that the horizontal infraorbitomeatal line is vertical, support the head if necessary
- Tilt tube to align the central ray parallel to the horizontal infraorbitomeatal line, median plane in middle of the film, skull straight
- Head immobilized with weighted band
- Skull filter, "keyhole," long portion over the region of the cervical spine
- Gonads shielded (large lead apron)

● Alignment

- Projection: (1) PA, or (2) AP, perpendicular to the film at the middle of the skull
- Central ray directed to occipital protuberance at the center of the film
- Centering and collimation, side identification
- No breathing or swallowing during the exposure

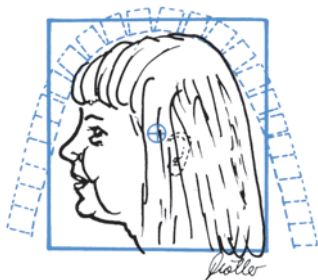
! Tips & Tricks

- The skull is straight when both auditory meatus are projected at the same level



► Criteria for a Good Radiographic View

- Complete visualization of the entire skull
- Both temporomandibular joints superimposed
- Lesser and greater sphenoid wings of the two sides superimposed (1)
- Sella linear (2) (no double line)
- Clinoid processes superimposed (3)



◆ Imaging Technique

Image receiver (e. g., film): size 24×30 cm (10×12"), landscape

Image receiver dosage (sensitivity class): ≤5 μGy (SC 400)

SID: 115 cm (40")

Bucky: yes (under the table, r 8 [12])

Focal spot size: small (focal spot nominal value: 0.6 [≤ 1.3])

Exposure: 70–80 kV, automatic, center cell

■ Patient Preparation

- Remove dentures, glasses, hearing aids, etc.
- Remove jewelry (necklace, earrings, hairpins)
- Open clothes (buttons, zipper)

▲ Positioning

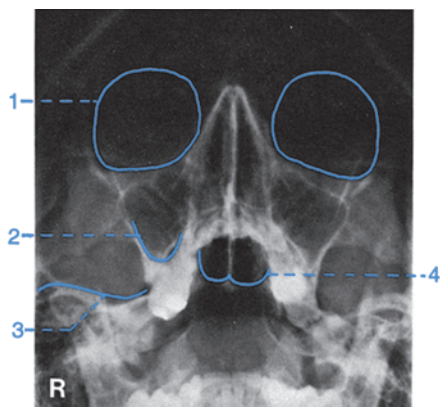
- Prone (or seated), side of the skull to be examined adjacent to the film
- Upper arm along the side of the body, forearm rests on the table
- Anterior shoulder and chin supported with sponge wedge so that the median plane of the skull is parallel to the film
- Upper border of the cassette 2 FB above the skin line (or simply: middle of the cassette = middle of the skull)
- Skull immobilized with weighted band
- Skull filter
- Gonads shielded (long lead apron)

● Alignment

- Projection: lateral, perpendicular to the film
- Central ray directed to the middle of the skull (about 1 cm above and in front of the external auditory meatus, center of the film)
- Centering and collimation, side identification
- No breathing or swallowing during the exposure

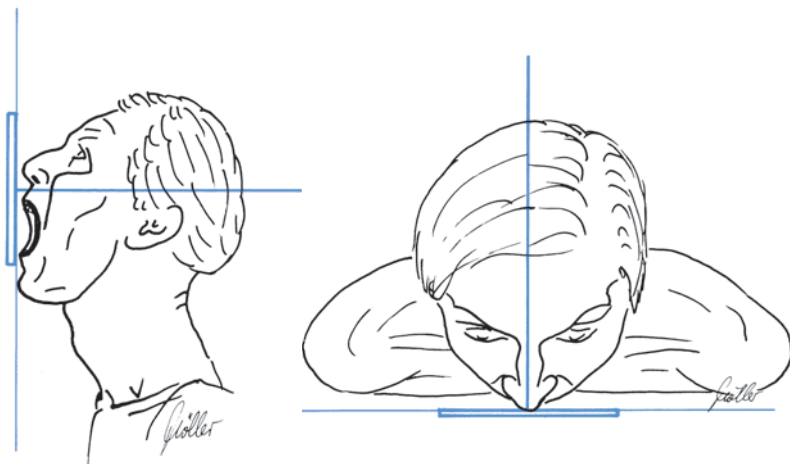
! Tips & Tricks

- Put a pillow wedge under the chest of thin patients and children so that the median sagittal plane of the skull is parallel to the table



► Criteria for a Good Radiographic View

- Both orbits symmetrical (1)
- Superior petrous ridges (3) below antral floors (2)
- Sphenoid sinus (4) projected through the open mouth



◆ Imaging Technique

Image receiver (e.g., film): size 13×18 cm (5×7") or 18×24 cm (8×10"), portrait

Image receiver dosage (sensitivity class): ≤5 μGy (SC 400)

SID: 115 cm (40")

Bucky: yes (under the table, r 8 [12])

Focal spot size: small/large (focal spot nominal value: 0.6 [≤1.3])

Exposure: 70–85 kV, automatic, center cell

■ Patient Preparation

- Remove dentures, glasses; open braids
- Remove jewelry (necklace, earrings, hairpins)
- Open clothes (buttons, zipper)

▲ Positioning

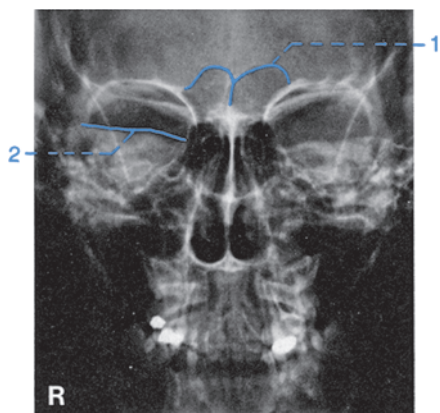
- Facing the film (seated erect)
- Head straight (median sagittal plane perpendicular to the table)
- Head extended backwards so that the chin touches and the tip of the nose is about 1 FB from the vertical cassette
- Mouth wide open
- Extension cone may be used
- Gonads shielded (large lead apron)

● Alignment

- Projection: occipitonasal
- Central ray enters 2 FB above occipital protuberance, emerges at the level of the upper lip (directed at maxillary antrum or inferior orbital rim) in the center of the film
- Centering and collimation, side identification
- No breathing or swallowing during the exposure

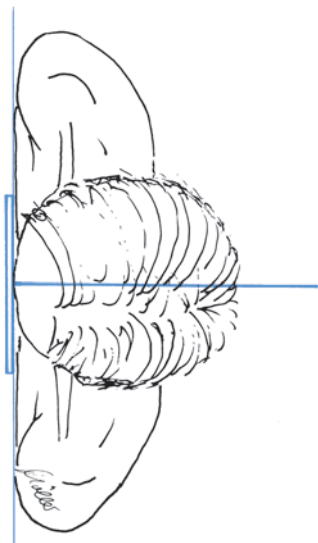
! Tips & Tricks

- Before taking the exposure, tape a paper towel to the cassette holder to put chin and mouth against (hygiene)
- If the patient cannot extend the head far enough, have him or her rest it on the chin and nose, move the tube cephalad and angle the central ray correspondingly, craniocaudad (mostly 12°, but possibly up to 30°)
- The cross in the center of the upright Bucky may be used as a centering aid: center of the cross directly below the nose



► Criteria for a Good Radiographic View

- Frontal sinuses completely visualized (1)
- Both superior petrous ridges (2) projected over the upper third of the orbit



◆ Imaging Technique

Image receiver (e. g., film): size 13×18 cm (5×7") or 18×24 cm (8×10"), portrait

Image receiver dosage (sensitivity class): ≤5 μGy (SC 400)

SID: 115 cm (40")

Bucky: yes (under the table, r 8 [12])

Focal spot size: large (focal spot nominal value: 0.6 [≤1.3])

Exposure: 77 kV, automatic, center cell

■ Patient Preparation

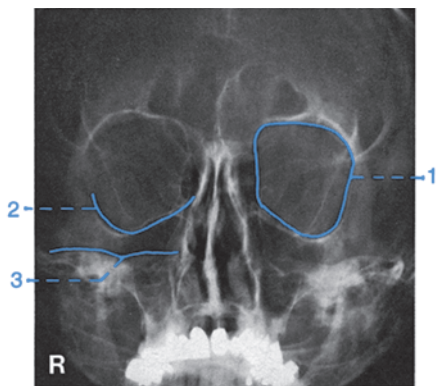
- Remove dentures, glasses; open braids
- Remove jewelry (necklace, earrings, hairpins)
- Open clothes (buttons, zipper)

▲ Positioning

- Facing the film (sitting upright, hands used for support)
- Head straight (median sagittal plane of the skull perpendicular to the film)
- Forehead and tip of the nose resting against the cassette
- Extension cone may be used
- Gonads shielded (long lead apron)

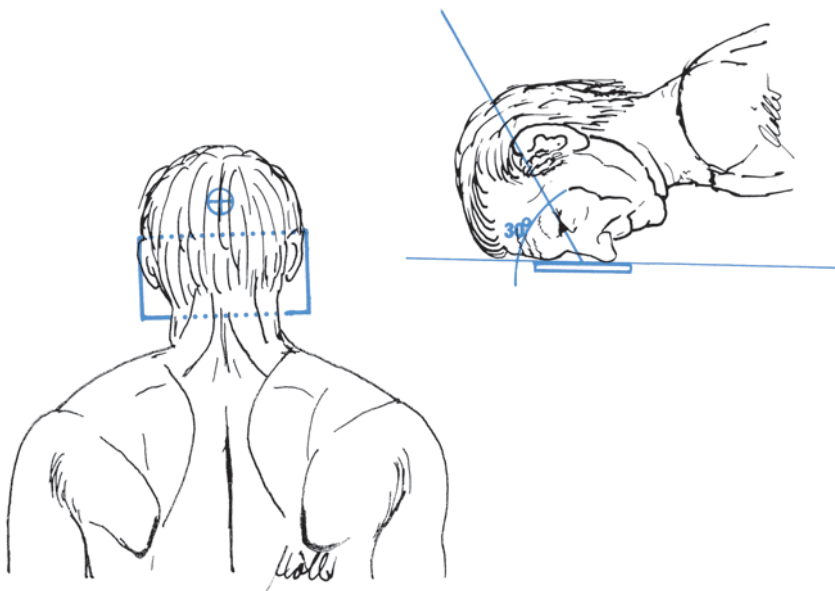
● Alignment

- Projection: occipitonasal, perpendicular to the film
- Central ray directed to the nasion in the center of the film
- Centering and collimation, side identification
- No breathing or swallowing during the exposure



► **Criteria for a Good Radiographic View**

- Symmetrical projection of both orbits without superimposition (1)
- Both superior petrous ridges (3) projected below the orbital floors (2)



◆ Imaging Technique

Image receiver (e.g., film): size 18×24 cm (8×10") or 13×18 cm (5×7"), landscape

Image receiver dosage (sensitivity class): ≤5 μGy (SC 400)

SID: 115 cm (40")

Bucky: yes (under the table, r 8 [12])

Focal spot size: small (focal spot nominal value: 0.6 [≤1.3])

Exposure: 70–85 kV, automatic, center cell

■ Patient Preparation

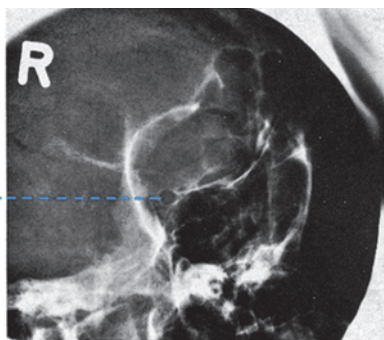
- Remove dentures, glasses; open braids
- Remove jewelry (necklace, earrings, hairpins)
- Open clothes (buttons, zipper)

▲ Positioning

- Facing the film, prone position, arms along the sides of the body
- Head straight (exactly median), resting on forehead and tip of the nose
- Gonads shielded (large lead apron)

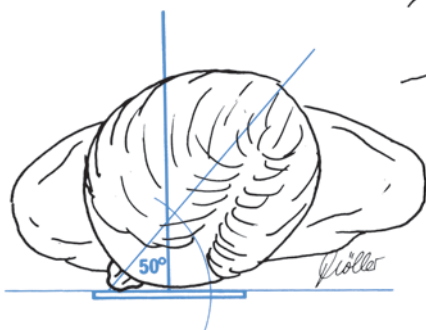
● Alignment

- Projection: occipitonasal, 20–30° craniocaudal
- Central ray directed through the median plane to the occiput and nasion in the center of the film
- Centering and collimation, side identification
- No breathing or swallowing during the exposure



► **Criteria for a Good Radiographic View**

- Optic foramen (1) projected clearly into the lower outer quadrant of the orbit



◆ Imaging Technique

Image receiver (e.g., film): size 13 × 18 cm (5 × 7"), landscape or portrait

Image receiver dosage (sensitivity class): ≤ 5 μGy (SC 400)

SID: 115 cm (40")

Bucky: yes (under the table, r8 [12])

Focal spot size: small/large (focal spot nominal value: 0.6 [≤ 1.3])

Exposure: 70–80 kV, automatic, center cell

■ Patient Preparation

- Remove dentures, glasses; open braids
- Remove jewelry (necklace, earrings, hairpins)
- Open clothes (buttons, zipper)

▲ Positioning

- Facing the film (sitting or prone position)
- Tip of the nose and zygomatic arch of the side to be examined resting against the cassette (face turned 50° to the exposed side)
- Orbit in the center of the film
- Gonads shielded (large lead apron)

● Alignment

- Projection: occipito-orbital, 5–15° craniocaudad
- Central ray enters at the vertex of an equilateral triangle whose baseline connects the mandibular angle (mastoid process) to the occipital protuberance
- Central ray emerges in the middle of the orbit
- Centering and collimation, side identification
- No breathing or swallowing during the exposure

! Tips & Tricks

- Always take both sides for comparison



► **Criteria for a Good Radiographic View**

- Complete visualization of the lower jaw
- Symmetrical projection of the temporomandibular joints

