RADIOGRAPHIC SKELETAL SURVEY
FOR SUSPECTED NON-ACCIDENTAL TRAUMA (CHILD ABUSE)

Madison Radiologists
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Summary:
1. Skull - 4 views (AP, Townes, right and left lateral)
2. C-spine - lateral
3. Chest - AP, bilateral oblique view of both ribs, lateral T-spine
4. Abdomen/Pelvis - AP
5. Lumbosacral spine - lateral
6. Arm and leg long bones - AP view each
7. PA hands
8. AP feet
Additional coned down images if there is a specific body in part in question (ie, AP and lateral knee if suspected injury)

Note: Whether the study is positive or negative for abusive trauma, appropriate patient positioning and collimation are of utmost importance. Flexed knees and ankles can obscure subtle metaphyseal fractures that can have serious consequences for the patient.

*****ACR-SPR Practice Parameters: https://www.acr.org/-/media/ACR/Files/Practice-Parameters/Skeletal-Survey.pdf

Reminders:

Right or left markers must appear on all images.

On the AP Upper Extremity view, include the hands for patients under 1 year of age and skip the PA view. Dedicated PA hand images should be obtained with patients over 1 year of age.

Do not collimate laterally for AP views of thoracic or lumbar spines when fractures are suspected due to abuse or trauma on patients under 2 years of age.

Pre-Exam Explanation

Explain to the patient and the parent what is expected to happen during the exam.

Protocol Details

AP Skull

- Supine on table, head aligned to CR and centerline of detector.
- Use head sponge to keep head still and keep arms immobilized alongside the patient. Use tape if needed.
- Ensure no rotation of head.

Exam Details

Central Ray: If AP, make sure head is straight and nose in a true AP position.
If PA, angle 15 degrees caudal to OML, centered at nasion.

FFD: 40”

Collimation: Collimate to four sides of skull.

Note: *This orientation should project the petrous ridges over the lower thirds of the orbits.*

AP Townes Skull

- Supine with arms alongside of patient. Midsagittal plane aligned to CR and centerline, perpendicular to detector.
- Ensure no rotation or tilt of head.
- Depress chin to bring OML (orbitomeatal line) perpendicular to detector.
- Immobilize head in head sponge if unable to keep head in AP position. Use tape if needed.
- Place a sheet under the patient and wrap arms in sheet to keep arms immobilized along the side of the patient's body. Place a sandbag under the legs and sandbags over the knee area to keep the patient motionless.

Exam Details

Central Ray: 30 degrees caudal to OML; infants and toddlers may need only a 15 degree caudal angle and center CR 2-3" above glabella.
ALTERNATIVE position: CR 37 degrees caudal to IOML (infraorbitomeatal line).

FFD: 40"

Collimation: Collimate to four sides of skull margins.

Respiration: Suspend during exposure if possible.

Lateral Skull

- Older patients my tolerate prone position with head turned to side. Have one arm alongside of patient with other arm resting by patient's head. For example, if doing right side, have the left arm by face with right arm along right side of body.
- If unable to do prone, do AP and keep patient immobilized with sheet and sandbags. Turn head laterally and immobilize with tape to keep head in true lateral position. Can place a small angle sponge under chin to help keep the patient lateral and motionless.
- Center detector to CR

Exam Details

Central Ray: CR perpendicular to detector and 2" superior to EAM, external auditory meatus.

FFD: 40"

Collimation: Collimate to four sides of skull margins.

Respiration: Suspend during exposure if possible.

Note: *Always do both laterals.*

AP Ribs

- Erect or recumbent with midsagittal plane to centerline and CR.
- Top of detector 1-1 ½ " above the shoulders.
- Roll shoulders forward and no rotation.
- Thorax should be centered to detector bilaterally.

Exam Details

Central Ray: CR perpendicular to center of IR

FFD: 40"

Collimation: To rib margins on all sides.

Respiration: Expose on **inspiration** if possible.

Oblique ribs

- AP or PA
- 45-degree rotation
- Entire thorax centered to detector

Exam Details

Central Ray: CR perpendicular to center of detector at level of T7

FFD: 40"

Collimation: To rib margins on all sides. Exclude face and pelvis.

Respiration: Expose on expiration, if possible

AP Abdomen/Pelvis

- Supine on the table with legs extended and rotated 15 degrees internally unless hip fracture is known. Immobilize with tape if necessary to hold legs in proper rotation.
- Immobilize arms with sandbags if necessary.

Exam Details

Central Ray: Perpendicular to detector and centered to iliac crests

FFD: 40”

Collimation: Collimate to include entire pelvis and abdomen. Exclude chest and legs beyond hips.

Note: Do not attempt to internally rotate if known hip fracture.

AP Upper Extremities (Long Bones)

- Arms fully extended and in AP position (no forearm pronation).
- Top of shoulder joint, arm and wrist joint must be included on one image.
- DO NOT include hands if over 1 year of age. Otherwise include hands in anatomic AP position with fingers straight.
- Use sponges and tape for positioning.

AP Lower Extremities

- Legs fully extended and in AP position. No rotation or flexion.
- Include top of hip joint to bottom of ankle joint on one image.
- DO NOT include feet.
- ***Knees must be in true AP projection, with growth plates perpendicular to beam. If not, supplement with dedicated AP knee images.***

Exam Details

Central Ray: Center tube to either elbow or knee area and open cones lengthwise.

FFD: 40”

Collimation: Collimate lengthwise to include area entire arm or leg.

AP Thoracic Spine

- Patient supine with hips and knees flexed if possible to reduce lordotic curve.
- Immobilization either by wrapping arms in sheet or placing sandbags on each arm.
- Ensure no rotation of thorax or pelvis.
- Raise chin above chest.
- Top of IR 1 ½" above shoulders.

Exam Details

Central Ray: Perpendicular to detector and centered at level of T7

FFD: 40"

Collimation: Long narrow collimation to T-spine area.

Respiration: Exposure on expiration is best for uniform density.

Note: For infant or toddler, may include both T and L spines on one image.

Lateral Thoracic Spine

- Patient recumbent with support under head in lateral position.
- Hips and knees flexed, arms raised and elbows flexed when possible.
- Align and center mid-axillary plane to centerline.
- Top of IR 1 ½" above shoulders.
- Ensure no rotation of spine.

Exam Details

Central Ray: Perpendicular to detector and centered at level of T7; about 3-4" below jugular.

FFD: 40"

Collimation: Long narrow collimation to T-spine area.

Respiration: Use a breathing technique when possible or expose on full expiration.

Note: If infant or toddler, may include both T and L spine on one image.

AP Lumbar Spine

- Patient supine with spine aligned to centerline.
- Flex hips and knees to reduce lordotic curve.
- Ensure no rotation so that ASISs are same distance from table.
- Center detector to CR.

Exam Details

Central Ray: Perpendicular and 1” above iliac crest.

FFD: 40”

Collimation: Long narrow collimation to L-spine area.

Respiration: Exposure at end of expiration.

Lateral Lumbar Spine

- Patient recumbent in true lateral position, flex hips and knees, midaxillary plane aligned to centerline and CR.
- Place support under waist as needed to orient spine parallel to tabletop. Provide support between knees if necessary.
- Center detector to CR.

Exam Details

Central Ray: Perpendicular to spine or level 1" above iliac crest (L3).

FFD: 40"

Collimation: Long narrow collimation to L-spine area.

Respiration: Suspend during exposure.

Note: If infant or toddler, may include both T and L spine on one image.

PA/AP Hands

- PA position preferred when possible
- Hand flat on detector
- Older patients can be seated, hand on table in PA position with elbow flexed.
- Align long axis of hand and wrist parallel to edge of detector.
- Digits slightly separated.

Exam Details

Central Ray: Centered to 3rd MCP (metacarpophalangeal) joint.

FFD: 40”

Collimation: Include entire hand and wrist.

AP Feet

- Supine or seated on the table with foot flat on detector.
- Extend foot by sliding foot and detector forward while keeping foot flat; support with sandbags to keep from sliding if necessary.

Exam Details

Central Ray: Perpendicular to metatarsals (5-10 degrees cephalic angle) and centered to base of 3rd metatarsal.

FFD: 40”

Collimation: Collimate to four sides of foot.