ARRT Radiography Trap-Buster — Part 5 of 6

Lower Extremities, Pelvis/Hip, Spine & Thorax Positioning Rules, Named Methods & Registry Traps

1. Lower Extremities: Rotation, Angles & Named Methods

Anatomy / Method	Positioning & CR Angle	Structure Demonstrated	ARRT Exam Trap
Foot: Medial vs. Lateral Oblique	**Medial (Internal) Oblique:** 30°–40° medial rotation. **Lateral Oblique:** 30° lateral rotation.	**Medial Oblique:** Sinus tarsi, cuboid, calcaneus, bases of 3rd–5th metatarsals. **Lateral Oblique:** 1st & 2nd metatarsals, medial cuneiform.	Routine foot oblique is **medial (internal)** at 30°–40°. Also requires a **10° posterior (toward heel)** CR angle on AP/oblique foot to open TMT joints!
Calcaneus (Axial Plantodorsal)	Dorsiflex foot 90°; CR **40° cephalad** entering base of 3rd metatarsal.	Calcaneal tuberosity, sustentaculum tali, subtalar joint.	If patient cannot dorsiflex foot fully to 90°, **increase** the cephalad angle to maintain a 40° angle relative to the plantar surface.
Ankle: Mortise vs. 45° Oblique	**Mortise:** 15°–20° internal rotation. **45° Oblique:** 45° internal rotation. CR perpendicular to malleoli.	**Mortise:** Entire 3-sided ankle mortise (tibiotalar joint) free of overlap. **45° Oblique:** Open **distal tibiofibular joint**.	**TRAP** 15°–20° opens the **mortise**; 45° opens the **distal tibiofibular joint**. Don't swap them!
Knee: Internal vs. External Oblique	**Internal (Medial):** 45° inward. **External (Lateral):** 45° outward. CR perpendicular (or 3°–5° cephalad).	**Internal Oblique:** Open **proximal tibiofibular joint** & lateral tibial condyle. **External Oblique:** Medial femoral/tibial condyles.	**Internal rotation** opens *both* the proximal (knee) and distal (ankle) tibiofibular joints!
Lateral Knee CR Angle	Flex knee 20°–30°; CR **5°–7° cephalad** entering 1 in. distal to medial epicondyle.	Superimposed femoral condyles; open patellofemoral & femorotibial joints.	The **5°–7° cephalad** angle compensates for the longer medial femoral condyle so the condyles superimpose cleanly.
Intercondylar Fossa (Tunnel Views)	**Holmblad (kneeling) & Camp Coventry (prone):** Knee flexed 40°–50°; CR perpendicular to lower leg (40°–50° caudad on prone). **Béclère:** Supine, CR perpendicular to tibia.	Intercondylar fossa (notch), tibial spines (intercondylar eminence), medial/lateral femoral condyles.	**Camp Coventry** = prone with **caudad** CR. **Béclère** = supine with **cephalad** CR (higher OID, more magnification).
Patella Tangential (Sunrise / Settegast / Hughston)	**Settegast:** Prone, acute knee flexion (>90°), CR 15°–20°. **Hughston:** Prone, 55° flexion, CR 45° cephalad. **Merchant:** Supine, 40° flexion, CR 30° caudad.	Patellofemoral joint space and vertical patellar fractures.	**TRAP** Acute flexion (Settegast) is **contraindicated** in suspected transverse patellar fracture (pulls fragments apart!).
Weight-Bearing Knees & Feet	Erect, full weight evenly distributed on both feet; horizontal CR.	True joint-space narrowing (osteoarthritis) and longitudinal arch status.	Must be performed **bilaterally** for comparison unless otherwise ordered.

2. Pelvis & Hip Positioning Traps

Projection / Method	Patient & CR Setup	Anatomy & Evaluation	ARRT Exam Trap
AP Pelvis & Unilateral Hip	Rotate lower limbs **internally 15°–20°**. Pelvis CR: midway between ASIS & symphysis pubis.	Places **femoral necks parallel to IR**; puts **lesser trochanters** out of profile (superimposed posteriorly).	**CRITICAL TRAP** **NEVER internally rotate** a suspected hip fracture! Leave externally rotated & shoot cross-table lateral.
Danelius-Miller (Cross-Table Lateral Hip)	Supine; flex unaffected hip/knee out of beam; IR vertical against affected hip; horizontal CR perpendicular to femoral neck.	Trauma lateral of femoral head, neck, and acetabulum without moving injured leg.	Requires a grid cassette placed parallel to the femoral neck; unaffected thigh is

			elevated out of the horizontal beam.
Modified Cleaves (Frog-Leg Lateral)	Supine; flex knees/hips and abduct femora **45° from vertical** (soles of feet together).	Non-trauma bilateral lateral view of femoral heads, necks, and trochanters (e.g., SCFE, DDH).	**Contraindicated** for acute trauma, suspected fracture, or destructive hip disease.
Pelvic Inlet vs. Outlet (Bridgeman / Taylor)	**Inlet:** CR **40° caudad**. **Outlet:** CR **20°–35° cephalad (males)** or **30°–45° cephalad (females)**.	**Inlet:** Pelvic ring (anterior/ posterior displacement). **Outlet:** Superior/inferior pubic rami & ischia without foreshortening.	**Inlet = Caudad** (looks *in* from above). **Outlet = Cephalad** (looks *up* from below; females need 10° more cephalad angle).
Judet Method (Acetabulum)	45° posterior oblique (affected side **UP** vs. affected side **DOWN**); CR perpendicular to hip.	**Upside (Affected UP):** Anterior column & posterior rim. **Downside (Affected DOWN):** Posterior column & anterior rim.	MEMORY **U-A-P** (Up = Anterior column / Posterior rim) and **D-P-A** (Down = Posterior column / Anterior rim).

ARRT Radiography Trap-Buster — Part 5 (Continued)

Spine, SI Joints, Sternum & Ribs — Opposite Oblique Rules, Breathing Techniques & CR Angles

3. Spine & Sacroiliac (SI) Joints: The "Opposite Oblique" Matrix

Spine / Joint Region	Oblique & CR Angle	Anatomy Demonstrated (Closest vs. Farthest)	ARRT Exam Trap
Cervical Spine Obliques (45°)	**LPO / RPO:** CR **15° caudad**. **LAO / RAO:** CR **15° cephalad**. Enter at C4.	**LPO / RPO:** Intervertebral foramina **FARTHEST** from IR. **LAO / RAO:** Intervertebral foramina **CLOSEST** to IR.	**TRAP** Anterior obliques = **Closest + Cephalad**. Posterior obliques = **Farthest + Caudad**.
AP Axial C-Spine	CR **15°–20° cephalad** entering at C4 (lower border of thyroid cartilage).	C3–C7 bodies and open intervertebral disk spaces.	Cephalad angle matches the natural upward tilt of the cervical intervertebral disk spaces.
Swimmer's Lateral (Twining Method)	Arm closest to IR raised overhead; opposite shoulder depressed. CR perpendicular (or **3°–5° caudad**).	**C7–T1** interspace when obscured by shoulders on routine lateral C-spine.	Add **3°–5° caudad** angle *only* if the patient cannot fully depress the shoulder farthest from the IR.
Thoracic Spine Obliques (70°)	Rotate body **70° from supine/ prone** (20° from lateral); CR perpendicular to T7.	**LPO / RPO:** Zygapophyseal joints **FARTHEST** from IR. **LAO / RAO:** Zygapophyseal joints **CLOSEST** to IR.	T-spine obliques require a steep **70°** obliquity (unlike 45° for C-spine and L-spine).
Lumbar Spine Obliques (45°)	45° oblique (or 30° for L5–S1, 50° for L1–L2); CR perpendicular to L3.	**LPO / RPO:** Zygapophyseal joints **CLOSEST** to IR. **LAO / RAO:** Zygapophyseal joints **FARTHEST** from IR.	**OPPOSITE OF C-SPINE!** In L-spine, **Posterior** obliques show the **downside (closest)** "Scottie dog" eye.
L5–S1 Lateral Spot & AP Axial	**Lateral Spot:** CR perpendicular (or 5°–8° caudad if waist sags). **AP Axial:** 30° cephalad (males), 35° cephalad (females).	Opens the L5–S1 lumbosacral intervertebral disk space.	Females have a wider pelvis, causing greater lumbar lordosis and requiring **5° more cephalad** angle (35° vs. 30°).
Sacroiliac (SI) Joints	**LPO / RPO (25°–30°):** CR perpendicular. **AP Axial:** 30° cephalad (M) / 35° cephalad (F).	**LPO / RPO:** Opens the SI joint **FARTHEST** from IR (e.g., RPO opens the **left** SI joint).	**LAO / RAO** opens the SI joint **CLOSEST** to the IR.
Sacrum vs. Coccyx AP Axial	**Sacrum:** CR **15° cephalad** (2 in. above symphysis). **Coccyx:** CR **10° caudad** (2 in. above symphysis).	Projects sacrum or coccyx free of symphysis pubis superimposition.	**Sacrum = Cephalad (15°)**; **Coccyx = Caudad (10°)**. Empty urinary bladder beforehand!

4. Thorax, Sternum & Ribs Traps

Exam / Projection	Positioning & Technical Setup	Clinical Rationale	ARRT Exam Trap
Sternum: RAO (15°–20°)	Prone, rotate into **15°–20° RAO**; 30–40 in. SID; low mA + long exposure time (orthostatic breathing).	Projects sternum over the homogeneous heart shadow on the left side of the spine, blurring lung markings.	**Never use LAO** for routine sternum (projects sternum over dense thoracic spine). Use **LPO** if patient cannot lie prone.
SC Joints (PA & RAO/LAO)	PA or slight **10°–15° RAO/LAO**; CR perpendicular to T2–T3; suspended expiration.	**RAO** demonstrates the **right** SC joint (closest to IR); **LAO** demonstrates the **left** SC joint.	Always place the **affected SC joint closest to the IR** (anterior oblique) to minimize OID and magnification.
Ribs: Above vs. Below Diaphragm	**Above Diaphragm (Ribs 1–10):** Upright, full **inspiration**, 65–75 kVp. **Below Diaphragm (Ribs 9–12):** Recumbent, full **expiration**, 75–85 kVp.	Inspiration depresses diaphragm to show upper ribs; expiration elevates diaphragm to show lower ribs through less dense air.	**TRAP** Above = **Upright + Inspiration**. Below = **Supine + Expiration**.

Rib Obliques (45°)	**Anterior injury:** 45° anterior oblique (LAO/RAO). **Posterior injury:** 45° posterior oblique (LPO/RPO).	Rotates axillary portion of ribs free from spine and sternum superimposition.	**Rule:** Always place the **injured side CLOSEST to the IR** (Anterior injury = Anterior oblique; Posterior injury = Posterior oblique).
Chest Lateral Decubitus	Patient lying on side for 5 minutes before exposure; horizontal CR; full inspiration.	**Affected side DOWN:** Rules out fluid (pleural effusion). **Affected side UP:** Rules out free air (pneumothorax).	Both sides of the chest must be included on the IR; arms raised well above head.

Master "Breathing Technique" (Orthostatic) Exam List — Blur Overlying Ribs & Lungs

Use a **low mA + long exposure time (2–4 seconds)** with shallow, quiet breathing on these four exams to blur overlying lung/rib markings: **(1) Lateral Thoracic Spine**, **(2) RAO Sternum**, **(3) Transthoracic Lateral Humerus (Lawrence Method)**, and **(4) Lateral Cervicothoracic (Swimmer's)** (optional).