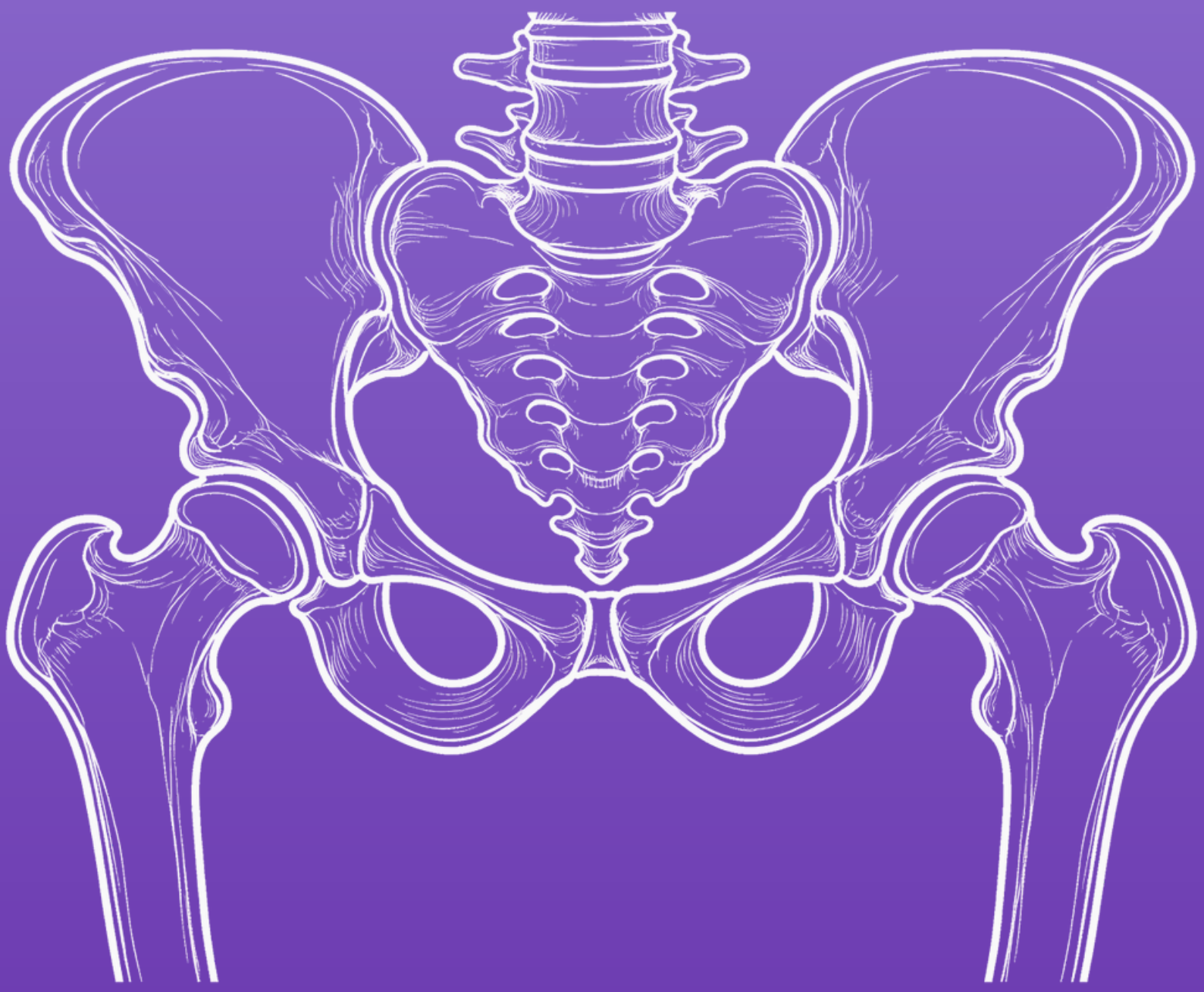
Unique
anatomies,
costumised
solutions

RADIOLOGICAL PROTOCOL

HIP



VALOR IMPLANT

Radiological protocol TC - Hip

The basic requirement for digital surgical planning is a high-quality computed tomography scan with clear and well-defined bone edges. These qualities are essential for the correct design of personalised instruments and implants.

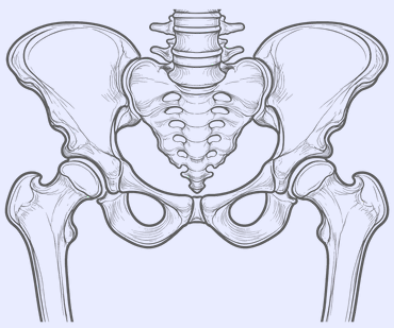
Indicatons

This protocol is indicated for personalised surgical planning studies of acetabular reconstruction, in which a detailed assessment of the bone defect and hip anatomy is required. It includes bilateral acquisition, which may be reduced to unilateral imaging of the affected hip, as indicated by the surgical team.

Recommendations

The X and Y centres should be not modified between scans, nor should the table be raised or lowered between slices. The scan should be performed using the same field of view and reconstruction centre.

Acquisition:

Topogram	Hip: Pelvis and proximal femur 
Field of view (FOV)	Adjust the FOV so that no anatomical region is cropped, ensuring the entire pelvis and proximal femur up to the middle third of the femur are included
Matrix	512 x 512
Detector collimation	1.5 mm. Continuous slice increment

Pitch	≤ 1
kVp	100 or 140 if the patient is obese, elderly or has metallic components
Automatic exposure control	Enabled
Rotation time	≤ 1 s

Reconstruction:

Multiplanar reconstruction (MPR)	Reconstruction of the complete study in all three planes
Reconstruction algorithm	Soft tissue/moderate algorithm. Do not use the bone algorithm. Use a single window
MPR slice thickness	0.625 mm

Appendix- Reduction of metal artefacts (MAR) and noise

Objective

Minimise artefacts caused by prostheses, screws or osteosynthesis in the hip joint, while preserving bone and soft tissues diagnostic image quality and enabling valid reconstructions for 3D planning and STL export.

Acquisition settings (add without modifying the original ROI)

Parameter	Recommended	Notes / Justification
Region	Affected hip (or bilateral if applicable) including the entire prosthesis, complete acetabulum and proximal femur up to the middle third	Prevents implant truncation
kVp	140 kVp (fallback 120 kVp)	Reduces beam hardening from metallic materials
mA / AEC	Automatic with an upper limit 20–30% above standard	Compensates for increased noise due to MAR and high kVp
Rotation time	0.5-1.0 s (prioritise 0.5 s)	Minimises motion artefacts
Pitch	0.6-1.0 (recommended 0.8)	Balance between coverage and resolution
Collimation/slice thickness	≤0.625 mm	Isotropy for MAR and 3D reconstructions

FOV	Centred on the femoral head or midpoint between both hips	Prevents the prosthesis from being located at the detector edge
Posición del paciente	Supine, legs extended and parallel, ensuring affected hip geometrically centred	Centring the metal reduces asymmetrical streaks

ALWAYS generate paired series with and without MAR.

- Reference (without MAR): Soft/moderate kernel, FBP or mild IR; slices 0.6 mm / 0.4 mm increment.
- MAR activated: Soft/moderate kernel + manufacturer algorithm (iMAR/O-MAR/Smart MAR/ SEMAR).
- DECT / Spectral (if available): VMI 100–140 keV (save at least 100, 120, and 140 keV); consider 70 keV for soft tissues if artefact saturation is absent.
- 3D volume (planning): Use the series without MAR, isotropic 0.6 mm, intended for STL export.

Post-processing and verification

- Check bone and soft tissue windows; confirm cortical continuity near metal.
- If streak artifacts persist, increase VMI keV (120 → 140 keV) and/or compare with the series without MAR.
- Confirm implant centering and absence of truncation before sending to PACS.
- Always export STL from the series without MAR (MAR can alter geometries).

Console setup sheet

```
Name: ORTO_[HIP]_MAR
 kVp: 140 (fallback 120)
 mA (AEC): ON, upper limit +20–30%
 Rotation: 0.5–1.0 s
 Pitch: 0.8 (≤1)
 Collimation: 0.6 mm (recon 0.6 / inc. 0.4)
 Kernels: B40s (soft) + B70f (bone)
 Series:
    1) Standard IR (B70f)
    2) MAR ON
    3) VMI 100–140 keV (if DECT)
    4) 3D export (without MAR)

FOV: 180–220 mm centred on the femoral head or midpoint between both hips
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