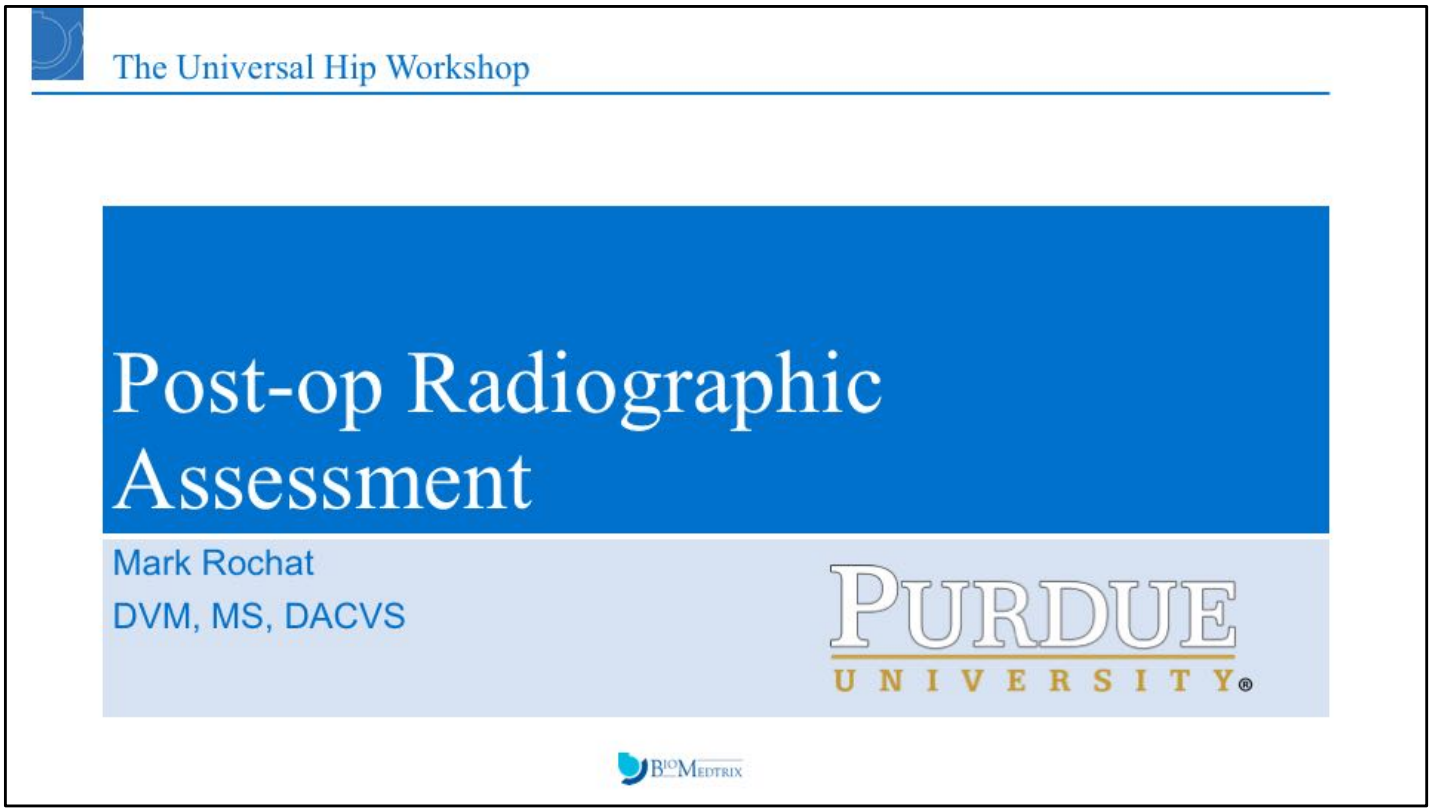
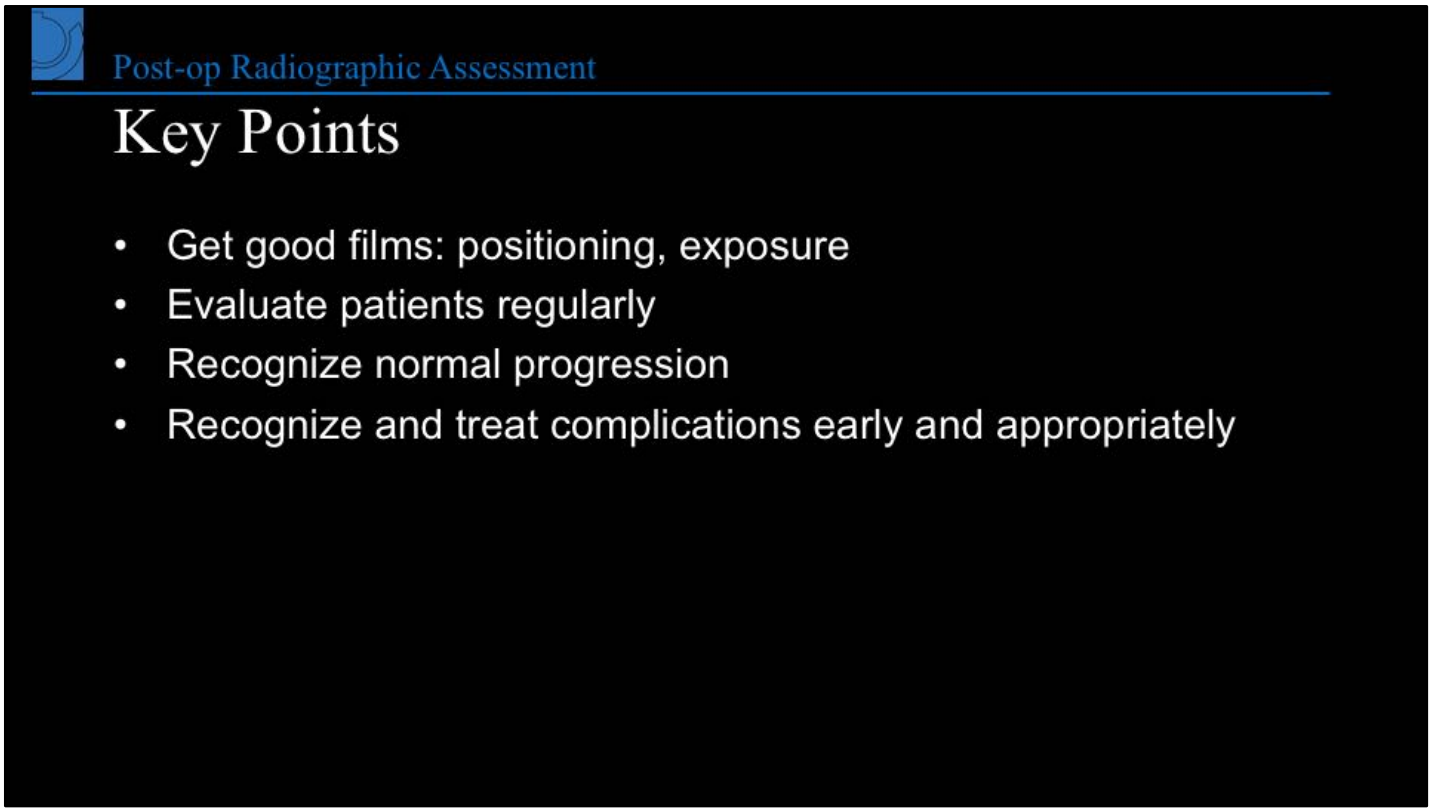
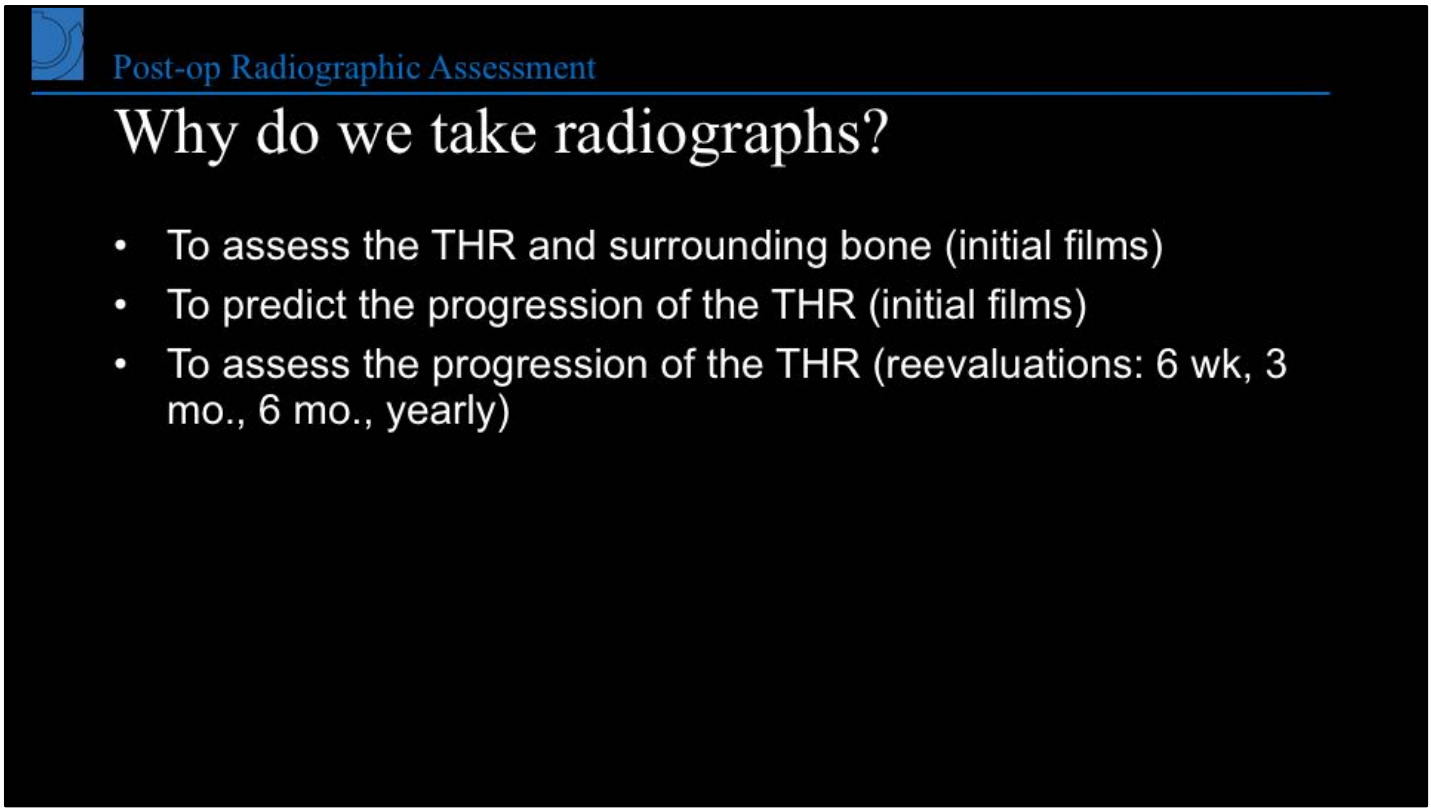

The Universal Hip Workshop
Post-op Radiographic Assessment
Mark Rochat
DVM, MS, DACVS
PURDUE
UNIVERSITY
BioMedtrix

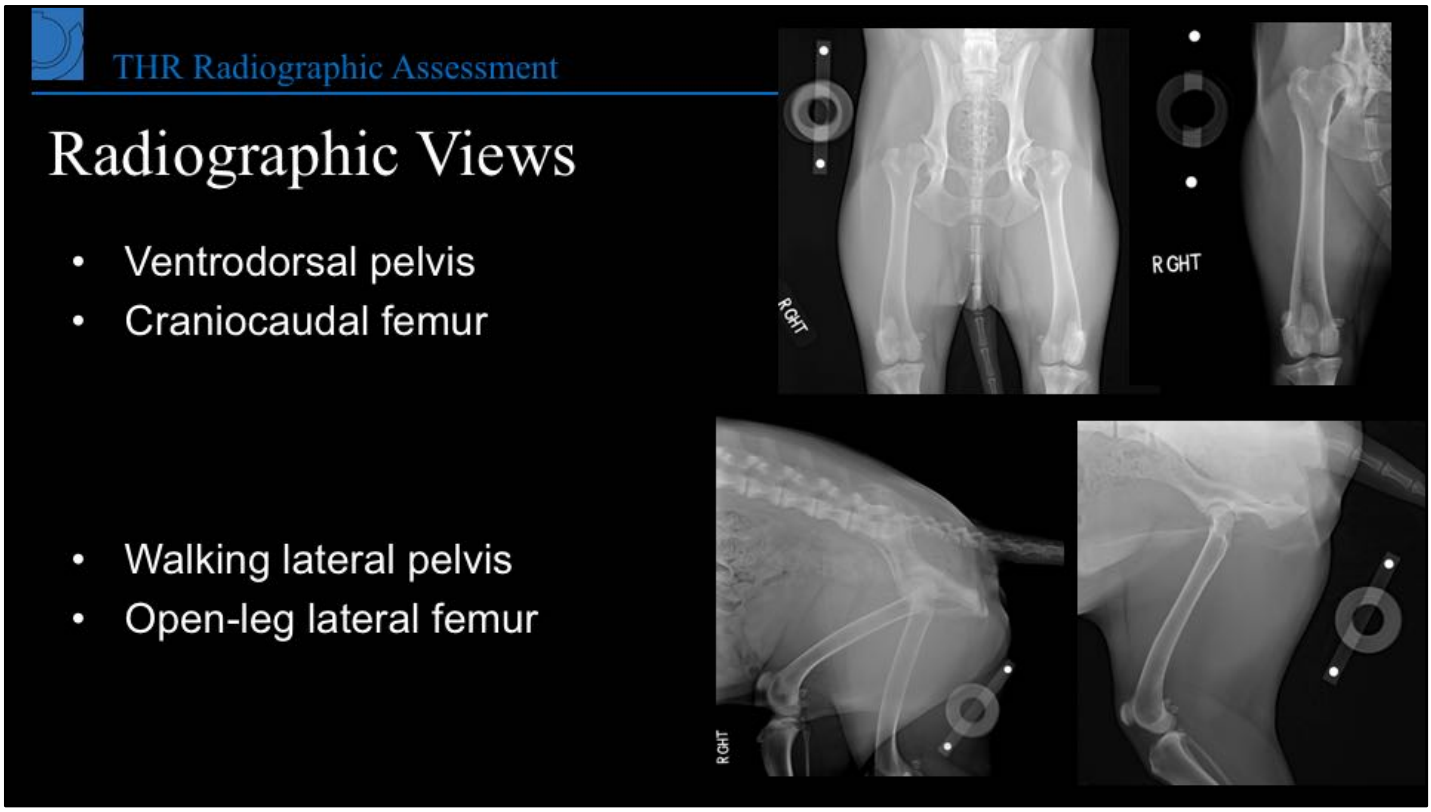
Notes


Post-op Radiographic Assessment
Key Points
• Get good films: positioning, exposure
• Evaluate patients regularly
• Recognize normal progression
• Recognize and treat complications early and appropriately

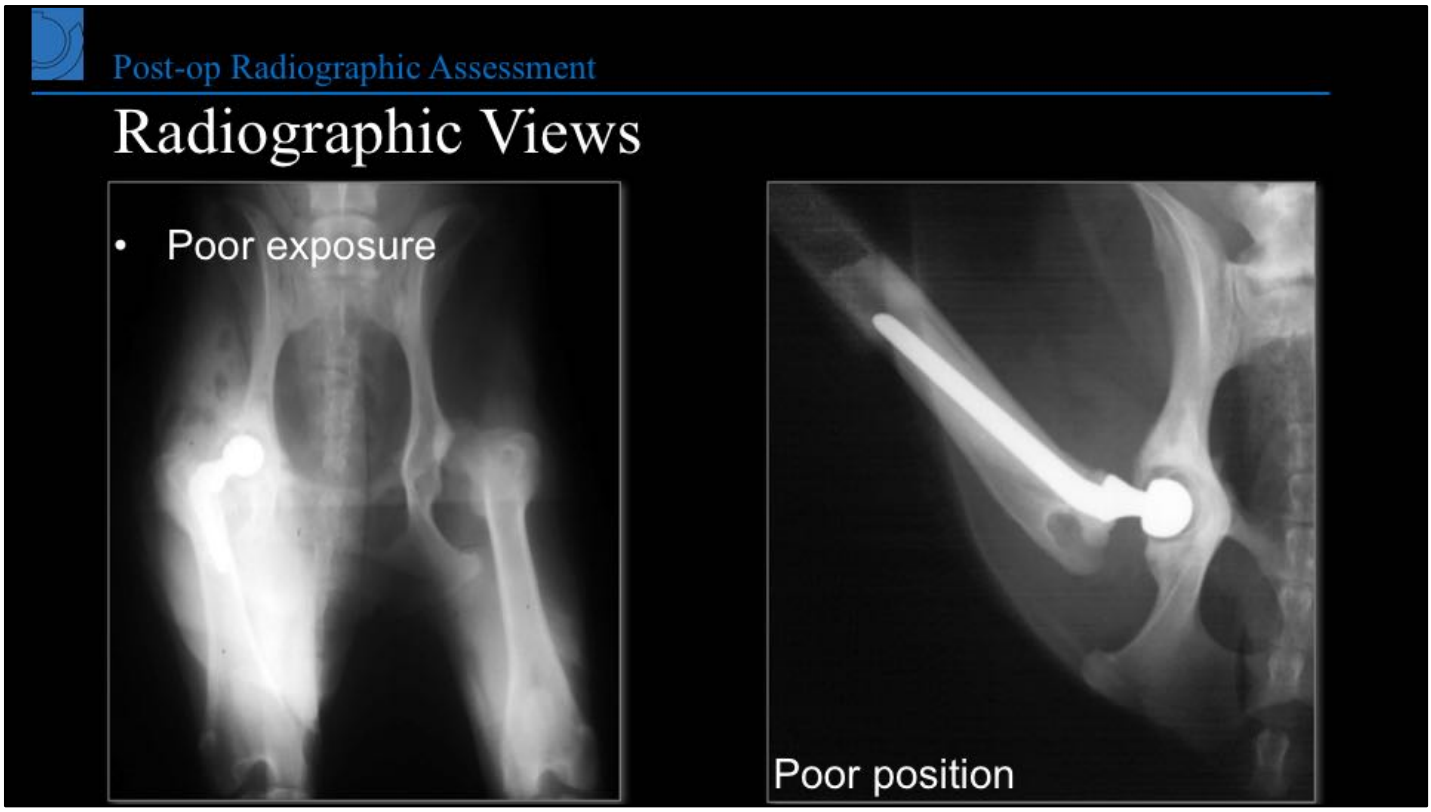
Notes


Post-op Radiographic Assessment
Why do we take radiographs?
• To assess the THR and surrounding bone (initial films)
• To predict the progression of the THR (initial films)
• To assess the progression of the THR (reevaluations: 6 wk, 3 mo., 6 mo., yearly)

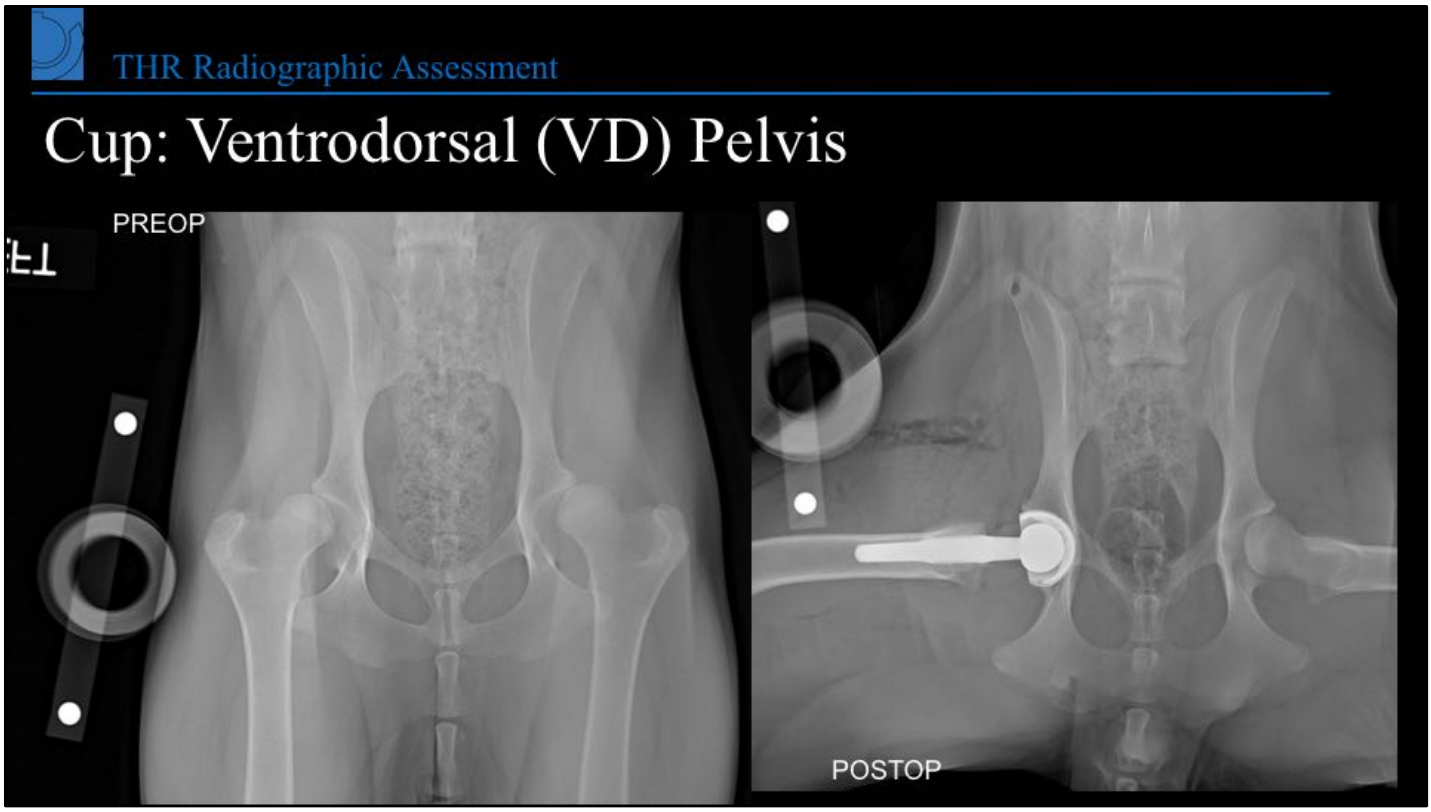
Notes


THR Radiographic Assessment
Radiographic Views
• Ventrodorsal pelvis
• Craniocaudal femur
• Walking lateral pelvis
• Open-leg lateral femur
RIGHT
RIGHT
RIGHT

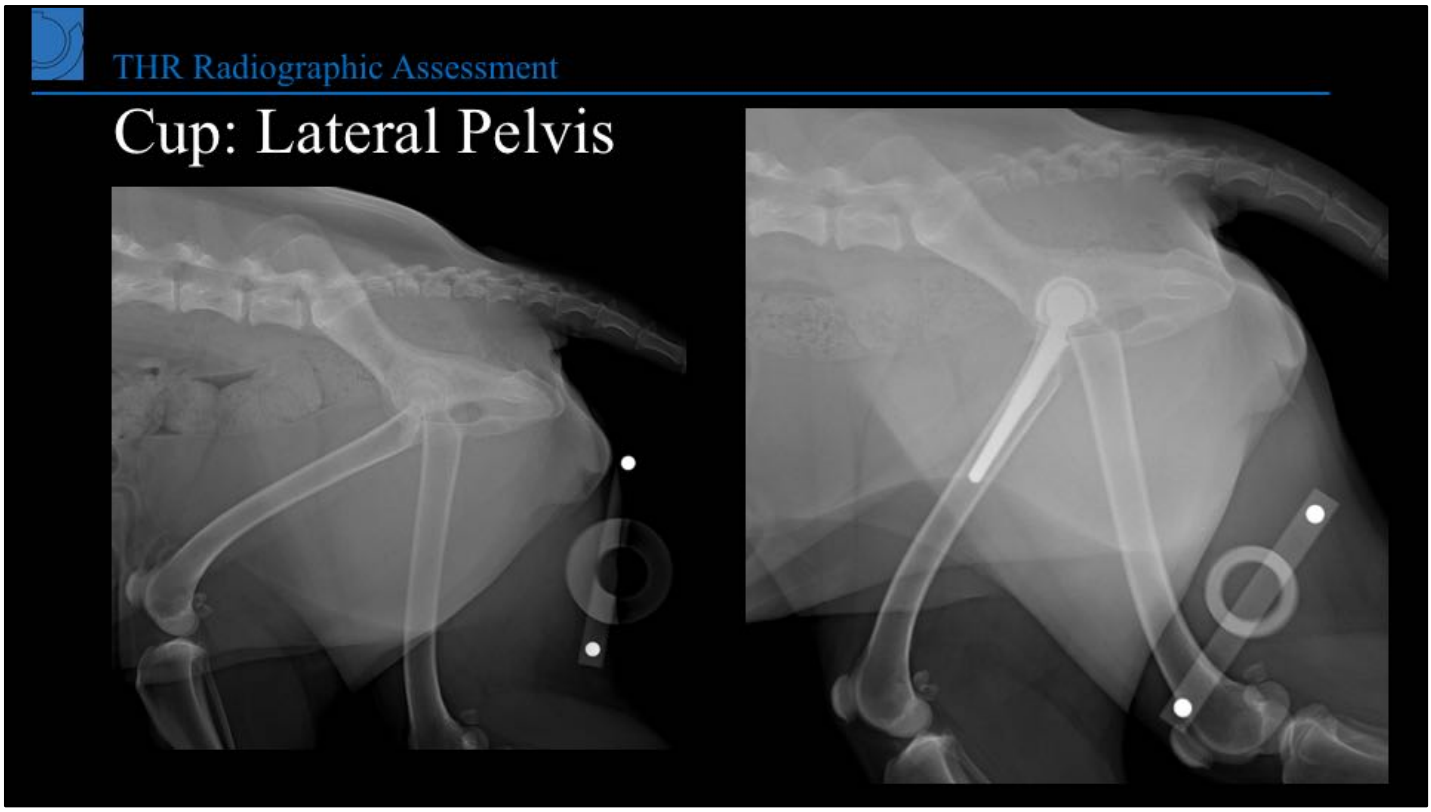
Notes


Post-op Radiographic Assessment
Radiographic Views
• Poor exposure
Poor position

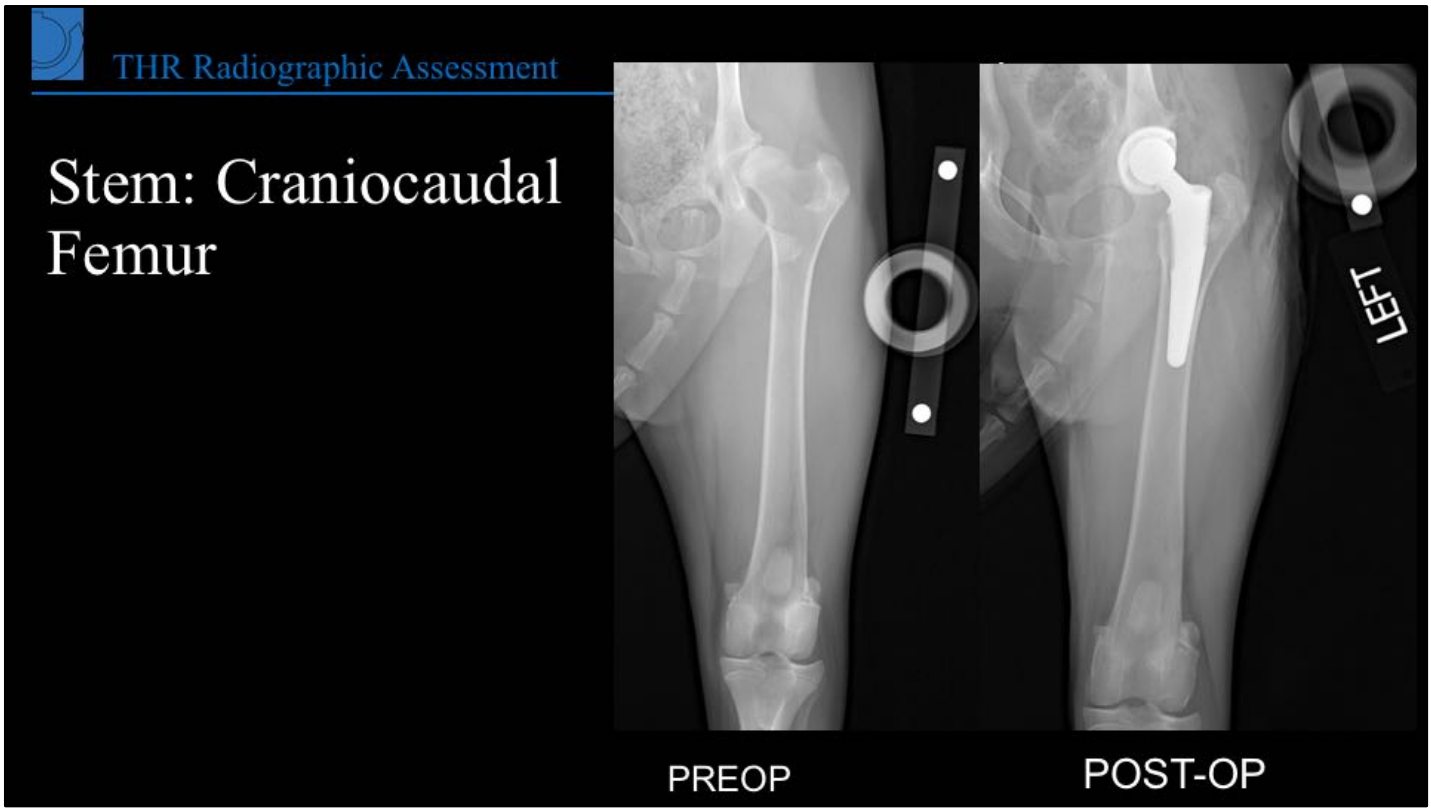
Notes



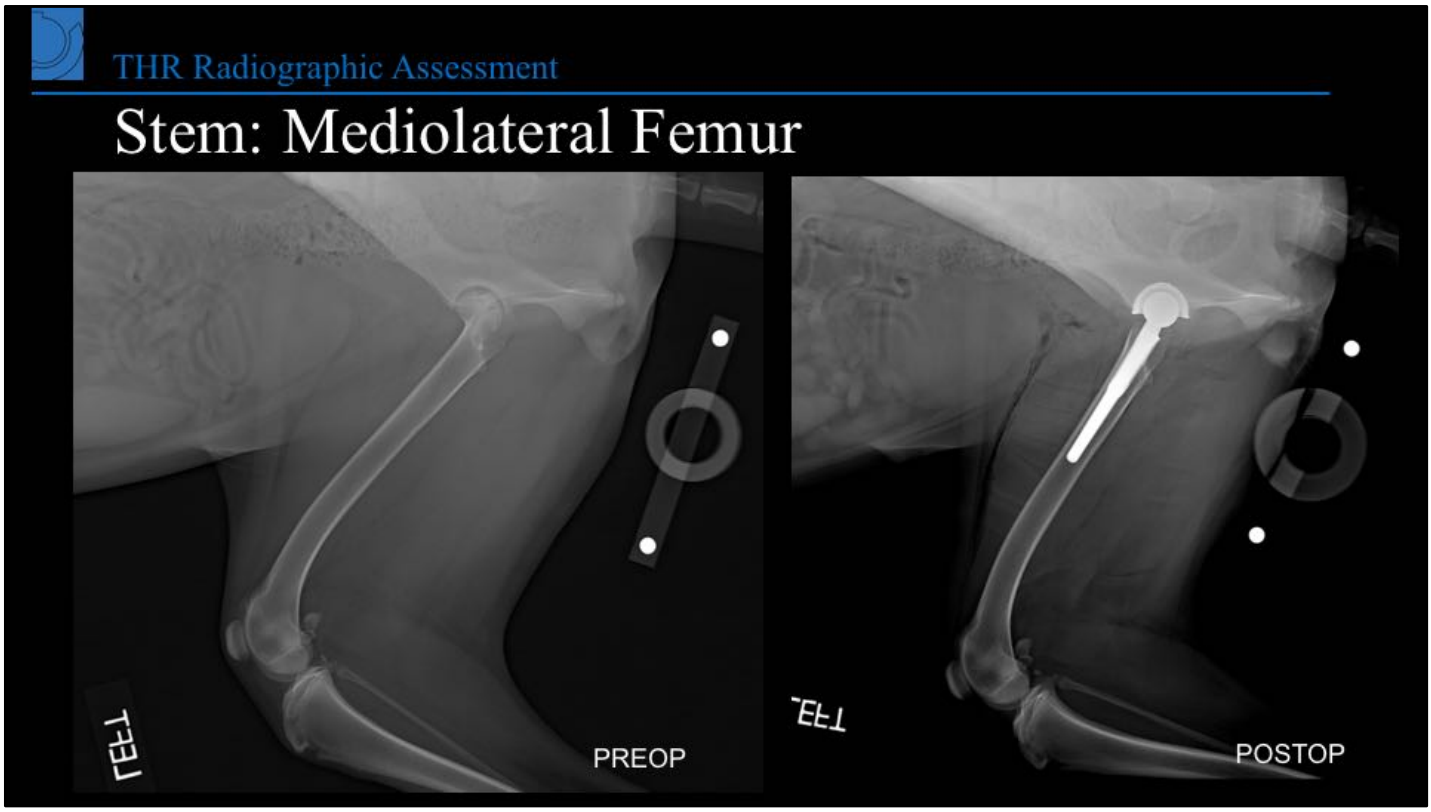
Notes want perfectly aligned pelvis - symmetrical obturator foramina and ilia



Notes Superimposed ilia

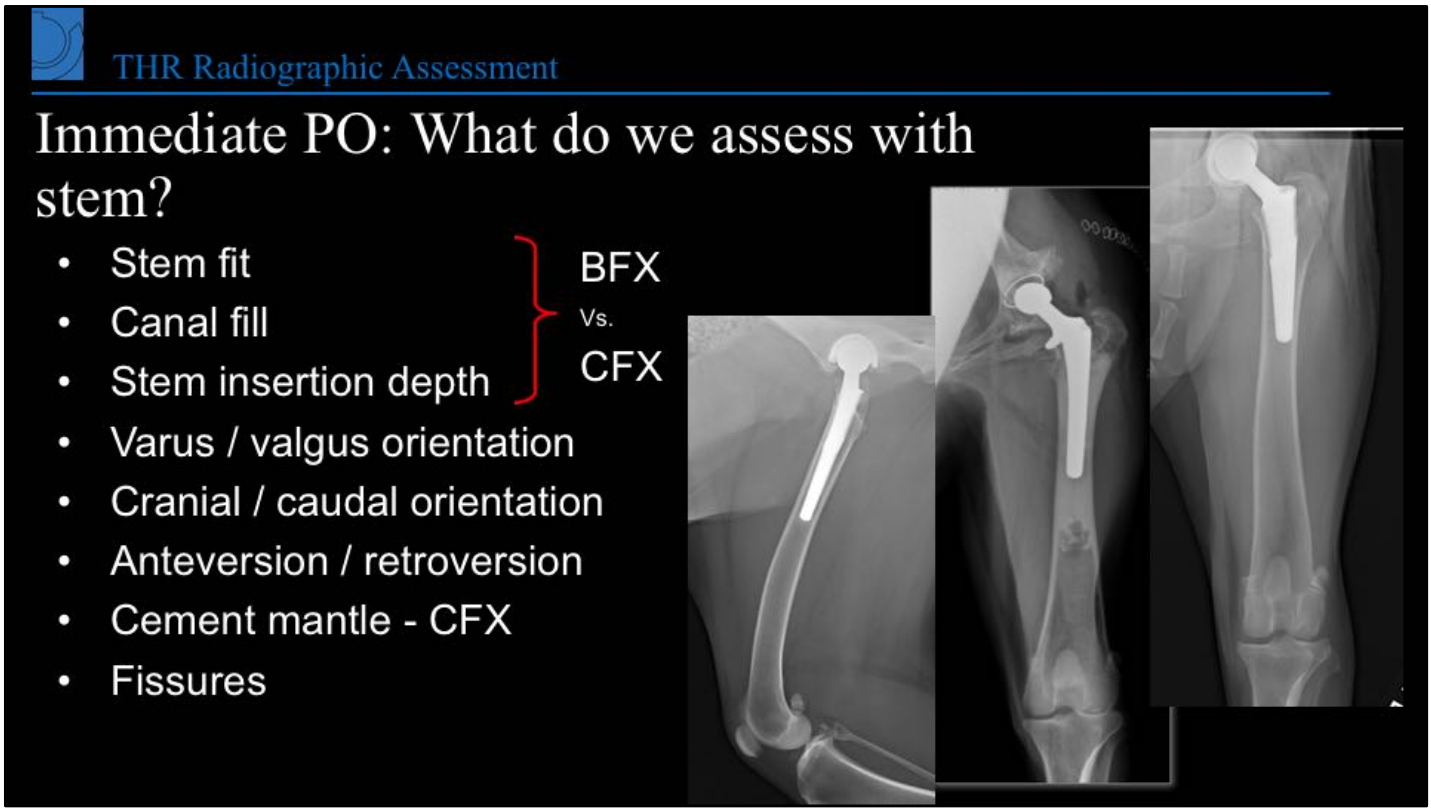

THR Radiographic Assessment
Stem: Craniocaudal Femur
LEFT
PREOP
POST-OP

Notes



Notes Want superimposed femoral condyles; some have distal femoral torsion and this is not possible. At least get the identical amount of condylar superimposition.

KEY: CONSISTENT POSITIONING FROM ONE TO THE NEXT SET OF RADS TO THE NEXT SESSION OF RADS



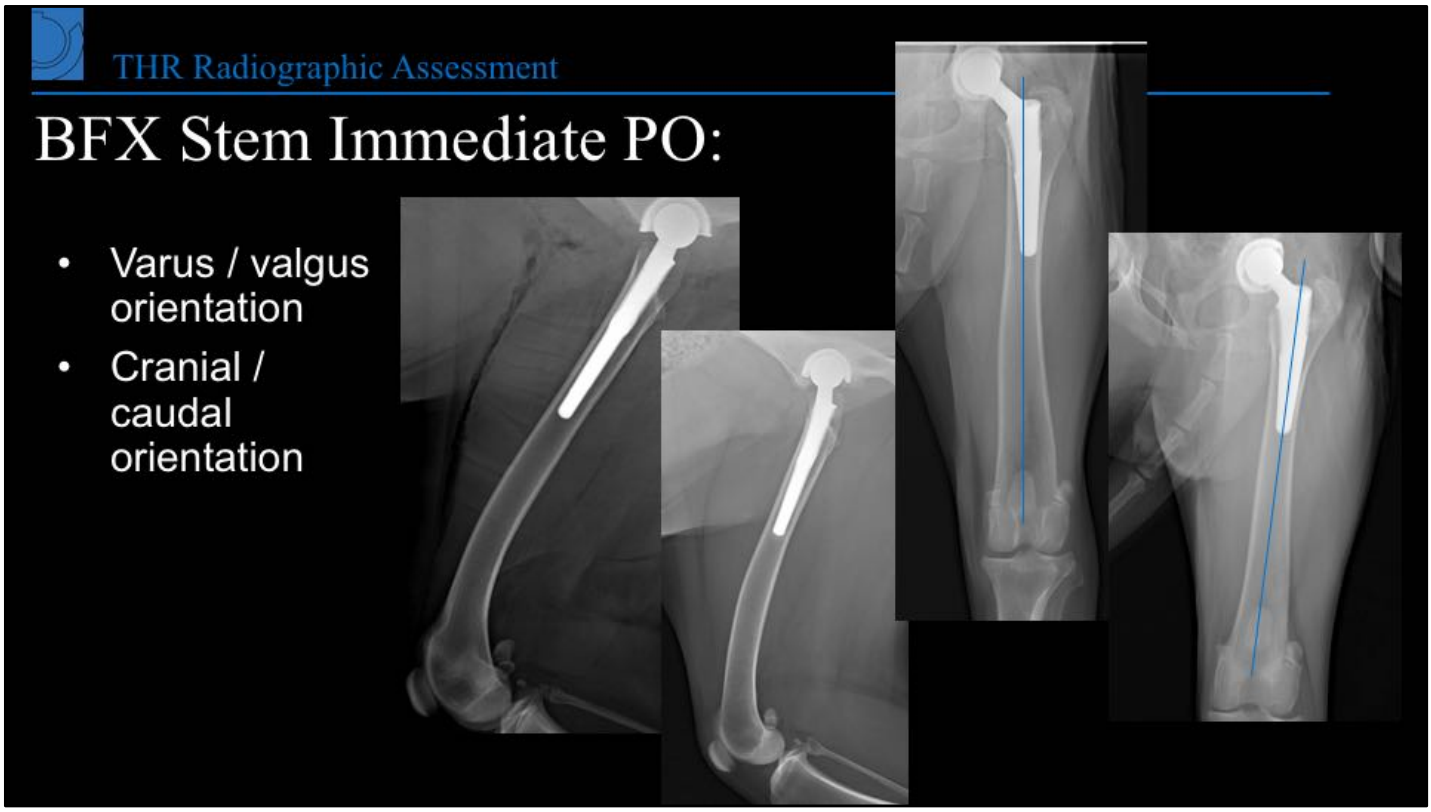
Notes Want 75% to 80% of fill at the bottom of the textured. However, the most important is to know that you have a press fit at the time of surgery.

THR Radiographic Assessment

BFX Stem Immediate PO:

- Stem fit
- % Canal fill
  - Avg of 3 points of assessment
    - End of porous surface
    - Just before narrowing of tip
    - Midway between these 2
  - Stem width/endosteal width

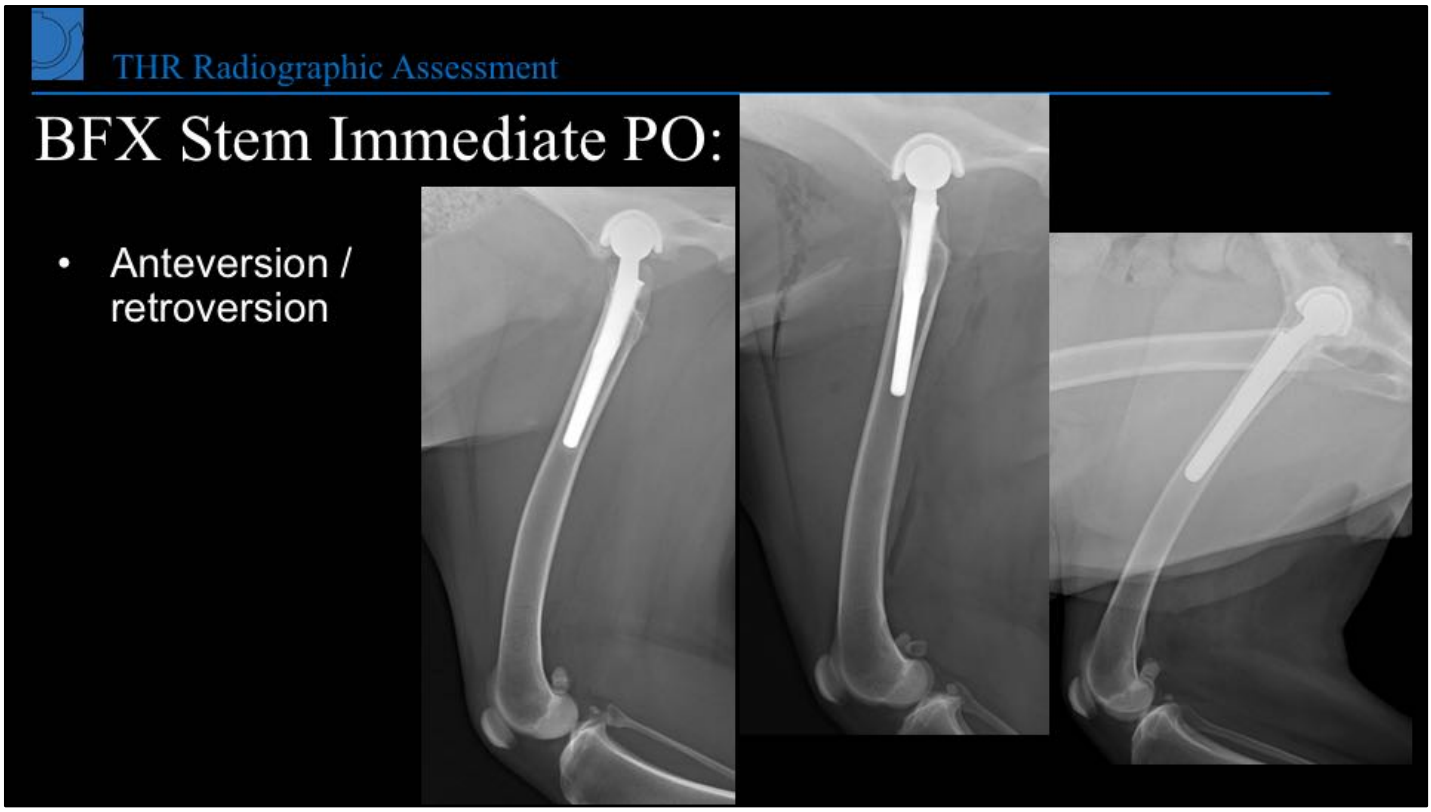
Notes



ideal

OK, but not as good

Notes


THR Radiographic Assessment
BFX Stem Immediate PO:
• Anteversion / retroversion

Notes

THR Radiographic Assessment

BFX Stem Immediate PO:

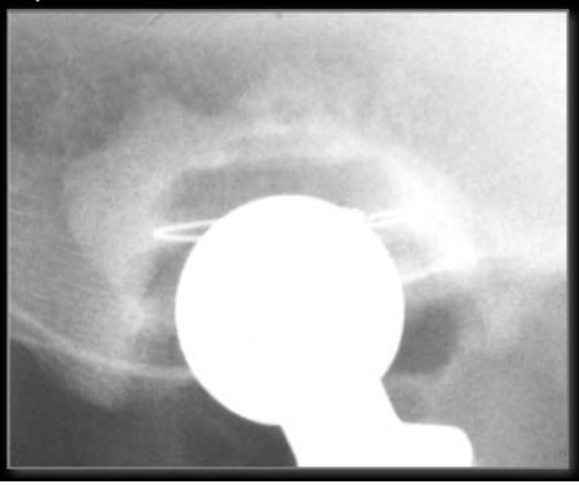
- Fissures

Notes look very carefully on both views; if there is any hint of a fissure, go back in and cerclage

Post-op Radiographic Assessment

Immediate PO: What do we assess w cup?

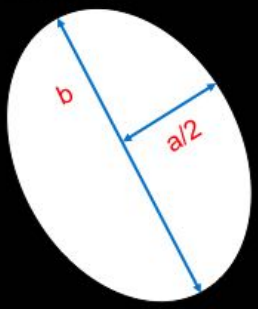
- Cup fit in relation to acetabular margins
- Cup depth & seat (full impaction?)
- Anteversion / retroversion
- Angle of lateral opening
- Inclination
- Fissures
- Cement mantle



Notes

Angle of Lateral Opening

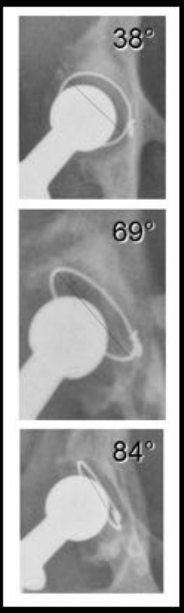
CFX



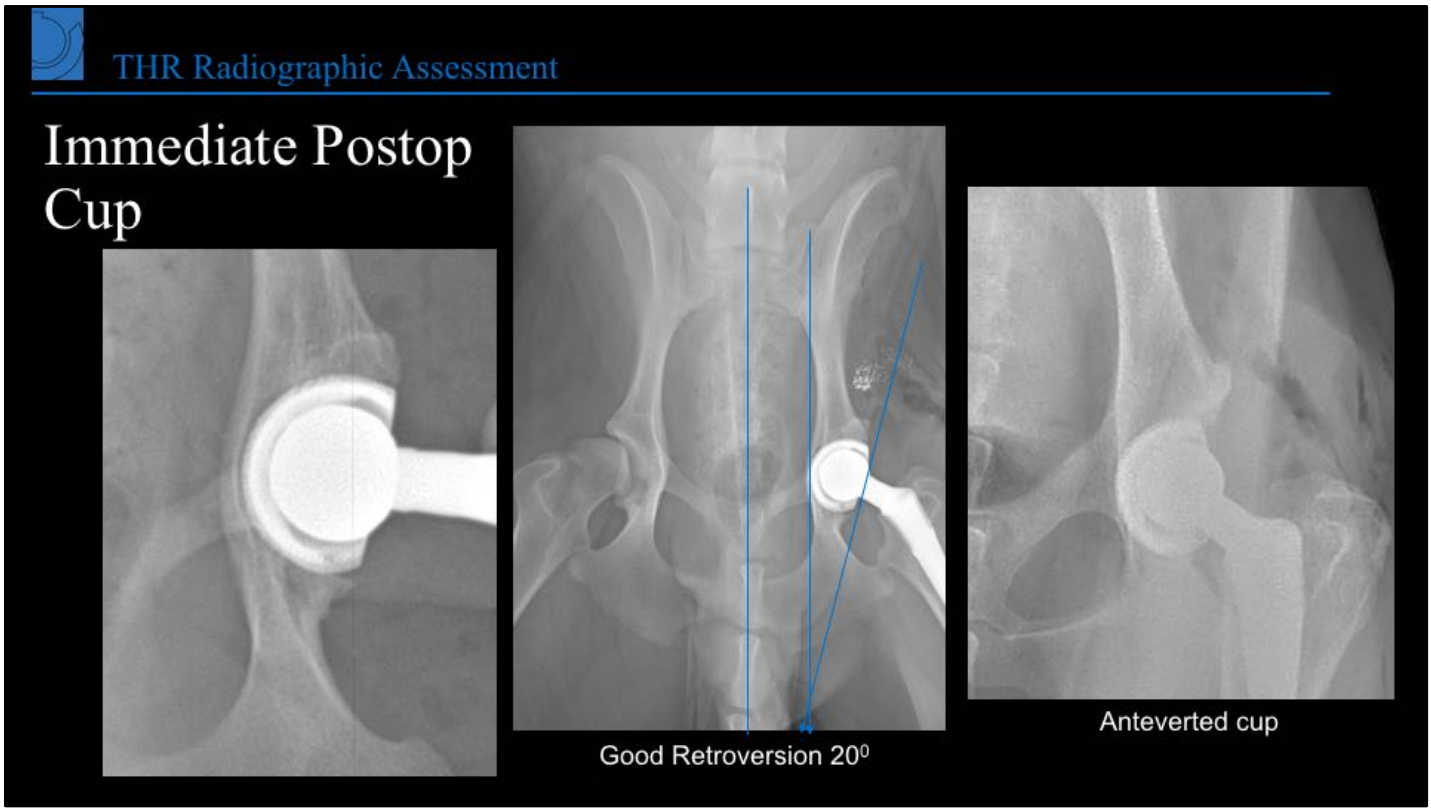
Ventral Dorsal Projection

a/b	Angle	a/b	Angle	a/b	Angle
0.05	87.1°	0.37	68.3°	0.69	46.4°
0.06	86.6°	0.38	67.7°	0.7	45.6°
0.07	86.0°	0.39	67.0°	0.71	44.8°
0.08	85.4°	0.4	66.4°	0.72	43.9°
0.09	84.8°	0.41	65.8°	0.73	43.1°
0.1	84.3°	0.42	65.2°	0.74	42.3°
0.11	83.7°	0.43	64.5°	0.75	41.4°
0.12	83.1°	0.44	63.9°	0.76	40.5°
0.13	82.5°	0.45	63.3°	0.77	39.6°
0.14	82.0°	0.46	62.6°	0.78	38.7°
0.15	81.4°	0.47	62.0°	0.79	37.8°
0.16	80.8°	0.48	61.3°	0.8	36.9°
0.17	80.2°	0.49	60.7°	0.81	35.9°
0.18	79.6°	0.5	60.0°	0.82	34.9°
0.19	79.0°	0.51	59.3°	0.83	33.9°
0.2	78.5°	0.52	58.7°	0.84	32.9°
0.21	77.9°	0.53	58.0°	0.85	31.8°
0.22	77.3°	0.54	57.3°	0.86	30.7°
0.23	76.7°	0.55	56.6°	0.87	29.5°
0.24	76.1°	0.56	55.9°	0.88	28.4°
0.25	75.5°	0.57	55.2°	0.89	27.1°
0.26	74.9°	0.58	54.5°	0.9	25.8°
0.27	74.3°	0.59	53.8°	0.91	24.5°
0.28	73.7°	0.6	53.1°	0.92	23.1°
0.29	73.1°	0.61	52.4°	0.93	21.6°
0.3	72.5°	0.62	51.7°	0.94	19.9°
0.31	71.9°	0.63	50.9°	0.95	18.2°
0.32	71.3°	0.64	50.2°	0.96	16.3°
0.33	70.7°	0.65	49.5°	0.97	14.1°
0.34	70.1°	0.66	48.7°	0.98	11.5°
0.35	69.5°	0.67	47.9°	0.99	8.1°
0.36	68.9°	0.68	47.2°	1	0.0°

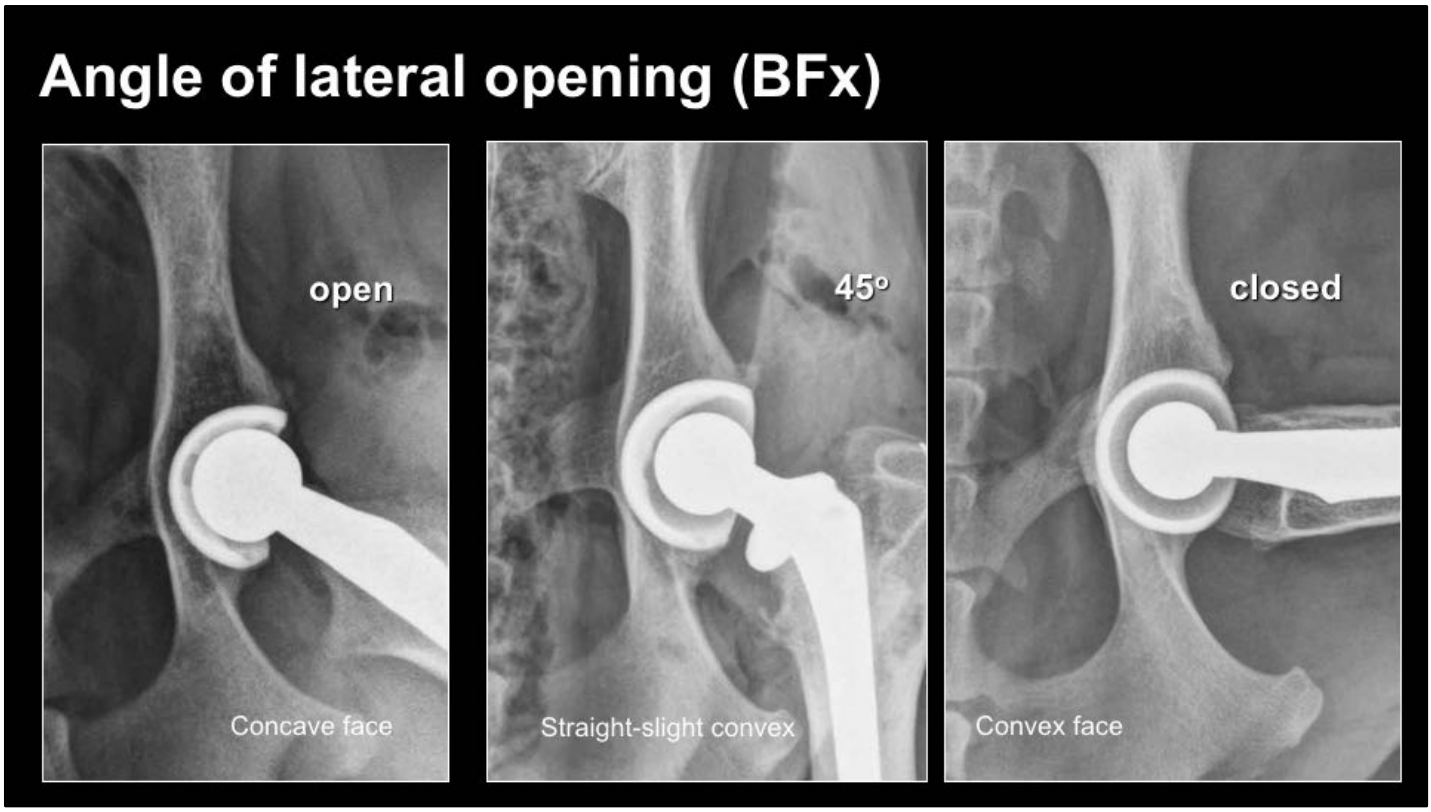
Dyce et al: Vet Surg 30:28-39, 2001



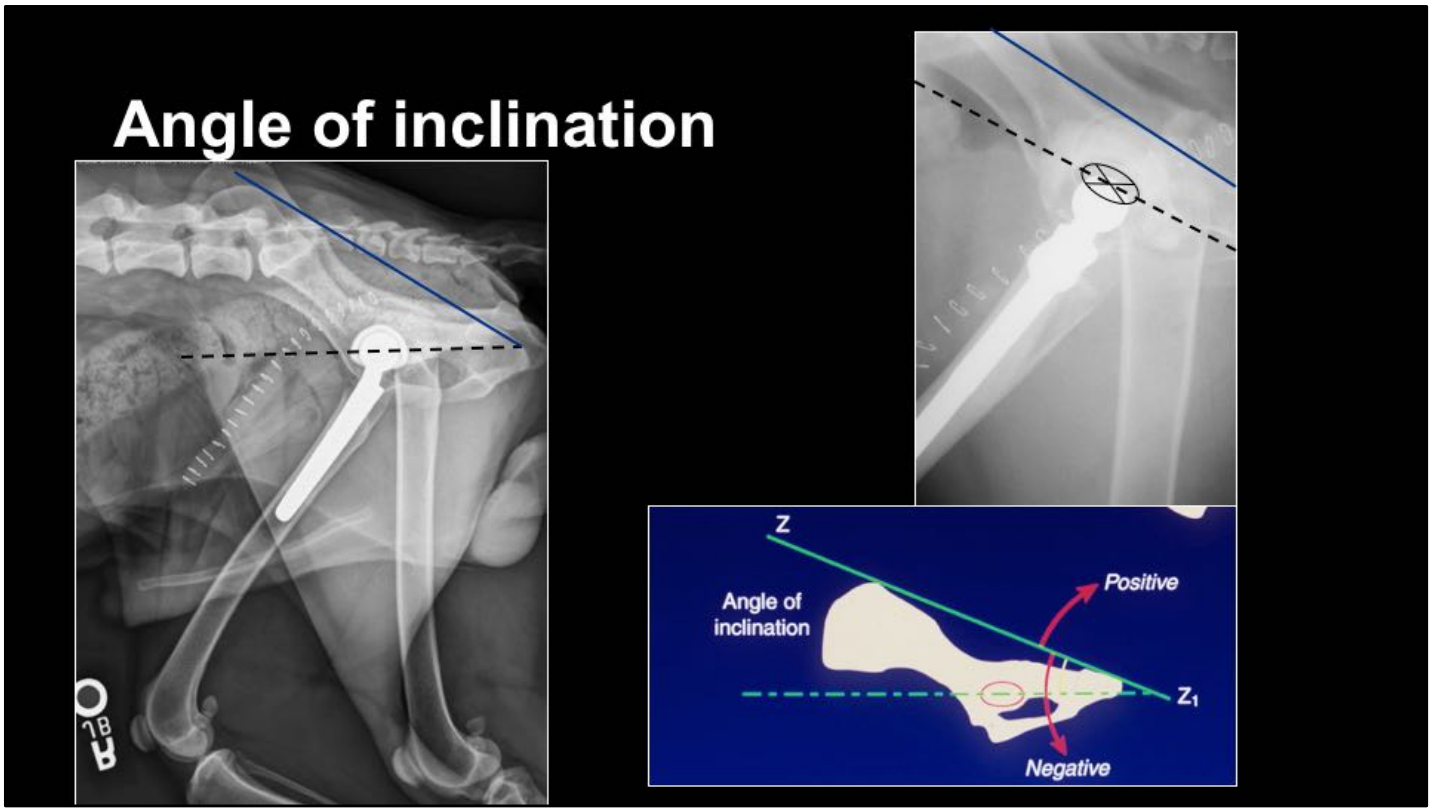
Notes



Notes 10 to 20 degrees is ideal...basically match what is normal for the dog


Angle of lateral opening (BFx)
open
Concave face
45°
Straight-slight convex
closed
Convex face

Notes



Notes about 20 to 30 degrees is OK; basically should be parallel to the spine

Post-op Radiographic Assessment

Re-check radiographs: What do we assess?

- Implants
  - Structure
    - Intact, bent, broken
  - Position
    - Identical, rotated, subsided, angled

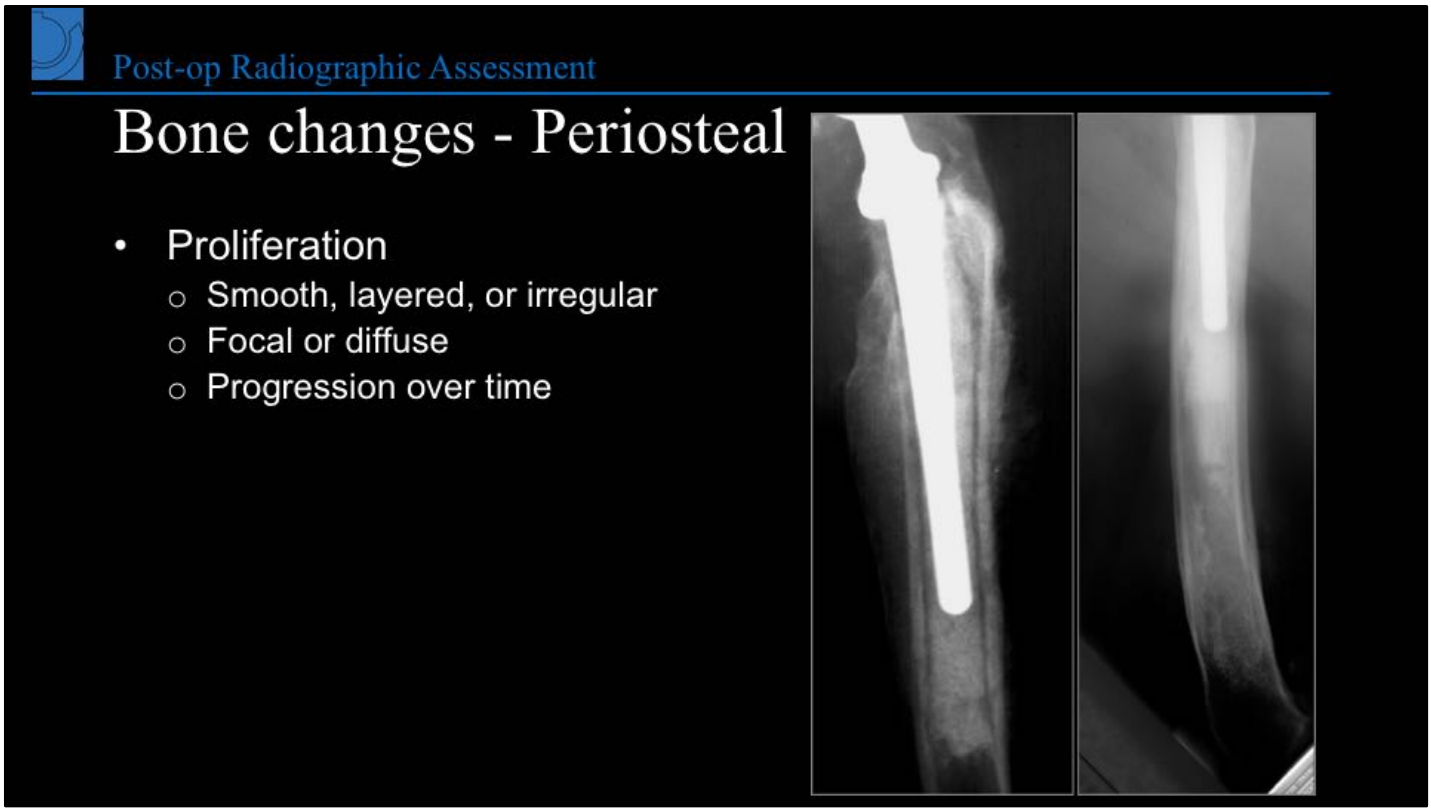
Notes

Post-op Radiographic Assessment

Re-check radiographs: What do we assess?

- Bone changes
  - More, less, same?
  - Periarticular soft tissues, periosteum, cortex, endosteum, bone
- New features
  - Fissures, fractures, infarcts

Notes



Notes

Smooth nonprogressive periosteal thickening is OK

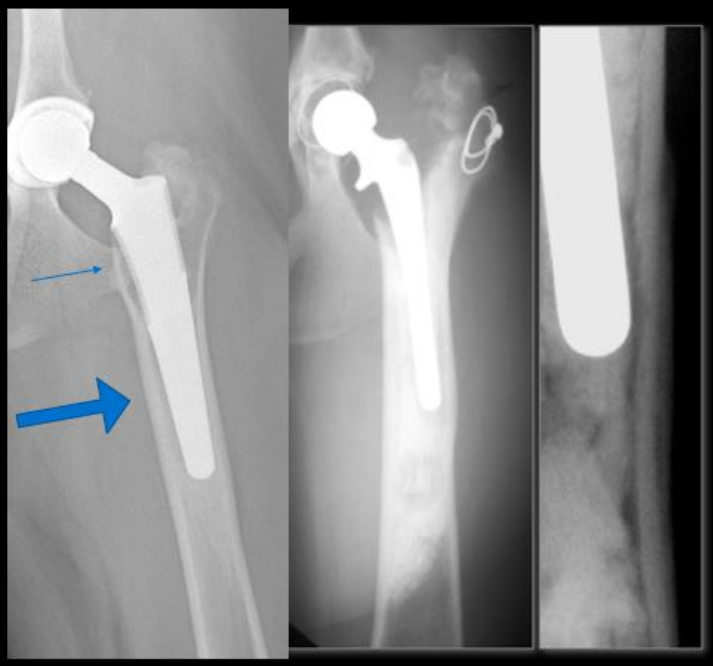
Calcar resorption is common with cobalt chrome implants. With the titanium EBM the resorption of the calcar region is much

less now. Having the implant coaxial reduces the changes dramatically.

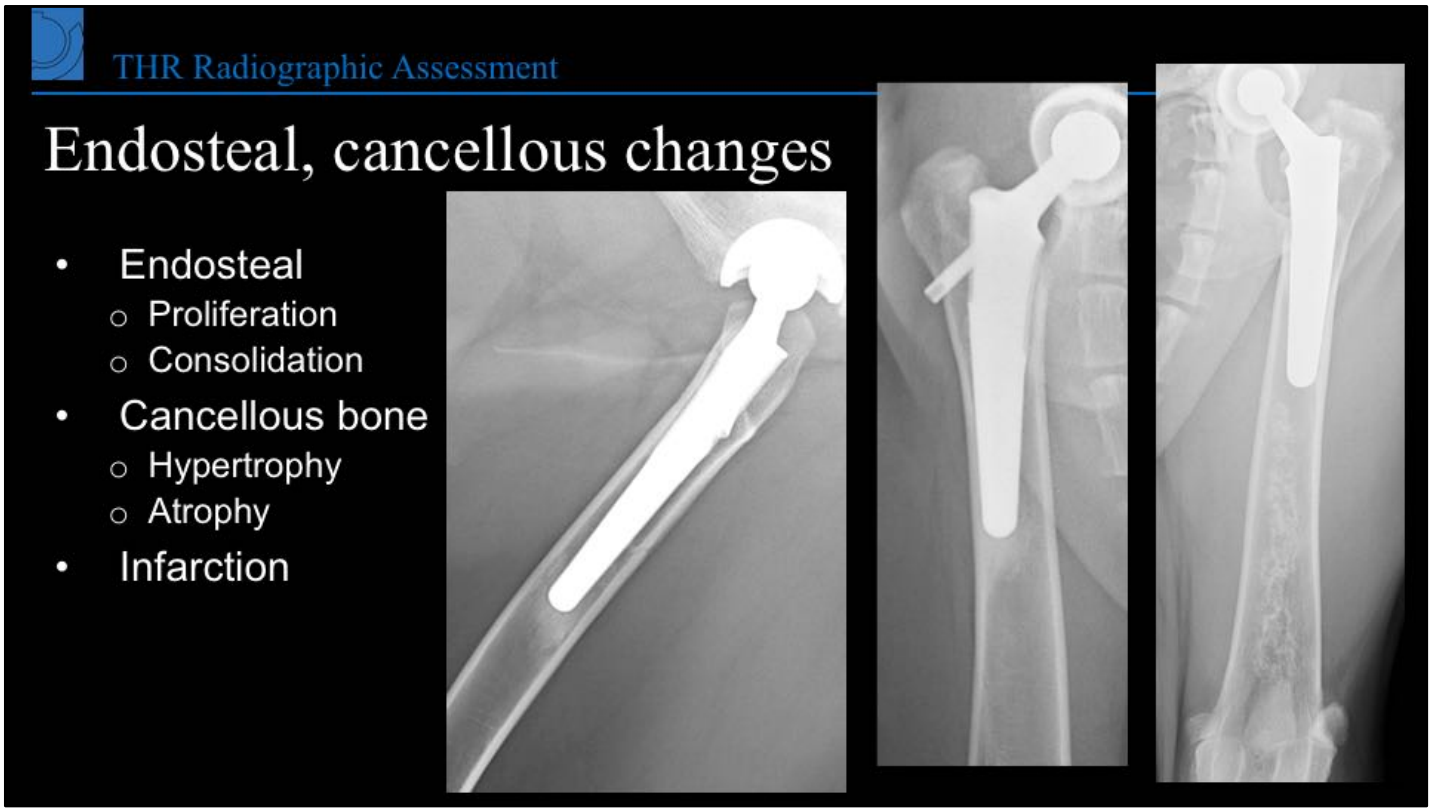
THR Radiographic Assessment

Cortical Bone Changes

- Hypertrophy
- Atrophy
- Absence
- Osteopenia
- Osteolysis
- Fracture



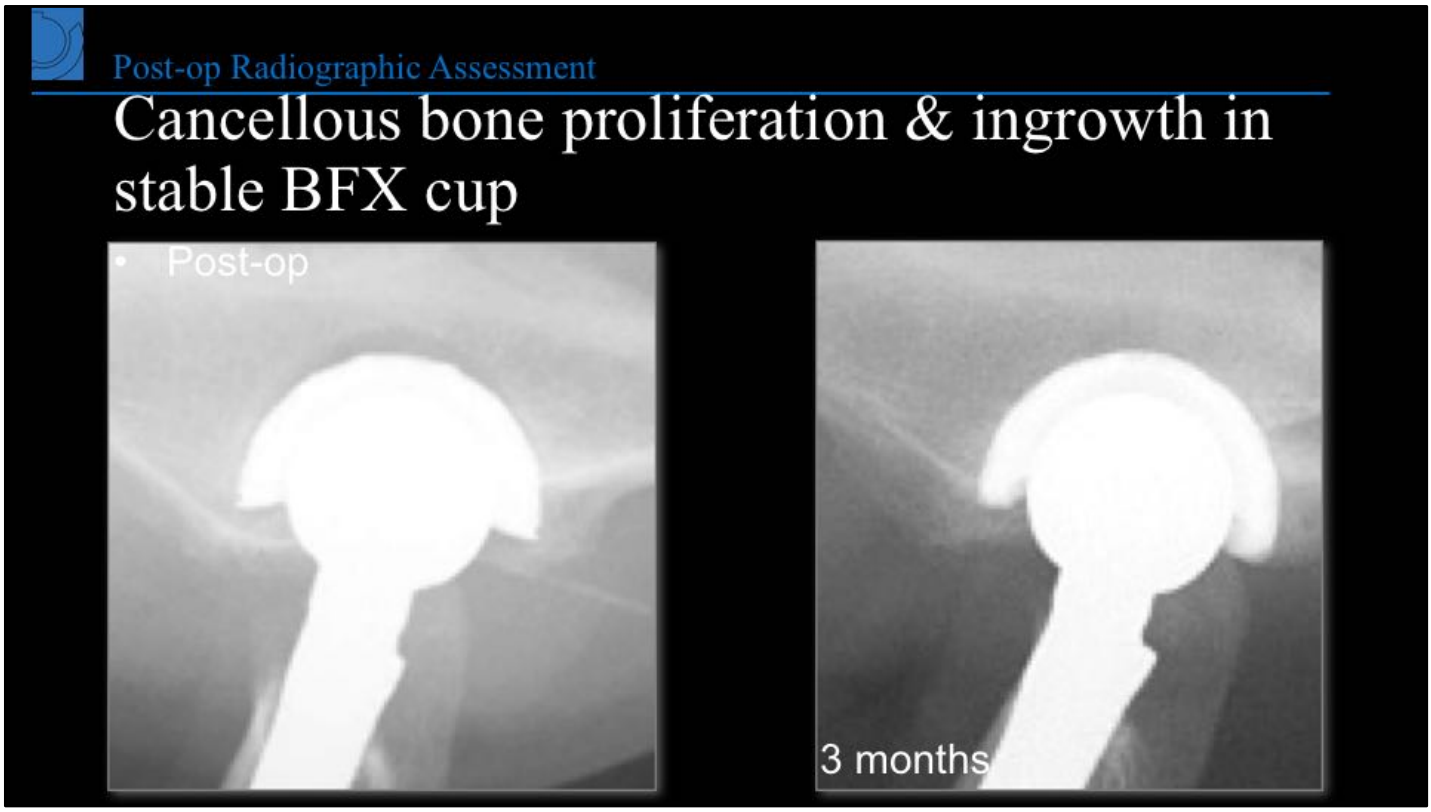
Notes



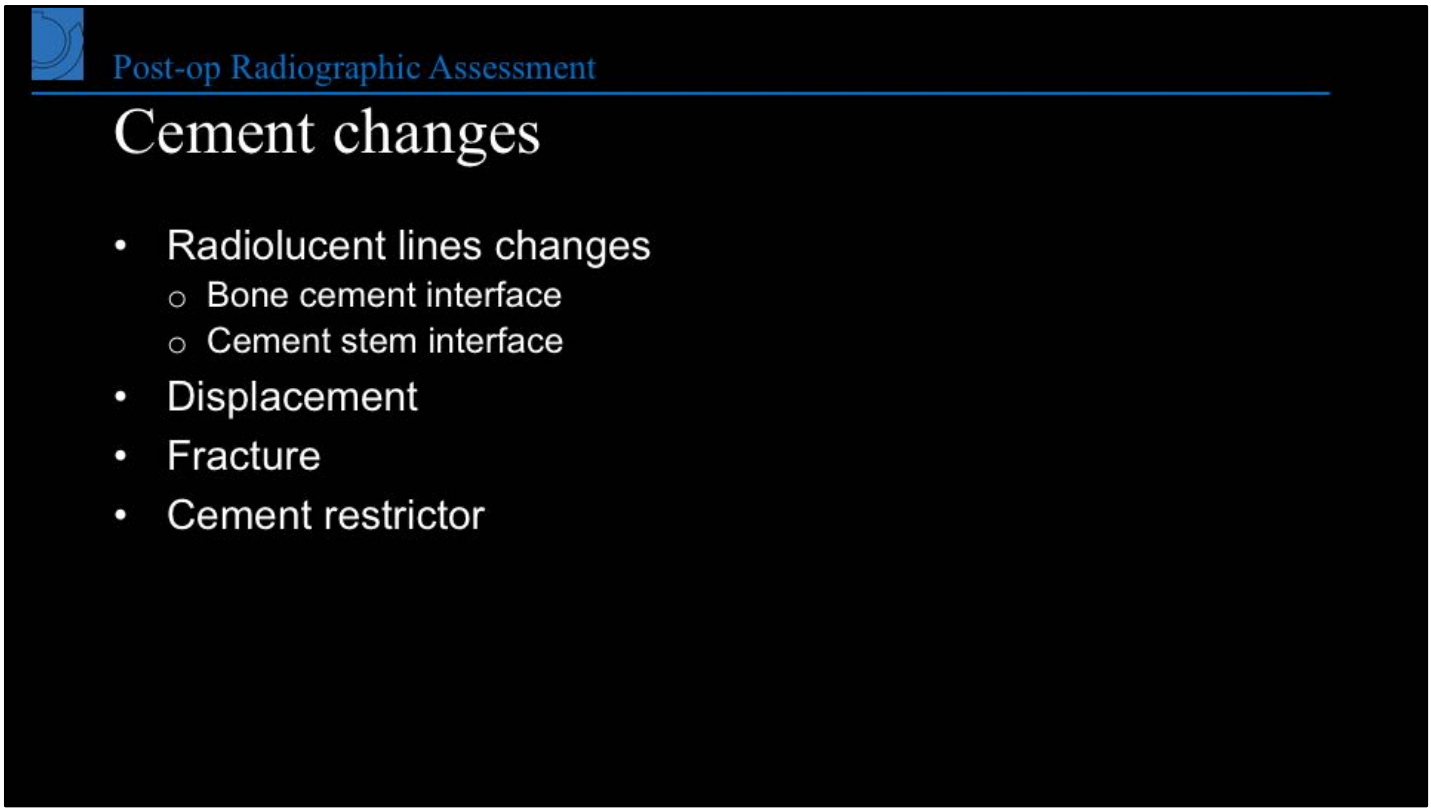
Distal sclerosis
may be due to impacted cancellous bone distally
not to worry about this

Infarct pattern
don't worry about this though

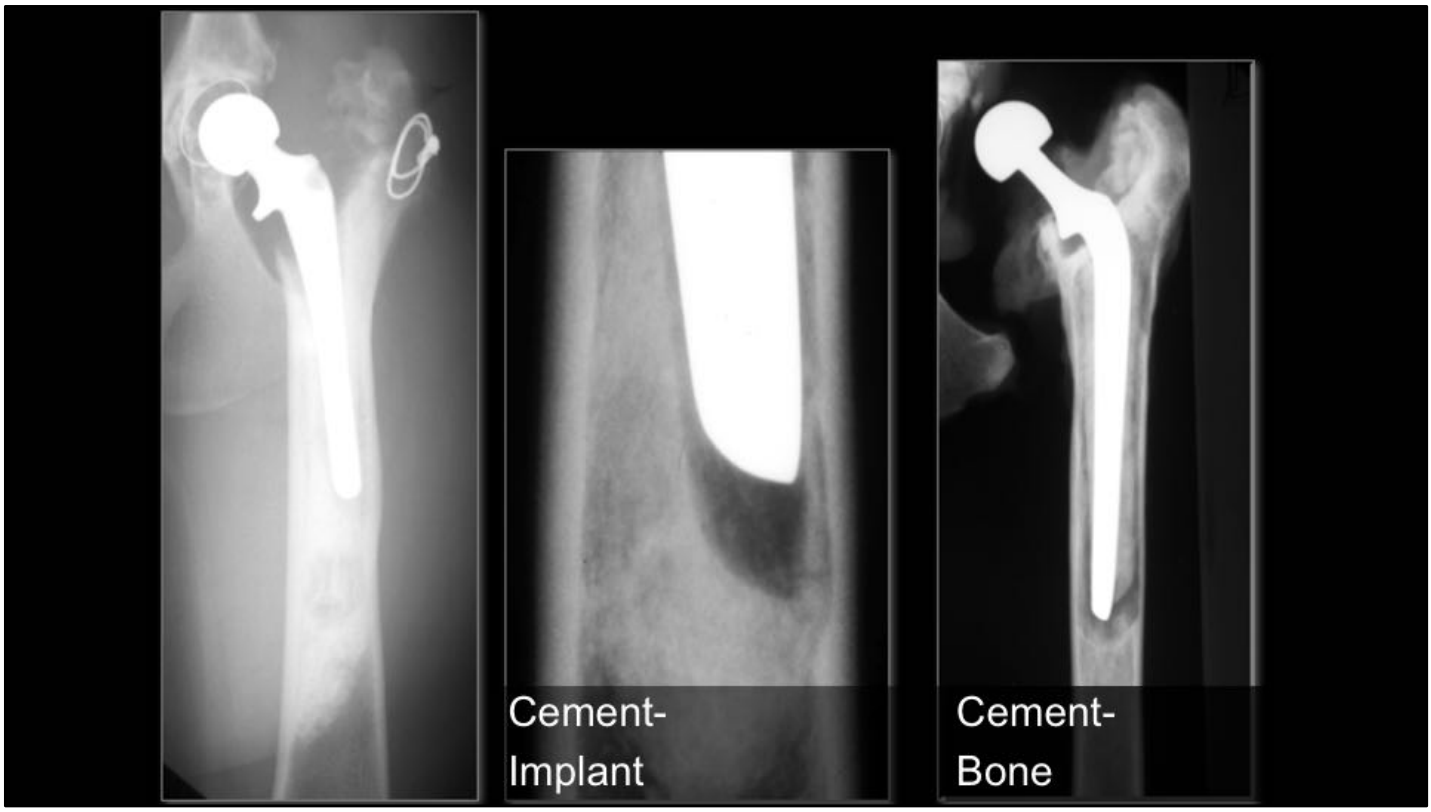
Notes



Notes Don't worry too much about the halo as it will fill in



Notes OK to have 1 to 2 mm of bony lysis around cement. If there is added periosteal reaction, then there is concern that there may be infection or aseptic loosening.



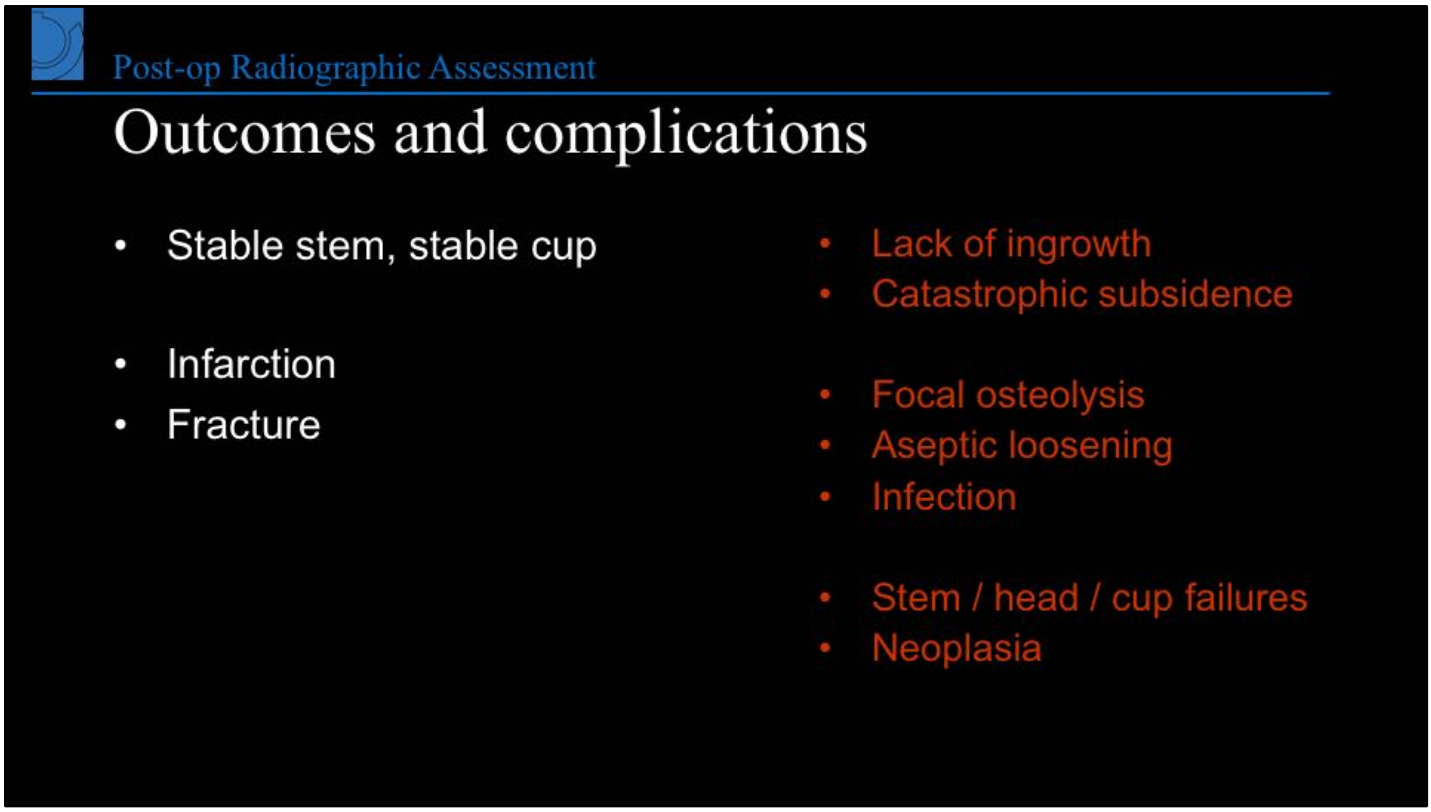
Notes

Post-op Radiographic Assessment

Surrounding tissues, implants

- Heterotopic bone formation
- Diffuse mineralization
- Trochanteric osteotomy
- Cerclages (if present)
- Muscle mass (mid-thigh)

Notes



Notes

Failure of ingrowth - due to soft tissue imposition

Subsidence - catastrophic when we get too much as the pet may luxate the hip

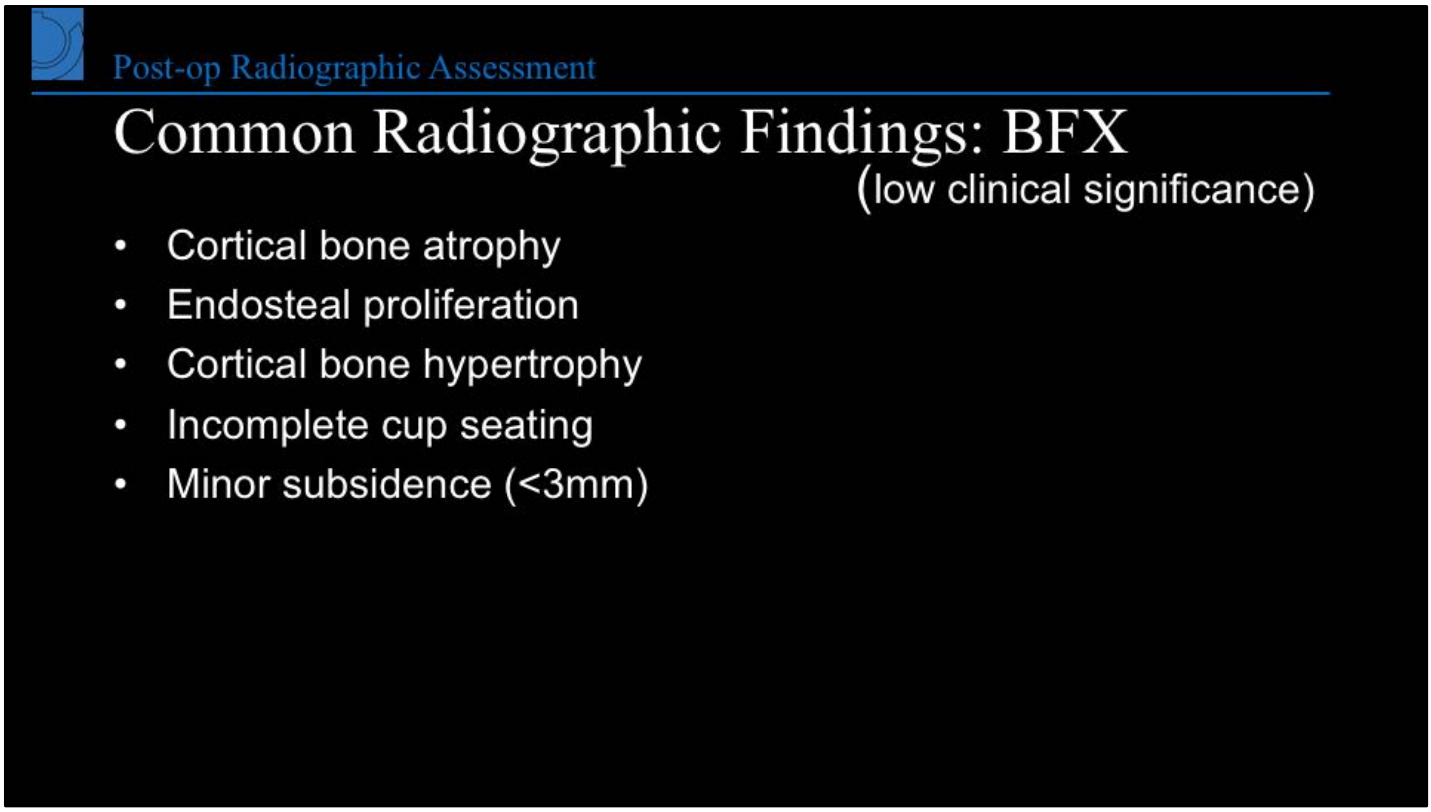
Keep in mind that the subisded implant will heal, but then hip luxates so get to a revision very quickly so that it can be revised.

Post-op Radiographic Assessment

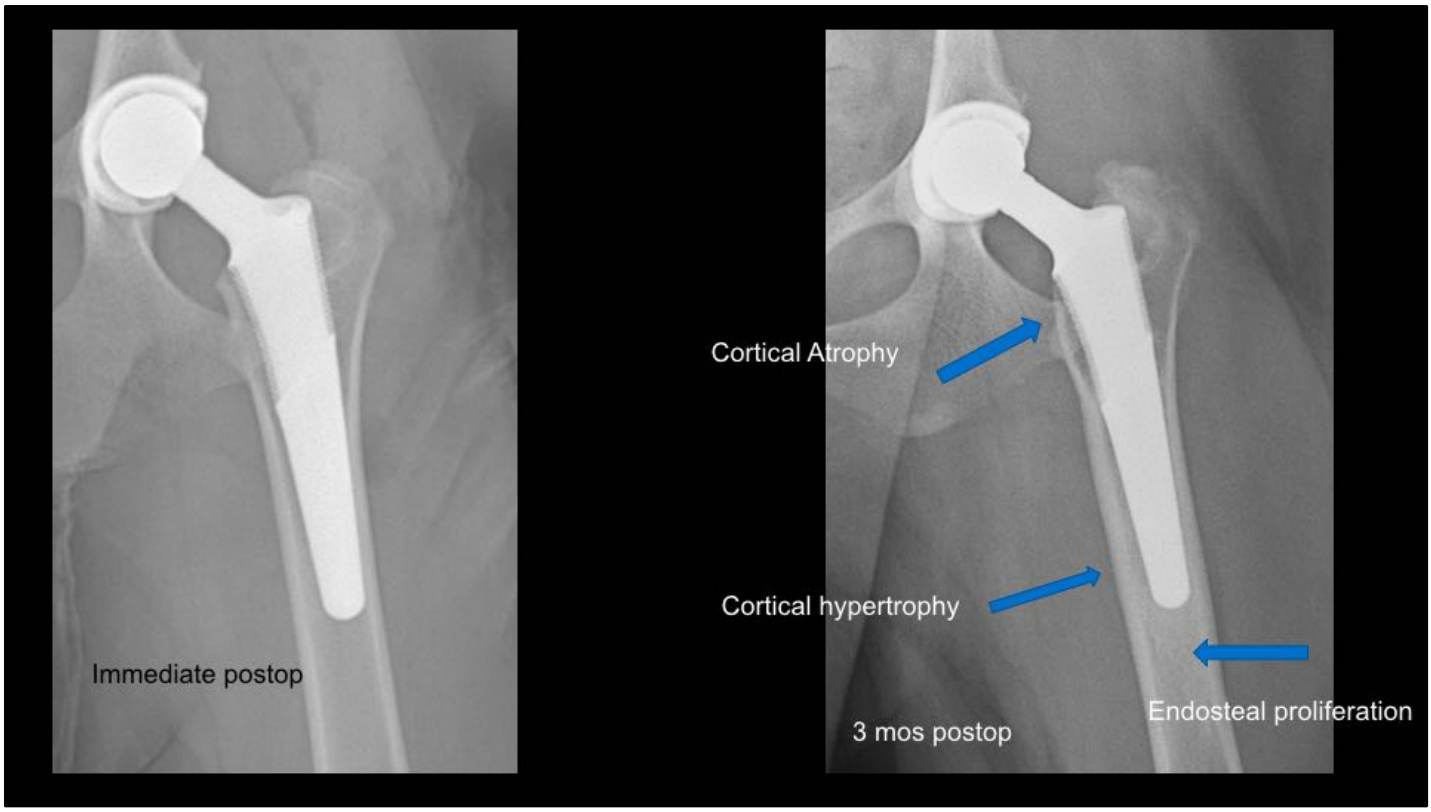
Stable Cementless Stem

- No or thin, focal radiolucent lines
  - Up to 0.5-mm-wide
  - Non progressive
- Smooth periosteal prolif.
  - Up to 2-mm-wide
- Some endosteal proliferation, no consolidation
- Focal cortical hypertrophy

Notes

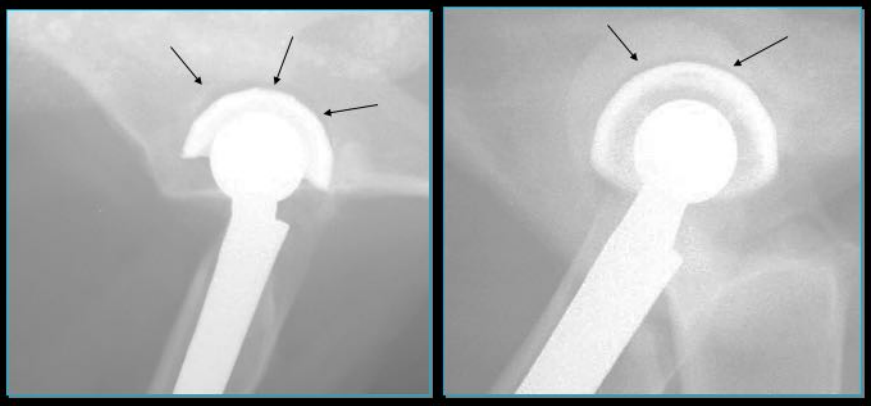

Post-op Radiographic Assessment
Common Radiographic Findings: BFX
(low clinical significance)
• Cortical bone atrophy
• Endosteal proliferation
• Cortical bone hypertrophy
• Incomplete cup seating
• Minor subsidence (<3mm)

Notes


Immediate postop
Cortical Atrophy
Cortical hypertrophy
Endosteal proliferation
3 mos postop

Notes

Incomplete cup seating



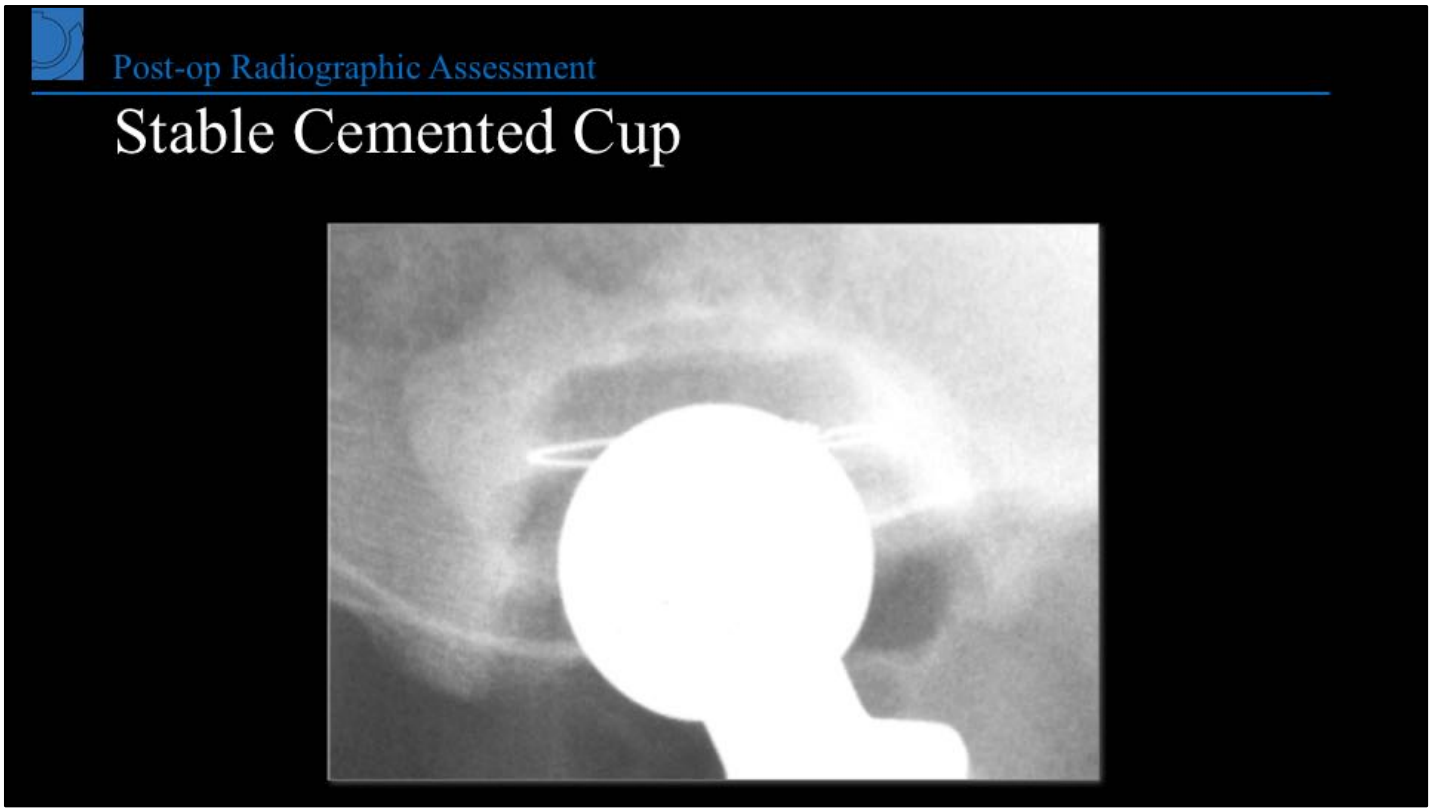
Notes

THR Radiographic Assessment

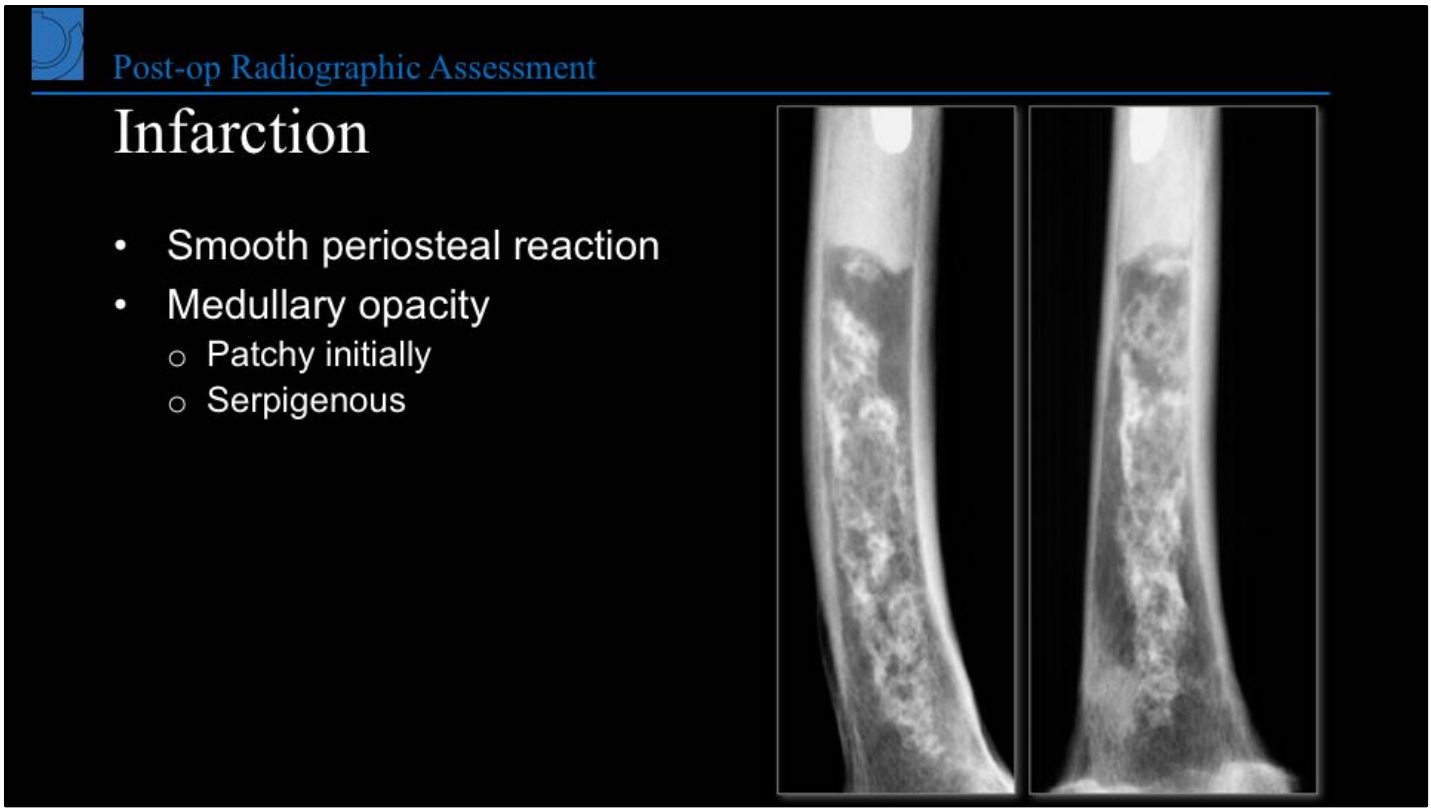
Stable Cemented Stem

- Smooth radiolucent line
  - Up to 2-mm-wide
  - Non progressive
- Smooth periosteal prolif.
  - Up to 5-mm-wide
- Cortical hypertrophy

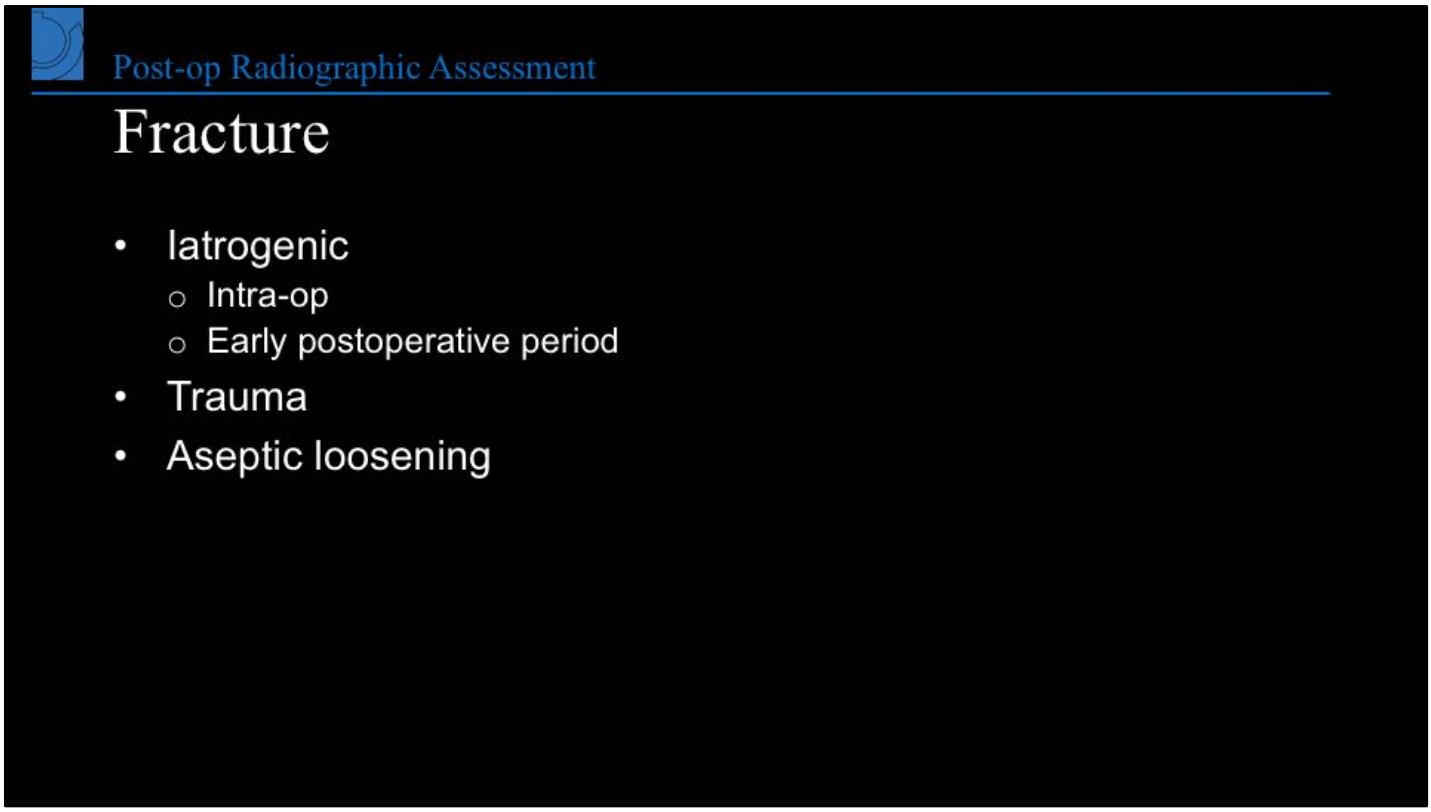
Notes



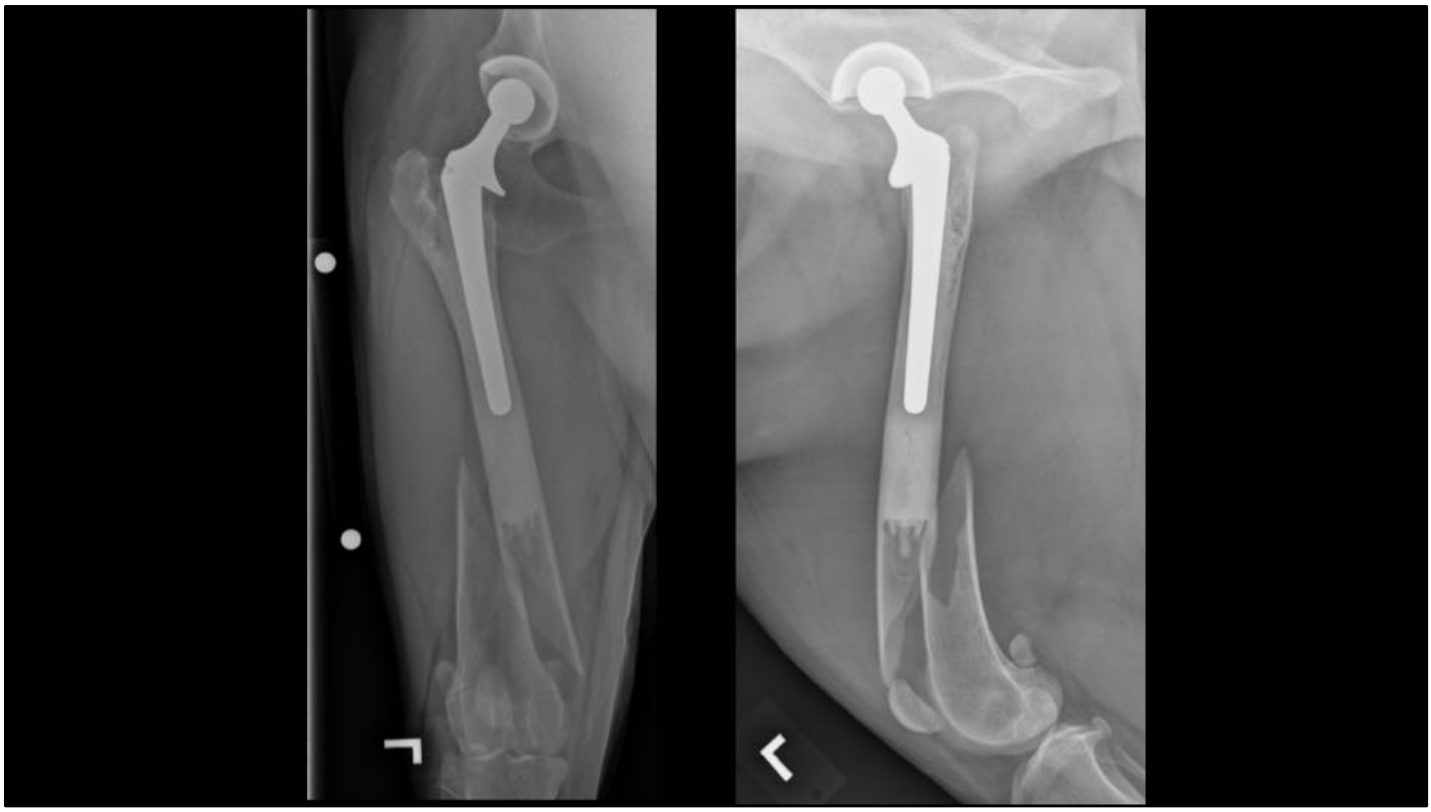
Notes


Post-op Radiographic Assessment
Infarction
• Smooth periosteal reaction
• Medullary opacity
o Patchy initially
o Serpigenous

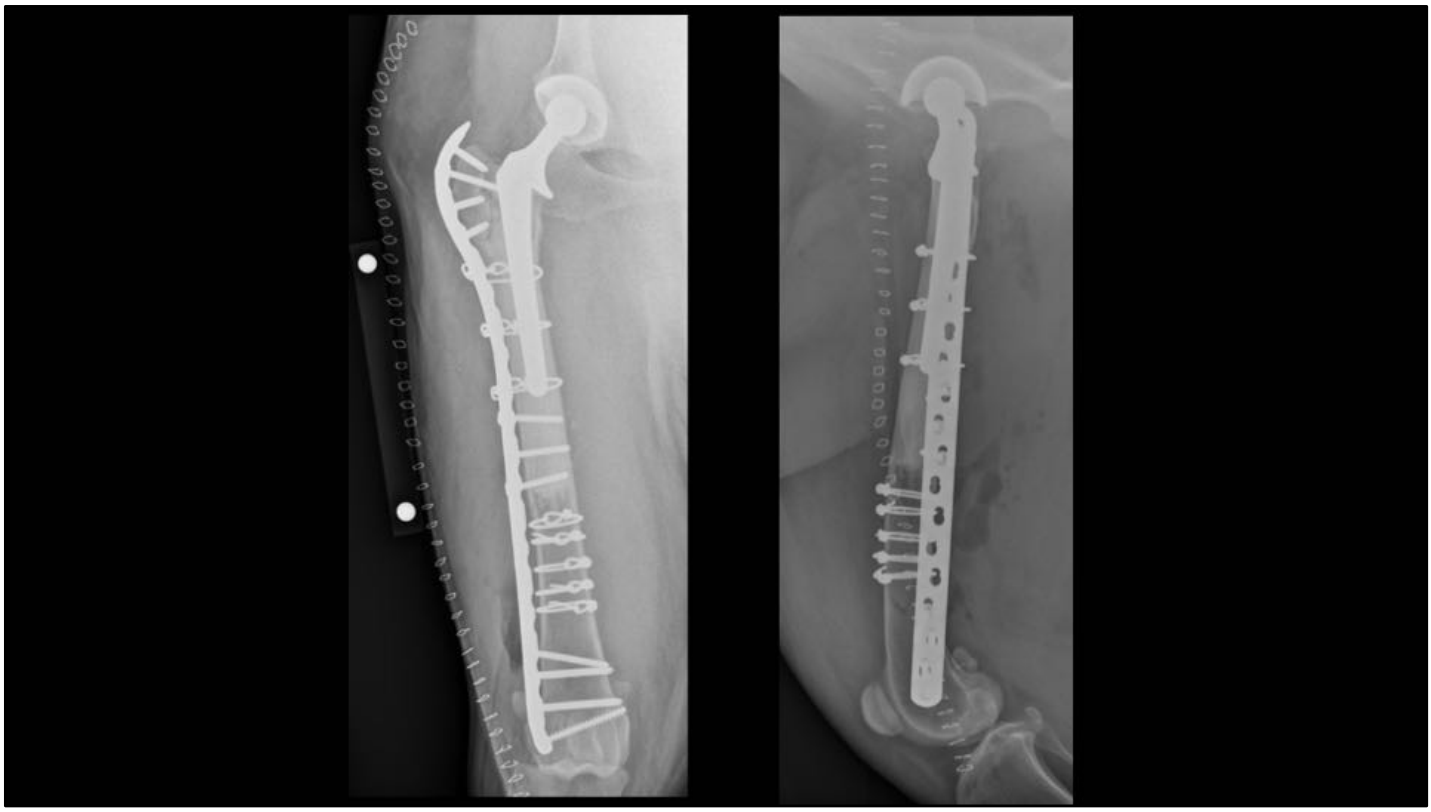
Notes


Post-op Radiographic Assessment
Fracture
• Iatrogenic
o Intra-op
o Early postoperative period
• Trauma
• Aseptic loosening

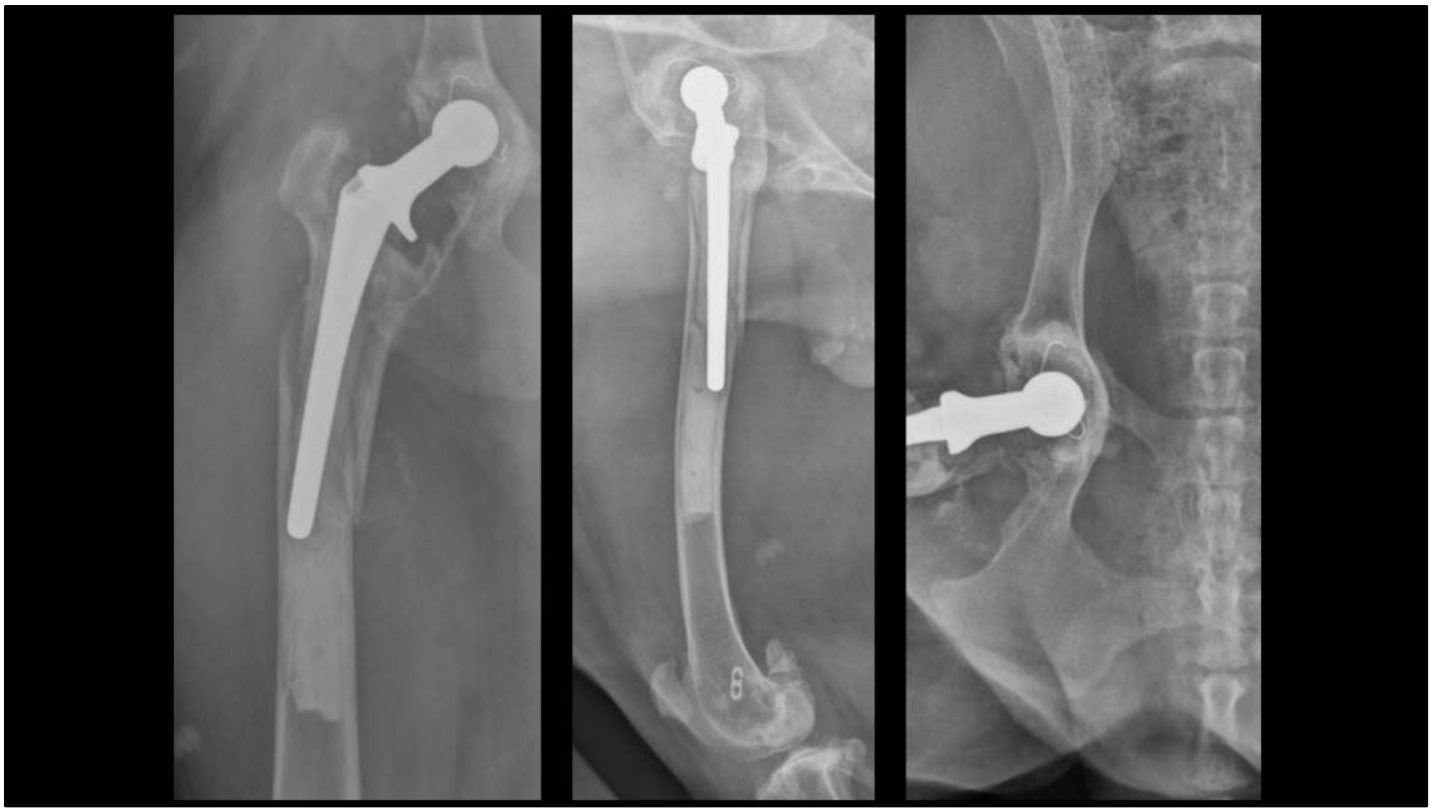
Notes



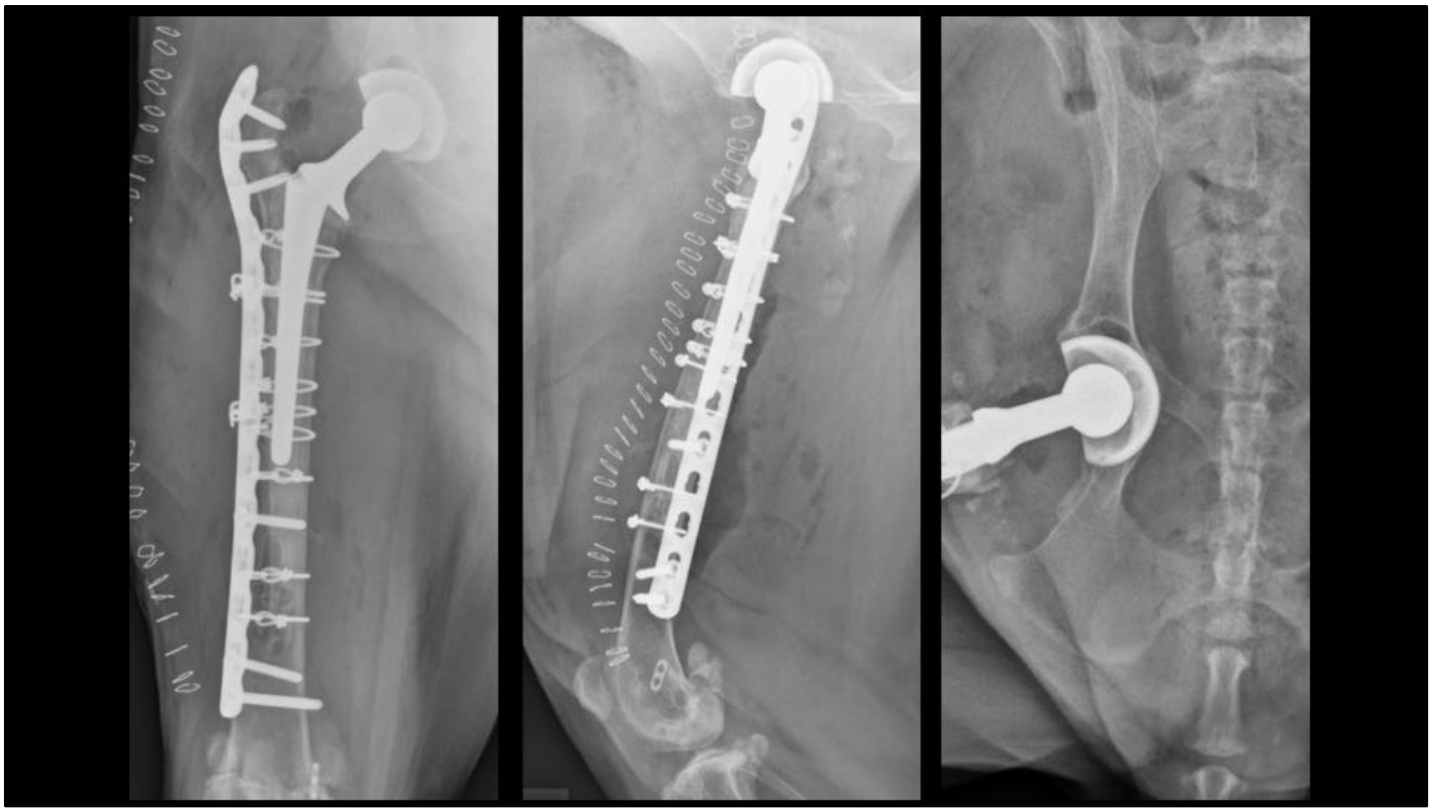
Notes



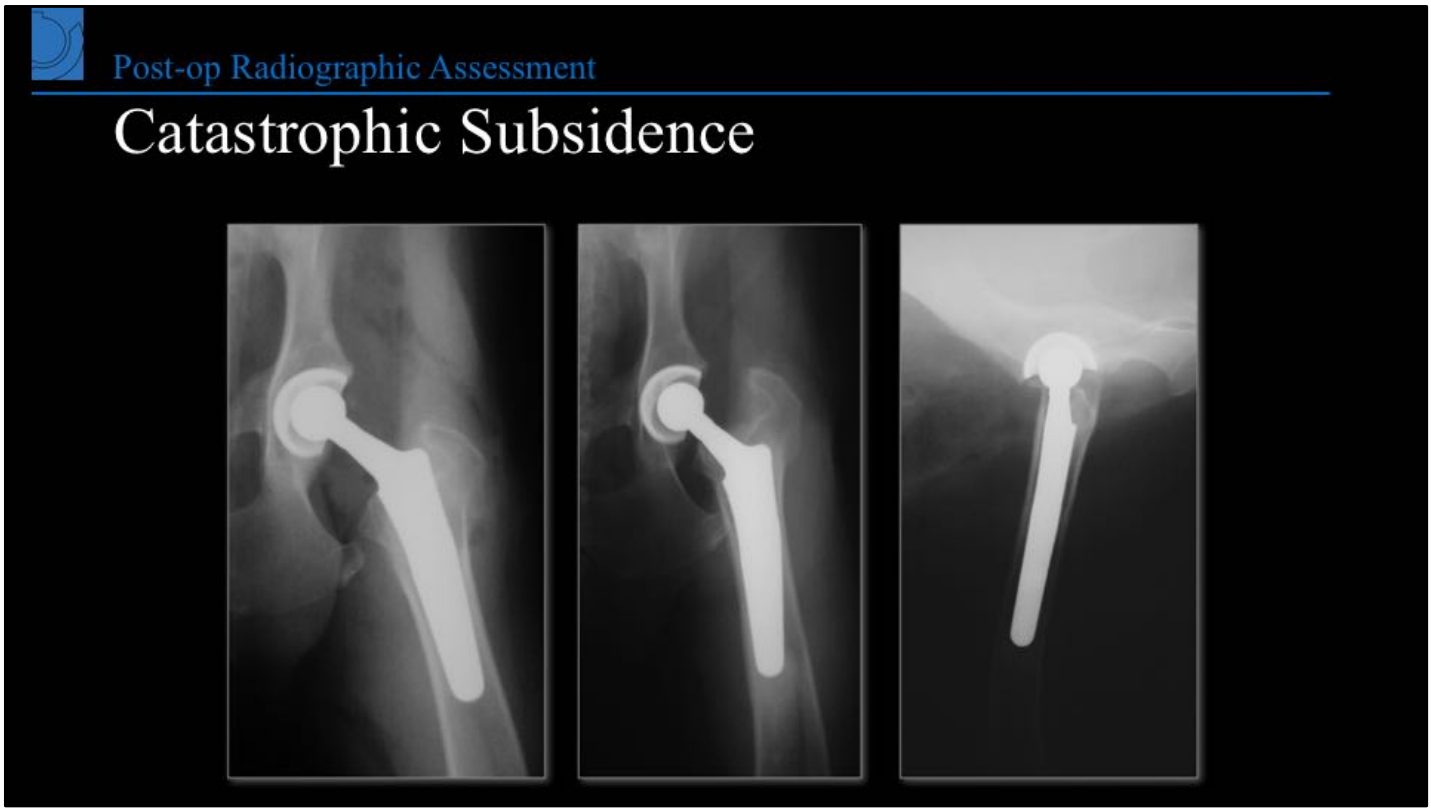
Notes



Notes

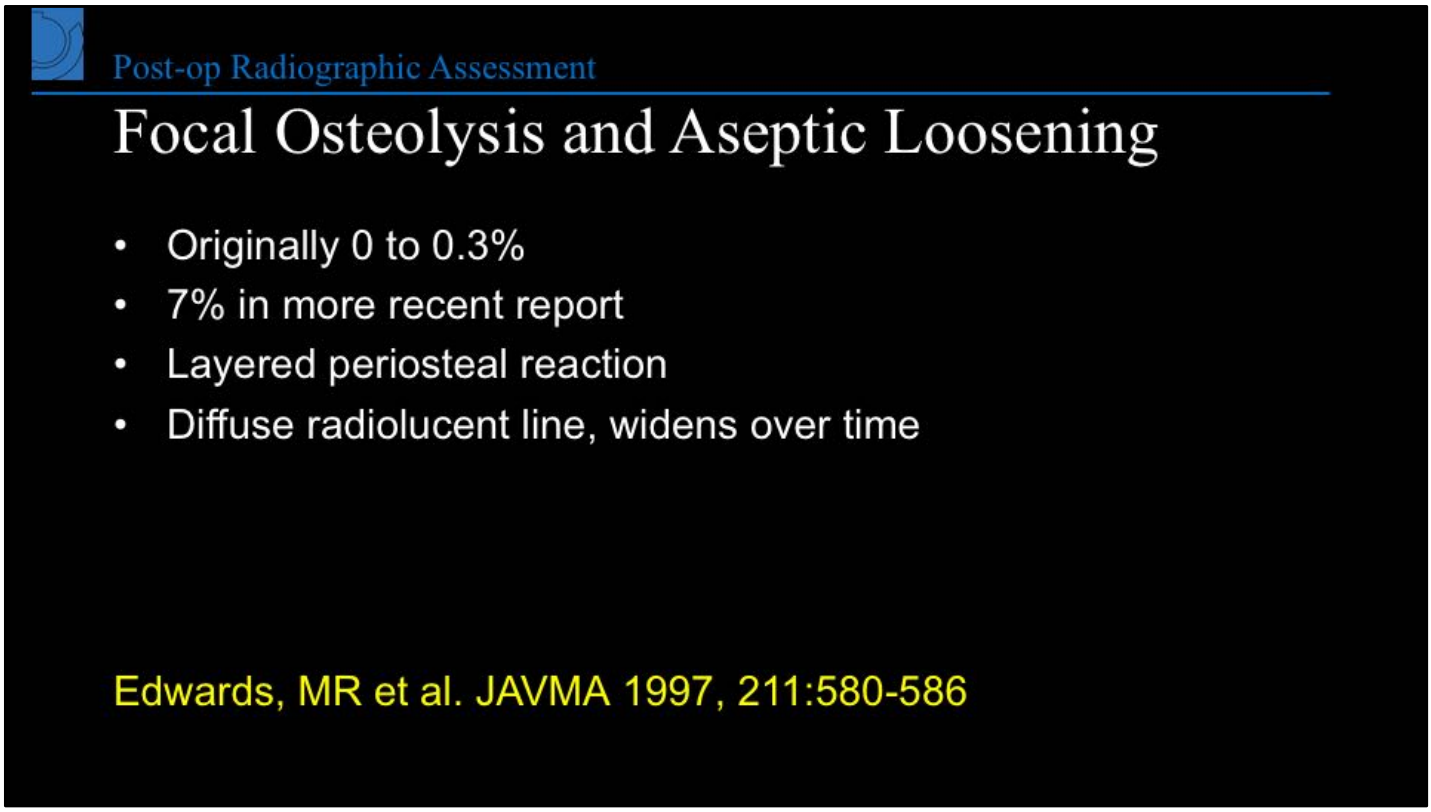


Notes Revised with another cemented femoral prosthesis; cementless upsized cup


Post-op Radiographic Assessment
Catastrophic Subsidence

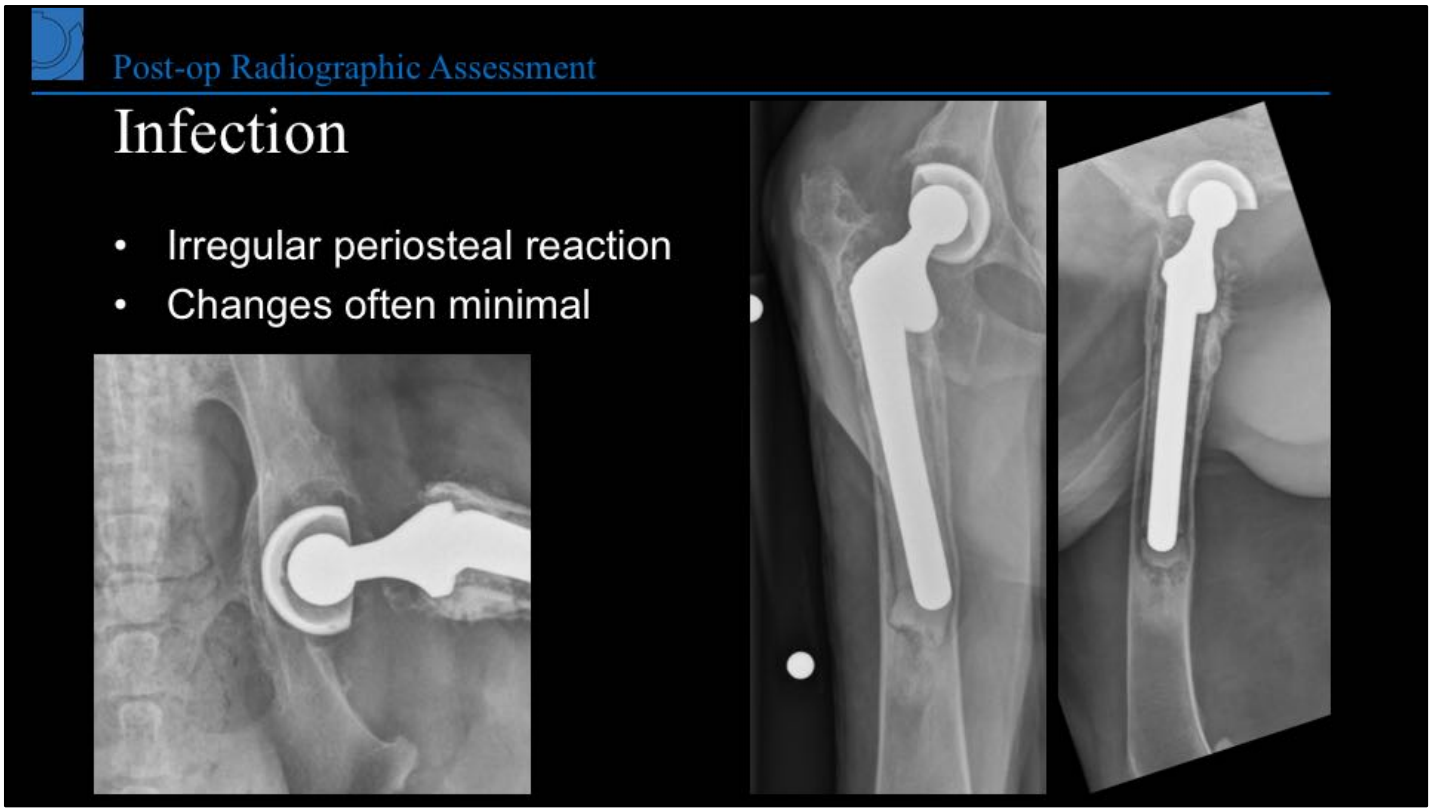
Notes

Notes Sibsidence and retroversion is bad - consider revision

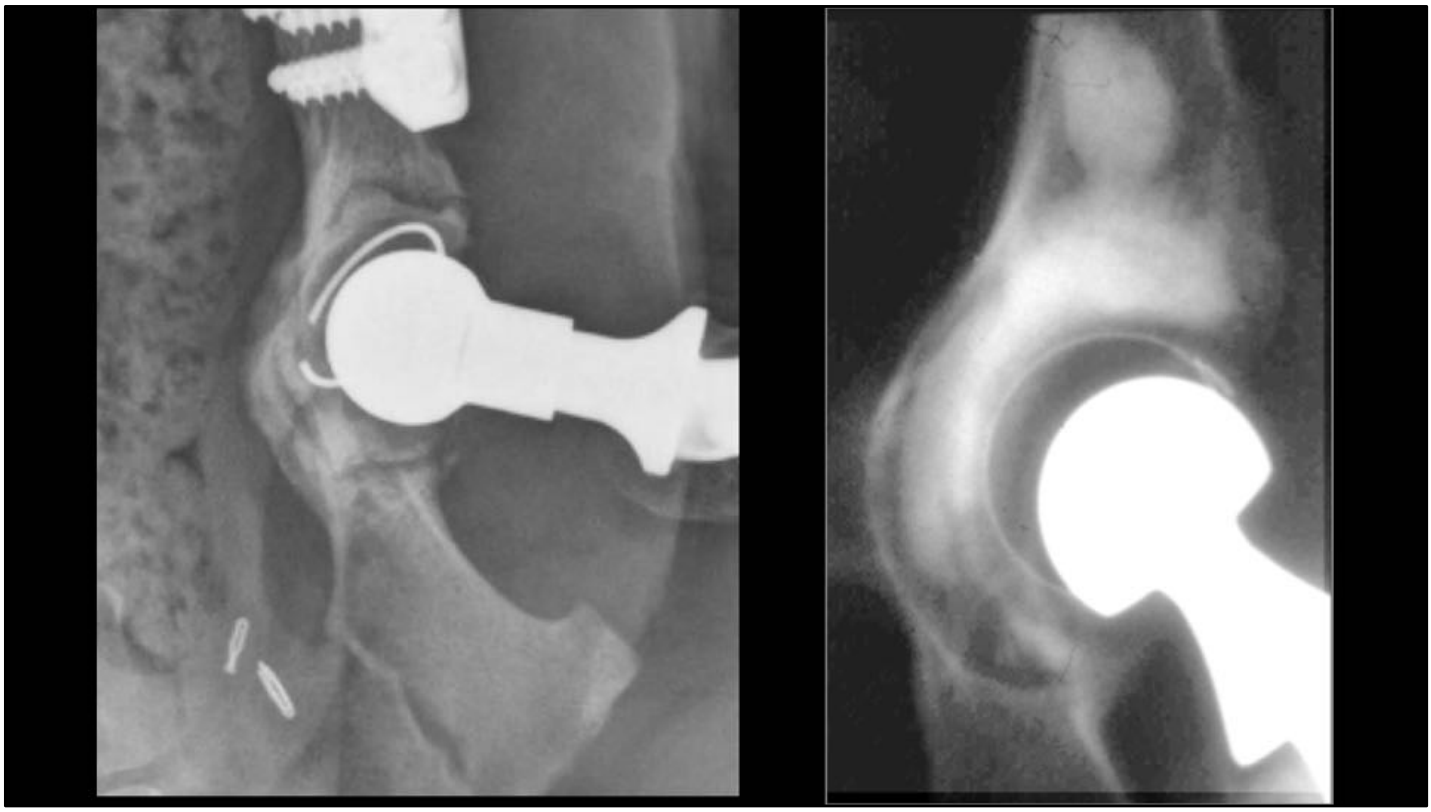

Post-op Radiographic Assessment
Focal Osteolysis and Aseptic Loosening
• Originally 0 to 0.3%
• 7% in more recent report
• Layered periosteal reaction
• Diffuse radiolucent line, widens over time
Edwards, MR et al. JAVMA 1997, 211:580-586

Notes

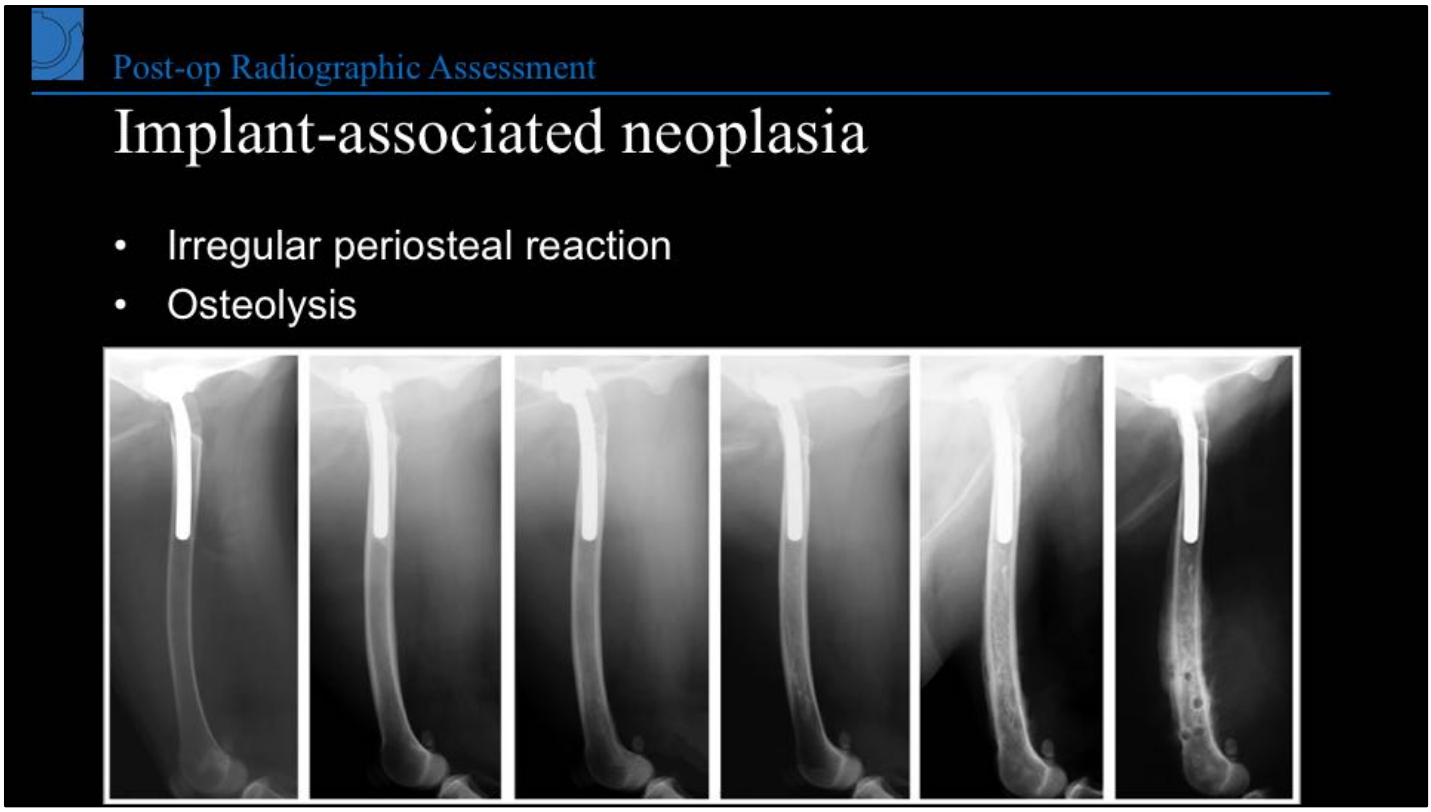
Notes


Post-op Radiographic Assessment
Infection
• Irregular periosteal reaction
• Changes often minimal

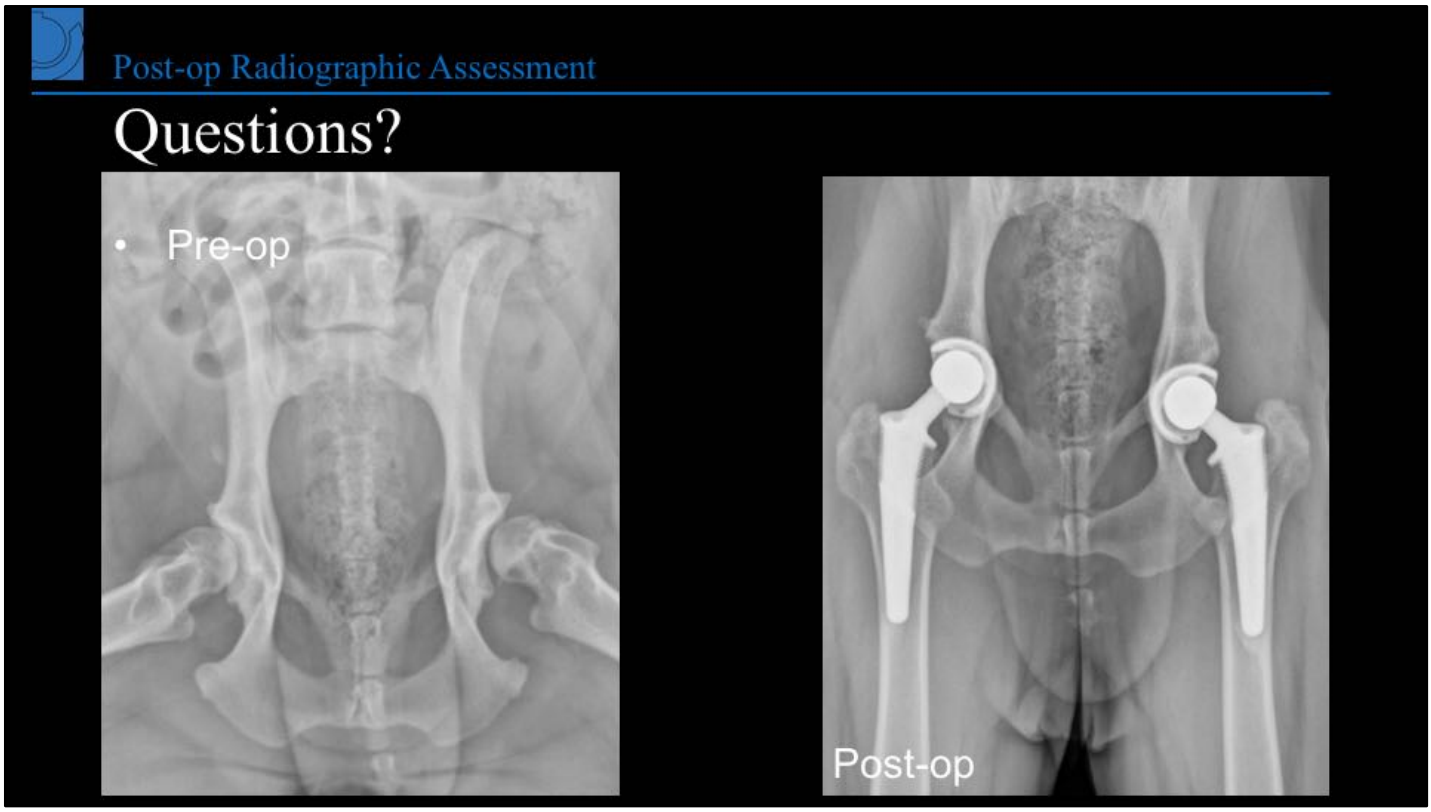
Notes



Notes


Post-op Radiographic Assessment
Implant-associated neoplasia
• Irregular periosteal reaction
• Osteolysis

Notes



Notes