

Biplanar Radiography: Pre- and Postsurgical Evaluation

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Topics



Technical Concept

Presurgical Evaluation

Postsurgical Evaluation



Technical Concept

Biplanar Radiography – EOS Scanner





Technical Concept

Biplanar Radiography – EOS Scanner

- Patient Positioning





Technical Concept

Biplanar Radiography – EOS Scanner

- Patient Positioning
- Upright Position: Normal Load of Body Weight





Technical Concept

Biplanar Radiography – EOS Scanner

- Patient Positioning
- Upright Position: Normal Load of Body Weight
- **Simultaneous Acquisition of an anteroposterior and lateral radiograph**





Technical Concept

Biplanar Radiography – EOS Scanner

- Patient Positioning
- Upright Position: Normal Load of Body Weight
- Simultaneous Acquisition of an anteroposterior and lateral radiography
- Storage on PACS and 3D post-processing

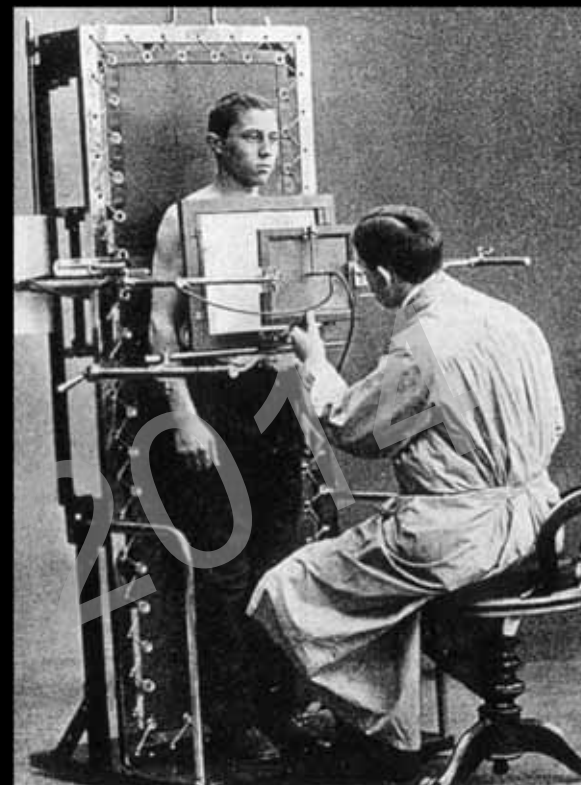




Technical Concept

So What?

- What's so special about this scanner
- What's different?
- What's new?

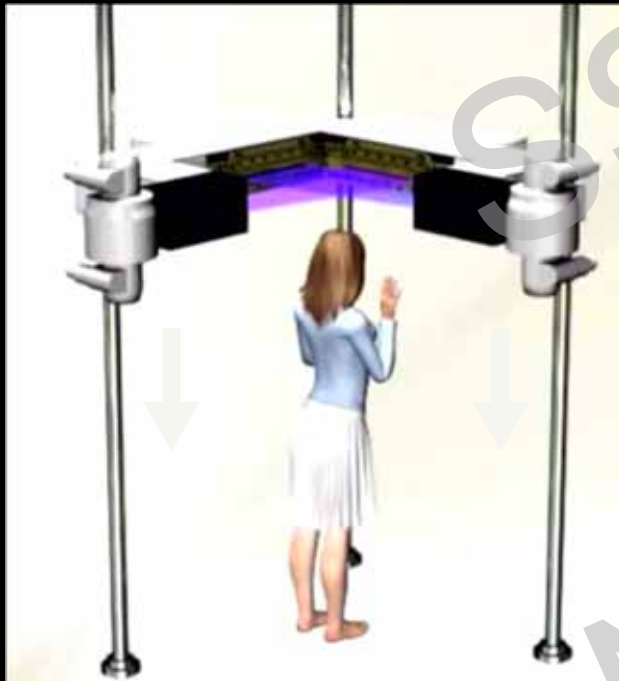


Imaging around 1900



Technical Concept

Scan versus Photography



Scan of about 15sec.

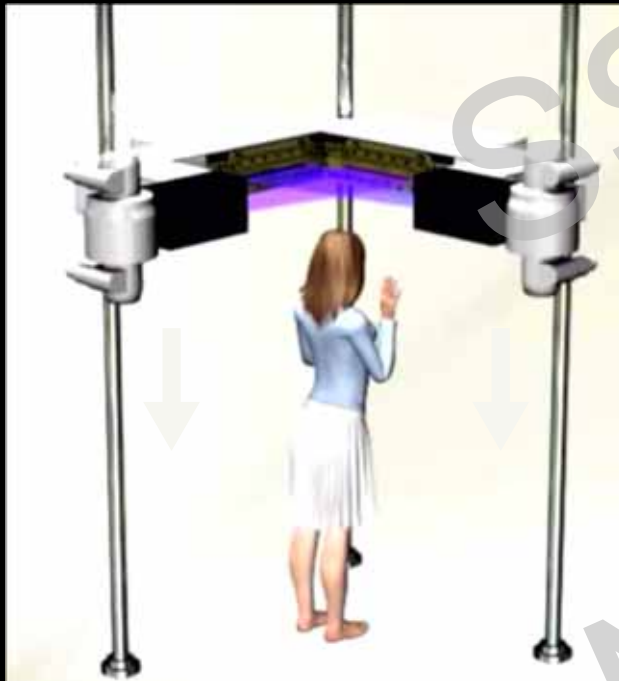


Plain film

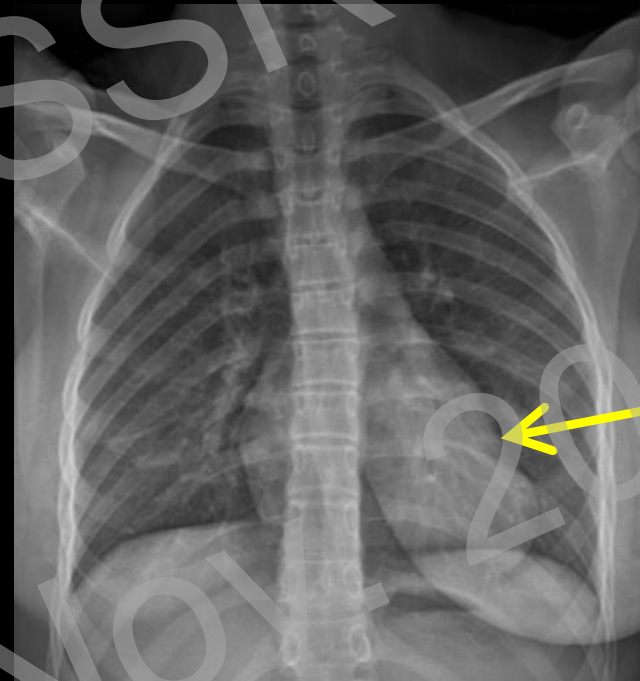


Technical Concept

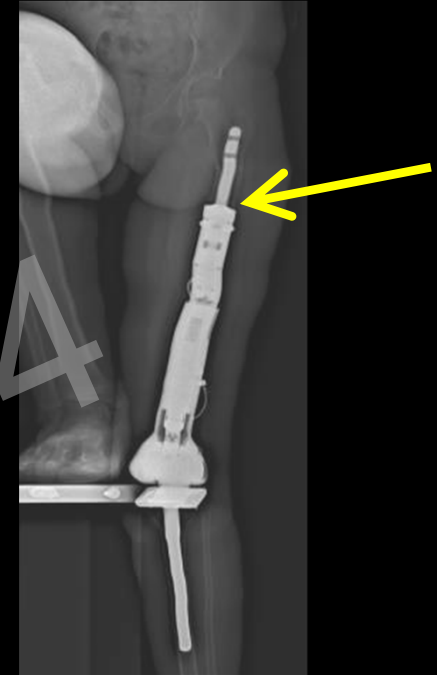
Scan versus Photography



Scan of about 15sec.



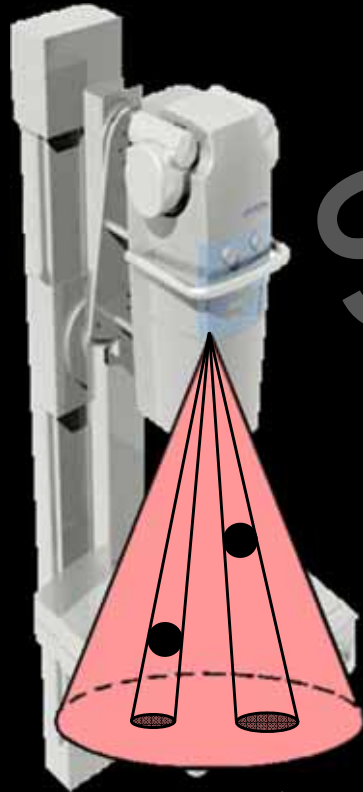
Motion Artifacts



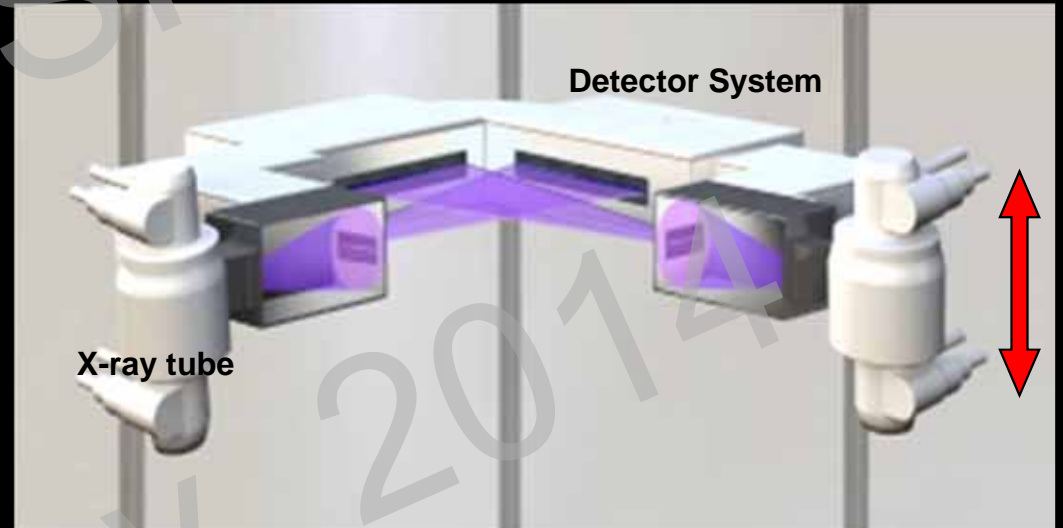


Technical Concept

Beam Path



X-ray: Cone-shaped beam



Biplanar Rx: Fan-shaped beam



Technical Concept

3D Acquisition

- Fan-shaped beam and known patient position
- Known 3D coordinates of all points in the scanner
- Basis for
 - 3D measurements
 - 3D reconstructions





Technical Concept

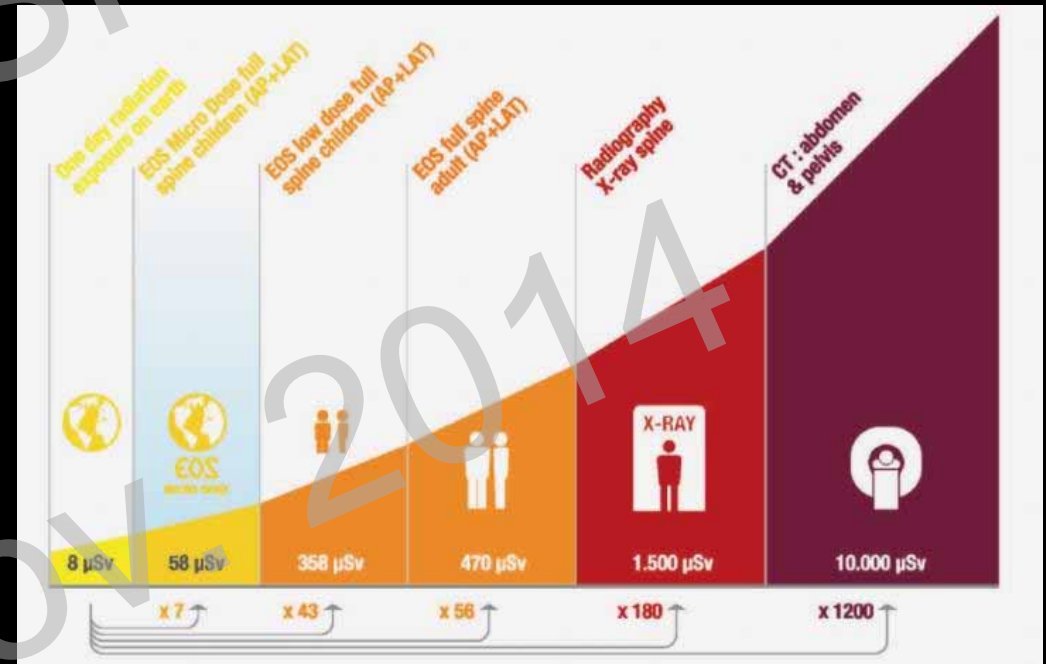
Dose Reduction

Low Dose (Standard)

Micro Dose



Highly sensitive Xenon detector



Dose compared to plain film 1/7

Dose compared to LowDose 1/7



Technical Concept

Image Quality – Adult Patient

Low Dose (Standard)



Micro Dose





Technical Concept

Image Quality – Child

Low Dose (Standard)

Micro Dose





Presurgical Evaluation

Leg Length and Axis





Presurgical Evaluation

Leg Length and Axis



Pelvic parameters						
Pelvic parameters	Value		Pelvic parameters	Value		
Pelvic incidence (1)	49.5°		Lateral pelvic tilt (1)	2 mm		
Sacral slope (1)	30.6		Lower limb parameters			
Sagittal pelvic tilt (1)	88.5	Lengths (3)		Right	Left	
		Femur length	44.1 cm	44.1 cm		
		Tibia length	37.3 cm	37.6 cm		
Total length	82.1 cm	82.3 cm				
		Hip (3)		Right	Left	
Femoral head diameter	42 mm	42 mm				
Femoral offset	46 mm	45 mm				
Neck length	61 mm	61 mm				
Neck shaft angle	134.0°	127.5°				
		Knee (4)		Right	Left	
Valgus/Varus	Valgus 0.7°	Varus 1.9°				
Flexion/Recurvatum	Recurv. 0.8°	Recurv. 2.4°				
Femoral mechanical angle	94.2°	92.7°				
Tibial mechanical angle	87.7°	86.0°				
HKS	3.8°	5.6°				



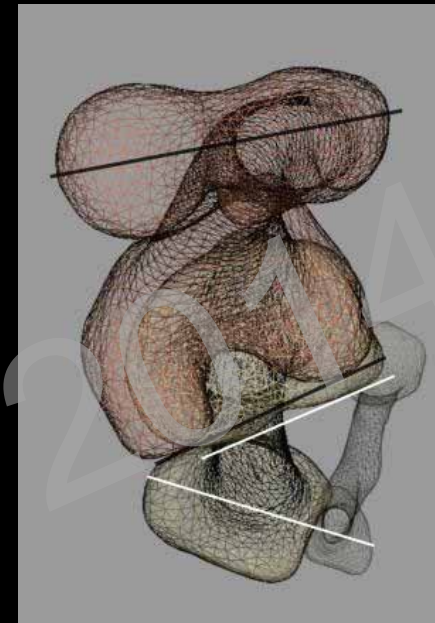
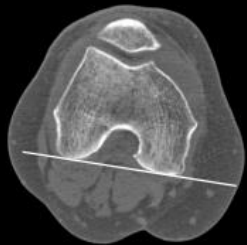
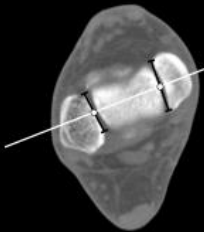
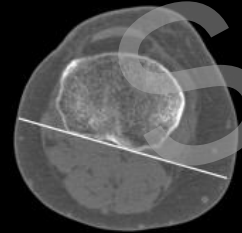
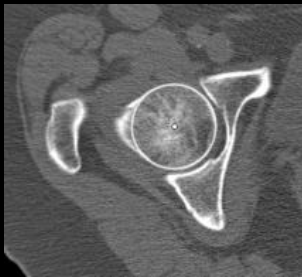


Presurgical Evaluation

Femoral and Tibial Torsion

Computed Tomography

Biplanar Radiography

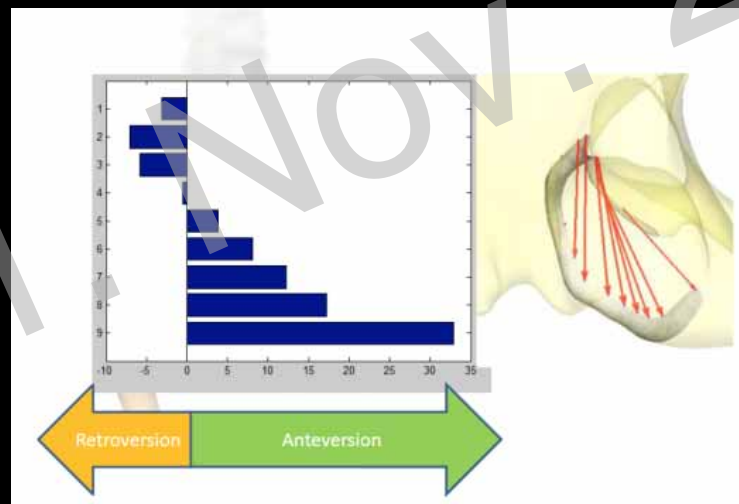
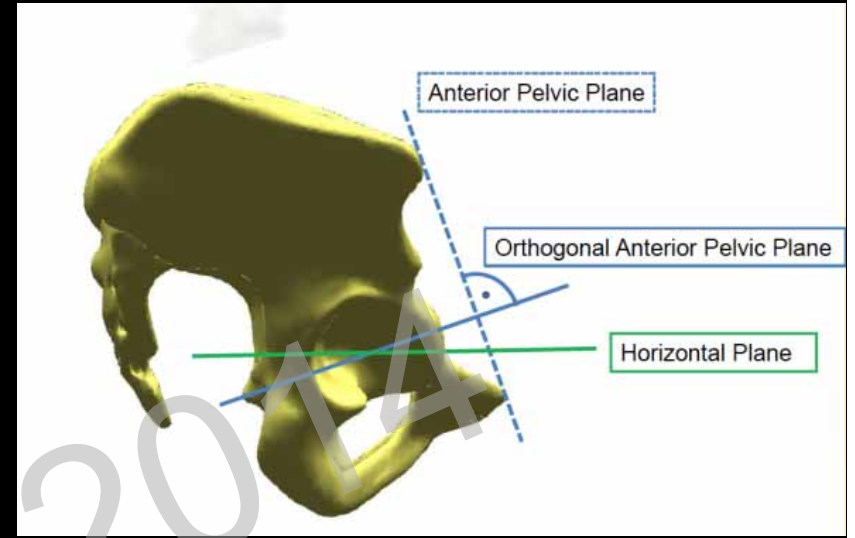
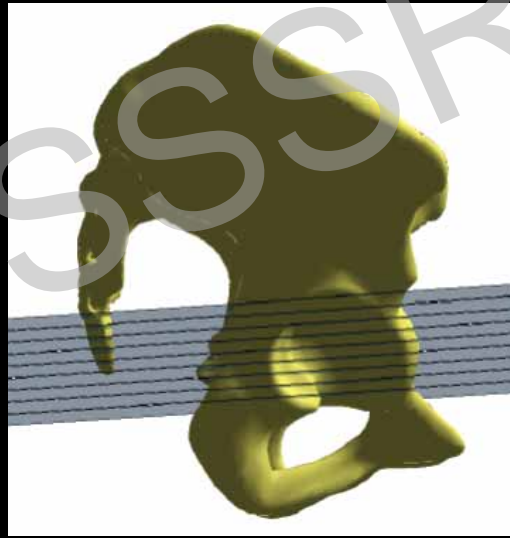
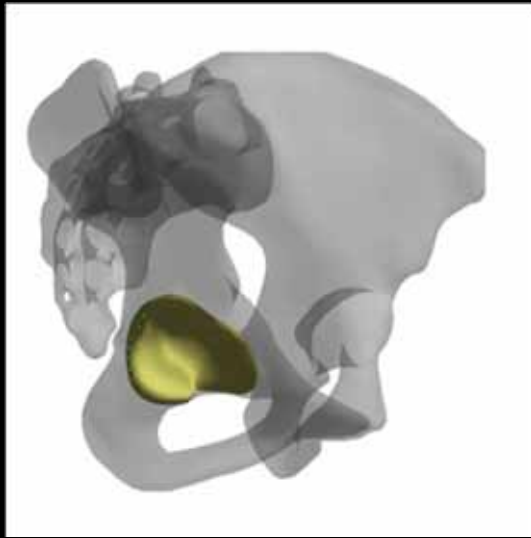


<i>Torsions</i>	Right	Left			
Femoral torsion	6.9°	4.0°			
Tibial torsion	38.3°	35.6°			
Femorotibial rotation	1.5°	-0.9°			



Presurgical Evaluation

Native Acetabulum





Postsurgical Evaluation

Prosthesis Position





Postsurgical Evaluation

Acetabular Cup Position



Acetabular cup (1)	Right	Left		
Acetabular cup inclination	53.0°	65.7°		
Acetabular cup anteversion	26.5°	34.3°		



Postsurgical Evaluation

Prosthesis Position

Knee parameters			
Lengths (3)			
	Right	Left	
Femur length	43.6 cm	42.9 cm	
Tibia length	35.5 cm	35.2 cm	
Functional length	78.7 cm	78.7 cm	
Anatomical length	79.1 cm	78.0 cm	
Femur (3)			
	Right (implant)	Left	
Femoral head diameter	-	48 mm	
Femoral offset	45 mm	42 mm	
Neck length	-	52 mm	
Neck shaft angle	136°	126°	
Knee (4)			
	Right	Left	
Valgus/Varus	Varus 4°	Varus 4°	
Flessum/Recurvatum	Flessum 22°	Flessum 5°	
Femoral mechanical angle	-	94°	
Tibial mechanical angle	-	84°	
HKS	7°	5°	
Torsions			
	Right	Left	
Femoral torsion	-	10°	
Stem antetorsion	7°	-	
Tibial torsion	-	30°	
Femorotibial rotation	-	-2°	



Summary

Take Home Messages



- Imaging in a weight-bearing upright position
- Substantial dose reduction
- 3D secondary reconstructions for pre- and postsurgical evaluations

Thank you for your attention!

SSSR
1. Nov. 2014

