Advantages of Image Guidance in Complex Spinal Surgery

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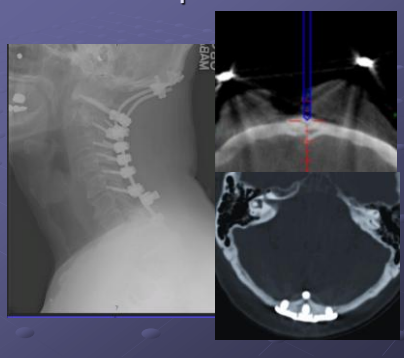
Disclosures

- Synthes Spine-Consultant
- Globus-Royalties

Cone beam Computed Tomography (cbCT)

Occipitocervical



Placement of Reference Arc in Posterior Occipitocervical cases

Posterior Occipitocervical and Cervical Setup

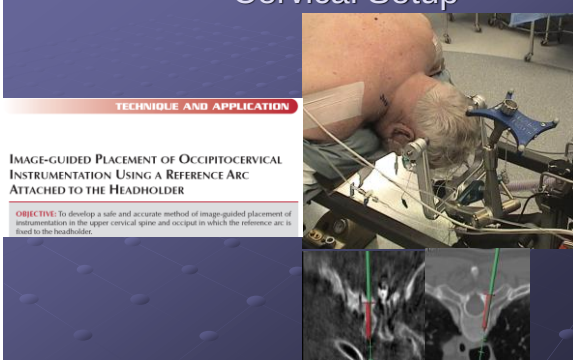
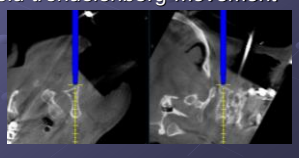
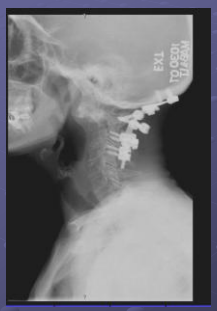


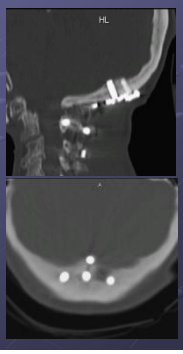
Image-guided Placement of Occipitocervical Instrumentation Using a Reference Arc Attached to the Headholder

- To minimize intersegmental movement in upper cervical spine
  - Scan with retractors in place
  - Drill all holes prior to tapping and placing screws
  - Hold respirations during spin
  - Avoid trendelenberg movement

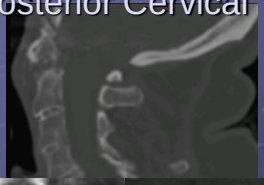


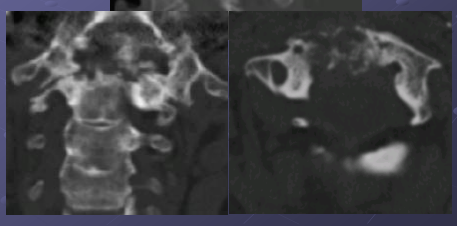
Occipitocervical



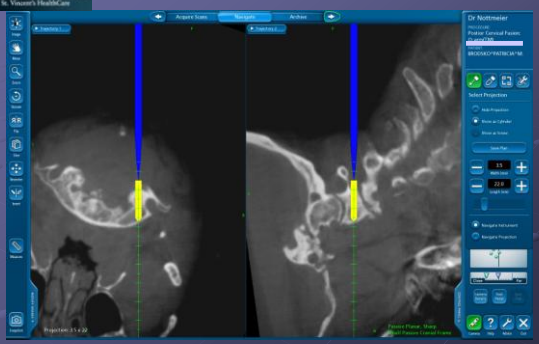


Posterior Cervical

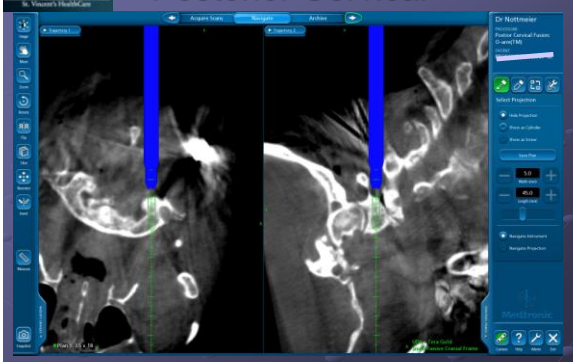




Posterior Cervical



Posterior Cervical



Posterior Cervical

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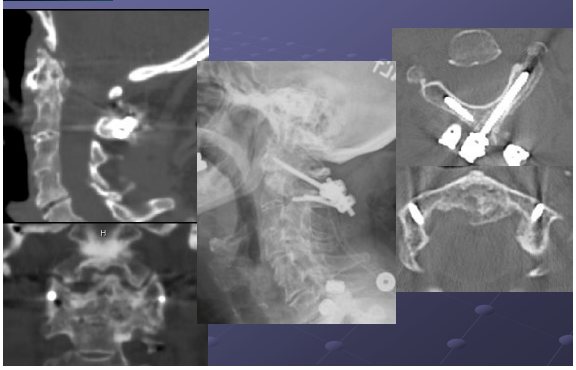
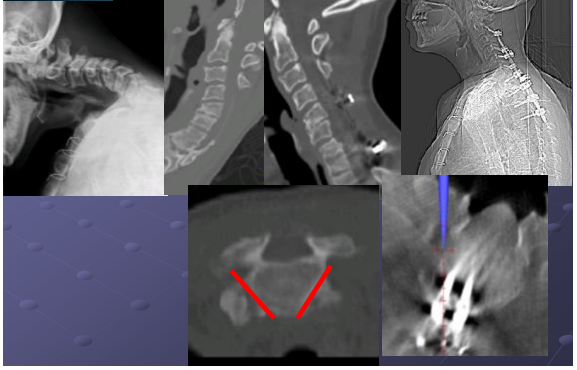
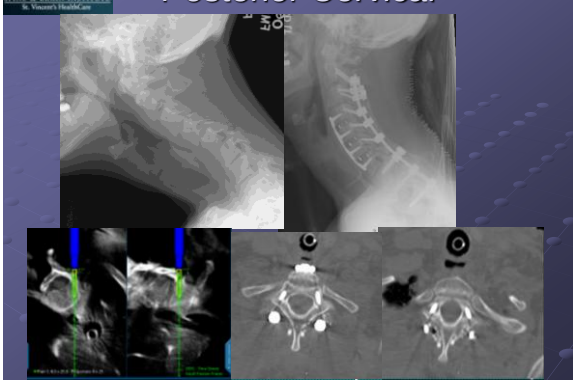


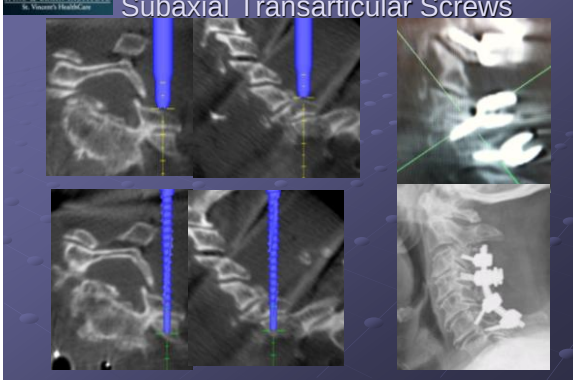
C7 PSO



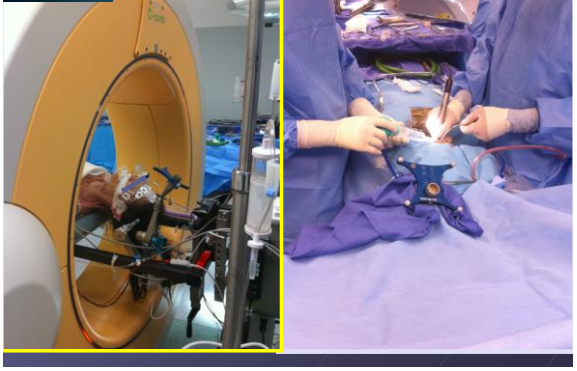
Posterior Cervical



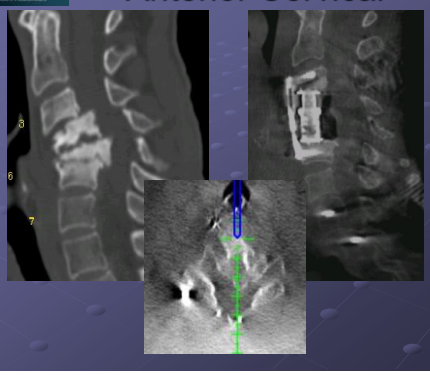
Posterior Cervical
Subaxial Transarticular Screws



Anterior Cervical



Anterior Cervical



Anterior Cervical

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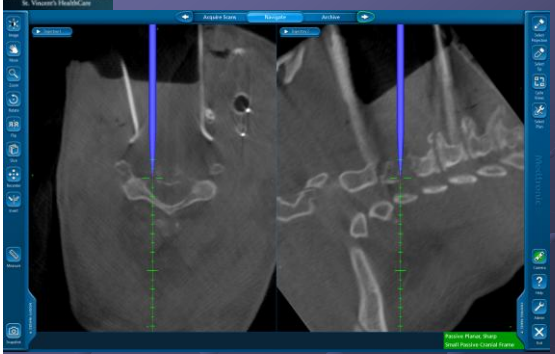
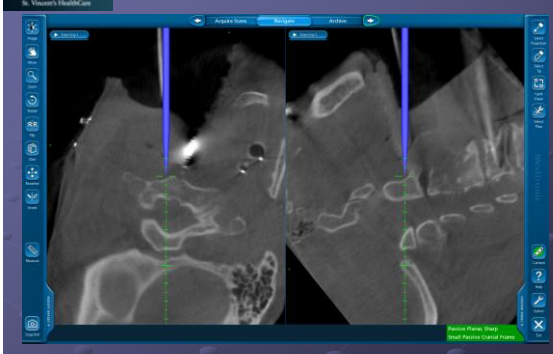
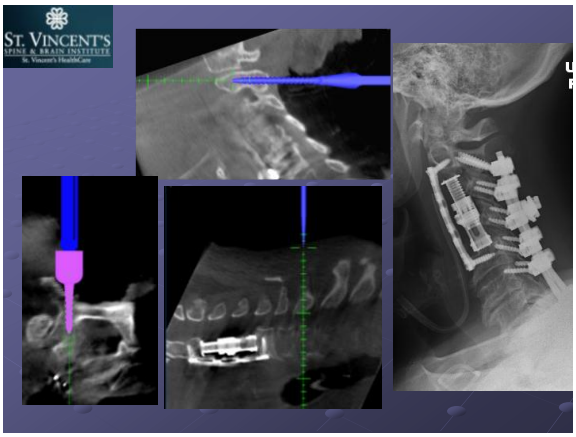
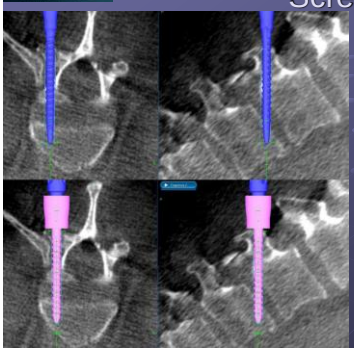


Anterior Cervical





Thoracic Transvertebral Pedicle Screws



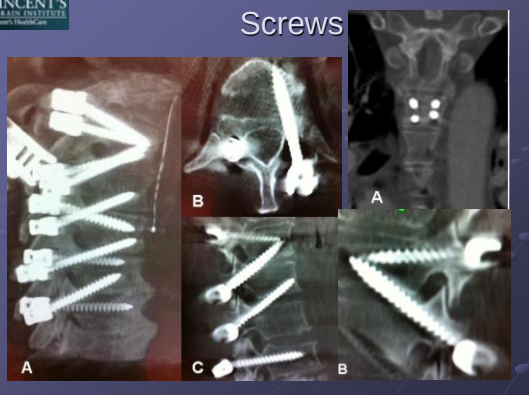
*Thoracic pedicles more elongated in the sagittal plane

*Sagittal pedicle angle in thoracic spine more accomodating

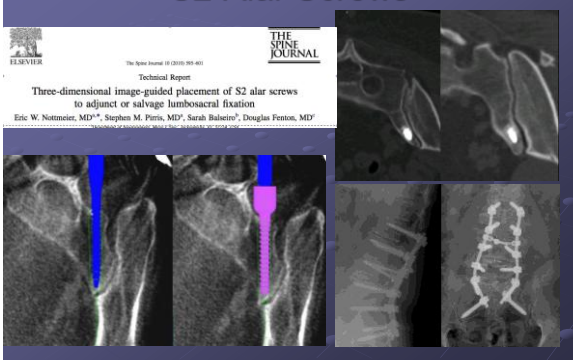
*Thoracic disc spaces more narrow

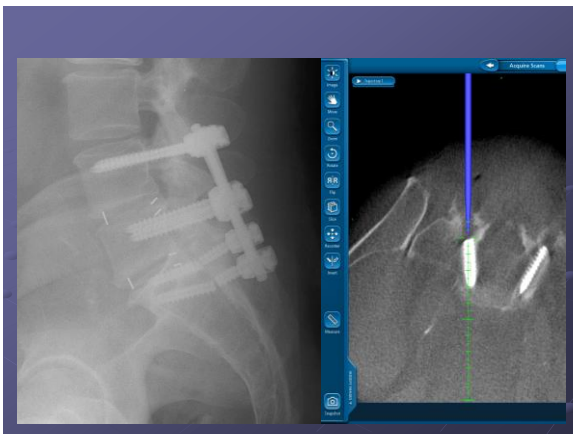
*40 screws placed, 1 Grade 1 medial breach

Thoracic Transvertebral Pedicle Screws



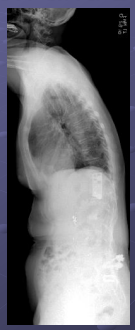
S2-Alar Screws

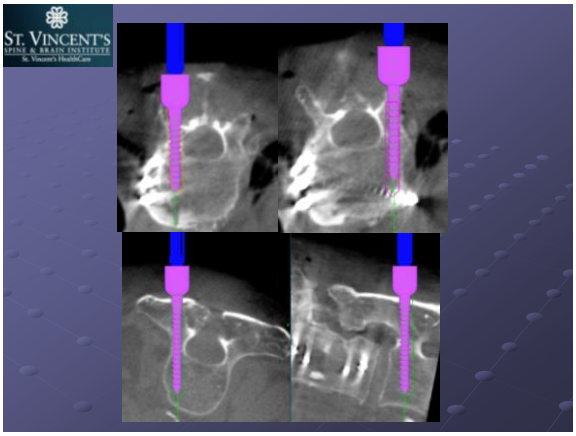


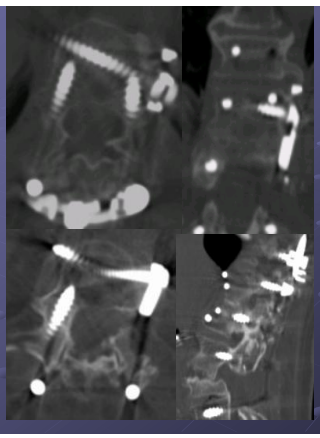


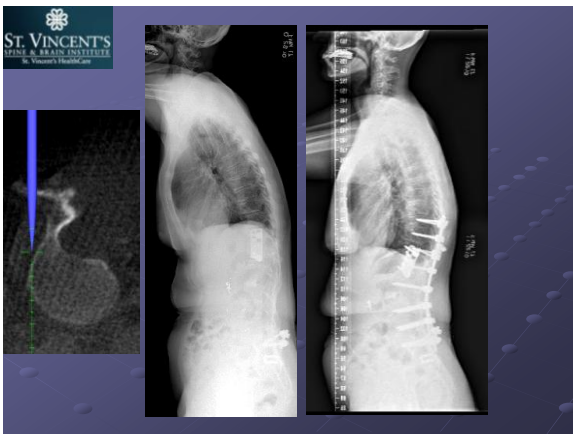
S2-iliac Screws

Other Useful Applications
Revision and Deformity

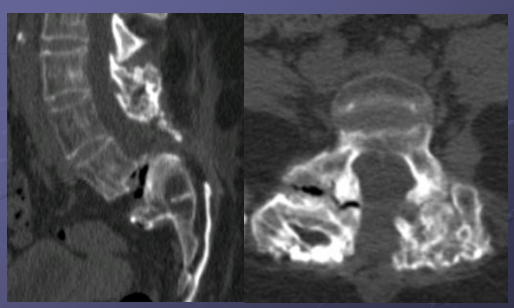


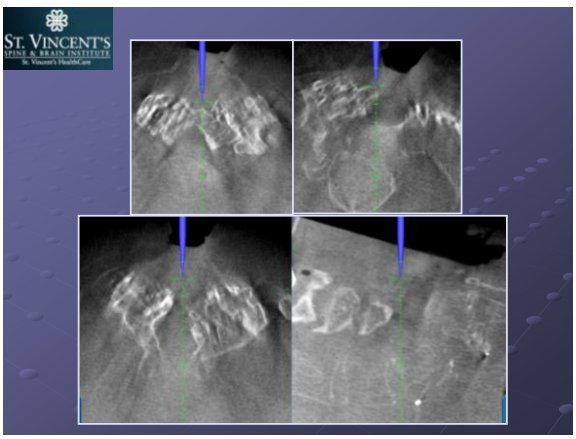


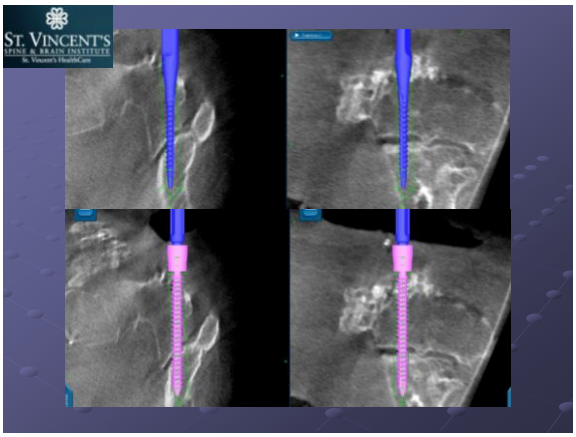


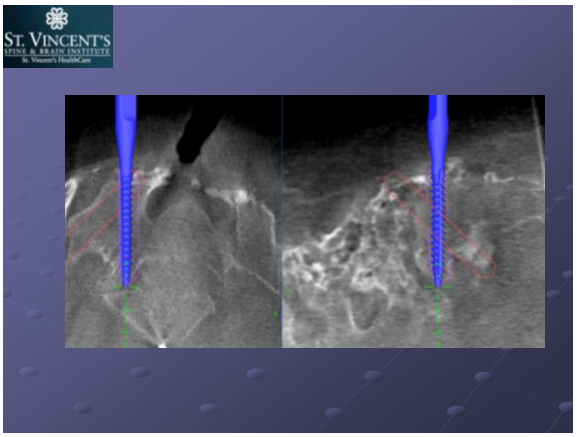


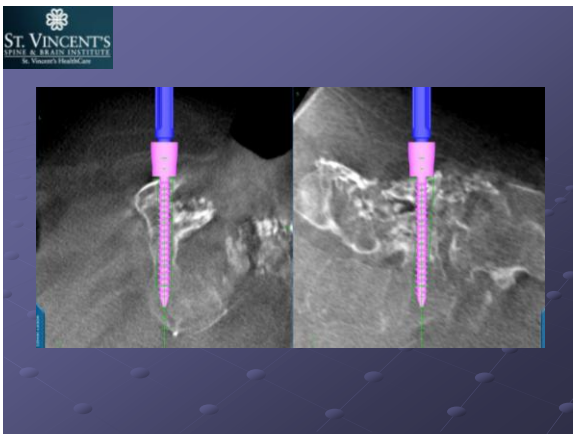
Lumbar

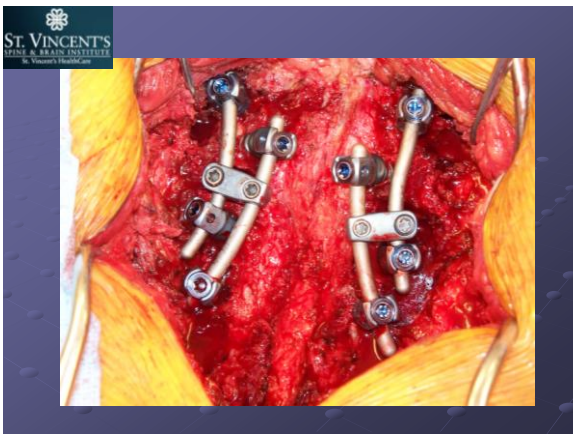


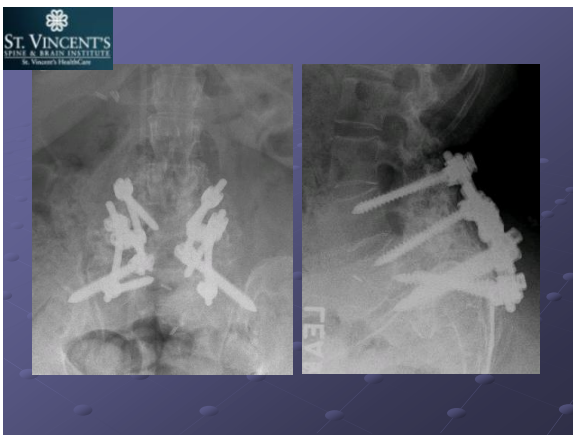




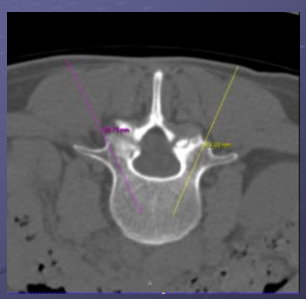








Percutaneous Pedicle Screws



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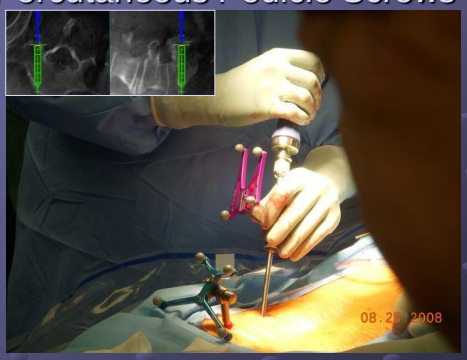

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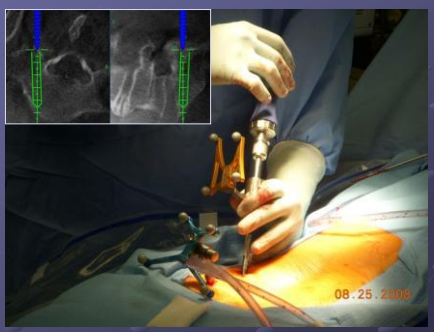
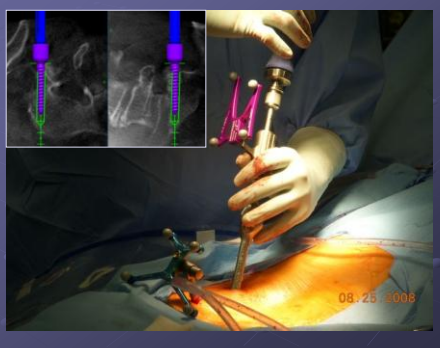


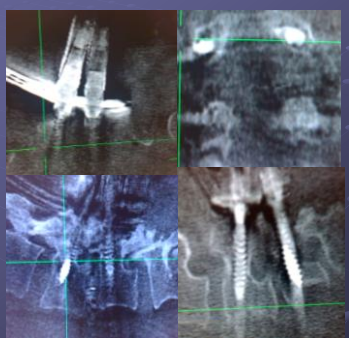
Percutaneous Pedicle Screws



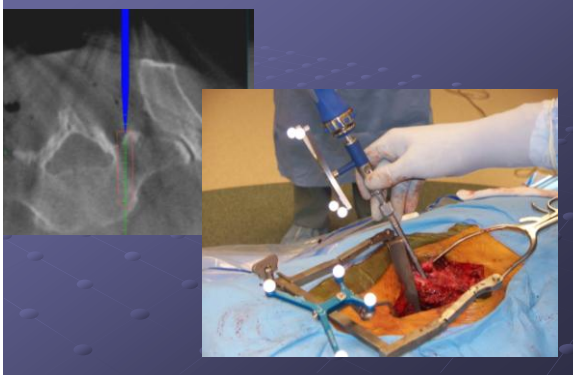
THE INTERNATIONAL JOURNAL OF MEDICAL ROBOTICS AND COMPUTER ASSISTED SURGERY
Int J Med Robotics Comput Assist Surg (2010).
Published online in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/rcs.359

ORIGINAL ARTICLE

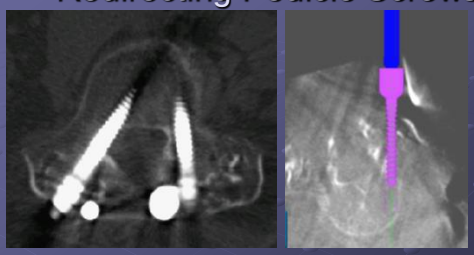
Three-dimensional image-guided placement of percutaneous pedicle screws without the use of biplanar fluoroscopy or Kirschner wires: technical note



Transfascial Pedicle Screws

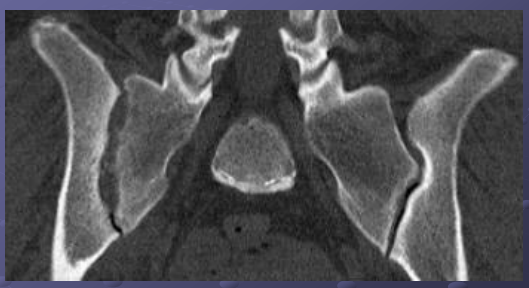


Redirecting Pedicle Screws

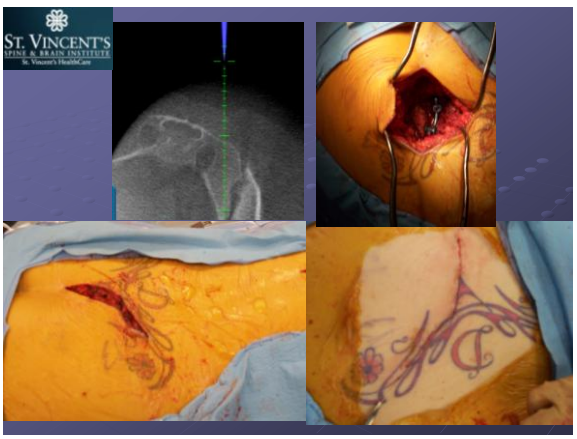


*35 screws redirected in 20 patients
*28/35 screws into or against nerve roots (5 pts symptomatic-unaware of screw)
*All screws redirected successfully without breach (radiologist grading)

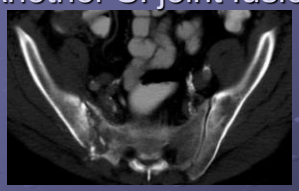
SI Joint Fusion

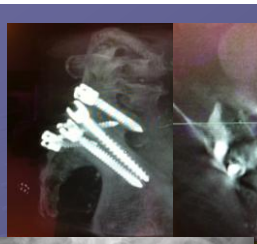


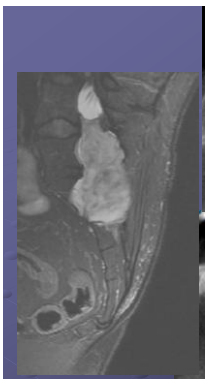
SI Joint Fusion

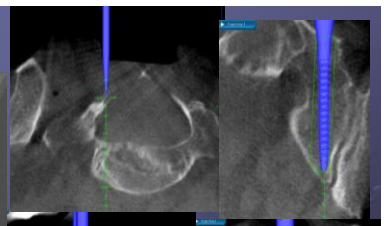


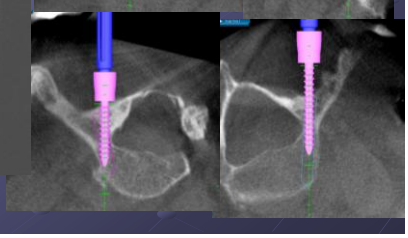
Another SI joint fusion









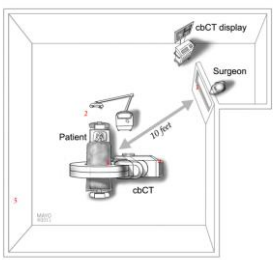


Radiation Exposure

THE INTERNATIONAL JOURNAL OF MEDICAL ROBOTICS AND COMPUTER ASSISTED SURGERY
Int J Med Robotics Comput Assist Surg (2015)
Published online in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/rcs.1650

ORIGINAL ARTICLE

Surgeon radiation exposure in cone beam computed tomography-based, image-guided spinal surgery



Summary of Badge Dosimetry Data in 25 Spinal Surgery Cases Utilizing cbCT

Badge	Badge Dosimetry Reading after 50 cbCT spins	Mean radiation dose per spin	Number of cbCT spins/year that would result in exceeding the maximum annual allowed radiation exposure of 5 REM to the torso when standing unprotected at badge location
1	181 mREM	3.6 mREM	1,385
2	94 mREM	1.9 mREM	2,660
3	8845 mREM	176.9 mREM	28
4	6402 mREM	128.0 mREM	39
5	33 mREM	0.7 mREM	7,276

Thank You