DAVID VERST, MD VERSTSPINE CARE

NAVIGATION AND ROBOTICS USE IN SPINE SURGERY

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ADVANTAGES

- TISSUE SPARING
- LESS RADIATION
- IMPROVED ACCURACY
- MORE EFFECIENT
- IMPROVED SAFETY
- BETTER OUTCOMES

SPINE SURGERY CHALLENGE

NAVIGATION/ ROBOTICS

- SPINE SURGERY CHALLENGE

NAVIGATION

- INTRAOPERATIVE CT
- NAVIGATIONAL SOFTWARE
- FIDUCIARY MARKERS (GPS)
- NOT AN ASSISTANCE MECHANICAL DEVICE
- NOT REAL TIME

TYPES OF NAVIGATION PLATFORMS

- O-ARM, STEALTH
- BRAINLAB, ARROW

BRAINLAB

- BRAINLAB, ARROW

O-ARM, STEALTH

- O-ARM, STEALTH

ABANDONED SOFTWARE

ROBOTICS

QUESTIONS THAT MUST BE ASKED?

- ARE ROBOTS READY FOR THE OPERATING ROOM?
- WILL THEY HELP US WITH SAFETY AND EFFICIENCY ?
- MOST IMPORTANT, WILL PATIENTS BENEFIT FROM THE TECHNOLOGY?

ROBOTS FOR SPINE SURGERY

- WHAT IS IMAGINED AND WHAT IS REAL
- NOT A SURPRISE
  - HIGH RESOLUTION IMAGING
  - RAW 3D COMPUTING POWER

ROBOTS

- 2 TYPES OF ROBOTS
  - SUPERVISORY- CONTROLLED
    - AUTOMATED ASSISTANCE SYSTEMS
  - MASTER SLAVE SYSTEMS
    - DAVINCI ROBOT

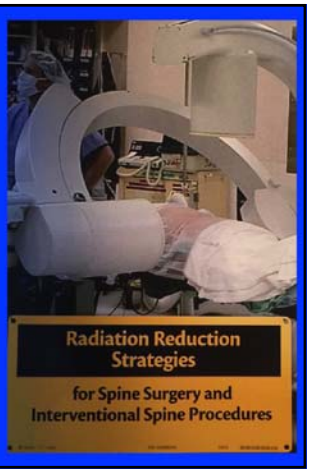
BENEFITS OF ROBOTIC APPLICATION?

- IMPROVED SAFETY, ASSIST WITH DELICATE AND COMPLICATED PROCEDURES
- REDUCED RADIATION
- SPEED UP RECOVERY TIME, REDUCING POST-OPERATIVE PAIN, LESS TISSUE DAMAGE, LESS INVASIVE

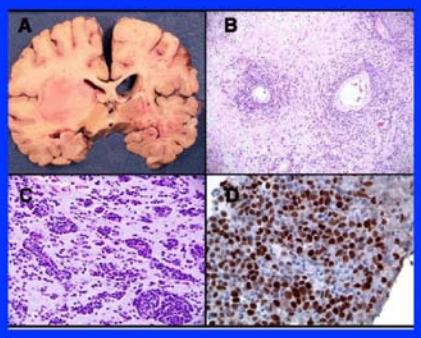
WHEN TECHNOLGY DISAPPOINTS

RADIATION RISK

- RADIATION



RADIATION INDUCED LYMPHOMA



THREE TYPES OF ROBOTS USED IN SPINE SURGERY

- MAZOR RENAISSANCE SYSTEM
- ROSA SPINE
- CARDAN

- MAZOR
  - LOW DOSE CT
  - PREOPERATIVE PLANNING
  - FLUOROSCOPY: AP AND OBLIQUE VIEW
- ROSA AND CARDAN
  - 3-D IMAGING CT INTRAOPERATIVE

DRAWBACKS

- INCREASED OPERATING TIME
- ECONOMIC INVESTMENT

CARDAN SURGICAL

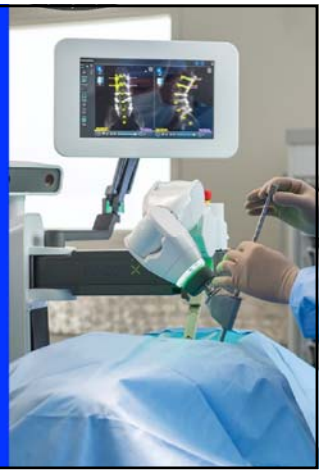
ROSA

- ROSA ROBOTICS

MAZOR

MAZOR X

- MAZOR X ROBOT



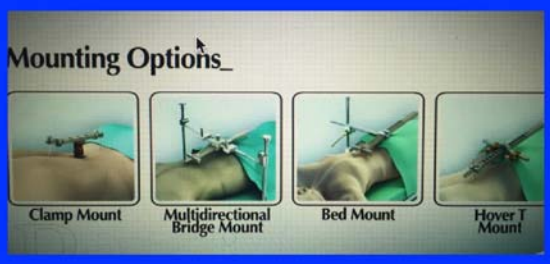
PROCEDURE OF OPERATIONS

- PRE-OPERATIVE PLAN
  - LOW DOSE CT
- REGISTRATION
  - MOUNTING PLATFORM
  - INTRA-OPERATIVE FLUOROSCOPY AP AND OBLIQUE
- EXECUTION OF PRE-OPERATIVE PLAN
  - PLACEMENT OF ROBOT ON PLATFORM

PREOPERATIVE PLAN

- LOW DOSE CT

ROBOTIC PLATFORM



REGISTRATION

- FLUOROSCOPY
  - AP AND OBLIQUE

ROBOT

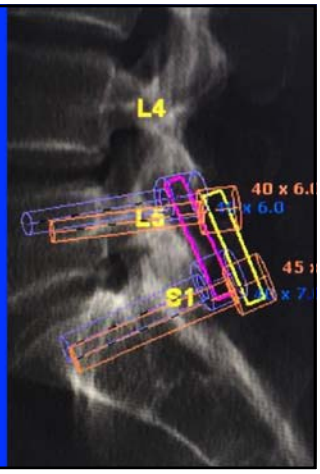
ROBOT IS USE

ROBOT

CLINICAL APPLICATION

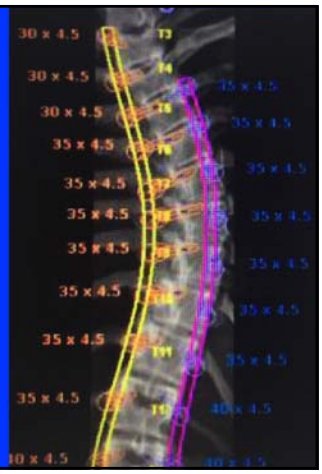
MIS SURGERY

CLINICAL APPLICATION



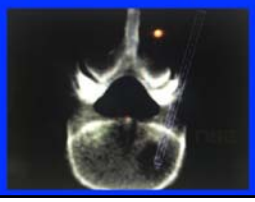
SCOLIOSIS

CLINICAL APPLICATION

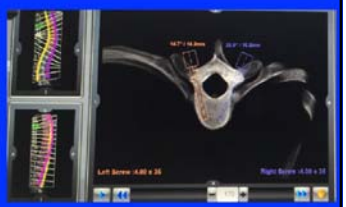


BIOPSY

CLINICAL APPLICATION



REVISION COMPLEX SURGERY



COMPRESSION FRACTURES

CLINICAL APPLICATION

SACROILIAC FUSION

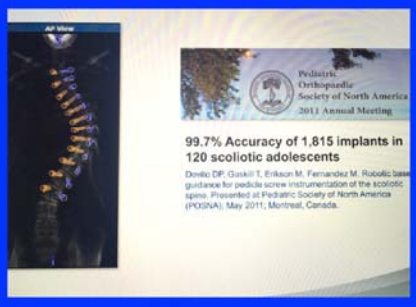
CLINICAL APPLICATION

VALIDATION
CLINICAL RESULTS

CLINICALLY VALIDATED TECHNOLOGY

CLINICAL EVIDENCE

EVIDENCE



IMPROVED SAFETY

- PEDICLE SCREW PLACEMENT IS ASSOCIATED WITH RISK OF MALPOSITIONING
  - INJURY TO SPINAL CORD, VESSELS, OR SPINAL CORD
- IMAGE GUIDANCE NAVIGATION OVERCOMES MANY OF THESE CHALLENGES
  - COMPLEX CASES
- ROBOTICS GUIDES THE SURGEON'S HANDS
  - FINDING THE PERFECT TRAJECTORY

TESTIMONIALS

TESTIMONIALS

CONCLUDING COMMENTS

ROBOTICS

- NEW TECHNOLOGY
  - TIME TO GETTING USED TO
  - REQUIRES INFORMATION TO WORK
  - TRANSFERRING IMAGING FROM RADIOLOGY SERVER TO ROBOT SYSTEM
    - PLANNING
    - INTRAOPERATIVE REGISTRATION
    - EXECUTION OF PLANNED SURGERY

ROBOTIC LIMITATIONS

- MANY PARTS OF SPINE SURGERY REMAIN OUT OF REACH FOR ROBOTIC APPLICATION
  - MICROSURGICAL DECOMPRESSION
  - DISC REMOVAL
  - INTRADURAL WORK

CONCLUSION

- INTRODUCTION OF ROBOTICS TO SPINE SURGERY HAS ONLY JUST BEGUN
- ACCURACY OF ROBOTIC ASSISTANCE IS MATCHED WITH EXPERT SPINE SURGEON.
- NO CLINICAL EVIDENCE OF BETTER OUTCOMES
- ACCURACY, PRECISION, EFFICIENCY = IMPROVED SAFETY= BETTER OUTCOMES
- WILL REVOLUTIONIZE SPINE SURGERY

PERSONAL EXPERIENCE

- LESS EXPOSURE OF DAILY RADIATION
- SHORTER OR TIMES
- IMPROVED OUTCOMES
- NOT AS MENTALLY AND PHYSICALLY DRAINING

THANK YOU

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  - VERSTSPINE CARE