

ABSTRACT

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- Title of Abstract:** The New Frontier of Minimally Invasive Spinal Surgery (MISS) through computer assisted technology (CAT)
- Introduction:** Minimally Invasive Spine Surgery (MISS) has rapidly come of age due to the explosive development of bio-computer technology, digital video imaging, laser application and much better medical/surgical instruments. Medical professionals expect that up to 85% of spinal surgery will soon be done with MISS.
- Purpose:** To identify and demonstrate the Minimally Invasive Spine Surgery treatment for cervical, thoracic and lumbar disc disease with various techniques and surgical techniques with digital Computer Assisted Technology (CAT) via a seamless computerized digital network. These will aid the precise diagnosis and improved MISS treatment.
- Materials and Methods:** Several computer aided innovations, different endoscopes, surgical robotics and MISS systems are introduced. Intra-operative x-ray fluoroscopy, digital video photography, various MISS instruments, laser application, newer endoscopy with better visualization, and thermodiskoplasty (i.e. the use of the laser at low energy levels, to shrink and tighten disc material) are described. MISS techniques used in surgery are demonstrated pictorially.
- An Institutional Information System (IIS) including an all digital Picture Archiving and Communication System (PACS), a digital 3-D imaging virtual reality system are included our Medical Surgical Planning Laboratory for better diagnosis and pre-operative surgical planning for MISS. This laboratory is networked with the entire Institutional Information System (IIS) for intramural and extramural connectivity or networking. This establishes the foundation for telemedicine, teleconferencing and telesurgery for improved patient care, education, research and development.
- Results:** Computer Assisted Technology (CAT) has allowed and promotes rapid progress in MISS technology. There is a definite correlation between clinical findings, digital radiology, neuropsychological studies, MRI, CT, 3D virtual imaging, virtual spinal endoscopy and surgical findings. Surgical robotics adds further precision in MISS. Overall MISS surgical outcome has improved to above 94% or more, patients with symptomatic relief but with little or no trauma and zero mortality from the MISS procedures.
- Conclusion:** The advantages of MISS through improved Computer Assisted Technology, (CAT) and Institutional Information System (IIS) compared to open spinal surgery for treatment of disc disease are obvious. This less traumatic, easier improved outpatient MISS treatment leads to excellent results, faster recovery, and significant economic savings. Soon further MISS applications will include spinal disk replacement, artificial disk, spine arthroplasty, vertebralplasty, spinal fixation/fusion and perhaps genome therapy.

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