AbstractID: 3396 Title: Guided Surgery Using Rapid Prototyping Patient Specific Guides

Purpose: One of the basic tenets of Neurosurgical planning is the ability to generate an operative approach that minimizes the disruption of normal tissues while allowing the required access to target tissues. To aid the surgeon in his or her ability to appreciate the location of target tissues, as well as the relationship of the target to normal tissues, graphical workstation have been employed. The introduction of Image Guidance Systems (IGS) into OR has brought along a host of new computers, infrared camera systems and radio frequency transmitters and receivers, all of which pose restrictions on the placement and operation of the other equipment needed for the operative procedure. In order to provide the advantages of IGS while avoiding the problems associated with the commercial equipment we elected to investigate a mechanical alternative, one that did not require any of the above equipment to be present with the operating room.

Method and Materials: Recently, a new generation of 3-dimensional printers has been developed. These systems are capable of fabricating OR compatible objects within an hour of design. The goal of this project is to develop software that provides the surgeon with the ability to build a patient specific 3D model from a diagnostic image dataset and to then plan a surgical procedure. Utilizing the 3D patient specific model, the software designs a patient specific reference frame and fabricates the frame using rapid prototyping technology. This reference frame incorporate all necessary trajectories, including mechanical referencing to the patient, guidance for initial skin incision, trajectory alignment to the target tissues, as well as providing a mechanical platform for mounting other surgical tools.

Results Conclusion: We have written and tested this new generation of software on phantom targets and are now engaged in an IRB surgical trial assessing the system's accuracy and precision.