Brain Surgery Through The Eye

Surgeons at UW Medicine at the University of Washington in Seattle and at the University of California, San Diego, School of Medicine have determined that transorbital neuroendoscopic surgery (TONES) is a safe, effective option for treating a variety of advanced brain diseases and traumatic injuries. This groundbreaking, minimally invasive surgery is performed through the eye socket, thus eliminating the removal of the top of the skull to reach the brain. The findings were published in the September issue of *Neurosurgery*.

"By performing surgery through the eye socket, we eliminate the need for a full craniotomy, gain equivalent or better access to the front of the brain, and eliminate the large ear-to-ear scar associated with major brain surgery," said Dr. Chris Bergeron, assistant professor of surgery, Division of Head and Neck Surgery, at UC San Diego Health System. "This novel technique is also critical to protecting major blood vessel structures and nerves, such as the optic and olfactory nerves."

In the TONES procedure, the surgeons make a small incision behind or through the eyelid. A tiny hole is then made through the paper-thin bone of the eye socket to reach the brain. This pathway permits repairs to be made without lifting the brain. The TONES approaches protect the nerves for sight and smell, as well as the carotid and ophthalmic arteries.

"This approach has opened a new field of brain surgery," said study investigator, Dr. Kris Moe, professor of surgery and chief of the Division of Facial Plastic and Reconstructive Surgery and professor of otolaryngology -- head and neck surgery at the Univerity of Washington. "The advantages to this transorbital approach are many, including less pain and faster recovery time for the patient."

Transnasal surgery, a technique performed through the nose, offers similar access to some areas of the brain, but means a more crowded operating environment for the surgeon than TONES. Moe, who pioneered TONES in 2005, said the technique builds on the nasal approach, but offers increased maneuverability and visibility for the surgical teams which usually require four sets of hands.

In a traditional craniotomy, a large portion of skull bone is removed. With TONES, the area of bone removed is only two to three centimeters. The operating time is much shorter since the skull does not need to be repaired and there is no need to close a large incision.

Patients have undergone the TONES procedure to repair cerebral spinal fluid leaks, optic nerve decompression, repair of cranial base fractures and removal of tumors.

With further research, the surgeons believe that TONES may serve as a means to

treat pituitary tumors, meningiomas and vascular malformations. TONES is currently performed at only two institutions in the world: UC San Diego Medical Center and UW Medicine's Harborview Medical Center in Seattle.

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