

Skull Base Surgery Team Provides Integrated Approach for Difficult Lesions

By **Steven W. Agata, M.D.**



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Skull base surgery is one of the most rapidly developing and exciting disciplines in the field of neurosurgery. This field involves treatment of pathologic processes at the junction of the intracranial compartment with the facial structures and upper cervical region. For years this area had been considered by many as a sort of surgical "no-man's land" between the disciplines of neurosurgery, otolaryngology, and craniofacial surgeons. Over the past two to three decades, however, a team approach involving multiple surgical disciplines has evolved to address these complex lesions.

New developments in microsurgery, interventional neuroradiology, intraoperative computer guidance, and sophisticated reconstructive techniques have allowed surgeons to now tackle, with much improved mortality and morbidity, many lesions previously thought inoperable.

Over the last few years, several of the surgeons of the Western Regional Center for Brain & Spine Surgery have worked with surgeons from other disciplines to develop a skull base team approach. In particular, Dr. Ashley Sikand (neurotology), Dr. Walter Schroeder (otolaryngology), and Dr. Mark Glyman (craniofacial surgery) have worked closely with our neurosurgeons in this exciting field.

Below I will describe a few specific skull base procedures and disease entities as a general (though certainly not complete) overview. This article will be the first in a two-part series on skull base surgery. Transoral and orsotozygomatic surgery will be among the topics covered in the next edition of the practice's newsletter, *Western Neurosurgery Review*.

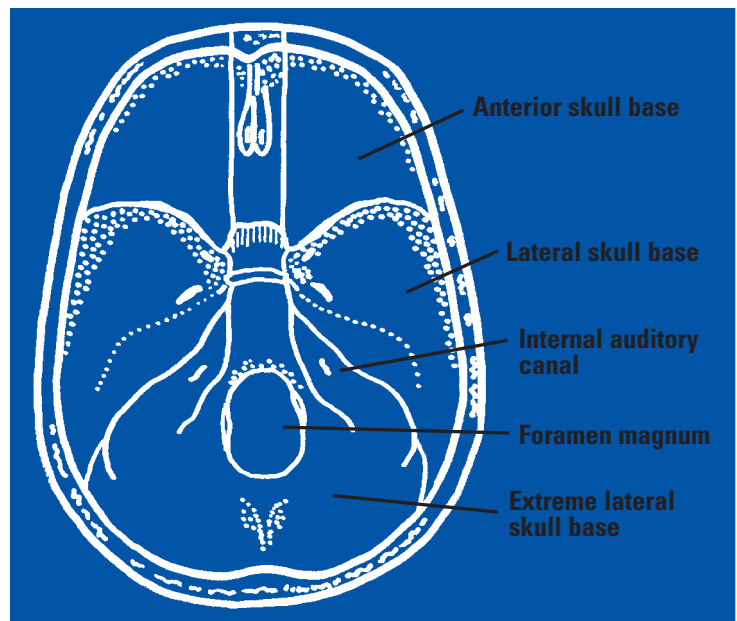
Transsphenoidal Surgery for Pituitary Tumors

Pituitary adenomas are generally benign lesions that arise from pituitary cells. They may be non-secretory or secretory tumors. Non-secretory tumors can grow quite large prior to discovery and cause either visual symptoms due to compression of the optic chiasm or panhypopituitarism via compression of the pituitary gland. Secretory tumors usually cause increased cortisol production (Cushing's Disease) or increased growth hormone production (acromegaly).

The transsphenoidal approach for pituitary tumors was first described by Dr. Cushing in 1914, but it was abandoned because of problems with infection and difficulties with illumination. The development of the operating microscope, intraoperative fluoroscopy, and of intraoperative antibiotics led to the transsphenoidal approach being revived by Dr. Hardy in the 1970s.

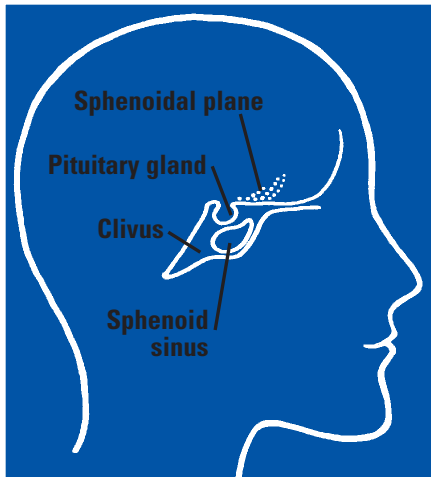
The operation involves either a sublabial or intranasal incision and submucous dissection to expose the sphenoid sinus. The floor of the sphenoid sinuses is removed, allowing direct access to the pituitary gland and tumor without having to

Skull Base Surgery, continued on page 2



The skull base is divided into many different divisions. Each contains cranial nerves, arteries, veins, and other structures. This complex anatomy necessitates many diverse surgical approaches into each specific region.

Skull Base Surgery, continued from page 1



The pituitary gland can be surgically approached through clivus, within the skull base. This trans-sphenoidal approach (through the sphenoid sinus) is completely outside of the intracranial cavity.

retract the brain or work around the optic nerves or carotid arteries as required in the alternative transcranial approach. Often these tumors can be removed completely. In the case of larger tumors or tumors invading the vascular structures at the skull base, only a partial resection can be accomplished usually followed by radiotherapy.

Gamma Knife

The Gamma Knife is a device for computer-directed radiotherapy, an extremely effective treatment for partially resected tumors. The physicians at the Western Regional Center for Brain & Spine Surgery have been working closely with Sunrise Hospital for the last three years to bring a Gamma Knife to Nevada. Dr. Agata and Dr. Duke will be co-directors of the state's first Gamma Knife Center which is scheduled to open November 2000. An upcoming issue of *Western Neurosurgery Review* will be devoted entirely to the Gamma Knife and its many uses.

Team Approach

Over the last eleven years, our surgeons have operated on several hundred pituitary tumors and have developed a comprehensive team approach to these tumors with our ENT and craniofacial

colleagues, Dr. Walter Schroeder and Dr. Mark Glyman. A newer potential modality for this surgery is an endoscopic approach to these tumors. The advantages of this approach have not been definitively proven. However if it proves helpful on selected cases, we will report on this in a future issue of the newsletter. Most patients after transsphenoidal surgery go home on the second postoperative day and can resume normal activities within two to four weeks.

Cerebellopontine Angle Tumors

The cerebellopontine angle has long been one of the most challenging areas for neurosurgeons. This is due to the fact that it is deep to the surface from any angle of approach and is transversed by many critical neural and vascular structures in a confined space.

Among cerebellopontine angle tumors, **acoustic neuromas** are benign tumors that usually arise from the superior vestibular nerve. The earliest symptom is usually unilateral hearing loss first noticed as loss of speech discrimination, e.g., difficulty using the telephone with the affected ear. Other symptoms include tinnitus, dizziness, balance problems, headaches, facial pain or numbness and, in advanced cases,

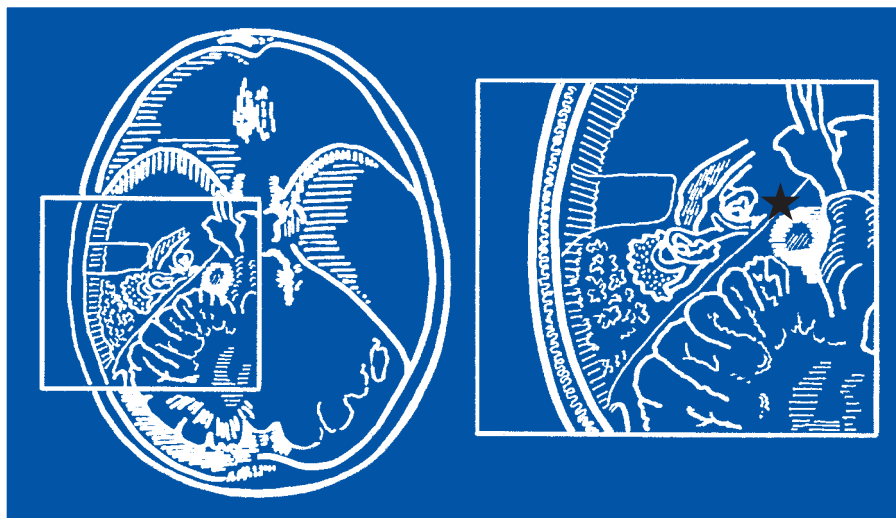
problems with hoarseness or swallowing.

Initial experience with these tumors via a suboccipital craniotomy carried almost 100% morbidity. The work of Dandy reduced morbidity to less than 20%, but almost always resulted in complete facial paralysis. With the introduction of the operating microscope in the 1960s, the goal of surgery became not only tumor removal but facial nerve preservation as well. We are now able to monitor facial nerve function intraoperatively, which allows for a much greater rate of facial nerve preservation. Advances in neuroimaging (particularly high-resolution MRI scans) have allowed for much earlier detection of these tumors so that in my cases the goal of surgery also includes hearing preservation.

Once detected, the treatment of these lesions is dictated by the size of the tumor, the degree of symptomatology, and the age and health of the patient. These treatment options include 1) observation with several MRI scans to check for tumor growth, 2) radiosurgery, and 3) surgical resection of the tumor.

There are three major surgical approaches for acoustic neuromas.

Skull Base Surgery, continued on page 4



Left: The cerebellopontine angle is located near the inner ear, medial to the temporal bone. Right: A closer view reveals the relationship of the inner ear and the acoustic nerve, from which acoustic neuromas (see black star in illustration) arise.

Meet Our Staff



Kim Mustard, Administrator, accepting her diploma upon earning her Masters in Business Administration degree, with honors, from the University of Phoenix.

In this edition of *Meet Our Staff*, we would like to introduce you to a pivotal member of the Western Regional Center for Brain & Spine Surgery—our practice administrator, Ms. Kimberly Mustard.

Kim has been our practice administrator for eight years and demonstrates on a daily basis the experience of over 11 years in medical management. She directs and coordinates all aspects of our practice, but recognizes that the requirements of her position are continually evolving. In the past, a practice administrator was expected to wear many hats, essentially working as a “jack of all trades, but master of none.” Within the context of the constantly changing managed care environment, it is becoming less practical for an administrator to also be the accounts manager, scheduler, financial advisor, human resources administrator, and marketing director—in addition to his or her usual responsibilities.

Kim has flawlessly integrated herself into the modified role of today’s administrator, which is

fundamentally to act as the chief operating officer of a practice. She *oversees all administrative functions* of our practice to maximize efficiency and output, including billing, marketing, scheduling, contract negotiation, payroll, human resources, policy development, and financial reporting. Kim also provides support to all physicians and staff, which has proven invaluable in the course of all of our jobs (and often makes all the difference when it comes to our sanity as well!).

Our physicians foster an environment in which education and training is mandatory for physicians and staff. In keeping with this philosophy, continual education keeps our physicians up to date with new procedures and medical developments. Our staff also is constantly training to hone customer service, coding, and other important skills—always with the ultimate goal of serving our patients, referring physicians, and insurance partners to the best of our ability.

“I am always available to address the concerns of our patients, referring physicians, and insurance partners.”

**Kim Mustard, MBA
Administrator**

With the encouragement and support of our physicians and staff, two years ago Kim decided to pursue an MBA in her already limited free time. We are proud to announce that after a lot of hard work, Kim received her MBA with honors this past May from the University of Phoenix. Much of the work she did at school could be related directly back to the practice, enabling her to better serve all our constituents.

Kim would be happy to address any questions or concerns regarding our practice. You can reach her at (702) 737-1948 or (800) 334-0878.



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Comments, questions, requests to be added to our mailing list, and requests for back issues of our newsletter are welcome and may be directed to Miriam Shamsabad by calling (702) 737-1948 or (800) 334-0878. Our fax number is (702) 735-0736. E-mail: WRCBSS@aol.com.

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Skull Base Surgery, continued from page 2

The type of surgery is determined by the size of the tumor and whether or not the patient has functional hearing on the affected side (which the surgeons are trying to preserve). In cases where we are not trying to preserve hearing, the options are the suboccipital approach or the translabyrinthine approach.

Three Approaches to Acoustic Neuromas

The **translabyrinthine approach** was developed by Dr. William House (a neurotologist) and Dr. William Hitselberger (a neurosurgeon). This is a specialized approach requiring a neurotologic/neurosurgical team and involves dissection of the petrous bone with removal of the hearing apparatus to allow a direct lateral approach to these tumors. The advantages of this approach include identification of the facial nerve

in the internal auditory canal before tumor resection begins, which often makes it easier to preserve the nerve. Another advantage is lack of cerebellar retraction. Disadvantages are that hearing on that side is sacrificed and the potential for cerebrospinal fluid leak is greater.

Dr. Ashley Sikand (a neurotologist) and I performed the first translabyrinthine operation for acoustic neuromas in southern Nevada about four years ago and have successfully treated many patients with this procedure. Drs. Anson and Smith of our practice have also worked with Dr. Sikand for this procedure.

The **suboccipital approach** is often the procedure of choice for very large tumors and for hearing preservation (particularly when there is a significant intracranial component to the tumors). This procedure is usually performed by a neurosurgeon and requires retraction of the cerebellum to

obtain access to the brain stem and tumor. In some cases, the neurotologist will participate in the procedure by drilling out the internal auditory canal from the intracranial side.

Finally, for small tumors contained primarily in the internal auditory canal, the **middle fossa approach** provides an excellent option for hearing preservation surgery. In this approach, the neurosurgeon performs a subtemporal craniotomy and elevates the temporal lobe. The neurotologist drills out the internal auditory canal from above, providing the neurosurgeon excellent access to the 7th and 8th nerve complex in the internal auditory canal.

Overall, acoustic tumor surgery is an area where the skull base team approach has led to improved results in terms of extent of tumor resection and preservation of neural function.