

soon become the standard of care. According to the authors, this possibility depends on several factors, including whether time and increasing experience in iMRI demonstrate a significant benefit for the patient with respect to postoperative quality of life and/or survival. In addition, they asserted that if open MRI units can be integrated into neurosurgical clinics in a cost-effective manner with probable interdisciplinary, resource-shared use, the integration of sophisticated MRI imaging may become the standard of care for neurosurgical patients. [Seifert, V et al., "Intraoperative MRI in Neurosurgery: Technical Overkill or the Future of Brain Surgery?," *Neurology India*, 2003;51: 329-332.]

A review conducted at the Department of Neurological Surgery at the University of California San Francisco also found definitive benefits of iMRI in neurosurgery. Specifically, intraoperative use of MRI was demonstrated to be a safe technique enabling the neurosurgeon to update data sets for navigational systems, evaluate the extent of tumor resection and modify surgery if necessary, to guide instruments to the site of the lesion and to evaluate the presence of intraoperative complications at the end of surgery. [Keles, GE, "Intracranial Neuro-navigation with Intraoperative Magnetic Resonance Imaging," *Current Opinions in Neurology*, 2004 Aug;17(4):497-500.]

Resecting Pituitary Tumors with iMRI CASE REPORT: Pituitary Macroadenoma in a 72-year-old patient

A 72-year-old male presented with a 7-day history of headache, dizziness, nausea, vomiting, visual disturbances, hyponatremia and was diagnosed with pituitary macroadenoma. MRI revealed 3.5x 2.5 cm size lesion impinging on the optic chiasm and encasing the carotid arteries bilaterally (Figure 1). Utilizing a minimally invasive transsphenoidal approach, Boulder Neurosurgical Associates neurosurgeons were able to completely resect the tumor (Figure 2) through a small incision in the posterior nasal mucosa without the need for any external incisions or postoperative scarring. iMRI unit in conjunction with real-time intraoperative computer volumetric navigation and endoscopy was utilized in order to minimize the risk of complications and maximize the outcome. Total operative time was less than 90 minutes, with a total estimated blood loss of less than 25 ml. The patient was discharged home in less than 48 hours and returned to the clinic in three weeks with his symptoms completely resolved except for some mild residual diplopia that was rapidly improving.

Pituitary Tumors

Pituitary adenomas are tumors located next to or within the pituitary gland. Almost all pituitary adenomas are benign. However, "macroadenomas", which are 10 mm or larger in diameter, often cause pressure effects and resultant neurological injury and deficits. The symptoms of a pituitary adenoma depends on its size and what hormone it secretes. Increased growth hormone causes gigantism in children and acromegaly in adults. Prolactin secretion in males can produce infertility and enlargement of the breasts. In females, it may produce no symptoms. ACTH (Adrenocorticotropic hormone) secreting tumors produce Cushing's syndrome. If a tumor extends above the sella turcica, it may compress the optic chiasm causing the loss of peripheral vision.

The surgical removal of pituitary tumors is performed via one of two main approaches: craniotomy or transsphenoidal. Transsphenoidal describes the path the surgeon follows to reach the pituitary gland, meaning through sphenoid sinus. The minimally invasive transsphenoidal approach allows the surgeon to reach pituitary tumor through the nostril on one side, without the need for an incision under the lip or on the external nare. This method is minimally invasive because it directly approaches the tumor through the patient's nostril, thus limiting facial swelling, decreasing postoperative pain, and making recovery quicker. The sphenoid sinus is entered and an opening is made in the wall of the sella turcica to expose the pituitary gland.

A Partner in Progressive Care

Boulder Neurosurgical Associates provides state-of-the-art neurosurgical care that can improve survival and quality of life and help those with previously untreatable or difficult to treat conditions. With investment in iMRI, our surgeons are offering those superior results.

Neurological disorders are highly individual challenges that require close focus and unwavering commitment. As a center of excellence, we pride ourselves on being able to offer some of the region's best results by tailoring our care to each patient's unique circumstances. We are also committed to serving the needs of physicians looking to give their patients the most effective treatment options available.

If you have a question about iMRI and how it can benefit your patients or want to arrange a consultation or referral, please call us at (303) 938-5700.

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