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Surgical Treatment of a Patient with Meningiomas of the Base of the Anterior Cranial Fossa

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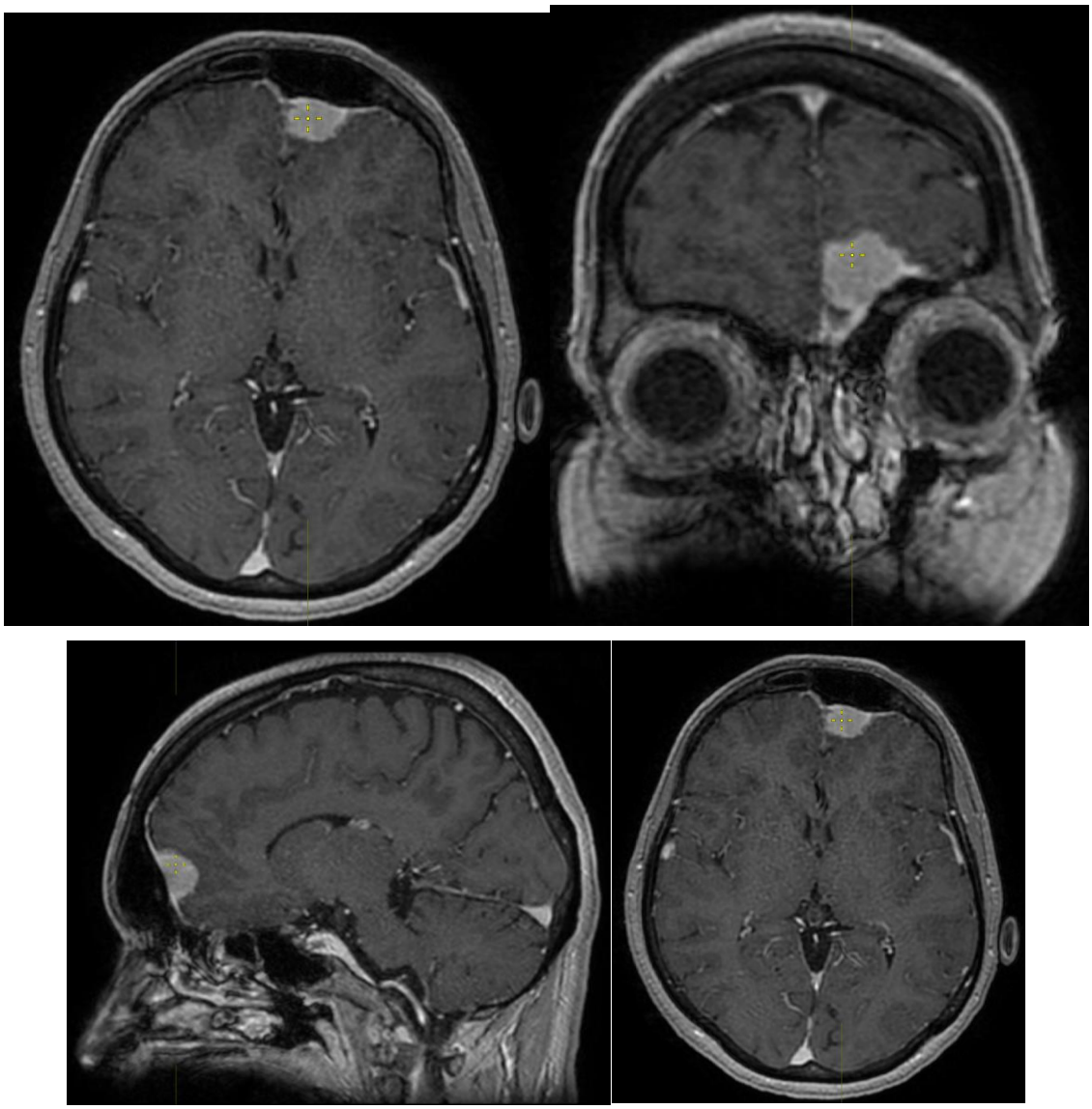
Abstract: Meningioma is an extracerebral, mostly benign tumor originating from the dura mater, less commonly from the pia mater of the brain and spinal cord, and rarely from the choroid plexuses of the cerebral ventricles or arising ectopically in the bones of the skull, spine, and along the nerve roots [1, 2, 3]. Meningiomas account for approximately one third of all intracranial tumors. The incidence of meningiomas is 6.58 per 100,000 population per year. This indicator increases with age, which, given the aging population of developed countries, further increases the significance of the problem [4, 5, 6]. In individuals aged 35 years and older, meningioma is the most common CNS tumor. Currently, the prevalence of meningiomas is 97.5 per 100,000 population. It should be noted that, despite the benign course, 30–45% of these neoplasms spread to the base of the skull. The localization of the tumor always determines the clinical symptoms of the disease, the course of the disease, and, to a large extent, the prognosis of surgical treatment [7].

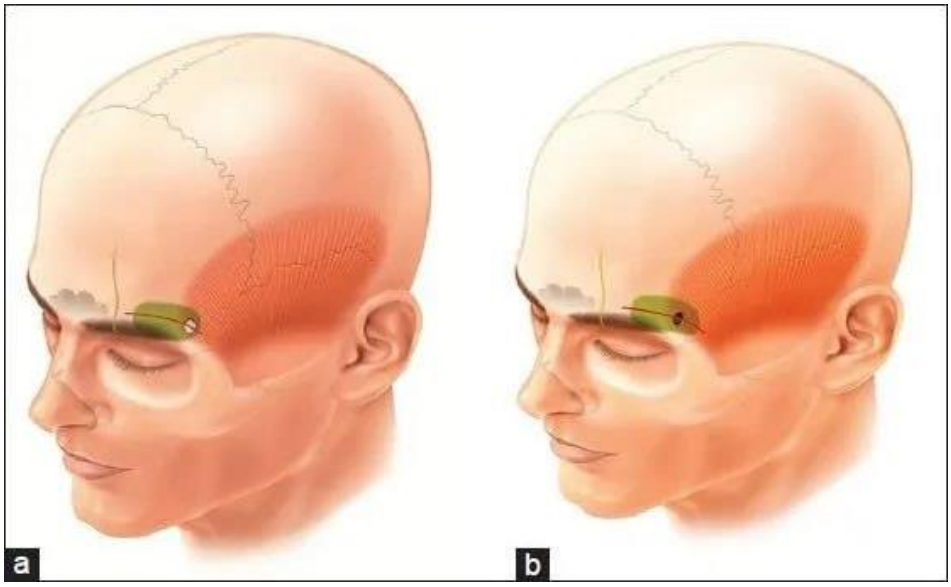
Keywords: meningioma, skull, removal

Description of a clinical case. Patient D., 52 years old, was admitted to the neurosurgery department with complaints of general weakness, periodic severe headache, and visual impairment. On admission, the general condition is moderate. Somatically compensated. Consciousness is clear. There are no general cerebral or meningeal symptoms. The sense of smell is lost on both sides. Decreased visual acuity, loss of visual fields. The range of eye movements is full. No diplopia. The pupils are uniform, 3 mm in size. The reaction of the pupils to light is brisk and uniform. The corneal reflex is brisk and uniform. The trigeminal points are painless. Sensitivity on the face is normal. The function of the masticatory muscles is normal. The palpebral fissures are uniform. The frontal folds are symmetrical. The nasolabial folds are symmetrical. Taste is normal. Hearing is normal in both ears. No nystagmus. Swallowing is normal. The tongue is in the midline. Sufficient strength in the limbs. Full range of motion in the joints. Muscle tone is normal. Tendon reflexes in the arms, knee, and Achilles reflexes S < D are brisk on the right with expanded reflexogenic zones. Pathological foot signs are on the right. Sensation is not impaired. Unstable in the Romberg position. Dynamic coordination tests are performed with intention tremor on the right. Elements of sensorimotor aphasia. Pelvic functions are under control. Before surgery, the patient underwent magnetic resonance imaging with contrast enhancement: the resulting images show a round tumor formation in the anterior cranial fossa with clear, smooth contours of an isointense MR signal, up to 5.6 × 4.3 × 5.4 cm in size, intensively accumulating the contrast agent. The tumor matrix is clearly visualized. Compression of the frontal lobe substance is noted with signs of perifocal edema up to 2.2 cm. The grooves are smoothed out, the anterior horns of the lateral ventricles are compressed.

Pic.1. Convexital meningioma of the left fronto-basal lobe of the brain.



Surgical treatment was performed using the "keyhole" technique, a modification of the standard approach that reduces the size of the skin incision and craniotomy. Surgery of the base of the anterior cranial fossa (ACF) has always been a complex area of neurosurgery. The close relationship of pathological processes in the ACF with major arterial vessels and cranial nerves required good visualization of this area through wide frontotemporal approaches.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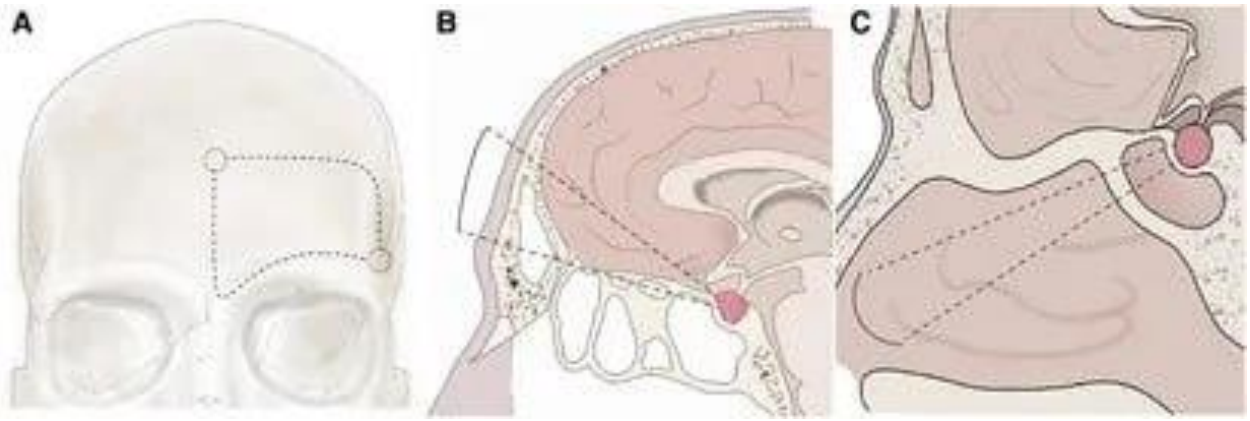
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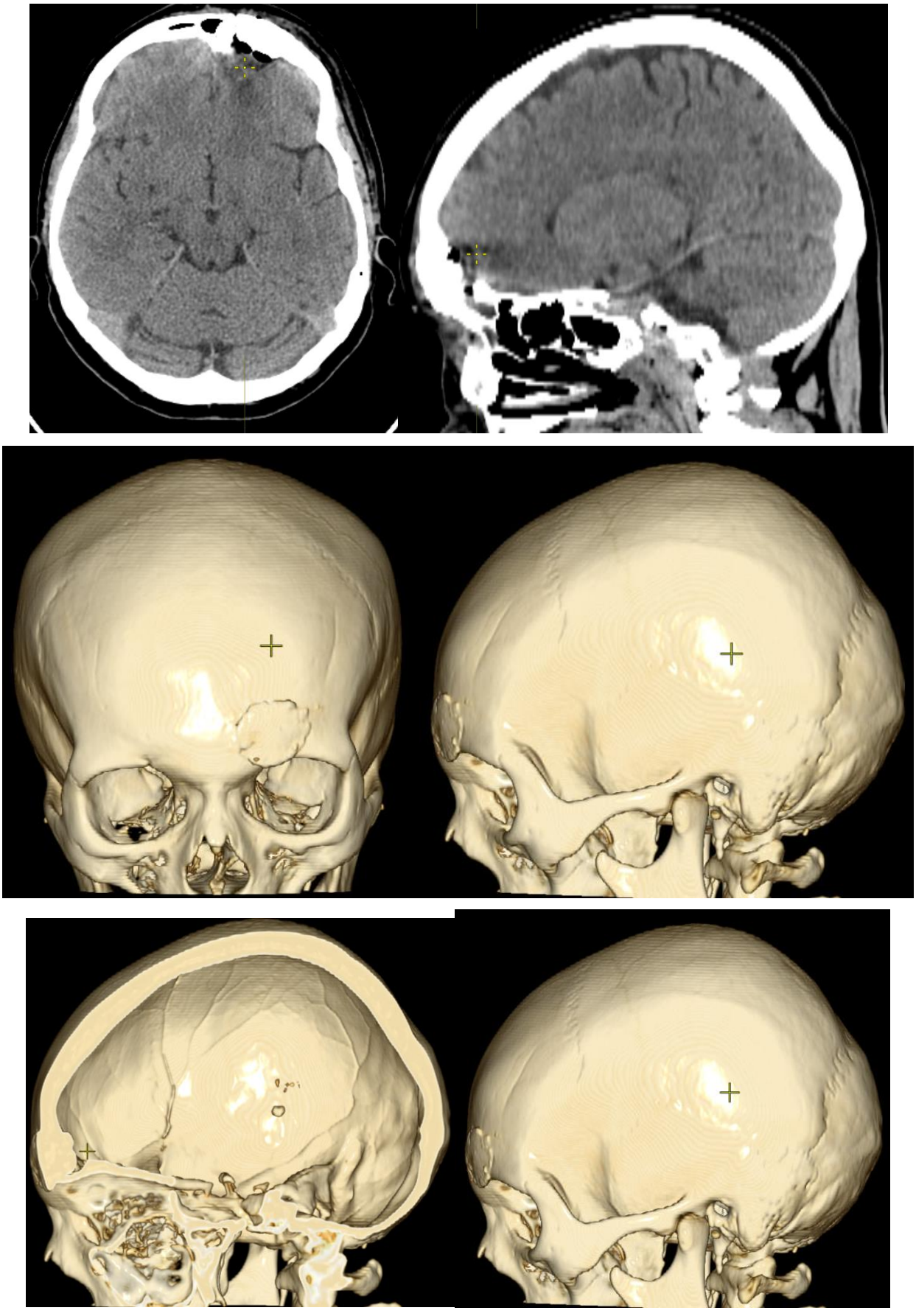
More than 100 years have passed since the first description of frontal craniotomy for the removal of olfactory meningioma. Since then, surgical approaches have evolved from the extensive "macrosurgical" frontotemporal approaches of Dandy to the pterional approach of Yasargil and to the micro "keyhole" approaches developed by Pernetsky. Developments in neuroimaging, neurosurgical instrumentation, the introduction of microscopes and endoscopes, and improved illumination of the surgical field have made these advances possible. The term "keyhole" accurately captures the essence of reducing the invasiveness of procedures by significantly reducing the size of the craniotomy. Through a small trephine opening, the surgeon can visualize a sufficient area of the cranial cavity, creating the surgical field necessary for manipulation of intracranial structures.

Conclusion: Using the keyhole approach, we were able to perform total resection of the anterior cranial fossa base tumor without worsening neurological deficits. The histological conclusion: morphological picture of meningotheliomatous meningioma with foci of ossification, grade I. The patient was mobilized in the days following the surgery, the postoperative wound healed by primary intention, and a good cosmetic effect was noted. The duration of hospitalization was 7 days. Total resection of the anterior cranial fossa base meningioma without worsening neurological deficits in the postoperative period was made possible by the use of the keyhole craniotomy, microsurgical techniques, and modern methods. After performing a control MRI of

the brain with contrast enhancement 6 months later, no signs of tumor recurrence were noted (Figs. 3, 4).

Pic 3.4 MRI after surgery



The patient has fully recovered and returned to his normal lifestyle.

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