Pineal region approach

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Victor Horsley [1] was the first to attempt the direct removal of a pineal region tumor in 1910. Since then, various surgical approaches to the pineal region have been reported.

Walter Edward Dandy reached the pineal region down the right side of the falx and through the splenium. Stein reemphasized the route used by Fedor Krause in 1926, which consisted of the infratentorial–supracerebellar approach to the pineal region

Many neurovascular structures form a formidable obstacle to the operative approach to this region. The approaches suitable for reaching the pineal region are the infratentorial supracerebellar, occipital transtentorial, posterior transcallosal, posterior transcortical and posterior subtemporal routes. [2].

When approaching the pathology hosted by the region, pineal tumors and pineal cysts being the most common, a calculated preoperative assessment of anatomical relationships is warranted in order to preserve the veins draining vital structures of the diencephalon [3] [4] [5] [6].

The extension of the lesion, its size, expected consistency, vascularity, and position relative to the deep venous system, as well as the surgeon's own training and experience, dictate the choice of the approach [7] [8] [9] [10] [11] [12] [13] [14] [15].

In this region, the Infratentorial supracerebellar approach and Occipital transtentorial approach are the two most commonly used approaches, using microsurgical, endoscopic, or combined techniques [16] [17] [18] [19] [20] [21].

When planning a pineal region approach, among the pivotal anatomic guidelines is the tentorial alignment, since a "steep" tentorium demands a switch from a Supracerebellar Infratentorial approach to Occipital transtentorial approach [22].

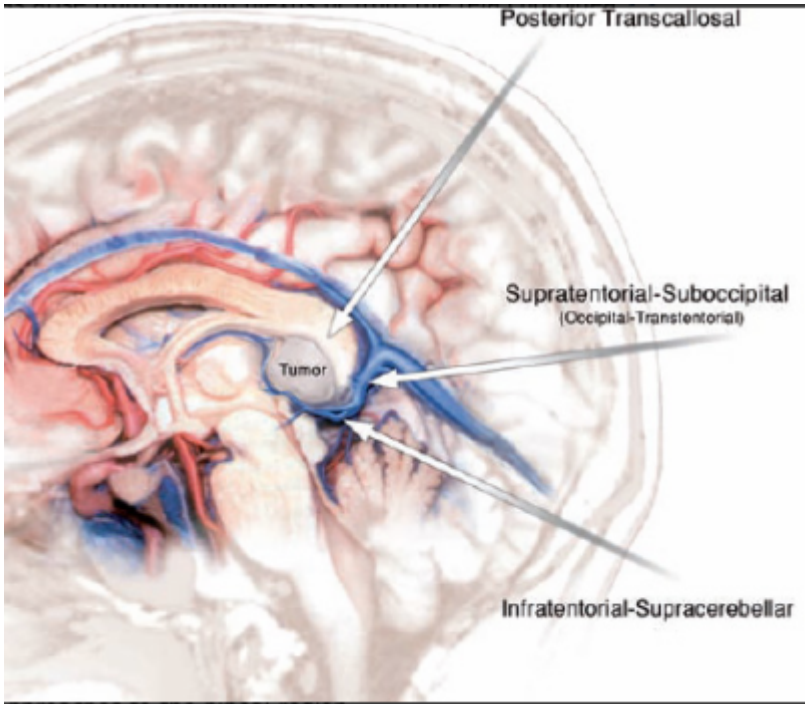
Neurovascular, particularly venous, relationships of the pineal region are the most complex in the cranium because the ICVs, BVs, and their tributaries converge at the vein of Galen.

Contains the Pineal gland. Tumors in this region can be of a wide variety of types; the most common are germ cell tumors, which arise from developmental abnormalities, and pineal cell tumors, which come from the cells of the pineal gland itself.

Deeply located beneath the corpus callosum and surrounding by crucial veins, the pineal and tectal structures still challenge the surgeon. Either anterior or posterior, many surgical approaches have been developed to reach the pineal region. Most popular are likely the posterior suboccipital or occipito-parietal transtentorial routes. Others, primarily transcallosal or supracerebellar, may be indicated depending of the extension of the tumors while the transcortical routes (frontal, parietal or

atrial) have been almost given up [23)]

Pineal region tumors pose certain challenges in regard to their resection: a deep surgical field, associated critical surrounding neurovascular structures, and narrow operative working corridor due to obstruction by the apex of the culmen.



Anterior interhemispheric transsplenial approach.

Supracerebellar infratentorial approach [24)].

Lateral supracerebellar infratentorial approach.

Occipital transtentorial approach.

Posterior interhemispheric transcallosal approach.

Suboccipital transtentorial approach.

Transcallosal interforniceal approach.

A common approach to lesions of the pineal region is along the midline below the torcula. However, reports of how shifting the approach off midline affects the surgical exposure and relationships between the tributaries of the vein of Galen are limited.

Understanding the characteristics of different infratentorial routes to the pineal gland will aid in gaining a better view of the pineal gland and cerebellomesencephalic fissure and may reduce the need for venous sacrifice at the level of the tentorial sinuses draining the upper cerebellar surface and the tributaries of the vein of Galen [25)].

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