# *COMPARISON BETWEEN TELOVELAR APPROACH AND TRANSVERMIAN APPROACH IN MANAGMENT of FOURTH VENTRICULAR TUMORS*

***Thesis submitted for partial fulfillment of MD degree in neurosurgery***
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# List of abbreviation

| | |
|---|---|
| CPP | Choroid plexus papilloma |
| CPC | Choroid plexus carcinoma |
| MRI | Magenitic resonance imaging |
| CT | Computed tomography |
| MRS | Magenitic resonance spectroscopy |
| NAA | n-acetyl aspartate |
| Cho | choline-containing compounds |
| Cr | creatine/phosphocreatine |

# Aim of The Work

The aim of this study is to compare the results of telovelar and transvermian approaches in the management of fourth ventricular tumors regarding to clinical outcome and extent of tumor excision. Also to correlate the results of each approach with age of patients, tumor location, size and pathological nature to evaluate the impact of these factors on each approach.

# Anatomy

The posterior cranial fossa is the largest and the deepest of the three cranial fossae. Here are found the pathways regulating consciousness, vital autonomic functions, and motor activities and sensory reception for the head, body, and extremities, in addition the center controlling the balance and gait also 10 pairs of cranial nerves have segment within the posterior cranial fossa. In addition to that the posterior cranial fossa is strategically situated at the outlet of the cerebrospinal fluid flow from the ventricularsystem**(Rhoton, 2000)**.

Operative approach to the posterior cranial fossa requires an understanding of the relationships of the cerebellum, cranial nerves, brain stem, the cerebellar arteries, veins, and peduncles, and complex fissures between the cerebellum and brain stem. The relationships of the fourth ventricle to the cerebellar surfaces and the fissures through which the fourth ventricle is approached surgically are among the most complex in the brain (**Rhoton, 2000)**.

## Cerebellum:

The cortical surfaces are divided on the basis of the structures they face, or along which they may exposed. The first surface, the tentorial surface, faces the tentorium. The second surface, the sub-occipital surface, is located below and between the lateral and sigmoid sinuses, and the third surface, the petrosal surface, face forward toward the posterior surface of the petrous bone. Each of the surfaces has the vermis in the mid line and the hemispheres laterally and is divided by a major fissure named on the basis of the surface that it divides. The fissures dividing the three cortical surfaces are to be distinguished from the fissures between the cerebellum and the brainstem **(Matsushima, 1982)**.

### Tentorial surface:

The tentorial surface faces and conforms to the lower surface of the tentorium. The antero-medial part of this surface, the apex, formed by the anterior vermis, is the highest point on the cerebellum. Tentorial surface slopes downward from the antero-medial to the postero-lateral edge. The transition from the vermis to the hemisphere on the tentorial surface is smoothand notmarkedby deep fissure **(Matsushima, 1992)**.

The anterior and posterior cerebellar incisura, groove the anterior and posterior edges of the tentorial surface in the midline. The brainstem fits into the anterior cerebellar incisura and the falx cerebelli fits into the posterior incisura **(Van Calenbergh, 1995)**.

The anterior border, separating the tentorial and petrosal surfaces, has a lateral part (antero-lateral margin) that is parallel to the superior petrosal sinus and separates the hemispheric part of the tentorial and petrosal surfaces, and a medial part (antero-medial margin) that faces the mid brain and forms the posterior border of the fissure between the midbrain and the cerebellum**(Matsushima,1992).**

The posterior border between the tentorial and the sub-occipital surfaces also has a lateral and a medial part. The lateral part (the posterolateral margin) is parallel and adjacent to the lateral sinus and separates the hemispheric part of the sub-occipital and tentorial surfaces, and the short medial part (postero-medial margin) faces the posterior cerebellar incisura and separates the vermic parts of two surfaces. The lateral angle, formed by the junction of the antero-lateral and postero-lateral margins, is located at the junction of sigmoid, lateral, and superior petrosal sinuses.Veins often converge on the anterior and lateral angels **(Rhoton, 2000)**.

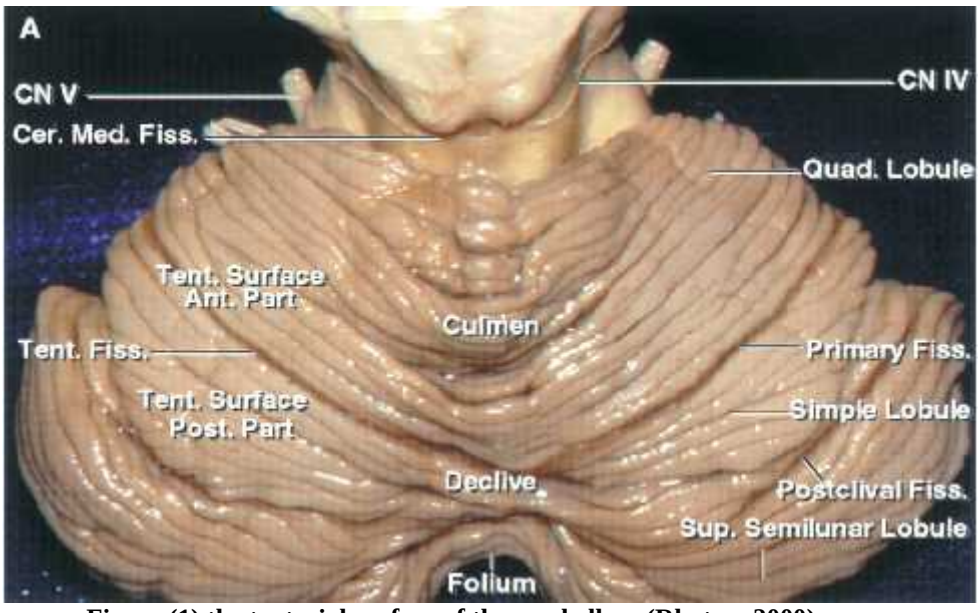


**Figure (1) the tentorial surface of the cerebellum (Rhoton, 2000)**

## Sub-occipital surface:

Operative approaches to the fourth ventricle and the most cerebellar tumors are commonly directed around and through this surface. The sub-occipital surface, located below and between the lateral and sigmoid sinuses. It has a deep vertical depression, the posterior cerebellar incisura, which contains a fold of dura, the falx cerebelli. The vermis is folded into and forms the cortical surface within the incisura. The medial aspects of the cerebellar hemispheres form the lateral walls of the incisura **(Matsushima, 1983)**.

The vermian surface within the incisura has a diamond shape. The upper half of the diamond-shaped formation has a pyramidal shape and is called the pyramid. The folium and the tuber, superior to the pyramid, form the apex of the sub-occipital part of the vermis. The lower half of the diamond-shape formation, the uvula, projects downward between the tonsils. The nodule, the lower most subdivision of the vermis, is hidden deep to the uvula **(Van Calenbergh, 1995).**

The posterior cerebellar incisura is continuous inferiorly with the vallecula cerebelli, a cleft between the tonsils that leads through the foramen of Magendie into the fourth ventricle **(Mussi, 2000).**

The tonsils, the most prominent structure blocking access to the caudal part of the fourth ventricle, are hemispheric component. Each tonsil is an ovoid structure in the infero-medial part of the sub-occipital surface that is attached to the reminder of the cerebellum along its superolateral border by a white matter bundle called the tonsillar peduncle. The remaining tonsillar surfaces are free surfaces. The inferior pole and the posterior surface face the cisterna magna and are visible infero-medial to the remainder of the sub-occipital surface. The lateral surface of each tonsil is covered by, but separated from, the biventral lobule by a narrow cleft, except at the level of cerebellar peduncle **(Mussi, 2000).**

The anterior surface of each tonsil faces and is separated from the posterior surface of the medulla by the cerebello-medullary fissure. The medial surface of the tonsils faces each other across a narrow cleft, the vallecula, which leads into the fourth ventricle. The ventral aspect of the superior pole of each tonsil faces the three structures (tela choroidea, inferior medullary velum, and nodule) forming the lower half of the roof of the fourth ventricle. The superior pole is separated from the surrounding structures by the posterior extension of the

cerebellomedullary fissure, called either the telovelotonsillar or supra-tonsillar cleft. The posterior aspect of the superior pole faces the uvula medially and the biventral lobule laterally **(Mussi, 2000)**.

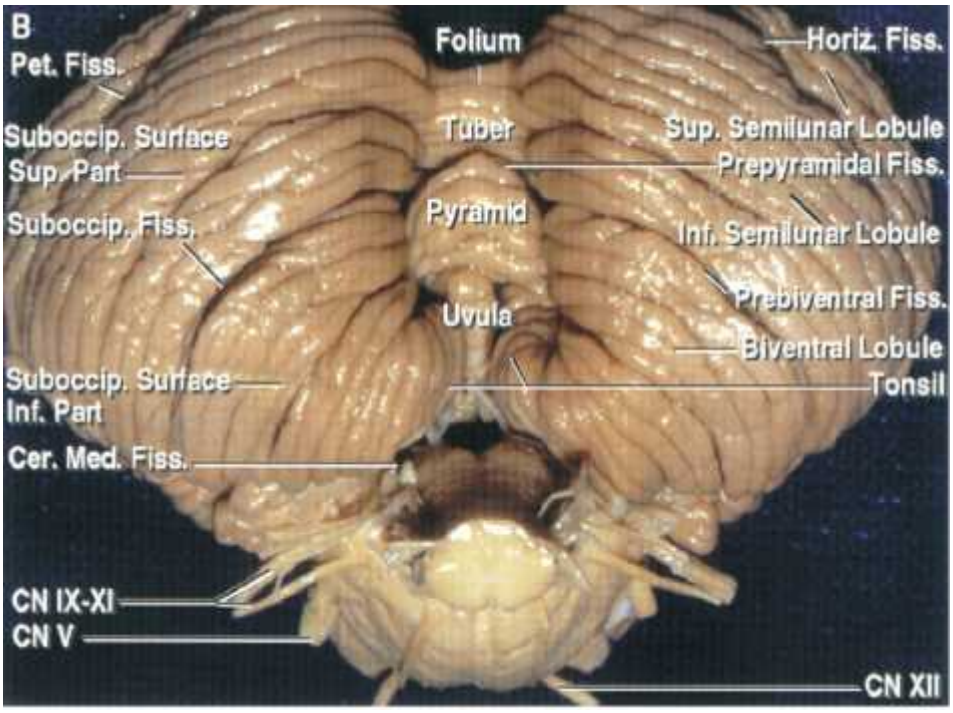


**Figure (2) the suboccipital surface of the cerebellum (Rhoton, 2000).**

## Petrosal surface:

The petrosal or anterior surface faces the posterior surface of the petrous bones, brain stem, and the fourth ventricle. The lateral or hemispheric part of the petrosal surface rests against the petrous bone and is retracted to expose the cerebellopontine angle **(Matsushima, 1982)**.

The median or vermian part of the petrosal surface has a deep longitudinal furrow, the anterior cerebellar incisura that wraps around the posterior surface of the brain stem and the fourth ventricle **(Van Calenbergh, 1995)**.

The major fissure on this surface, the petrosal fissure, also called the horizontal fissure, splits the petrosal surface into superior and inferiorparts and on to the sub-occipital surface between the superior and inferiorsemi-lunar lobules **(Matsushima, 1982)**.

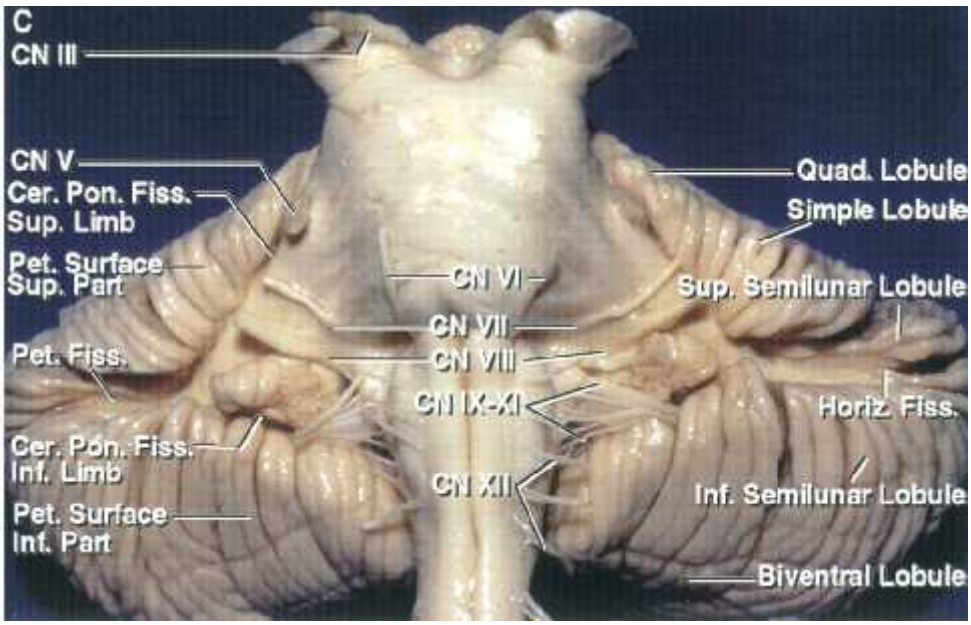


**Figure (3) the petrosal surface of the cerebellum (Rhoton, 2000).**

# Fourth ventricle:

The fourth ventricle is a broad, tent-shaped midline cavity located between the cerebellum and the brain stem. It is connected rostarlly through the aqueduct with the third ventricle, caudally through the foramen of Magendie with the cisterna magna, laterally through the foramen of Luschka with the cerebellopontine angle. The fourth ventricle has a roof, floor, and two lateral recesses. It is ventral to cerebellum, dorsal to pons and medulla, and medial to the cerebellar peduncles **(Rhoton, 2000)**.

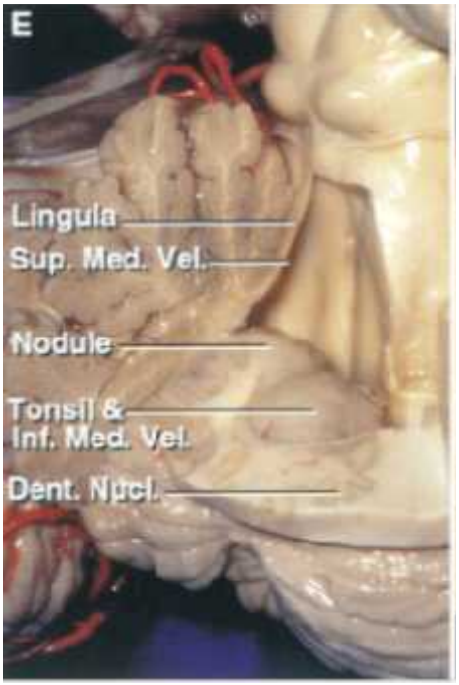


**Figure (4) oblique view into the fourth ventricle (Rhoton, 2000).**