

MICROSURGICAL RESECTION OF A PONTINE CAVERNOMA THROUGH A FAR LATERAL INFRATENTORIAL SUPRACEREBELLAR APPROACH

Resección microquirúrgica de un cavernoma pontino mediante un abordaje supracerebeloso infratentorial extremo lateral

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ABSTRACT

Introduction: Cavernomas on the posterolateral pontomesencephalic surface can be approached from an extreme lateral supracerebellar infratentorial corridor, although the theory is scarce. The brainstem has a dense concentration of nuclei and fibers that are responsible for a high rate of morbidity when treating brainstem lesions. The objective of this work is to demonstrate the safe microsurgical resection technique for the complete removal of a pontine cavernoma.

Clinical Case: 27-year-old woman with a 5-month history of disease; characterized by headache, left facial paresis and right half body paresis. Magnetic resonance imaging (MRI) showed a hemorrhage in the middle cerebellar peduncle compatible with a ruptured cavernoma, initially receiving medical treatment. Subsequently, due to an increase in the motor deficit and the presence of keratopathy in the left eye, surgery was decided. A retromastoid craniotomy and an extreme lateral supracerebellar infratentorial approach were performed. A safe entry zone was identified and the cavernoma was completely excised. In the postoperative period, she did not present additional neurological deficit, being extubated at 24 hours, with a score on the Glasgow scale of 15 points. Postoperative brain tomography (CT) showed the absence of the cavernoma.

Conclusion: The far lateral supracerebellar infratentorial approach is safe for the excision of cavernomas with a middle cerebellar peduncle. When combined with the significant reverse Trendelenburg position it results in minimal cerebellar retraction as the cerebellum descends with gravity.

Keywords: Hemangioma, Cavernous, Pons, Middle Cerebellar Peduncle, Craniotomy (source: MeSH NLM)

RESUMEN

Introducción: Los cavernomas en la superficie posterolateral pontomesencefálica pueden abordarse desde un corredor supracerebeloso infratentorial extremo lateral, aunque la teoría es escasa. El tronco encefálico presenta una densa concentración de núcleos y fibras que son responsables de una alta tasa de morbilidad al tratar las lesiones del tronco encefálico. El objetivo de este trabajo es demostrar la técnica de resección microquirúrgica segura para la eliminación completa de un cavernoma pontino.

Caso Clínico: Mujer de 27 años con historia de enfermedad de 5 meses de evolución; caracterizada por cefalea, paresia facial izquierda y paresia en hemicuerpo derecho. La resonancia magnética nuclear (RMN) mostró una hemorragia en pedúnculo cerebeloso medio compatible con cavernoma roto recibiendo inicialmente tratamiento médico. Posteriormente, ante incremento del déficit motor y presencia de queratopatía en ojo izquierdo se decidió cirugía. Se realizó una craneotomía retromastoidea y un abordaje infratentorial supracerebeloso extremo lateral. Se identificó una zona segura de entrada y se realizó la exéresis total del cavernoma. En el postoperatorio no presentó déficit neurológico adicional siendo extubada a las 24 horas, con un puntaje en la escala de Glasgow de 15 puntos. La tomografía cerebral (TAC) postoperatoria mostró ausencia del cavernoma.

Conclusión: El abordaje infratentorial supracerebeloso extremo lateral es seguro para la exéresis de cavernomas de pedúnculo cerebeloso medio. Cuando se combina con la posición de Trendelenburg inverso significativo da como resultado una retracción cerebelosa mínima a medida que el cerebelo desciende con la gravedad.

Palabras Clave: Hemangioma Cavernoso, Puente, Pedúnculo Cerebeloso Medio, Craneotomía. (fuente: DeCS Bireme)

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CLINICAL CASE

Cavernomas on the posterolateral pontomesencephalic surface can be approached from a lateral infratentorial supracerebellar corridor.¹ Until not long ago, neurosurgeons believed that the brainstem was an inaccessible surgical ground. Thanks to the pioneering efforts and courageous vascular neurosurgeons, brain stem cavernomas both in the pia mater and below it is currently resected as first-line management in different centers around the world.²

The extreme lateral supracerebellar infratentorial approach was initially proposed to treat lesions on the posterolateral surface of the pons, mainly cavernomas. The versatility of the approach allowed its use for other pathologies such as gliomas, aneurysms, epidermoid tumors and meningiomas.³ The brainstem has a dense concentration of nuclei and fibers that are responsible for the high rate of morbidity when treating brainstem lesions.⁴

The objective of this work is to demonstrate the safe microsurgical resection technique for the complete removal of a pontine cavernoma.

History and examination: 27-year-old female patient with no relevant history. Her illness began 5 months before admission with sudden headache, left facial paralysis and loss of strength in the right half of the body, for which she went to the emergency room of a hospital center where she underwent a brain MRI, showing a hemorrhage in the middle cerebellar peduncle. A conservative treatment was indicated.

One month before admission, the symptoms were exacerbated, presenting an increase in the motor deficit in the right hemibody, and keratopathy in the left eye, for which she went to the National Institute of Neurological Sciences (INCN) where she was hospitalized. Brain magnetic resonance imaging (MRI) was performed (Figure 2) where a probable rebleeding was evidenced in the same area. A cerebral angiography was performed which ruled out another vascular malformation (Figure 3).

Treatment: It was decided to give definitive treatment, so she was scheduled for surgery. The patient was placed in a lateral position (Figure 4A) and a retromastoid craniotomy

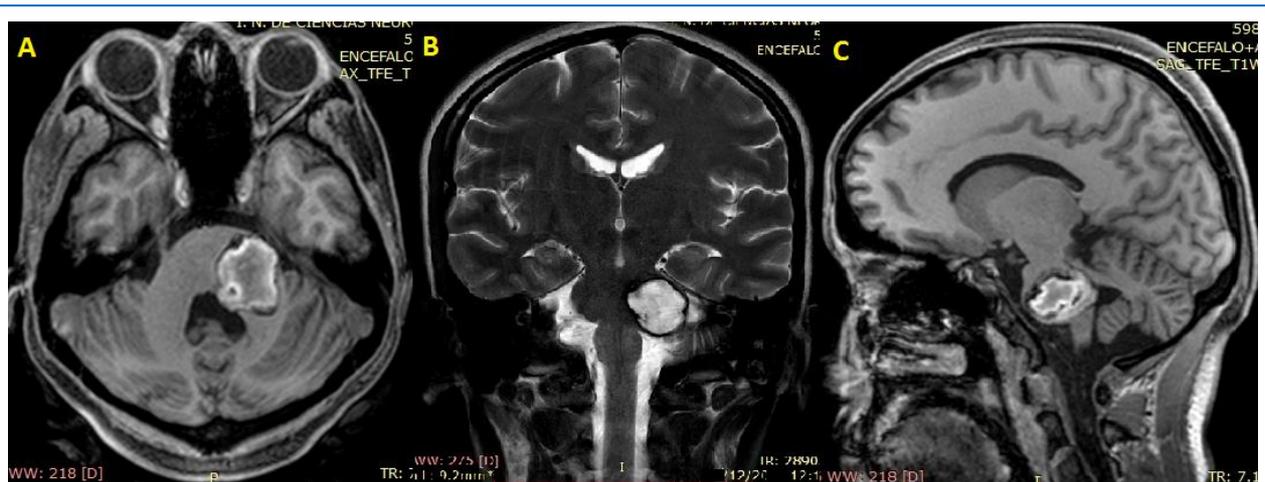


Fig 1. Brain MRI without contrast, 5 months before admission, showing a bulging hemorrhage in (A) axial view T1, (B) coronal view T2, (C) sagittal view T1.

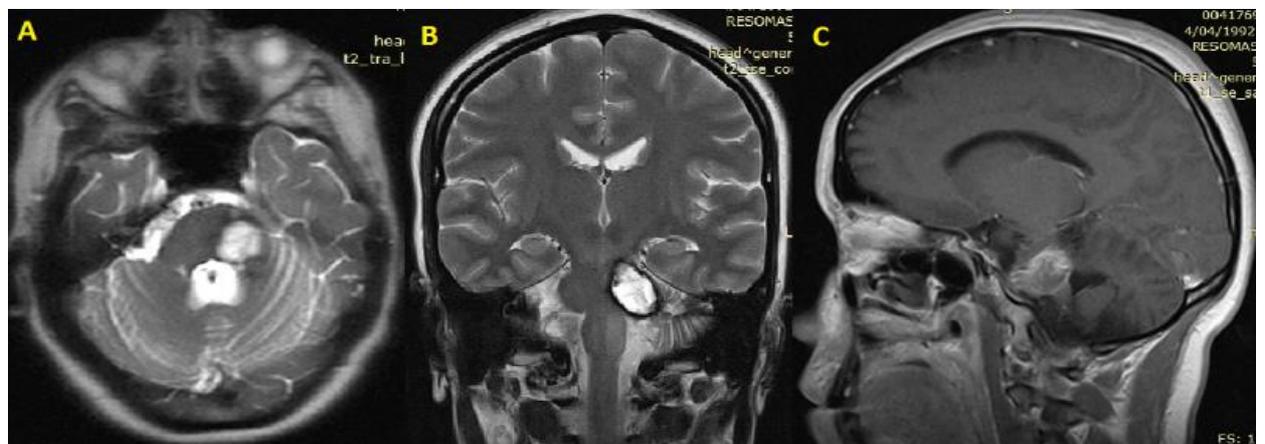


Fig 2. Brain magnetic resonance imaging (MRI) with contrast, 1 month before admission, showing rebleeding of a pons cavernoma in (A) axial view T2, (B) coronal view T2, (C) sagittal view T1 with contrast.

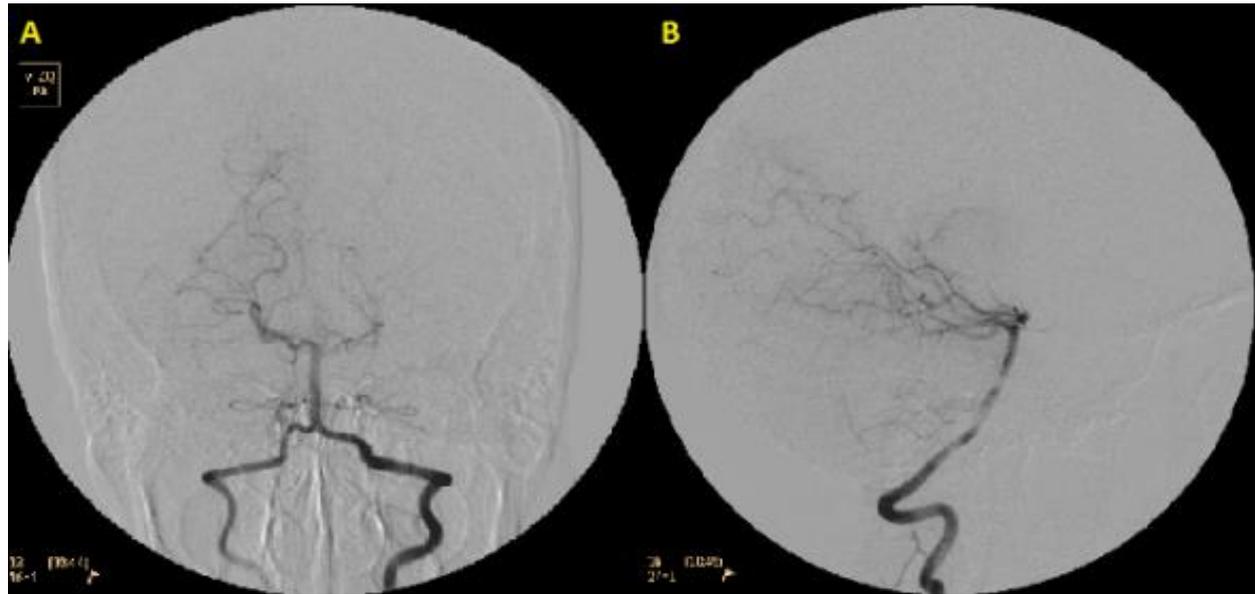


Fig 3. Posterior circulation cerebral angiography without evidence of vascular injury. **(A)** Anteroposterior view. **(B)** Lateral view.

(Figure 4B) and an extreme lateral supracerebellar infratentorial approach was performed (figure 5A). The microdissection was performed with the help of gravity which allowed less retraction of the cerebellum, also the evacuation of cerebrospinal fluid (CSF) facilitated the vision of the pontomesencephalic sulcus and the identification of the safe zone of posterior supratrigeminal entrance where a bleeding zone was evidenced as shown in Figure 5B. The cavernoma was excised (Figure 5C), verifying the total removal of the lesion under direct vision (Figure 5D).

Clinical evolution: In the postoperative period, the patient evolved favorably. She was maintained 24 hours under sedoanalgesia and mechanical ventilation. The postoperative non-contrast cerebral tomography (CT) showed the presence of a cavity in the middle cerebellar peduncle (Figure 6A) and the surgical corridor (Figure 6B). It was decided to remove sedation and mechanical ventilation being extubated without presenting any

intercurrence in later hours. Subsequently, the patient was discharged in a stable condition, without additional neurological deficit and the Glasgow Coma Scale (GCS) was 15 points.

DISCUSSION

In 1982, Baghai et al. ² recommended a safe corridor at the junction between the median cerebellar peduncle and the pons, and between the root entry areas of the vestibulocochlear complex. ⁵

The extreme lateral supracerebellar infratentorial approach is the main route to the posterolateral midbrain surface and its safe zones. Most of the current literature only refers to approach the midbrain, but the retraction and evacuation of CSF facilitates the arrival towards the pons. ⁶

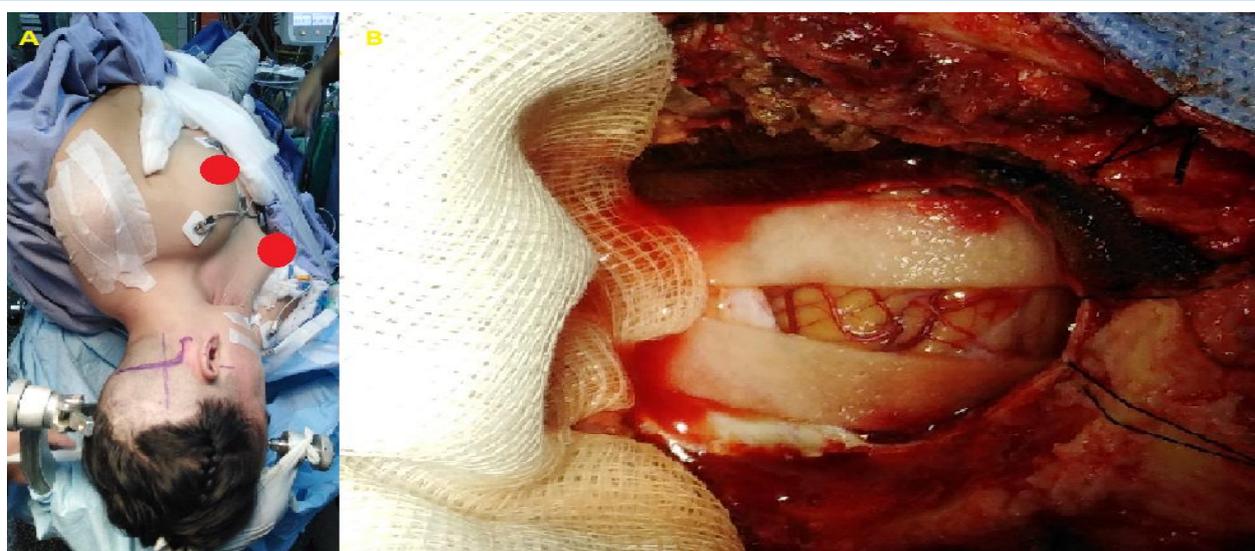


Fig 4. This picture shows **(A)** the position of the patient in 3/4 prone or “park-bench position”. **(B)** Left retromastoid craniotomy

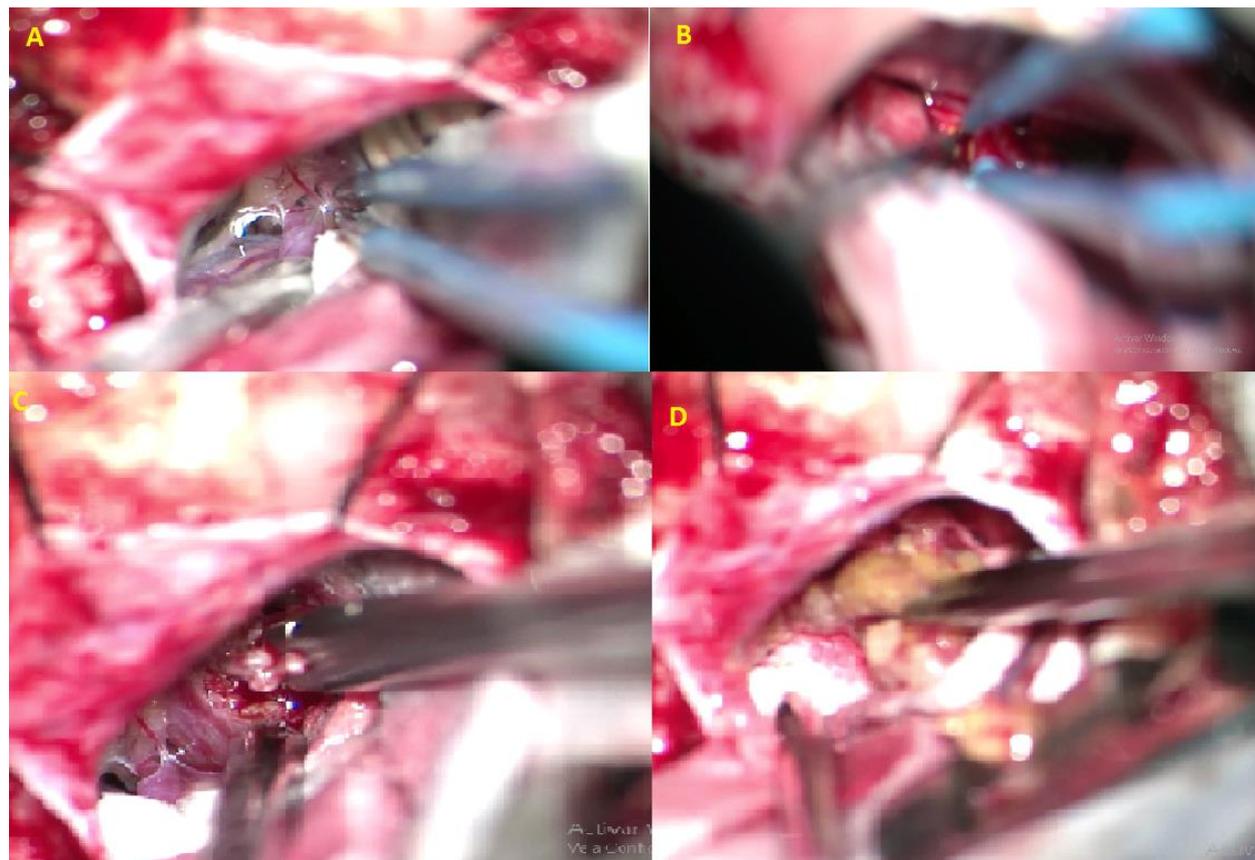


Fig 5. (A) Extreme lateral supracerebellar infratentorial approach. (B) coagulation of the safe entry zone, (C) extraction of the pontine cavernoma, (D) visualization of the total extraction of the lesion.

The patient is placed in the lateral decubitus position, and the head is slightly flexed and turned ipsilaterally. A burr hole is placed just above the Asterión in the parietomastoid suture, and a modified retromastoid craniotomy is adapted, facilitating surgical exposure through intermittent retraction.⁵

Inverted Trendelenburg positioning helps widen the corridor due to gravity. Drainage of CSF from the CP angular cistern further enhances cerebellar relaxation. The venous anatomy must be considered, which can make the approach difficult or contribute to postoperative complications.¹

The preoperative planning and intraoperative monitoring recommended by experts requires a careful evaluation of the functions of the cranial nerves; however, the reality of our health system makes the optimization of the use of different monitoring instruments far away, which implies that we have to use at maximum our knowledge in surgical anatomy.

Among the neurophysiological examinations we have auditory evoked potentials (lateral lemniscus test) and mapping of the brainstem for cranial nerves VII, IX, X and XII in the floor of the IV ventricle, nerve tracts are evaluated with somatosensory evoked potentials (lemniscus test medial) and motor evoked potentials for the evaluation of the corticospinal and corticobulbar pathways, cerebellar function does not exist a monitoring technique.⁷

CONCLUSION

The extreme or far lateral supracerebellar infratentorial approach is safe for excision of medial cerebellar peduncle cavernomas when combined with significant reverse Trendelenburg resulting in minimal cerebellar retraction as the cerebellum descends with gravity, especially after CSF release

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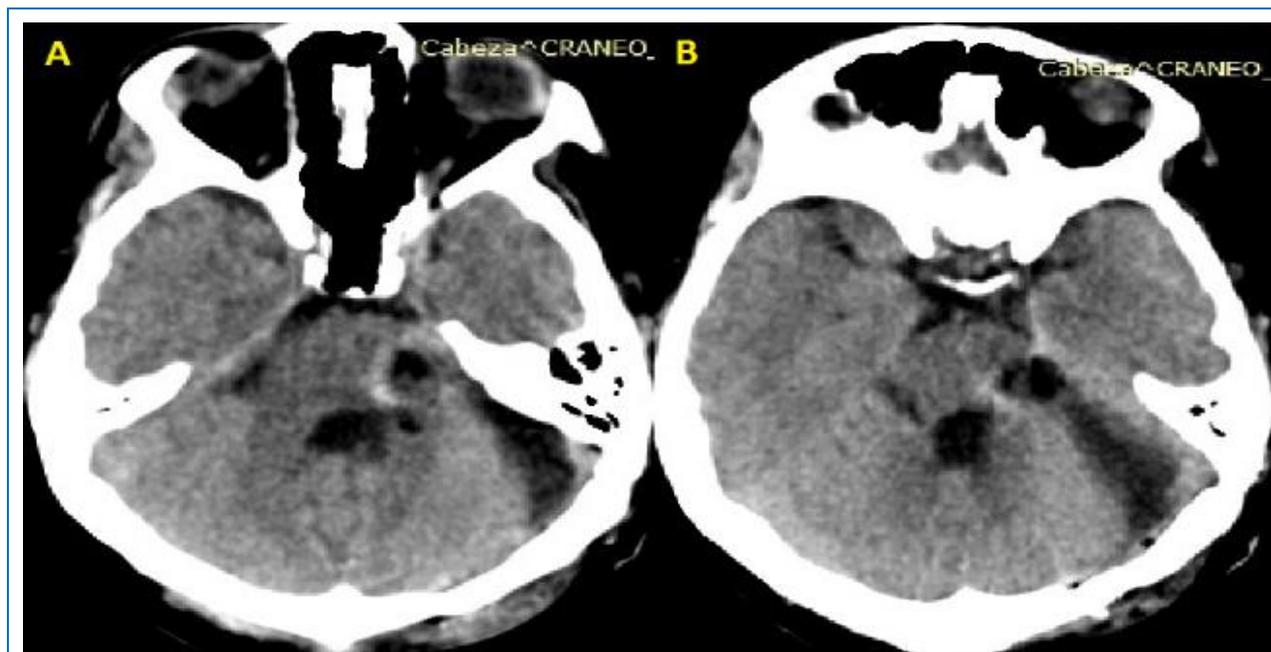


Fig 6. Postoperative brain CT showing (A) cavity in the middle cerebellar peduncle and, (B) the surgical corridor performed.

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Disclosures

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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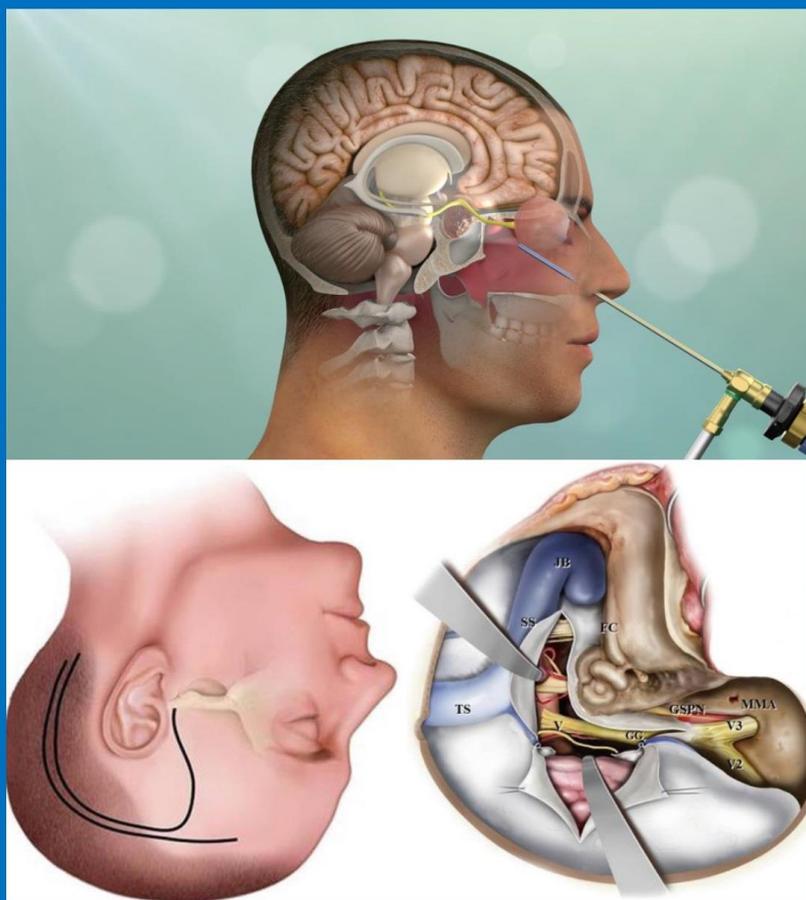
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