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EFFICACY AND SAFETY OF THE TELOVELAR APPROACH IN THE RESECTION OF FOURTH VENTRICLE TUMORS PROSPECTIVE STUDY OF 30 CASES

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ABSTRACT

Traditionally operated via the transvermian route, fourth ventricle tumors expose [patients] to the risk of cerebellar mutism due to lesion of the vermis and dentate nuclei. The telovelar approach, using the cerebellomedullary fissure (CMF), proposes a less invasive alternative. A prospective study was conducted on 30 patients operated on between 2021 and 2025 for fourth ventricle tumors via the telovelar approach. The series includes 11 children and 19 adults. The predominant pathologies were medulloblastoma (23.3%) and pilocytic astrocytoma (20%). Resection was total in 66.7% of cases. No case of cerebellar mutism was observed. The telovelar approach offers excellent exposure of the fourth ventricle while preserving the vermis, significantly reducing post-operative morbidity.

Keyword: Telovelar approach, Cerebellomedullary fissure, Fourth ventricle tumors, Cerebellar mutism, Neurosurgery, Microsurgical anatomy

1. INTRODUCTION

Lesions of the fourth ventricle (V4) represent a major neurosurgical challenge due to their proximity to the brainstem and the deep nuclei of the cerebellum. Historically, the transvermian approach described by Dandy allowed rapid access but at the cost of significant morbidity, notably "posterior fossa syndrome" or cerebellar mutism, attributed to the sectioning of the inferior vermis and damage to the dentato-thalamo-cortical pathways.

The evolution of anatomical knowledge, notably thanks to the works of Rhoton and Matsushima, has highlighted the importance of the cerebellomedullary fissure (CMF) as a natural corridor. The telovelar approach allows access to the ventricular cavity by incising the tela choroidea and the inferior medullary velum (IMV) without transgressing the vermian parenchyma. This article aims to evaluate the contributions of this technique, its clinical results, and its limitations through a series of 30 cases.

2. MATERIAL AND METHODS

This is a prospective descriptive study conducted over a period of 3 years (December 2021 to January 2025) within the neurosurgery departments of the University Hospitals (CHU) of mustapha bacha Algiers

- **Population:** 30 patients (11 children ≤ 16 years, 19 adults) presenting a V4 tumor.
- **Surgical technique:** All patients were operated on in the prone position (97%) or sitting position (3%), via a midline suboccipital craniectomy or craniotomy. The telovelar approach (unilateral or bilateral) was systematically used. Endoscopy was coupled with microsurgery in 46.7% of cases.
- **Outcome measures:** Quality of resection (post-operative MRI), neurological complications (mutism, ataxia), and survival.

3. RESULTS

- **Demographic data:** The mean age was 25 years. Intracranial hypertension syndrome was the main revealing sign (73.3%), followed by ataxia (43.3%).
- **Histopathology:** The series was polymorphous: Medulloblastomas (23.3%), Pilocytic Astrocytomas (20%), Ependymomas (16.7%), Epidermoid/dermoid cysts (13.4%), Metastases (6.7%), Hemangioblastomas (6.7%).

- **Quality of resection:** Resection was total in 20 cases (FIGURE 1) (66.7%), subtotal in 8 cases (26.6%) and partial in 2 cases. Lateral extension could be totally resected in 73.7% of the concerned cases.
- **Follow-up:** No case of cerebellar mutism was deplored. A transient aggravation of ataxia was noted in 5 patients (16.7%).

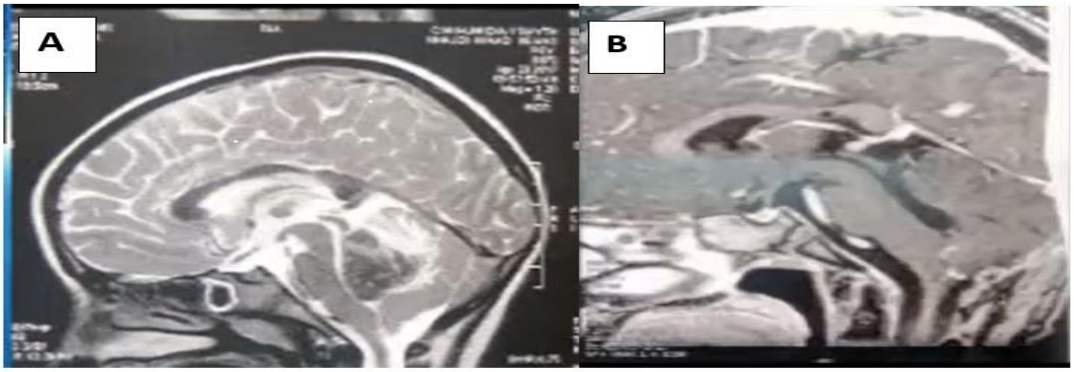

FIGURE 01: SAGITTAL BRAIN MRI SHOWING A LESION FILLING THE FOURTH VENTRICULE, TREATED WITH TOTAL RESECTION.

- **A: PREOPERATIVE**
- **B: POSTOPERATIVE**

4. DISCUSSION

4.1. Anatomical-Surgical Recall

The understanding of the telovelar approach relies on the fine anatomy of the cerebellomedullary fissure (CMF), described in detail by Matsushima **[2]** and Rhoton **[3]**. This fissure is a natural space located between the cerebellum (uvula and tonsils) and the medulla oblongata.

- **The Roof of the V4:** It is constituted in its lower half by the tela choroidea and the inferior medullary velum (IMV). These thin and avascular structures constitute the entry door of the telovelar approach **[3]**.
- **The Tonsillar Spaces:** (FIGURE 2) The dissection of the uvulo-tonsillar and medullo-tonsillar spaces is the key step described by Matsushima **[2]**. It allows mobilizing the cerebellar tonsils laterally and the uvula superiorly, thus exposing the tela choroidea without parenchymal resection.

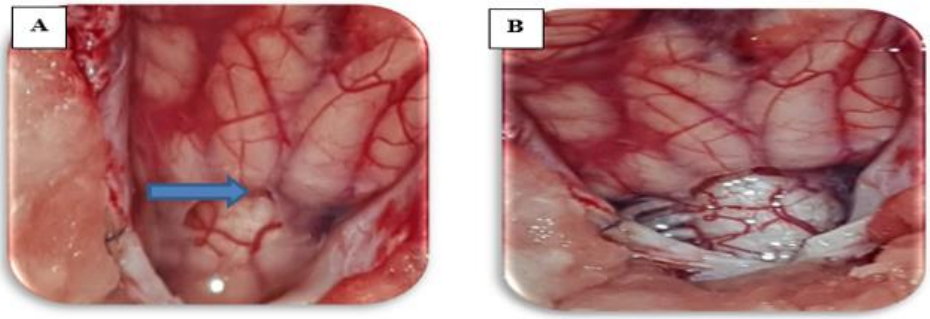

FIGURE 2: Status of the CMf (Department of Neurosurgery, mustapha bacha University Hospital)

- **(A)** Tonsillar herniation (or Tonsillar engagement).
- **(B)** Opening of the arachnoid of the cisterna magna.

4.2. Detailed Presentation of Pathologies and Surgical Implications

The nature of the tumor influences the surgical strategy via the CMF:

- **Medulloblastomas (23.3%):** These tumors often arise from the IMV and invade the roof. Ferguson **[8]** reports that the telovelar approach allows for adequate resection even for these aggressive midline tumors.
- **Ependymomas (16.7%):** Typically arising from the floor of the V4, they tend to extend laterally into the recesses (foramen of Luschka). The telovelar approach offers a direct view of these lateral extensions after tonsillar retraction, unlike the transvermian route which offers a limited view of the lateral angles as demonstrated by Tanriover **[10]**.
- **Pilocytic Astrocytomas and Hemangioblastomas:** For these often cystic or very vascularized tumors, the large opening of the CMF allows controlling vascular afferents (often arising from the PICA) before attacking the tumor, reducing hemorrhagic risk.

4.3. Details of Surgical Approaches

In our study, we adapted the opening of the CMF according to the tumor extension, in accordance with the recommendations of Tomasello **[4]**:

- **Bilateral Opening (Extensive):** (FIGURE 3) Used in 90% of cases. It offers a panoramic view of the floor, from the obex to the aqueduct. Han **[9]** emphasizes that this variant maximizes exposure without increasing morbidity.

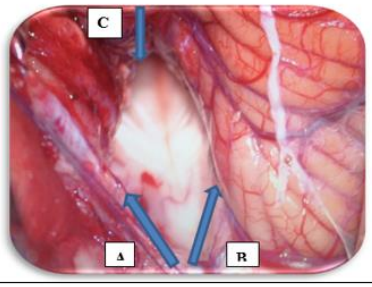

Figure 3: Bilateral opening of the CMf (Cerebellomedullary fissure) (Department of Neurosurgery,mustapha bacha University Hospital)

- **(A) and (B)** Bilaterally incised choroid plexus (tela choroidea)
- **(C)** Incised inferior medullary velum

- **Unilateral Opening:** (FIGURE 4) Used in 10% of cases for lateralized tumors, minimizing the manipulation of contralateral structures, a strategy supported by Gok **[1]**.

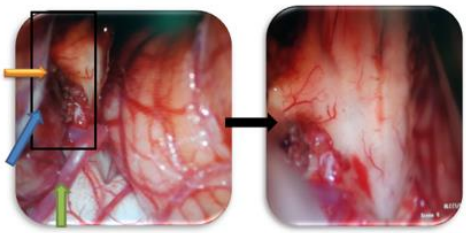

Figure 04 Unilateral opening of the FCM (Fissura Cerebello-Medullaris)
(Neurosurgery Department, University Hospital Center [CHU] of MUSTAPHA BACHA)

- **Blue arrow:** Unilateral opening of the **tela choroidea**
- **Green arrow: Telovelotonsillar segment** of the **PICA** (Posterior Inferior

- **The Contribution of Endoscopy:** Used in 46.7% of cases, endoscopy (30° or 70°) introduced via the CMF allows inspecting "blind spots" inaccessible to the microscope. Di Ieva **[7]** demonstrated the utility of this technique to verify the patency of the cerebral aqueduct at the end of the intervention.

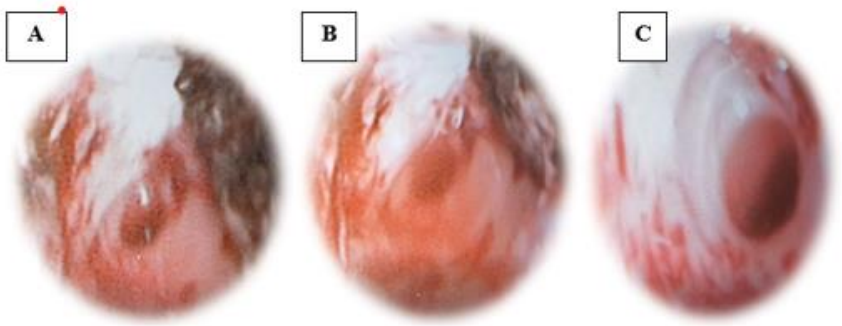

FIGURE 5: Endoscopic exploration of the roof of the fourth ventricle (A), the lateral recess (B), and the cerebral aqueduct (C) (mustapha bacha University Hospital)

4.4. Strengths of the Telovelar Approach

1. **Preservation of the Vermis:** This is the major advantage. By avoiding vermiotomy, one prevents the disconnection of the dentate nuclei, almost totally eliminating the risk of cerebellar mutism. Our series confirms the absence of mutism (0%), contrasting with rates of 8 to 30% reported in classic transvermian series **[6]**.
2. **Early Visualization of the Floor:** Unlike the transvermian route where the floor is seen last, the telovelar route often allows identifying the tumor/floor interface early (at the level of the obex), increasing dissection safety **[4]**.

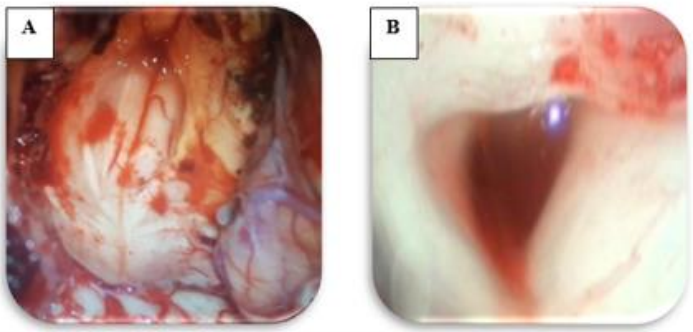

FIGURE 4 :** (A) Tumor resection and exposure of the floor of the fourth ventricle (4V) from the obex to the cerebral aqueduct, and from the right to the left lateral recesses.** ** (B) Resection of the aqueductal portion and verification of its patency. (Department of Neurosurgery, mustapha bacha University Hospital)**

4.5. Limitations of the Approach

1. **Rostral Extension (Aqueductal):** Access to the very superior part of the roof and to the aqueduct can be limited by the angle of view. Deshmukh **[5]** proposes the resection of the posterior arch of C1 to

improve this vertical angle, a maneuver we performed in 66.7% of our patients.

2. **Infiltration of the Obex:** When the tumor invades the obex (20% of our cases), the approach does not change the unfavorable prognosis linked to the impossibility of total resection without major bulbar sequelae.

3. **Learning Curve:** Fine dissection of the arachnoid spaces of the CMF requires perfect anatomical knowledge to avoid injuring the PICA **[1, 3]**.

5. CONCLUSION

The telovelar approach stands out today as the approach of choice for fourth ventricle tumors. By exploiting a natural anatomical corridor, it allows satisfactory and secure exposure, authorizing complete resections in the majority of cases. Its major benefit lies in the prevention of cerebellar mutism through preservation of the vermis. The combined use of endoscopy allows for pushing back the visual limits of this approach, notably towards the lateral recesses and the aqueduct.

6. BIBLIOGRAPHY

[1]. **Gok A, Alptekin M, Erkutlu I.** Surgical approach to the fourth ventricle cavity through the cerebellomedullary fissure. *Neurosurg Rev* 27(1), 2004: 50-54.

[2]. **Matsushima T, Fukui M, Inoue T, et al.** Microsurgical and magnetic resonance imaging anatomy of the cerebellomedullary fissure and its application during fourth ventricle surgery. *Neurosurgery* 30, 1992:325-330.

[3]. **Mussi AC, Rhoton AL Jr.** Telovelar approach to the fourth ventricle: Microsurgical anatomy. *J Neurosurg* 92(5), 2000:812-823.

[4]. **Tomasello F, Conti A, Cardali S, et al.** Telovelar Approach to Fourth Ventricle Tumors: Highlights and Limitations. *World Neurosurg*, 2015;83(6):1141-7.

[5]. **Deshmukh VR, Figueiredo EG, Deshmukh P, et al.** Quantification and comparison of telovelar and transvermian approaches to the fourth ventricle. *Neurosurgery*. 2006;58:ONS-202-206.

[6]. **Steinbok P, Cochrane DD, Perrin R, Price A.** Mutism after posterior fossa tumour resection in children: Incomplete recovery on long-term follow-up. *Pediatr Neurosurg* 39(4), 2003: 179-183.

[7]. **Di Ieva A, Komatsu M, Komatsu F, Tschabitscher M.** Endoscopic telovelar approach to the fourth ventricle: anatomic study. *Neurosurgical Review*, 2011; 35(3), 341–349.

[8]. **Ferguson SD, Levine NB, Suki D, et al.** The surgical treatment of tumors of the fourth ventricle: a single institution experience. *Journal of Neurosurgery*, 2018 128(2), 339–351.

[9]. **Han S, Wang Z, Wang Y, Wu A.** Transcerebellomedullary fissure approach to lesions of the fourth ventricle: less is more? *Acta Neurochirurgica*, 155(6), 2013; 1011–1016.

[10]. **Tanriover N, Ulm AJ, Rhoton AL, Yasuda A.** Comparison of the transvermian and telovelar approaches to the fourth ventricle. *Journal of Neurosurgery*, 2004;101(3), 484–498.