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# The Influence of Total Intravenous Anesthesia with Thiopental Sodium in Managing Giant Cerebropontine Angle Meningioma: A Case Report

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## Abstract

*Introduction: Giant intracranial cerebropontine angle (CPA) lesion is hard to access, bleeding and other complications are common. Thiopental sodium, often used for anesthesia induction, can help in quickly and smoothly inducing anesthesia. We aimed to describe a case to show the efficacy and safety of total intravenous anaesthesia and thiopental sodium for the management of giant CPA mass. Case description: A 55-year-old male presented with headaches, hearing impairment, and occasional loss of consciousness, without chronic diseases. He showed stable vital signs and a Glasgow Coma Scale score of E4M6V5. Radiological assessment revealed a mass compressing the brainstem. During surgery, careful positioning and anesthesia were conducted, with minimal bleeding and relaxed intracranial vessels noted. Cerebrospinal fluid drainage and appropriate treatment were administered. In the ICU, he received ventilator support and medication. After successful tumor excision, he regained consciousness within a day and was closely monitored in the inpatient ward for four days, with a follow-up consultation scheduled after one week. Conclusions: In this case, effective management of a sizable cerebropontine angle meningioma in a 55-year-old male patient was demonstrated through the strategic utilization of thiopental sodium.*

**Keywords:** Total intravenous anesthesia, thiopental sodium, giant cerebropontine angle meningioma, case report

## Introduction

Total intravenous anesthesia (TIVA) has been recognized as a beneficial technique in the management of patients undergoing craniotomy for various conditions, including intracranial meningiomas. TIVA, utilizing drugs like propofol, dexmedetomidine, and analgesics such as remifentanyl or fentanyl, has shown advantages in reducing cerebral blood flow, intracranial pressure, and maintaining brain perfusion pressure, thus safeguarding brain tissue from damage. (Fernández-de Thomas et al., 2024) In the context of giant intracranial CPA meningiomas, surgical approaches and outcomes have been extensively studied. A retrospective study involving 51 patients with CPA meningiomas revealed that gross total resection was achieved in 67% of cases, predominantly through a retrosigmoid approach for large lesions. (Fernández-de Thomas et al., 2024; Skibiski et al., 2024) Furthermore, the size of cystic meningiomas in the CPA has been noted to be relatively large, with a largest diameter of 50 mm.

In the realm of meningioma management, the choice of treatment for hemorrhagic

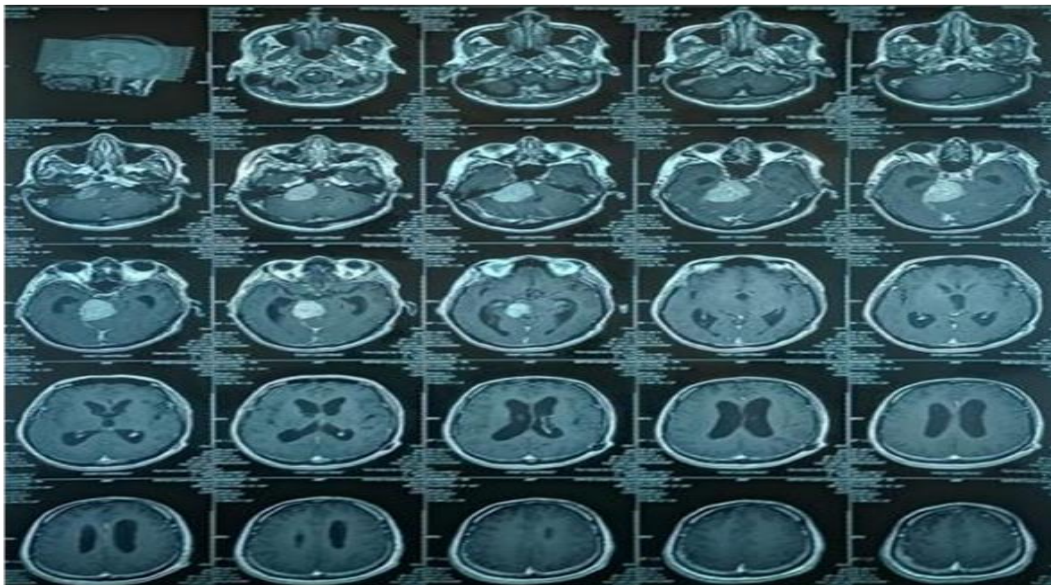
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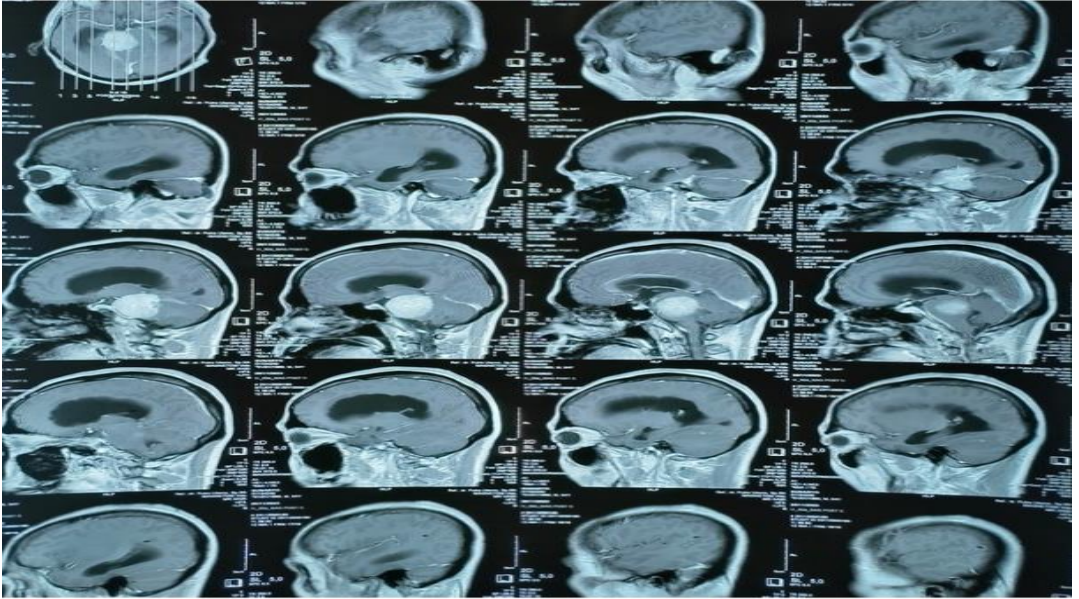
meningiomas typically involves one-stage total removal of the hemorrhagic meningioma and associated hematoma.(Skibiski et al., 2024) Additionally, the radiological evolution of progesterone-induced meningiomas has been a subject of investigation, emphasizing the importance of surgical intervention for severely symptomatic meningiomas, particularly those causing intracranial hypertension or neurological deficits.(Skibiski et al., 2024) Moreover, the risk of postoperative hematoma following intracranial meningioma surgery has been highlighted, indicating a higher risk compared to surgeries for other brain tumor types.(Goettel et al., 2016; Todd et al., 1993) By using TIVA and thiopental sodium with innovative surgical approaches, surgeons can potentially improve access to and resection of hard intracranial lesions while ensuring optimal anesthesia and surgical conditions.(Petersen et al., 2003) Hence, we aimed to describe a case to demonstrate the efficacy and safety of thiopental sodium for the management of giant cerebropontine angle meningioma.

### Case Description

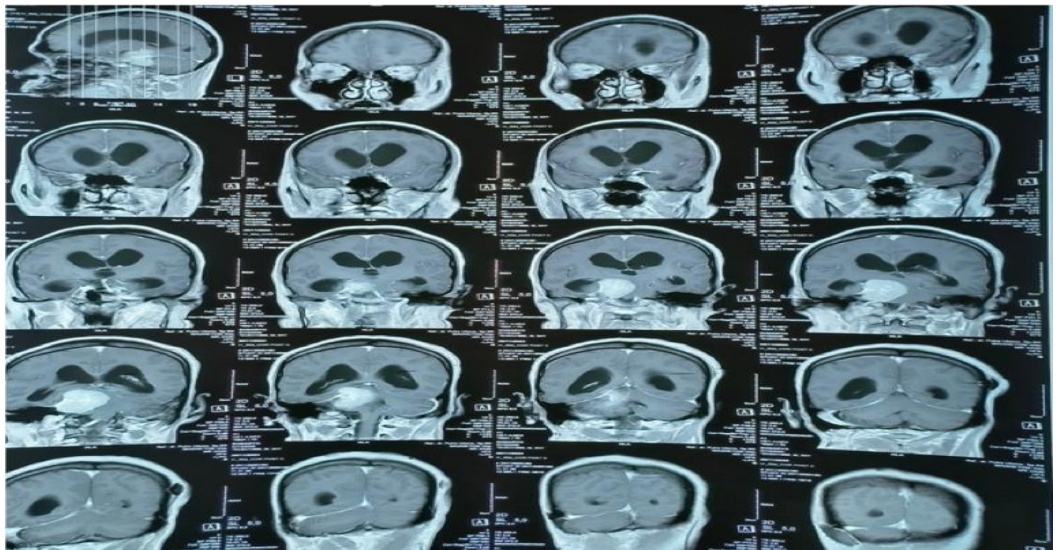
A 55-year-old male presented with persistent complaints over the past year, including headaches, hearing impairment, occasional episodes of loss of consciousness, and difficulties with balance and weakness, without a history of chronic diseases like diabetes or hypertension. Physical examination revealed the patient, categorized as ASA 2, had a stable vital sign, including a blood pressure of 130/80 mmHg, respiratory rate of 18 breaths per minute, heart rate of 72 beats per minute, temperature of 36.7°C, body weight of 65 kg, height of 165 cm, a peripheral oxygen saturation (SpO<sub>2</sub>) of 99% on room air, and a Glasgow Coma Scale (GCS) score of E4M6V5. Radiological assessment showed a mass with relatively homogeneous intensity, isointense on T1, slightly hyperintense on T2 and TIRM, with strong and relatively homogeneous post-contrast enhancement. The mass, measuring 3.9 x 3.9 x 3.8 cm, involved the right cerebellar tentorium, extending into the right cerebellopontine angle (CPA), compressing the brainstem and right cerebellar hemisphere, and narrowing the fourth ventricle (Figure 1 – 3).



**Figure 1** An Axial Section of the Intracranial MRI Showing a Mass Measuring 3.9 X 3.9 X 3.8 Cm.



**Figure 2:** A Sagittal Slice of the Intracranial MRI Reveals a Mass Measuring 3.9 X 3.9 X 3.8 Cm.



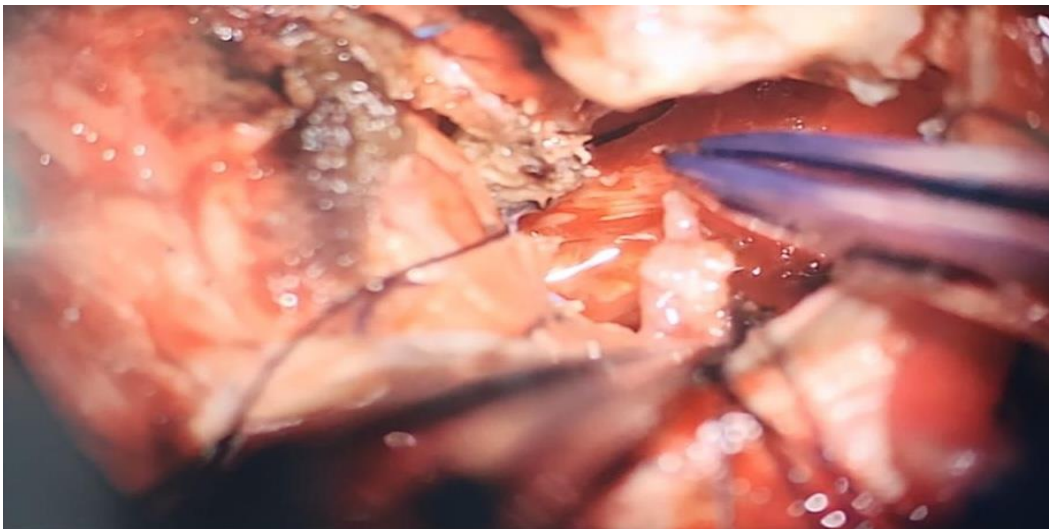
**Figure 3:** A Coronal View of the Intracranial MRI Revealing a Mass with Dimensions of 3.9 X 3.9 X 3.8 Cm.

During the surgical procedure, the patient was positioned in a three-quarter prone stance with specific vital signs monitored closely (Figure 4). Vital signs were recorded, including a systolic blood pressure of 100 mmHg and a diastolic pressure of 60 mmHg, along with a respiratory rate of 14 breaths per minute while receiving oxygen supplementation via a ventilator. Anesthesia induction involved administering 0.1 mcg/kgBW of remifentanyl, 150 mg of propofol, and 50 mg of rocuronium. Sevoflurane was introduced at a concentration of 1.2 volume percent. Intubation was carried out using a Macintosh laryngoscope with a 7.0 size

non-kinking endotracheal tube equipped with a balloon. Anesthesia maintenance consisted of maintaining sevoflurane between 1.2% to 2% along with a 50% oxygen to 50% air mixture, continuous infusion of remifentanyl at a rate of 50 mcg/kg/min, and continuous administration of rocuronium. The surgery, lasting for 12 hours, resulted in a recorded blood loss of 350 cc and diuresis measuring 1500 cc. From a surgical perspective, it was observed that there was minimal bleeding and the intracranial blood vessels appeared to be in a relaxed state (**Figure 5**). Extracranial cerebrospinal fluid (CSF) drainage was performed with the following recorded outputs: at the sixth hour, 30 cc; and at the seventh hour, 20 cc. Additionally, lumbar CSF drainage yielded the following outputs: 1.5 hours post-excision, 5 cc; at 4 hours post-excision, 12 cc; at 5 hours post-excision, 10 cc; and 1 hour prior to surgical closure, 2 cc. Other treatment involved administering 15 drops per minute of crystalloid solution, along with 40 mg of mannitol and 10 mg of dexamethasone.



**Figure 4.** The Patient was Positioned in a Three-Quarter Prone Stance with the Neck Flexed and the Torso Elevated Approximately 30 Degrees.



**Figure 5:** Surgical Standpoint Showing there was Minimal Bleeding and Intracranial Blood

Vessels were in a Relax State.

On the first day in the ICU, ventilator support was initiated for the patient with specific parameters: pressure control mode, FiO<sub>2</sub> set at 50%, respiratory rate maintained at 12 breaths per minute, inspiratory pressure set at 12 cmH<sub>2</sub>O, positive end-expiratory pressure (PEEP) set at 5 cmH<sub>2</sub>O, tidal volume ranging from 350 to 370 cc, with oxygen saturation maintained at 99%. The patient received a continuous infusion of fentanyl at a rate of 20 mcg/h while in the ICU. Additionally, therapeutic interventions included administration of ceftriaxone, omeprazole, citicoline, propofol, dexamethasone, and mannitol. Upon dissecting the periosteum, the dura mater exhibited no tension, and subsequent opening revealed relaxed brain tissue, facilitating the excision of the tumor. The patient regained consciousness within one day and subsequently transitioned to an inpatient ward, where he was monitored closely for four days. A follow-up consultation was arranged for one week post-surgery.

## Discussion

Here, a 55-year-old male presented with persistent complaints over the past year, including headaches, hearing impairment, occasional episodes of loss of consciousness, and difficulties with balance and weakness. The patient was diagnosed with a giant intracranial cerebellopontine angle (CPA) mass measuring 3.9 x 3.9 x 3.8 cm. Subsequently, the patient underwent surgical removal of the mass with the administration of TIVA alongside thiopental sodium.

TIVA has been a topic of interest in intracranial surgeries, especially for large intracranial meningiomas. Research suggests that TIVA can lead to lower subdural intracranial pressure, higher cerebral perfusion pressure, and reduced cerebral swelling compared to inhalational anesthesia, offering potential benefits for managing intracranial pressure and cerebral perfusion during surgeries involving these tumors. (Beverstock et al., 2021; Bromfalk et al., 2023) However, some studies found no significant patient benefit in terms of recovery and cognitive functions when comparing TIVA with conventional anesthesia, underscoring the need for a nuanced evaluation of TIVA's advantages in specific surgical contexts. In the case of intracranial meningiomas, studies shed light on surgical patterns and outcomes. (Bromfalk et al., 2023) Some studies highlighted the importance of surgical management, even in apparently asymptomatic cases, while others emphasized radical total surgical removal as the primary option, particularly in developing countries. (Mizrak et al., 2009; Tsai et al., 2003) Additionally, research underscores the potential benefits of TIVA in protecting brain tissue during surgeries by reducing cerebral blood flow, intracranial pressure, and cerebral metabolism oxygen rate, aligning with the rationale for considering TIVA for large intracranial meningiomas to maintain optimal brain perfusion and minimize cerebral edema. (Miller & Gan, 2015)

When considering the impact of TIVA and thiopental sodium on surgical outcomes for giant CPA meningiomas, it is essential to recognize that anesthesia management plays a critical role in the overall success of the procedure. (Miller & Gan, 2015) TIVA has been associated with reduced postoperative nausea and vomiting, faster recovery times, and improved hemodynamic stability compared to inhalational anesthesia. (Miller & Gan, 2015) Thiopental sodium, a short-acting barbiturate, is commonly used for induction of anesthesia due to its rapid onset and favorable hemodynamic profile. (Skibiski et al., 2024) Notably, thiopental sodium has been associated with heightened pain intensity during injection relative to alternative anesthetic

agents. The surgical procedure, in our case, which endured for 12 hours, led to the recorded loss of 350 cc of blood and a diuresis measurement of 1500 cc.

Possible limitations of this case report include its retrospective nature and the lack of a control group for comparison. Since it is based on a single case, generalizability to broader populations may be limited. Additionally, the absence of long-term follow-up data restricts the assessment of the sustained efficacy and safety of the treatment approach described. Furthermore, while the detailed description of the surgical procedure and perioperative management is valuable, it may not fully capture all relevant factors influencing outcomes. Variability in individual patient responses and potential confounding variables, such as comorbidities or concurrent medications, could also impact the interpretation of results. Moreover, the case report does not provide information on any adverse events or complications that may have occurred during the treatment course, which could affect the overall assessment of the intervention's safety profile. Future studies incorporating larger sample sizes, prospective designs, and longer-term follow-up are warranted to better evaluate the efficacy, safety, and generalizability of thiopental sodium for the management of giant cerebropontine angle meningioma.

## Conclusion

In summary, this case study illustrates the successful treatment of a giant meningioma situated in the cerebropontine angle of a 55-year-old male patient. Thiopental sodium demonstrated efficacy and safety during the surgical intervention. Despite the procedure's duration of 12 hours, careful monitoring and anesthesia maintenance ensured stable vital signs and minimal intraoperative bleeding. The patient recovered consciousness within one day post-surgery and was subsequently transferred to an inpatient ward for further observation. Utilization of specific ventilator settings and continuous fentanyl infusion in the ICU contributed to the patient's postoperative management. Overall, this case emphasizes the significance of thorough perioperative care and vigilant monitoring in achieving positive outcomes for patients undergoing complex neurosurgical procedures. Further research may provide additional insights into the effectiveness and safety of this combined anesthetic approach in similar clinical scenarios.

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