



# Modified 30-Degree Head-Up Tilt Park Bench Position in Semielective Posterior Fossa Surgery in a Patient with Pheochromocytoma

## *Posição de banco de apoio de inclinação de cabeça para cima de 30 graus modificada em cirurgia de fossa posterior semieletiva em paciente com feocromocitoma*

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### Abstract

Von Hippel–Lindau (VHL) disease is a rare genetic disorder associated with the central nervous system and visceral organs. Pheochromocytomas occur in 10% of VHL patients, while cerebellar tumors are common tumors in VHL syndrome, with an incidence of 60%. The most common position for posterior fossa operations is the park bench or lateral decubitus position. These positions have primarily replaced the sitting position. However, the advantages of the supine position cannot be overlooked. The coexistence of pheochromocytoma and the cerebellar tumor may require modification in surgical position and anesthesia management in line with possible pathophysiological changes. We present the anesthesia management in posterior fossa surgery in patients with postponed pheochromocytoma surgery. The present case highlights the importance of a multidisciplinary team approach and anesthetic management.

### Keywords

- ▶ von hippel–lindau
- ▶ park bench position
- ▶ pheochromocytoma
- ▶ general anesthesia

### Resumo

A doença de Von Hippel-Lindau (VHL) é uma doença genética rara associada ao sistema nervoso central e órgãos viscerais. Feocromocitomas ocorrem em 10% dos pacientes com VHL, enquanto os tumores cerebelares são tumores comuns na síndrome de VHL, com incidência de 60%. A posição mais comum para operações da fossa posterior é o banco do parque ou posição de decúbito lateral. Essas posições substituíram principalmente a posição sentada. No entanto, as vantagens da posição supina não podem ser negligenciadas. A coexistência de feocromocitoma e tumor cerebelar pode exigir modificação da posição cirúrgica e manejo da anestesia de acordo com possíveis alterações fisiopatológicas. Apresentamos o manejo da anestesia na cirurgia da fossa posterior em pacientes com cirurgia de feocromocitoma adiada. O presente caso destaca a importância de uma abordagem de equipe multidisciplinar e do manejo anestésico.

### Palavras-chave

- ▶ von hippel - lindau
- ▶ posição de banco de parque
- ▶ feocromocitoma
- ▶ anestesia geral

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## Introduction

The park bench position is widely used in posterior fossa operations. It has replaced the sitting position for most neurosurgery procedures. However, this position has been modified since the advantages of the sitting position cannot be achieved. The modified 30-degree head-up tilt park bench position can provide the same advantages as the sitting position, and it also reduces the risk of venous air embolism and hypotension.<sup>1-4</sup> Von Hippel-Lindau (VHL) disease is a rare genetic disorder associated with cerebellar tumor and pheochromocytoma. Catecholamine discharges in the pheochromocytoma can lead to dangerous cardiovascular consequences and produce raised intracranial pressure (ICP).<sup>1,5</sup> We present the anesthesia management in a woman with pheochromocytoma for the excision of a cerebellar hemangioblastoma due to neurological symptoms.

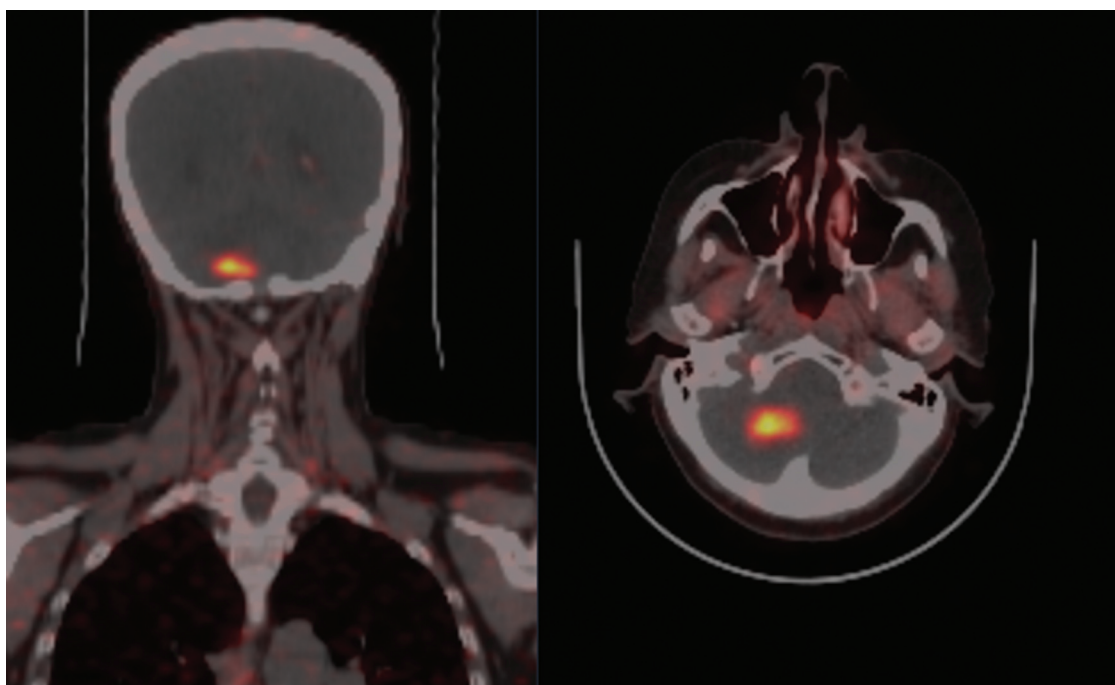
## Case

A 57-year-old female was admitted with complaints of hypertensive attack and vomiting. She was diagnosed with VHL disease. Neurological worsening and disorientation developed. A right cerebellar hypermetabolic mass measuring 19 × 21 mm was seen on positron emission tomography (PET) (► Fig. 1). Single-photon emission computed tomography (SPECT) images revealed an adrenal nodule consistent with pheochromocytoma. Adrenalectomy was postponed, and it was decided to perform posterior fossa surgery first. The patient had hypertension for 10 years. She had undergone Coronary artery bypass graft surgery 6 years before. Esmolol, phentolamine, doxazosin and methyldopa were started for blood pressure control. Written informed consent was obtained from the patient for the present study. The patient

was monitored with electrocardiograms (leads II, V1), peripheral SpO<sub>2</sub>, cutaneous temperature, Patient State Index (PSI), invasive blood pressure (BP) assessments (right radial artery), and central venous pressure (right subclavian catheter) in the operating room. Her heart rate (HR) was 100 beats/minute, her BP was 70/98 mmHg, and her body temperature was 36.6° C. Anesthesia was induced with fentanyl 1 µg/kg, propofol 2.5 mg/kg, and rocuronium 0.6 mg/kg, and the patient was intubated. Maintenance of anaesthesia was achieved with sevoflurane/oxygen/air, combined with a remifentanyl 0.25–0.5 mcg/kg/minute infusion. The PSI value remained between 25 and 50. After the intubation in the supine position, the patient was turned into the park bench position. Description of the modified park bench position: The head of the operating table and the thorax were elevated ~ 30 ° to be higher than the feet. The head was fixed with a three-pin head holder. During this time, the head was kept coaxial with the thorax without any lateral flexion, but the lateral side of the craniotomy was rotated and slightly bent forward as in the semisitting position (► Fig. 2).<sup>2</sup> No hemodynamic problems occurred during the positioning. The BP of the patient shot up to 185/105 mmHg. Esmolol infusion was used for BP control. Hemodynamics were stable during surgery, with a maximum drop in BP to 100/70 mmHg. After surgery, the patient was sent to the intensive care unit (ICU), where she was extubated within 4 hours. Neurological impairment was not observed. One day later, the patient was sent to the neurosurgery clinic with an excellent general condition.

## Discussion

Pheochromocytoma is observed in between 10 and 20% of cases of VHL disease, but the incidence of cerebellar tumor is of 60%. The association of a pheochromocytoma with



**Fig. 1** A right cerebellar hypermetabolic mass measuring 19 × 21 mm on PET/CT.



**Fig. 2** Modified 30-degree head-up tilt park bench position.

cerebellar mass further increases the complications rate. The release of excessive amounts of catecholamines, especially during anesthesia induction or during surgery, can cause life-threatening cardiovascular complications and cause raised ICP.<sup>1,5,6</sup>

Anesthesia management is challenging in patients with pheochromocytoma. The catecholamine storm can raise ICP and result in lethal complications. In the perioperative period, cardiac complications such as severe hypertensive attacks and arrhythmias may occur. Thiopental can cause histamine release, which needs to be avoided in pheochromocytoma. Propofol is preferred because it causes vasodilation and reduces the hypertensive response to laryngoscopy and intubation. Sevoflurane can be used as an inhalation agent as it provides cardiac stability. Vecuronium, rocuronium, and cisatracurium can be used as muscle relaxant agents since they do not release histamine.<sup>7,8</sup> In our case, providing anesthesia depth with brain function monitoring facilitated hemodynamic stabilization.

Besides the anesthetic agents, the position of the patient used in the operation can help preventing complications and serious adverse events. Although each position applied in posterior fossa operations has its advantages and disadvantages, the surgeon should choose the most suitable for the patient and the pathology. The sitting position for posterior fossa surgery modified to the semisitting or “beach chair” position keeps most of its advantages and allows a rapid trendelenburg in the case of air embolism.<sup>3</sup> The classical

sitting position causes postural hypotension in  $\sim 1/3$  of the patients, and severe hypotension occurs in between 2 and 5% of the patients.<sup>3,4</sup> The hypotension effect of the sitting position may be an advantage for high BP in pheochromocytoma. Excellent surgical exposure, drier area, less blood loss, and reduced facial swelling are the advantages of the sitting position. However, we cannot ignore venous air embolism and the increased risk of pneumocephalus.<sup>3</sup> In addition, the prone and sitting positions can increase abdominal compression, causing catecholamine surge. Mugawar et al.<sup>9</sup> preferred the prone position in a cerebellar mass excision in a patient who had bilateral pheochromocytoma and detected VHL because the hemodynamic reactions caused by the sitting position during surgery might not be tolerated by the patient. They were careful to avoid any excessive pressure over the abdomen, as there might be excessive endocrine discharges from the adrenal glands due to abdominal compression in the prone position. Another case performed in a similar position is that described by Tempelhoff et al.<sup>10</sup> They reported anesthetic management of a patient with multiple posterior fossa tumors and pheochromocytoma. After the induction of anesthesia, the patient had a cardiac arrest after an attempt at pulmonary artery catheterization. After successful cardiopulmonary resuscitation, surgery was performed on the following day in the prone position. When the advantages and disadvantages were evaluated, the modified park bench position was considered suitable for our patient. This position allows a neural and vascular

manipulation and control of the cerebellopontine angle. In addition, it may result in a decrease in the posterior fossa pressure.<sup>2</sup> Wajekar et al.<sup>1</sup> reported that they had performed posterior fossa surgery in the sitting position in a patient with pheochromocytoma. Hemodynamic stabilization in the sitting position was achieved by central venous pressure (CVP) monitoring. We preferred a modified park bench position in our patient due to cardiac instability.

## Conclusion

The management of anesthesia in the modified park bench position can be safer than other positions, especially in posterior fossa surgery in patients with postponed adrenalectomy and cardiac instability. Careful monitoring and titration of anesthesia are essential in providing a successful outcome at such high-risk patients.

## Main Points

- The coexistence of pheochromocytoma and a cerebellar tumor may require a modification in the surgical position in line with possible pathophysiological changes.
- The modified 30-degree head-up tilt park bench position can provide the same advantages as the sitting position, and it also reduces the risk of venous air embolism and of hypotension
- The modified park bench position may be safe in posterior fossa surgery in patients with postponed adrenalectomy and cardiac instability.

### Informed Consent

Written informed consent was obtained from the patient who participated in the present study.

### Financial Disclosure

The authors declare that the present study has received no financial support.

### Conflict of Interests

The authors have no conflict of interests to declare.

## References

- 1 Wajekar AS, Oak SP, Shetty AN, Jain RA. Emergency Posterior Fossa Surgery in Sitting Position in a Patient With Pheochromocytoma. *J Neurosurg Anesthesiol* 2016;28(01):83
- 2 Spina G, Guerrini F, Grimod G. A modified park bench position: the “Dormeuse” position. *Acta Neurochir (Wien)* 2019;161(09):1823–1827
- 3 Rozet I, Vavilala MS. Risks and benefits of patient positioning during neurosurgical care. *Anesthesiol Clin* 2007;25(03):631–653, x
- 4 Black S, Cucchiara R. Tumor Surgery. In: RF Cucchiara, SB.; Michenfelder, JD., editors. *Clinical Neuroanesthesia*. Second ed. NY, New York 100111998:334–366
- 5 Pacak K. Preoperative management of the pheochromocytoma patient. *J Clin Endocrinol Metab* 2007;92(11):4069–4079
- 6 Kammoun B, Belmabrouk H, Kolsi F, et al. Brain Metastasis of Pheochromocytoma: Diagnostic and Therapeutic Challenge. *World Neurosurg* 2019;130:391–399
- 7 O’Riordan JA. Pheochromocytomas and anesthesia. *Int Anesthesiol Clin* 1997;35(04):99–127
- 8 Sumikawa K, Amakata Y. The pressor effect of droperidol on a patient with pheochromocytoma. *Anesthesiology* 1977;46(05):359–361
- 9 Mugawar M, Rajender Y, Purohit AK, Sastry RA, Sundaram C, Rammurti S. Anesthetic management of von Hippel-Lindau Syndrome for excision of cerebellar hemangioblastoma and pheochromocytoma surgery. *Anesth Analg* 1998;86(03):673–674
- 10 Tempelhoff R, Modica PA. Anesthetic management of a patient with multiple posterior fossa tumors and an active pheochromocytoma: case report and review of the literature. *Anesth Rev* 1988;25:13–20