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Case Report

Anaesthesia Section

Navigating Anaesthetic Complexities in Perimesencephalic Epidermoid Cyst with Obstructive Hydrocephalus: A Case Report

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ABSTRACT

Perimesencephalic epidermoid cysts are rare intracranial lesions that present with atypical neurological symptoms caused by obstructive hydrocephalus. This case report details the complex neuro-anaesthetic management of a 53-year-old male {Body Mass Index (BMI) 26.6} who presented with altered sensorium, vomiting, tinnitus, and headache for one week. Neurological assessment showed a Glasgow Coma Scale (GCS) of E3V4M5, with the involvement of cranial nerves VIII–X and disorientation. An MRI of the brain (plain) revealed a perimesencephalic epidermoid cyst measuring 4.2×1.6×2.1 cm, accompanied by obstructive hydrocephalus. The anaesthetic plan involved a staged approach: External Ventricular Drainage (EVD) followed by definitive tumour excision in the left lateral sitting position. The patient, classified as ASA Grade III, had stable cardiovascular status but exhibited a potentially difficult airway (Mallampati class III). Intraoperative management included invasive monitoring through radial artery and central venous catheterisation, controlling Intracranial Pressure (ICP) using mannitol, a scalp block for analgesia, and the avoidance of nitrous oxide. Precautions were taken to prevent Venous Air Embolism (VAE), which included the use of a precordial Doppler and adequate head elevation of the patient. Anaesthesia was maintained with a fentanyl-sevoflurane-air-oxygen regimen. Extubation was complicated by transient laryngospasm, requiring reintubation. Postoperative care was notable for the presence of transient pneumocephalus, which resolved with supportive care. The patient was successfully extubated on postoperative day 3, showed complete neurological recovery, and was discharged on day 7. This unique case highlights the challenges faced in managing posterior fossa tumours such as perimesencephalic epidermoid cysts, which require multidisciplinary anaesthetic approaches and vigilant postoperative care to ensure adequate neurological outcomes.

Keywords: Airway management, Intracranial pressure, Neurosurgery, Pneumocephalus, Venous air embolism

CASE REPORT

A 53-year-old male (75 kg, 168 cm, BMI: 26.6) presented with chief complaints of altered sensorium, headache, vomiting, forgetfulness for the past eight days, and tinnitus for the last six days. His past medical history included hypertension for the past four years. During the Pre-Anaesthetic Check-Up (PAC), his Glasgow Coma Scale (GCS) score was E3V4M5, indicating drowsiness and confusion. His vitals were normal with a pulse rate of 86/min, respiratory rate of 18/min, SpO2 of 97%, temperature of 36.7°C, and blood pressure of 148/92 mmHg.

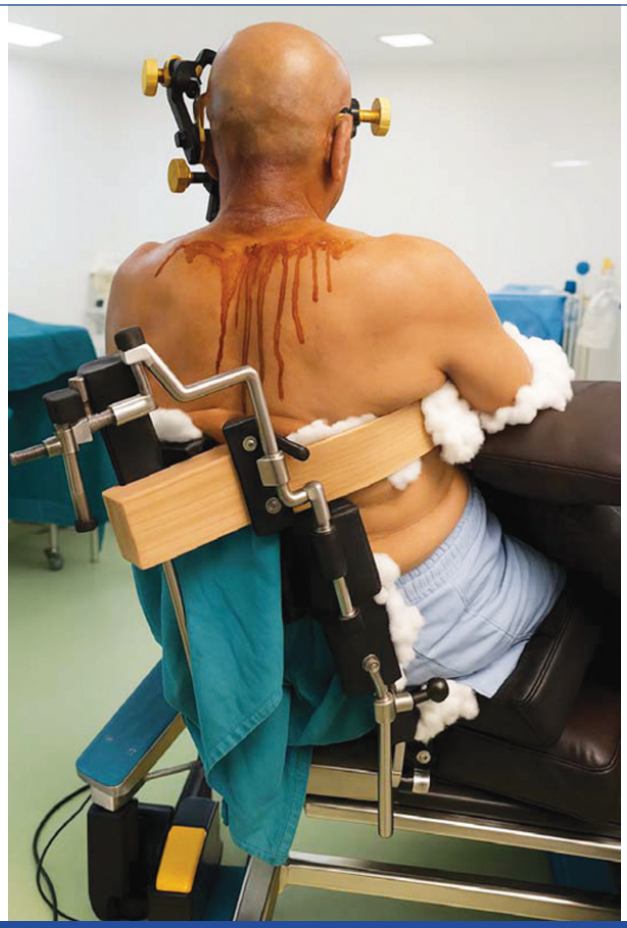
Central Nervous System (CNS) examination revealed disorientation to time, place, and person, with involvement of cranial nerves VIII–X, resulting in weak gag reflexes and a motor tone and power (4/5) in all four limbs. The systemic examination showed reduced air entry in the bilateral lower lungs on auscultation. Magnetic Resonance Imaging (MRI) of the brain (plain) revealed a perimesencephalic epidermoid cyst with obstructive hydrocephalus. An External Ventricular Drainage (EVD) was planned, followed by excision of a tumour measuring 4.2×1.6×2.1 cm.

Preoperative Assessment and Anaesthetic Preparation: The patient was classified as ASA Grade III due to hypertension and neurological symptoms. A Two-Dimensional (2D) echocardiography showed adequate Left Ventricular (LV) systolic function with a 60% ejection fraction. The Mallampati score of 3 and limited mouth opening suggested a possible difficult airway. Venous Thromboembolism (VTE) prophylaxis was implemented via compression stockings. The patient was confirmed Nil Per Oral (NPO) preoperatively: no solid food for eight hours and no clear liquids for two hours prior to anaesthesia to avoid perioperative aspiration.

Intraoperative preparation and neuroanaesthetic considerations: In the operating room, Electrocardiography (ECG), pulse oximetry, capnography, and Non-Invasive Blood Pressure (NIBP) monitoring were established. Warming blankets were used for active temperature control. Two large-bore intravenous (i.v.) access lines (18G) were secured. A radial arterial line was placed for monitoring both Arterial Blood Gas (ABG) levels and blood pressure. Under ultrasound guidance, a right subclavian central venous catheter was placed for medication administration and monitoring of Central Venous Pressure (CVP). Induction was performed with i.v. Fentanyl (2.1 mcg/kg), Propofol (1.7 mg/kg), and Vecuronium (0.1 mg/kg) following three minutes of preoxygenation. He was intubated with an 8.0 mm cuffed armored endotracheal tube, secured at 22 cm at the mouth angle. Post-intubation, auscultation confirmed adequate bilateral air entry, verifying the placement of the endotracheal tube and effective ventilation. To minimise fluctuations in Intracranial Pressure (ICP), mild hypocapnia was maintained (PaCO2 ~30-35 mmHg).

Anaesthetic management: A scalp block was performed using 3 mL of 0.5% bupivacaine infiltrated into the supraorbital region, along with 3 mL in the supratrochlear, 3 mL in the auriculotemporal, 5 mL in the lesser occipital, and 5 mL in the greater occipital nerves for regional analgesia. A 2% lignocaine injection was administered at the pin-holding sites before fixing the Mayfield head holder for secure head positioning. The patient was positioned in a left lateral sitting position with legs semi-flexed and elevated to avoid vascular compression and thromboembolism while also providing surgical access and maintaining haemodynamic stability. The left lateral positioning of the patient is shown in [Table/Fig-1]. During induction, precautions for Venous Air Embolism (VAE) included

the Trendelenburg position and the use of a precordial Doppler. i.v. Levetiracetam (1.5 g) and i.v. Hydrocortisone (100 mg) were administered, along with hyperosmolar therapy using i.v. Mannitol (100 mL of 20%) preoperatively; 3% sodium chloride was not used. i.v. Ceftriaxone (1 g) was given 30 minutes before incision to prevent surgical site infection.

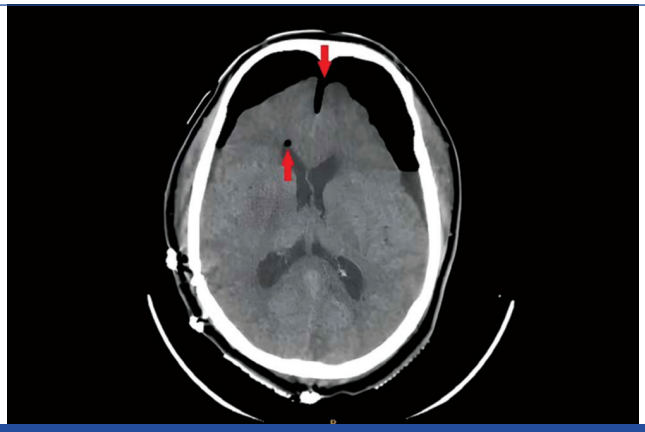


[Table/Fig-1]: Left lateral positioning of patient for haemodynamic stability and surgical access.

His mechanical ventilation was maintained in volume-controlled mode with the following parameters: tidal volume: 450 mL, respiratory rate: 12 breaths/min, FiO_2: 50%, and Positive End-Expiratory Pressure (PEEP) of 5 cmH_2O for adequate oxygenation and prevention of atelectasis. General anaesthesia was administered with Fentanyl (50 mcg/h) and muscle relaxation achieved with Vecuronium (2 mg/h) intravenously. A mixture of air and oxygen was used with Sevoflurane, which was titrated for the depth of anaesthesia. Nitrous oxide was not used to prevent an increase in ICP and the expansion of pneumocephalus. Blood loss was 150 mL, with no need for blood transfusion. The patient was hemodynamically stable throughout the six-hour operative procedure.

Later, the patient was placed in a supine position with the head elevated about 15°, and oropharyngeal suctioning was performed. The neuromuscular blockade was antagonised with intravenous Neostigmine (2.5 mg) and Glycopyrrolate (0.5 mg). Elective ventilation and extubation in the Intensive Care Unit (ICU) were not initially planned, as the patient showed respiratory efforts, intact airway reflexes, and hemodynamic stability. Two minutes before extubation, intravenous Lidocaine (1.5 mg/kg) was administered to attenuate airway reflexes and prevent hemodynamic surges. The patient developed tachypnea with laryngospasm, causing increased inspiratory effort and stridor; therefore, reintubation was performed using a 7.5 mm cuffed endotracheal tube.

Outcome and follow-up: Postoperatively, the patient was transferred to the ICU with the endotracheal tube in situ. The neurological status was E4V4M6, and the GCS was 14/15 within 24 hours. Intravenous Paracetamol (1 gm every 8 hours) and Fentanyl (25 mcg/hour, titrated) were administered for analgesia. Arterial blood gas analysis showed a pH of 7.20, PaCO2 of 60 mmHg, PaO2 of 80 mmHg, $HCO3^-$ of 18 mEq/L, and a base excess of 20 mEq/L, indicating satisfactory oxygenation and ventilation. Ventilatory weaning occurred on day 3. A Computed Tomography (CT) scan showed tumour decompression with resolution of hydrocephalus. Within two days, pneumocephalus occurred but resolved within 12 hours with supportive care, including 100% oxygen, Fowler's position, analgesics for pain control, infection prevention, and rehabilitation. The CT of pneumocephalus is presented in [Table/Fig-2]. The patient was discharged on day 7, with an MRI follow-up scheduled for three months.



[Table/Fig-2]: Computed Tomography (CT) scan of the patient which shows pneumocephalus.

DISCUSSION

A perimesencephalic epidermoid is a benign brain tumour located in the perimesencephalic region around the midbrain, also known as the mesencephalon [1]. The epidermoid tumour derives from the ectodermal remnants of embryonic brain tissue during early development [2]. Obstructive hydrocephalus occurs when there is an obstruction of Cerebrospinal Fluid (CSF) flow within the ventricles, leading to its accumulation, which increases ICP, causes ventricular enlargement, and can result in brain tissue damage [3,4]. External Ventricular Drainage (EVD) is a medical intervention for relieving ICP by draining CSF from the brain ventricles [5].

Anaesthetic Aspects of the Sitting Position

Considering anaesthesia, the sitting position presents quite a challenging consideration. Venous Air Embolism (VAE) is a risk due to the high surgical field [6]. To prevent VAE, the use of a central venous catheter for air aspiration, precordial Doppler monitoring, and maintaining adequate venous pressure are recommended [6,7]. Other risks include hypotension and decreased cerebral perfusion, which necessitate haemodynamic monitoring and fluid management for patient safety during surgery. The sitting position requires patient evaluation, availability of monitoring and support facilities, and the surgeon's experience [6]. Despite these precautions, the sitting position is a safe option for complex neurosurgery [6].

Anaesthetic Management in Perimesencephalic Epidermoid with Hydrocephalus

Anaesthetic care includes ensuring stable haemodynamics, maintaining ICP, proper brain perfusion through careful monitoring, and avoidance of maneuvers that increase ICP [8]. Preoperative imaging is conducted to assess ventricular dilation and brainstem compression [9]. Intraoperative anaesthetic agents like propofol and remifentanil are used to decrease the cerebral metabolic rate while maintaining autoregulation [10]. Normocapnia and cerebral perfusion pressure are upheld through end-tidal CO_2 and arterial blood pressure monitoring [10]. In surgeries of the posterior fossa, lateral or park bench positioning requires proper haemodynamic stability and airway management [11]. Motor-evoked potentials and

brainstem auditory-evoked potentials allow for early recognition of neural compromise [11]. Osmotherapy with mannitol or hypertonic saline is beneficial for brain relaxation, but it carries the risk of ICP surges [12]. The postoperative period involves neuromonitoring, ICU observation, and monitoring the status of fluid, CSF leakage, and infections [12].

A 53-year-old male presented with altered sensorium, vomiting, tinnitus, and cranial nerve VIII–X involvement. His brain MRI revealed a perimesencephalic epidermoid cyst with obstructive hydrocephalus. Anaesthetic management included External Ventricular Drain (EVD) placement, ICP-lowering agents, lateral positioning, scalp block, invasive monitoring, and avoidance of nitrous oxide. Despite stable intraoperative events, post-extubation laryngospasm occurred, necessitating reintubation. Similar neuro-anaesthetic approaches were reported by Rodrigues D et al., in a 52-year-old female in a sitting position with a foramen magnum meningioma [13]. In this case, a total intravenous anaesthesia approach with remifentanil, flexible endoscopic intubation, ICP control using mannitol and steroids, and VAE precautions ensured haemodynamic stability throughout a 9-hour surgery [13]. Nikolic M et al., also reported a vestibular schwannoma excision in a semi-sitting position in a 34-year-old male, with intraoperative transesophageal echocardiography and ultrasound-guided central access [14]. Although this case was complicated by arterial catheter placement due to a rare vascular anomaly, it was successfully managed with vigilant monitoring [14]. These cases highlight the importance of individualised airway management, patient positioning, ICP control, and guidance through real-time imaging, which reinforced a successful perioperative approach in the present patient [13,14].

CONCLUSION(S)

This case shows importance of peri-operative anaesthetic management in patients with perimesencephalic epidermoid tumour with obstructive hydrocephalus. Preoperative evaluation, intraoperative monitoring and effective postoperative care result in positive outcomes. Early surgical intervention for neurological recovery is done with coordinated multidisciplinary approach. This case depicts further need of research in anaesthetic management, monitoring practices, and neurosurgical practices to prevent complications by promoting recovery.

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