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Perioperative Management of Patients with Extra Axial Tumors in the Region Suprasella et causa Suspected Pituitary Macroadenoma Undergoing Tumor Resection Craniotomy Procedures Endonasal Transphenoid with Postoperative Diabetes Insipidus Complications

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A B S T R A C T

Introduction: Perioperative management of a patient with a pituitary macroadenoma involves a complex set of procedures, including careful clinical evaluation, decision making regarding the surgical strategy, preparation of the patient before surgery, execution of the operation with the correct technique, and care.post operation effective. **Case presentation:** A 52-year-old female patient with the diagnosis of extra axial tumor R. Suprasella ec susp pituitary macroadenoma, the plan is to perform craniotomy for transphenoid endonasal tumor resection. Induction with TCI propofol and preoxygenation. For analgesia can be given fentanyl 2-5 g/kg during induction, but before intubation. Ensure adequate neuromuscular blockade prior to intubation to avoid coughing/straining. Intubation with a videolaryngoscope is the technique we use to secure the airway. The position of the patient will depend on the location of the tumor. Maintain anesthesia with TCI propofol target effect 2-3 µg/kg/min, dexmedetomidine 0.2-0.7 mcg/kg/hour, and intermittent fentanyl 0.5-1 mg/kg/hour. Use light hyperventilation ($PaCO_2$ 30-35 mm Hg). Maintain euvolemia (Ringer Fundin/iso osmolar fluid) and neuromuscular relaxation. **Conclusion:** In these cases the anesthetic technique must be targeted towards hemodynamic stability, maintenance of adequate cerebral oxygenation and normal intracranial pressure. Postoperative care must also be considered considering the bleeding complications due to large blood vessel trauma and diabetes insipidus which often occurs post operation.

1. Introduction

Pituitary macroadenoma is the most common suprasellar mass in adults. It is defined as a pituitary adenoma that is larger than 10 mm in size and is approximately twice as common as a pituitary microadenoma. The appearance is often due to increased or decreased hormone secretion and the most common operation is transsphenoidal transnasal pituitary surgery. Postoperative care must also be considered considering the complications of diabetes insipidus that often occur post operation. Perioperative management of patients with pituitary macroadenoma is a critical aspect of medical practice involving the diagnosis, treatment, and recovery of patients with benign pituitary tumors. Pituitary macroadenoma is a benign tumor that grows in the pituitary gland with a size of more than 1 cm. These tumors can interfere with the normal hormonal

function of the pituitary gland and put pressure on surrounding structures, such as the optic nerve and pituitary tissue.[1-5]

Perioperative management of a patient with a pituitary macroadenoma involves a complex array of procedures, including careful clinical evaluation, decision-making regarding the surgical strategy, preparation of the patient before surgery, execution of surgery using the correct technique, and effective postoperative care. The main goals of this management are to reduce complications, minimize damage to normal tissues, and maximize clinical outcome and patient quality of life.[6-9] This study aimed to present a case of pituitary macroadenoma plan carried out transsphenoidal transnasal tumor excision.

2. Case Presentation

A 52-year-old female patient with diagnosis tumor extra axial R. Suprasella ec susp pituitary macroadenoma, plan to perform craniotomy transphenoid endonasal tumor resection. Patients with complaints of headaches since 8 months ago, headaches are said to come and go when taking anti-pain drugs. The pain has been getting worse since January 2023 with increasingly frequent relapses. In December the patient did a CT scan of the head and it was said that there was a tumor in the patient's brain. But at that time the patient did not dare to operate. Until February 2023 the patient experienced seizures and vomiting. The patient was then treated at Prof. Dr. I.G.N.G Ngoerah General Hospital and a VP shunt was installed in February 2023. After the VP shunt was installed, the headaches were not as severe as before. The patient has gained about 20 kg in body weight in the last 8 months. The patient had no complaints of waking up at night due to shortness of breath, tired when she woke up, palpitations or cold sweat. The patient has not menstruated for 2 years final. Denied complaints of fever, cough, runny nose, shortness of breath since the last 2 weeks.

When evaluating pre surgery in the ward, a patient with a weight of 73 kg and a height of 165 cm. The patient was found conscious compos mentis with GCS E4V5M6 level of consciousness with isochoric round pupils and pupillary reflexes in both eyes, respiration rate 16 times per minute, vesicular in both lungs, rhonchi and no wheezing, SpO_2 99% room air. Blood pressure was 100/80 mmHg, pulse 87 beats per minute regularly. Single 1st and 2nd heart sound. Abdominal examination did not reveal distention and bowel sounds were within normal limits. Spontaneous urination. Flexion and deflection of good neck, Mallampati III, intact teeth, warm acral, CRT <2 seconds, no edema in upper or lower limbs.

Table 1. Preoperative supporting examination.

Hemoglobin	14.2 g/dL
Hematocrit	43.8 %
Leukocytes	9.38/mm^3
Platelets	339 x $10^3/\mu L$
PPT	9.4’
aPTT	21.5’
INR	0.82
Sodium	137 mmol/L
Potassium	3.60 mmol/L
Chloride	104,4 mmol/L
BUN	10.7 mg/dL
Creatinine serum	0.71 mg/dL
SGOT	34.9 U/L
SGPT	80 U/L
GDS	113
Blood gas analysis	Room air, RR 16 times/minute
pH	7.38
pCO_2	35 mmHg
pO_2	193 mmHg
HCO_3-	20,7 mmol/dL
BE	-4.4 mmol/L
SaO_2	100 %

From the examination of chest X-ray obtained the heart and lungs show no abnormalities, the right diaphragm is high. From the patient's ECG showed a normal sinus appearance rhythm with HR 82 x/min, ST-T changes are absent. From inspection Head MRI obtained Intrasella supratentorial extraaxial mass, partially demarcated, lobulated margins, with a snowman appearance, with an internal bleeding component (measured +/-3.0 x 3.2 x 4.4 cm) that extends to the suprasellar cystern, right and left sphenoid sinuses, adheres to the cavernous sinus and n.opticus pars intracranial right and left, urging the optic chiasma to superior, midbrain and pons right and left posteriorly, encase a. left and right internal carotid and causes non-communicating hydrocephalus and transependymal edema surrounding, suggesting apoplexy macroadenoma; Bilateral ethmoid sinusitis; Minimal deviation of the nasal septum to the right; Bilateral inferior turbinate hypertrophy.

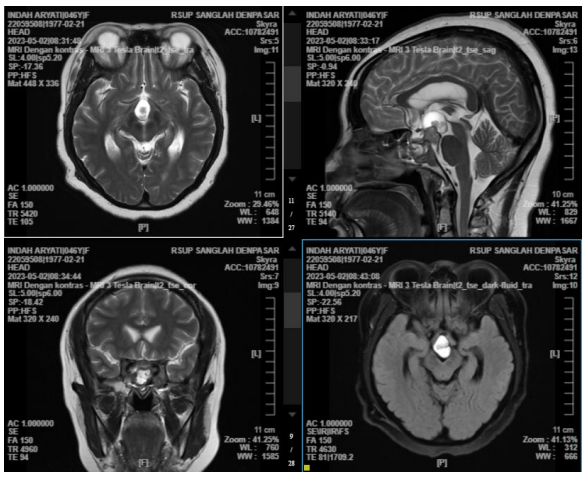

Figure 1. CT scan of the head with contrast.

The patient was concluded as ASA III physical status with problems CNS (central nervous system): Extra axial tumor R. Suprasella ec susp pituitary macroadenoma with clinical E4V5M6 with a history of signs of increased ICP/Intra-Cranial Pressure (headaches) with MRI images Extraaxial supratentorial mass in the intrasella, partially indistinct boundaries, lobulated edges, with a snowman appearance, with a bleeding component inside (measured +/-3.0 x 3.2 x 4.4 cm) which extends to the suprasellar cystern, sinus sphenoidalis right and left, attached to the cavernous sinus and n.opticus pars intracranial right and left, pushing the chiasma opticum to the superior, midbrain and right left pons posteriorly, mencase a. left and right internal carotid and causes non-communicating hydrocephalus and transependymal edema around it, suggesting apoplexy macroadenoma post VP Shunt installation February 2023.

Preparation before surgery Informed consent, 8 hours preoperative fasting, STATICS, anesthesia and emergency drugs, infusion warmer, PRC blood components 4 cups ready 2 cups before incision, 5 bags FFP, 5 bags TC, 2 IV large bore line, arterial line, etCO_2, vasopressor and inotropic drugs, TCI, syringe pump and intensive care unit. While the patient is on the operating table, done artery line insertion with local anesthetic infiltration of 2% lidocaine. Then the patient is sedated with TCI propofol schneider mode target effect of 1-2 mcg/ml and fentanyl 0.5 mcg/kgBB. After the artery line is installed and has appeared on the monitor, proceed with induction. Analgesic given fentanyl 175 mcg IV. Propofol TCI 3-4 mcg/ml. Induction facility in the form of rocuronium 40 mg IV. Then given 2% lidocaine at a dose of 1-1.5 mg/kgbb (50-75 mg) IV before laryngoscopy is done slowly, and insert ETT number 7.5 cuffed After ascertaining the location of the ETT, it is fixed. Maintenance using O_2; compressed air; Propofol TCI

schnider mode with a target effect of 2-3 µg/kgbb/minute; Dexmedetomidine titration 0.2-0.7 mcg/kg/hour, Fentanyl intermittent 0.25 µg/kgbb IV every 45-60 minutes; Roccuronium intermittent 0.15 mg/kg IV every 30-45 minutes. Other medication with Tranexamic Acid 1000 mg IV, Paracetamol 1000 mg IV. The position of the patient during surgery is supine. Hemodynamic fluctuations: Blood pressure: 95 - 133 / 52-86 mmHg, heart rate: 65 - 88 x/minute, respiratory rate: 14-16/minute, SpO_2 99-100%. Incoming fluid is 2500mL crystalloid. The exit fluid is 700 mL of bleeding and 2500 mL of urine.

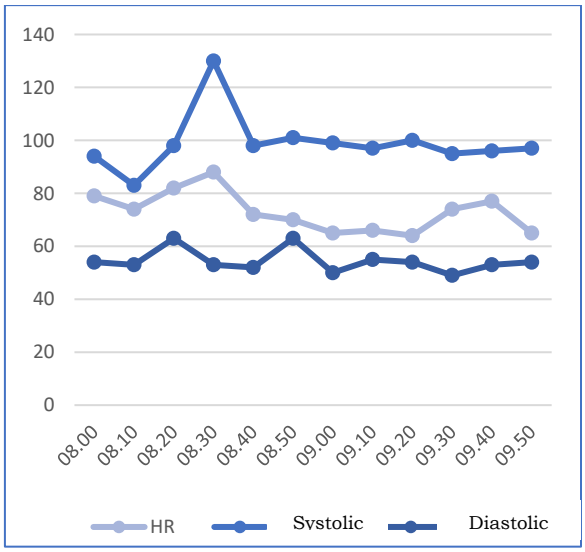

Figure 2. Hemodynamic conditions 2 hours after induction.

At the end of the reversal operation, the packing was removed and conscious extubation was performed, after ensuring adequate breathing. Operation duration 310 minutes. Postoperatively, the patient was treated in the ICU. The patient was given analgesics in the form of Fentanyl 400 mcg drip/24 hours via a syringe pump and Paracetamol 1000 mg IV every 8 hours.

Table 2. Postoperative investigations.

Hemoglobin	12.3 g/dL
Hematocrit	38,9 %
Leukocytes	17.89 x 10^3/µL
Platelets	308 x 10^3/µL
Blood gas analysis	On FM 6 lpm
pH	7.37
pCO_2	45 mmHg
pO_2	112 mmHg
HCO3-	21.6 mmol/dL
BE	-5.3 mmol/L
SaO_2	98 %
Sodium	151 mmol/L
Potassium	4.17 mmol/L

On admission to the ICU, the patient had vital signs, HR 68 x/minute, blood pressure 127/80 mmHg, SpO_2 99% via FM 6 lpm. Management in ICU given analgesics with Fentanyl 300 mg in 24 hours; Paracetamol 1000 mg every 8 hours IV; Phenytoin 100 mg every 8 hours IV and Tranexamic acid 1000 mg every 8 hours IV. At 16.00 an electrolyte examination was carried out. Electrolyte examination results

obtained Sodium 151 mmol/L. At that time, the patient's urine output was 4.3 ml/kg/hour. Our patient asses with hypervolaemia hypernatremia, diabetes insipidus. Farpressin 10 IU given every 12 hours subcutaneously. Correct hypernatremia with KaEn 3B liquid 275 ml/hour. Close monitoring of bleeding, periodic electrolyte checks and urine output. Patient's second day compos mentis, complained of minimal pain in the surgical wound with blood pressure 121/74 mmHg, HR 62 X/minute, SpO_2 99% with Spontaneous FM 6 lpm. At that time, the patient's urine output was still quite a lot with 4.8 ml/kgBB/hour. Farpressin 10 IU was continued. From the results of electrolyte examination, it was found that sodium was 152 mmol/L with correction for hypernatremia. Analgesics and other treatments were continued and closely monitored for bleeding and urine output.

Table 3. Monitoring urine output and plasma sodium.

	Day 1	**Day 2**	**Day 3**	**Day 4**
Plasma osmolality	309 mOs/L	-	-	-
Urine osmolality	-	116 Osm/KgH_2O	-	183 Osm/KgH_2O
Urine output	9200 mL	8900 mL	4200 mL	1900 mL
Sodium plasma	151 mmol/L	152 mmol/L	148 mmol/L	145 mmol/L

Patient's third day with blood pressure 123/75 mmHg, HR 71 X/minute, SpO_2 98% with O_2 nasal cannula 3 lpm. Urine production 2.21 ml/kgBB/hour with a sodium examination result of 148 mmol/l. Management in ICU Farpressin 10 IU was replaced with desmopressin 0.1 mg PO every 12 hours. KaEn 3B liquid is continued with a maintenance dose of 1000 ml/24 hours. The patient is planned to be moved to the intermediate room to continue monitoring urine output and corrected hypernatremia. Fourth day in the intermediate room, patient with blood pressure 112/65 mmHg, HR 64 X/minute, SpO_2 98% with O_2 nasal cannula 3 lpm. Urine production 1.1 ml/kgBB/hour with a sodium examination result of 145 mmol/l. The patient has been given desmopressin 0.1 mg PO every 12 hours. The patient is planned to be transferred to a regular room.Urine output still monitored.

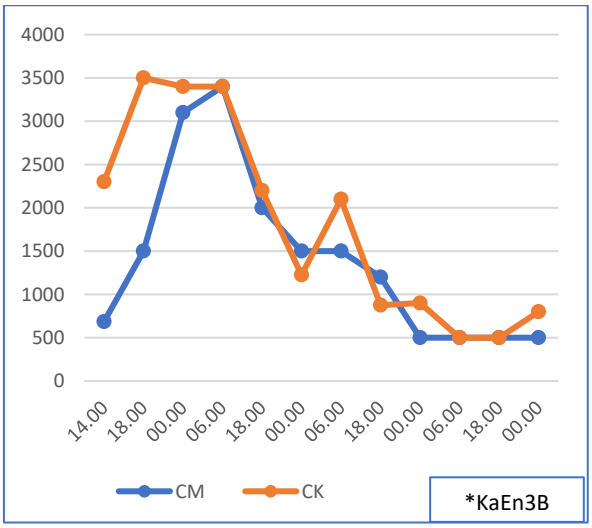

Figure 3. Monitoring and fluid balance during administration of vasopressin (CM = Fluid in, CK = Fluid out).

3. Discussion

Pituitary tumors constitute 10% of intracranial tumors. The pituitary gland weighs 0.5 to 0.9 grams measuring 15 x 10 mm. This gland is located in the sella turcica at the base of the skull. A pituitary macroadenoma is defined as a pituitary adenoma that is larger than 10 mm in size. The clinical presentation of a pituitary tumor can be due to changes in hormone secretion or due to mass effect. Anesthetic management requires knowledge of the neurosurgical aspects of anesthesia in general and pituitary disease in particular. Pathophysiology involving hormonal changes resulting from pituitary disease may have a significant influence on the outcome of surgery. Peripheral venous access and invasive monitoring are major challenges for the anesthesiologist. The goals of anesthetic technique should be targeted towards hemodynamic stability, maintenance of adequate cerebral oxygenation and normal intracranial pressure. Anesthesiologists face difficulties in mask ventilation, laryngoscopy and intubation because of the large tongue and drooping chin. A thorough assessment of the airway is mandatory in the acromegaly patient. Facial features with overgrowth of adipose tissue may complicate ventilation. Induction with TCI propofol and preoxygenation. For analgesia can be given Fentanyl 2-5 g / kg during induction, but before intubation. Ensure adequate neuromuscular blockade prior to intubation to avoid coughing/straining. Intubation with a videolaryngoscope is the technique we use to secure the airway. The position of the patient will depend on the location of the tumor. Maintain anesthesia with TCI propofol target effect 2-3 µg/kg/min, dexmedetomidine 0.2-0.7 mcg/kg/hour, and intermittent Fentanyl 0.5-1 mg/kg/hour. Use light hyperventilation ($PaCO_2$ 30-35 mm Hg). Maintain euvolemia (Ringer Fundin/iso osmolar fluid) and neuromuscular relaxation. Nasal obstruction due to nasal packing after the procedure should be explained to the patient. The risks in the trans sphenoidal approach include persistent CSF rhinorrhea and the associated risks of postoperative meningitis, panhypopituitarism, transient diabetes insipidus, vascular damage, cranial nerve injury, cerebral ischemia, and stroke due to vasospasm or thromboembolism. Prophylactic anticonvulsants should be given. Position during surgery is a major concern and is increasing risk air embolism in the sitting position. Intra-arterial blood pressure measurement is mandatory. Permissive hypercapnia with a $PaCO_2$ of 60 mm Hg is useful for increasing ICP, favoring shift of the suprasellar portion of the tumor to the sella for easy surgical excision. Monitoring of intraoperative glycemic status is also significant. There is negligible blood loss during trans sphenoidal surgery unless there is injury to a large vessel such as the carotid artery. The intraoperative structures likely to be damaged are cranial nerves II to VI, the optic nerve or chiasm and the venous sinuses. Damage to the olfactory nerve causes anosmia. The Valsalva maneuver is performed to test for CSF (cerebrospinal fluid) leakage after tumor excision and the sella is packed with autologous fat to prevent CSF leakage. Adequate analgesia should be added intraoperatively and postoperatively. Emergence of anesthesia should be as smooth as possible, avoid coughing and bucking. Postoperatively there is an increased risk of airway compromise because of the difficult airway and associated history obstructive sleep apnea. Level of consciousness, eye movements and visual fields should be tested regularly. Neuroendocrine abnormalities are common. If necessary, hormone replacement therapy is given to all patients.[10-14]

One of the most common postoperative complications is diabetes insipidus (DI), characterized by inappropriate dilutional polyuria, often seen after brain trauma, especially with injury to the pituitary. DI is divided into two, namely central DI and nephrogenic DI. Failure of urinary osmolarity to increase more than 30 mosm/L within the first few hours of complete fluid restriction is diagnostic of DI. The fluid loss in DI is almost pure water, so the replacement strategy is aimed at replacing the free water deficit and limiting the rate of sodium correction to ≤ 0.5 mEq/L per hour. response to vasopressin (5 Units intravenous) will differentiate central from nephrogenic DI. In central DI, urine osmolality increases by at least 50% immediately after administration of vasopressin, whereas in nephrogenic

DI, urine osmolality does not change after administration of vasopressin. Other possible causes of polyuria should be ruled out and the diagnosis confirmed by measurement of urine and serum osmolality prior to treatment with fluid restriction and vasopressin.[15-17]

4. Conclusion

Pituitary macroadenoma is the most common suprasellar mass in adults. It is defined as a pituitary adenoma that is larger than 10 mm in size and is approximately twice as common as a pituitary microadenoma. The appearance is often due to increased or decreased hormone secretion and the most common operation is transphenoidal transnasal pituitary surgery. The goals of anesthetic technique should be targeted towards hemodynamic stability, maintenance of adequate cerebral oxygenation and normal intracranial pressure. Postoperative care must also be considered considering the bleeding complications due to large blood vessel trauma and diabetes insipidus which often occur after surgery. Other possible causes of polyuria should be ruled out and the diagnosis confirmed by measurement of urine and serum osmolality prior to treatment with fluid restriction and vasopressin.

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