

Introduction

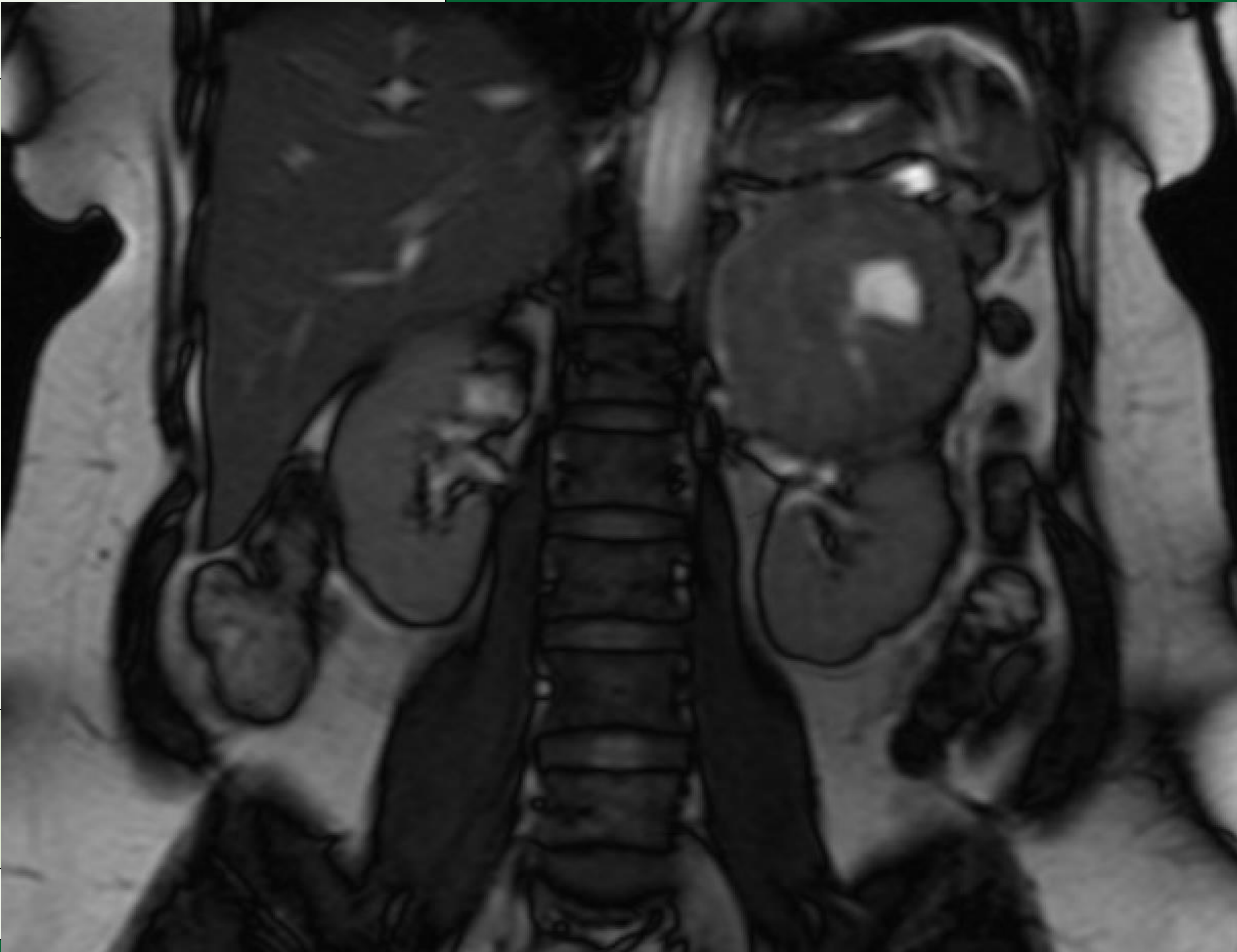
Hypertension in Pregnancy

- Hypertension affects 6-8% of all pregnancies
 - Less than 1% of these cases are related to secondary causes of hypertension
 - Endocrine etiologies include: Pheochromocytoma/Paraganglioma, Cushing Syndrome, Primary Hyperaldosteronism

Pheochromocytomas in Pregnancy

- Pheochromocytomas are rare and affect 0.007% of pregnancies
- Diagnosed with elevated urine and plasma metanephrines and confirmed with MRI localization of an adrenal mass (80% of cases)
- Maternal considerations:
 - Presents with the same symptoms as non pregnant patients
 - Symptoms can worsen throughout pregnancy due to intraabdominal pressure, fetal movements, labour and delivery
 - Severe complications include: catecholamine induced cardiomyopathy, cardiogenic shock, acute coronary syndrome
 - Mortality 40-50% if left untreated, 1-8% if diagnosed and treated antenatally
- Fetal considerations:
 - Limited direct transfer of catecholamines due to presence of catechol O-methyltransferase and monoamine oxidase in the placenta but elevated levels lead to constriction of uterine vasculature and uteroplacental insufficiency
 - Fetal risks include growth restriction, hypoxia and death
 - Historical mortality was 55% but is now 7% with antenatal diagnosis
- Treatments:
 - Alpha blockade
 - Metoprolol
 - Nifedipine
 - Magnesium

Gestation	Events	Treatments
Prenatal	Presented to primary care provider with BP 183/115 and HR 124 Described polyuria and polydipsia, A1c 14.3%	Essential Hypertension: started on amlodipine Type 2 Diabetes: started on metformin and empagliflozin
4-6 Weeks	Positive pregnancy test	Changed to labetalol Weekly appointments for insulin titration
6-12 Weeks	Home blood pressure readings 116-160/78-110 Ongoing poorly controlled glucose levels	Nifedipine and ASA added
20 Weeks	MFM appointment due to diabetes BP at appointment 238/119	Urine metanephrines ordered
22 Weeks	Urine normetanephrine 30x normal	Admitted for initiation of treatment Terazosin started, Metoprolol replaced labetalol
24 Weeks	MRI confirmed 7.9cm mass on the left adrenal	
25 Weeks	Multidisciplinary meeting: obstetrics, OB medicine, endocrinology, MFM, OB anesthesia, NICU, urology, patient and her partner	Decision to proceed with combined caesarean delivery and adrenalectomy near term
31 Weeks	Increased lability in blood pressure	Increased terazosin dosing
33 Weeks	Betamethasone administered due to planned 35 week delivery BP 216/115 following administration	Admitted for hypertensive emergency Terazosin, Metoprolol, Nifedipine Increased
34 Weeks	Readmitted with labile blood pressures up to 230/147 Daily titration of medications required	Terazosin 12mg QID Doxazosin 1 mg Daily Metoprolol 100mg TID Nifedipine 30mg QAM, 60mg QHS Magnesium infusion Salt tabs 2g TID IV Fluids
35 Weeks	Elective OR for caesarean delivery and adrenalectomy Normotensive for preceding 20 hours	See next slide 24 hour ICU admission for vasopressors
POD 7	Discharged home	Doxazosin and Labetalol prescribed



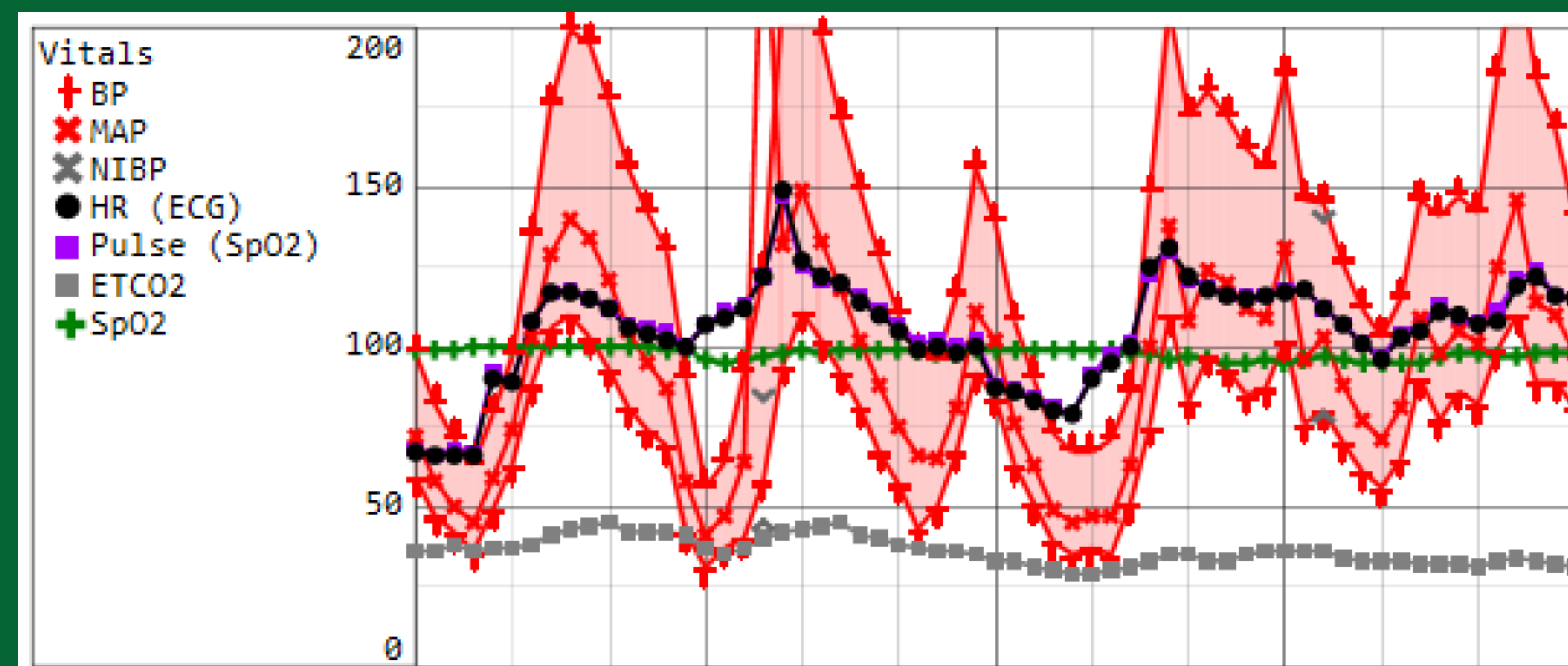
Anesthetic Management

Set Up and Lines

- T6/7 epidural placed awake with midazolam for sedation
- Awake arterial line and large bore IV access
- Asleep central line due to anxiety regarding this procedure

Blood Pressure and Medication Management

- Initial BP 175/100 when brought to the operating room
- Blood pressure remained labile throughout procedure
- Medications used for hypertensive management
 - Remifentanyl infusion and boluses
 - Esmolol infusion
 - Sodium nitroprusside infusion and boluses
 - Nitroglycerin boluses
 - Phentolamine infusion and boluses
 - Magnesium infusion
- Medication used for hypotension
 - Vasopressin infusion
 - Norepinephrine infusion and boluses



Discussion

Lessons Learned

- Caution required with betamethasone in pheochromocytoma parturients
- Multidisciplinary management is vital as pregnancy progresses, potentially increased lability of hemodynamics
- Timing of delivery can be challenging when attempts to optimize blood pressure are complicated by the enlarging uterus and fetal movements
- Consider including pharmacy when planning for operative management as we were unaware that nicardipine is not stocked at our obstetrical centre until the day of the OR

Things to Consider- Medications to Avoid

- Oral:
 - Labetalol- avoid due to fixed alpha/beta ratio
 - Methyldopa- avoid due to risk of worsening hypertension
- Parenteral
 - Esmolol- caution in pregnancy due to inadequate data
 - Phentolamine- emergency use only due to risk of hypotension and death (limited data)
 - Sodium nitroprusside- avoid due to risk of fetal death and cyanide toxicity (limited data)

Things to Consider- Timing of Adrenalectomy

- Traditionally adrenalectomy is performed 10-14 days after initiation of alpha blockade during the second trimester (before 24 weeks) or delayed to the weeks following delivery
- Some reports of concurrent adrenalectomy and caesarean section as with our patient
- Increasing case reports of successful vaginal deliveries with delayed adrenalectomy despite previous reports of increased risk with this mode of delivery
 - Consider early epidural placement
 - Patients selected for vaginal deliveries tend to have less symptoms and lower urine catecholamines

References

- 1) Corsello S, Paragliola R. Evaluation and management of endocrine hypertension during pregnancy. Endocrinol Metab Clin N Am 2019; 48: 829-842.
- 2) Bancos I, Atkinson E, Eng C, et al. Maternal and fetal outcomes in pheochromocytoma and pregnancy: a multi-center retrospective cohort study and systematic review of literature. Lancet Diabetes Endocrinol 2021; 9(1): 13-21.
- 3) Lijima S. Impact of maternal pheochromocytoma on the fetus and neonate. Gynecological Endocrinology 2019; 35(4): 280-286.
- 4) Gruber L, Young W, Bancos I. Pheochromocytoma and paraganglioma in pregnancy: a new era. Curr Cardiol Rep 2022; 23(6): 60-74.