

# Interesting case

15. 09. 2021

R<sub>2</sub> Soravish Sirilertworakul  
Wanwipha Malaithong, M.D.

“

18 years-old Male

Diagnosis : Rt. Pheochromocytoma

Operation : Rt. Laparoscopic adrenalectomy

”

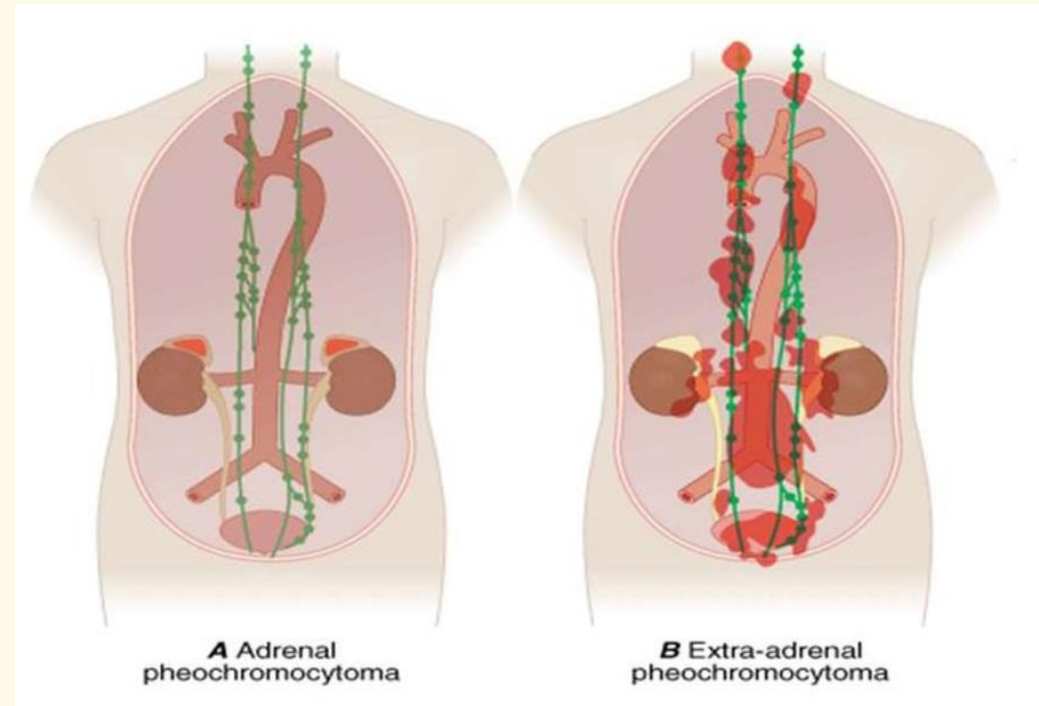
$R_1$  History ?

# History

- Chief complaint : แพทย์นัดผ่าตัด
- Present illness : Admission 11/03/2021, Operation 18/03/2021
  - 1 yrPTA : Known case Adrenal incidentaloma presented with Body assault  
AT ER : V/S 160/90 mmHg, Ultrasound : FAST negative, Isoechoic nodule sized about 27.3 mm at Rt. Suprarenal area  
Admit for observe abdominal sign : ผู้ป่วยมีปัญหาเรื่อง HT (BP 140-160/70-80) มีปวดหัว เหงื่อแตกบ้างบางครั้ง  
Imp : case Adrenal incidentaloma with HT in the young จึงส่งตัวมาตรวจรักษาเพิ่มเติม
  - 6 moPTA : ตรวจรักษาที่รพ.พระมงกุฎ Dx : Rt. Pheochromocytoma แพทย์นัด admit เพื่อเตรียมตัวผ่าตัด
  - 1 dPTA : มา admit เพื่อผ่าตัด ไม่มีอาการปวดหัว ไม่น้ำมืด ไม่เหงื่อแตกใจสั่น ควบคุมความดันได้ดี

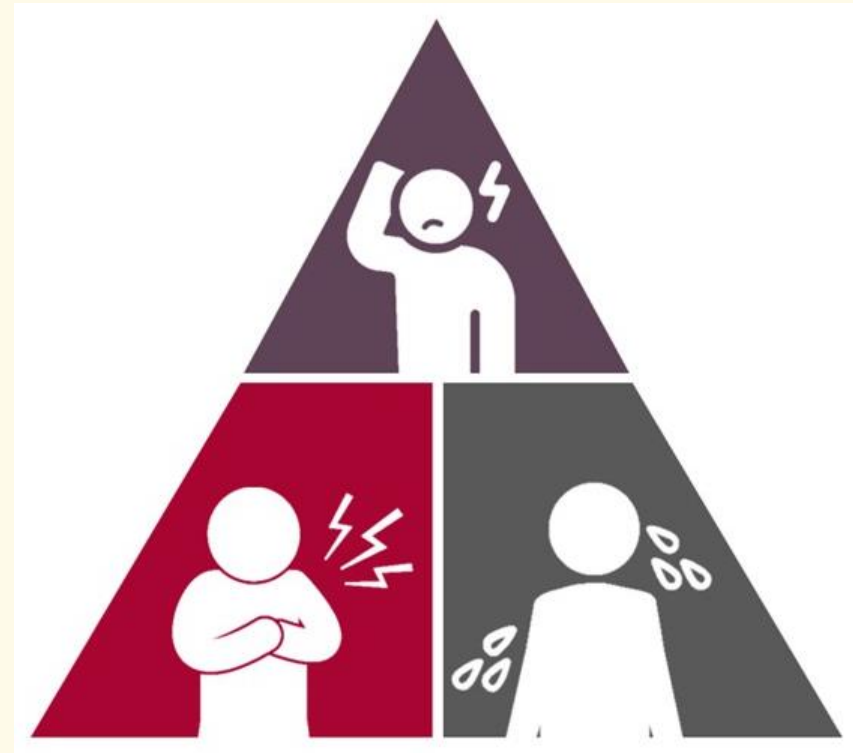
# Pheochromocytoma

- Catecholamine – secreting tumors
  - Pheochromocytoma : Adrenal medulla
  - Paraganglioma : Extra-adrenal paraganglion
- Secrete three catecholamines : Epinephrine, Norepinephrine and dopamine



# Pheochromocytoma

- Classic triads :
  - Headache
  - Diaphoresis
  - Palpitations
- Other symptoms :
  - Paroxysmal hypertension
  - Diabetes-like syndrome
  - Weight loss, Nausea/Vomiting, Anxiety
- Complication : Myocardial infarction, Stroke, Renal failure



# Pheochromocytoma

- Incidence rate : 0.2/100,000
- Peak incidence in 30-50 years old patients
- Associated with other diseases
  - Multiple endocrine neoplasia 2A and 2B
  - Von Hippel-Lindau disease
  - Neurofibromatosis type 1

# Pheochromocytoma

**TABLE 22.1** Syndromes Associated with Pheochromocytoma

MEN type IIa (Sipple syndrome)	Parathyroid adenoma/hyperplasia Medullary carcinoma of thyroid Pheochromocytoma
MEN type IIb	Medullary carcinoma of the thyroid Mucosal adenomas Marfanoid appearance Pheochromocytoma
von Hippel-Landau syndrome	Hemangioblastoma of the retina, cerebellum, or other parts of the CNS, pheochromocytoma
Neurofibromatosis	Neurofibromas, café-au-lait spots, axillary or inguinal freckling, optic nerve glioma, pheochromocytoma

CNS, central nervous system; MEN, multiple endocrine neoplasia.



# Pheochromocytoma

- “Rule of 10s”



## Past History

- Underlying disease :
  - Rt. Pheochromocytoma  
Dx by Plasma/urine for Normetanephrine, Plasma/urine for Metanephrine  
CT chest with abdomen : Rt. Adrenal gland enlargement size 2.5x2.7x2.8 cm,  
no paravertebral mass  
 $I^{131}$  MIBG : Focal uptake at posterior aspect of Rt. Upper abdomen below liver at 24-48 hr  
No associated disease and syndrome
- Current medication : -

# Past History

- No history of drug/food allergy
- No history of alcohol drinking
- No history of smoking
- No previous anesthesia
- Functional class I

R<sub>1</sub> Physical Examination ?

# Physical Examination

- BW 68.6 kg.      Ht 166 cm      BMI 24.9 kg/m<sup>2</sup>
- V/S : BT 36 °C, PR 52/min, RR 16/min BP 115/64 mmHg
- GA : Good conscious, well cooperative
- HEENT : - no pale conjunctivae, anicteric sclerae  
- no sunken eyeballs, no dry lips, no dry tongue

# Physical Examination

- Airway assessment :
  - Full neck flexion and head extension
  - Mallampati grade 1
  - Thyromental distance  $> 6$  cm
  - Mouth opening  $> 3$  cm
  - Normal dental examination

# Physical Examination

- Heart : Normal  $S_1S_2$ , no murmur, PMI 5<sup>th</sup> ICS, no heaving, no thrill pulse full and regular
- Lungs : Clear and equal breath sound BL, no adventitious sound
- Abdomen : Normoactive BS, soft, not tender, no guarding, no rebound
- Ext : No edema, no ecchymosis
- Neuro :  $E_4V_5M_6$ , motor grade V all, Sensory intact

$R_1$  Investigation ?

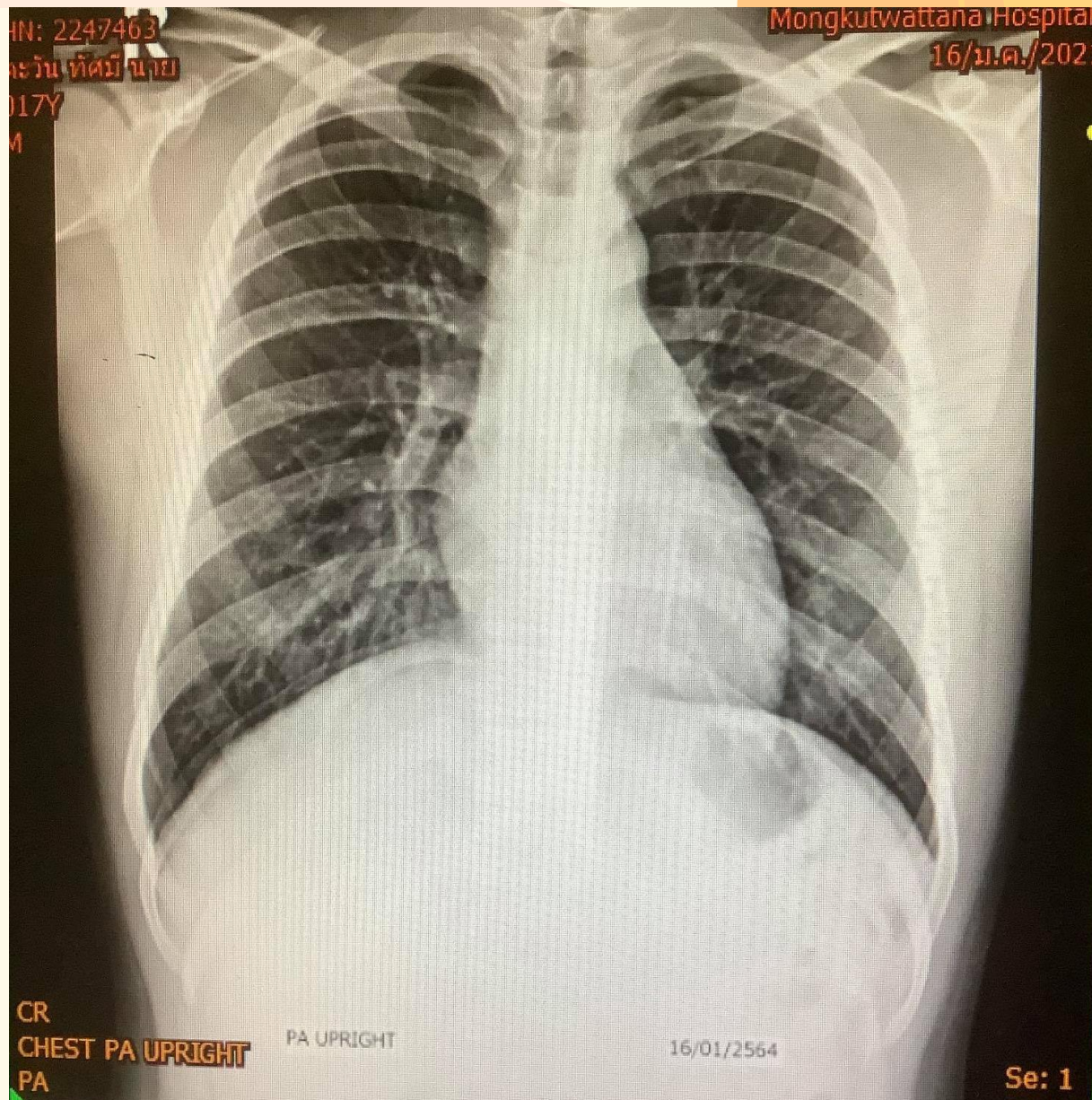


# Laboratory Investigation

- CBC : Hb 13.1 g/dL, Hct 39.8 %, Plt 183,000/ul
- BUN 16.1 mg/dl, Cr 0.87 mg/dL (GFR 116 mL/min/1.73 m<sup>2</sup>)
- Electrolyte : Na 140.8 K 3.55 Cl 105 HCO<sub>3</sub> 21.8 Ca 8.37 Mg 2.12 PO<sub>4</sub> 3.36
- FBS : 92 mg%

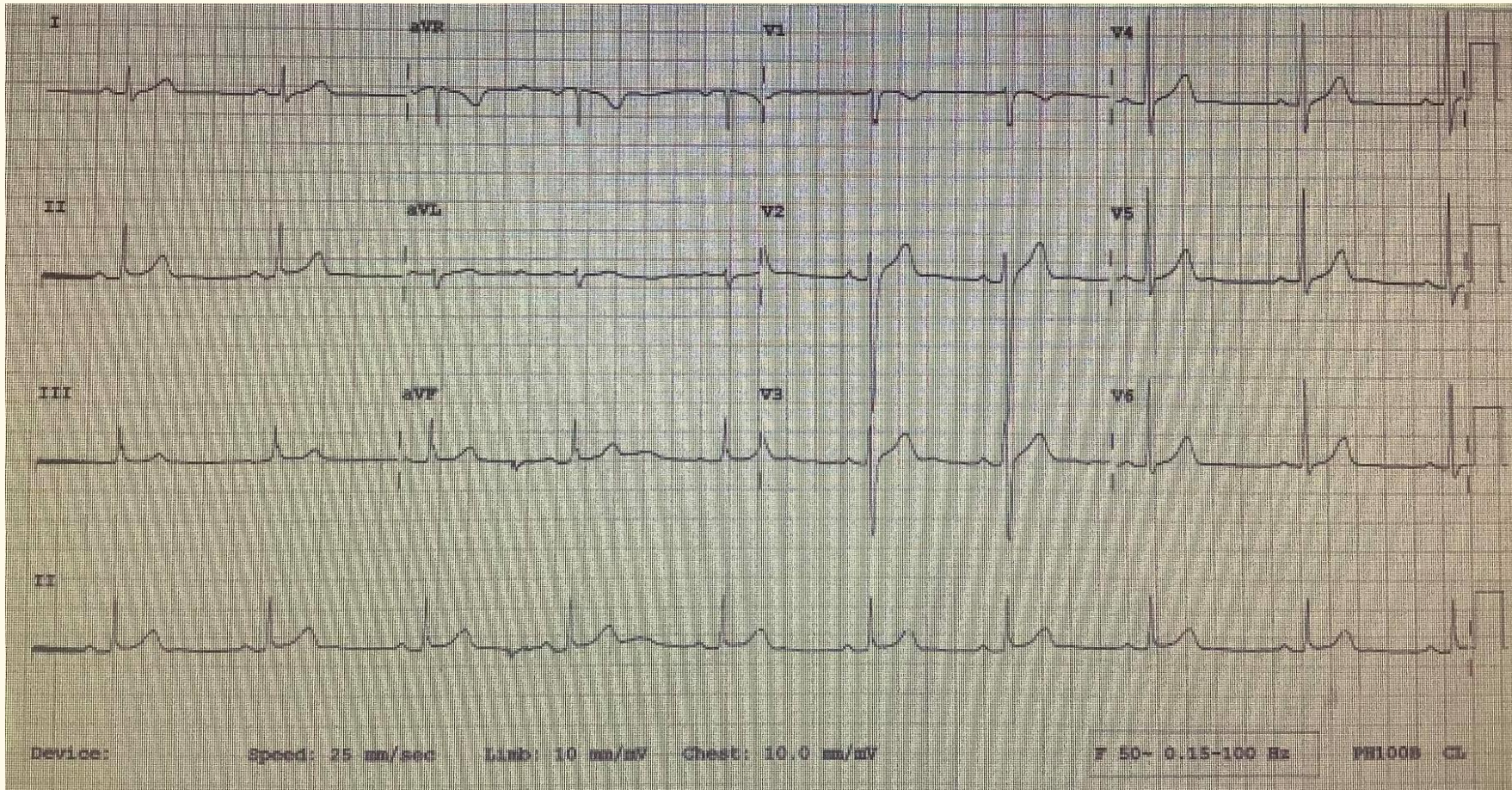
# Chest X-ray

- No Cardiomegaly
- No infiltration



# ECG

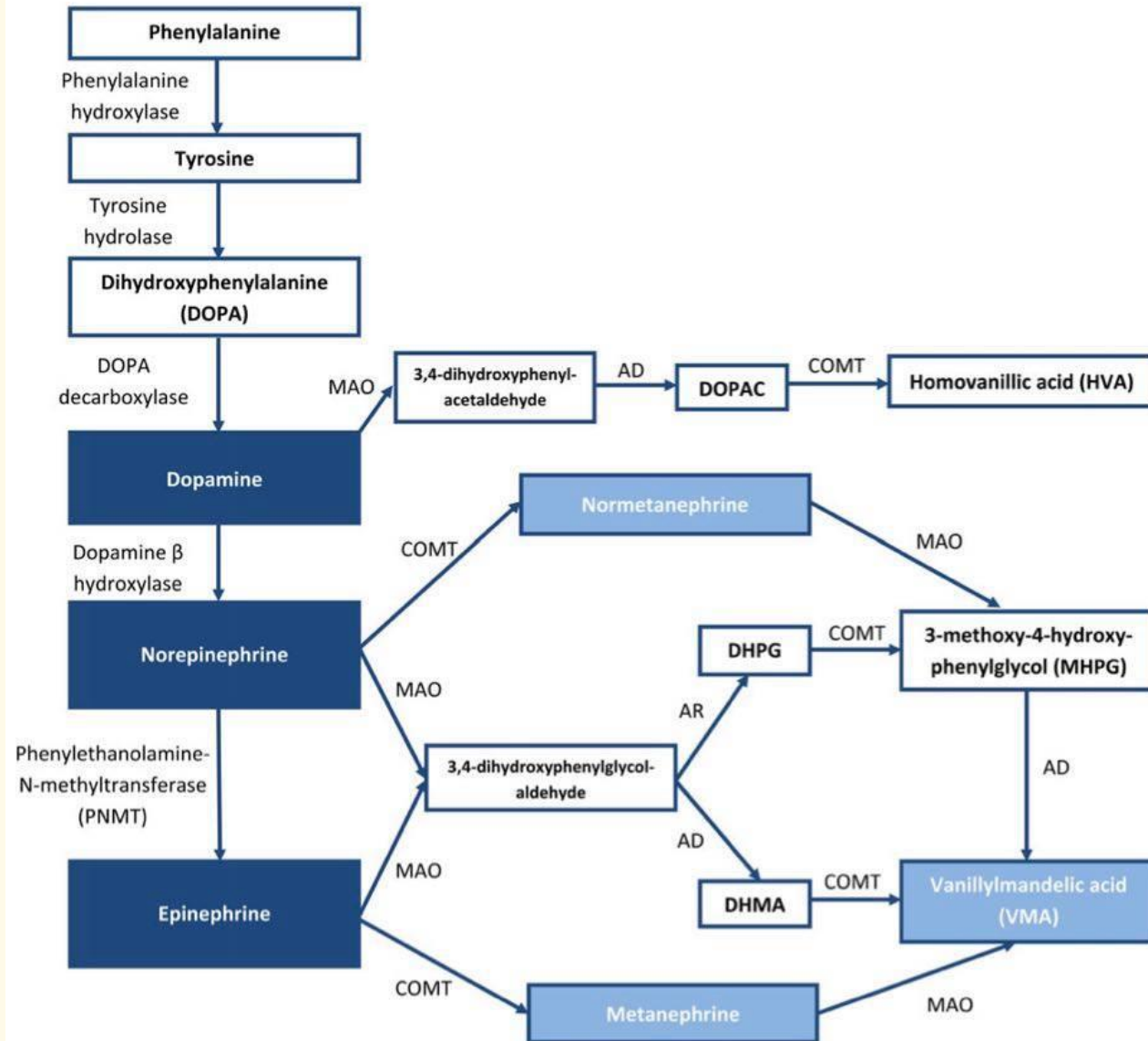
- Normal sinus rhythm 65 bpm, no ST-T change



# Echocardiogram

- Normal cardiac anatomy and physiology
- Mild TR, no MR, trivial PR, no AR
- LVEF 69%, LA/Ao 1.14
- Normal coronary artery origin, no PDA, no PFO, no CoA

# Specific test



## Specific test

**TABLE 32.4** Characteristics of Tests for Pheochromocytoma

Test/Symptoms	Sensitivity (%)	Specificity (%)	LIKELIHOOD RATIO	
			Positive Result*	Negative Result†
Vanillylmandelic acid excretion	81	97	27.0	0.20
Catecholamine excretion	82	95	16.4	0.19
Metanephrine excretion	83	95	16.6	0.18
Abdominal computed tomography	92	80	4.6	0.10
Concurrent paroxysmal hypertension, headache, sweating, and tachycardia‡	90	95	18.0	0.10

\*The ratio representing the likelihood of a positive result is obtained by dividing the sensitivity by 1 and then subtracting the specificity.

†The ratio representing the likelihood of a negative result is obtained by subtracting the sensitivity from 1 and then dividing by the specificity.

‡Data for concurrent paroxysmal symptoms are best estimates from available data.

Modified from Pauker SG, Kopelman RI. Interpreting hoofbeats: can Bayes help clear the haze? *N Engl J Med.* 1992;327:1009–1013.

## Specific test

- Biochemical test

24 hr Urine	Sample	Reference range
Volume	3600	-
Creatinine (mg/dL)	49.68	-
Calculated Urine Creatinine (g/day)	1.789	0.87 – 2.41
Normetanephrine (mcg/day)	2233.1	< 659.5
Metanephrine (mcg/day)	669.6	< 374.7

## Specific test

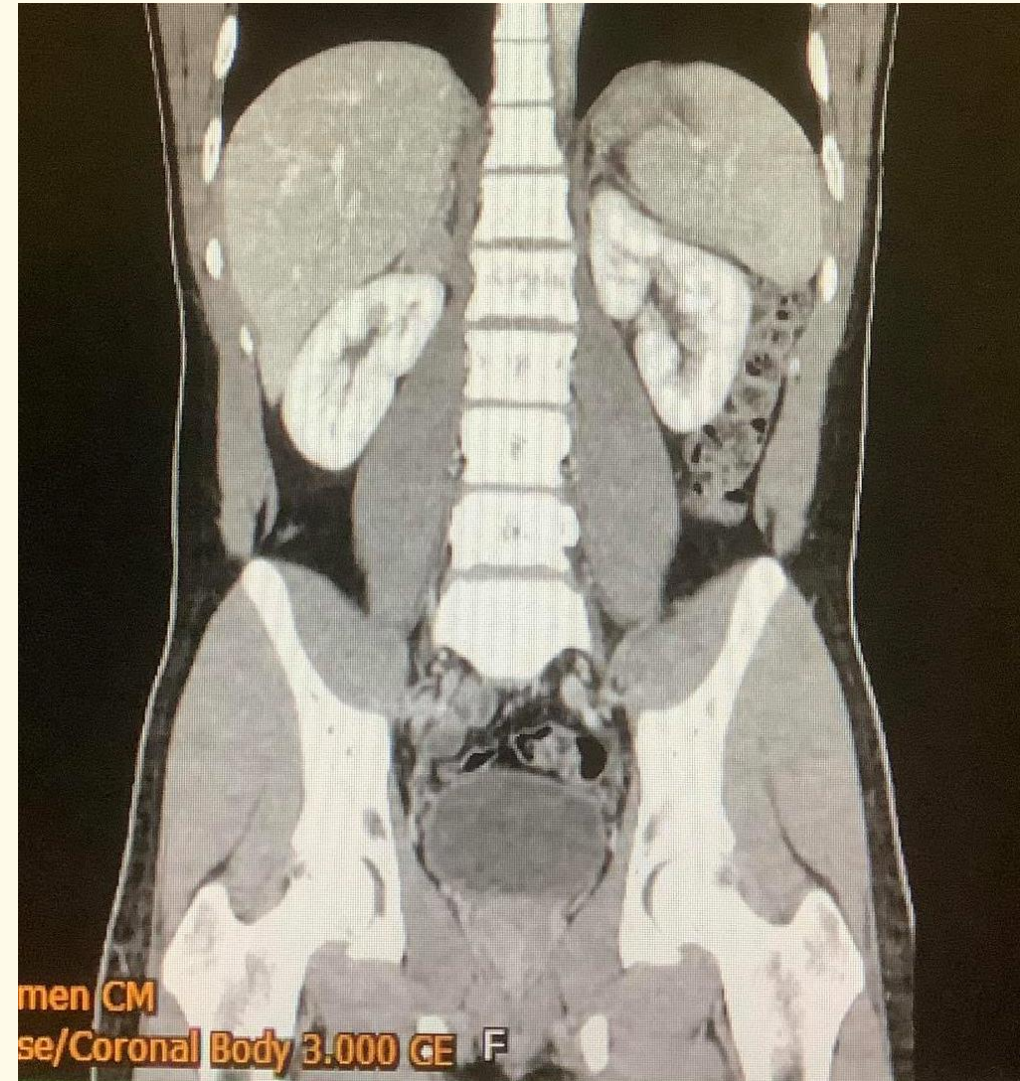
- Biochemical test

Plasma	Sample	Reference range
Normetanephrine (pg/ml)	260.32	0.00-96.64
Metanephrine (pg/ml)	373.11	163.05



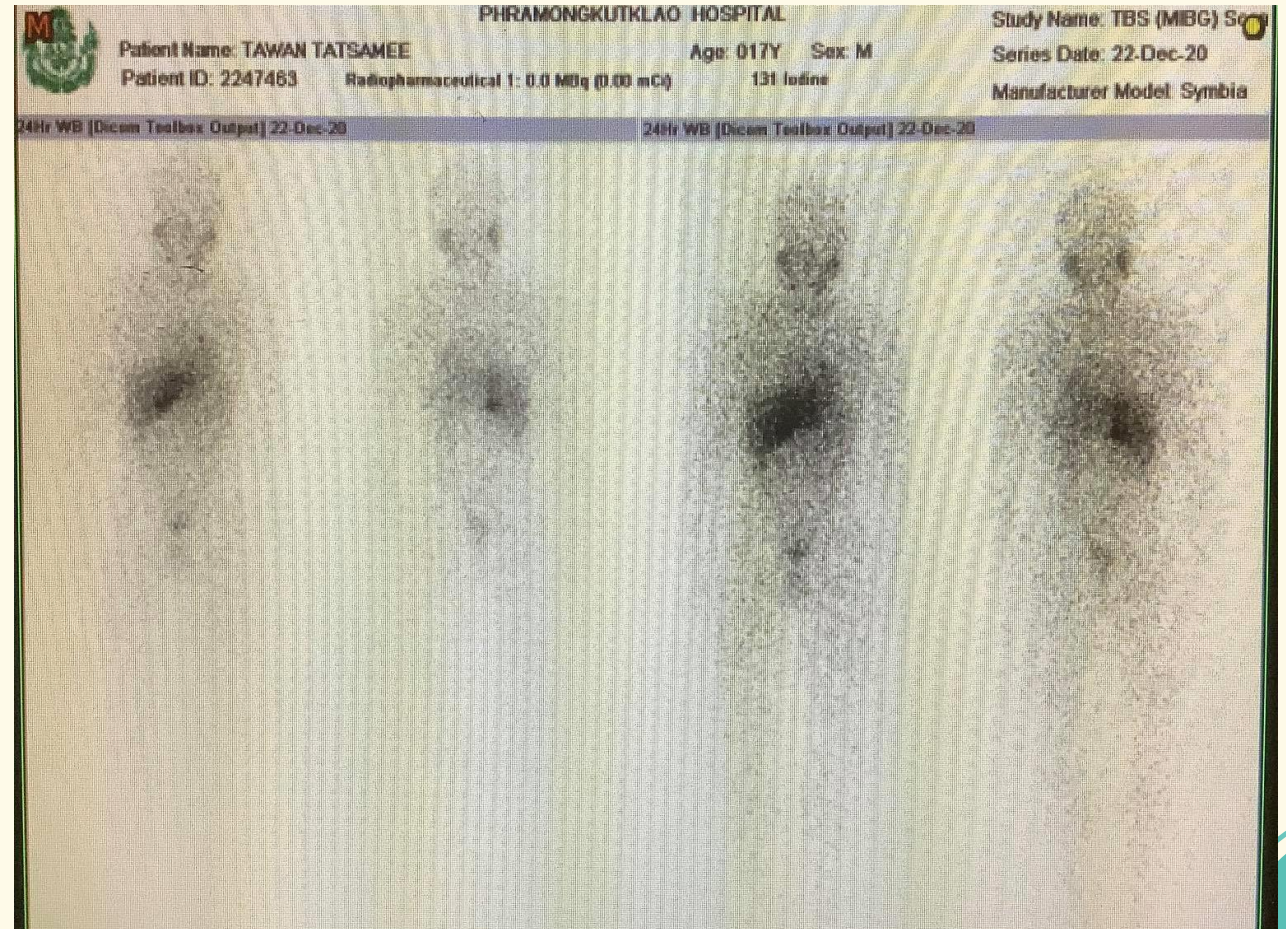
## CT abdomen

- A 2.5 x 2.7 x 2.8 cm enhancing adrenal mass is slightly enlarged at medial limb of right adrenal gland, no paravertebral mass



# $^{131}\text{I}$ MIBG

- Focal uptake at posterior aspect of Rt. Upper abdomen below liver at 24-48 hr



## Work up for associated anomalies

- MEN IIa/IIb :
  - No evidence of parathyroid hyperplasia, Normal PTH and Ca level
  - No medullary thyroid cancer
- Von Hippel-Lindau syndrome (VHL) :
  - No hemangioblastoma at liver and eye
- Neurofibromatosis type 1 :
  - No café-au-lait spot, No mucosal mass, no freckling



# Problem Lists

# Problem lists

- Pheochromocytoma

# ASA Classification

- ASA Classification 2



R<sub>2</sub> Preoperative evaluation  
and preparation

# Patient factors : Pheochromocytoma

- Arterial pressure control
- Reversal of chronic circulating volume depletion
- Heart rate and arrhythmia control
- Assessment and optimization of myocardial function
- Reversal of glucose and electrolyte disturbance



# Arterial pressure control

- $\alpha$  – antagonist
  - Non-selective  $\alpha$  – antagonist
  - Selective  $\alpha$  – antagonist
- Calcium channel antagonist

e.g. Phenoxybenzamine

e.g. Doxazosin, terazosin, prazosin

e.g. Nicardipine

## $\alpha$ – antagonist

- $\alpha$  – antagonist : Beginning  $\alpha$  – antagonist therapy for 10-14 days before surgery to achieve
  - Arterial pressure control
  - Reversal of chronic circulating volume depletion
  - Reduce perioperative mortality rates from 45% > 0-3%

## $\alpha$ – antagonist

- Non-selective  $\alpha$  – antagonist e.g. Phenoxybenzamine
  - Long acting (24-48 hr), Irreversible
  - Side effects : reflex tachycardia, nasal congestion, postural hypotension
  - Risk of post-operative hypotension
- Selective  $\alpha_1$  – antagonist e.g. Doxazosin, terazosin, prazosin
  - Short acting
  - Decrease reflex tachycardia and post-operative hypotension
  - Risk of intraoperative hypertension

# Calcium channel antagonist

- Calcium channel antagonist
  - Inhibit norepinephrine-induced calcium influx and have been utilized for hemodynamic control.
  - Alternative drug for  $\alpha$  – antagonist
  - Better tolerated, cheaper and more accessible

## $\alpha$ – Metyrosine

- $\alpha$  – Metyrosine ( $\alpha$ -Methyl-para-tyrosine) is also an option for preoperative management.
  - Decrease biosynthesis of catecholamines through competitive inhibition of the enzyme tyrosine hydroxylase.
  - Significant depletion of catecholamines stores reduced hemodynamic fluctuation during tumor manipulation
  - Should be administered a minimum of 2 to 3 days before surgery

# Reversal of chronic circulating volume depletion

- Normalization of blood volume minimizes the possibility of protracted hypotension or shock resulting from sudden diffuse vasodilation at the time of tumor removal.
- May be titrated using serial hematocrits.
- A high sodium diet and fluid intake are also recommended to help restore blood volume.

# Heart rate and arrhythmia control

- Tachyarrhythmias may result from epinephrine/dopamine-secreting tumors or secondary to  $\alpha$ -antagonist.
- $\beta_1$  – antagonist e.g. Atenolol, Metoprolol are preferred to manage tachyarrhythmia.
- Must be started after complete  $\alpha$ -blockade to avoid the unopposed  $\alpha$ -mediated vasoconstriction.

# $\beta$ – antagonist

- $\beta$  – antagonist
  - Persistent tachycardia or cardiac arrhythmia caused by  $\alpha$  – antagonist or catecholamine-secreting tumor
    - Non-selective  $\beta$  – antagonist e.g. Propranolol
    - $\beta_1$  – antagonist e.g. Atenolol, Metoprolol
  - $\beta$  – antagonist should never initiated before  $\alpha$  – antagonist (Unopposed  $\alpha$ -adrenergic stimulation)



# Assessment and optimization of myocardial function

- ECG : Ventricular hypertrophy, tachyarrhythmias, or myocardial ischemia.
- Echocardiogram : Diastolic dysfunction, left ventricular systolic dysfunction, hypertrophic cardiomyopathy

# Reversal of glucose and electrolyte disturbance

- Hyperglycemia
  - Increased glycogenolysis ( $\alpha_1$  receptors)
  - Impaired insulin release ( $\alpha_2$  receptors)
  - Lipolysis ( $\beta_1$  receptors)
  - Increased glucagon release coupled with peripheral insulin resistance ( $\beta_2$  receptors)
- Electrolyte disturbance
  - Renal impairment
  - Hypercalcemia

# Assessment for adequate optimization

- No in-hospital arterial blood pressure reading higher than 165/90 mmHg should be evident for 48 hours preoperatively.
- Orthostatic hypotension is acceptable as long as arterial blood pressure when the patient is standing is not less than 80/45 mmHg.
- The ECG should be free of ST-T changes that are not permanent.
- No more than one premature ventricular contraction (PVC) should occur every 5 minutes.

# Assessment for adequate optimization

Reference	Criteria
Endocrine society 2014 <sup>1</sup>	<ul style="list-style-type: none"><li>- BP &lt; 130/80 mmHg while seated and SBP &gt; than 90 mmHg while standing</li><li>- HR of 60-70 bpm seated and 70-80 bpm standing</li></ul>
NEJM Review 2019 <sup>2</sup>	<ul style="list-style-type: none"><li>- BP at low normal</li><li>- HR of 80 bpm</li></ul>
Williams <sup>3</sup>	<ul style="list-style-type: none"><li>- Target BP is low-normal BP for age (e.g. &lt; 120/80 mmHg in the seated position)</li><li>- SBP &gt; 90 mmHg while standing</li></ul>

1. Lenders JW. J Clin endocrinol metab. 2014 Jun;99(6). Doi: 10.1210/jc.2014-1498. PMID: 24893135.

2. Neumann HPH, Young WF Jr, Eng C. Pheochromocytoma and Paraganglioma. N Engl J Med. 2019 Aug 8;381(6):552-565. doi: 10.1056/NEJMra1806651. PMID: 3139501.

3. Young W. Williams Textbook of Endocrinology 14<sup>th</sup> edition, Philadelphia, 2020

# Patient Preparation

- Pheochromocytoma
  - BP baseline : 110-130/60-80 mmHg, no orthostatic hypotension
  - No current medication
  - Normal EKG, CXR, Echocardiogram, Electrolyte
  - Functional class I
  - No history of Ischemic heart disease, heart failure and stroke

# Patient Preparation

- Admit 13/03/64 (1 wk prior surgery) for preoperative preparation :
  - Start medication : Doxazosin (2) 1 tab po OD (Evening)
  - High-salt diet (Sodium 5 g/day)
  - Promote oral fluid
  - Hematocrits : 45% > 39.8%
  - Pre-medication : Lorazepam (0.5) 1 tab po hs

# Surgical factors

- Laparoscopic Rt. adrenalectomy
  - Laparoscopic surgery
  - Lateral position
  - Beware catecholamine release during insufflation of gas



$R_3$  Anesthetic consideration



# Preoperative phase

- Arterial pressure control
- Reversal of chronic circulating volume depletion
- Heart rate and arrhythmia control
- Assessment and optimization of myocardial function
- Reversal of glucose and electrolyte disturbance

# Intraoperative phase

- Consider anxiolytic therapy
- Real-time blood pressure monitoring
- Avoid catecholamine release induced by anesthetic or surgical maneuvers.
- Establish large-bore intravenous access, consider central venous access
- Adequate depth of anesthesia
- Anticipate and treat hyperglycemia and hypoglycemia

# Intraoperative phase

- Avoid drug-induced catecholamine release
  - Histamine release : potent catalyst of catecholamine release
  - Indirect increase of catecholamine level
  - Inhibit catecholamine reuptake

## Intraoperative phase

- Avoid drug-induced catecholamine release

**TABLE 22.3** Suggested Drugs to Avoid in Patients with Pheochromocytoma

Droperidol
Morphine
Atracurium
Pancuronium
Ketamine
Ephedrine
Halothane
Cocaine
Metoclopramide

# Intraoperative phase

- Anticipate and treat hemodynamic fluctuations (Pre/post-mass removal)

<b>Drug</b>	<b>Dose</b>
Nicardipine	Infusion of 5–15 mg/hr. Increase by 2.5 mg/hr every 15 min to effect.
Phentolamine	1-mg IV boluses every 5–10 min. Start infusion 0.1–2 mg/min and titrate to effect.
Nitroglycerin	20–40 $\mu\text{g}$ boluses every 5–10 min to effect. Infusion 5–20 $\mu\text{g}/\text{min}$ initial (maximum dose 400 $\mu\text{g}/\text{min}$ )
Nitroprusside	Infuse initially with 0.5–1.5 $\mu\text{g}/\text{kg}/\text{min}$ to maximum of 8 $\mu\text{g}/\text{kg}/\text{min}$ over 1–3 hr.
Propranolol	1-mg boluses to total 10 mg
Esmolol	Load with 5–10-mg boluses and infuse at 0.25–0.5 $\mu\text{g}/\text{kg}/\text{min}$ .
Labetalol	5–10-mg boluses every 20–30 min to maximum dose 150 mg

R<sub>2-3</sub> Preoperative preparation

# Preoperative preparation

- Informed consent
- NPO AMN
- Invasive monitoring : A-line, C-line
- Large bore IV
- Warm isotonic crystalloid fluid
- G/M : PRC 2 U
- Assess volume status
- Force air warmer
- Post-op ICU
- Anti-HT drugs : Nicardipine, Nitroglycerine, Esmolol
- Vasopressor : Norepinephrine
- Position : Lt. lateral decubitus



# Intraoperative management



# Intraoperative management

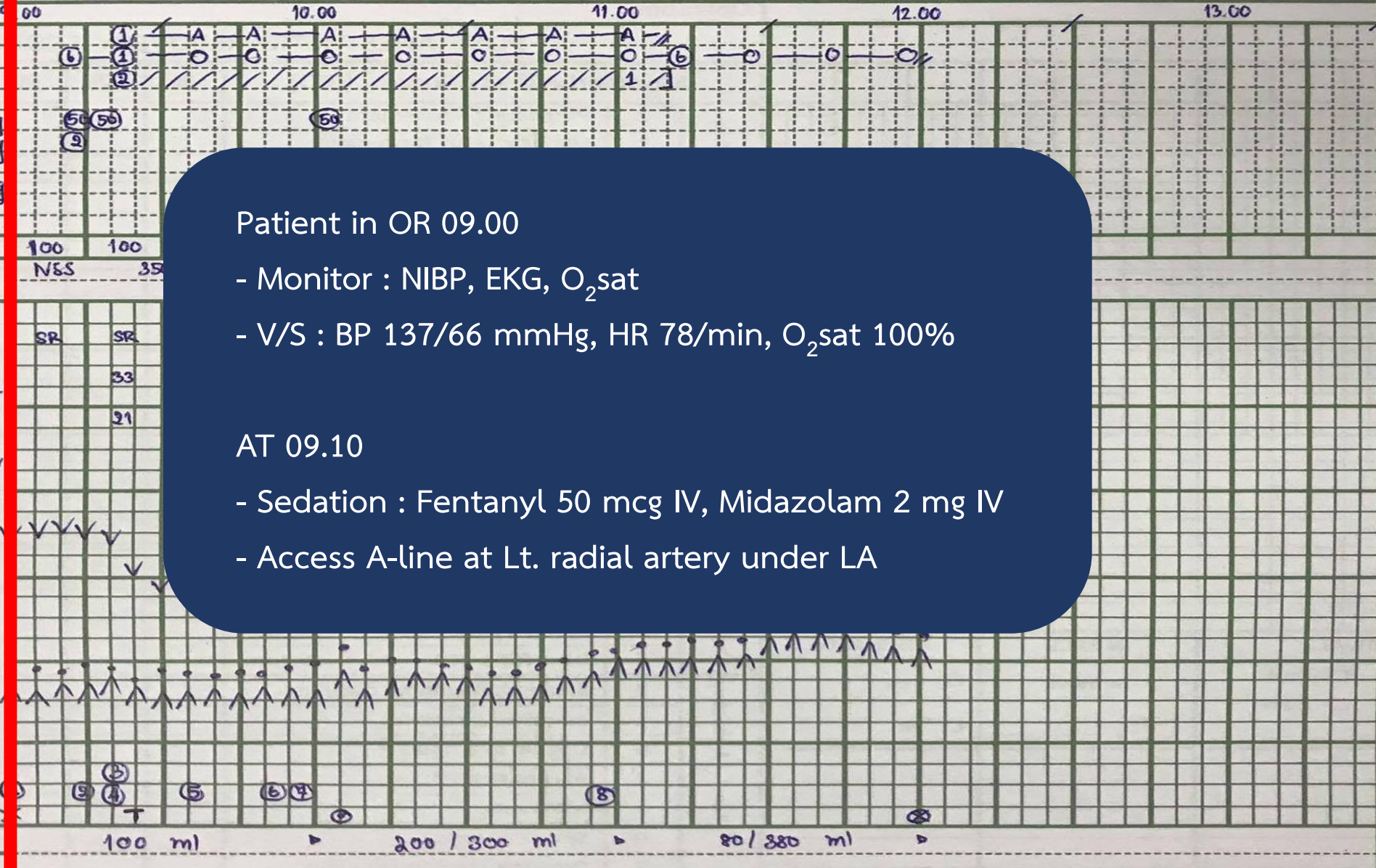
- Choice of anesthesia : GA with ETT with control ventilation
- Monitoring : EKG, NIBP, O<sub>2</sub>sat, ETCO<sub>2</sub>, Temp
- Invasive monitoring : A-line, C-line
- Position : Lt. lateral decubitus

Phranongkutkiao Hospital Anesthetic Record

Date 18 เม.ย. 64 HN. 22474163 AN. 4693/64  
 Name นายอภิรักษ์ น้อยดี Age 18 ปี Sex ชาย  
 Ward ภา. 5 -> PSCU Code. ภา. 5 Op. No. OR 14  
 Anesthetic technique GA + ETT Service. Uro  
 Remark FRS = 35

ASA 1 ② 3 4 5 E WT. 66 kgs HT. 174 cm Hct. 43.2%  
 BI. Group O<sup>+</sup> BI. Request PRC 2 ñ  
 PRE-Medication Ativan (0.5) 1 tab @ hs  
 Monitoring : NIBP, O<sub>2</sub>Sat, EKG, ETCO<sub>2</sub>, A-line, IVP, PAP, TEMP, TO  
 Other Force air warmer ROOM No. 14

AGENTS/TIME	09:00	10:00	11:00	12:00	13:00
Air	100	100			
O <sub>2</sub>	100	100			
Sevoflurane	0	0	0	0	0
Fentanyl	50	50	50		
Midazolam	2				
Nimbex					
O <sub>2</sub> sat	100	100			
IV FLUID INTAKE					
IN					
CR					
BP	137/66				
PULSE	78				
START ANES	X				
START	30				
END ANES	26				
TEMP	36				
URINE FIC	100 ml	200 / 300 ml	80 / 380 ml		
BLOOD					



Patient in OR 09.00

- Monitor : NIBP, EKG, O<sub>2</sub>sat
- V/S : BP 137/66 mmHg, HR 78/min, O<sub>2</sub>sat 100%

AT 09.10

- Sedation : Fentanyl 50 mcg IV, Midazolam 2 mg IV
- Access A-line at Lt. radial artery under LA

<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<b>PRE - OP VISIT</b>	
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<b>POSITION</b>	
<input type="checkbox"/> SUPINE	<input type="checkbox"/> PRONE
<input type="checkbox"/> LITHOTOMY	<input type="checkbox"/> SITTING
<input type="checkbox"/> TRENDEL	<input type="checkbox"/> Rt. LATERAL
<input checked="" type="checkbox"/> Lt. LATERAL	<input type="checkbox"/> JACK-KNIFE
<input type="checkbox"/> OTHER	
<b>LAB</b>	
<input type="checkbox"/> Hct.	<input checked="" type="checkbox"/> Blood Sugar
	at 10.55 = 110 mg/dl
<input type="checkbox"/> Electrolyte	
<input type="checkbox"/> ABG	
<input type="checkbox"/>	
<b>TOTAL URINE</b>	

**Phramongkutklo Hospital Anesthetic Record**

Date 18 มี.ค. 64 HN. 22474163 AN. 4693/64 ASA 1 ② 3 4 5 E WT. 66 kgs HT. 174 cm Hct. 43.2%  
 Name นายอภิรักษ์ น้อยดี Age 18 ปี Sex ชาย BI. Group O<sup>+</sup> BI. Request PRC 2 ñ  
 Ward ภา. 5 → PSCU Code ๒๓๓ Op. No. OR 14 PRE-Medication Ativan (0.5) 1 tab @ hs  
 Anesthetic technique GA @ EBT Service. Uro Monitoring : NIBP, O<sub>2</sub>Sat, EKG, ETCO<sub>2</sub>, A-line, IVP, PAP, TEMP, TO  
 Remark FRS = 35 ๐๙:๐๐

AGENTS/TIME		O <sub>2</sub> SAT		
100% Air	09:00	100	100	100
Sevoflurane	1%			
Fentanyl	mg	50	50	
Midazolam	mg	2		
Nimbex	mg			
IV FLUID INTAKE		N&S		
IN CR	09:00 H.		350	
BP	C	240	SR	SR
137 / 66	mmHg	EKG	SR	SR
PULSE	38	220		
78	bpm	ETCO <sub>2</sub>	33	31
START ANES	34	200		
X	32	AP	21	22
START	30	180		
○	28	CBP		10
END ANES	26	78F		
⊗	24			
TEMP	22			
Δ				
VCV mode				
TV 500 ml				
RR 14/min				
IE 1:2				
PEEP 5cmH <sub>2</sub> O				
URINE FIC		100 ml	200 / 300 ml	80 / 380 ml
BLOOD				

**AT 09.15**

- Preoxygenation 5 min
- Blunt reflex : Lidocaine 100 mg IV
- Induction agent : Propofol 120 mg IV
- Intubation agent : Cisatracurium 8 mg IV

**Intubation at 09.25**

- ETT No. 8, Depth 21 cm, LV grade I by CMAC
- Maintenance : O<sub>2</sub> : Air = 1 : 1 + Sevoflurane up to 2 %

**Ventilator setting**

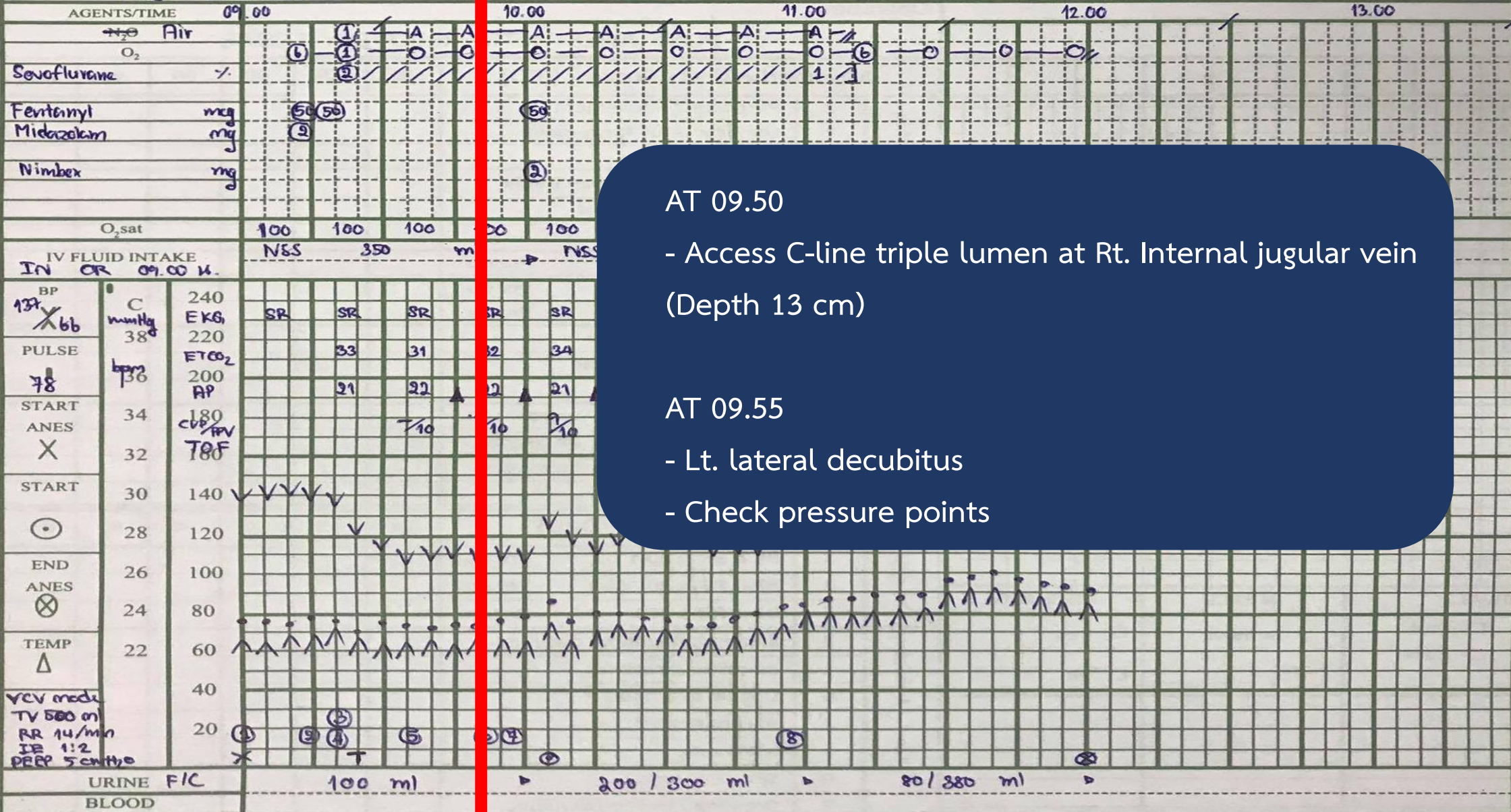
- VCV mode : V<sub>T</sub> 500 ml RR 14/min PEEP 5 cmH<sub>2</sub>O I:E 1:2

CONSENT	
<input checked="" type="checkbox"/>	YES
<input type="checkbox"/>	NO
PRE - OP VISIT	
<input checked="" type="checkbox"/>	YES
<input type="checkbox"/>	NO
POSITION	
<input type="checkbox"/>	SUPINE
<input type="checkbox"/>	PRONE
<input type="checkbox"/>	LITHOTOMY
<input type="checkbox"/>	SITTING
<input type="checkbox"/>	TRENDEL
<input type="checkbox"/>	Rt.LATERAL
<input checked="" type="checkbox"/>	LI.LATERAL
<input type="checkbox"/>	JACK-KNIFE
<input type="checkbox"/>	OTHER
LAB	
<input type="checkbox"/>	Hct.
<input checked="" type="checkbox"/>	Blood Sugar
	at 10.55 = 110 mg/dl
<input type="checkbox"/>	Electrolyte
<input type="checkbox"/>	ABG
<input type="checkbox"/>	TOTAL URINE

Phramongkutklo Hospital Anesthetic Record

Date 18 เม.ย. 64 HN. 22 74163 AN. 4693/64  
 Name นายอภิรักษ์ น้อยดี Age 18 ปี Sex ชาย  
 Ward ภา.5 → PSCU Code. 313 Op. No. OR 14  
 Anesthetic technique GA @ ETT Service. Uro  
 Remark FRS = 35 0.111111

ASA 1 ② 3 4 5 E WT. 66 kgs HT. 174 cm Hct. 43.2%  
 BI. Group O<sup>+</sup> BI. Request PRC 2 ñ  
 PRE-Medication Ativan (0.5) 1 tab @ hs  
 Monitoring : NIBP, O<sub>2</sub>Sat, EKG, ETCO<sub>2</sub>, A-line, IVP, PAP, TEMP, TO  
 Other Force air warmer ROOM No. 14



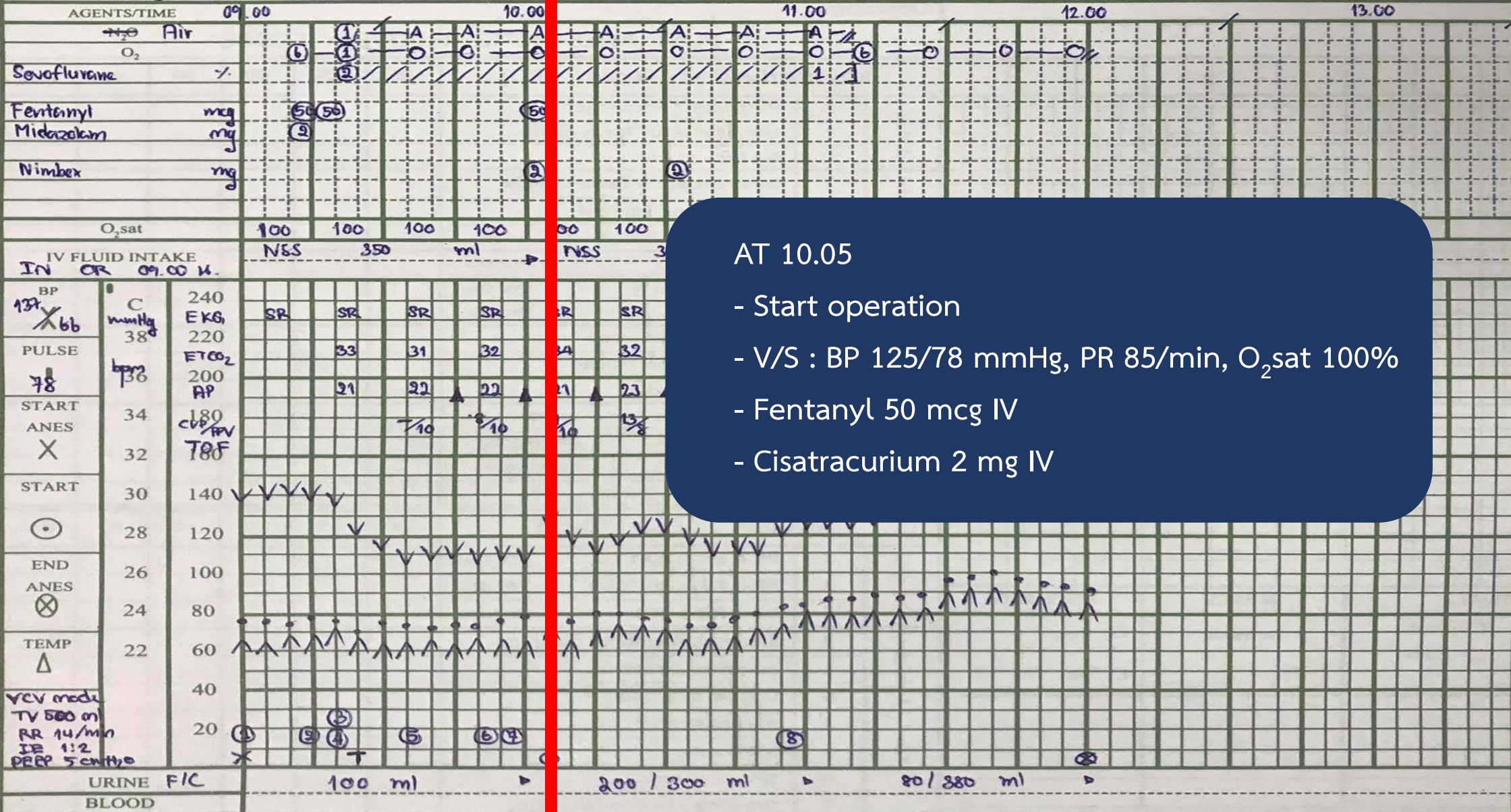
AT 09.50  
 - Access C-line triple lumen at Rt. Internal jugular vein (Depth 13 cm)  
 AT 09.55  
 - Lt. lateral decubitus  
 - Check pressure points

- CONSENT**  
 YES  
 NO
- PRE - OP VISIT**  
 YES  
 NO
- POSITION**  
 SUPINE  
 PRONE  
 LITHOTOMY  
 SITTING  
 TRENDEL  
 Rt. LATERAL  
 Lt. LATERAL  
 JACK-KNIFE  
 OTHER
- LAB**  
 Hct.  
 Blood Sugar at 10.55 = 110 mg/dl  
 Electrolyte  
 ABG
- TOTAL URINE

Phramongkutklo Hospital Anesthetic Record

Date 18 เม.ย. 64 HN. 22474163 AN. 4693/64  
 Name นายอภิรักษ์ น้อยดี Age 18 ปี Sex ชาย  
 Ward ภา.5 → PSCU Code. ๒๓๓ Op No. OR 14  
 Anesthetic technique GA @ ETT Service. Uro  
 Remark FRS = 35 ๐๖:๓๓๓.

ASA 1 (2) 3 4 5 E WT. 66 kgs HT. 174 cm Hct. 43.2%  
 BI. Group O<sup>+</sup> BI. Request PRC 2 ñ  
 PRE-Medication Ativan (0.5) 1 tab @ hs  
 Monitoring : (NIBP), (O<sub>2</sub>Sat), (EKG), (ETCO<sub>2</sub>), (A-line), (IVP), PAP, (TEMP), TO  
 Other Force air warmer ROOM No. 14



AT 10.05

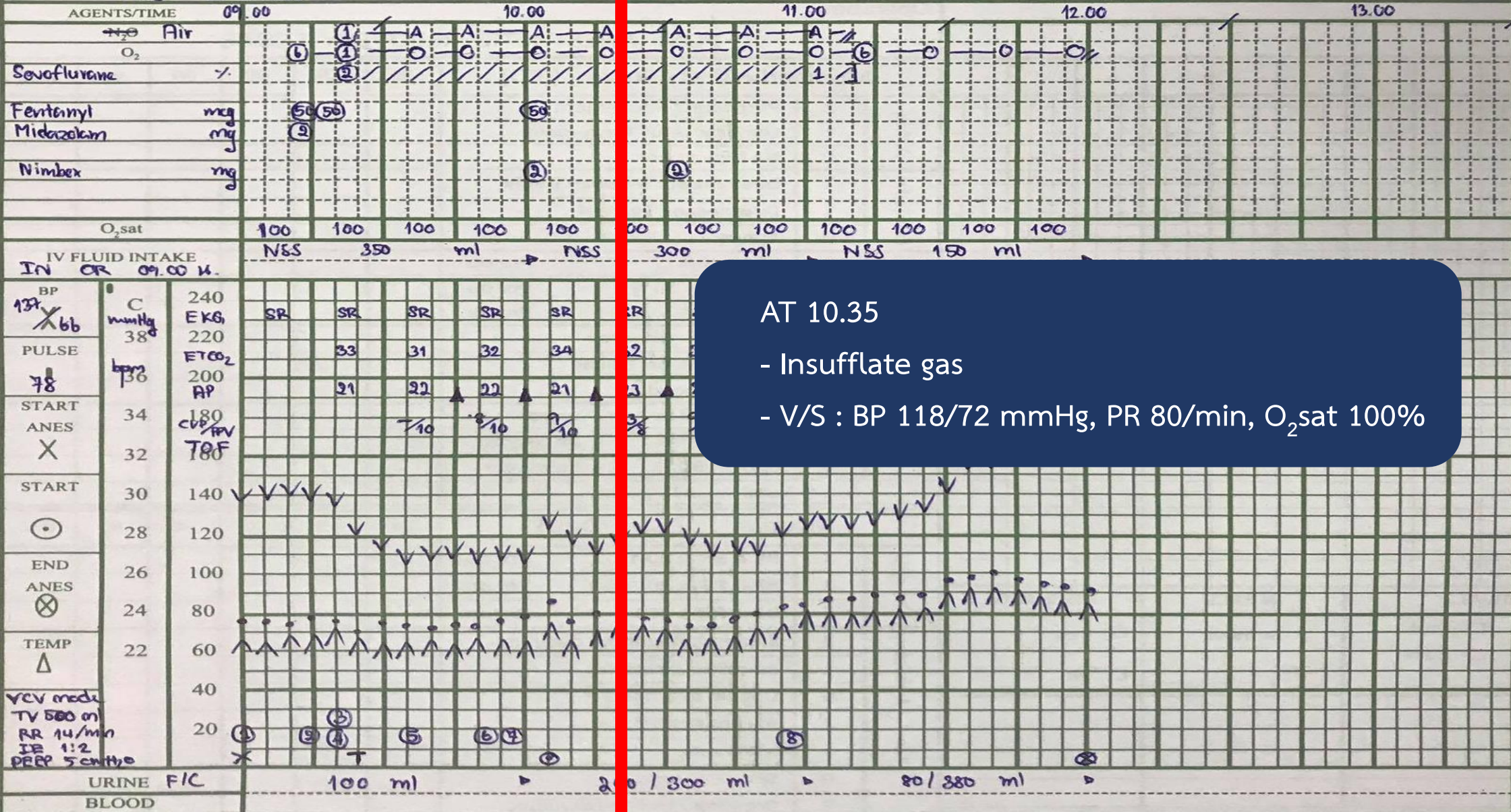
- Start operation
- V/S : BP 125/78 mmHg, PR 85/min, O<sub>2</sub>sat 100%
- Fentanyl 50 mcg IV
- Cisatracurium 2 mg IV

- CONSENT**  
 YES  
 NO
- PRE - OP VISIT**  
 YES  
 NO
- POSITION**  
 SUPINE  
 PRONE  
 LITHOTOMY  
 SITTING  
 TRENDEL  
 Rt. LATERAL  
 Lt. LATERAL  
 JACK-KNIFE  
 OTHER
- LAB**  
 Hct.  
 Blood Sugar at 10.55 = 110 mg/dl  
 Electrolyte  
 ABG
- TOTAL URINE

**Phramongkutklo Hospital Anesthetic Record**

Date 18 เม.ย. 64 HN. 22474163 AN. 4693/64  
 Name นายอภิรักษ์ น้อยดี Age 18 ปี Sex ชาย  
 Ward ภา.5 → PSCU Code. ๒๓๓ Op. No. OR 14  
 Anesthetic technique GA @ ETT Service. Uro  
 Remark FRS = 35 ๐๙:๑๑:๓๓.

ASA 1 ② 3 4 5 E WT. 66 kgs HT. 174 cm Hct. 43.2%  
 BI. Group O<sup>+</sup> BI. Request PRC 2 ñ  
 PRE-Medication Ativan (0.5) 1 tab @ hs  
 Monitoring : NIBP, O<sub>2</sub>Sat, EKG, ETCO<sub>2</sub>, A-line, IVP, PAP, TEMP, TO  
 Other Force air warmer ROOM No. 14



**AT 10.35**  
 - Insufflate gas  
 - V/S : BP 118/72 mmHg, PR 80/min, O<sub>2</sub>sat 100%

- CONSENT**  
 YES  
 NO
- PRE - OP VISIT**  
 YES  
 NO
- POSITION**  
 SUPINE  
 PRONE  
 LITHOTOMY  
 SITTING  
 TRENDEL  
 Rt.LATERAL  
 Lt.LATERAL  
 JACK-KNIFE  
 OTHER
- LAB**  
 Hct.  
 Blood Sugar at 10.55 = 110 mg/dl  
 Electrolyte  
 ABG
- TOTAL URINE

Phramongkutkiao Hospital Anesthetic Record 1

Date 18 เม.ย. 64 HN. 22474163 AN. 4692/64  
 Name นายอภิรักษ์ น้อยดี Age 18 ปี Sex ชาย  
 Ward ภา.5 → PSCU Code. 2133 Op. No. OR 14  
 Anesthetic technique GA + ETT Service. Uro  
 Remark FRS = 35 0.111111

ASA 1 (2) 3 4 5 E WT. 66 kgs HT. 174 cm Hct. 43.2%  
 BI. Group O<sup>+</sup> BI. Request PRC 2 ñ  
 PRE-Medication Ativan (0.5) 1 tab @ hs  
 Monitoring : (NIBP), (O<sub>2</sub>Sat), (EKG), (ETCO<sub>2</sub>), (A-line), (VP), PAP, (TEMP), TO  
 Other Force air warmer ROOM No. 14

AGENTS/TIME	09.00	10.00	11.00
Sevoflurane	0	1	1
Fentanyl	50	50	50
Midazolam	2	2	2
Nimbex	0	2	2
O <sub>2</sub> sat	100	100	100

IV FLUID INTAKE	09.00 H.	10.00	11.00
NSS	350 ml	300 ml	150 ml

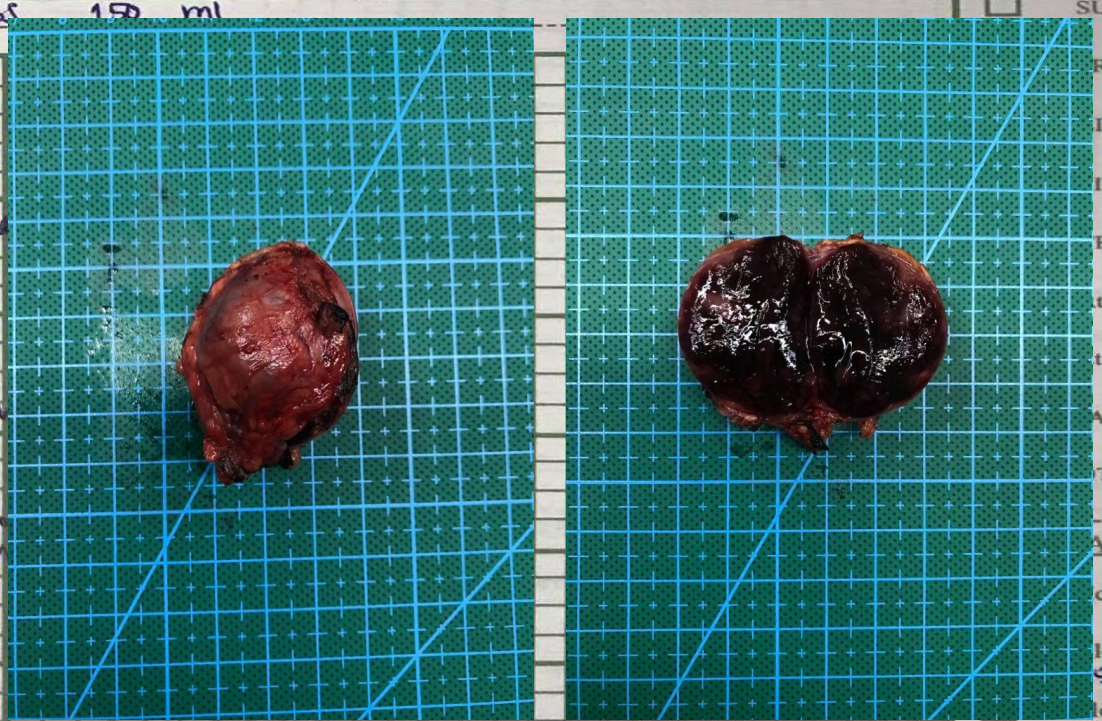
BP	C	240	220	200	180	160	140	120	100	80	60	40	20
137	mmHg	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
78	bpm	33	31	32	34	32	31	33	32	21	22	21	22
34	mmHg	21	22	22	21	23	22	21	22	21	22	21	22
32	mmHg	10	10	10	10	10	10	10	10	10	10	10	10
30	mmHg	140	120	100	80	60	40	20	10	10	10	10	10
28	mmHg	120	100	80	60	40	20	10	10	10	10	10	10
26	mmHg	100	80	60	40	20	10	10	10	10	10	10	10
24	mmHg	80	60	40	20	10	10	10	10	10	10	10	10
22	mmHg	60	40	20	10	10	10	10	10	10	10	10	10

AT 10.45

- Remove tumor
- V/S : BP 112/68 mmHg, PR 79/min, O<sub>2</sub>sat 100%




AT 10.45  
 - Remove tumor  
 - V/S : BP 112/68 mmHg, PR 79/min, O<sub>2</sub>sat 100%



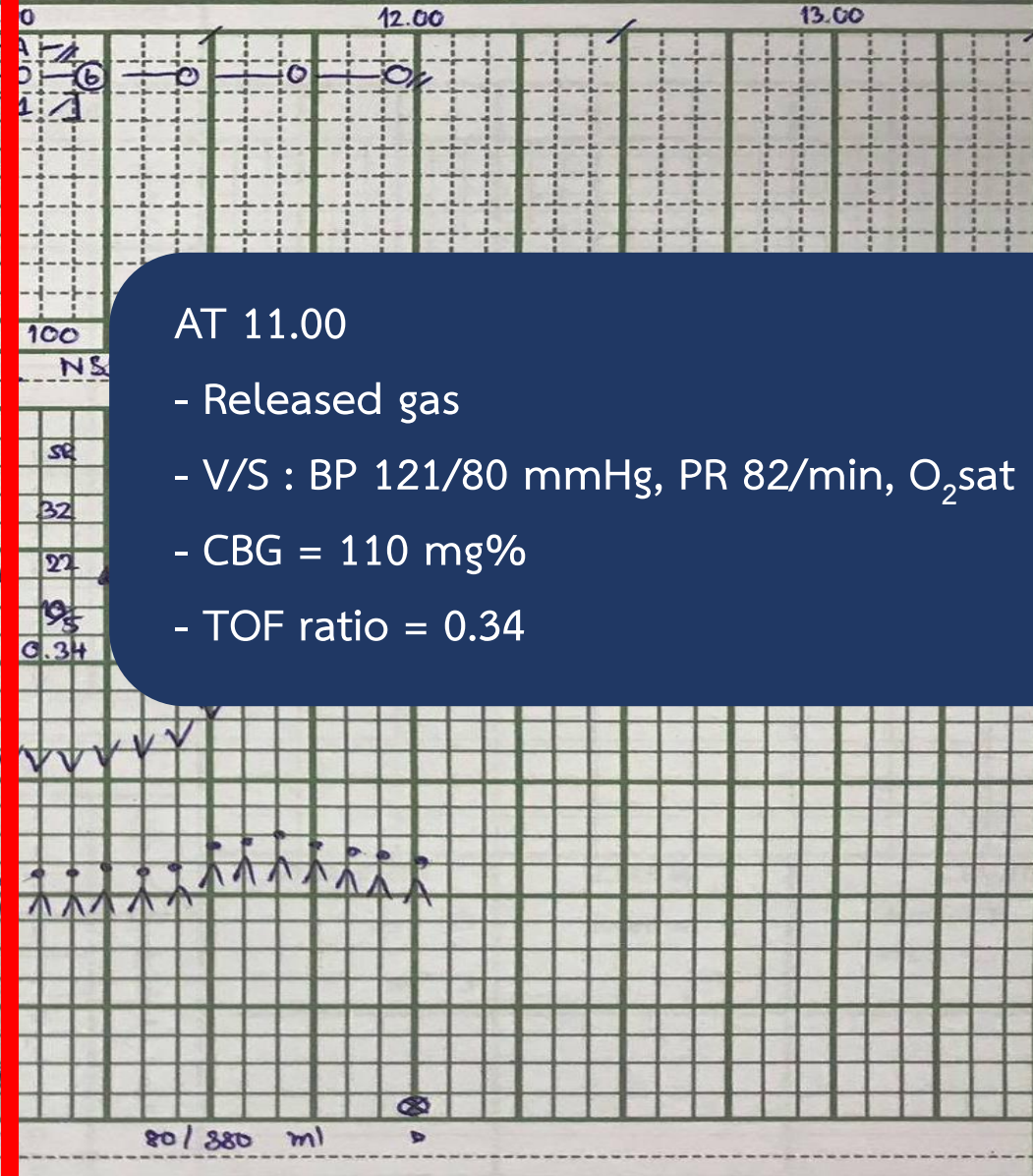
INSENT  
 OP VISIT  
 POSITION  
 SUPINE  
 PRONE  
 LITHOTOMY  
 SITTING  
 RENDEL  
 L.LATERAL  
 R.LATERAL  
 BACK-KNIFE  
 OTHER  
 AB  
 ct.  
 Blood Sugar  
 SS = 110 mg %  
 Electrolyte  
 ABG  
 TOTAL URINE

**Phramongkutklo Hospital Anesthetic Record**

Date 18 มี.ค. 64 HN. 22474/63 AN. 4693/64  
 Name นายอภิรักษ์ น้อยดี Age 18 ปี Sex ชาย  
 Ward ภา.5 → PSCU Code. ๒๓๓ Op. No. OR 14  
 Anesthetic technique GA @ ETT Service. Uro  
 Remark FRS = 35 ๐๖:๓๓๓.

ASA 1 ② 3 4 5 E WT. 66 kgs HT. 174 cm Hct. 43.2%  
 BI. Group O<sup>+</sup> BI. Request PRC 2 ñ  
 PRE-Medication Ativan (0.5) 1 tab @ hs  
 Monitoring : NIBP, O<sub>2</sub>Sat, EKG, ETCO<sub>2</sub>, A-line, IVP, PAP, TEMP, TOF  
 Other Force air warmer ROOM No. 14

AGENTS/TIME	09.00	10.00	11.00
Air	100	100	100
O <sub>2</sub>	100	100	100
Sevoflurane	0	0	0
Fentanyl	50	50	50
Midazolam	2	2	2
Nimbex	0	0	0
O <sub>2</sub> sat	100	100	100
IV FLUID INTAKE	NSS 350 ml	NSS 300 ml	NSS
BP	137/66	121/80	121/80
PULSE	78	82	82
START ANES	X		
END ANES			
TEMP	36.5	36.5	36.5
URINE FIC	100 ml	200 / 300 ml	80 / 380 ml



**CONSENT**  
 YES  
 NO

**PRE - OP VISIT**  
 YES  
 NO

**POSITION**  
 SUPINE  
 PRONE  
 LITHOTOMY  
 SITTING  
 RENDEL  
 BILATERAL  
 LI.LATERAL  
 JACK-KNIFE  
 OTHER

**LAB**  
 Hct.  
 Blood Sugar at 10.55 = 110 mg%  
 Electrolyte  
 ABG

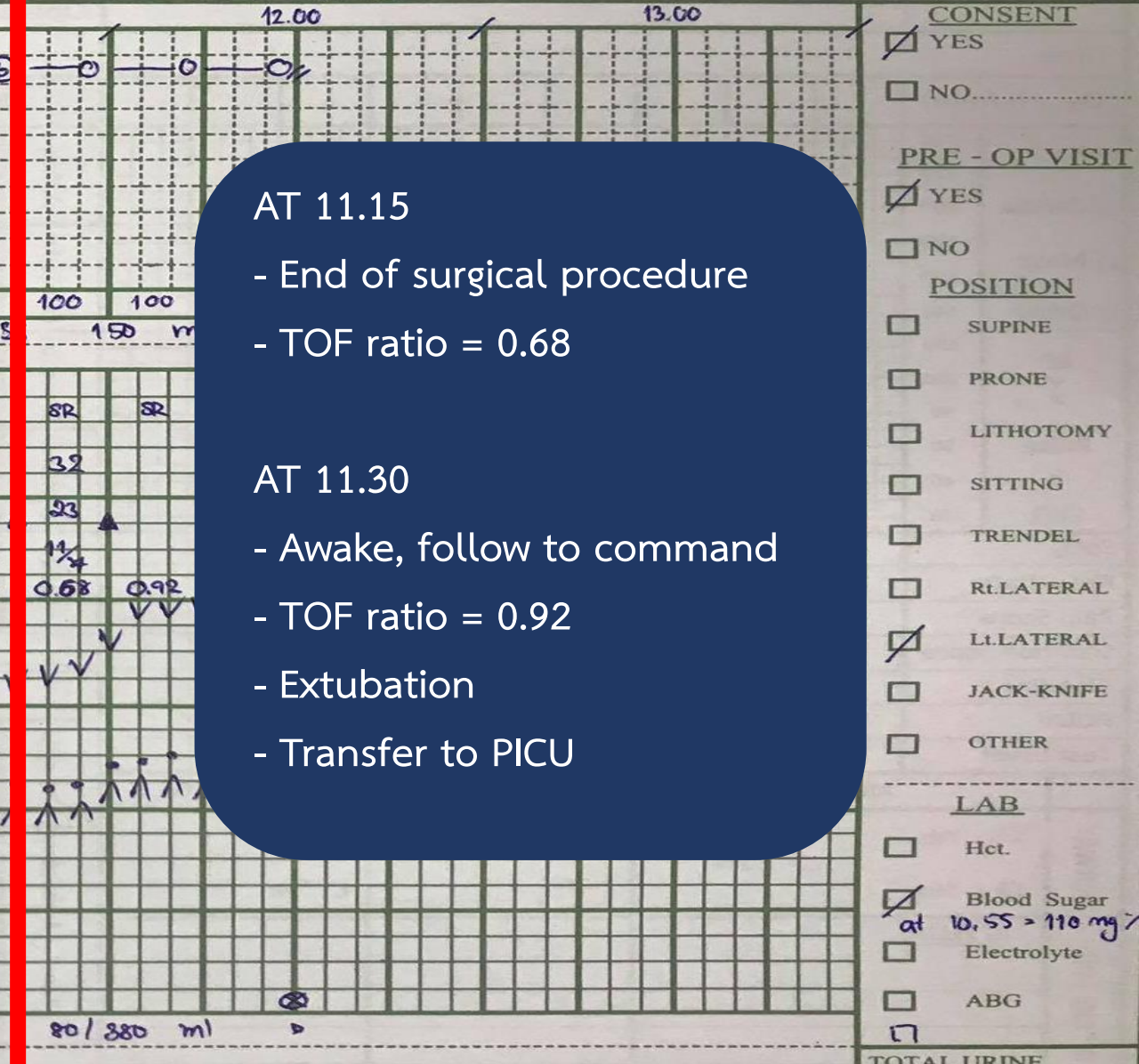
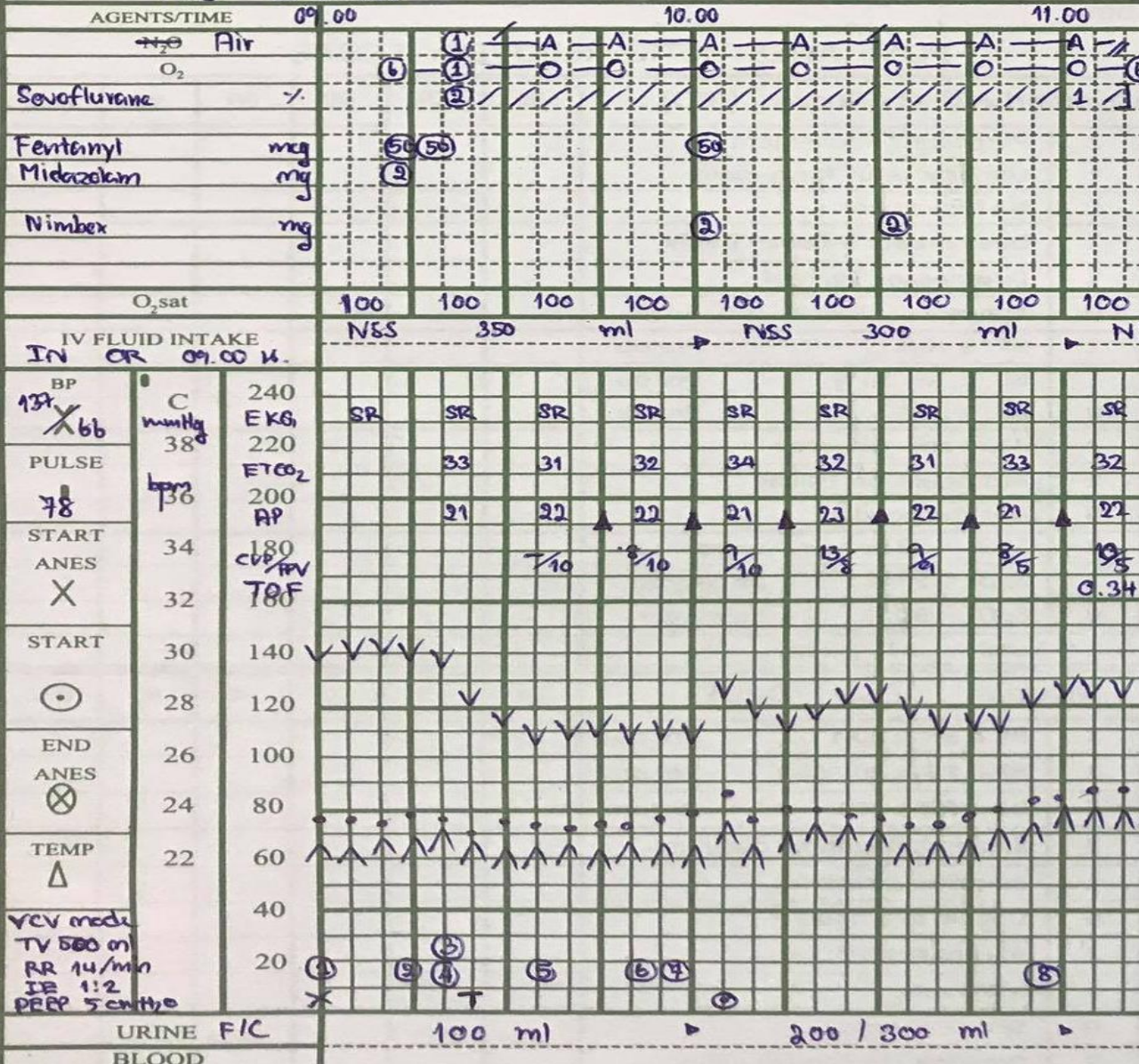
**TOTAL URINE**



**Phramongkutklo Hospital Anesthetic Record**

Date 18 เม.ย. 64 HN. 22474163 AN. 4693/64  
 Name นายอภิรักษ์ น้อยดี Age 18 ปี Sex ชาย  
 Ward ภา. 5 → PSCU Code. ๒๓๓ Op. No. OR 14  
 Anesthetic technique GA + ETT Service. Uro  
 Remark FRS = 35 คะแนน

ASA 1 ② 3 4 5 E WT. 66 kgs HT. 174 cm Hct. 43.2%  
 BI. Group O<sup>+</sup> BI. Request PRC 2 ñ  
 PRE-Medication Ativan (0.5) 1 tab @ hs  
 Monitoring : NIBP, O<sub>2</sub>Sat, EKG, ETCO<sub>2</sub>, A-line, IVP, PAP, TEMP, TOF  
 Other Force air warmer ROOM No. 14



**AT 11.15**

- End of surgical procedure
- TOF ratio = 0.68

**AT 11.30**

- Awake, follow to command
- TOF ratio = 0.92
- Extubation
- Transfer to PICU

**CONSENT**

YES

NO

**PRE - OP VISIT**

YES

NO

**POSITION**

SUPINE

PRONE

LITHOTOMY

SITTING

TRENDEL

Rt. LATERAL

Lt. LATERAL

JACK-KNIFE

OTHER

**LAB**

Hct.

Blood Sugar at 10.55 = 110 mg/dl

Electrolyte

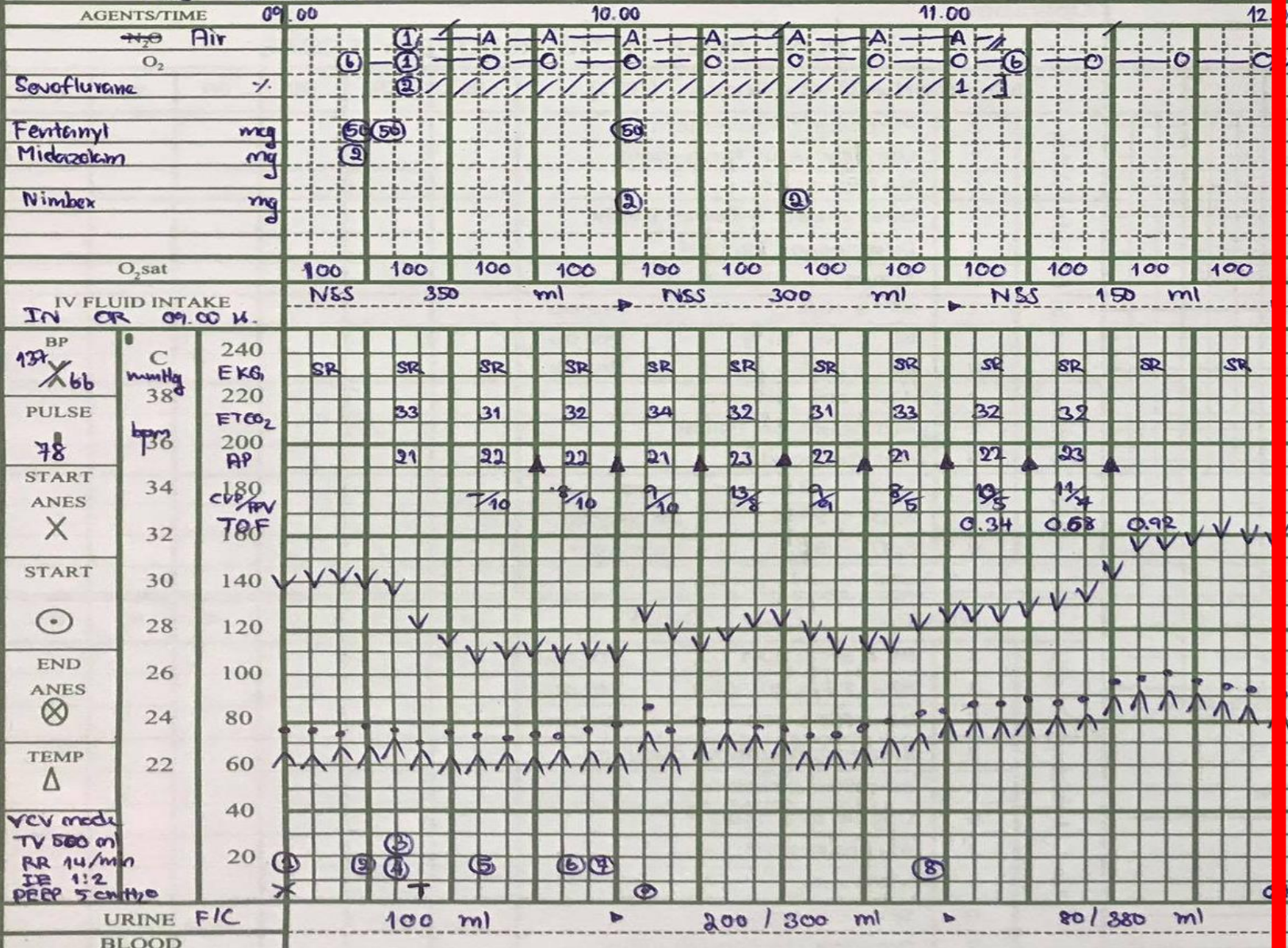
ABG

**TOTAL URINE**

# Phramongkutklo Hospital Anesthetic Record

Date 18 เม.ย. 64 HN. 22474/63 AN. 4693/64  
 Name นายอภิรักษ์ น้อยดี Age 18 ปี Sex ชาย  
 Ward ภา. 5 → PSCU Code. ๒๓๓ Op. No. OR 14  
 Anesthetic technique GA + ETT Service. Uro  
 Remark FRS = 35 ๐๖:๓๓๓.

ASA 1 (2) 3 4 5 E WT. 66 kgs HT. 174 cm Hct. 43.2%  
 BI. Group O+ BI. Request PRC 2 ñ  
 PRE-Medication Ativan (0.5) 1 tab @ hs  
 Monitoring: (NIBP) (O<sub>2</sub>Sat) (EKG) (ETCO<sub>2</sub>) (A-line) (VP) PAP (TEMP), TO  
 Other Force air warmer ROOM No. 14



AT 12.00  
 - End of operation  
 - EBL : 50 ml  
 - Operation time : 3 hr  
 - Total fluid : 800 ml

**CONSENT**  
 YES  
 NO

**PRE - OP VISIT**  
 YES  
 NO

**POSITION**  
 SUPINE  
 PRONE  
 LITHOTOMY  
 SITTING  
 TRENDEL  
 Rt. LATERAL  
 Lt. LATERAL  
 JACK-KNIFE  
 OTHER

**LAB**  
 Hct.  
 Blood Sugar at 10:55 = 110 mg/dl  
 Electrolyte  
 ABG

**TOTAL URINE**



Postoperative period

# Postoperative consideration

- Adequate pain control
- Stable hemodynamic
  - Ddx for postoperative hypertension : Pain, Urinary retention, Fluid overload, Essential HT, Residual tumor
- Control hypoglycemia

# Postoperative day 1

- S : ผู้ป่วยตื่นดี ปวดแผลเล็กน้อย PS at rest = 2, PS at movement = 3, ไม่มีไข้ หายใจปกติ ปัสสาวะออกดี
- O : BT 37.2 °C, RR 16/min, BP 127/63 mmHg, HR 74/min, O<sub>2</sub>sat 100%  
I/O : 1,281/1,185, Hct 40%, CBG 107 mg%
- A : Rt. Pheochromocytoma S/P Rt. adrenalectomy post-op d1 ; Clinically stable
- P :
  - Fentanyl 50 mcg IV q 2 hr
  - Fentanyl 25 mcg IV prn for pain q 2 hr
  - Acetaminophen (500) 1 tab po q 6 hr
  - ย้ายกลับบอร์ด กุมภาพันธ์

## Postoperative day 2

- S : ผู้ป่วยตื่นดี ปวดแผลเล็กน้อย PS at rest = 1, PS at movement = 2, ไม่มีไข้ หายใจปกติ ปัสสาวะออกดี
- O : BT 37.0 °C, RR 14/min, BP 121/65 mmHg, HR 72/min, O<sub>2</sub>sat 100%  
I/O : 1,081/850, CBG 98 mg%
- A : Rt. Pheochromocytoma S/P Rt. adrenalectomy post-op d2 ; Clinically stable
- P :
  - Fentanyl 50 mcg IV q 2 hr
  - Fentanyl 25 mg IV prn for pain q 2 hr
  - Acetaminophen (500) 1 tab po q 6 hr



**Thank you**