

Interesting case

04. 11. 2020

**R₁ Soravish Sirilertworakul
Teerawat Poojinya, M.D.**

“

24 years-old Male

Diagnosis : End-stage renal disease

Operation : Cadaveric donor kidney transplant

”

R_1 History ?

History

- **Chief compliant** : แพทย์นัดผ่าตัดเปลี่ยนไต
- **Present illness** :
 - **Admission 13/10/2020, Operation 14/10/2020**
ไม่มีไข้ ไม่มีขาบวม นอนราบได้ ไม่แน่นหน้าอก ไม่คลื่นไส้/อาเจียน ไม่มีลุกขึ้นแล้วหน้ามืด
ปัสสาวะออกปกติ

History

- Underlying disease :
 - ESRD due to Lupus nephritis (Diagnosis by kidney biopsy Feb 2017)
HD via Lt. AVF (Mon, Thu, Sat) ; Last HD 12/10/2020 UF : 500 ml
Residual urine 300 ml/day ; Dry weight 49 kg
 - Systemic Lupus Erythematosus : Presented with AIHA and Lupus nephritis
 - Hypertension ; baseline BP 140-150/80-90 mmHg

Past History

- Current medication
 - Manidipine (20) 1 tab po OD pc
 - Lorsatan (50) 1 tab po bid pc
 - Hydroxychloroquin (200) 1 tab po OD pc
 - Prednisolone (5) 1 tab po AD pc
 - Ferrous fumarate (200) 1 tab po tid pc
 - Folic acid (5) 1 tab po OD pc
 - ZnSO₄ (25) 1 tab po OD pc
 - Vit D2 (20,000) 1 cap po q 2 wks
 - CaCO₃ (1,500) 1 tab po tid with meal

Past History

- Drug allergy : Penicillin (MP rash), No History of food allergy
- No alcohol drinking, No smoking
- Previous anesthesia : 1/2/62 Lt. BC AVF (Brachial plexus block, no complication)
- No history of chest discomfort
- No history of intradialysis hypotension

R₁ Physical Examination ?

Physical Examination

- **BW 49 kg**. Ht 174 cm BMI 16.18 kg/m²
- V/S : BT 37 °C, PR 84/min, RR 14/min BP 143/84 mmHg
- GA : Good conscious, well cooperative
- HEENT : mild 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 I
 - Thyromental distance > 6 cm
 - Mouth opening > 3 cm
 - Normal dental examination
 - No limitation of TMJ joint

Physical Examination

- Heart : Normal S₁S₂, no murmur, PMI 5th ICS, no heaving, no thrill
neck vein not engorged, pulse full and regular
- Lungs : **Clear and equal breath sound BL**, no adventitious sound
- Abdomen : Normoactive BS, soft, not tender, no guarding
- Ext : **no edema**, no ecchymosis
- Neuro: E₄V₅M₆, motor grade V all, Sensory intact

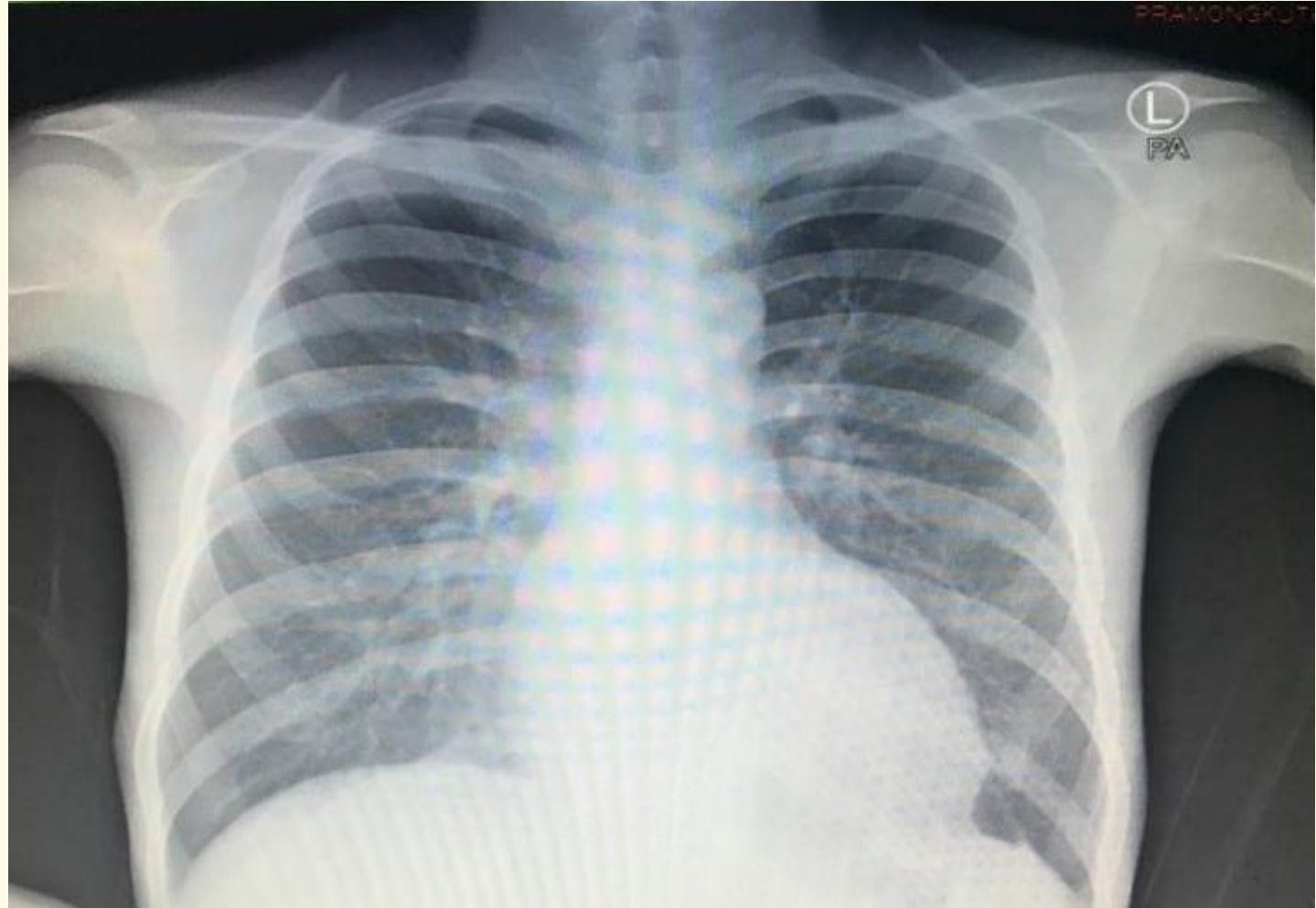
R₁ Investigation ?

Laboratory Investigation

- CBC : Hb 9.6 g/dL, Hct 30.8 %, Plt 179,000/ul
- BUN 42.7 mg/dl, Cr 7.18 mg/dL (GFR 9.67 ml/min/1.73m²)
- Electrolyte : Na 137 K 4.39 Cl 98.2 HCO₃ 23.9 Ca 9.06 Mg 2.22 PO₄ 3.73
- Coag : PT 12.4 INR 1.07 aPTT 27.8/1.09 TT 12.7/1.02
- LFT : TP 6.8 Alb 4.09 TB 0.23 DB 0.13 AST 25.4 ALT 16.4 ALP 183

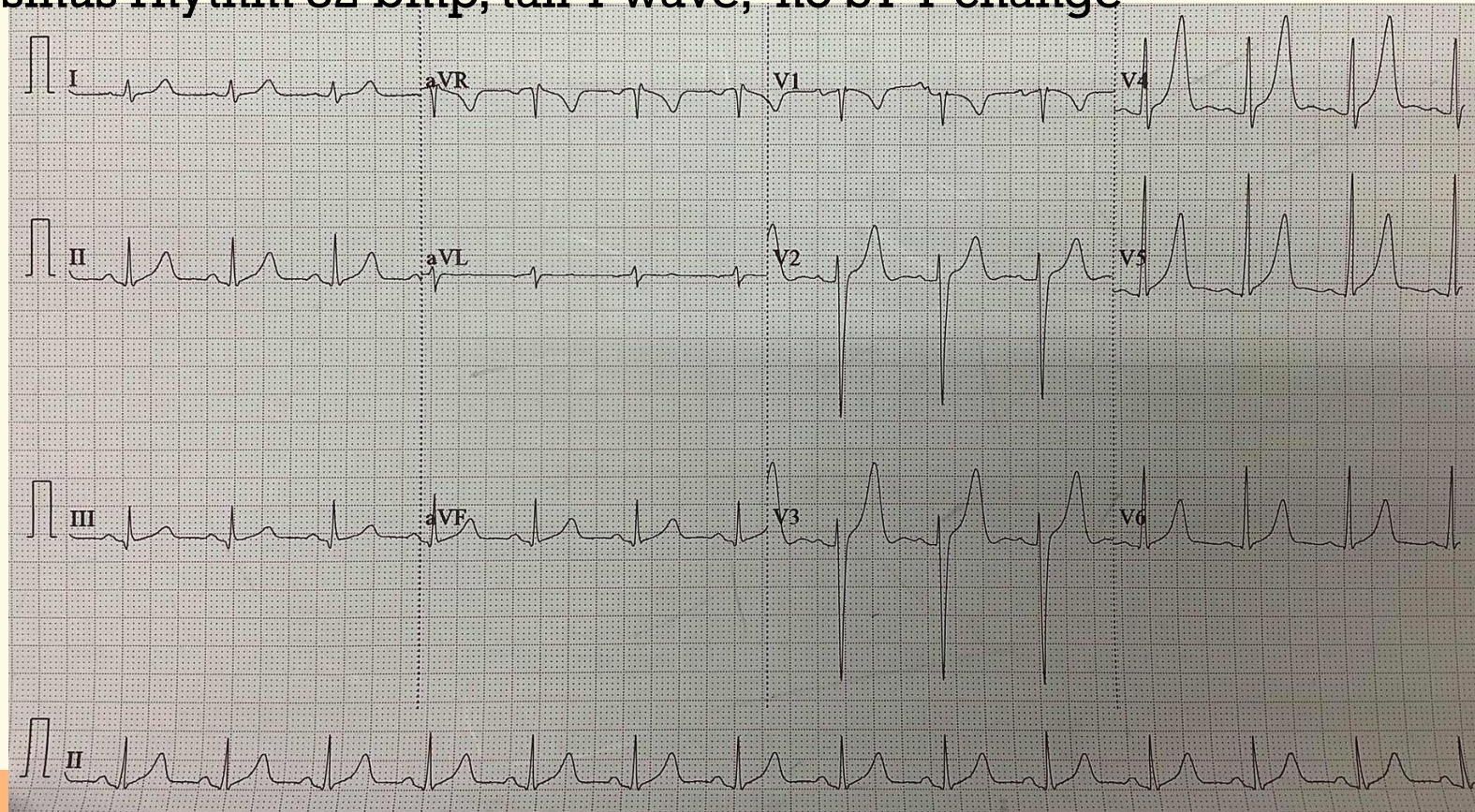
Chest X-ray

- No Cardiomegaly
- No infiltration
- No pulmonary congestion



EKG

- Normal sinus rhythm 82 bmp, tall T-wave, no ST-T change



Laboratory Investigation

- Last Echo (15/02/62) : Normal biventricular size and systolic function without RWMA, LVEF 72%, No significant valvular pathology
- Last USG whole abdomen (07/02/62) : Bilateral renal parenchymal disease without abnormal mass or evidence of obstruction
- Last VCUG (18/02/62) : No evidence of vesicoureteral reflux, Bladder capacity 200 ml
- Psychological examination

Screening for tumor

- EGD (27/3/19) : Erosive gastritis
- Colonoscope (27/3/19) : Normal

Screening for infection

Serology	Donor	Recipient
VDRL	Negative	Negative
HBsAg	Negative	Negative
HBsAb		Positive
Anti-HCV	Negative	Negative
Anti-CMV IgG/IgM	Positive/Negative	Positive/Negative
Anti-HSV IgG/IgM		Positive/Negative
Anti-HBV IgG/IgM		Positive/Negative
Blood group	B, Rh+	B, Rh+

Problem List

Problem List

1. Male 24 years plan set OR for CDKT
2. ESRD on HD via Lt. AVF
3. SLE (AIHA, Lupus nephritis) on Steroid
4. Hypertension
5. Anemia

ASA classification 3E

R₂ Preoperative evaluation

Patient Factors

- ESRD
- SLE (AIHA, Lupus nephritis)
- Hypertension
- Anemia

ESRD (CVS)

- Systemic hypertension : Salt-water retention, Alter RAAS secretion
- Congestive heart failure :
 - Primary : Uremic cardiomyopathy
 - Secondary : Fluid overload
- Coronary artery disease (Accelerated atherosclerosis)
- Structural cardiac abnormality (esp. LV dysfunction)
- Cardiac dysrhythmia (Hyperkalemia, Hypocalcemia)
- Uremic pericarditis

ESRD (Pulmonary system)

- Pulmonary abnormality
 - Pulmonary edema
 - Pleural effusion
 - Hyperventilation
 - Basal lung atelectasis
- Oxygen carrying capacity
 - Rt. Shift of O₂-Hb dissociation curve
 - Increase cardiac output
 - Decreased blood viscosity

ESRD (Fluid & Electrolyte imbalance)

- Hypervolemia
- Hyperkalemia
- Hypocalcemia
- Hypermagnesemia

ESRD (Hematological abnormality)

- Anemia
 - Decreased erythropoietin production
 - Diminished erythrocyte production
 - Reduced life span
 - Blood Loss
 - Dietary Deficiency : Iron, Folic Acid
- Platelet Dysfunction
 - Qualitative Dysfunction
 - Bleeding Diathesis

ESRD (Others)

- **Gastrointestinal**
 - Delayed gastric emptying time
 - Nausea and vomiting
 - Peptic ulcer disease
 - Gastrointestinal bleeding
 - Uremic gastroenteritis
- **Acid base abnormalities**
 - Metabolic Acidosis
- **Peripheral Neuropathy**
 - Muscle Weakness :
Peripheral Nerve Palsy
 - Autonomic Neuropathy

ESRD (CNS)

- **CNS Dysfunction**
- **Behavioral Changes**
- **Loss of Memory**
- **Neuromuscular Irritability**
- **Lethargy**
- **Coma**
- **Myoclonus**
- **Convulsions**

ESRD (Endocrine system)

- Altered temperature regulation
- Altered exogenous insulin requirement
- Reduced/impaired EPO production
- Secondary hyperparathyroidism
- Renal osteodystrophy
- Osteomalacia

ESRD (Dialysis related Problem)

- Dialysis Dementia
- Dialysis Disequilibrium Syndrome
- Hypovolemia
- Peritonitis
- Systemic Anticoagulation

Systemic lupus erythematosus

- Multisystemic chronic inflammatory disease
- Stresses such as infection, pregnancy, surgery may exacerbate SLE.

Diagnostic criteria : ANA titer > 1:80 with clinical criteria (score > 10)

Clinical domains and criteria	Weight	Immunology domains and criteria	Weight
<i>Constitutional</i>		<i>Antiphospholipid antibodies</i>	
Fever	2	Anti-cardiolipin antibodies OR Anti-β2GP1 antibodies OR Lupus anticoagulant	2
<i>Hematologic</i>		<i>Complement proteins</i>	
Leukopenia	3	Low C3 OR low C4	3
Thrombocytopenia	4	Low C3 AND low C4	4
Autoimmune hemolysis	4	<i>SLE-specific antibodies</i>	
<i>Neuropsychiatric</i>		Anti-dsDNA antibody* OR Anti-Smith antibody	6
Delirium	2		
Psychosis	3		
Seizure	5		
<i>Mucocutaneous</i>			
Non-scarring alopecia	2		
Oral ulcers	2		
Subacute cutaneous OR discoid lupus	4		
Acute cutaneous lupus	6		
<i>Serosal</i>			
Pleural or pericardial effusion	5		
Acute pericarditis	6		
<i>Musculoskeletal</i>			
Joint involvement	6		
<i>Renal</i>			
Proteinuria >0.5g/24h	4		
Renal biopsy Class II or V lupus nephritis	8		
Renal biopsy Class III or IV lupus nephritis	10		

Systemic lupus erythematosus

- Treatment :
 - Antimalarial drug : Hydroxychloroquine, quinacrine
 - Systemic corticosteroid : prednisolone

HPA suppression

- 5 daily doses of prednisolone 20 mg
 - 3 weeks of prednisolone 5-7.5 mg
 - 2 grams/day of topical steroid
 - 0.8 mg/day of inhaled steroid
-
- Recovery of HPA function occur gradually and can take up to 9-12 months

HPA suppression

- Steroid equivalent dose

Medication	Equivalent doses
Cortisone	25 mg
Hydrocortisone	20 mg
Deflazacort	6 mg
Prednisone or Prednisolone	5 mg
Methyl prednisone	4 mg
Triamcinolone	4 mg
Betamethasone	0.75 mg
Dexamethasone	0.75 mg

HPA suppression

TABLE 31.15 Recommendations for Perioperative Corticosteroid Coverage

Surgical Stress	Target Hydrocortisone Equivalent	Preoperative Corticosteroid Dose	Perioperative Corticosteroid Dose
Superficial procedure (e.g., biopsy, dental procedure)	8–10 mg/day	Usual daily dose	<ul style="list-style-type: none"> ■ Then usual daily dose
Minor (e.g., inguinal hernia repair, colonoscopy, hand surgery)	50 mg/day	Usual daily dose	<ul style="list-style-type: none"> ■ Hydrocortisone 50 mg IV before incision ■ Hydrocortisone 25 mg IV every 8 h for 24 h ■ Then usual daily dose
Moderate (e.g., colon resection, total joint replacement, lower extremity revascularization)	75–150 mg/day	Usual daily dose	<ul style="list-style-type: none"> ■ Hydrocortisone 50 mg IV before incision ■ Hydrocortisone 25 mg IV every 8 h for 24 h ■ Then usual daily dose
Major (e.g., esophagectomy, pancreateoduodenectomy, major cardiac, major vascular, trauma)	75–150 mg/day	Usual daily dose	<ul style="list-style-type: none"> ■ Hydrocortisone 100 mg IV before incision ■ Continuous IV infusion of 200 mg of hydrocortisone over 24 h ■ Then usual daily dose OR ■ Hydrocortisone 50 mg IV every 8 h for 24 h ■ Taper dose by 50% per day until usual daily dose is reached* ■ Then usual daily dose

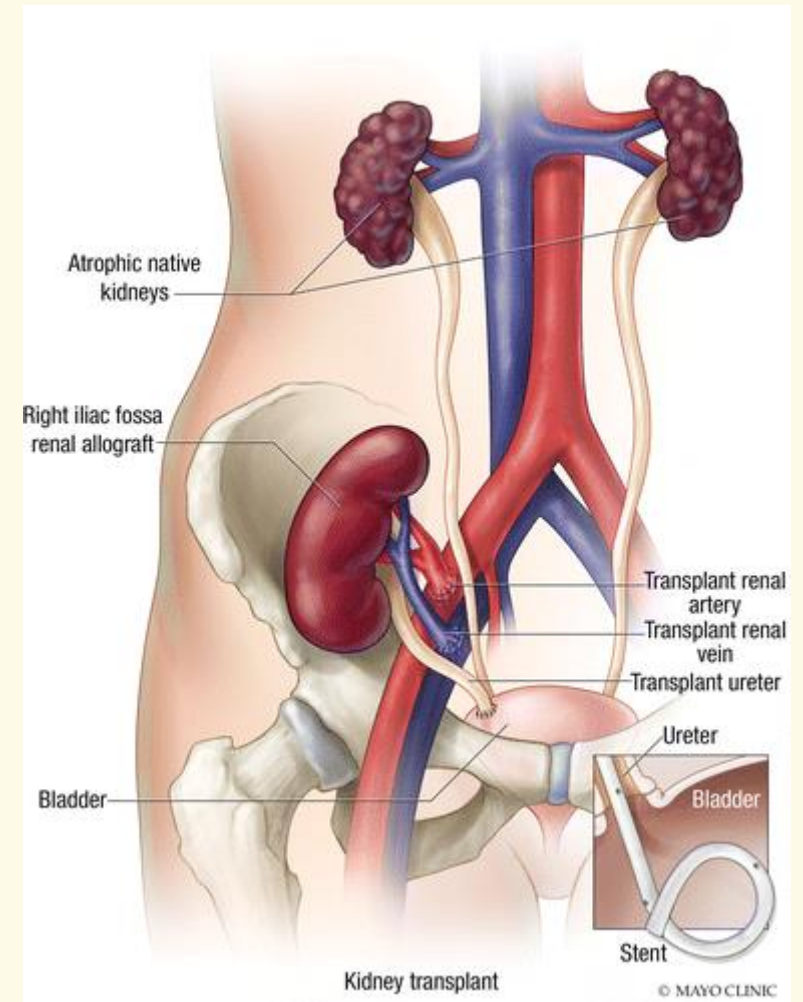
Hypertension

- Baseline BP 130-140/70-80 mmHg
- No systemic complication
- Current medication
 - Manidipine (20) 1 tab po OD pc
 - Lorsatan (50) 1 tab po bid pc

R_3 Anesthetic consideration

Anesthesia for kidney transplant

- Curvilinear incision
- Donor kidney placed in the iliac fossa in situ
- Anastomoses
 - Renal V = External iliac V
 - Renal A = External iliac A
 - Ureter kidney = bladder



Anesthesia for kidney transplant (Recipient)

- **Absolute contraindications**
 - **Active infection**
 - **Untreated malignancy**
 - **Predicted patient survival less than 5 years**
 - **Risk of transplant graft loss greater than 50% at 1 yr**
 - **Inability to comply with immunosuppression regimen, and immunosuppression predicted to cause a life threatening complication**

Anesthesia for kidney transplant (Recipient)

- Relative contraindications
 - Age > 70 years
 - Active infection process
 - Cirrhosis, chronic liver disease, active hepatitis
 - Active substance abusers
 - Active TB

Anesthesia for kidney transplant (Recipient)

- Relative contraindications
 - COPD
 - LVEF < 20%
 - Diffuse atherosclerotic or CAD not amenable to surgical repair, CABG or PCA
 - Morbid obesity (BMI > 35)
 - Psychosocial or behavioral abnormalities

Anesthesia for kidney transplant (Donor)

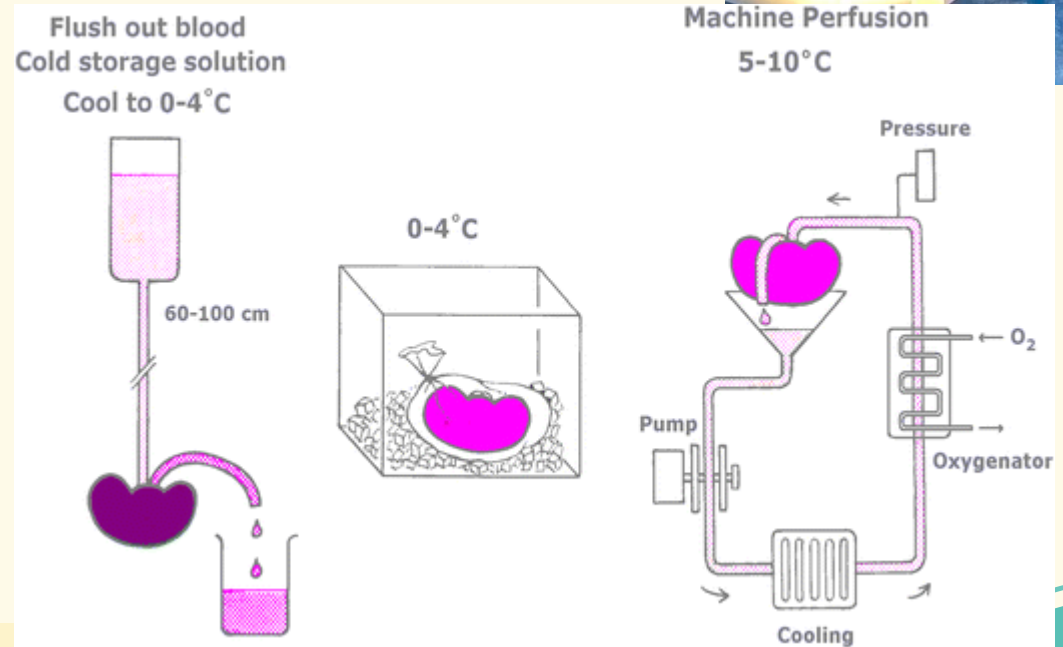
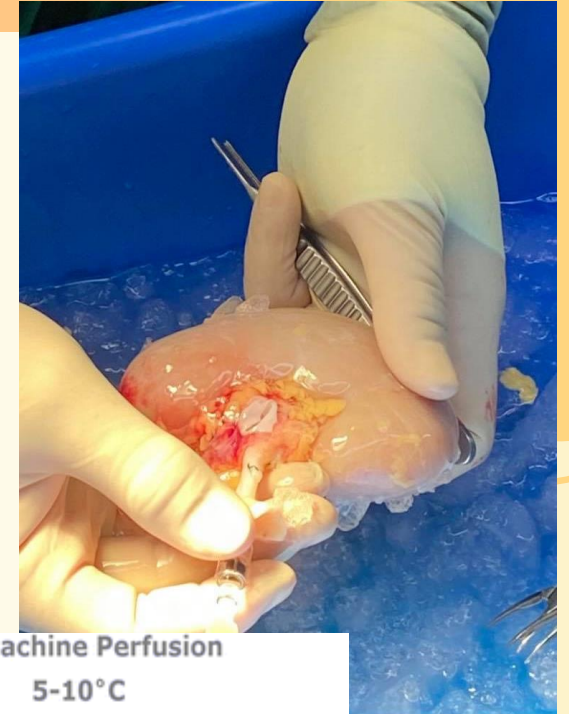
- Living Donor
 - **Elective Procedure**
 - Timing of an operation flexible
 - KT from living donors show an increased graft survival
 - Evaluated both psychologically and medically
- Cadaveric donor
 - Donor after circulatory death (DCD)
 - Uncontrolled
 - Controlled
 - Donor after brain death (DBD) :
Heart beating organ donation
 - **Urgency surgery** due to cold ischemic time effects graft function and survival

Anesthesia for kidney transplant (Matching process)

- Blood group matching : ABO matching
- HLA type matching :
 - Six antigen (MCH) at three loci A, B and DR
 - Six antigen match : best outcome
 - Immunosuppression ensures favourable outcome for fully mismatched organs
- Testing donor T cells against recipient serum
 - Final crossmatch : lymphocytotoxicity crossmatch between donor lymphocytes and recipient

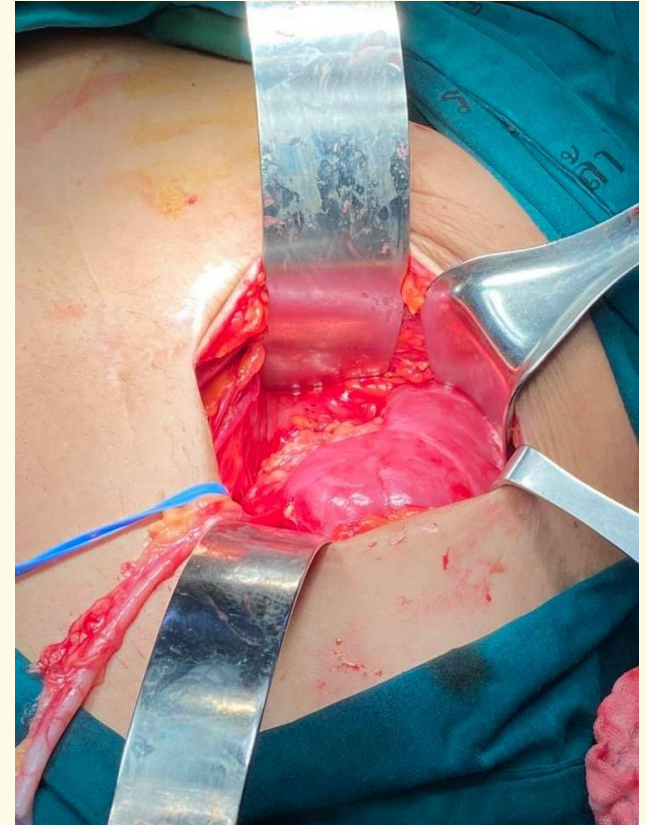
Anesthesia for kidney transplant (Preservation of harvested organ)

- Static cold storage
- Hypothermic machine perfusion



Anesthesia for kidney transplant (Preservation of harvested organ)

- Cold ischemic time (CIT)
- Warm ischemic time (WIT)



Anesthesia for kidney transplant (Preservation of harvested organ)

- Cold ischemia time (CIT)
 - Initiation of cold preservation of donor organ to restoration of warm circulation in the organ recipient
 - Lower CIT improve graft function and survival
 - For cadaveric graft safety > 24hr, potentially > 36hr
 - Cold Storage Solutions : Oxygen radical scavengers, improve organ storage conditions

Anesthesia for kidney transplant (Preservation of harvested organ)

- Warm Ischemic Time (WIT)
 - Begins when the kidney is placed in the recipient, and terminates when the vascular anastomosis is complete and perfusion by the recipient begins
 - Incidence ATN increases with its duration

Anesthesia for kidney transplant (Preoperative evaluation - CVS)

- History
- Physical Examination to identify any active cardiac conditions
 - Unstable coronary syndrome
 - Severe valvular disease
 - Decompensated heart failure
 - Significant arrhythmias
- Assessment of functional status

Anesthesia for kidney transplant (Preoperative evaluation - CVS)

- **Non-invasive stress testing** should be considered without active cardiac disease but who have **3 or more risk factors** associated with CAD
 - DM
 - Prior CVD
 - Duration of dialysis >1 yr,
 - LVH
 - Age > 60 yr
 - Hypertension, Dyslipidemia

Anesthesia for kidney transplant (Preoperative evaluation)

- Likelihood of structural cardiac abnormalities and the potential for left ventricular dysfunction in ESRD is significant.
- Preoperative assessment of Left and right ventricular function by **echocardiography is an appropriate test in most kidney transplant candidates.**

Anesthesia for kidney transplant (Preoperative evaluation - Hemodialysis)

- **Routine dialysis should be avoided in the 24 hours** prior to transplantation
- If dialysis needs to be done within 24 hours of the operation, It is best to avoid overzealous.

Anesthesia for kidney transplant (Monitoring)

- Goals of monitoring
 - Optimize renal perfusion
 - Minimizes myocardial stress
 - Keep normovolemia
 - Anesthesia consideration in ESRD

Anesthesia for kidney transplant (Monitoring)

- Standard monitoring
 - EKG
 - NIBP
 - Heart rate
 - Oxygen saturation
 - ETCO₂
 - Temperature

Anesthesia for kidney transplant (Monitoring)

- Special monitoring
 - Central line : **Help ensuring adequate hydration** during anesthesia
 - Arterial line : **For advance comorbid condition** requires close BP monitoring or acid-base status
 - Pulmonary artery catheter : **For severe comorbid conditions** such as symptomatic coronary artery disease, left ventricular dysfunction, congestive heart failure, valvular heart disease.
 - Urine output

Anesthesia for kidney transplant (Choice of anesthesia)

- GA with ETT with controlled ventilation
 - **Rapid sequence induction of anesthesia is preferred** because of increase risk of aspiration

(uremic gastropathy, other condition such as obesity, diabetes)

Anesthesia for kidney transplant (Choice of anesthesia)

- Regional anesthesia should be concern due to
 - **Increased risk of epidural hematoma**
(Uremic thrombasthenia and thrombocytopenia)
 - Residual Dialysis Anticoagulation
 - Infection : long term immunosuppression
 - Prolong surgery : patient discomfort

Anesthesia for kidney transplant (Preparation & Premedication)

- NPO
- Warmed IV fluid : Crystalloid
- Post op ICU
- Aspiration Prophylaxis : H2 blocker & Metoclopramide
- Anxiolysis: Midazolam
- **NEW all equipment and drugs including sodalime**
- Informed consent
- Blood component : LDPRC

Anesthesia for kidney transplant (Altered renal function & Effect)

- Most drugs employed during anesthesia partly dependent on renal excretion
- The systemic effects of azotemia potentiate the pharmacological actions
 - Low albumin levels : increase free fraction of available drugs
 - Uremia : increase the levels of unbound drug crossing the BBB into CNS
 - Depressant effects of metabolic toxins on CNS have synergistic effect with anesthetic drugs.

Anesthesia for kidney transplant (Medication)

	Use	Avoid
IV induction	Propofol Thiopental	Etomidate
RSI	Rocuronium Succinylcholine	
NMBD	Cis-atracurium Atracurium	Pancuronium Sugammadex
Volatile anesthetic	Desflurane Isoflurane	Sevoflurane Enflurane
Opioids	Fentanyl Remifentanyl	Morphine

Anesthesia for kidney transplant (Fluid therapy)

- Post-dialysis patients : status intravascular volume depletion.
- To optimize cardiac output and renal blood flow.
 - SBP: 130-160 mmHg
 - CVP: 10-14 mmHg
 - Mean PA pressure: 18-20 mmHg
- It is critical that patients are well hydrated, as renal function is critically dependent on renal perfusion.

Anesthesia for kidney transplant (Fluid therapy)

- Normal saline : controversial due to hyperchloremic metabolic acidosis leading to **hyperkalemia**
- Preferred : balanced crystalloids (aware of Potassium containing fluid)
- Fluids are warmed before administration
- **Larger volumes may be required**, and patients should be kept normothermia

Anesthesia for kidney transplant (Fluid therapy)

- Albumin : suggest an improvement in short-term and long-term outcome in renal transplant surgery patients after volume expansion with human albumin , **routine use not recommended**
- HES should be **used with caution** and reserved for special indications, such as the need for large volumes of fluid or for an increase in colloid osmotic pressure

Anesthesia for kidney transplant (Fluid therapy)

- 20% Mannitol
 - 200 to 250 ml immediately before reperfusion
 - **Improve renal perfusion pressure** , acts as a free radical scavenger, decreased incidence of impaired renal function immediately after transplant
- Furosemide role is controversial
 - Two large RCTs **did not show any benefit of furosemide** on the recovery from renal failure in patients with oliguria

Anesthesia for kidney transplant (Postoperative)

- Renal transplant recipients should be reversed and extubated once the established criteria for extubation is fulfilled and there is no concern for airway protection
- In general, renal transplant patients are postoperatively nursed in a high-dependency unit

Anesthesia for kidney transplant (Postoperative)

- Supplemental O₂
- Avoid hypotension and hypovolemia
 - Continuous monitoring of PPV, ABP and CVP
- Strict monitoring of urine output
 - Decrease strongly suggests mechanical impingement of graft , vessel or ureter
 - Sudden decrease in urine output may require surgical re-exploration
- Nephrotoxic agents should be avoided
- Postoperative pain is usually mild to moderate.

Anesthesia for kidney transplant (Immunosuppressive drug)

- Immunosuppression strategies aim to prevent graft rejection
- Form a vital part in the management of renal transplant patients
- Immunosuppression regimens differ from center to center, anesthesiologists must communicate with the transplant team to obtain the schedule of immunosuppressive agents used for each patient

Anesthesia for kidney transplant (Immunosuppressive drug)

- Steroids
- Calcineurin inhibitors(CNI)
 - Cyclosporin, Tacrolimus
- Target of rapamycin(TOR) inhibitors
 - Sirolimus, Everolimus
- Polyclonal antibodies
 - Anti-lymphocyte globulin
- Monoclonal antibodies
 - IL-2, Daclizumab, Basiliximab, OKT 3
- Purine synthesis inhibitors
 - Azathioprine

R₂₋₃ Preoperative preparation

Preoperative preparation

- NPO AMN
- Informed consent
- Large bore IV
- Warm IV fluid : NSS
- Preparation whole abdomen and shave perineum
- G/M LPRC 2 U, FFP 2 U, Platelets 2 U
- Pressure bags
- Force air warmer
- Check ICU post-op

Preoperative preparation

- Machine : new circuit, change soda-lime
- No reused medication
- A-line at Lt. Radial artery
- C-line : triple lumen at Rt. Internal jugular vein depth 14 cm
- Infusion/syringe pump
- Check BW, history of CAPD

Preoperative preparation

- Premedication
 - Antihypertensive drug : Manidipine (20) 1 tab
 - Aspiration prophylaxis : Ranitidine 50 mg IV
Metoclopramide 10 mg IV

Intraoperative management

Anesthetic goals

- Optimize perfusion to renal
 - SBP: 130-160 mmHg
 - CVP: 10-14 mmHg
 - Mean PA pressure: 18-20 mmHg
- Minimizes myocardial stress
- Keep normovolemia
- Anesthesia consideration in ESRD

Phramongkutklo Hospital Anesthetic Record

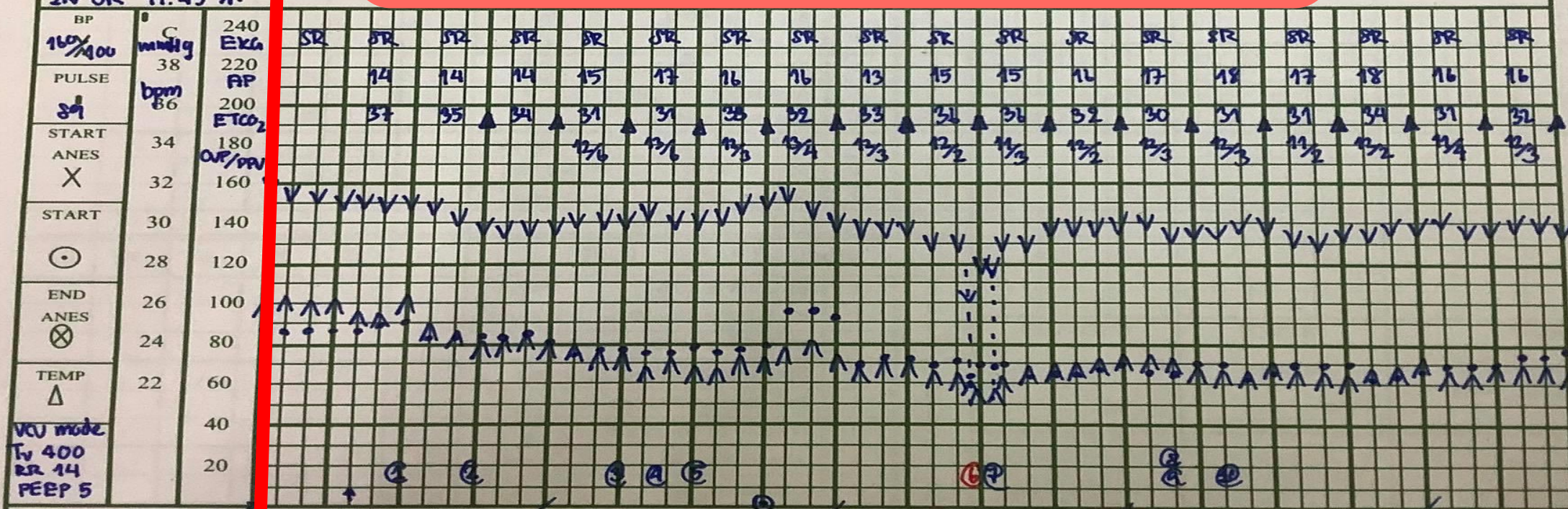
Date 13/10/20 HN 16670/44 AN 21332/63
 Name นายสิริวัฒน์ นาคอย อายุ 24 Sex ชาย
 Ward ICU MED2 Code 30 LHM Op. No. Emer.
 Anesthetic technique GA & ETT & RSJ & Service. Sx I, Uro
 Remark not Penicillin ผื่น. Cricoid pressure.

ASA 1 2 ③ 4 5 ⑥ WT. 49 kg. HT. 174 cm. Hct. 30.8%
 BI. Group BI. Request PRC 2 unit
 PRE-Medication Ranitidine 50 mg IV.
 Phasil 10 mg IV.
 Monitoring: NIBP, (Sat), EKG, ETCO₂, A line, (VP), PAP, (TEMP), (PPV).
 Other Force air warmer ROOM No. Hybrid

AGENTS/TIME	11.45	12.00	13.00	14.00	15.00	16.00
N ₂ O						
O ₂	6					
Desflurane						
Nimbex						
Fentanyl						
Ephedrine						
O ₂ sat	100%	100				
IV FLUID INTAKE IN OR 11.45 H.						

Patient in OR 11.45
 - Monitor : NIBP, EKG, ETCO₂, O₂sat
 - V/S : BP 160/100 mmHG, HR 89/min, O₂sat 100%

- CONSENT
 YES
 NO
- PRE - OP VISIT
 YES
 NO
- POSITION
 SUPINE
 PRONE
 LITHOTOMY
 SITTING
 TRENDEL
 R. LATERAL
 L. LATERAL
 JACK-KNIFE
 OTHER



URINE BLOOD FLUID N.S 1000 ml enar.
 IV. CATH. NO. 22, 18 SITE RH, RH.
 TOTAL URINE OUTPUT 40 ml

Phramongkrtkiao Hospital Anesthetic Record

Date 13/10/20 HN 16670/44 AN 21332/63
 Name นายสิริวัฒน์ นันทชัย Age 24 Sex ชาย
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AGENTS/TIME		11.45	12.00
N ₂ O			15
O ₂		6	0.5
Desflurane	%		6
Nimbex	mg		8
Fentanyl	mcg	50	
Ephedrine	mg		
O ₂ sat	100%	100	100
IV FLUID INTAKE		NSS	20
IN OR 11.45 H.			
BP	mmHg	160/90	140/90
PULSE	bpm	38	34
START ANES		X	
START		30	30
END ANES		26	24
TEMP		36	36
VCV mode			
Tv		400	
RR		14	
PEEP		5	

AT 12.00

- Preoxygenation 5 min
- Induction agent : Propofol 100 mg
- Intubation agent : Succinylcholine 100 mg

Intubation at 12.05

- ETT No. 7.5, Depth 21 cm, LV grade I
- Muscle relaxant : Cisatracurium 8 mg
- Maintenance : O₂ : N₂O = 0.5 : 0.5 + Desflurane up to 6 %

Ventilator setting

- VCV mode : V_T 400 ml RR 14/min PEEP 5 cmH₂O I:E 1:2

16.00	
BP	80/50
PULSE	16
START ANES	31
START	30
END ANES	26
TEMP	36
URINE	
BLOOD	
FLUID	
NSS 1000 ml	

- CONSENT
- YES
- NO
- PRE - OP VISIT
- YES
- NO
- POSITION
- SUPINE
- PRONE
- LITHOTOMY
- SITTING
- TRENDEL
- R. LATERAL
- L. LATERAL
- JACK-KNIFE
- OTHER
- LAB
- Hct.
- Blood Sugar
- Electrolyte
- ABG
- TOTAL URINE OUTPUT 40 ml

Phramongkutklao Hospital Anesthetic Record

Date 13/10/20 HN 16670/44 AN 21332/63
 Name นายสิริวัฒน์ นันทอง Age 24 Sex ♂
 Ward ICU MED2 Code 30 LHM Op. No. Emer.
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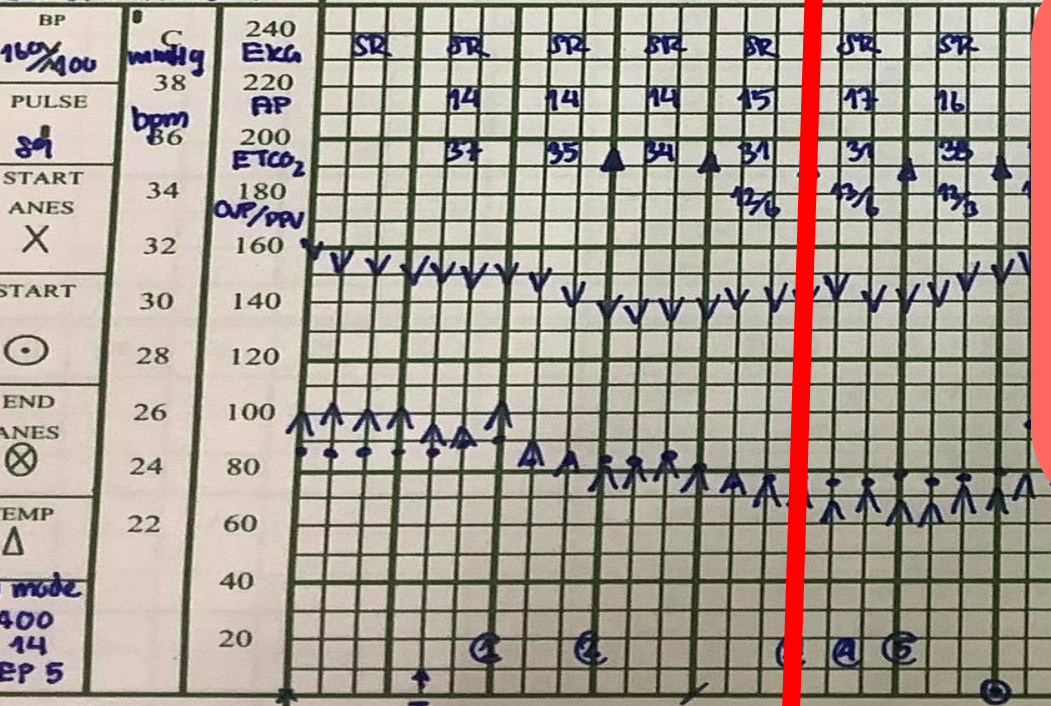
AGENTS/TIME	11.45	12.00	13.00	14.00	15.00	16.00
N ₂ O		1.5	X	X	X	X
O ₂	6	0.5	0	0	0	0
Desflurane %		6				
Nimbex mg		6				
Fentanyl mcg		50				
Ephedrine mg					6	
O ₂ sat 100%	100	100	100	100	100	100

CONSENT
 YES
 NO

PRE - OP VISIT
 YES
 NO

POSITION

IV FLUID INTAKE IN OR 11.45 H. NSS 200 ml → NSS 150 ml



- A-line at Lt.dorsalis pedis (No.20) at 13.00
 - C-line at Rt.Internal jugular vein at 13.10

AT 13.20
 - Basilliximab 1 mg + NSS 50 ml via C-line drip in 30 min

URINE BLOOD FLUID NSS 1000 ml enan. IV. CATH. NO. 22, 18 SITE RH, RH. TOTAL URINE OUTPUT 40 ml

Phramongkutkiao Hospital Anesthetic Record

Date 13/10/20 HN 16670/44 AN 2132/163
 Name นายสิริวัฒน์ นันทวงษ์ Age 24 Sex ♂
 Ward ICU MED2 Code 30 LHM Op. No. Emer.
 Anesthetic technique GA & ETT & RSJ & Service Sx I, Uro
 Remark not Penicillin: งดให้. Cricoid pressure.

ASA 1 2 ③ 4 5 ⑥ WT. 49 kg. HT. 174 cm. Hct. 30.8%
 BI. Group BI. Request PRC 2 unit
 PRE-Medication Ranitidine 50 mg IV.

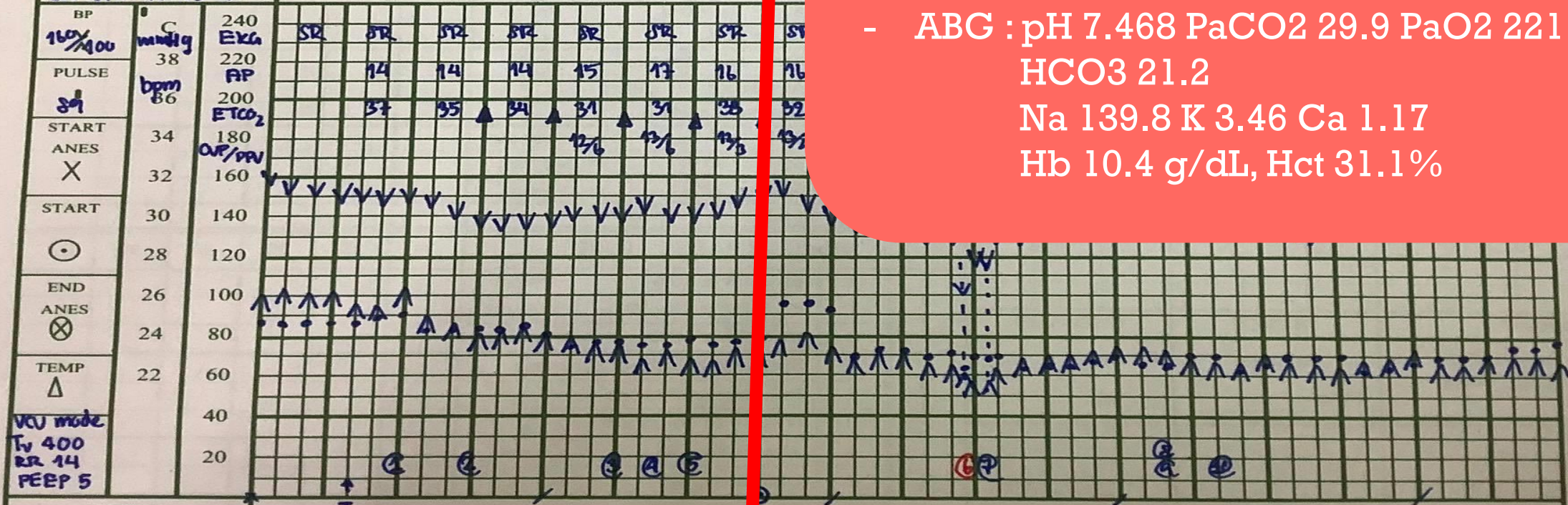
AGENTS/TIME	11.45	12.00	12.15	12.30	12.45	13.00	13.15	13.30	13.45
N ₂ O				X	X	X	X	X	X
O ₂	6	6.5	6	6	6	6	6	6	6
Desflurane %		6	6	6	6	6	6	6	6
Nimbex mg		6	6	6	6	6	6	6	6
Fentanyl mcg		50	50	50	50	50	50	50	50
Ephedrine mg									
O ₂ sat 100%	100	100	100	100	100	100	100	100	100
IV FLUID INTAKE IN OR 11.45 H.	NSS	200	ml	NSS	150	ml			

AT 13.30

- Start operation
- Fentanyl 50 mcg IV
- V/S : BP 145/75 HR 80/min O₂sat 100%

AT 13.40

- ABG : pH 7.468 PaCO₂ 29.9 PaO₂ 221.8
 HCO₃ 21.2
 Na 139.8 K 3.46 Ca 1.17
 Hb 10.4 g/dL, Hct 31.1%



URINE BLOOD FLUID NSS 1000 ml enan. IV. CATH. NO. 22, 18 SITE RH, RH. TOTAL URINE OUTPUT 40 ml

Phramongkutklao Hospital Anesthetic Record

ASA 1 2 ③ 4 (E) WT. 49 kg. HT. 174 cm. Hct. 30.8%

Date 13/10/97
 Name KUN
 Ward ICU
 Anesthetic tech
 Remark not Per

BI. Request PRC 2 unit
 Ranithidine 50 mg IV.
 Phosf 10 mg IV.
 (Sat) (KKG) (ETCO₂) (A line) (VP) (PAP) (TEMP) (PPV)

AT 14.15

- Heparin 1,500 u via C-line

AT 15.00

- 20% Mannitol 200 ml IV drip
 - Lasix 250 mg IV

AGENTS/TIM
 N₂O
 O₂
 Desflurane
 Nimdex
 Fentanyl
 Ephedrine
 O₂sat

ROOM No. Hybrid

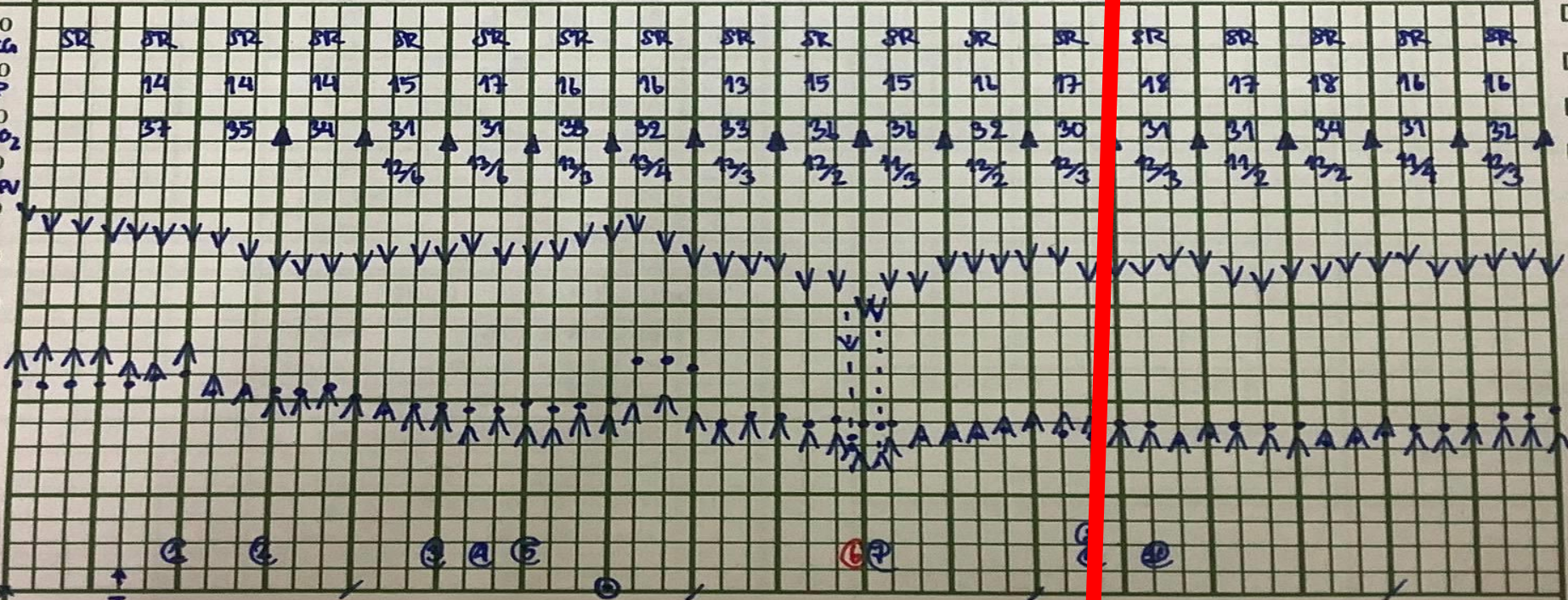
15.00	15.10	15.20	15.30	15.40	15.50	16.00	16.10	16.20	16.30	16.40	16.50
X	X	X	X	X	X	X	X	X	X	X	X
100	100	100	100	100	100	100	100	100	100	100	100

NS 100 ml NS 100 ml

- CONSENT
- YES
- NO
- PRE - OP VISIT
- YES
- NO
- POSITION
- SUPINE
- PRONE
- LITHOTOMY
- SITTING
- TRENDEL
- R. LATERAL
- L. LATERAL
- JACK-KNIFE
- OTHER

IV FLUID INTAKE IN OR 11.45 H.

BP 160/100
 PULSE 84
 START ANES X
 END ANES X
 TEMP Δ
 VCU mode
 Tv 400
 RR 14
 PEEP 5



URINE
 BLOOD
 FLUID NS 1000 ml enar.

IV. CATH. NO. 22, 18

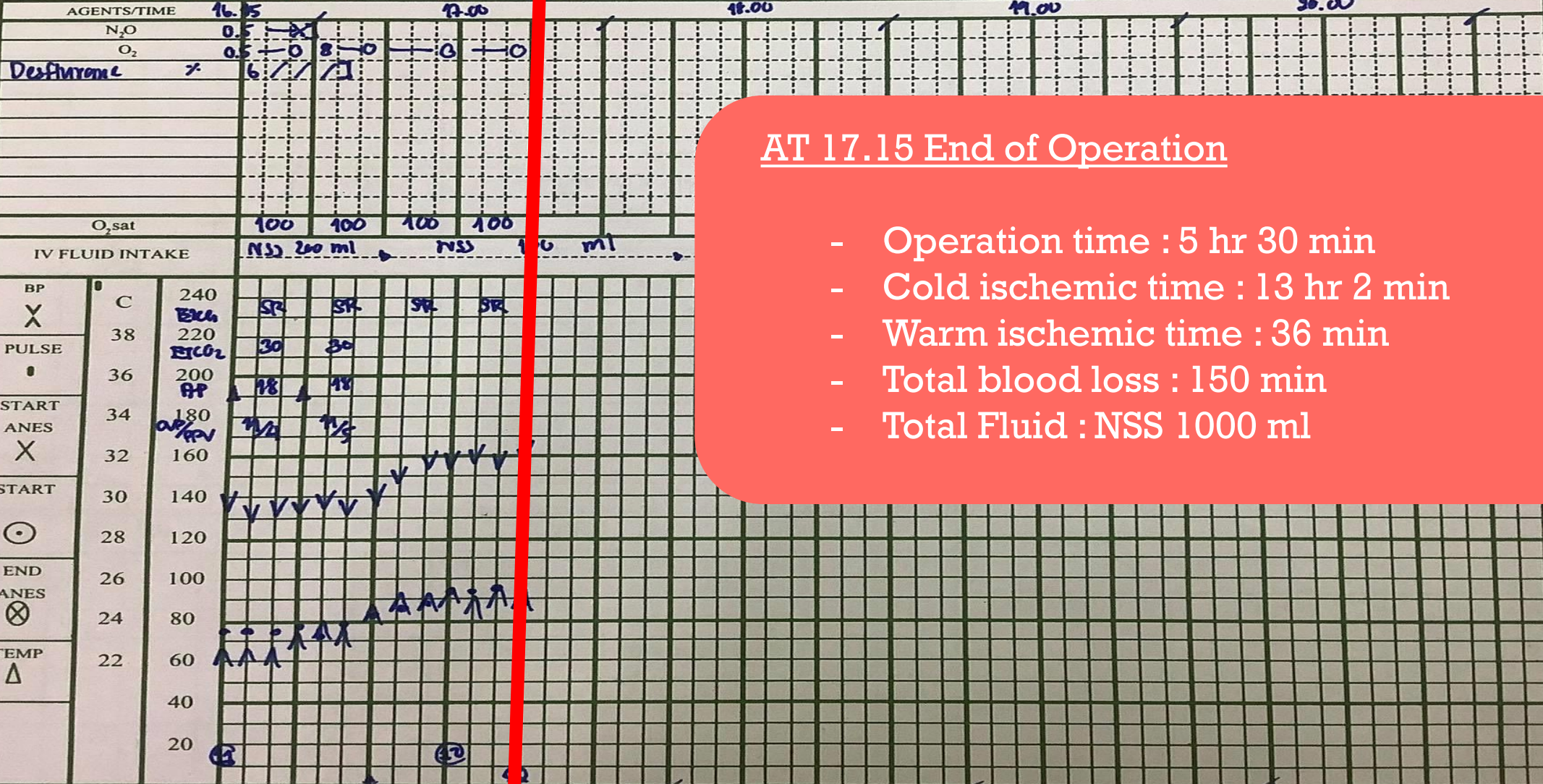
SITE RH, RH.

TOTAL URINE OUTPUT 40 ml

Phramongkutklo Hospital Anesthetic Record

Date 13/10/20 HN. 16670/4 AN. 21332/63
 Name นางสาวณัฐพร นาคอ Age 24 Sex ♀
 Ward _____ Code _____ Op. No. Emer
 Anesthetic technique GA 8ETT & RSI & Service Sr I, Uro
 Remark ให้ Penicillin : 1000000 Circled pressure

ASA 1 2 3 4 5 E WT. 29 kg HT. 174 cm Hct. 30.8 %
 BI. Group _____ BI. Request PRC 2 unit.
 PRE-Medication Ramithidin 50 ug IV.
Plasol 10 ug IV.
 Monitoring : NIBP, O₂ sat, EKG, ETCO₂, A-line, CVP, PAP, TEMP, IPV.
 Other Force air warmer. ROOM No. Hybrid



AT 17.15 End of Operation

- Operation time : 5 hr 30 min
- Cold ischemic time : 13 hr 2 min
- Warm ischemic time : 36 min
- Total blood loss : 150 ml
- Total Fluid : NSS 1000 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
 Electrolyte
 ABG

TOTAL URINE

URINE FC 2 way #20 1st urine 40 ml.

Postoperative Period

Postoperative Evaluation

- Supplemental O₂
- Avoid hypotension and hypovolemia
- Continuous monitoring of PPV, ABP and CVP
- Strict monitoring of urine output
 - Decrease strongly suggests mechanical impingement of graft , vessel or ureter
 - Sudden decrease in UO may require surgical re-exploration
- Postoperative pain is usually mild to moderate.

Postoperative Day 1

- **S :** ผู้ป่วยตื่นดี ปวดแผลเล็กน้อย **PS at rest = 2, PS at movement = 3**, ไม่เหนื่อย ไม่นอนราบ ปัสสาวะออก
- **O :** **BT 37.2 °C, RR 18/min, BP 147/63 mmHg, HR 80/min, O2 sat 100%**
I/O : 3,325/916 Cr 8.5
- **A :** **S/P CDKT post-op d1 ; Clinically stable**
- **P :** **Morphine 3 mg IV prn for pain q 4 hr**

Postoperative Day 2

- **S :** ผู้ป่วยตื่นดี ปวดแผลเล็กน้อย **PS at rest = 2, PS at movement = 2**, ไม่เหนื่อย ไม่นอนราบ ปัสสาวะออกน้อย
- **O :** **BT 37.0 °C, RR 16/min, BP 142/72 mmHg, HR 76/min, O2 sat 100%**
I/O : 3,250/425 Cr 9.5
- **A :** **S/P CDKT post-op d2 ; Low urine output ddx. Delayed graft function**
- **P :** **Set Acute hemodialysis**
Observe urine output

Postoperative Day 5

- **S :** ผู้ป่วยตื่นดี ปวดแผลเล็กน้อย **PS at rest = 0, PS at movement = 1**, ไม่เหนื่อย ไม่นอนราบ ปัสสาวะออกมากขึ้น
- **O :** **BT 37.0 °C, RR 18/min, BP 138/68 mmHg, HR 78/min, O2 sat 100%**
I/O : 2,875/2,550 Cr 6.6
Kidney biopsy : ATN, No evidence of acute rejection
- **A :** **S/P CDKT post-op d5 ; Clinically stable**
- **P :** **Observe urine output**
Fluid replacement

Postoperative Day 12

- **S :** ผู้ป่วยตื่นดี ปวดแผลเล็กน้อย **PS at rest = 0, PS at movement = 1**, ไม่เหนื่อย ไม่นอนราบ ปัสสาวะออกปกติ
- **O :** **BT 37.0 °C, RR 18/min, BP 138/68 mmHg, HR 78/min, O2 sat 100%**
I/O : 3,125/2,880 Cr 4.3
- **A :** **S/P CDKT post-op d12 ; Clinically stable**
- **P :** **Discharge**



Thanks you