

# INTERESTING CASE

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R3 ภัควิภา สุทธิยุทธ์

อ.กฤษณะ นองเนื่อง

# Case

- A 64 years old man
- Diagnosis : Juxtarenal Abdominal Aortic Aneurysm
- Operation : Open repair AAA

# Patient's history

- 2 ปี PTA : Incidental finding จาก CTA abdominal aorta พบ juxtarenal AAA และ infrarenal AAA F/U CT พบว่ามีขนาดใหญ่ขึ้น จึงนัดมา admit เพื่อทำการผ่าตัด
- CTA abdominal : fusiform juxtarenal AAA size 5.9 x 5.7cm
-

# R 1 ชักประวัติเพิ่มเติม

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# Comorbidities

- Hypertension
- Coronary artery disease
- Stroke and TIA
- Diabetes mellitus
- Renal insufficiency

# Risk factor aneurysm

- Older age
- Male
- Family history of AAA
- Smoking
- Hypertension
- Hyperlipidemia
- Atherosclerotic occlusive disease
- Obesity

# Patient's history

- ไม่มีเจ็บแน่นหน้าอก
- เหนื่อยเท่าๆเดิม
- ไม่มีประวัติหอบ หน้ามืด หมดสติ
- นอนราบหนุนหมอน **1-2** ใบ เท่าๆเดิม
- ไม่มีแขนขาอ่อนแรง
- ปัสสาวะออกปกติ ไม่มีชาบวม
- **FC II**

# Past history

- Underlying disease
  - Dilated cardiomyopathy S/P CRT-D
  - CKD stage II
- Current medications
  - Aspirin (81) 1\*1 opc
  - Cavedilol (25) ½ \*1 opc
  - Amiodarone (200) 1\*1 opc
  - Spironolactone (25) 2\*1 opc
  - Entresto (sacubitril49/valsartan51) 1\*2 opc
  - Atrovastatin (40) ½ \*1 opc



# Past history

- Allergy : **Ultravist** ผื่นคัน
- No History alcohol drinking
- Quit smoking 1 years, smoking 40 pack years
- Previous surgery :
  - LC under GA 2019 : no complication
  - TEVAR under GA 2020 : heart failure , pneumonia
  - ERCP under GA 2021 no complication

# R 1 PHYSICAL EXAMINATION

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# Physical examination

- Vital signs
  - BP 109/69 mmHg    PR 85 BPM
  - BT 36°C                      RR 16 BPM
- BW 69 kg, Height 165 cm (BMI 25.34 Kg/m<sup>2</sup>)
- GA : An old Thai male, good consciousness, well co-operated

# Physical examination

- Airway examination :
  - Limit neck of motion : No
  - Thyromental distance  $> 6$  cm
  - Mouth opening  $> 3$  cm
  - Upper lip bite test : Class 1
  - Prominent incisor : No
  - Mallampati grade : Grade 2

# Physical examination

- HEENT : Not pale conjunctivae, anicteric sclerae , no carotid bruits
- Lung : Equal breath sound both lungs, no use of accessory muscle, **no adventitious sound**
- Lt. clavicular area : CRT-D device
- Heart : Pulse full & regular, no heaving, no thrill, normal S1&S2, no murmurs , no neck vein engorgement

# Physical examination

- Abdomen : Soft, not tender, **liver & spleen can not palpable** , **pulsatile mass size 4\*4 cm**
- Back : Normal spine alignment , no local skin infection , no skin dimple
- Extremities : **No pitting edema**
- Neuro : E<sub>4</sub>V<sub>5</sub>M<sub>6</sub>, no facial palsy, full EOM, pupil 2 mm RTLBE, sensory intact, motor grade V/V all, DTR 2<sup>+</sup>all

# R 1 INVESTIGATION

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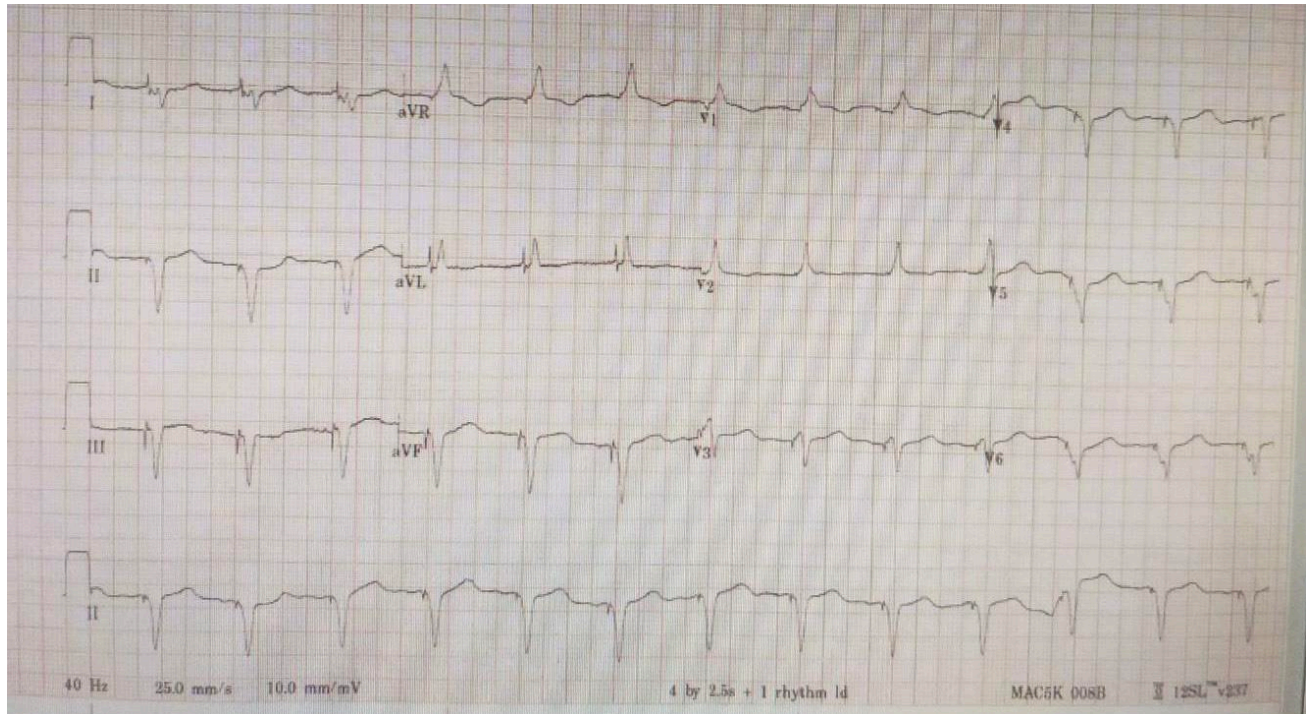
# Investigation

- CBC: Hb 11.8 gm/dl      Hct 37.2%  
    Platelet 198,000/mm<sup>3</sup>
- Electrolytes: Na 143.7 mEq/l      K 4.21 mEq/l  
    Cl 110.3 mEq/l      CO<sub>2</sub> 24.1 mEq/l
- BUN: 12.5 mg/dL Cr: 1.22 mg/dL
- GFR: 62.26 mL/min/1.73m<sup>2</sup>
- Coagulogram PT/INR 11.3/0.97    aPTT 23.5/0.92  
    TT 14.1/0.93



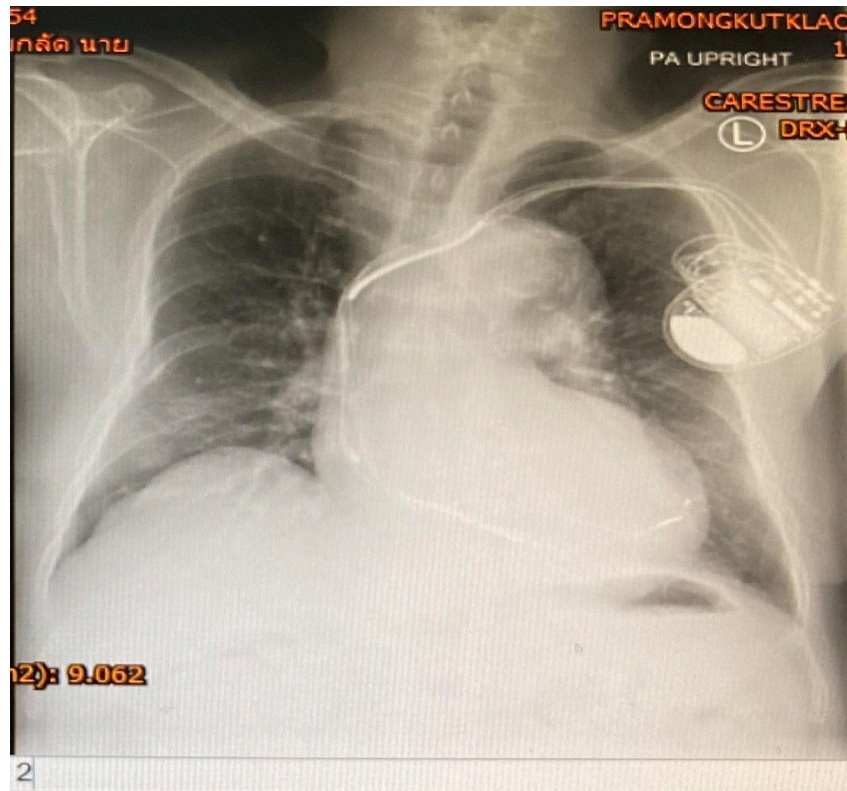
# Investigation

- EKG : electronic pacemaker, HR 80 bpm, no ST-T change



# Investigation

- CXR : CRT-D at Lt. chest wall, **Cardiomegaly**, No infiltration



# Investigation

- Echocardiogram :
  - LVEF 35-40% with global wall hypokinesia
  - No dilate LV
  - No significant valvular pathology

# Investigation

- CTA abdominal aorta (12 Jul 2021)
- Slightly increase in size of fusiform juxtarenal AAA 5.9\*5.7cm from 5.7\*5.7cm(21/01/2021)with no significant change inn thickness of intramural thrombus

# R 1 PROBLEM LIST & ASA CLASSIFICATION

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# Problem list

- Asymptomatic Juxtarenal Abdominal Aortic Aneurysm
- Underlying disease
  - Dilated cardiomyopathy S/P CRT-D
  - Hypertension
  - CKD stage II
- Ultravist allergy
- History of heart failure & pneumonia
  
- ASA 3

# R 2 PREOPERATIVE EVALUATION

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# Dilated Cardiomyopathy

- On CRT-D
  - Last check 4 months PTA
  - DDDR mode rate 60-120 bpm
  - Pacing 100%
  - No episode of arrhythmia
- Echocardiogram :
  - LVEF 35-40% with global wall hypokinesia
  - No dilate LV
  - No significant valvular pathology
- **Clinical** : เหนื่อยบ่อยๆเดิม นอนหอนๆเหมือนเท่าๆเดิม ไม่มีใจสั่น ไม่มีแน่นหน้าอก ไม่มีขาบวม
- Volume status : Euvolemia

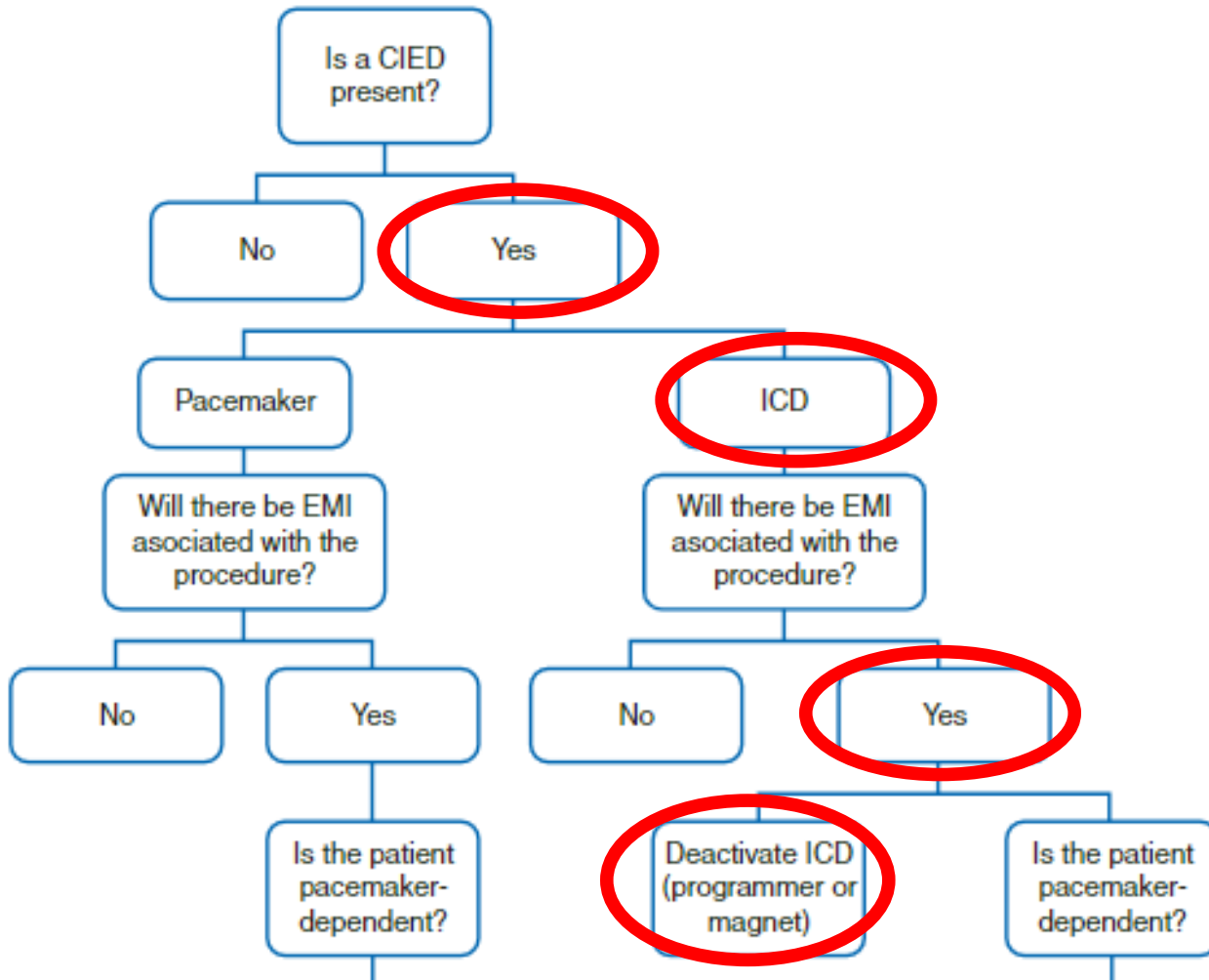


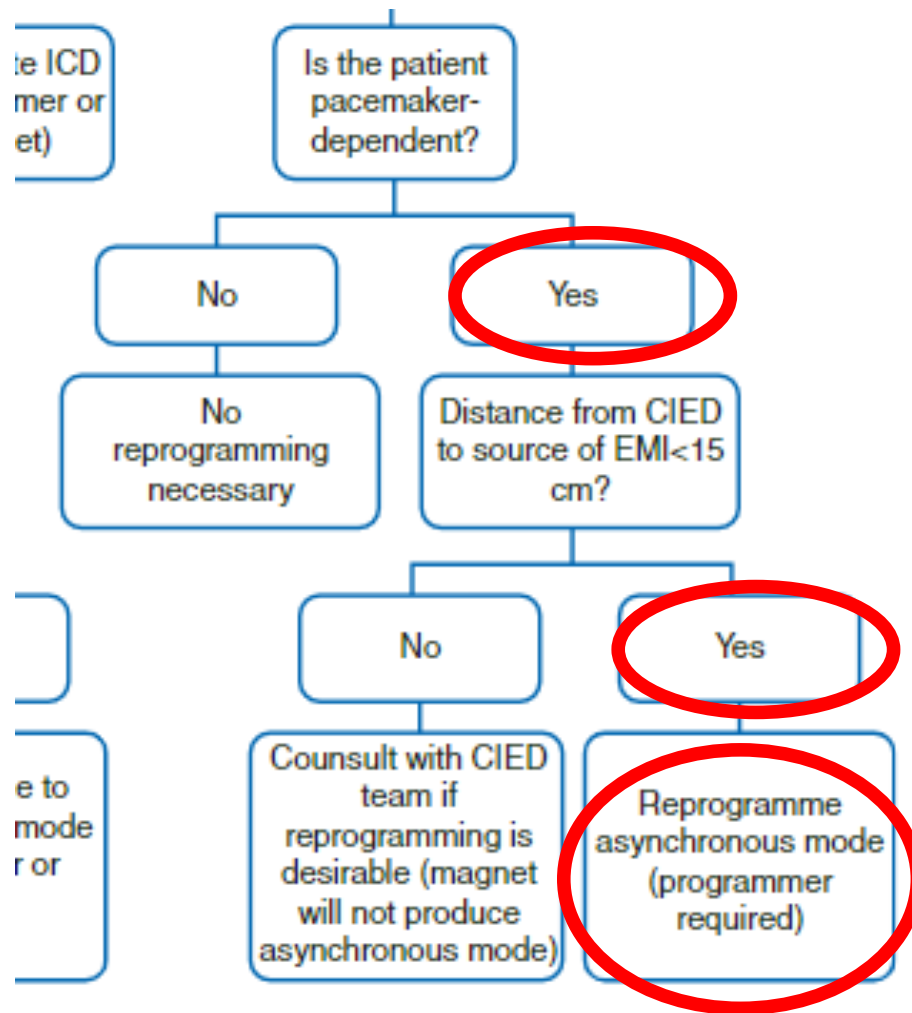
# Hypertension

- Baseline BP 100-110/60 mmHg
- Current medications
  - Cavedilol (25) ½ \*1 opc
  - Amiodarone (200) 1\*1 opc
  - Spironolactone (25) 2\*1 opc
  - Entresto (sacubitril49/valsartan51) 1\*2 opc
- Pre medication
  - Cavedilol (25) ½ \*1 opc
  - Amiodarone (200) 1\*1 opc

# Patients with CIEDs

- Pacemaker : checked within the last 12 months
- ICD : checked within last 6 months





# Chronic kidney disease [stage II]

- Baseline Creatinine 1.1–1.3 mg/dl
- GFR 60-70 ml/min/1.73m<sup>2</sup>

# Ultravist allergy

- **Mild** immediate hypersensitivity reactions (rash)
- Use a different contrast agent
- Premedication

**TABLE IV.** Premedication for prophylaxis of reactions to radio-contrast media \*

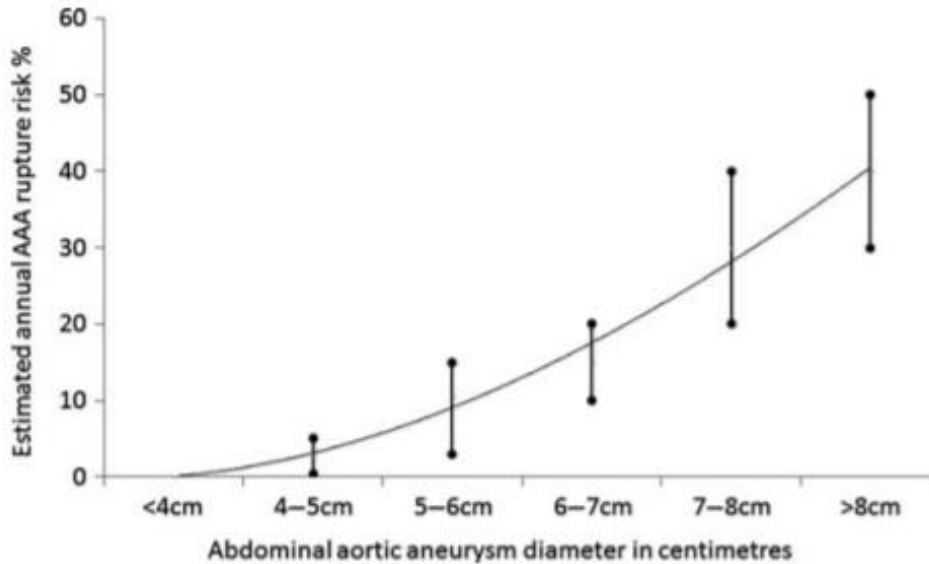
Time before injection (h)	Pretreatment	Recommended dose
13	Corticosteroid: prednisone	50 mg PO
7	Corticosteroid: prednisone	50 mg PO
1	Corticosteroid: prednisone	50 mg PO
1	Anti-H1 antihistamine: diphenhydramine	1 mg/kg PO or IM

*IM*, Intramuscular route; *PO*, oral administration.

\*Modified from Greenberger and Patterson.<sup>28</sup>

# Abdominal Aortic Aneurysm

- Indication for surgery > 5.5cm



**Fig 1** Estimated annual rupture risk according to aneurysm size. The vertical lines represent the range of mean values for the annual risks of AAA rupture from published series; the curved line indicates the polynomial trend of these mean values. Figure created using data from Brewster *et al.*<sup>8</sup>

# Cardiac assessment [ACC/AHA 2014]

- Revised cardiac risk index
  - High-risk surgery
  - History of ischemic heart disease
  - History of congestive heart failure
  - History of cerebrovascular
  - Pre-operative treatment with insulin
  - Pre-operative creatinine >2
  
- RCRI score = 2



# Revised cardiac risk index

RCRI Score	Risk of major cardiac event
• 0	0.4%
• 1	0.9%
• 2	6.6%
• $\geq 3$	$>11\%$

1

Patient scheduled for surgery with known or risk factors for CAD\* (Step 1)

Emergency

Yes → Clinical risk stratification and proceed to surgery

No

2

ACS† (Step 2)

Yes → Evaluate and treat according to GDMT†

No

3

Estimated perioperative risk of MACE based on combined clinical/surgical risk (Step 3)

Low risk (<1%) (Step 4)

No further testing (Class III:NB)

Elevated risk (Step 5)

Moderate or greater (≥4 METs) functional capacity

No or unknown

Excellent (>10 METs)

Moderate/Good (≥4-10 METs)

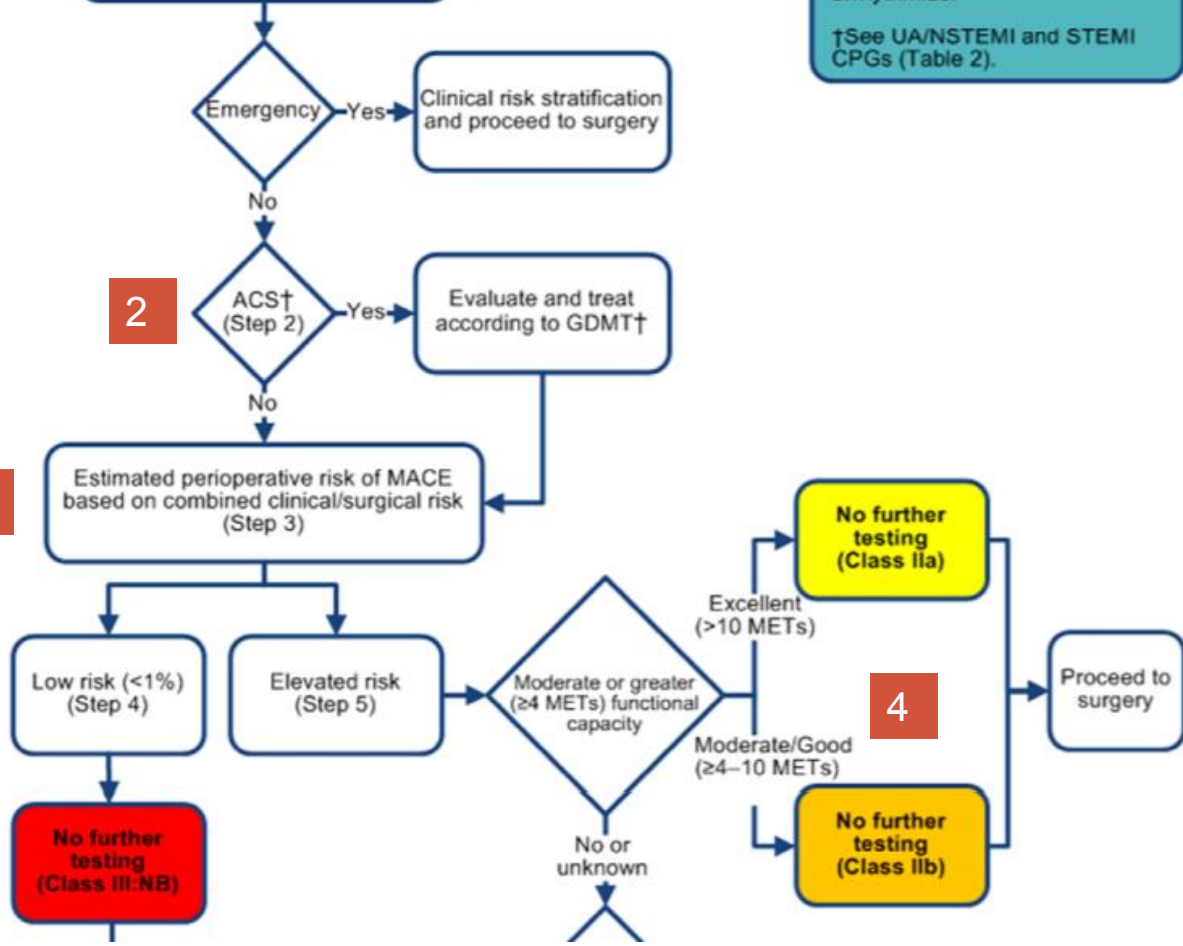
No further testing (Class IIa)

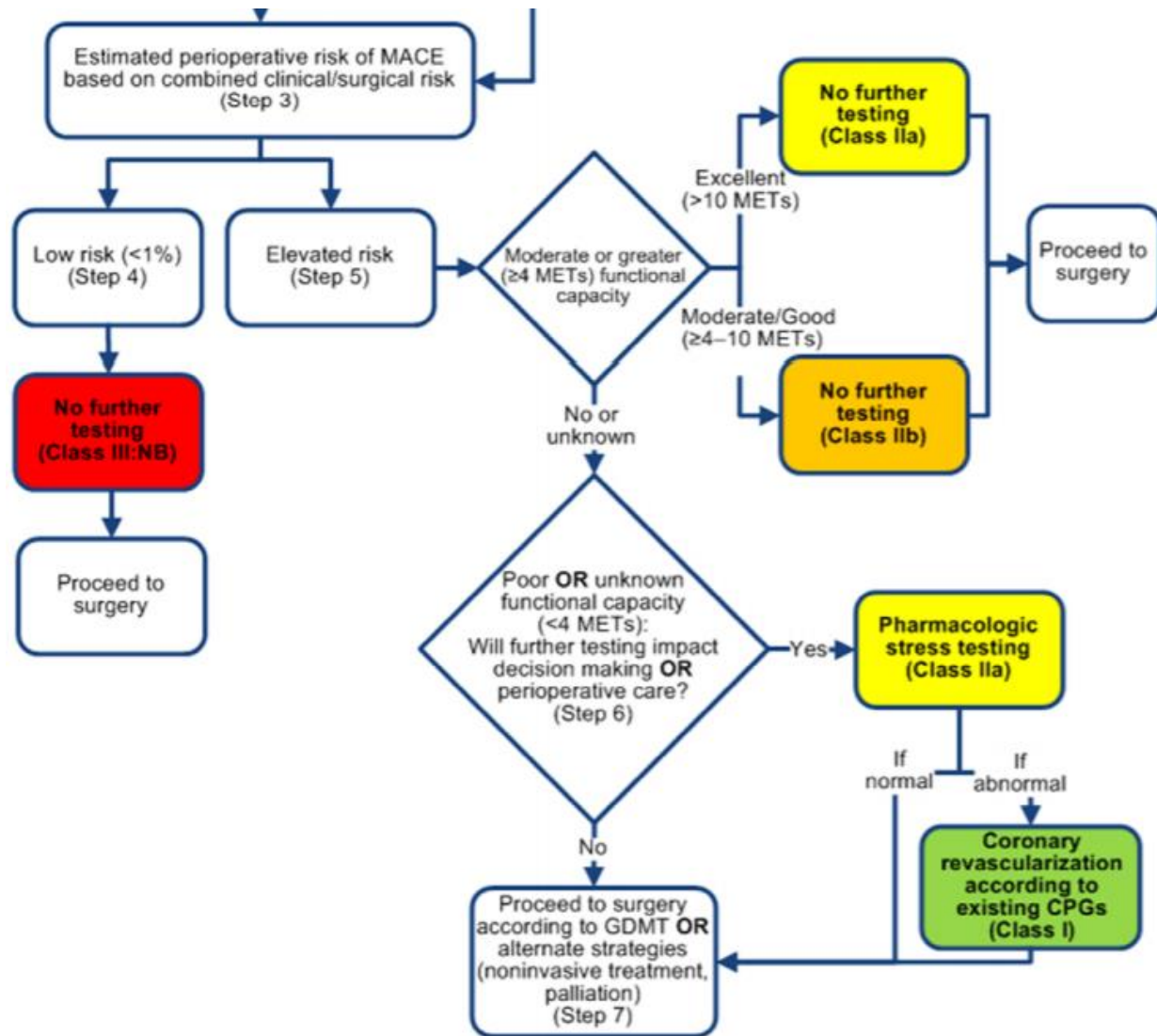
No further testing (Class IIb)

4

Proceed to surgery

\*See Sections 2.2, 2.4, and 2.5 in the full-text CPG for recommendations for patients with symptomatic HF, VHD, or arrhythmias.  
†See UA/NSTEMI and STEMI CPGs (Table 2).





# R 2 PREPARATION & PREMEDICATION

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# Preparation

- Informed consent
- NPO
- CRT-D > change asynchronous mode , off defibrillation function
- External pads
- Blood components
- Large-bore iv fluids
- Warming device
- Cell salvage
- Ranger infusion warmer
- Intraoperative monitoring ; Standard, Invasive, Specific
- Medication ; Inotropes, vasopressor, vasodilator
- ICU

# Premedication

- Off ASA
- Continue
  - Cavedilol (25)  $\frac{1}{2}$  \*1 opc
  - Amiodarone (200) 1\*1 opc

# R3 ANESTHETIC CONSIDERATION

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# Choice of anesthesia

- General anesthesia ETT with Controlled ventilation
- General anesthesia combined epidural analgesia



# Choice of anesthesia

	Advantage	disadvantage
General anesthesia	<ul style="list-style-type: none"><li>-Control ventilation</li><li>-Adequate anesthesia</li><li>-stable hemodynamic</li></ul>	<ul style="list-style-type: none"><li>-Insufficient postoperative pain control</li></ul>
GA combined epidural anesthesia	<ul style="list-style-type: none"><li>-Adequate postoperative analgesia</li><li>-Decrease the incidence of hypertension</li></ul>	<ul style="list-style-type: none"><li>-Risk of epidural hematoma</li><li>-Delay detect sensory/motor deficit</li><li>-Timing of removal catheter</li><li>-Hypotension at unclamping</li></ul>

# Epidural technique

- Can not reduction incidence of
  - Cardiovascular complication
  - Pulmonary complication
  - Renal complication
- No major advantage/disadvantage over GA and IV PCA

# Peripheral nerve block

- TAP blocks
- Rectus Sheath block
- Quadratus lumborum block
- Erector spinae plane block
- Paravertebral block

# Peripheral nerve block

- Advantage

- Analgesic efficacy
- Decrease opioids

- Disadvantage

- LAST
- Hematoma formation
- Lower extremity weakness (TQLB)

# Anesthetic consideration

- AICD
- Prevent aneurysm rupture
- Aortic cross-clamping
- Aortic unclamping
- Organ protection
- Hypothermia
- Contrast induced nephropathy
- Postoperative analgesia

# AICD

- Electromagnetic interference
- EMI–CIED interactions
- Management
  - Change asynchronous mode : **DOO rate 60 bpm**
  - Off defibrillation function
  - External pads

# Prevent aneurysm rupture

- ABP monitoring before induction
- Gentle laryngoscopy and endotracheal intubation
- Adequate depth of anesthesia
- Blunt hemodynamic response

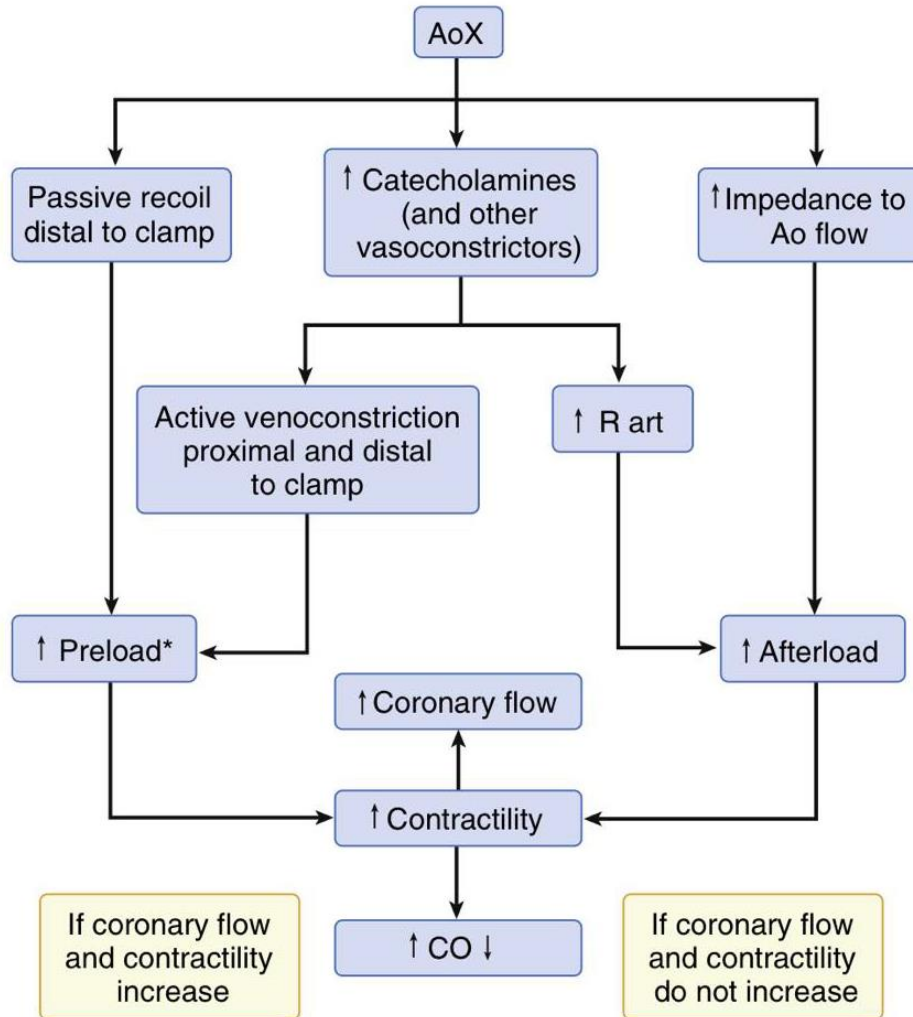
# Aortic cross-clamping

- Hemodynamic changes
  - ABP above clamp ↑
  - ABP below clamp ↓
  - Segmental wall motion abnormalities
  - Left ventricular wall tension ↑
  - Ejection function ↓
  - Cardiac output ↓
  - Renal blood flow ↓
  - Pulmonary occlusion pressure ↑
  - CVP ↑
  - Coronary blood flow ↑



# Aortic cross-clamping

- Metabolic changes
  - Total body O<sub>2</sub> consumption ↓
  - Total body CO<sub>2</sub> production ↓
  - Mixed venous O<sub>2</sub> saturation ↑
  - Total body O<sub>2</sub> extraction ↓
  - Epinephrine and Norepinephrine ↑
  - Respiratory alkalosis
  - Metabolic acidosis



# Aortic cross-clamping

**TABLE 56.5** Percent Change in Cardiovascular Variables on Initiation of Aortic Occlusion

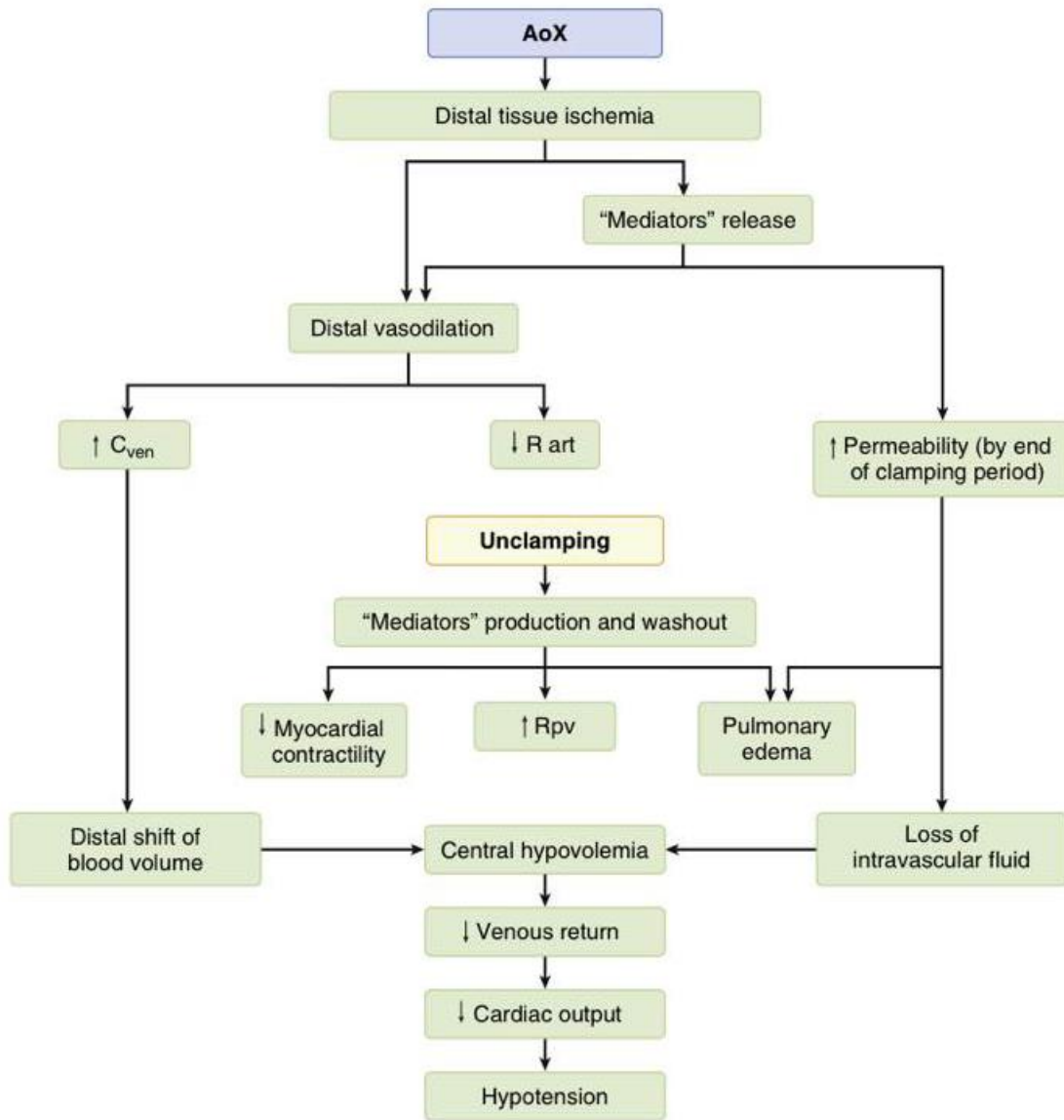
Cardiovascular Variable	PERCENT CHANGE AFTER OCCLUSION		
	Supraceliac	Suprarenal-Infraceliac	Infrarenal
Mean arterial blood pressure	54	5*	2*
Pulmonary capillary wedge pressure	38	10*	0*
End-diastolic area	28	2*	9*
End-systolic area	69	10*	11*
Ejection fraction	-38	-10*	-3*
Patients with wall motion abnormalities	92	33	0

# Aortic unclamping

- Hemodynamic changes
  - Myocardial contractility ↓
  - ABP ↓
  - Pulmonary artery pressure ↑
  - CVP ↓
  - Venous return ↓
  - Cardiac output ↓

# Aortic unclamping

- Metabolic changes
  - Total body O<sub>2</sub> consumption ↑
  - Lactate ↑
  - Mixed venous O<sub>2</sub> saturation ↓
  - Prostaglandins ↑
  - Activated complement ↑
  - Myocardial depressant factors ↑
  - Temperature ↓
  - Metabolic acidosis



# Aortic unclamping

- Close communication with surgical team
- Discontinue vasodilators before unclamping
- Avoid significant hypotension
- Administration of fluids and vasoactive drugs
- Replacement of blood loss
- Decrease volatile anesthetics
- Avoid hypertension : bleeding from anastomosis

# Organ protection

- Prevent myocardial injury
  - Balance O<sub>2</sub> demand–supply
  - Reduce afterload : SNP , clevidipine (reduce wall tension) , NTG



# Organ protection

- Prevent kidney injury :
  - Urine output cannot predict postoperative renal function
  - Mannitol , loop diuretics , dopamine : controversy
    - Disadvantage : hypovolemia > renal hypoperfusion
    - Dopamine : tachycardia > ↑ myocardial O<sub>2</sub> consumption
  - Maintain intravascular volume and hematocrit (most effective)
  - Avoid excessive intravascular volume > increase preload , pulmonary edema
  - Adequate renal perfusion
  - Avoid nephrotoxic

# Organ protection

- Prevent spinal cord ischemia (TAA repair)
  - Short aortic cross clamp time
  - Partial bypass
  - Hypothermia (mild)
  - Monitor SSEP , MEP
  - Lumbar drain
- Incidence of paraplegia in infrarenal aortic aneurysm repair 0.25%
  - Variation of artery of Adamkiwicz

# Hypothermia

- Warm blanket covers
- Room temperature set at 24°C
- Fluid warming
- Heat exchanger on the fresh gas flow

# Contrast induced nephropathy

- Risk factors for CIN
  - Pre-existing renal impairment
  - Diabetes mellitus
  - Peri-procedural intravascular depletion
  - Congestive heart failure
  - Volume and type of contrast administered
  - Concomitant use of other nephrotoxic drugs

# Prevention

- Hydration : 0.9% NaCl / NaHCO<sub>3</sub>
  - 1 ml/kg/hr for 12 hr before and after the contrast administration
  - Emergency procedures : 3 ml ml/kg/hr for 1 hr before ,1 ml/kg/hr for 6 hr after the contrast administration
- N-acetylcysteine
  - **No evidence** of overall benefit in prophylactic protocols for surgical patients at risk of CIN
- Statins
- Remote ischaemic preconditioning
- Renal replacement therapy : **Not recommended**

# Prevention

- Agents acting on the renal circulation
  - Dopamine X
  - Fenoldopam X
  - Calcium channel antagonists X
  - Adenosine antagonist
    - Theophylline
    - Aminophylline
  - Prostacyclin analogue
    - Iloprost

# Choice of anesthesia

- General anesthesia with ETT with control ventilation

# Intraoperative management

- Standard monitoring
  - NIBP, EKG 5 leads, O<sub>2</sub> sat, EtCO<sub>2</sub>, Temperature
- Invasive
  - A-line , C-line , FloTrac
- Others
  - Urine output
  - DTX
  - ABGs
- Position : supine



Anesthetic technique **DMC II** **SX I** **ultravist** **sterile** **under body warmer** **forte air warmer** **ROOM No. 113**

Remark **FRS = 35** **W2 PCR COVID = not detected.**

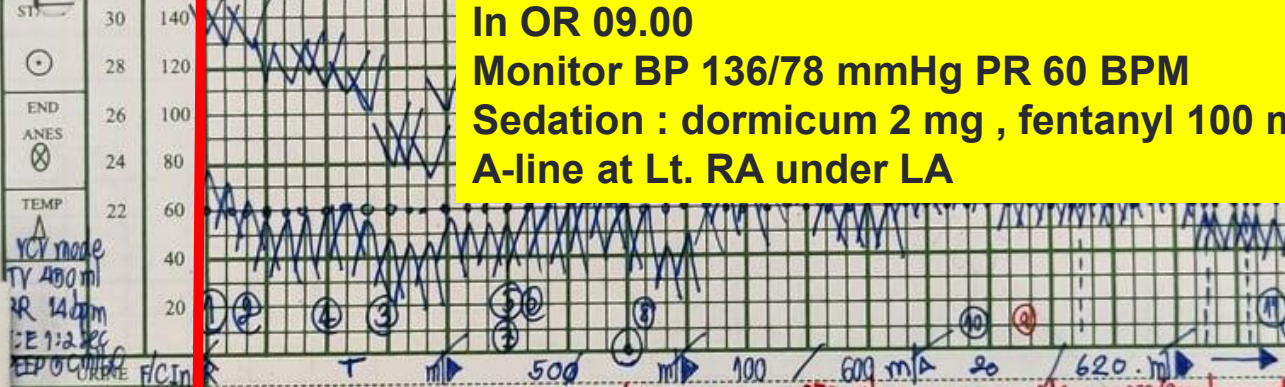
AGENTS/TIME	09:15	10:00	11:00	12:00	13:00
<b>AN</b>	3	5	5	5	5
<b>Des Y</b>	3	5	5	5	5
<b>Fentanyl mcg</b>	100		30	10	10
<b>Dormicum mg</b>	2		10		10
<b>Rocuronium mg</b>			10		10
<b>MS(LF) ml/min</b>					10
<b>Ephedrine mg</b>		600	600		40
<b>Levophed mcg</b>					40
<b>O<sub>2</sub> sat</b>	100	100	100	100	100

- CONSENT**  
 YES  
 NO
- PRE-OP VISIT**  
 YES  
 NO
- POSITION**  
 SUPINE  
 PRONE  
 LITHOTOMY  
 SITTING  
 TRENDEL  
 RL LATERAL

**IV FLUID INTAKE**  
**IN OR** **09:00 U**  
**Acetate 600 ml** **Acetate 100 ml** **Acetate 250 ml** **Acetate 50+50 ml**

13/5	C	240	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
<b>78</b>	<b>mmHg</b>	<b>BP</b>															
<b>60</b>	<b>mm</b>	<b>PR</b>															
<b>34</b>	<b>mm</b>	<b>ETCO<sub>2</sub></b>															
<b>32</b>	<b>mm</b>	<b>SpO<sub>2</sub></b>															

**In OR 09.00**  
**Monitor BP 136/78 mmHg PR 60 BPM**  
**Sedation : dormicum 2 mg , fentanyl 100 mcg**  
**A-line at Lt. RA under LA**



**BLOOD** **FLUID** **5/1/1/2** **600 ml (hold)** **IV. CATH. NO.** **20, 16, 18** **TE** **LH, RH, LH**

- Blood Sugar  
 Electrolyte  
 ABG
- TOTAL URINE OUTPUT** **850 ml**

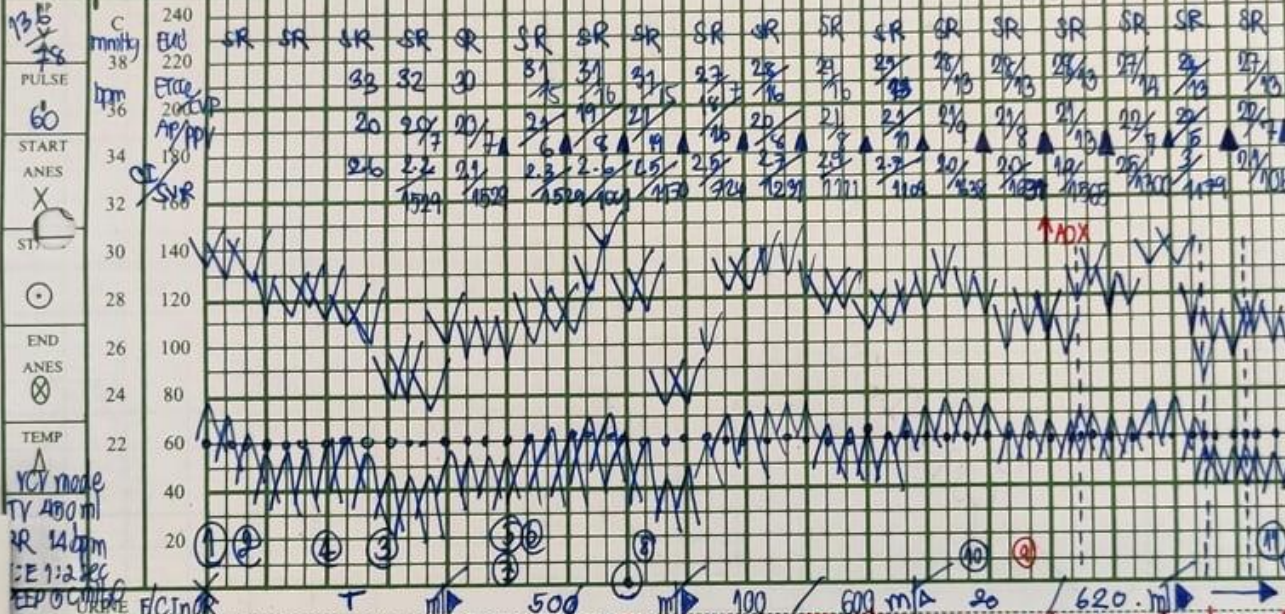
**REGULARIZATION** **g. Xylocaine 100 mg** **mg** **LA** **off** **TREATMENT**

Anesthetic technique		D.M.C. I		S.X. I		ultravist		under body warmup		for air warmup		ROOM No. 773	
Remark												CONSENT	
FRS = 35												<input checked="" type="checkbox"/> YES	
GAD PCR COVID = not detected.												<input type="checkbox"/> NO	
AGENTS/TIME												PRE-OP VISIT	
09:15												<input checked="" type="checkbox"/> YES	
1000												<input type="checkbox"/> NO	
11:00												POSITION	
12:00												<input checked="" type="checkbox"/> SUPINE	
13:00												<input type="checkbox"/> PRONE	
												<input type="checkbox"/> LITHOTOMY	
Desflurane													
Propofol													
Rocuronium													
MS(LV)													
Ephedrine													
Levophed													
O <sub>2</sub> sat													
100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100													
IV FLUID INTAKE													
IN OR													
09:00 U.													
Acetate 600 ml													
Acetate 100 ml													
NSS 20 ml													
Acetate 250 ml													
NSS 350 ml													
Acetate 50 + 30 ml													
NSS 100 ml													
C													
mmHg													
240													
220													
180													
140													
100													
80													
60													
40													
20													
PULSE													
38													
36													
34													
32													
30													
28													
26													
24													
22													
20													
TEMP													
38													
36													
34													
32													
30													
28													
26													
24													
22													
20													
BLOOD													
FLUID													
REGULARIZATION													
TOTAL URINE OUTPUT													
850 ml													
TREATMENT													
<p><b>2%xylocaine 100 mg</b>  <b>Induction : Propofol 50 mg</b>  <b>Intubation : Rocuronium 50 mg</b>  <b>On ETT no. 8 22 cm</b>  <b>Maintainance Air:O<sub>2</sub> 0.5:0.5 Desflurane up to 6%</b></p> <p>- C line 3 lumen at Rt IJV 14 cm            - Sheath 9 Fr. Rt. IJV            - IV 16,18</p>													

Anesthetic technique: DMG, E11, SX.1  
 Remark: FRS = 35, G2 PCR COVID = not detected. 110 ultraviolet spectrum under body warmer, force air warmer. ROOM No. 773

AGENTS/TIME	09:15	10:00	11:00	12:00	13:00
<del>AN</del>					
O <sub>2</sub>	3	5	5	5	5
Des Y					
Fentanyl / mcg	100		30	10	10
Dexamethasone / mg	2		10		10
Rocuronium / mg			10	10	10
MIS(V)					10
Ephedrine / mg		600	600		40
Levophed / mcg					4
O <sub>2</sub> sat	100	100	100	100	100

IV FLUID INTAKE	IN OR	09:00	10:00	11:00	12:00	13:00
Acetate	600		100	100	250	50 + 50
NSS			20	100	350	100



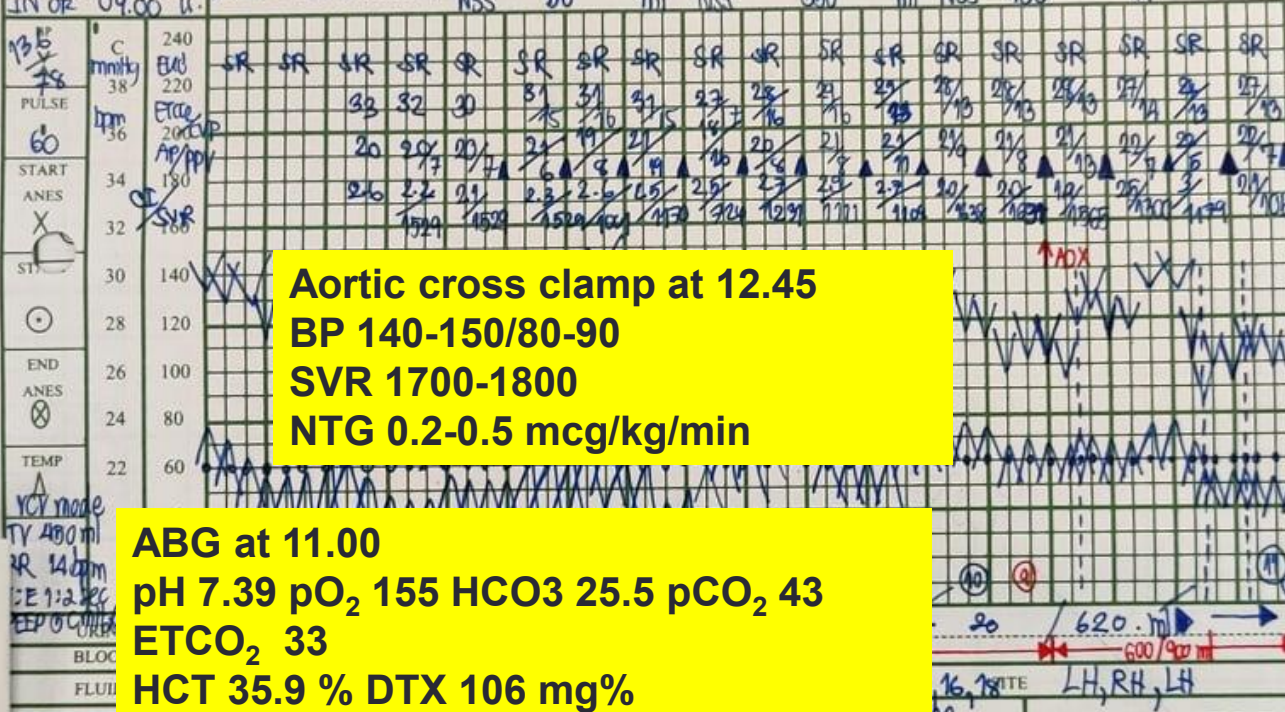
- CONSENT YES
- NO
- PRE-OP VISIT YES
- NO
- POSITION SUPINE
- PRONE
- LITHOTOMY
- SITTING
- TRENDEL
- RL LATERAL
- LL LATERAL
- JACK-KNIFE
- OTHER
- LAB Hct
- Blood Sugar
- Electrolyte
- ABG
- TOTAL URINE OUTPUT: 850 ml

BLOOD: FC INK  
 FLUID: D<sub>1</sub> D<sub>1/2</sub> 600 ml (hold)  
 REGULARIZATION: Xylocaine 100 mg  
 IV CATH. NO. 20, 16, 18  
 TREATMENT: LA off

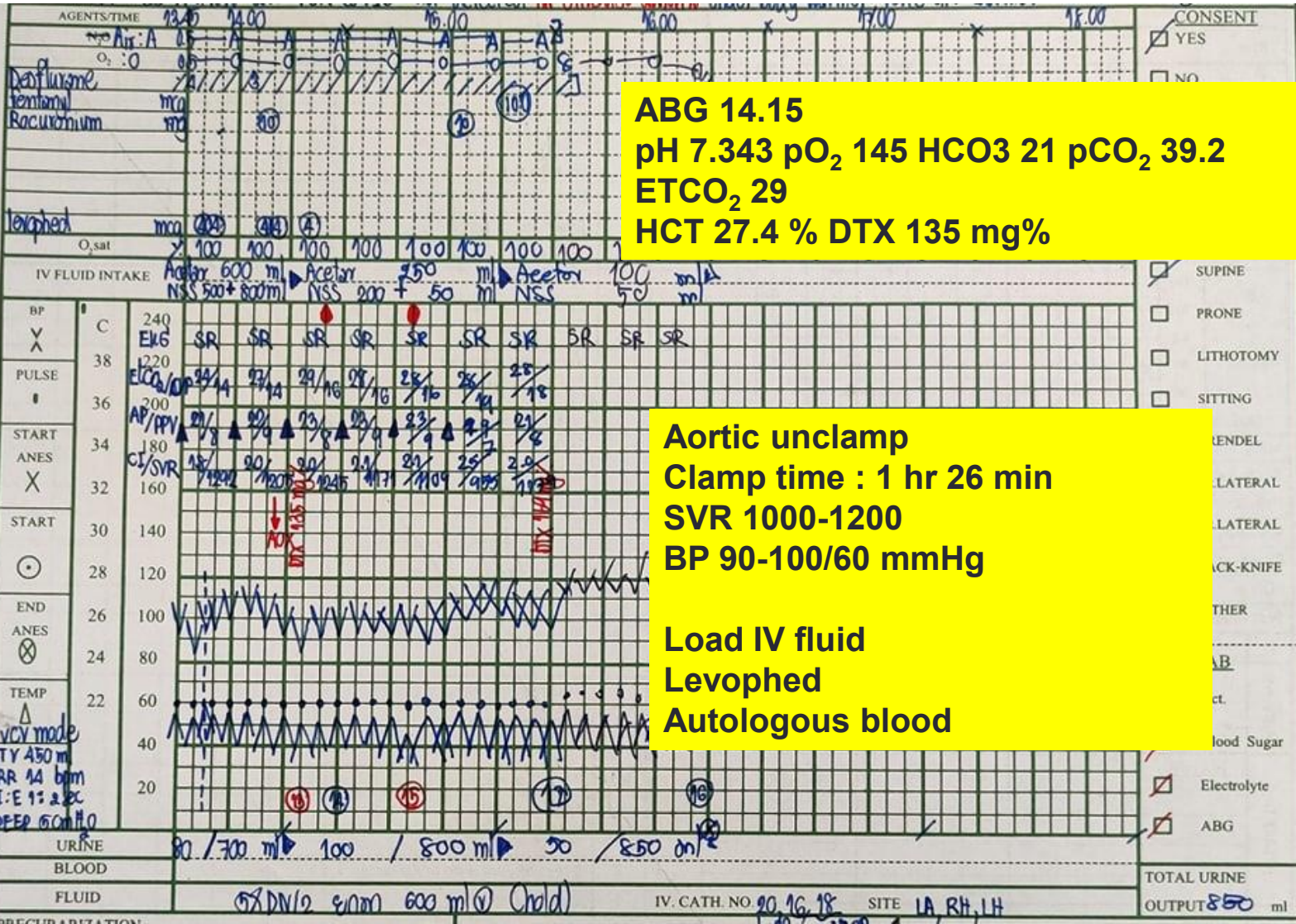
Anesthetic technique: DMCC 1.1  
 Remark: FRS = 35 GAD PCR COVID = not detected. 11:00 ultravist 12:00 vinder body warmur, forre air warmur ROOM No. 773

AGENTS/TIME	09:15	10:00	11:00	12:00	13:00
AN	3	5	5	5	5
Des Y					
Fentanyl mcg	100		30	10	10
Dexamethasone mg	2		10		10
Rocuronium mg			10		10
NTG (µg)					0.2
Ephedrony mg		600			4
Levopropofol mg					
O <sub>2</sub> SAT	100	100	100	100	100
IV FLUID INTAKE	Acetate 600	mNSS	Acetate 100	mNSS 350	mNSS 100

- CONSENT YES
- NO
- PRE-OP VISIT YES
- NO
- POSITION SUPINE
- PRONE
- LITHOTOMY
- SITTING
- TRENDEL
- RLLATERAL
- LLLATERAL
- JACK-KNIFE
- OTHER
- LAB Hct
- Blood Sugar
- Electrolyte
- ABG



TOTAL URINE OUTPUT 850 ml  
 TREATMENT



**ABG 14.15**  
 pH 7.343 pO<sub>2</sub> 145 HCO<sub>3</sub> 21 pCO<sub>2</sub> 39.2  
 ETCO<sub>2</sub> 29  
 HCT 27.4 % DTX 135 mg%

**Aortic unclamp**  
 Clamp time : 1 hr 26 min  
 SVR 1000-1200  
 BP 90-100/60 mmHg

**Load IV fluid**  
 Levophed  
 Autologous blood

AGENTS/TIME	13:00	14:00	15:00	16:00	17:00	18:00
Desflurane	0.5	0.5	0.5	0.5	0.5	0.5
Fentanyl	100	100	100	100	100	100
Rocuronium	100	100	100	100	100	100

**CONSENT**  
 YES  
 NO  
**PRE - OP VISIT**  
 YES

IV FLUID INTAKE	13:00	14:00	15:00	16:00	17:00	18:00
Acetate	600 ml	600 ml	250 ml	250 ml	100 ml	100 ml
NSS	500 + 800 ml	200 ml	50 ml	50 ml	50 ml	50 ml



Autologous blood 500 ml  
 Analgesic : Fentanyl 500 mcg  
 Operation time : 7 Hrs  
 EBL : 2000 ml  
 I/O : 5500/850 ml  
 Reverse : Sugammadex 200 mcg  
 Off ETT  
 Transfer to ICU Sx

URINE	13:00	14:00	15:00	16:00	17:00	18:00
Output	700 ml	100 ml	800 ml	50 ml	550 ml	50 ml

LAB  
 Hct  
 Blood Sugar  
 Electrolyte  
 ABG

TOTAL URINE OUTPUT 850 ml

IV. CATH. NO. 90, 16, 18 SITE LA, RH, LH

vcr mode  
 TY 450 ml  
 RR 14 bpm  
 I:E 1:2  
 PEEP 5cmH<sub>2</sub>O

# Post operative complication

- CNS : stroke , spinal cord ischemia
- RS : atelectasis , pneumonia
- CVS : MI , CHF
- GI : bowel ischemia ,bowel ileus
- GU : AKI
- Hemato : bleeding , massive blood transfusion

# Post Operative D 0-1

- CVS : BP 97-120/50-60 mmHg PR 60-70 BPM  
EKG Pacing 60-70 BPM, no ST-T change  
CVP 6-8 mmHg PPV 9-12 mmHg  
Change AIC-D mode DDDR rate 60-130 bpm
- CNS : E<sub>4</sub>M<sub>6</sub>V<sub>5</sub>, No neuro deficit , motor power grade V all ext.
- Res : RR 12-16 BPM O<sub>2</sub> sat 100% on canular 3 LPM
- KUB : Urine 0.4 ml/kg/hr Cr. 0.88  
I/O : 8144/3660 positive 5284 ml
- Metabolic : Hct 34.8% Blood sugar 115-138 mg%
- Pain score 0-2 Pain control : Acupan 60 mg iv drip in 24 hr  
Fentanyl (10:1) 3 ml/hr
- Problem 1.Juxtarenal AAA S/P open repair AAA  
2.Rt. EIA stenosis with thrombosis S/P Rt. Thrombectomy  
with Rt. EIA stent



# Post Operative D 2

- CVS : BP 70-160/50-76 mmHg PR 60-80 BPM  
EKG Pacing 60-80 BPM, no ST-T change  
CVP 8-11 mmHg CO/CI 5-8/3.2-5 SVR 515-900  
U/S IVC 1 cm , collapse >50%  
start Levophed 0.1-.0.2 mcg/kg/min titrate off
- CNS : E<sub>4</sub>M<sub>6</sub>V<sub>5</sub>, No neuro deficit , motor power grade V all ext.
- Res : RR 12-18 BPM on O<sub>2</sub> F/M with bag 10 LPM O<sub>2</sub> sat 93-96%
- KUB : Urine 0.3 ml/kg/hr ↓ Cr. 1.15 ↑  
I/O : 5035/545 positive 4490 ml  
total positive in 2 Days ≈ 9000 ml
- Metabolic : Hct 28 % > PRC 1 u Blood sugar 115-160 mg%
- Pain score 0-2 Pain control : Fentanyl (10:1) 3 ml/hr
- Problem 1.Juxtarenal AAA S/P open repair AAA  
2.Rt. EIA stenosis with thrombosis S/P Rt. Thrombectomy  
with Rt. EIA stent

# Post Operative D 3-4

- CVS : BP 100-110/50-70 mmHg PR 70-80 BPM  
EKG Pacing 70-80 BPM, no ST-T change  
CVP 10-15 mmHg CO/CI 5-8/4.6-5 SVR 630-760  
U/S IVC 2 cm , collapse <50% , B-line positive both lung
- CNS : E<sub>4</sub>M<sub>6</sub>V<sub>5</sub>, No neuro deficit , motor power grade V all ext.
- Res : Fine crepitation both lung CXR : bilateral pulmonary congestion  
RR 16-22 BPM on BIPAP FiO<sub>2</sub> 0.55 IP 10 RR 16 PEEP 8  
O<sub>2</sub> sat 91-96%
- KUB : Urine 2 ml/kg/hr I/O : 1205/3805 Negative 2600 ml
- Metabolic : Hct 24 %> PRC 1 u > Hct 27% BS 120-140 mg% Lactate 1.4
- Pain score 0-2 Pain control : Fentanyl 25 mcg IV \* 3 dose
- Problem 1.Juxtarenal AAA S/P open repair AAA  
2.Rt. EIA stenosis with thrombosis S/P Rt. Thrombectomy  
with Rt. EIA stent  
3.Noncardiogenic pulmonary edema (R/O VAP)  
Treatment : IV diuretic keep I/O negative  
Start ATB Tazosin

# Post Operative D 7

- CVS : BP 80-120/50-80 mmHg PR 80-120 BPM PPV 5-7  
Start Levophed 0.08-0.1 mcg/kg/min , Dobutamine 2-5mcg/kg/min
- CNS : E<sub>4</sub>M<sub>6</sub>V<sub>T</sub>, No neuro deficit
- Res : Crepitation RLL  
CXR infiltration at RLL , decrease pulmonary congestion  
on ETT PCV mode Pi 8 FiO<sub>2</sub> 0.5 RR 16 PEEP 7
- KUB : Urine 1.8 ml/kg/hr I/O : Negative 1500 ml
- Metabolic : Hct 32% WBC 13,200 PMN85%  
Lactate 2.62 BS 100-140 mg%
- Pain score 0-1 Pain control : Fentanyl(10:1) iv 3 ml/hr
- Problem 1.Juxtarenal AAA S/P open repair AAA
  - 2.Rt. EIA stenosis with thrombosis S/P Rt. Thrombectomy with Rt. EIA stent
  - 3.Noncardiogenic pulmonary edema > improved
  - 4.Pneumonia Start ATB Tazosin , Meropenam
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# Post Operative D9

- CVS : BP 110-120/60-70 mmHg PR 60-90 BPM  
Off Levophed , Dubotamine
- CNS : E<sub>4</sub>M<sub>6</sub>V<sub>T</sub>, No neuro deficit
- Res : CXR infiltration at RLL ,  
on ETT Spont mode FiO<sub>2</sub> 0.4 PS 8 PEEP 5
- KUB : Urine 1.2 ml/kg/hr
- Metabolic : Hct 27.8% WBC 17,300 PMN 91%  
BS 117-160 mg%
- Pain score 0 Pain control : Fentanyl(10:1) iv 3 ml/hr
- Problem 1.Juxtarenal AAA S/P open repair AAA  
2.Rt. EIA stenosis with thrombosis S/P Rt. Thrombectomy  
with Rt. EIA stent  
3.Noncardiogenic pulmonary edema > improved  
4.Pneumonia Start ATB Tazosin , Meropenam

# Post Operative D13

- CVS : BP 110-140/60-80 mmHg PR 60-90 BPM
- CNS : E<sub>4</sub>M<sub>6</sub>V<sub>T</sub>, No neuro deficit
- Res : No crepitation  
Off ETT > on O<sub>2</sub> High flow O<sub>2</sub> sat 97-100% > O<sub>2</sub> Canular 3LPM
- KUB : Urine 0.8 ml/kg/hr Cr 0.81
- Metabolic : Hct 27.7% **WBC 30,500 PMN 95%**  
BS 130-150 mg%
- Pain score 0 No pain control
- Problem 1.Juxtarenal AAA S/P open repair AAA  
2.Rt. EIA stenosis with thrombosis S/P Rt. Thrombectomy  
with Rt. EIA stent  
**3.Noncardiogenic pulmonary edema > improved**  
**4.Pneumonia ATB Ertapenam 10 Days**

# Take home message

- Preoperative evaluation
  - coexisting morbidities
- Intraoperative management
  - Prevent aneurysm rupture
  - Aortic cross-clamping
  - Aortic unclamping
  - Organ protection
  - Hypothermia
- Postoperative management
  - Complication