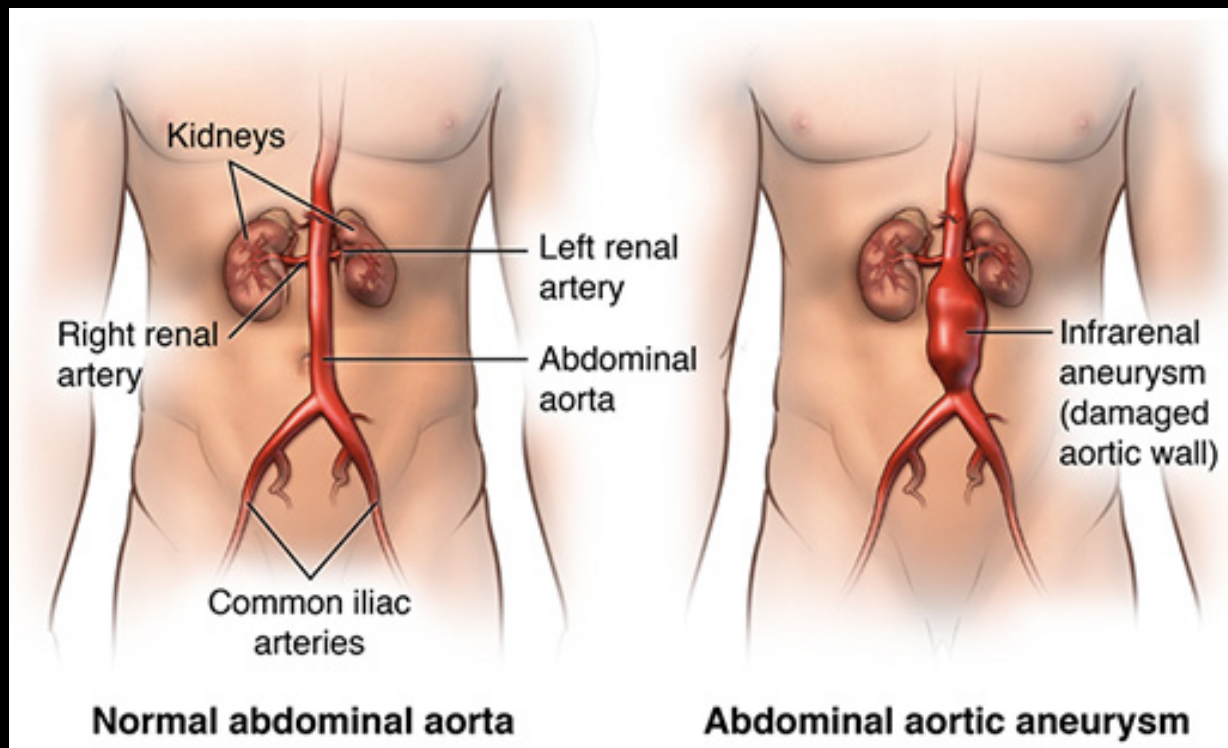


INTERESTING CASE

INFRARENAL ABDOMINAL AORTIC ANEURYSMS



INTERESTING CASE

- Case : Female 81 years old
- Dx : Asymptomatic infrarenal AAA
- Operation : Endovascular Aneurysm Repair {EVAR}

Female 81 years old

Chief complaint

มารับการผ่าตัดเส้นเลือดแดงในช่องท้องตามนัด

R1 History

History

- Risk factor aneurysm
 - Smoking
 - Size AAA
 - Hypertension
 - Hyperlipidemia
 - Trauma
 - Advance age

History

- Clinical risk factor
 - Coronary arterial disease
 - Congestive heart failure
 - Cerebrovascular disease
 - Chronic renal insufficiency
 - Metabolic equivalent

History

- Present illness : - 5 years PTA ตรวจร่างกายประจำปี พบว่ามี Infrarenal aortic aneurysm {size diameter 2.6 cm} แนะนำติดตามผล U/S ทุก 1 ปี ไม่มีอาการผิดปกติ
- - 3 months PTA ทำ CTA พบว่าขนาดของ aneurysm โตขึ้นเป็น **5 cm** ไม่มีอาการอื่นผิดปกติ จึงตัดสินใจเข้ารับการผ่าตัด

History

- เดินขึ้นบันได 2 ชั้น เหนื่อยต้องหยุดพัก
- ปกตินอนหนุนหมอน 2 ใบ ชอบนอนหัวสูง
- ไม่มีอาการตื่นมาหอบเหนื่อยตอนกลางคืน
- ไม่มีเจ็บหน้าอก ไม่มีประวัติวูบหมดสติ

Table 2: Annual risk of rupture with size of aneurysm

Aneurysm diameter (cm)	Annual rupture risk (%)
4.0-4.9	0.5-5
5.0-5.9	3-15
6.0-6.9	10-20
≥7.0	20-50

Past History

- Hypertension
 - Baseline BP : SBP 140-150 mmHg , DBP 80-90 mmHg
 - Med : Enalapril [5] 1x1 o pc
 - Metoprolol [100] 1x2 o pc
 - Lecarnidipine [20] 1x1 o pc
 - Lasix [40] ½ x 1 o pc
- Atrial fribillation
 - Control rate 70 – 90 bpm
 - Med : Warfarin >> Edoxaban [60] ½ x 1 o pc

Past History

- Chronic kidney disease [stage IV]
 - Baseline Creatinine 2 – 2.3 mg/dl
 - GFR 15-30 ml/min/1.73m²
- Severe tricuspid regurgitation
 - Last echo 7/10/63 : LVEF 40 % with mild hypokinesia overall
- Hyperlipidemia
 - Atorvastatin [20] 2x1 o pc
- Old CVA : TIA >> full recovery

Past History

- Allergy : Aspirin
- No smoking
- No alcohol drinking
- No previous surgery

R1 Physical examination and investigation

Physical examination

- Vital Signs : BT 36 °c HR 72 bpm RR 18 b / min BP 123/61 mmHg BW 52 kg, Height 150 cm, BMI 23.11 kg/m²
- GA : A Thai female, good consciousness
- HEENT : not pale conjunctivae, anicteric sclerae, no dry lips/dry tongue
- Respiratory : lung clear and equal, no adventitious sound
- *CVS : PSM at parasternal border, normal S₂, Heaving ,PMI shift to 6th ICS MCL*

Physical examination

- Ext : no pitting edema
- Neuro : E₄V₅M₆, motor grade V/V all extremities
- Airway : *{difficult intubation}*
 - Mallampati grade 3*
 - Thyromental distance < 6 cm*
 - Mouth opening > 3 cm
 - No prominent incisor
 - Upper lip bite test class II*
 - No limit ROM of neck

Investigation

- CBC : Hb 13 %, Hct 41 %, platelet 211,000 /mm³
- *BUN 34.1 Cr 2.34 mg/dl GFR 18.95 ml/min/1.73m²*
- Electrolytes : Na 138.7 K 4.86 Cl 99.7 HCO₃ 29.5
- Coagulogram : PT 14.3 INR 1.25 aPTT 29.2/1.14
TT 14/1.13
- CXR : *cardiomegaly*, no infiltration
- EKG : *AF 80 bpm* , no ST-T change

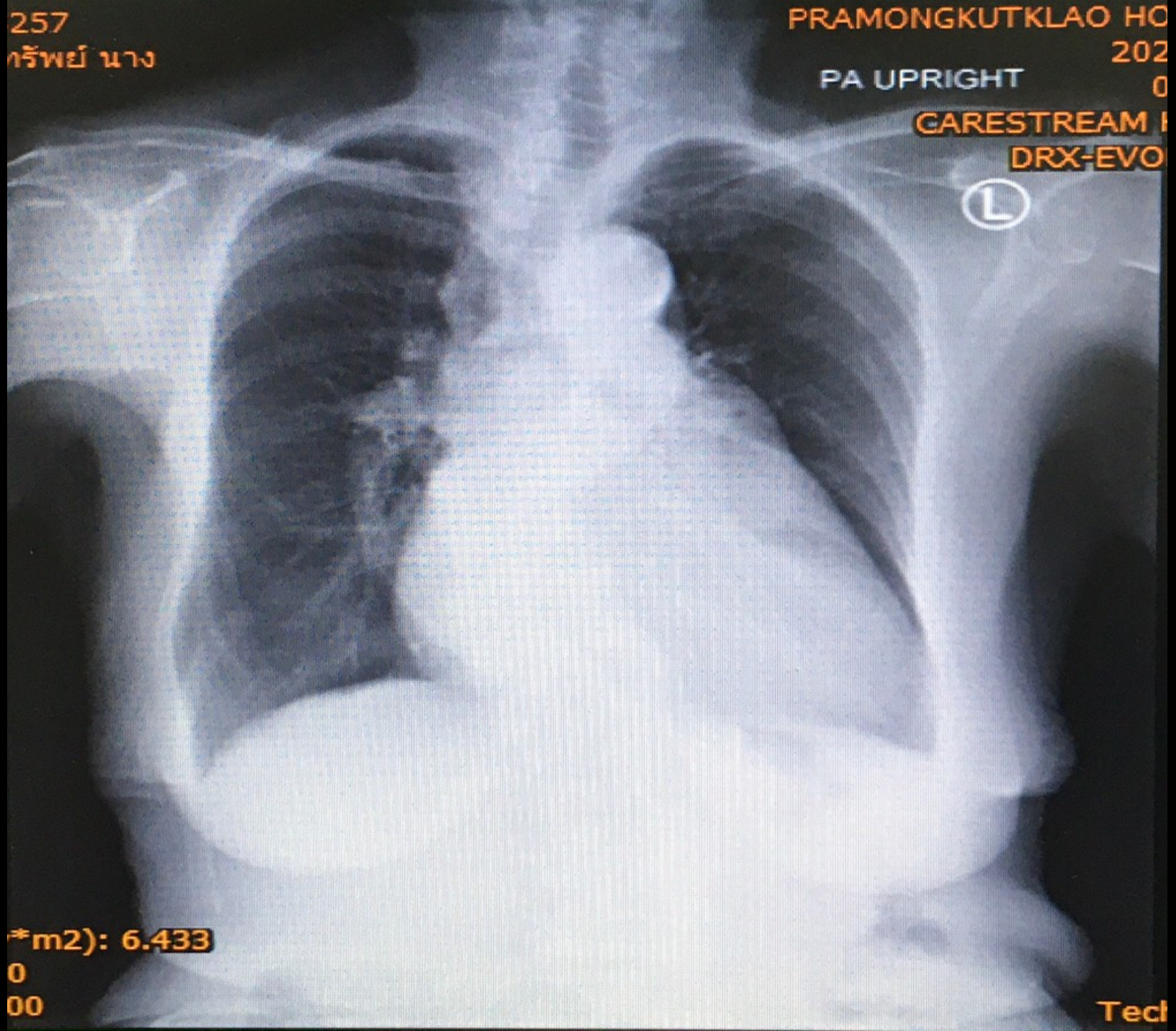
257
กริพย์ นาง

PRAMONGKUTKLAO HO
202
0
PA UPRIGHT
CARESTREAM I
DRX-EVO

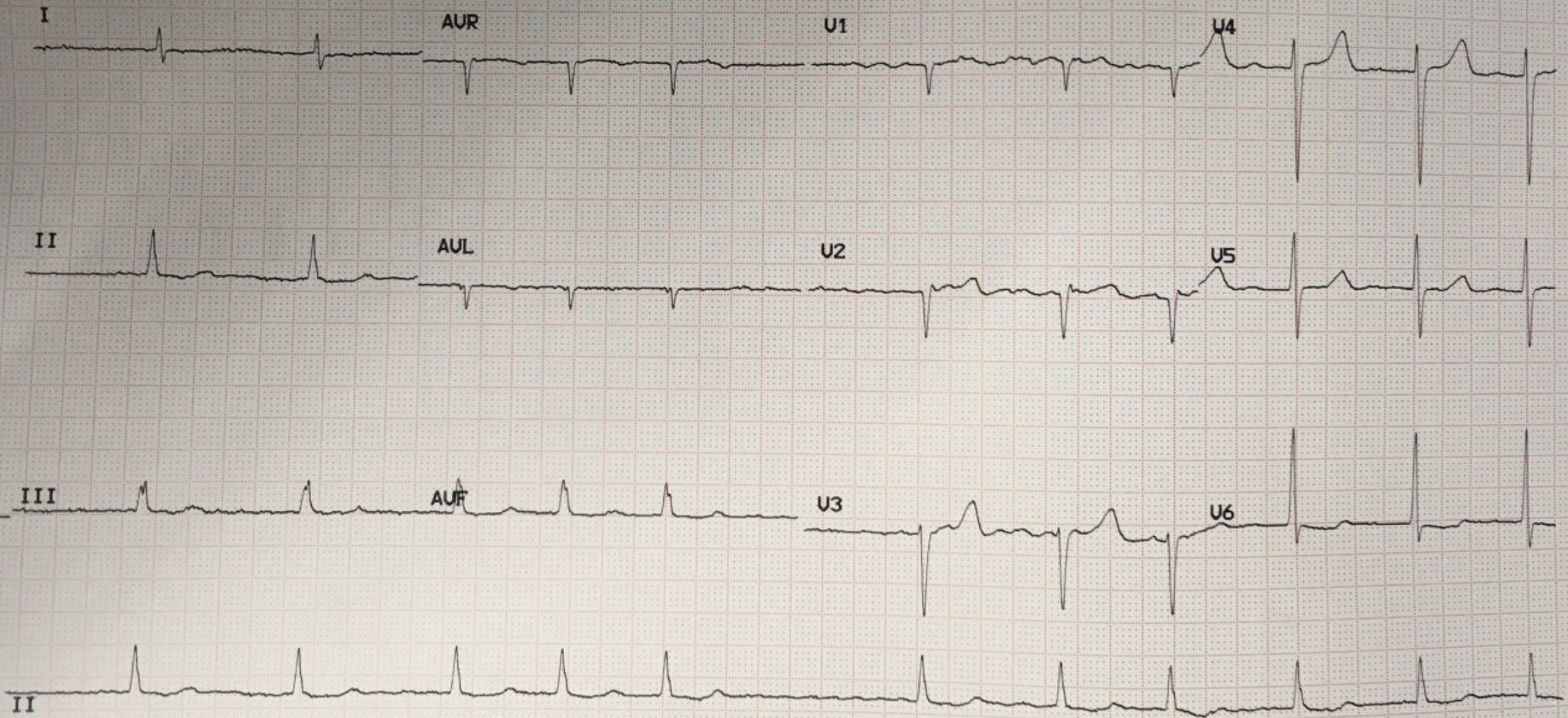
(L)

*m2): 6.433
0
00

Tech



Unconfirmed report.



CTA of the whole Aorta

- *5-cm infrarenal abdominal aorta*
- Society for Vascular surgery 2018
 - Recommend assessment of femoral and popliteal arteries [co-aneurysm]

R1 Problem list and ASA classification

Problem list

1. Asymptomatic infrarenal AAA
2. Atrial fibrillation
3. Severe tricuspid regurgitation
4. Hypertension
5. Chronic kidney disease stage IV
6. Aging
7. Difficult intubation

ASA Class III

R2 Preoperative evaluation and preparation

Preoperative evaluation

- Patient factor
- Surgical factor
- Anesthetic factor

Patient factor

- Asymptomatic infrarenal AAA
- Co-morbidities

Patient factor

- Hypertension : Baseline BP < 140 / 90 mmHg
 - Med : Enalapril [5] 1x1 o pc
 - Metoprolol [100] 1x2 o pc
 - Lecarnidipine [20] 1x1 o pc
 - Lasix [40] ½ x 1 o pc
- *Premed : Lecarnidipine [20] 1 tab*
 - *Metoprolol [100] 1 tab*

Patient factor

- Atrial fibrillation : Control rate 70 – 90 bpm
 - Med : Warfarin >> Edoxaban [60] ½ x 1 o pc
 - CHA₂DS₂VASc score = 8 [diabetes, age 65-74]
- *Edoxaban : high risk bleeding , CrCl < 30 ml/min*
 - *Off before surgery > 72 hr*

WHETHER TO BRIDGE

2 Assess patient thrombotic risk definitions:

Low:
CHA₂DS₂-VASc 1-4 (annualised stroke risk <5%), no prior TE

Moderate:
CHA₂DS₂-VASc 5-6 (annualised stroke risk 5-10%) or prior TE more than 3 months previously

High:
CHA₂DS₂-VASc 7+ (annualised stroke risk >10%) or prior TE within 3 months

1 Assess patient bleed risk checklist

Bleed risk considered increased if any 1 of the following: major bleed or ICH <3 months; quantitative or qualitative platelet abnormality including aspirin use, INR above therapeutic range; prior bleed from previous bridging

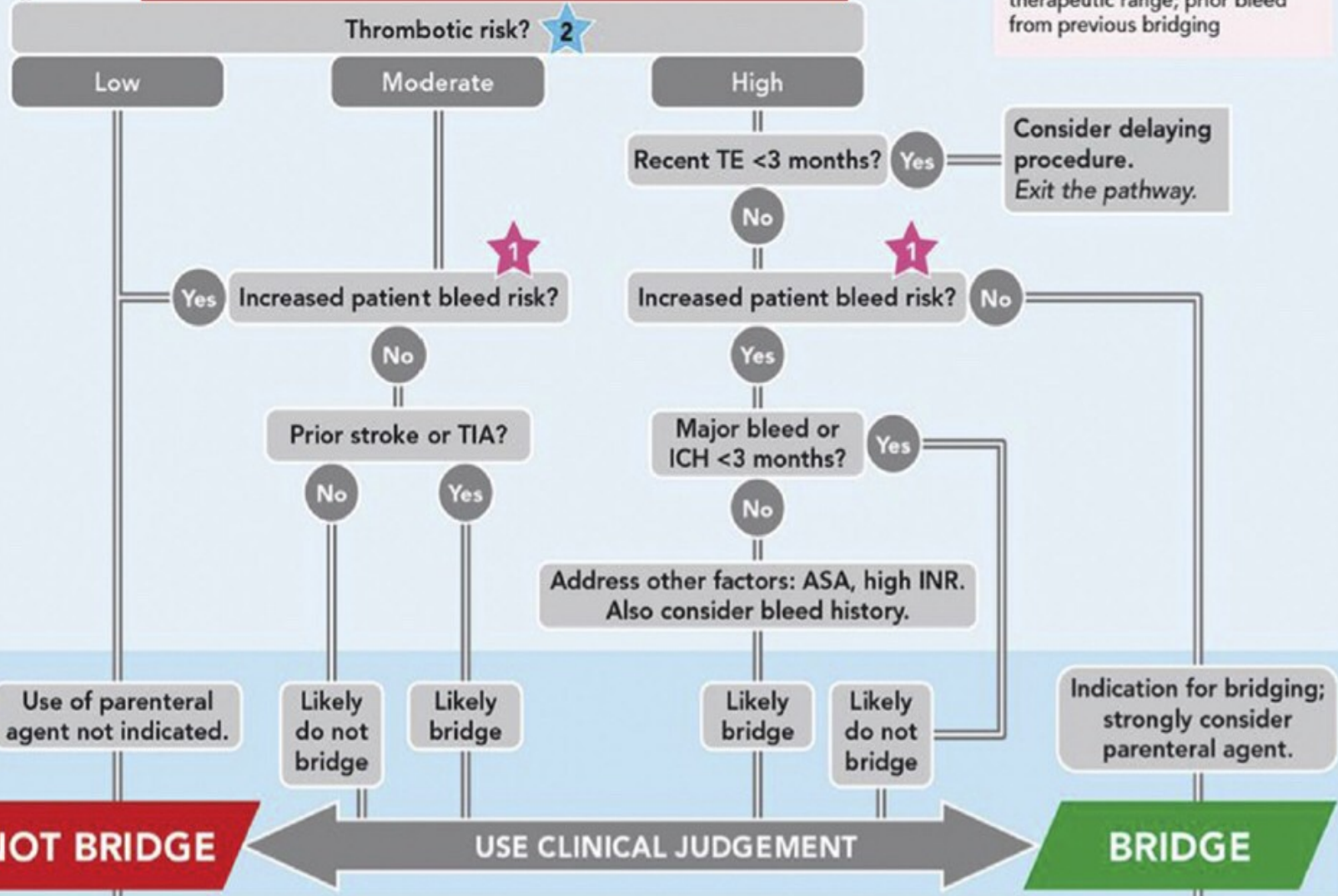
Type of anticoagulant?

DOAC (highlighted in red box)

VKA

CONSIDERATIONS

GUIDANCE



DO NOT BRIDGE

USE CLINICAL JUDGEMENT

BRIDGE

Estimate bleeding risk

High bleeding risk procedure (two-day risk of major bleed 2 to 4%)

Any major operation of duration >45 minutes

Abdominal aortic aneurysm repair

Coronary artery bypass

Endoscopically guided fine-needle aspiration

Foot/hand/shoulder surgery

Heart valve replacement

Hip replacement

Kidney biopsy

Knee replacement

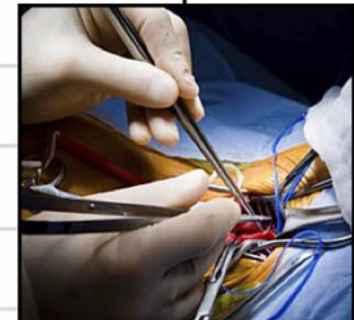
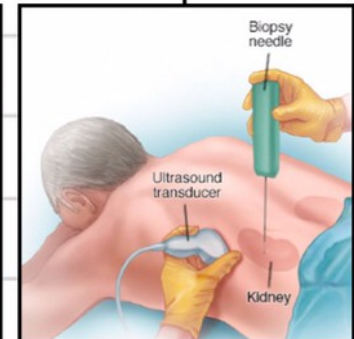
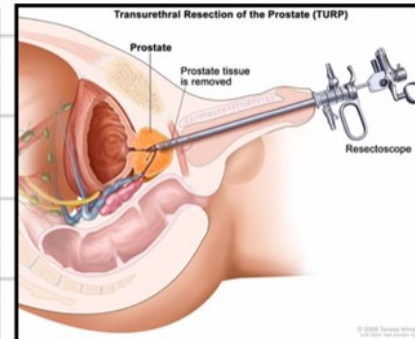
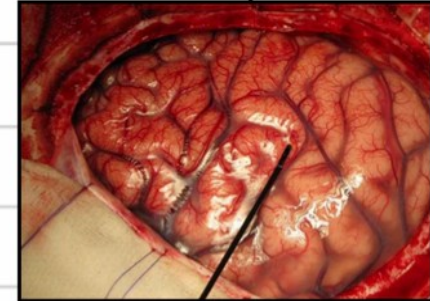
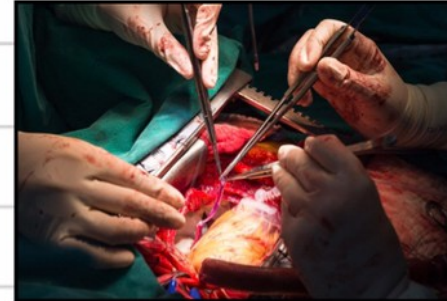
Laminectomy

Neurosurgical/urologic/head and neck/abdominal/breast cancer surgery

Polypectomy, variceal treatment, biliary sphincterectomy, pneumatic dilatation

Transurethral prostate resection

Vascular and general surgery



Patient factor

- Severe tricuspid regurgitation
 - Last echo 7/10/63 : Concentric LVH, LVEF 40 % with mild hypokinesia overall , severe TR 2° to annulus dilatation , not seen thrombosis
- *Cardiac assessment [ACC/AHA 2014]*
 - *Revised cardiac risk index*
 - *Customized probability index*

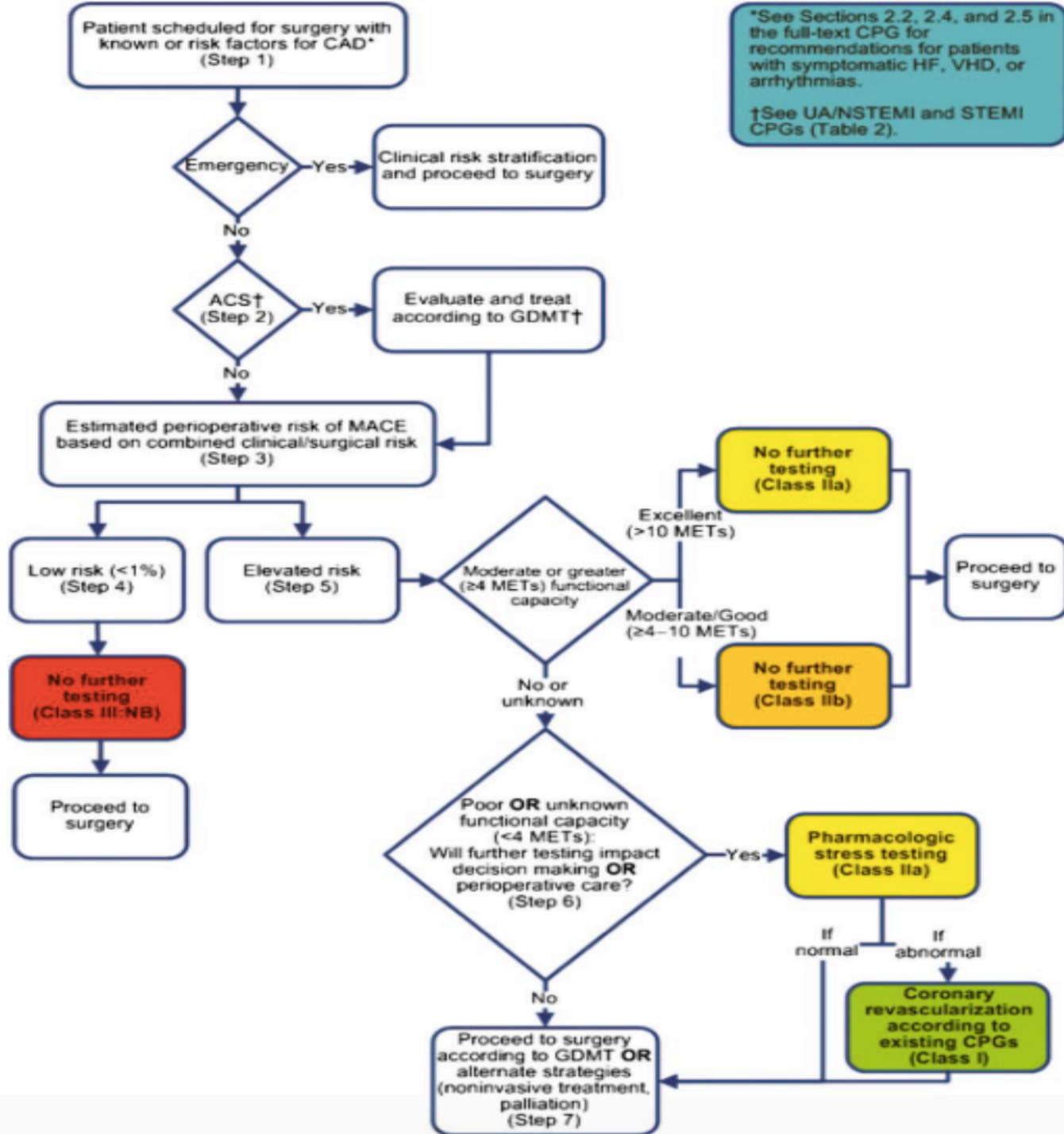
Revised cardiac risk index

- 1. High-risk surgery [complex EVAR]*
 2. History of ischemic heart disease
 - 3. History of congestive heart failure*
 - 4. History of cerebrovascular*
 5. Pre-operative treatment with insulin
 - 6. Pre-operative creatinine > 2*
- !! RCRI SCORE = 4 , MET < 4*

Interpretation

RCRI Score	Risk of major cardiac event*
• 0	• 0.4 %
• 1	• 0.9 %
• 2	• 6.6 %
• ≥ 3	• >11 %

*Defined as death, myocardial infarction, or cardiac arrest at 30 days after non cardiac surgery



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)

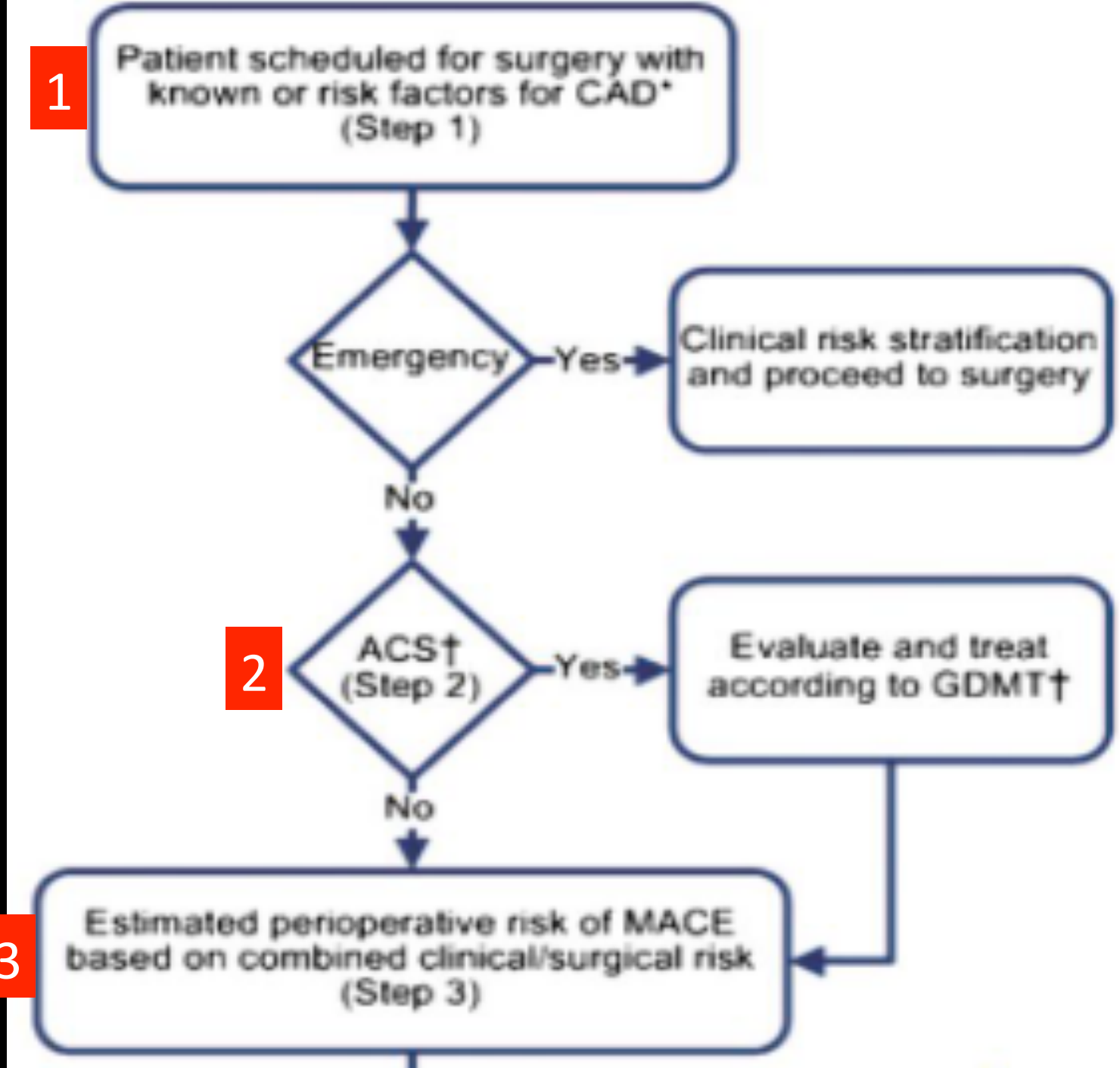
Yes

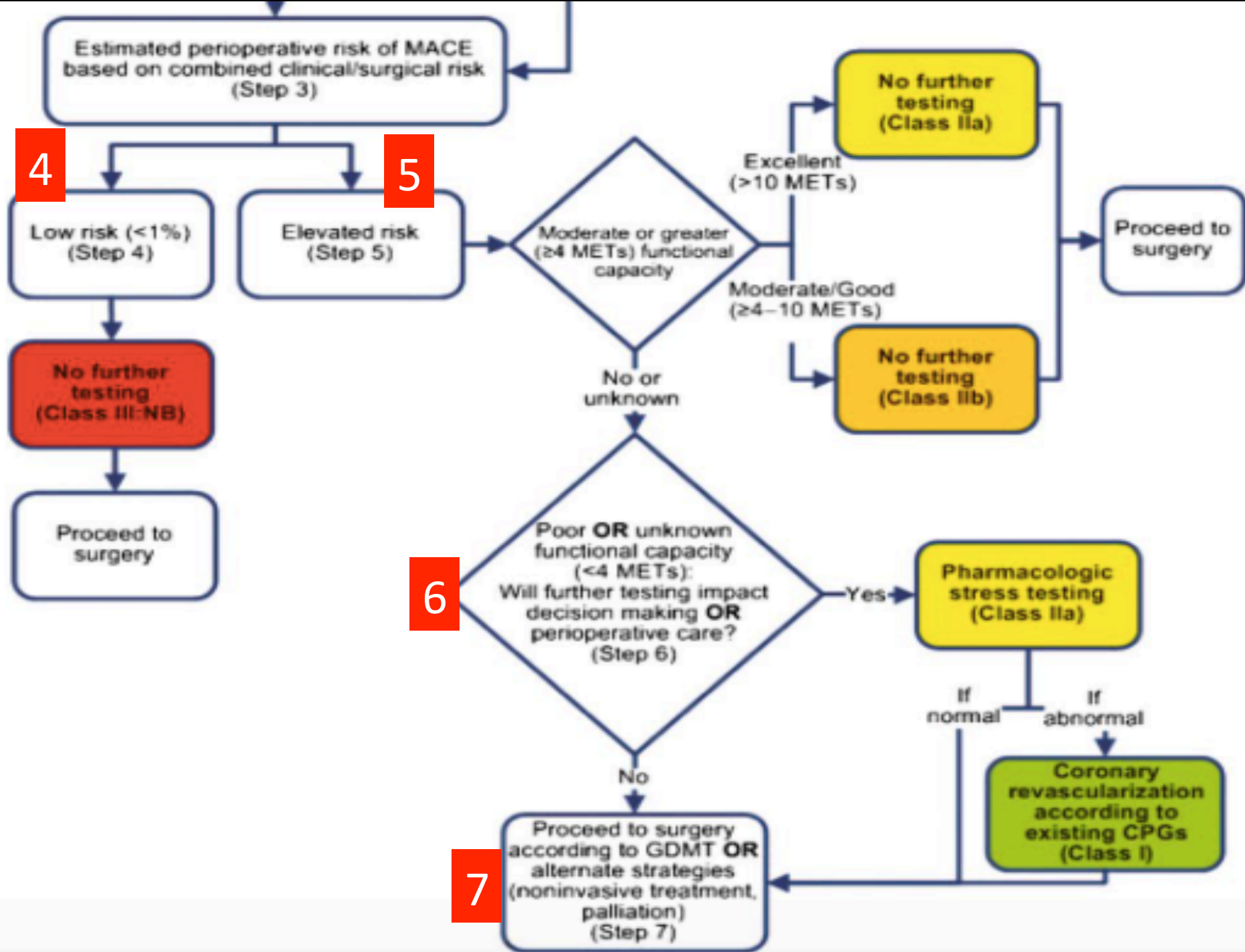
Evaluate and treat according to GDMT†

No

3

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





Coronary angiogram

- LM : The vessel was heavy calcification
- LAD : There was 20-30 % stenosis at proximal segment
- LCX : The vessel was free stenosis
- RCA : Dominant vessel with 30 % stenosis
- *Conclusion : Non obstructive CAD*

Patient factor

- Chronic kidney disease [stage IV]
 - Baseline Creatinine 2 – 2.3 mg/dl
 - GFR 15-30 ml/min/1.73m²
- *High risk AKI post operative*
 - *IV contrast [limit contrast 111 m]*
 - *Para-renal stents , perioperative dehydration*
 - *Medication ex. ACEI ,diuretic*
 - *Advice patient for CIN*

Surgical factor

- EVAR [Intermediate-risk procedure]
- Complex EVAR consider as high-risk
- Intra operative bleeding [high-risk]

Preoperative preparation

General preparation

- NPO
- Informed consent
- Anesthetic machine
- intubation equipment
- Force air warmer
- Warm IV fluids
- Antibiotic
- IV anesthetic drugs

Specific preparation

- Difficult airway device [C-mac, SGA]
- Blood components [same as open repair]
 - PRC 4 units FFP 4 units pool Plt 2 units
- Large-bore IV fluids [no.16,18]
- Pressure bags , Rapid infusion device
- A-line
- C-line
- Lead Apron, thyroid shield
- ICU post-op [CCU]

Specific preparation

- Medication
 - Drug for blunt hemodynamic response : lidocaine
 - Anticoagulant : Heparin
 - Antihypertensive drug : Esmolol
 - Inotropic agents : dopamine , levophed
 - Protamine

Intraoperative monitoring

Non invasive

- Five-leads EKG
- NIBP
- Pulse oxymetry
- ETCO₂
- Core temperature
- Urine output

Invasive

- A-line [*before induction*]
- C-line

Anesthetic consideration

R3

Choice of anesthesia

Choice	Advantage	Disadvantage
RA LA + sedation	<ul style="list-style-type: none">-Less stress & inflammatory response-Avoid mechanical ventilation in severe CVD & pulmonary disease-Good post operative pain	<ul style="list-style-type: none">-Patient discomfort-Patient use antiplatelet & anticoagulant-Heparinize might be problem
GA	<ul style="list-style-type: none">-Control BP easier-Breath-holding easier-Suitable for long operation-If aneurysm rupture airway already secure	<ul style="list-style-type: none">-manipulate airway

Choice of anesthesia

- *GA more practical than RA*
 - Patient are frequently on antiplatelet preoperative
 - Require heparin intraoperative
 - Blood pressure control is easier
 - If aneurysm rupture occurs [airway is secure]

Choice of anesthesia

- *GA more practical than RA*
 - Breath holding on the ventilator is easy
 - Use of iliac bifurcated devices or complex fenestrated grafts may take lengthy periods of time

Choice of anesthesia

GA with ETT with controlled ventilation

Anesthetic consideration

- Prevent aneurysm rupture
- Hemodynamic stability of the patient and Preserve perfusion vital organs
- Maintenance of intravascular volume
- Early identification and management of bleeding
- Keep Normothermia
- Heparinization and Prevent device migration

Prevent aneurysm rupture

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

*Hemodynamic stability of the patient and
Preserve perfusion vital organs*

- Keep optimal MAP [auto regulation]
 - Intraoperative control BP
 - Hypertension : short-acting beta blocker
 - Hypotension : vasopressor

*Hemodynamic stability of the patient and
Preserve perfusion vital organs*

- Severe TR : Anesthetic goal
 - Preload : normal to high , avoid hypovolemia
 - Afterload : maintain
 - Rate : normal to high to sustain forward flow
 - Rhythm : sinus
 - Contractility : RV may need inotropic support if RV failure

Hemodynamic stability of the patient and Preserve perfusion vital organs

- Prevent kidney injury
 - CIN prevention volume expansion with NSS before procedure
 - Maintain adequate hydration [urine output ,PPV ,CVP]
 - Limit contrast load [111 ml]
 - Avoid Nephrotoxic drug
 - Pharmacologic : Mannitol , dopamine , Furosemide

Hemodynamic stability of the patient and Preserve perfusion vital organs

- Prevent myocardial injury
 - Balance O₂ demand –supply
 - Follow clinical and lab postoperative
- Prevent pulmonary complication
 - Lung protective ventilator [Low TV ,PEEP ,Recruitment]
 - Post operative lung expansion [breathing exercise]

Prevent perioperative spinal cord ischemia

- Spinal cord ischemia [SCI] following infra-renal EVAR is rare : 0.21%

Risk factors
Supra-renal abdominal EVARs
Long stent graft
Prolonged procedural time
Extensive manipulation of the intravascular catheters
Perioperative embolisation the lumbar arteries.
Patients who have had previous AAA repair

Early identification and management of bleeding

- LAB baseline intraoperative
- Assess bleeding
 - Vital sign
 - Follow LAB
 - Communicate with surgeon

Normothermia

- Monitor core temperature [keep CBT>36°C]
 - Invasive : pulmonary artery catheter
 - Reliable
 - *Nasopharyngeal* ,Distal esophageal, Tympanic membrane
- Air warming device
- IV fluid warmers

Heparinization and Prevent device migration

- Heparin 3000-5000 units before device insertion
- Recommend check activated clotting time [ACT]
 - 3 min after heparin and every 30 min
 - ACT : maintain 2-2.5 times the baseline [200-250 sec]
- At time of deployment
 - SBP <110 mmhg to decrease risk of distal stent migration

OPERATION

Anesthetic technique: **ASA: Full**
 Code: **4011** Op. No. **HB-2** Monitoring: **NIBP, O₂Sat, EKG, ETCO₂**, A-line, CVP, PAP, **TEMP**
 Remark: **ASA: Full** Service: **Sx 1** Other: **Blanket warmer + Face air warmer** ROOM No. **HB**

AGENTS/TIME	10:15	11:00	12:00	13:00	14:00	15:00
N ₂ O	0	0	0	0	0	0
O ₂	0	0	0	0	0	0
Desflurane	0	0	0	0	0	0
Fentanyl	0	0	50	0	0	0
Nim box	0	0	0	0	0	0
epheдрine	0	0	0	0	0	0
O ₂ sat	99%	100	100	100	100	100
IV FLUID INTAKE	10:45					
IN OR	10:45					
Temp	38	38	38	38	38	38
PULSE	70 bpm	70 bpm	70 bpm	70 bpm	70 bpm	70 bpm
START ANES	34	34	34	34	34	34
TEMP	32	32	32	32	32	32
END ANES	30	30	30	30	30	30
TEMP	28	28	28	28	28	28
VCV mode	TV 400 ml	TV 400 ml	TV 400 ml	TV 400 ml	TV 400 ml	TV 400 ml
RR	12 /min	12 /min	12 /min	12 /min	12 /min	12 /min
I:E	1:1.5	1:1.5	1:1.5	1:1.5	1:1.5	1:1.5
PEEP	5 cm	5 cm	5 cm	5 cm	5 cm	5 cm
URINE in OR	-	100 ml	100 ml	200 ml	300 ml	300 ml
BLOOD						
FLUID	57.0/12	600 ml	0	0	0	0

At 10.45 start

- NIBP 146/96 mmHg
- HR 70 bpm [EKG 5 leads]
- Fentanyl 50 mcg
- Access A-line No.20 at Lt RA before induction

m | Acetamin
 AF AF AF
 21 24 22
 19 18 18
 12 13 18

CONSENT

YES

NO

PRE - OP VISIT

YES

NO

POSITION

SUPINE

PRONE

LITHOTOMY

SITTING

TRENDEL

R_LLATERAL

L_LLATERAL

JACK-KNIFE

OTHER

LAB

Hct.

Blood Sugar

Electrolyte

ABG

TOTAL URINE OUTPUT 360 ml

IV. CATH. NO. 22, 18, 18 SITE LH, LH, RH.

Anesthetic technique GA: ETT

Op. No. HB-2 Service. Sx 1

Monitoring: NIBP, O₂Sat, EKG, ETCO₂, A-line, CVP, PAP, TEMP

Remark ASA: II

Other Blanket warmer + Face air warmer ROOM No. HB

AGENTS/TIME	10:45	11:00	12:00	13:00	14:00	15:00
N ₂ O						
O ₂	6-0-0	5-0	5-0	5-0	5-0	5-0
Desflurane	✓					
Embolyl Nimbex	mg mg	50				
ephedrine	mg					
O ₂ sat	99%	100	100	100	100	100
IV FLUID INTAKE	10.45	W				
IN OR						
Temp	38					
PULSE	70 bpm					
START ANES						
START						
END ANES						
TEMP						

At 11.15
 -2% xylocaine 3.5 ml IV
 -Propofol 50 mg IV
 -Nimbex 8 mg IV
 -ETT no.7 deep 18 cm.
 [LV grade 1 by C-MAC]
 -Large bore IV no.18 LH, 18 RH
 -Maintenance : N₂O:O₂:DES,
 0.5:0.5:up to 5%
 -Muscle relaxant : Nimbex



- 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 360 ml

VCV mode
 TV 400 ml
 RR 12 /min
 I:E 1:1.5
 PEEP 5 cm

IV. CATH. NO. 22, 18, 18 SITE LH, LH, RH.

Anesthetic technique		Code		Op. No.		HB-2		Monitoring		A-line, CVP, PAP, TEMP						
CA + ETT		ASA: Full		Sx 1				NIBP, O ₂ Sat, EKG, ETCO ₂		ROOM No. HB						
Remark								Other Blanket warmer + Face air warmer								
AGENTS/TIME		10:45	11:00	12:00	13:00	14:00	15:00									
N ₂ O																
O ₂		6-0-0	5-0-0	5-0-0	5-0-0	5-0-0	5-0-0	5-0-0	5-0-0	5-0-0	5-0-0					
Desflurane		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
Fentanyl		mg	50													
Nim box		mg									2					
ephedrine		mg														
O ₂ sat		99%	100	100	100	100	100	100	100	100	100					
IV OR FLUID INTAKE		10:45	W	NSS	800	m	NSS	150	m	NSS	100	m	NSS	100	m	Acetate
ABG		240	AR	AR	AR	AR	AR	AR	AR	AR	AR	AR	AR	AR	AR	AR
EKG		38														
PULSE		36														
START ANES		34														
END ANES		26														
TEMP		22														
VCV mode		TV 400 ml, RR 12 /min, I:E 1:1.5, PEEP 5 cm														
URINE in OR		-														
BLOOD																
FLUID		57-D/N12 600 ml → hold														
IV. CATH. NO.		22, 18, 18														
SITE		LH, LH, RH														

At 11.30
-on C-line at Rt. IJV depth 12 cm.

ABG
-pH 7.439 PaCO₂ 34.4 PaO₂ 331.2
HCO₃ 22.8 BE -0.9
Hct 34.8 % Hb 11.6
Na 142.8 K 3.68 Ca 1.12
DTX 133 mg%

- 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 360 ml

Anesthetic technique		Code		Op. No.		HB-2		Monitoring:		NIBP		O ₂ Sat		EKG		ETCO ₂		A-line		CVP		PAP		TEMP		
Remark		ASA: Full		Service		Sx 1		Other		Blanket warmer		+ Face air warmer		ROOM No.		HB		CONSENT		RE - OP VISIT		YES		NO		
AGENTS/TIME		10:45	11:00				12:00								12:00											
N ₂ O																										
O ₂		6	0	0																						
Desflurane		✓																								
Fentanyl	mg	50																								
Nimbex	mg																									
ephedrine	mg																									
O ₂ sat	%	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
IV FLUID INTAKE																										
IN OR		10:45	W																							
BP	mmHg	140																								
PULSE	bpm	96																								
START ANES																										
END ANES																										
TEMP	°C																									
VCV mode																										
TV	ml	400																								
RR	/min	12																								
I:E		1:1.5																								
PEEP	cm	5																								
URINE in OR																										
BLOOD																										
FLUID																										

At 13.00

- Heparin 4000 units IV Before deployment
- BP ~ 110/60 mmHg
- Device deployment
- SBP ~ 100-110 mmHg
- DBP ~ 50-60 mmHg

- YES
- NO
- RE - 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 360 ml

VCV mode TV 400 ml RR 12 /min I:E 1:1.5 PEEP 5 cm

URINE in OR: - m / 100 m / 00 / 200 ml / 100 / 300 ml

BLOOD: 57.0/112 600 ml c → hold

FLUID: V. CATH. NO. 22, 18, 18 SITE LH, LH, RH.

Anesthetic technique **GA + ETT** Op. No. **HB-2** Monitoring: **NIBP**, **O₂Sat**, **EKG**, **ETCO₂**, A-line, CVP, PAP, **TEMP**
 Remark **ASA: II** Service **Sx 1** Other **Blanket warmer + Face air warmer** ROOM No. **HB**

AGENTS/TIME	10.45	11.00	12.00	13.00	14.00	15.00
N ₂ O			X	X	X	X
O ₂	6	10	X	X	X	X
Desflurane	/					
Fentanyl	mg	50				
Rim box	mg				2	2
ephedrine	mg					
O ₂ sat	99%	100	100	100	100	100
IV FLUID INTAKE	10.45	W				
IN OR						
NSJ				100		
Acetar				100		Acetar
ABG						
ETCO ₂	38					
PULSE	36					
START ANES	34					
START ANES	32					
END ANES	26					
TEMP	22					
VCV mode						
TV	400 ml					
RR	12 /min					
I:E	1:1.5					
PEEP	5 cm					
URINE in OR						
BLOOD						
FLUID						

At 14.30 [follow up LAB]
 -on going bleed
 -stent not appropriate
 At 15.00
 -PRC 1 unit IV drip [270ml]

ABG
 -pH 7.465 PaCO₂ 27.5 PaO₂ 234.2
 HCO₃ 19.4 BE -3.4
 Hct 30.2 % Hb 10.1
 Na 139.5 K 3.46 Ca 1.09
 DTX 118 mg%

CONSENT
 YES
 NO

PRE - OP VISIT
 YES
 NO

POSITION
 SUPINE
 PRONE
 LITHOTOMY
 SITTING
 TRENDEL
 R/L LATERAL
 L/L LATERAL
 JACK-KNIFE
 OTHER

LAB
 Hct.
 Blood Sugar
 Electrolyte
 ABG

TOTAL URINE OUTPUT 360 ml

IV. CATH. NO. 22, 18, 18 SITE LH, LH, RH.

Intraoperative fluid resuscitation and blood conservation

Recommendation	Level of recommendation	Quality of evidence
We recommend using cell salvage or an ultrafiltration device if large blood loss is anticipated.	1	B
If the intraoperative hemoglobin level is <10 g/dL and blood loss is ongoing, we recommend transfusion of packed blood cells along with fresh frozen plasma and platelets in a ratio of 1:1:1.	1	B

Remark: 11700 ASA: AUA14

AGENTS/TIME	15.15	16.00	17.00	18.00	19.00
N ₂ O = x	0.5-x	0.5-x	0.5-x	0.5-x	0.5-x
O ₂ = 0	0.5-0	0.5-0	0.5-0	0.5-0	0.5-0
Desflurane	4	4	4	4	4
Nimbox	mg ②				
Levophed	mcg ④				
Ephedrine	mg ⑥				
O ₂ sat	100	100	100	100	100
IV FLUID INTAKE	100 ml	100 ml	100 ml	100 ml	100 ml
BP	240	220	200	180	160
PULSE	138	124	127	120	118
START ANES	180	170	160	150	140
TEMP	36.5	36.5	36.5	36.5	36.5
URINE	50/350 ml	10	1	360	

Operation time 5 hr 45 mins
 -Reverse: neostigmine 2.5 mg + Glycopyrorate 0.4 mg
 -Total narcotic : fentanyl 100 mcg
 -ephedrine 30 mg, levophed 4 mcg
 -Crystalloid 1,300 ml
 -PRC 1 unit [270ml]
 -Bleeding ~ 500 ml
 -Urine output ~ 1.5 ml/kg/hr

CONSENT	<input checked="" type="checkbox"/> YES
	<input type="checkbox"/> NO
PRE - OP VISIT	<input checked="" type="checkbox"/> YES
	<input type="checkbox"/> NO
POSITION	<input checked="" type="checkbox"/> SUPINE
	<input type="checkbox"/> PRONE
	<input type="checkbox"/> LITHOTOMY
	<input type="checkbox"/> SITTING
	<input type="checkbox"/> TRENDEL
	<input type="checkbox"/> R.LATERAL
	<input type="checkbox"/> L.LATERAL
	<input type="checkbox"/> JACK-KNIFE
	<input type="checkbox"/> OTHER
LAB	<input checked="" type="checkbox"/> Hct
	<input checked="" type="checkbox"/> Blood Sugar
	<input checked="" type="checkbox"/> Electrolyte
	<input checked="" type="checkbox"/> ABG
TOTAL URINE OUTPUT	- ml



Table 3: Surgical and medical complications of EVAR

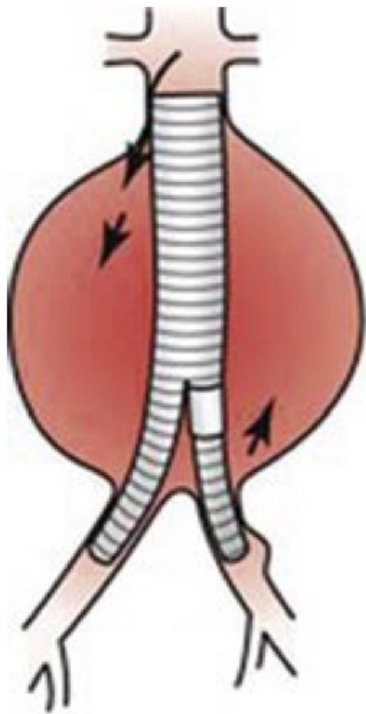
Surgical	Medical
Maldeployment or malposition of graft	Acute coronary syndromes
Arterial rupture/arterial dissection	Acute congestive cardiac failure
Delayed AAA rupture	Acute renal failure/CIN
Stent-graft limb thrombosis leading to lower limb ischemia	Arrhythmia
Graft migration (unusual with new stent grafts)	Respiratory infection
Endoleak	Venous thromboembolism
Rupture of iliac artery (commoner in women who have smaller arteries than men)	Cerebrovascular accident
Ischemia of: Spinal cord, kidneys, liver, bowel, legs	Postimplantation syndrome
Graft infection (very rare)	
Paralysis (very rare)	

CIN: Contrast-induced nephropathy, EVAR: Endovascular abdominal aortic aneurysm repair, AAA: Abdominal aortic aneurysm

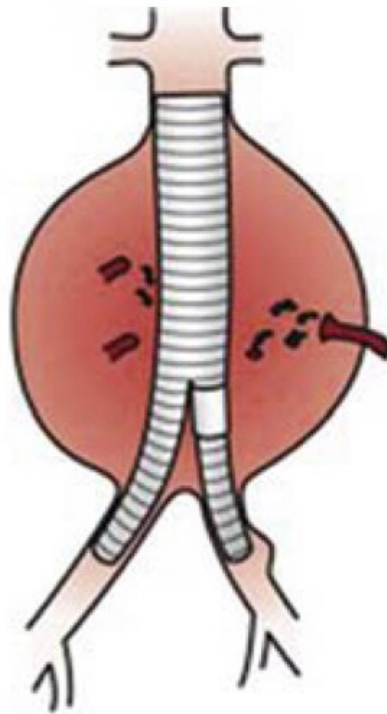
Endoleaks

- Type I : high flow leak adjacent to a stent that is not sealing the sac
- Type II : low flow leak due to arterial branch
- Type III : failure with the stent itself
- Type IV : porosity in the stent

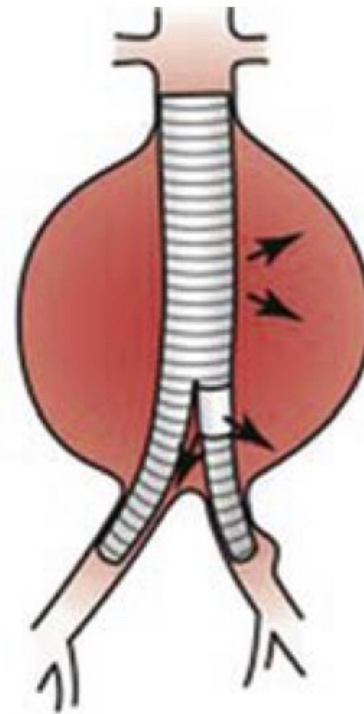
Endoleaks



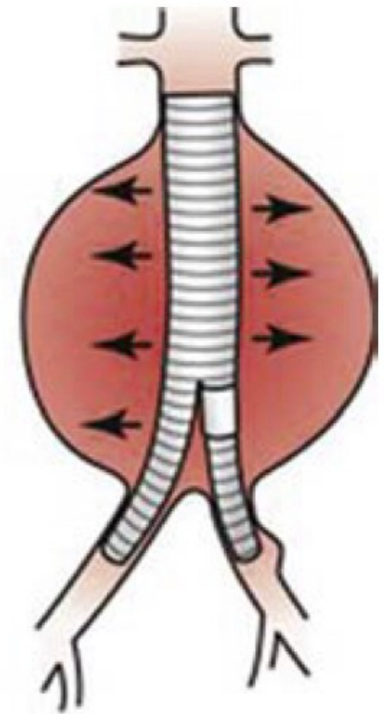
Type I



Type II



Type III



Type IV

In these patient

- Aortography was done ; good distal flow *but*
Endoleak type II was detected intraoperative
- *Plan F/U CT next 1 month*

Postoperative day 0 [at ICU]

S : ตื่นรู้ตัว ถามตอบทำตามสั่งได้ *ไม่เจ็บแน่นหน้าอก ไม่มีหายใจเหนื่อย*

ปัสสาวะออกดี ปวดแผลเล็กน้อย [PS3/10] ระบายคอเล็กน้อย ไม่มีเสียงแหบ

O : V/S BT 36.9 °C ABP 131/63 mmHg HR 80 bpm RR 18 b/m

neuro : E₄V₅M₆ , no motor power change [no POD]

Abdomen : soft , not tender , hypoactive bowel sound

Extremity : pulse full all extremity

I/O = 2600 / 2800

A+P : Infrarenal AAA S/P EVAR post op day 0

-Fentanyl 50 mcg IV q 4 hr

-Fentanyl 25 mcg IV q 2 hr for severe pain

Postoperative day 0 [at ICU]

- *CBC : Hct 32.4 % Hb 10.6 mg/dl*
platelet 155,000 /mm³
- Electrolytes: Na 138.8 K 4.23 Cl 103.6 HCO₃ 21.5
- *BUN/Cr : 26.6/1.93*
- Advice follow up cardiac marker
- *EKG : AF rate 70 -90 bpm [no ST-T change]*
- CXR : cardiomegaly, no pulmonary congestion ,proper position c-line

Postoperative day 1

S : ตื่นรู้ตัว ถามตอบทำตามสั่งได้ ไม่เจ็บแน่นหน้าอก ไม่มีหายใจเหนื่อย

ปัสสาวะออกดี ปวดแผลเล็กน้อย [PS2/10]

O : V/S BT 36.9 °C ABP 131/63 mmHg HR 80 bpm RR 18 b/m

neuro : E₄V₅M₆ , no motor power change

Abdomen : soft , not tender , hypoactive bowel sound

Extremity : pulse full all extremitie

Wound : no discharge

Postoperative day 1

A+P : Infrarenal AAA S/P EVAR post op day 1

- control pain: Fentanyl 50 mcg IV prn q 4 hr
paracetamol 500 mg 1 tab o q 6 hr
- step diet
- ward 14/2
- off A-line ,c-line, foley cath
- continue anti hypertensive drug*
- Edoxaban plan continue next day [resume 48 hr after SX]*
- Plan discharge นัด F/U

Postoperative day 3



