CASE DISCUSSION

R1 ณัฐนิช / อ. กฤษ

Case

- **Case :** A Thai female 65 years old
- **Diagnosis :** Full thickness rotator cuff tear right shoulder
- **Operation :** Arthroscopic rotator cuff repair right shoulder

Patient's history

- **Chief complaint** : นัดมาผ่าตัดส่องกล้องไหล่ขวา
- **Present illness** :

  2 ปี PTA มีอาการปวดไหล่ขวา ขยับไหล่ขวาได้ไม่สุด ปฏิเสธประวัติอุบัติเหตุ ไม่มีแขนชาอ่อนแรง กำมือได้ปกติ รักษาทำกายภาพไม่ดีขึ้น จึงนัดมาผ่าตัด

Past history

- **U/D :** Dyslipidemia
- **NPO time :** AMN
- ปฏิเสธประวัติดื่มเหล้าหรือสูบบุหรี่
- แพ้ยา Sulfa, Penicillin, Tetracycline ผื่นคันตามตัว
- ผ่าตัดเต้านมซ้าย 20ปีก่อน under GA -> no complication
- Functional class 1

Past history

- **Current medication**
  - Simvastatin(10) 1x1 po hs

Physical examination

- V/S : BT 36.2°C BP 119/65 mmHg. HR 80 bpm RR 18/min
- BW 46 kg. Height 150 cm. BMI 20.4 kg/m^2
- GA : good consciousness , not pale
- HEENT : not pale conjunctivae, anicteric sclerae

Airway examination

- Mouth opening > 3 cm
- No prominent incisor
- Dental : normal
- Upper lip bite test class I
- Mallampati grade 2
- Thyromental distance > 6 cm

Physical examination

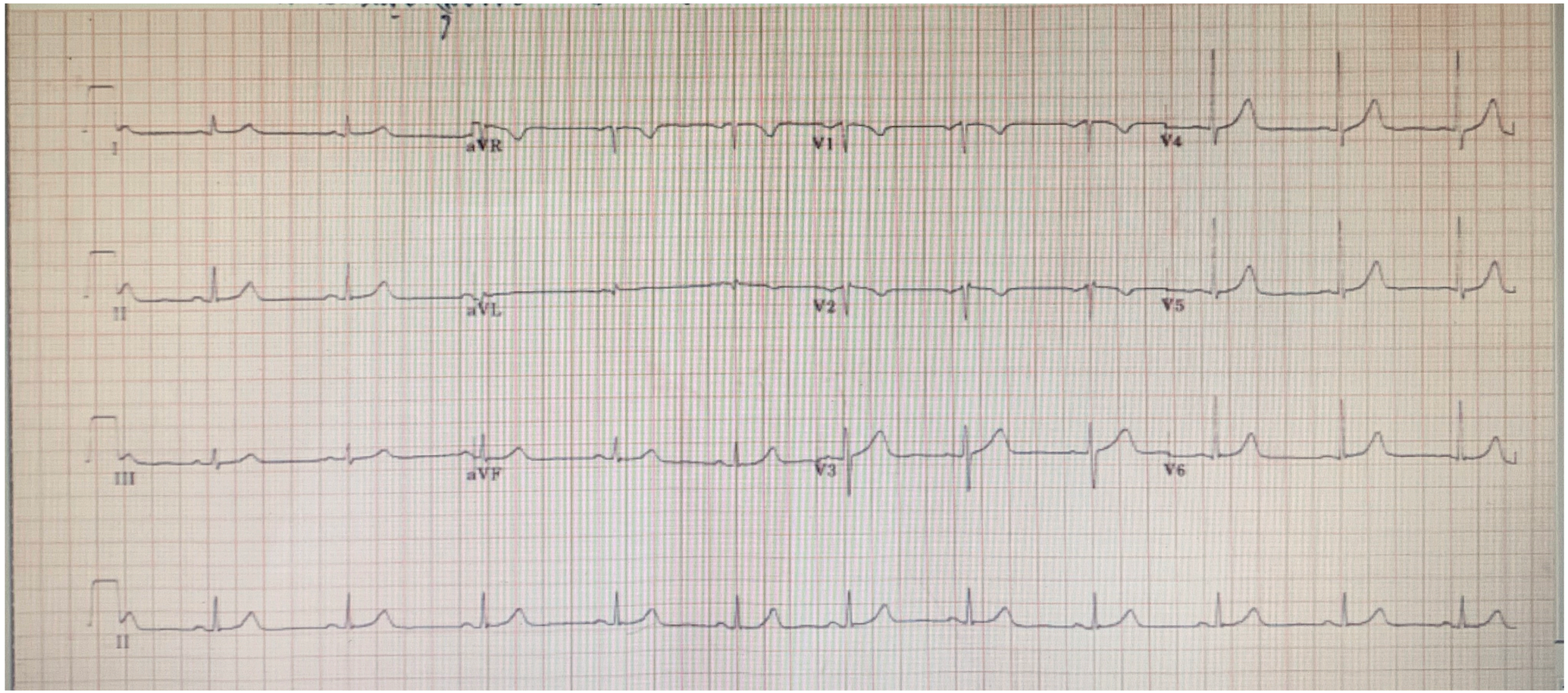
- Heart : pulse full and regular, no murmur
- Lungs : clear, equal breath sound
- Abdomen : soft, not tender, no guarding
- Extremities : no external wound, limit ROM of right shoulder
- Neuro : E4V5M6, pupil 2 mm RTLBE, motor grade V all extremities

Investigation

- CBC : Hb 12.9 g/dl Hct 40.5 % platelet 281,000 /mm3
- Electrolyte : Na 143 mEq/L K 4.83 mEq/L
  Cl 105.7 mEq/L HCO3 28 mEq/L
- BUN 12.4 mg/dl Cr 0.74 mg/dl GFR 85.29

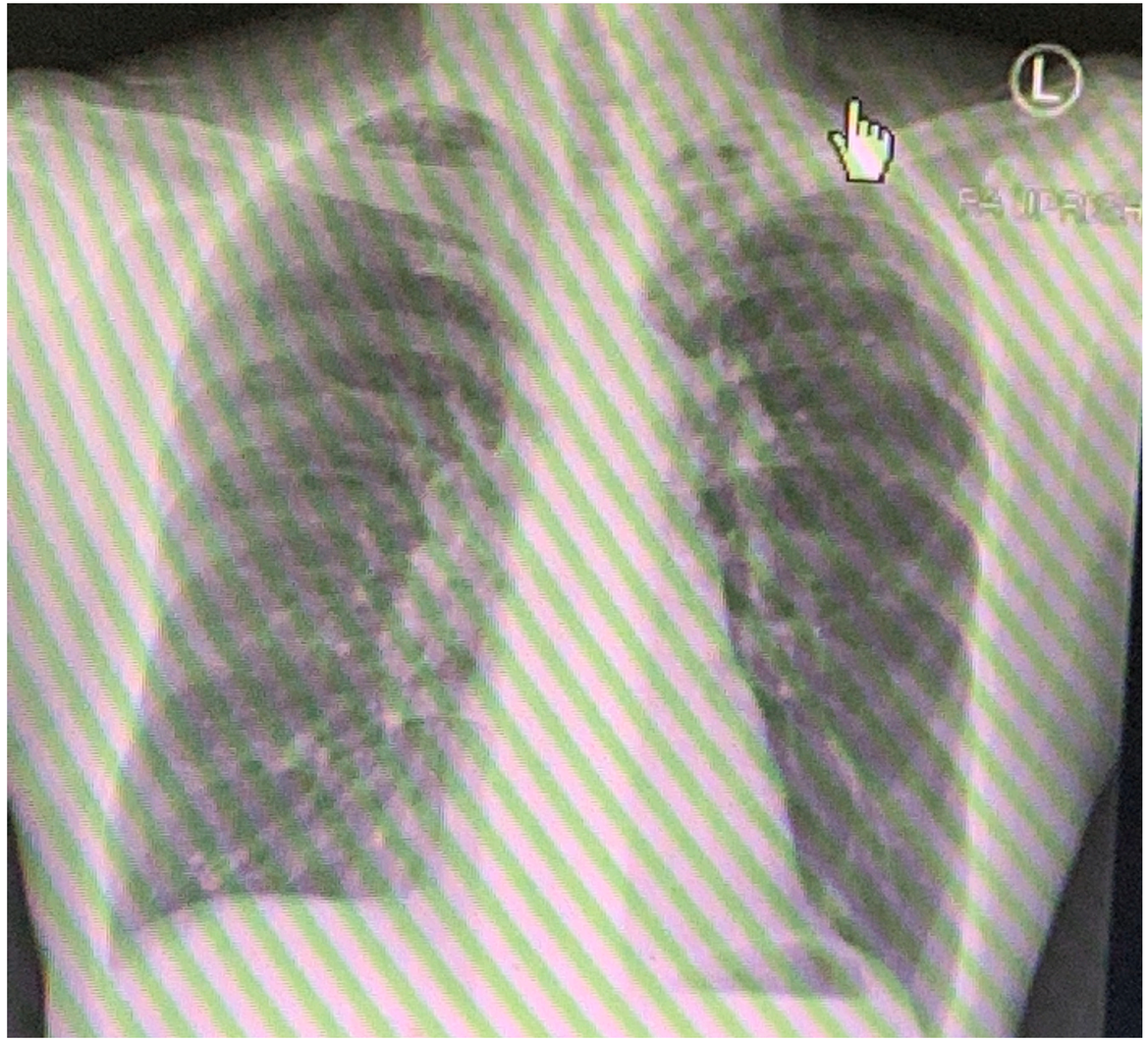
Investigation

ECG : NSR rate 70 bpm , no ST change



Investigation

CXR : no infiltration



Problem list

1. Full thickness rotator cuff tear right shoulder
2. Aging
3. Beach chair position

ASA classification

- ASA II

Preoperative evaluation

1. Patient factor
2. Surgical factor
3. Anesthetic factor

Patient factor

- **Aging**

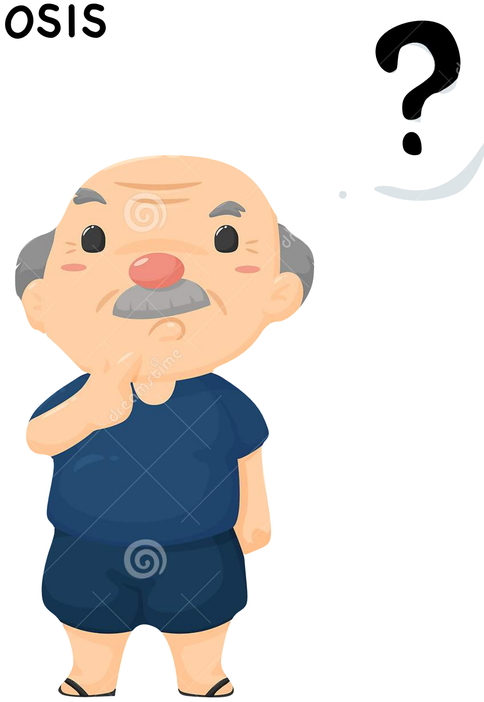
  Aging is associated with changes in physiology

  - CVS
  - Respiratory system
  - Renal system
  - GI and hepatic system
  - CNS

➤ Physiological change in Aging

➤ CVS

- Arterial stiffening -> increased afterload
- Myocardial thickening and decreased elasticity
- Thickening and calcified aortic valve -> Aortic stenosis
- Decreased B-adrenergic sensitivity



➤ Physiological change in Aging

➤ Respiratory system

- blunted response to hypercarbia and hypoxia
- Increased closing capacity > FRC -> atelectasis
- Decreased elastic recoil -> increased lung compliance
- Increased work of breathing

➤ Physiological change in Aging

➤ Renal system

- GFR decreased by 1 ml/min/m2 per year starting at 40 years of age
- Blunted response to RAAS -> electrolyte disturbance

➤ Physiological change in Aging

➤ Hepatic system

- Decreased hepatic blood flow -> slowly metabolized drug in phase I

  e.g. ketamine, flumazenil, fentanyl, lidocaine

- Phase II metabolism dosed not be affect by age

Table 2. Suggested Intravenous Drug Doses

	Drugs	Young Patient	Elderly Patient
Sedative/Hypnotics	Midazolam	0.05 mg/kg	0.02 mg/kg
	Propofol	2-2.5 mg/ kg	1-2 mg/kg
	Maintenance:	**100-200 µg/kg/min**	**50-100 µg/kg/min**
	Ketamine	0.5-2mg/kg	0.3-1.5mg/kg
	Etomidate	0.2-0.3 mg/kg	0.1-0.2mg/kg
	Thiopental	3-5 mg/kg	1.5-3 mg/kg
Opiates	Fentanyl	1-2 µg/kg	0.5-1 µg/kg
	Morphine	0.03-0.06 mg/kg	0.02-0.03 mg/kg
	Sufentanil	0.5-10 µg/kg	0.25-5 µg/kg
	Remifentanil	Bolus: 0.1 µg/kg	0.05 µg/kg
	Maintenance:	**0.5-2 µg/kg/min**	**0.3-1.5 µg/kg/min**
Neuromuscular Blocking Drugs	Succinylcholine	0.5-1.0 mg/kg	0.5-1.0 mg/kg
	Rocuronium	0.1-0.6 mg/kg	0.05-0.4 mg/kg
	Vecuronium	0.02-0.06 mg/kg	0.01-0.04 mg/kg
	Pancuronium	0.02-0.1 mg/kg	0.01-0.05 mg/kg
	Cisatracurium	0.05-0.2 mg/kg	0.05-0.2 mg/kg
	Atracurium	0.2-0.5 mg/kg	0.2-0.5 mg/kg
	Doxacurium	0.01-0.03 mg/kg	0.005-0.03 mg/kg

The drug doses listed are intended to be guides and must be adjusted according to the clinical situation and needs of each patient. In general, most of the drug doses should be decreased 30-50% in elderly patients. There are some exceptions, such as some of the neuromuscular blocking drugs. Except for succinylcholine, the lower dose for each of the neuromuscular blocking drugs is for maintenance during anesthesia while the higher dose is for intubating conditions. The clinician should consider administering maintenance doses of the neuromuscular drugs less frequently. Young patients are assumed to be around 30 yr old, while elderly patients are greater than 70 yr old.

➤ Physiological change in Aging

➤ CNS system

- Decreased cognitive reserve -> ⬆️ sensitivity to anesthetic medications & risk POCD
- Decreased Neurotransmitter

Surgical factor

- Beach chair position

Fig. 34.20 Sitting position adapted for shoulder surgery, often called the lawn or beach chair position. The arms must be supported to prevent stretching of the brachial plexus without pressure on the ulnar area of the elbow. As with all head-up positions, blood pressure should be regulated with the height of the brain in mind.

Miller's anesthesia

Surgical factor

- **Beach chair position : Advantage**
  - Access to the shoulder from both the anterior and posterior aspect
  - Easier airway access , facial swelling is minimized
  - ⬇️ Risk neurovascular complication

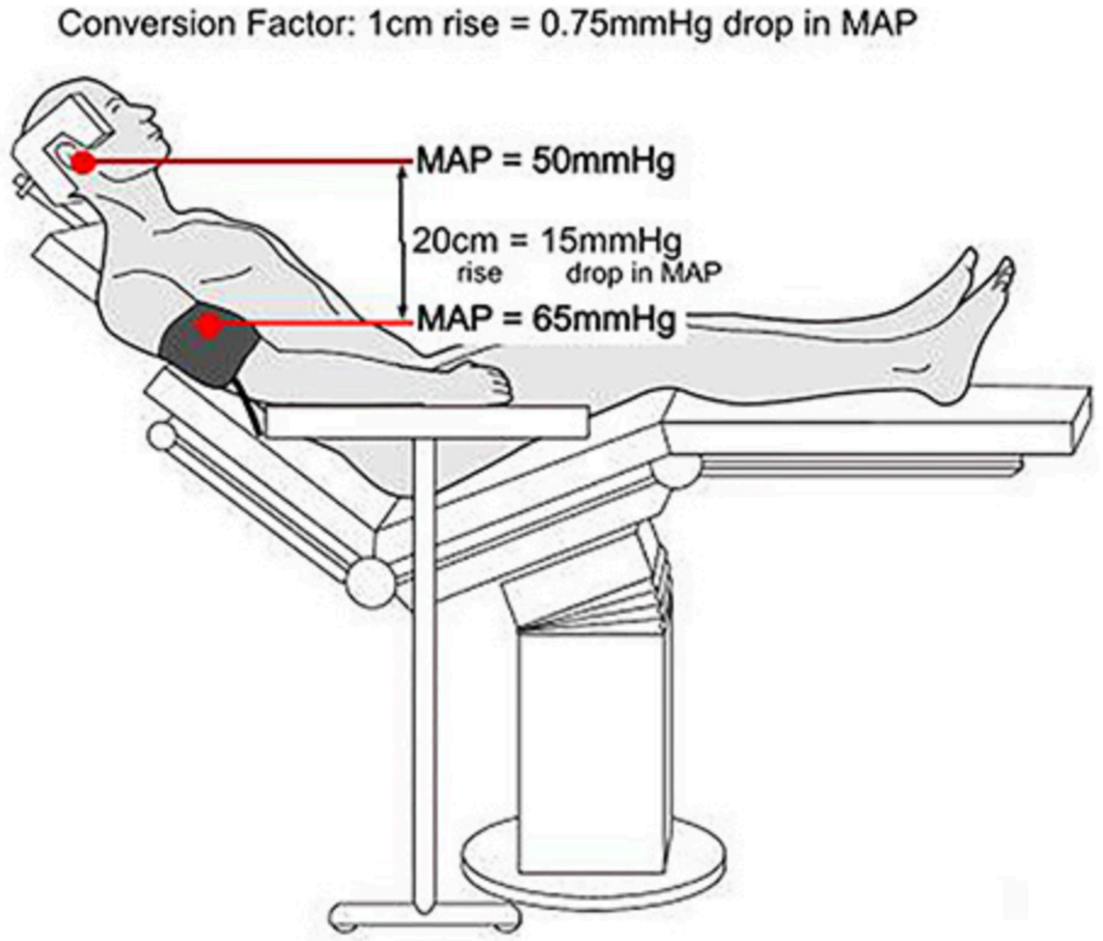
Beach chair position : physiologic changes

- CVS
  - In awake patients : change position supine ->upright
    - ⬇️BP, ⬇️CO, ⬆️SVR
  - If patients under GA
    - ⬇️⬇️BP, ⬇️CO,⬇️SVR
  - Mx - incrementally placed into the sitting position

    - intravenous fluids and vasopressors

Beach chair position : physiologic changes

- **RS**
  - ⬆️VC ⬆️FRC
- **CNS**
  - Maintain CPP



Surgical factor

- **Complication sitting position**
  - Venous air embolism (VAE)
  - Pneumocephalus
  - Hemodynamic instability
  - Cerebral ischemia
  - Spinal cord infarction (Hyperflexion, hyperextension, external rotate of neck)

Cerebral oxygen desaturation during beach chair position

Annelies T. Moerman, Stefan G. De Hert, Tom F. Jacobs, Lieven F. De Wilde and Patrick F. Wouters

Table 3 Postural changes in cerebral oxygen saturation and in blood pressure

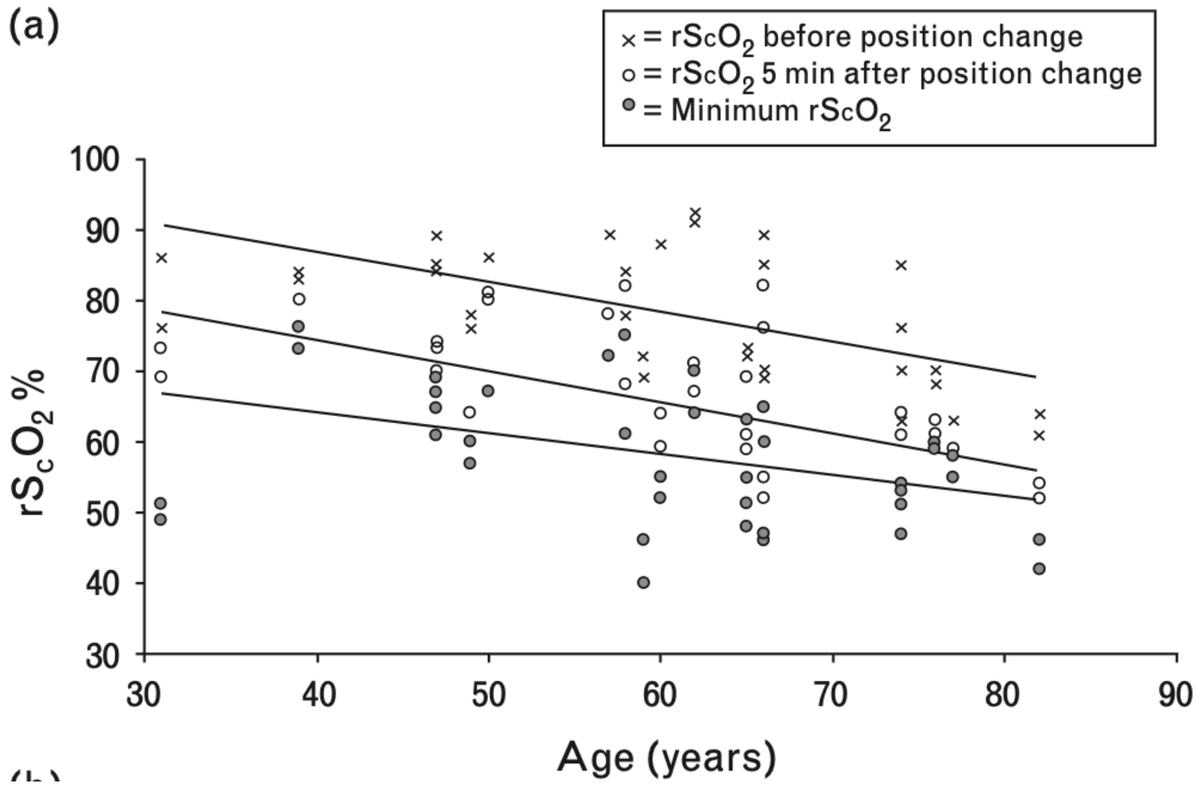
	Left rS_cO_2 (%) mean ± SD (min–max)	Right rS_cO_2 (%) mean ± SD (min–max)	SAP/DAP (mmHg) (mean ± SD)
Awake	69 ± 6 (56–78)	68 ± 6 (54–79)	156 ± 29/76 ± 20
Before position change	79 ± 9 (63–92)	77 ± 10 (61–91)	130 ± 32*/67 ± 20
5 min after position change	65 ± 10 (46–82)§	66 ± 11 (40–82)§	110 ± 24*,§/64 ± 24
Minimum value	57 ± 9 (42–73)*,§	59 ± 10 (40–76)*,§	84 ± 22*,§/46 ± 11*,§

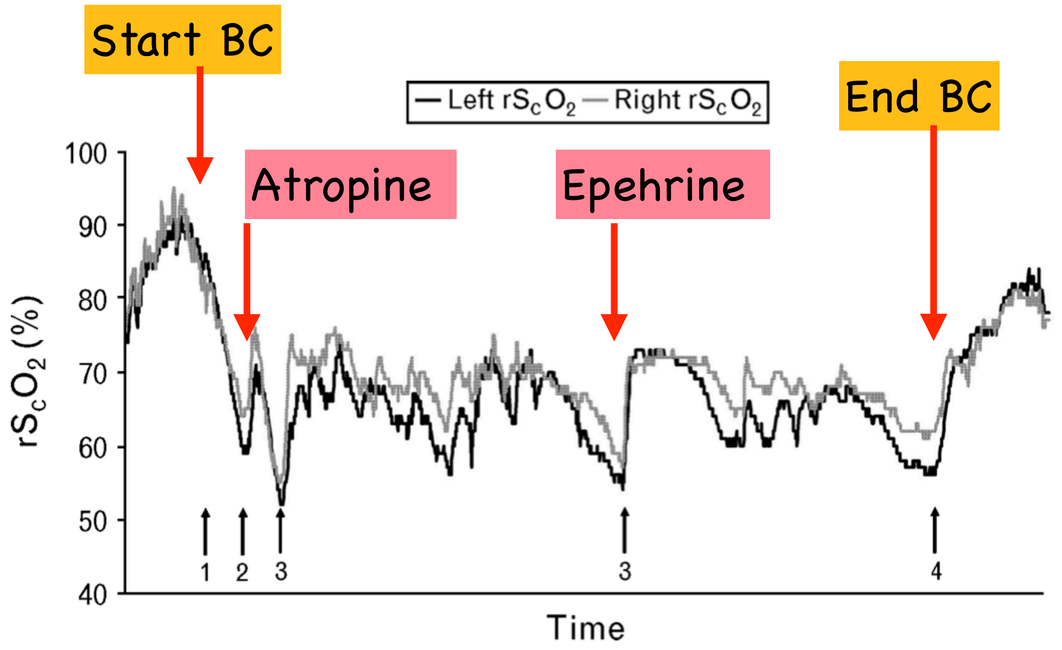
rS_cO_2, regional cerebral oxygen saturation; SAP, systolic arterial pressure; DAP, diastolic arterial pressure. * $P < 0.05$ vs. awake value. § $P < 0.05$ vs. value before position change.

Cerebral oxygen desaturation during beach chair position

Annelies T. Moerman, Stefan G. De Hert, Tom F. Jacobs, Lieven F. De Wilde and Patrick F. Wouters

Average rScO2 change after BC position 27 %





Representative case. Changes in regional cerebral oxygen saturation (rS_cO_2) at the start (1) and the end (4) of the beach chair position and after administration of atropine (2) and ephedrine (3).

British Journal of Anaesthesia Page 1 of 10
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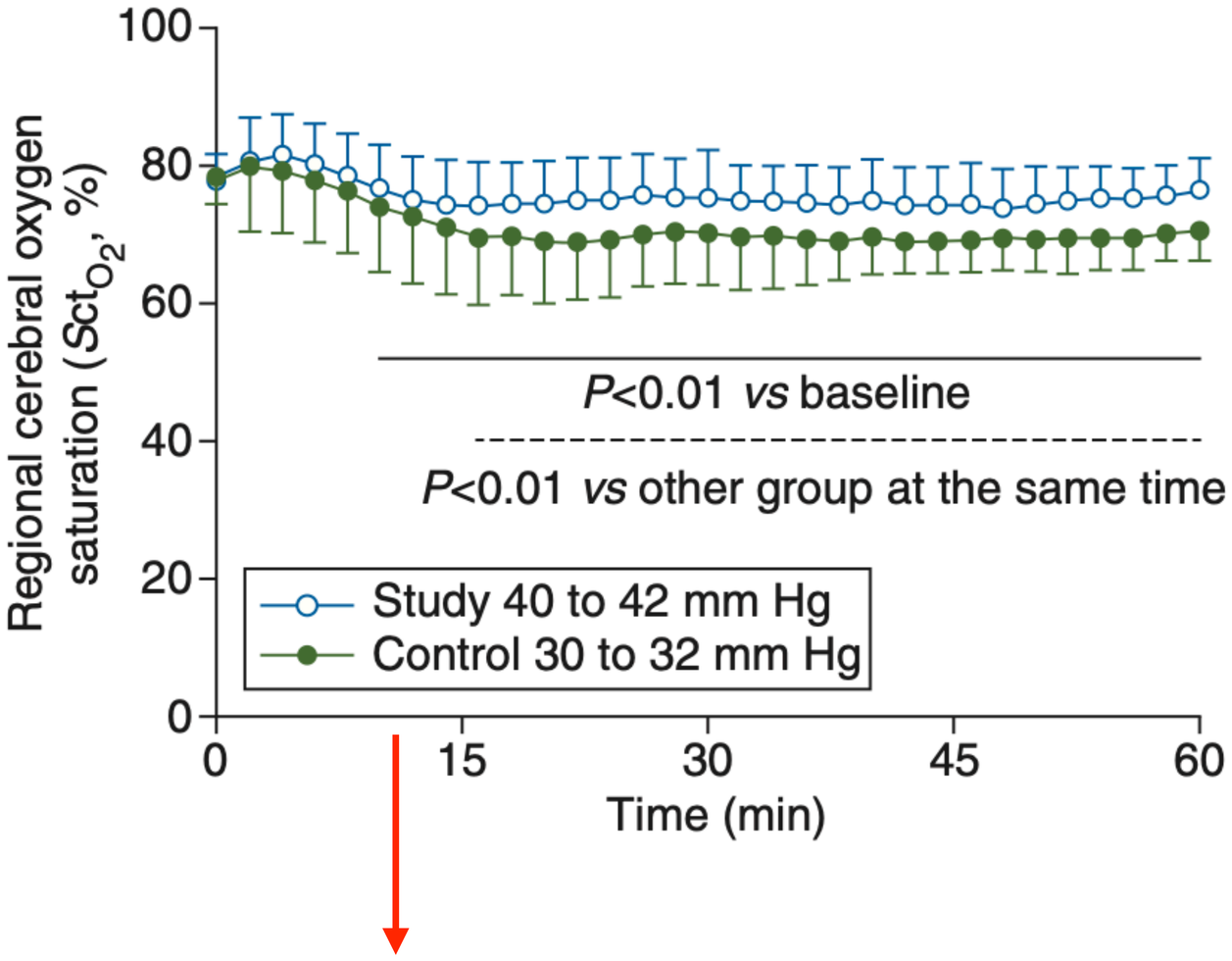
BJA

Effect of ventilation on cerebral oxygenation in patients undergoing surgery in the beach chair position: a randomized controlled trial

G. S. Murphy[1*], J. W. Szokol[1], M. J. Avram[3], S. B. Greenberg[1], T. D. Shear[1], J. S. Vender[1], S. D. Levin[2], J. L. Koh[2], K. N. Parikh[1] and S. S. Patel[1]

- RCT : 70 patients undergoing shoulder surgery in the BCP with GA
- Compared ETCO2 of 30-32 mmHg VS ETCO2 of 40-42 mmHg
- Recored cerebral desaturation events (CDEs)

  (defined as a ≥20% reduction in cerebral oxygenation from baseline values)



~ 10 mins start BC

- **Results :**

- cerebral oxygenation values were significantly higher in ETCO2 40-42 group throughout the intraoperative period (P< 0.01).

- the incidence of CDEs was lower in the study 40-42 group (8.8%) compared with the control 30-32 group (55.6%, P<0.0001).

Anesthetic factor

- Choice of anesthesia
- Pain control
- VTE prophylaxis
- PONV

Guidelines

PROSPECT guideline for rotator cuff repair surgery: systematic review and procedure-specific postoperative pain management recommendations

O. Toma,[1,2] **B. Persoons,**[3] **E. Pogatzki-Zahn,**[4] **M. Van de Velde**[5] and **G. P. Joshi**[6] **on behalf of the PROSPECT Working Group collaborators**[#]

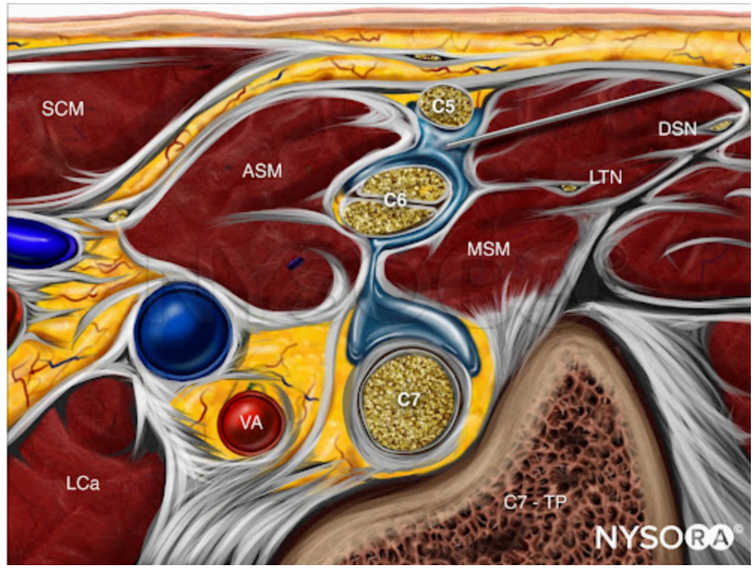
Recommendations

1. Whenever possible, rotator cuff repair should be performed using an arthroscopic approach, as it is associated with reduced postoperative pain.
2. Systemic analgesia should include paracetamol and non-steroidal anti-inflammatory drugs (NSAID) administered pre-operatively or intra-operatively and continued postoperatively.
3. Interscalene brachial plexus blockade is recommended as the first-choice regional analgesic technique. Suprascapular nerve block, with or without axillary nerve block, may be used as an alternative to interscalene block.
4. A single dose of intravenous (i.v.) dexamethasone is recommended for its ability to increase the analgesic duration of interscalene brachial plexus block, decrease analgesic use and anti-emetic effects.
5. Opioids should be reserved as rescue analgesia in the postoperative period.

Toma et al. PROSPECTguidelineforrotatorcuffrepairsurgery:systematicreviewandprocedure-specificpostoperativepainmanagementrecommendations. Anaesthesia 2019, 74, 1320–1331

Interscalene Brachial Plexus Nerve Block

- **Indications:** Shoulder and upper arm surgery
- **Transducer position:** Transverse on the neck, 3–4 cm superior to the clavicle, over the external jugular vein
- **Goal:** Local anesthetic spread between the anterior and middle scalene muscles
- **Local anesthetic:** 7–15 mL



Gautier PE, Vandepitte C, Gadsden J. Ultrasound-Guided Interscalene Brachial Plexus Nerve Block. Nysora

Complication of ISBPB

- Phrenic nerve block: 100% using conventional techniques
- Recurrent laryngeal nerve block
- Horner's syndrome
- Pneumothorax
- Nerve root injury
- Intravascular injection : LAST

Phrenic Nerve Palsy

- Presence of diaphragmatic paresis
    - Inspiration is achieved largely by contraction of intercostal and accessory muscles and expansion of the rib cage
    - The paralyzed diaphragm to move cephalad and the abdominal muscles inward.

El-Boghdadly K. Phrenic Nerve Palsy and Regional Anesthesia for Shoulder Surgery. Anesthesiology 2017; 127:173-91.

Phrenic Nerve Palsy

- **Strategies to Reduce Phrenic Nerve Palsy**
  - ⬇️ Local anesthetic doses and injection volumes **(to less than 10ml)**
  - Extrafascial (periplexus) injection
  - **Alternatives : Superior Trunk Block**

El-Boghdadly K. Phrenic Nerve Palsy and Regional Anesthesia for Shoulder Surgery. Anesthesiology 2017; 127:173-91.

Risk VTE assessment

BOX 31.12 Modified Caprini Risk Assessment Model for Venous Thromboembolism

1 Point Each

Age 41–60 years
Minor surgery
BMI > 25 kg/m2
Swollen legs
Varicose veins
Pregnancy or postpartum
History of unexplained or recurrent spontaneous abortion
Oral contraceptives or hormone replacement
Sepsis (<1 month)
Serious lung disease, including pneumonia (<1 month)
Abnormal pulmonary function
Acute myocardial infarction
Heart failure (<1 month)
History of inflammatory bowel disease
Medical patient at bed rest

2 Points Each

Age 61–74 years
Arthroscopic surgery
Major open surgery (>45 min)
Laparoscopic surgery (>45 min)
Malignancy
Confined to bed (>72 h)
Immobilizing plaster cast
Central venous access

3 Points Each

Age ≥ 75 years
History of VTE
Family history of VTE
Factor V Leiden mutation
Prothrombin 20210A mutation
Lupus anticoagulant
Anticardiolipin antibodies
Elevated serum homocysteine
Heparin-induced thrombocytopenia
Other congenital or acquired thrombophilia

5 Points Each

Stroke (<1 month)
Elective arthroplasty
Hip, pelvis, or leg fracture
Acute spinal cord injury (<1 month)

Caprini score 4(moderate risk VTE)

Risk VTE assessment

Total Score and VTE Risk Level for surgical patients based on Caprini model		
Total Score	**VTE Risk Level**	**VTE prophylaxis recommended?**
0	Very low	No
1-2	Low	Mechanical prophylaxis
3-4	Moderate	Pharmacological and/or Mechanical prophylaxis
5 or more	High	Pharmacological and Mechanical prophylaxis

VTE prophylaxis

- **Mechanical prophylaxis**
  - : Early ambulation
  - : Ankle pumping
  - : Graduated compression stocking
  - : intermittent pneumatic compression (IPCD)

- **Pharmacological prophylaxis**
  - : ASA
  - : Vitamin K antagonists
  - : Unfractionated heparin
  - : LMWH
  - : NOAC

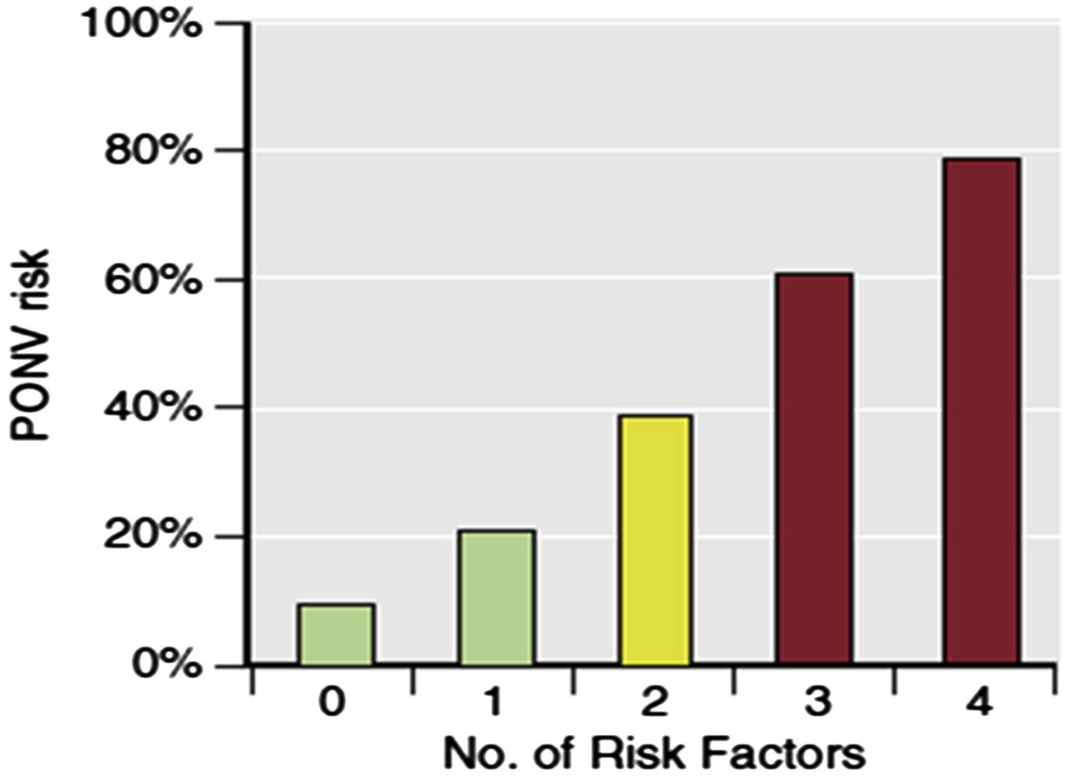
Choice of anesthesia

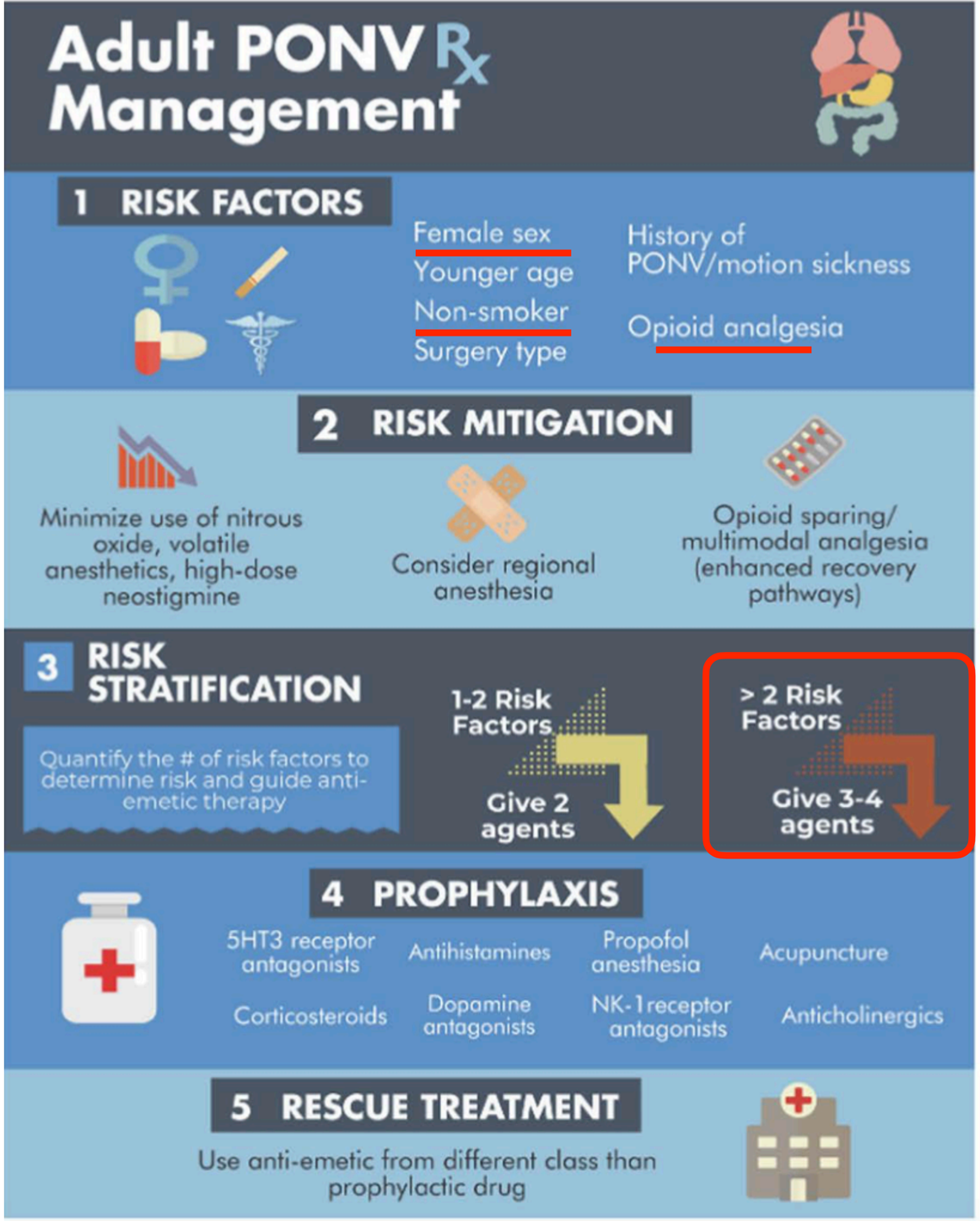
- GA with ETT with controlled ventilation with right interscalene brachial plexus nerve block

Anesthetic factor

- PONV : Apfel score

Risk factors	Points
Female gender	1
Nonsmoker	1
History of PONV	1
Postoperative opioids	1
Risk score =	0...4





Gan TJ, Belani KG, Bergese S, et al. Fourth Consensus Guidelines for the Management of Postoperative Nausea and Vomiting. Anesth Analg 2020;131:411–48

Table 4. Antiemetic Doses and Timing for Prevention of PONV in Adults

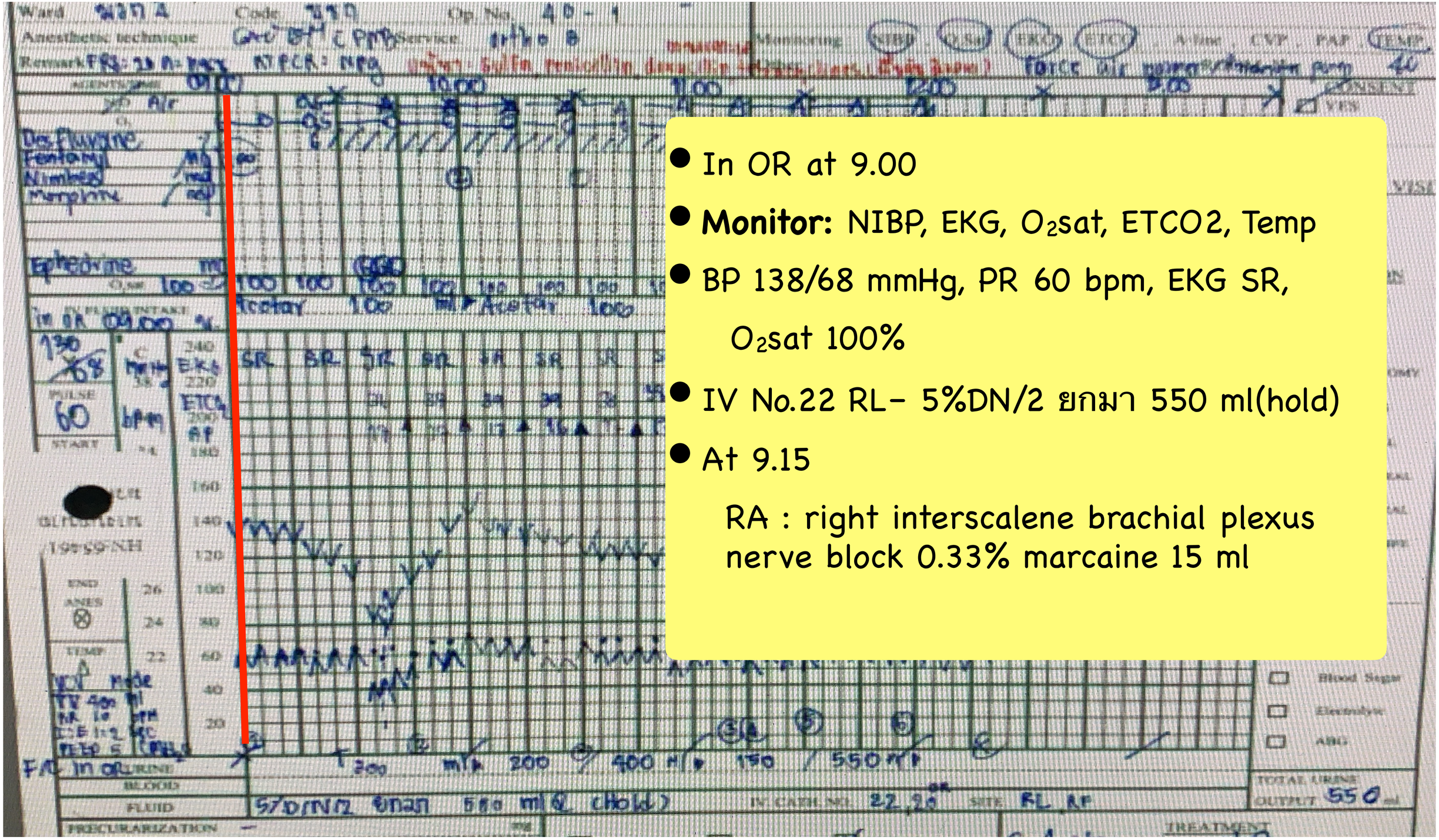
Drugs	Dose	Evidence	Timing	Evidence
Amisulpride	5 mg	A2[113,114]	At induction	A2[113,114]
Aprepitant	40 mg PO	A1[115–117]	At induction	A2[118]
Casopitant	150 mg PO	A1[119–121]	At induction	
Dexamethasone	4–8 mg IV	A1[122]	At induction	A1[123]
Dimenhydrinate	1 mg/kg IV	A1[124–126]		
Dolasetron	12.5 mg IV	A2[127–129]	End of surgery; timing may not affect efficacy	A2[128]
Droperidol[a]	0.625 mg IV	A1[130,131]	End of surgery	A1[132]
Ephedrine	0.5 mg/kg IM	A2[133,134]		
Granisetron	0.35–3 mg IV	A1[135,136]	End of surgery	A1[137–139]
Haloperidol	0.5 to <2 mg IM/IV	A1[140]		
Methylprednisolone	40 mg IV	A2[141]		
Metoclopramide	10 mg	A1[142]		
Ondansetron	4 mg IV 8 mg PO or ODT	A1[143,144]	End of surgery	A1[145]
Palonosetron	0.075 mg IV	A1[146–148]		
Perphenazine	5 mg IV	A1[149]		
Promethazine[a]	6.25 mg	A2[150,151]		
Ramosetron	0.3 mg IV	A1[152]	End of surgery	A2[152]
Rolapitant	70–200 mg PO	A3[153]	At induction	
Scopolamine	Transdermal patch	A1[154,155]	Prior evening or 2 h before surgery	A1[156]
Tropisetron	2 mg IV	A1[157]	End of surgery	

Gan TJ, Belani KG, Bergese S, et al. Fourth Consensus Guidelines for the Management of Postoperative Nausea and Vomiting. Anesth Analg 2020;131:411–48

Preparation

- NPO
- Informed consent
- Standard monitoring : NIBP, EKG, O_2sat, body temperature
- Warm IV fluid
- Force air warmer

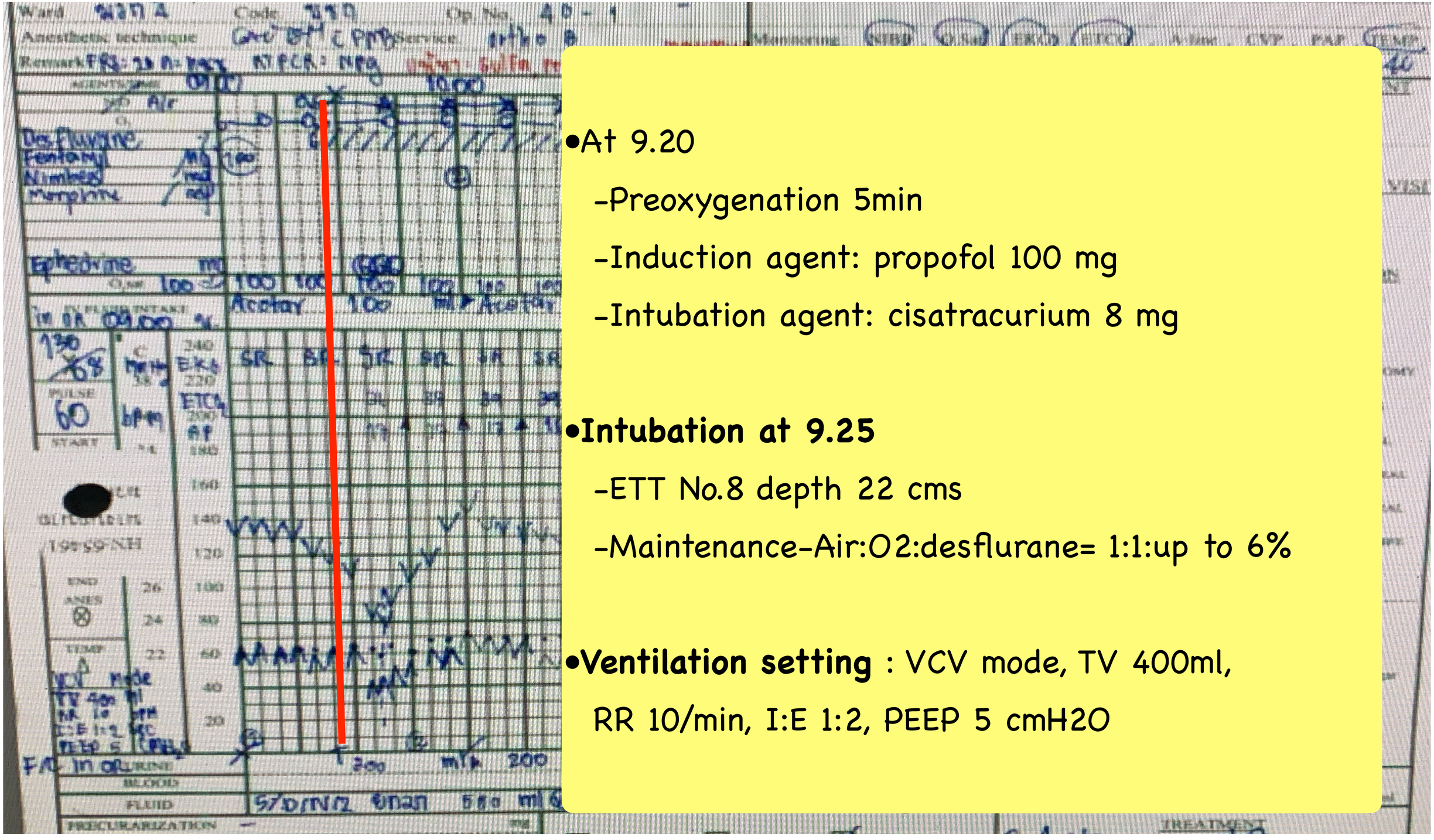
- Anesthetic machine
- IV anesthetic drugs
- Vasopressor drugs
- Intubation equipment



- In OR at 9.00
- **Monitor:** NIBP, EKG, O_2sat, ETCO2, Temp
- BP 138/68 mmHg, PR 60 bpm, EKG SR,

  O_2sat 100%
- IV No.22 RL- 5%DN/2 ยกมา 550 ml(hold)
- At 9.15

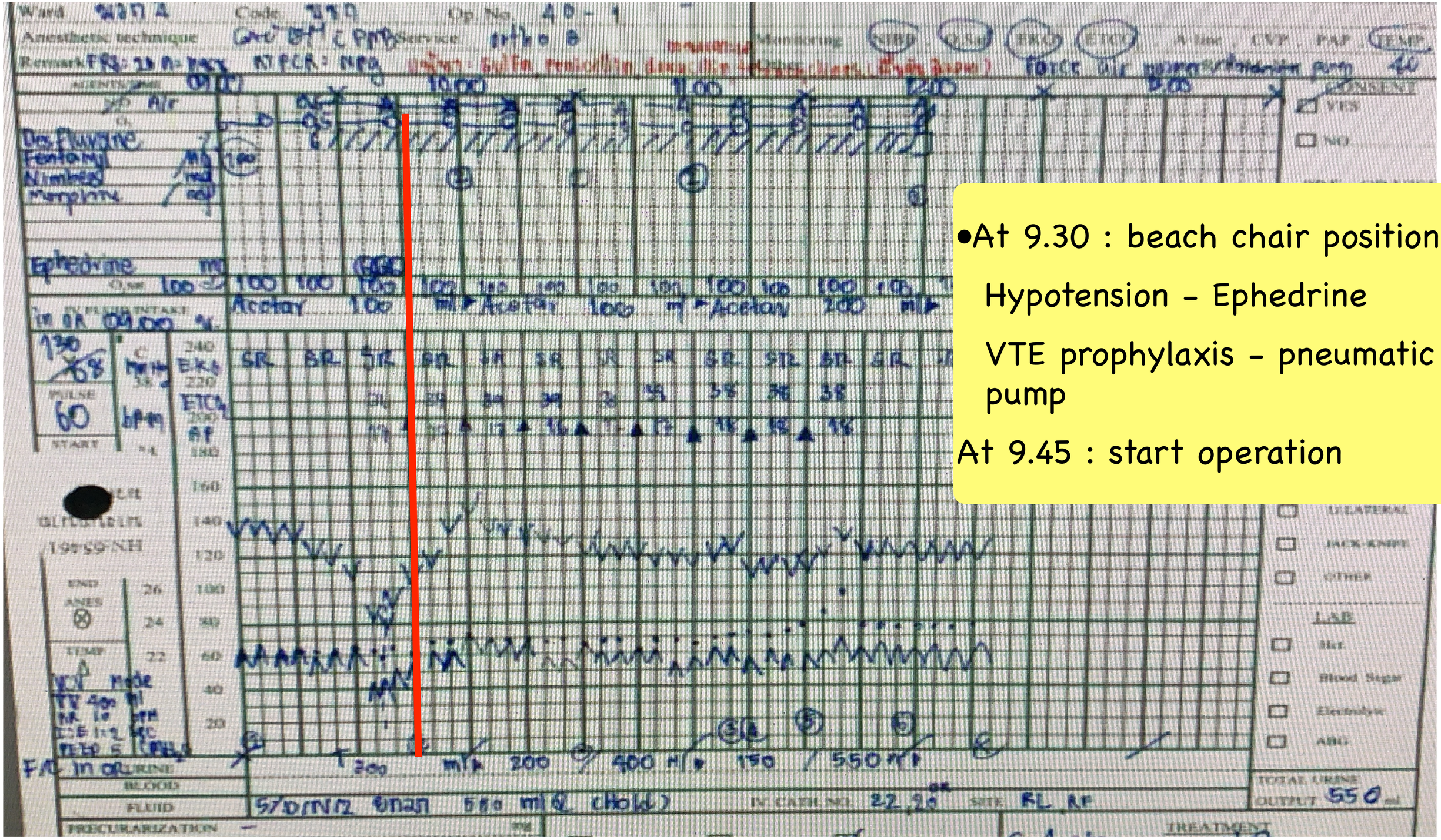
  RA : right interscalene brachial plexus nerve block 0.33% marcaine 15 ml



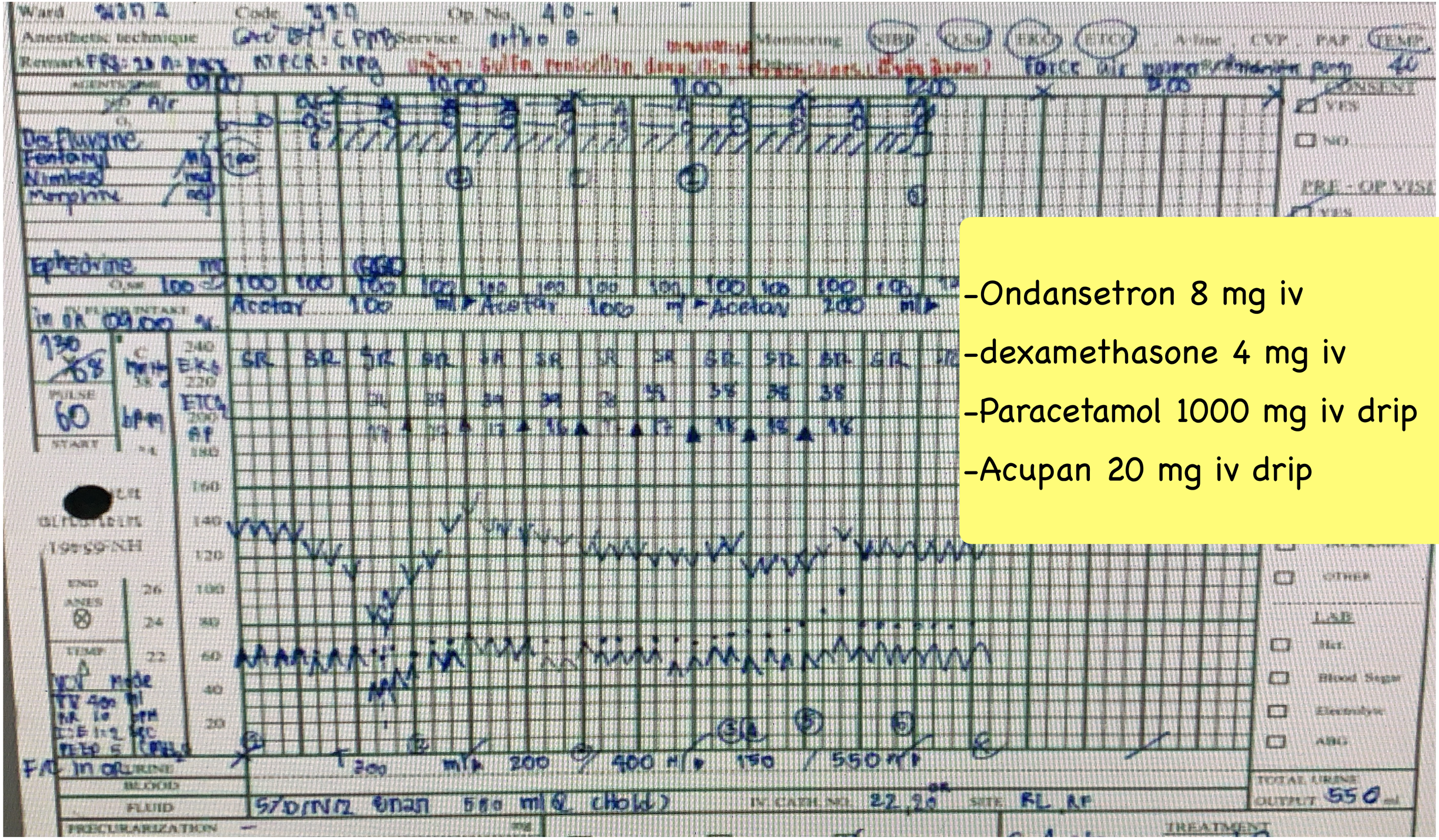
- At 9.20
  - -Preoxygenation 5min
  - -Induction agent: propofol 100 mg
  - -Intubation agent: cisatracurium 8 mg

- **Intubation at 9.25**
  - -ETT No.8 depth 22 cms
  - -Maintenance-Air:O2:desflurane= 1:1:up to 6%

- **Ventilation setting** : VCV mode, TV 400ml, RR 10/min, I:E 1:2, PEEP 5 cmH2O



- At 9.30 : beach chair position
  - Hypotension - Ephedrine
  - VTE prophylaxis - pneumatic pump
- At 9.45 : start operation

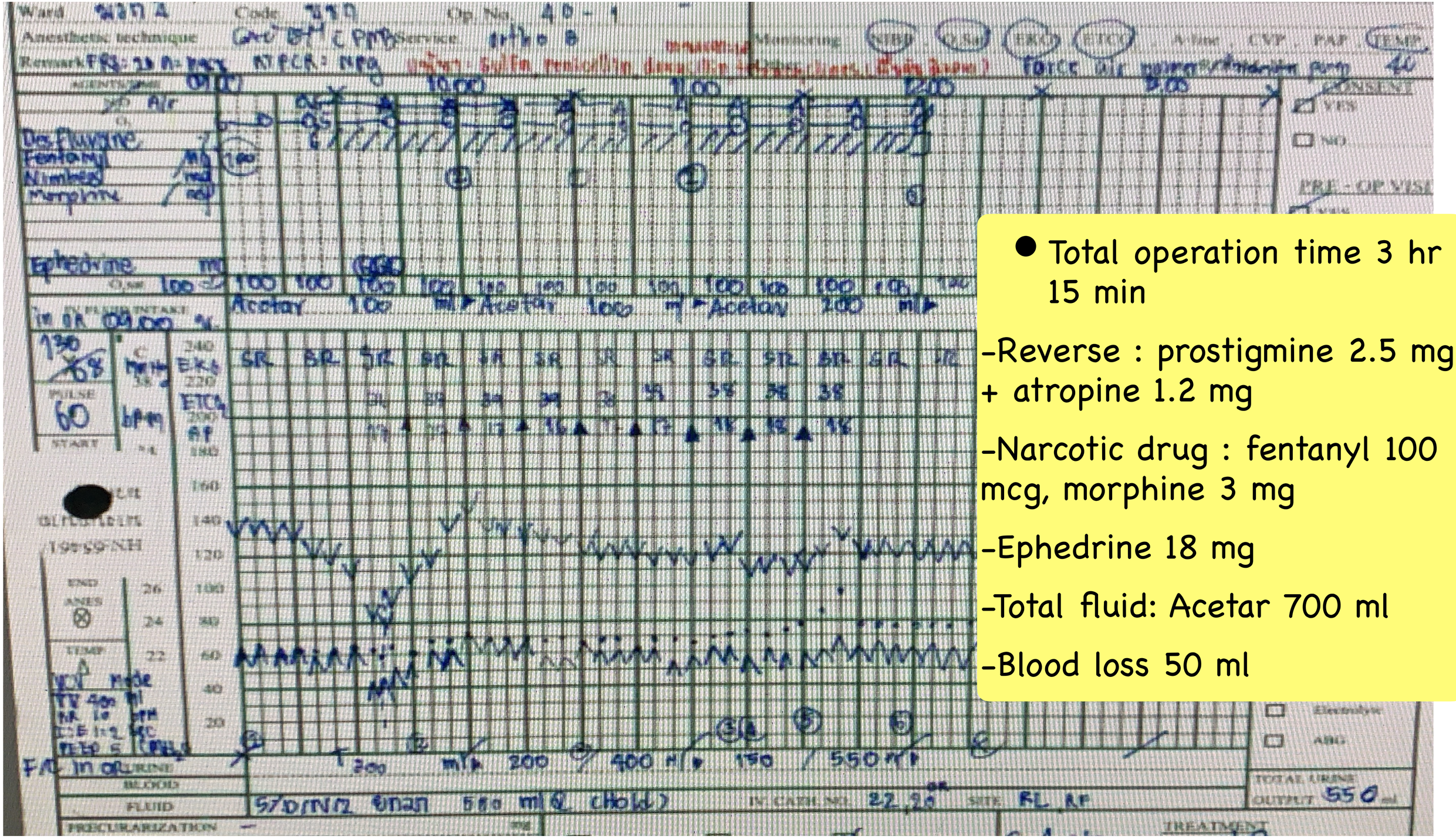


-Ondansetron 8 mg iv

-dexamethasone 4 mg iv

-Paracetamol 1000 mg iv drip

-Acupan 20 mg iv drip



- Total operation time 3 hr 15 min

-Reverse : prostigmine 2.5 mg + atropine 1.2 mg

-Narcotic drug : fentanyl 100 mcg, morphine 3 mg

-Ephedrine 18 mg

-Total fluid: Acetar 700 ml

-Blood loss 50 ml

Post operative day 1

S : ผู้ป่วยตื่นดี PS at rest 0/10, PS at movement 5/10 ไม่มีอาการคลื่นไส้อาเจียน ไม่มีวิงเวียนศีรษะ

O : V/S : BT 37.3 °C BP 121/61 mmHg. PR 90 bpm RR 18/min

GA : good consciousness

Heart : Normal S1S2, no murmur

Lungs : clear, equal BS

Neuro : E4V5M6, no facial palsy

Extremities : marked swelling at right shoulder

A+P : Full thickness rotator cuff tear right shoulder S/P Sx POD1

- control pain : Morphine 4 mg iv q 4 hr
  : Morphine 2 mg iv prn q 2 hr
  : Acupan 80 mg + NSS 500 ml iv drip in 24 hr
  : Paracetamol(500) 1 tab po 6 hr
- PONV : Plasil 10 mg iv prn q 8 hr

Post operative day 2

S : ผู้ป่วยตื่นดี PS at rest 0/10, PS at movement 2-3/10 ไม่มีอาการคลื่นไส้อาเจียน ไม่มีวิงเวียนศีรษะ

O : V/S : BT 36.3 °C BP 118/64 mmHg. PR 88 bpm RR 18/min

GA : good consciousness

Heart : Normal S1S2, no murmur

Lungs : clear, equal BS

Neuro : E4V5M6, no facial palsy

Extremities : swelling at right shoulder

A+P : Full thickness rotator cuff tear right shoulder S/P Sx POD2

- D/C
- control pain HM : ultracet 1 tab po prn q 6 hr

THANK YOU