

ICU review

September 2013

จัดทำโดย พญ. ปัญชิกา ลีอตระกูล
พญ. ทิพรรัตน์ พงษ์วัฒนสุข
อาจารย์ที่ปรึกษา อ.นพ. สันฐิติ โมรากุล

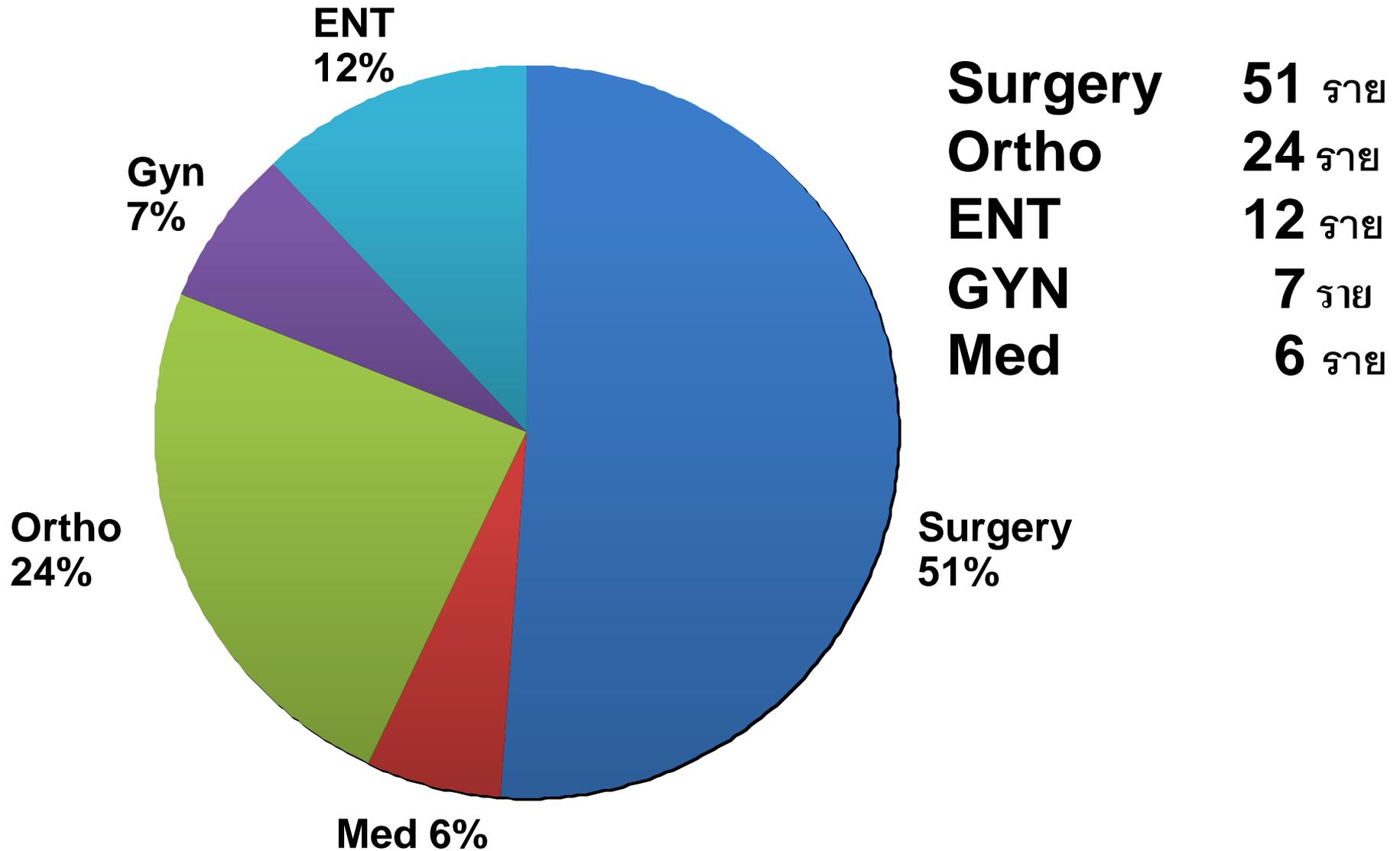
สถิติ

- ผู้ป่วยทั้งหมด **90** ราย
- ยกยอดมาจากเดือนธันวาคม **4** ราย
- รับใหม่ **9** ราย
- รับย้าย **77** ราย

สถิติ

- จำหน่าย **1** ราย
- ย้ายออก **80** ราย
- ถึงแก่กรรม **2** ราย
- ส่งต่อเดือนตุลาคม **7** ราย

Service



Dead case 1

- Male 81 years old.
- **Underlying disease** : COPD
- Status :
 - on home oxygen 3 LPM
 - S/P tracheostomy 18/9/55
 - Bed ridden

Dead case 1

- **Problem list:**
 - COPD with acute exacerbation
 - Spontaneous tension pneumothorax
 - S/P cardiac arrest with successful resuscitation
 - Septicemia
 - Bacterial pneumonia
 - Acute renal failure
 - Disseminated herpesviral disease
 - Atrial fibrillation

Dead case 1

- Admit 6/6/56 present with COPD with AE
- Day 1 --> tension pneumothorax
--> On ICD and transfer to 8IK
- Day 19 --> transfer to 8NK
- Day 67 --> Cardiac arrest --> CPR 1 hr
--> VF --> defib 200 J. X 4 times
--> therapeutic hypothermia 24 hrs.
--> Transfer to 8IK

Dead case 1

- Day 109 --> Dead , No CPR, ญาติ accept
- **Cause of dead :**
 - Gram negative septicemia
 - Bacterial pneumonia
 - Spontaneous tension pneumothorax
 - COPD

Dead case 2

- Myanmar female 37 years old
- No underlying disease
- **Diagnosis:**
 - G2P1 GA 34 wk with severe preeclampsia with HELLP syndrome
 - S/P Caesarean section with TL with TAH post op day 2
 - R/O intraabdominal bleeding
 - Coagulopathy
 - Anemia from acute blood loss
 - Renal insufficiency
 - Impaired hepatic function

Dead case 2

- **Operation:** (รพ.เจ้าพระยาอภัยมราช)
 - Caesarean section with TL with TAH
 - Pre-op : platelet 95000, INR 1.84 , Hct 34%
 - Technique : SB convert to GA-T due to massive bleeding
 - Op-time : 4 hr
 - Blood loss : 3200 ml
 - Blood component: PRC 4 u , FFP 3 U, cryo 20 U
 - Post-op : retained ETT to ICU
 - Extubate at post-op hour 10

Dead case 2

- Refer from รพ.เจ้าพระยาบรมราช เสุพรรณบุรี
- At 8IK:
 - แกร็บ confuse GCS E3M5V4
 - BP 140-150/80-90 HR 100-110 RR 20 BT 36.5
 - On O2 mask FiO2 0.4 flow 8 LPM
 - Bleeding per mouth, per surgical wound, skin eccymosis
 - CT brain : no ICH , generalized brain swelling

Dead case 2

- **Admission Hour. 5** ซึ่มลง: intubate with controlled ventilation
 - > Bleeding per tube
 - > Gross hematuria
- **Admission Hour. 18** : Bleeding per wound เพิ่มขึ้น, Hct drop
 - > Novo-7 5 amp IV
 - > Set OR for explor lap

Dead case 2

- **Operation:**
 - Explor-lap
 - GA-T
 - 1 hr 15 min
 - BL 1500 ml
 - PRC 2 U, FFP 4 U , LPPC 1 U
- **Intraoperative finding :**
 - No bleeding point
 - Ascitic fluid 1000 ml

Dead case 2

- **Admission day 1-9** : progressive consumptive coagulopathy (Ongoing intraabdominal bleeding , hematuria, pulmonary hemorrhage)
- Develop liver failure, renal failure
- Dead on admission day 9 , no CPR
- **Cause of dead** : multiple organs failure

ICU Interesting case

September 2013

History

- A Thai male 60 years old.
- Present illness:
 - Known case CA sigmoid colon S/P Hartmann's operation ๕.ค. 55 and adjuvant CMT ครบ ๓.ค. 56
 - 1 mo PTA ตรวจ follow up CT whole abdomen พบ multiple liver metastasis (segment VIII 2.2-4.2 cm, segment VI 3.1-4.9 cm)
 - ครั้งนี้นัดมาผ่าตัด Rt hepatectomy with wedge resection segment 4

History

- Past illness:
 - DM on
MFM(500) 1 tab po OD pc เช้า; 0.5 tab po OD
pc เย็น, Glipizide(5) 1 tab po bid ac
no DN, no DR
- Personal history: History of smoking (quit 20 y),
History of alcohol drinking???
- No history of drug allergy
- No abnormal history of anesthesia
- Functional class 1

Physical examination

- V/S: BP 110-140/70-90 mmHg, PR 80/min, RR 20/min, Temp 36 °c
- Not pale, no jaundice
- Heart: normal S1S2, no murmur
- Lung: clear
- Abdomen: soft, not tender, no hepatosplenomegaly, on colostomy

Preoperative investigation

- **CBC:** WBC 2,910, Hb 11.5, Hct 34.2, platelet 157,000
- **Electrolyte:** Na 132, K 4, Cl 101, CO₂ 22.8
- **BUN 20, Cr 1.07, FBS 262**
- **LFT:** ALP 208, AST 24, ALT 29, GGT 274, TP 77.4, alb 31.2, Chol 282, TB 0.3, DB 0.1
- **Coagulogram:** INR 1.01, PTT 34.3, PT 12, TT 11.2
- **CXR:** no definite abnormal opacity
- **EKG:** NSR 78/min, no ST-T change, LVH by voltage criteria

Problem lists

- CA sigmoid colon with liver metastasis
set OR for Rt hepatectomy with wedge
resection segment 4
- DM
- History of alcohol drinking
- Anemia
- Hyponatremia

ASA physical status 3

Anesthetic management

- Anesthetic technique: GA with ETT
- Monitoring: standard → NIBP, SpO₂, ET-CO₂, temp
- Invasive monitoring: A-line, CVP via cavafix #475
- Operative time: 7 hr 50 min
- Blood loss 3000 ml
- Blood transfusion: PRC 3 U

Anesthetic management

- IV fluid: 5%D/N/2 400 ml, Acetar 4000 ml, NSS 2000 ml, Sterofundin 1000 ml, tetraspan 1000 ml
- Urine output: 680 ml
- Retained ETT to 8IK, no reverse muscle relaxant



HL 175 Wt. 68 Ht/Hb 342/11.5
CXR WNL
ECG Sinus tachycardia rate 77 bpm LVH
Allergy none

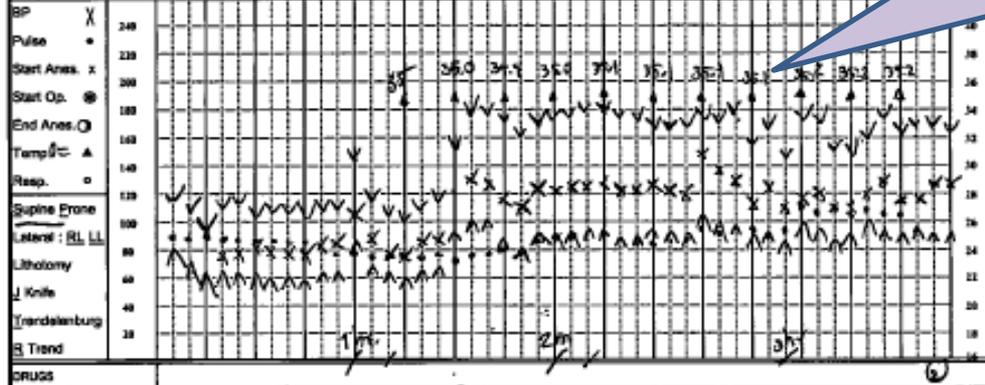
LAST ORAL INTAKE 18.00% X
PROBLEMS DM, Anemia, CA sigmoid col

PREOP DIAG CA SIGMOID COLON S/P HARTMANN
WITH LIVER METASTASIS
OP PROPOSED R1 HE PATECTOMY & WEDGE
RESECTION SA

POSTOP DIAG
2
OP PERFORMED SAME

Lactate 21(6.3-22.5)
pH 7.473, PaCO₂ 26.9,
PaO₂ 164.6
F_IO₂ 0.33 HCO₃ 19.9

TIME	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	
N ₂ O	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
O ₂	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CAEDIPINE																						
DURAMICUM	5																					
PIRACURIUM	50	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
PENTAMIL	150																					
MORPHINE																						
THIO PENTAL	100																					



EVENTS	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	
5% DIV 2 (700)					250				290					300								
Pentax (1000)					800				1400					1800								
PENTASOL (500)														100								

BLOOD LOSS	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	
BLOOD GIVEN																						
SpO ₂	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
ETCO ₂	33	29	28	28	29	28	29	27	26	26	26	26	26	26	26	26	26	26	26	26	26	
PPV		9	7	7-4	3	2	2	3	3	4	4	4	4	4	4	4	4	4	4	4	4	
DTX																						
Lhrs																						

EVENTS
① INTUBATION AT 9:15M
② A-LINE ③ RADIAL
④ A-G TUBE PLACEMENT
⑤ OXAPLEX #475 PLACE INTO
⑥ PASTIC V.
⑦ COCO #14 at internal jugular

COMPLICATIONS
ABO
PR 7.50J
PO₂ 24.7
PO₂ 153.6
Na 134
K 3.34
Ca 4.2
Mg 1.05
Lactate 21 (6.3-22.5)



HL 175 Wt. 68 Hct/Hb 34.2 / 11.5

CXR HNL

ECG Sinus Rhythm rate 99 bpm, L VH

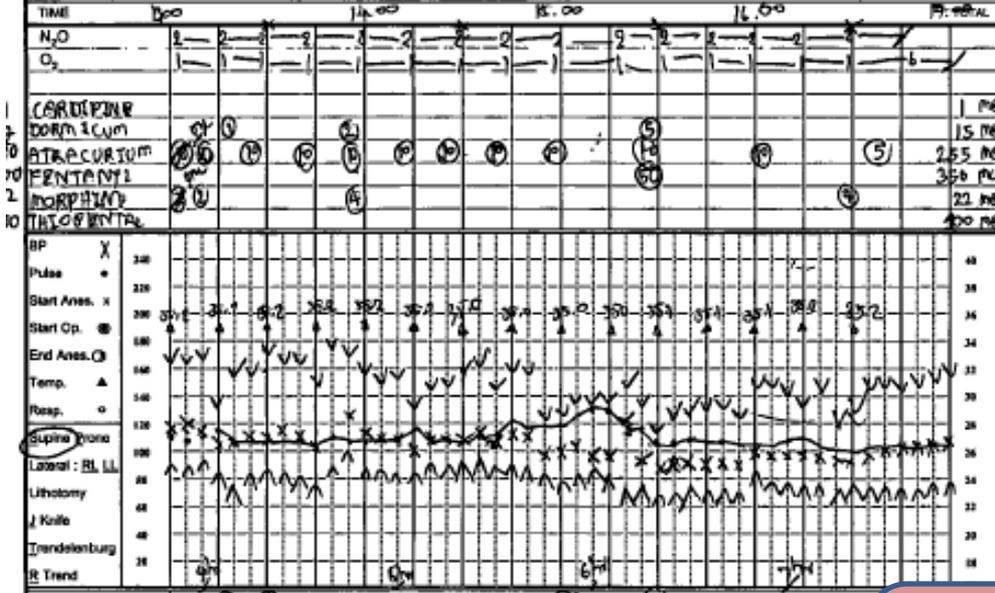
Allergy none

PREOP DIAG CA SIGMOID COLON S/P PARTIAL
WITH LIVER METASTASIS
OP PROPOSED R. HEPATOTOMY & HZDSE
RESECTION S4

POSTOP DIAG SAME

OP PERFORMED SAME E OC

PREINDUCTION ASSESSMENT	
<input checked="" type="checkbox"/>	Unchanged
<input type="checkbox"/>	Changed (BP, PR, GCS, Labs)
LAST ORAL INTAKE 18 hr.....	
PROBLEMS DM, Anemia, smoker,.....	
CA sigmoid colon. S/P part. resection. C. CA	
ASA 1 2 3 4 5 6 E	
PREMED - Oxycodone (15mg) 1/2 tab 07X	
EFFECT 1 = anxious 2 = calm 3 = drowsy 4 = coma	



DRUGS EFFECTS

③ HC 4U IV PUSH AT 13:22

④ PRC of 8' NO. 10050-2-07723
260 ml 10 min

⑤ CEFOXITIN 1000 IV AT 15:22

⑥ TRANSAMINE 500mg

⑦ PRC of 8' NO. 10056-4-07774
225 ml IV DRIP

⑧ PRC of 8' NO. 10056-Y-07503
251 ml IV DRIP

DTX 230 mg%
→ RI 4 U iv

Hct 24.5 %
→ PRC 2 U

DRUGS	③	④	⑤	⑥	⑦	⑧
EVENTS	5:20N/2(100)	Acetaz (100)	TETRAAPR(500)	Nfsgc (1000)	St. erofundin(1000)	
BLOOD LOSS	1850					
BLOOD GIVEN PRC	170					
SpO2	100	100	100	100	100	100
ETCO2	30	29	26	24	23	23
BPV /CVP	19	8	6/4	14	16	11
DTX /Hct	230				24.5	
Urine		no				

At 8IK

- V/S: BP 190/100 mmHg, HR 120/min, RR 18/min, temp 35.0 °c
- เรียกตื่นลืมตา ไม่ทำตามคำบอก หลังจากนั้นก็ตื่นดี แต่ดึงสายน้ำเกลือ ไม่ให้ความร่วมมือ กด PCA ไม่ได้
- Heart: normal S1S2, no murmur
- Lung: clear, on full ventilatory support
- Abdomen: soft, not guarding

Immediate post-op Investigation

- CBC: WBC 16,950, Hb 12.8, Hct 38.1, plt 190,000
- Coagulogram: INR 1.34, PTT 37.5, PT 16.3, TT 11
- BUN 13, Cr 0.74
- LFT: ALP 157, AST 278, ALT 206, GGT 199, TP 46.9, **Alb 18.3**, Chol 160, TB 1.1, DB 0.6

Immediate post-op Investigation

- Electrolyte: Na 136, K 4.07, Cl 107, CO₂ 10.6
- ABG: pH 7.222, PaCO₂ 27, PaO₂ 204.3, F_IO₂ 0.4
- DTX 202 mg%

**Arterial blood gas analysis
???**

Problem lists

- *Metabolic acidosis*
- Mild confusion
- Mild coagulopathy
- Hypoalbuminemia
- Mild elevated liver function test

Approach to metabolic acidosis

- Appropriate compensation in acid-base disorders
- *Winter's formula*
“Predicted PaCO₂ = (1.5 × HCO₃⁻) + 8 ± 2”
- $(1.5 \times 10.6) + 8 \pm 2 = 24 \pm 2$

➤ Measured PaCO₂ > predicted PaCO₂ →
concurrent respiratory *acidosis*

➤ Measured PaCO₂ < predicted PaCO₂ →
concurrent respiratory *alkalosis*

Approach to metabolic acidosis

- Anion gap = $[\text{Na}^+] - ([\text{Cl}^-] + [\text{HCO}_3^-])$
- $136 - (107 + 10.6) = 18.4$

Each 1.0 g/dL ↓ or ↑ in serum albumin below or above 4.4 g/dL → ↓ or ↑ of unmeasured anion 2.3-2.5 mEq/L

- So anion gap of this patient is $18.4 + 6.4 = 24.8$
- Normal anion gap 8-12 mEq/L

Approach to metabolic acidosis

- Assess additional metabolic disturbance
- $\frac{\Delta \text{anion gap}}{\Delta \text{HCO}_3^-} = \frac{24.8 - 12}{24 - 10.6} = \frac{12.8}{13.4} = 0.955 \approx 1$
- **1-2 : pure wide gap metabolic acidosis**
- < 1 : wide gap and normal gap metabolic acidosis
- > 2 : wide gap metabolic acidosis and metabolic alkalosis

Pure wide gap metabolic acidosis

Differential diagnosis???

Approach to metabolic acidosis

- Pure wide gap metabolic acidosis
- Differential diagnosis: metabolic acidosis
 - Increase acid production
 - Loss of bicarbonate or bicarbonate precursors
 - Decrease renal acid excretion

Increase acid production

- **Wide anion gap**

- Lactic acidosis
- Ketoacidosis: DM, starvation, alcohol-associated
- Ingestion: methanol, ethylene glycol, aspirin
- Toluene (early or kidney impairment)
- Diethylene glycol

- **Normal anion gap**

- Toluene (late and normal renal function)

Increase acid production

- **Wide anion gap**

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- **Normal anion gap**

- Toluene (late and normal renal function)

Loss of bicarbonate or bicarbonate precursors

- **Normal anion gap**

- Diarrhea or other intestinal loss
- Type 2 (proximal) renal tubular acidosis
- Posttreatment of ketoacidosis
- Carbonic anhydrase inhibitors
- Ureteral diversion (eg, ileal loop)
- Resuscitation with NSS (>30 ml/kg/hr): excessive Cl load

Decreased renal acid excretion

- **Wide anion gap**
 - Chronic kidney disease
- **Normal anion gap**
 - Chronic kidney disease & tubular dysfunction (but relatively preserved GFR)
 - Type 1 (distal) RTA
 - Type 4 RTA (hypoaldosteronism)

Differential diagnosis of this patient

- **Wide gap metabolic acidosis**
 - Lactic acidosis
 - DKA
 - Alcohol-associated ketoacidosis

Lactic acidosis

- **Type A:**
 - Tissue hypoperfusion
- **D-lactic acidosis:**
 - short bowel syndrome
- **Type B:**
 - Toxin-induced impairment of cellular metabolism or regional areas of metabolism
 - Metformin
 - Malignancy
 - Alcoholism
 - HIV infection

Lactic acidosis

- **Type A:**
 - Tissue hypoperfusion
- **D-lactic acidosis:**
 - short bowel syndrome
- **Type B:**
 - Toxin-induced impairment of cellular metabolism
 - Metformin
 - Malignancy
 - Alcoholism
 - HIV infection

Further investigation

- Blood lactate: 132 mg/dL ↑ (6.3-22.5)
- Serum ketone: not available
- Urine ketone: negative

Management

- 20% albumin 50 ml iv drip 30 min q 8 hr
- FFP 4 u iv drip 1 U/hr
- PRC 1 u iv drip in 3 hr
- 5%D/N/2 1000 ml iv drip 40 ml/hr
- Acetar 1000 ml iv 100 ml/hr
- Thiamine 100 mg iv OD * 3 days

Investigation on post-op d 1

- Blood lactate 12 (normal = 6.3-22.5)
- **ABG: pH 7.419, PaCO₂ 38.4, PaO₂ 84.5, F_IO₂ 0.4**
(O₂ mask with NB 10 LPM)
- Electrolyte: Na 137, K 4.66, Cl 105, **CO₂ 26.4**
- LFT: ALP 127, AST 104, ALT 118, GGT 112, TP 59.9, **alb 32**, Chol 133, TB 2.4, DB 1.3, Ca 8.6
- BUN 16, Cr 0.99

Summary

- A Thai male 60 years old
- CA sigmoid colon with liver metastasis
- Post op partial hepatectomy at 8IK
- Wide anion gap metabolic acidosis
- Blood component, crystalloid and colloid resuscitation

Thank You!

