Pre-referral stabilization and Rural hospital management

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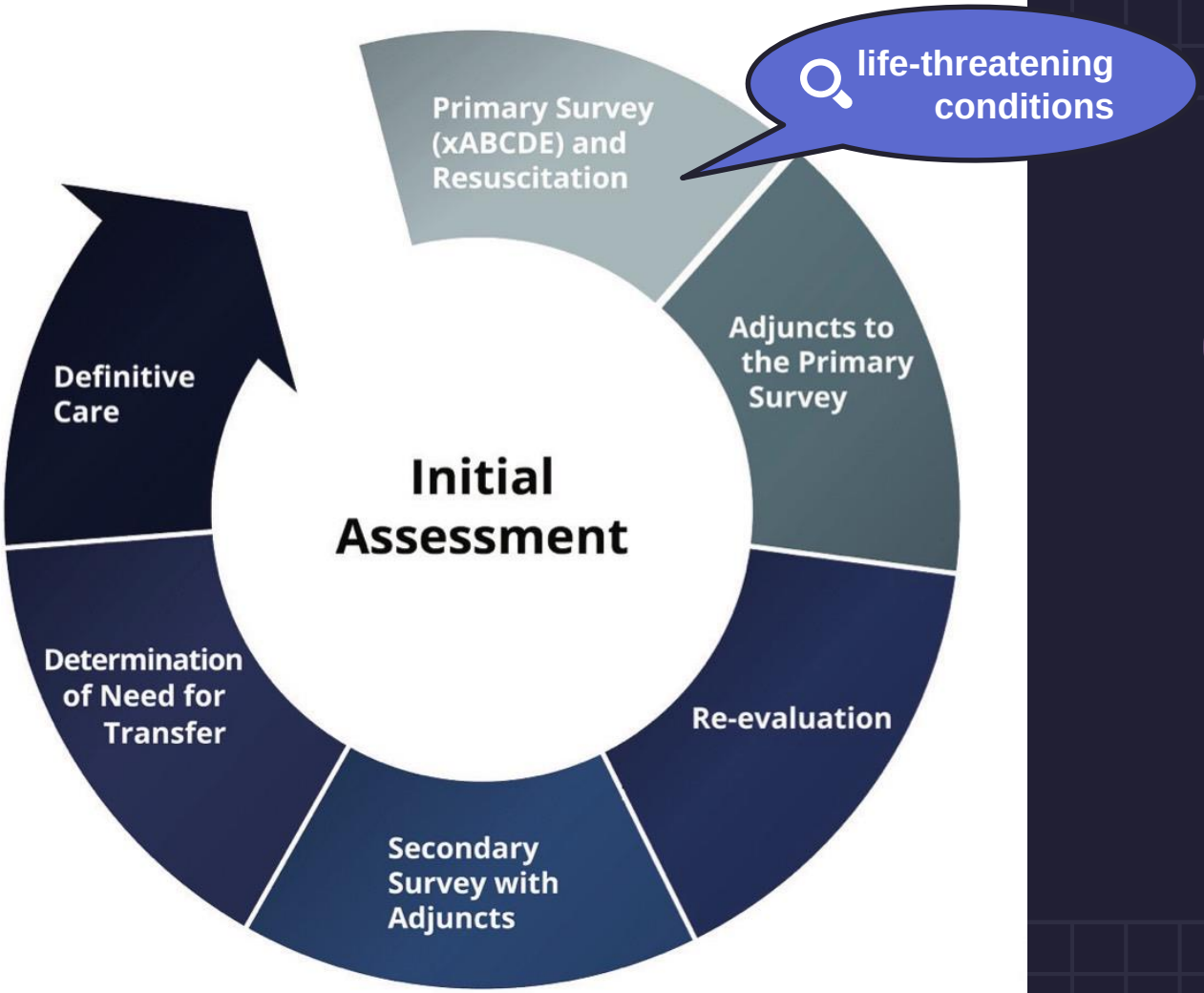

life-threatening conditions
Primary Survey (xABCDE) and Resuscitation
Adjuncts to the Primary Survey
Re-evaluation
Secondary Survey with Adjuncts
Determination of Need for Transfer
Definitive Care
Initial Assessment

ATLS 11th

Mechanism of injury

pretransfer checklist

pregnancy (> 24 wks)

Stabilize patients prior to transfer

Management of **life-threatening injuries**

Know the capabilities of your facility

transfer ?

Early transfer; should be initiated while the patient is being resuscitated

SBAR

High mechanism of injury

- Falls
  - Adult > 6 m. (2 stories)
  - Children > 3 m. (2-3 * height of child)
- High-risk motor vehicle crash
  - Intrusion, including roof: > 30 cm. occupant side; > 45 cm any side
  - Ejection from vehicle
  - Death in same passenger compartment
  - Vehicle telemetry data consistent with high risk of injury
- Auto vs. pedestrian/bicyclist thrown, run over, or with significant (>20 mph; 32 kph) impact
- Motorcycle crash > 20 mph

The Primary Survey

& SIMULTANEOUS RESUSCITATION

		Key Causes and Issues
X	e**X**sanguinating e**X**ternal hemorrhage	Massive bleeding from open extremity and other wounds
A	**A**irway	Inability to maintain the airway patency due to direct injury, altered mental status, shock
B	**B**reathing	Compromise of oxygenation and/or ventilation due to direct injury, shock
C	**C**irculation	1. Presence of shock from hemorrhagic, neurogenic, cardiogenic, or other sources 2. Hemorrhage control 3. Restoration and maintenance of end-organ perfusion
D	**D**isability	Injury to the central nervous system • Traumatic brain injury • Spinal cord injury
E	**E**xposure/ **E**nvironment	1. Exposure to prevent missed injuries while maintaining patient dignity 2. Maneuvers to prevent hypothermia

Primary survey = identify life-threatening injuries

- Exsanguinating hemorrhage
- Tension pneumothorax
- Massive hemothorax
- Open pneumothorax
- Tracheal or bronchial injuries

Exsanguinating hemorrhage

- Blood spurting out of the wound
- Blood that won't stop coming out
- Blood that is pooling on the ground
- Clothing soaked with blood
- Bandages soaked with blood
- Amputation of an arm or leg
- Bleeding in a victim with confused or unconscious

https://onlinelibrary.wiley.com/doi/full/10.1002/ccr3.7215

Treatment before transfer

Airway

- Intubation
- suction
- Gastric tube

Breathing

- O2
- Chest drain

Circulation

- Control external bleeding
- 2 large-caliber IV lines
- Restore blood volme losses: crytalloid fluid + blood
- catheter to monitor urine

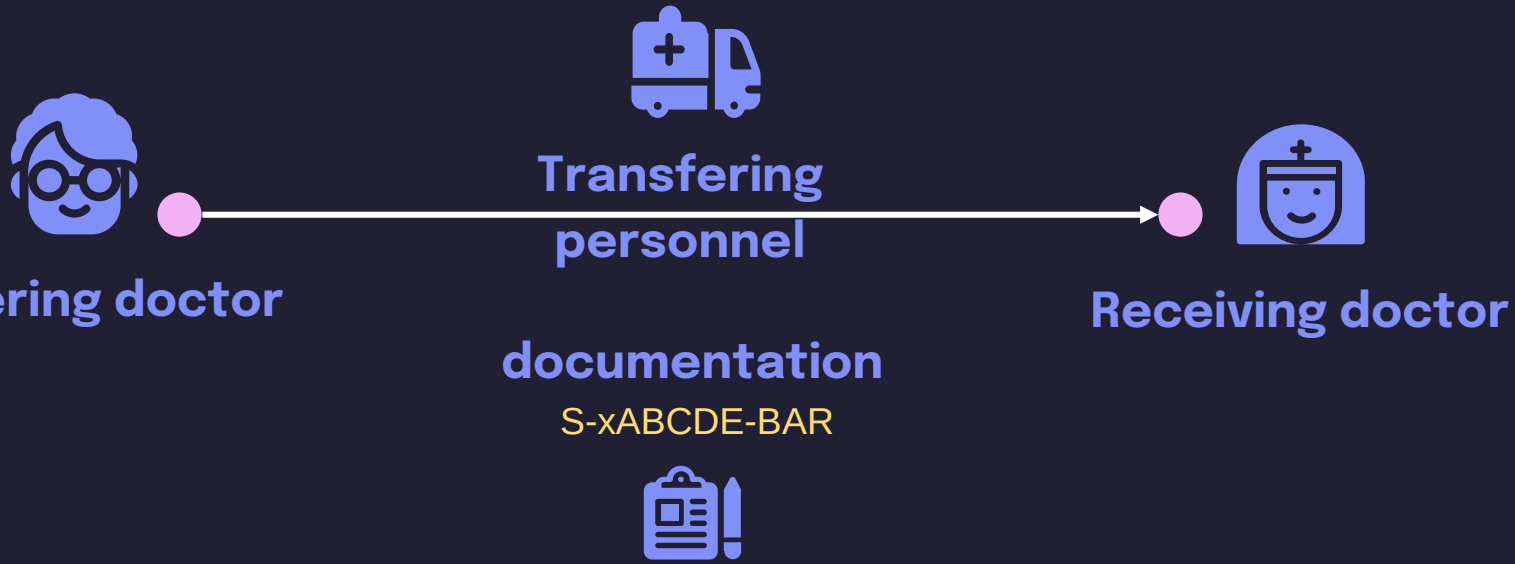
CNS

- Assist respiration in unconscious patients
- Restrict spinal motion

Fracture

- Apply splinting

Transfer protocols



Acronym	Intent	Information
S-xABCDE	**Situation-x-Airway-Breathing-Circulation-Disability-Exposure/ Environment**	• Referring clinician and facility • Name, age, gender, mechanism of injury • Indication for transfer • x-emergency hemorrhage control interventions (e.g., pressure, packing, or tourniquet) • **Airway:** assessment, intervention • **Breathing:** assessment, intervention • **Circulation:** assessment, intervention • **Disability**: assessment, intervention • **Environment/Exposure:** assessment, intervention
B	**Background**	• AMPLE history • Fluid/blood requirements • Medications (date and time) • Images • Reduction/splints
A	**Assessment**	**Current Status:** • Physiology • Response to interventions • Likely injuries
R	**Recommendation**	• Transport mode and capability • Transport interventions • Other necessary interventions

Case 1

16 ปี
หายใจเหนื่อย 11 ชม.

ซ้อน MC ไม่สวมหมวกนิรภัย
ชนกระบะ
สลบ จำเหตุการณ์ไม่ได้
ชักเกร็ง ตาเหลือก
ไม่ทราบระยะเวลา
หยุดชักเอง
หายใจลำบาก ปวดท้อง

20.00

20.20

1◦ survey

A: patent, tender at C-spine, no stepping
B: no subcutaneous emphysema, RR 20/min, SpO2 96% RA
C: BP 65/40 mmHg, PR 120/min, no active external wound,
no long bone deformities
D: $E_4V_5M_6$, pupil 2.5 mm RTLBE
E: tender at T7/8 level, no stepping, no wound

EFAST: free fluid at Lt. lung
CXR
Retain NG + Foley's cath

Mx
on hard collar
NSS 500 ml IV load then IV 100 ml/hr
On ICD No. 28, depth 10 ต่อ 2 ขวด

Scalp hematoma 4 cm at Rt. parietal area

Mx:
CT brain + c-spine: no ICH,
no cervical spine Fx

23.45

Admit Sx ชาย
BP 121/55 mmHg, PR 104/min
RR 20/min

Massive hemothorax

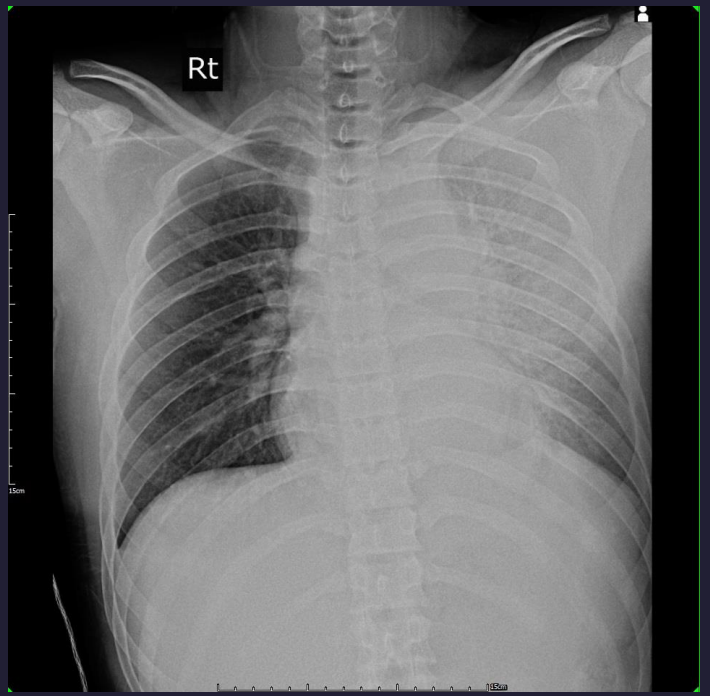
Notify **ICD content 1000 ml**
BP 90/45 mmHg, PR 120/min, RR 24/min, SpO_2 100%

03.00

Mx
Load Acetar 1,000 ml IV in 30 mins

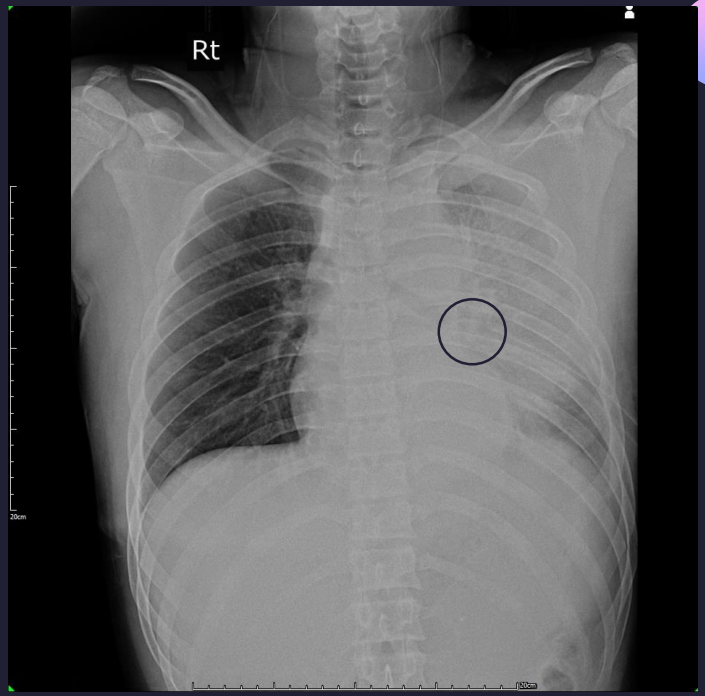
BP 81/42, PR 140, RR 28

NE (4:250) IV rate 10 ml/hr
PRC 2 U, FFP 2 U

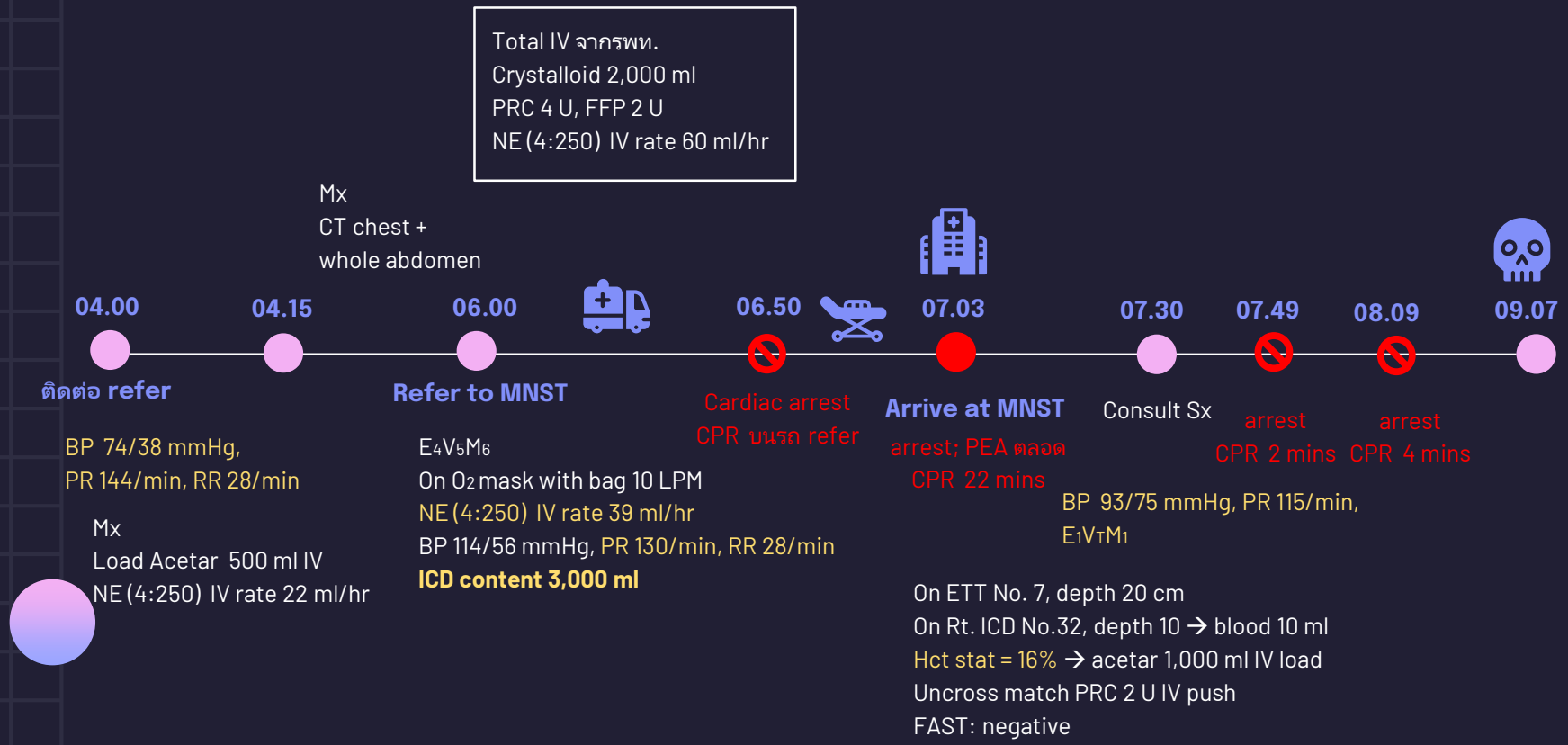


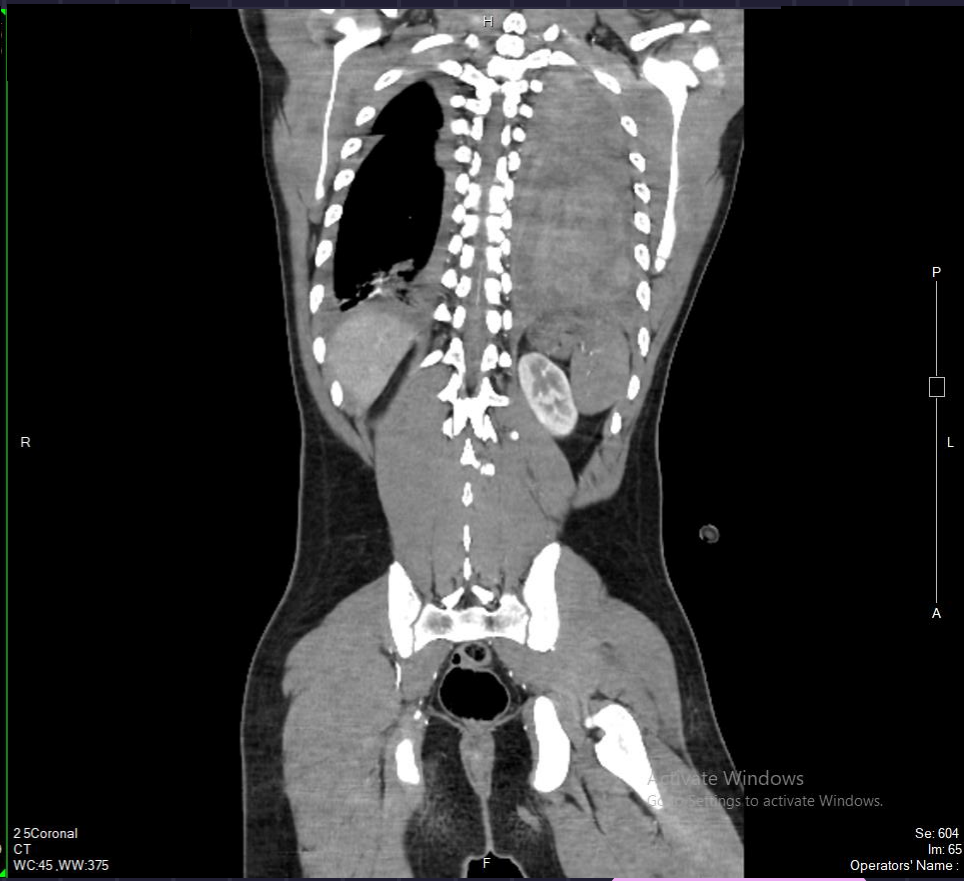
20.56

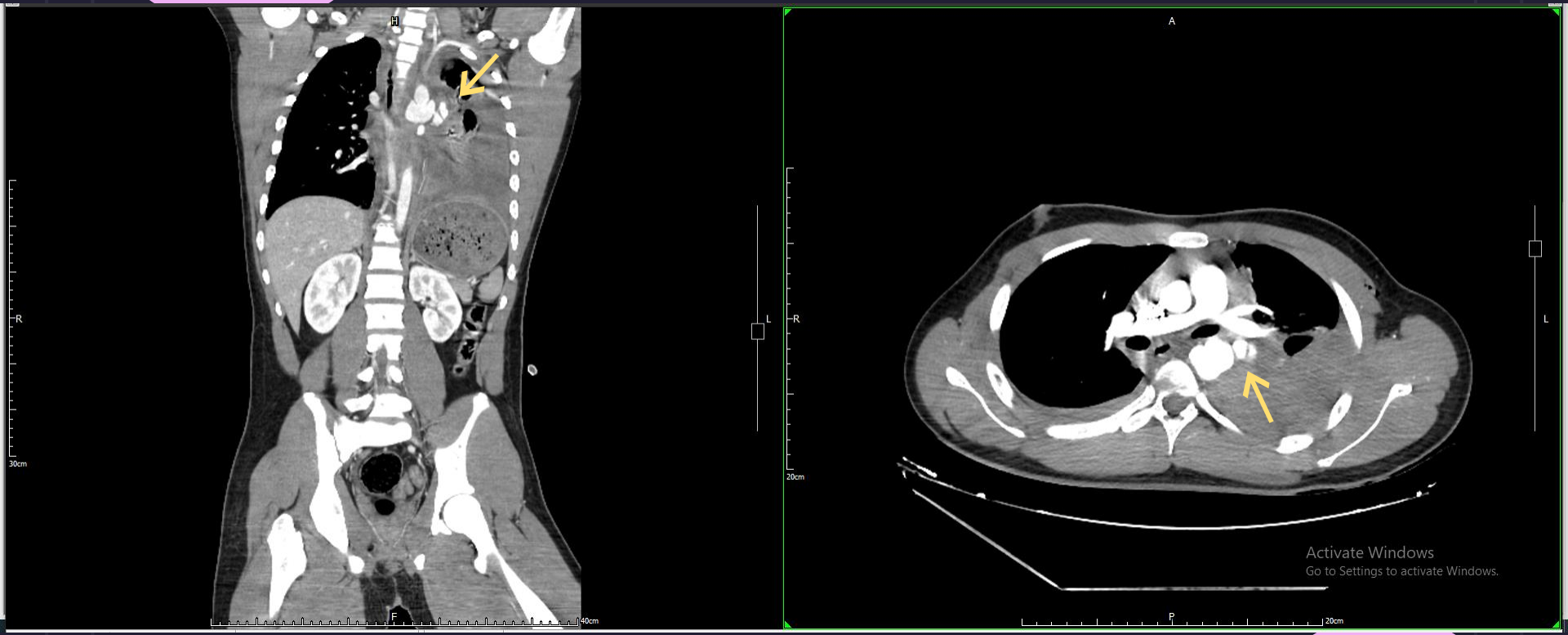
ICD

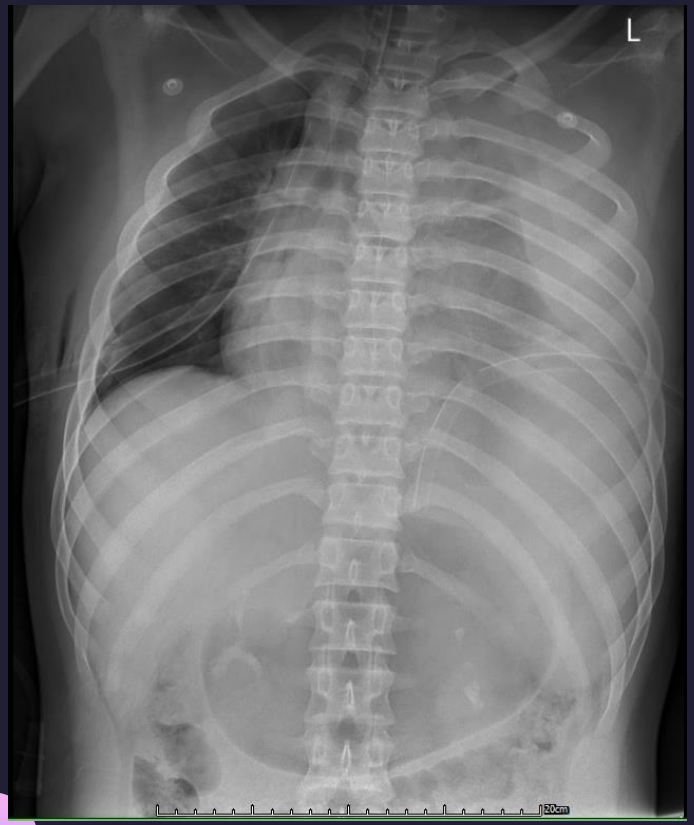


21.26


Total IV จากรพท.
Crystalloid 2,000 ml
PRC 4 U, FFP 2 U
NE (4:250) IV rate 60 ml/hr
Mx
CT chest +
whole abdomen
04.00
04.15
06.00
06.50
07.03
07.30
07.49
08.09
09.07
ติดต่อ refer
BP 74/38 mmHg,
PR 144/min, RR 28/min
Mx
Load Acetar 500 ml IV
NE (4:250) IV rate 22 ml/hr
Refer to MNST
E4V5M6
On O2 mask with bag 10 LPM
NE (4:250) IV rate 39 ml/hr
BP 114/56 mmHg, PR 130/min, RR 28/min
ICD content 3,000 ml
Cardiac arrest
CPR บนรถ refer
Arrive at MNST
arrest; PEA ตลอด
CPR 22 mins
Consult Sx
BP 93/75 mmHg, PR 115/min,
E1VTM1
On ETT No. 7, depth 20 cm
On Rt. ICD No.32, depth 10 → blood 10 ml
Hct stat = 16% → acetar 1,000 ml IV load
Uncross match PRC 2 U IV push
FAST: negative
arrest
CPR 2 mins
arrest
CPR 4 mins




H
R
L
30cm
F
40cm
A
R
L
20cm
P
20cm
Activate Windows
Go to Settings to activate Windows.



Chest Radiograph Signs Associated with Aortic Injury

- Wide mediastinum (supine chest radiograph >8 cm; upright >6 cm)
- Obscured, indistinct, or enlarged aortic knob; abnormal aortic arch contour
- Left “apical cap” (opacity at apex of left lung representing extrapleural blood)
- Large left hemothorax
- Displacement of the left mainstem bronchus
- Deviation of nasogastric tube to the right
- Deviation of trachea to the right and/or right mainstem bronchus inferiorly
- Wide left paravertebral stripe

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Problem lists

- Blunt chest with massive Lt. hemothorax
- Hemorrhagic shock (major hemorrhage)
- Postcardiac arrest

What have we learned form this case?

Time to refer

After adjunct to primary survey

Blunt aortic injury

Mechanism of injury: decelerating force
Large Lt. hemothorax especially without rib Fx

Treatment before transfer

ICD content?/ fluctuation?
On ETT before refer
Be careful using NE

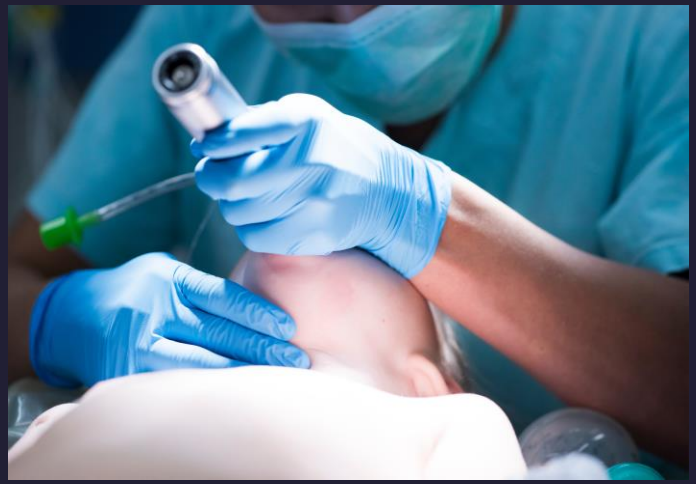
Role of ER thoracotomy

Penetrating injujy 15 mins
Blunt injury 5-10 mins

Intubation

- Moderate head injury
- Maxillofacial injury that can’t maintain airway >>> risk of airway loss
- Shock especially decompensated shock

tissue hypoperfusion ?



Case 2

 56 ปี

ซึมลง ปวดท้องมากขึ้น 4 ชม.

ขับ MC ประสบอุบัติเหตุกับกระบะ
ปวดสะโพก 2 ข้าง
ปวดท้องทั่วๆ

Mx:
Admit observe
CFx Rt. 8th rib
CFx Rt. sup. rami

Notify หลับมาก ปลุกตื่น
เหงื่อออก BP 80/50, PR 140, RR 28, SpO_2 RA 91-93%
Load LRS 1,600 ml
NE (4:250) IV 10 ml/hr
FEAST 14.10 น.: negative
On O2 mask with bag 10 LPM >> SpO2 95%
Ceftriaxone 2 g IV

Mx:
On ETT No.7.5, depth 21 cm (RSI) >> SpO_2 96%
LRS 400 ml IV loading (ระหว่าง warm เลือด)
E-FAST: positive at hepatorenal, splenorenal, cul- de-sac
PRC uncross match gr.O 1 U IV free flow
Consult Sx 17.48 น.
CTWA 18.54 น.

5/2/67 19.22

1◦ survey 20.20

FAST: negative
CXR
Film pelvis

Stay at รพช. 2 days

Admit 2 วัน
ปวดท้อง ท้องอืดขึ้น
ระหว่าง admit มีไข้ต่ำ BT 37.5 C
abdomen: moderate distension, generalized tender, no guarding

Cr 0.91 >>> 2.98
Hct 39.5% >>> 43%

7/2/67 13.48

Blunt abdomen with peritonitis

Decision to transfer 4 hrs 17.40

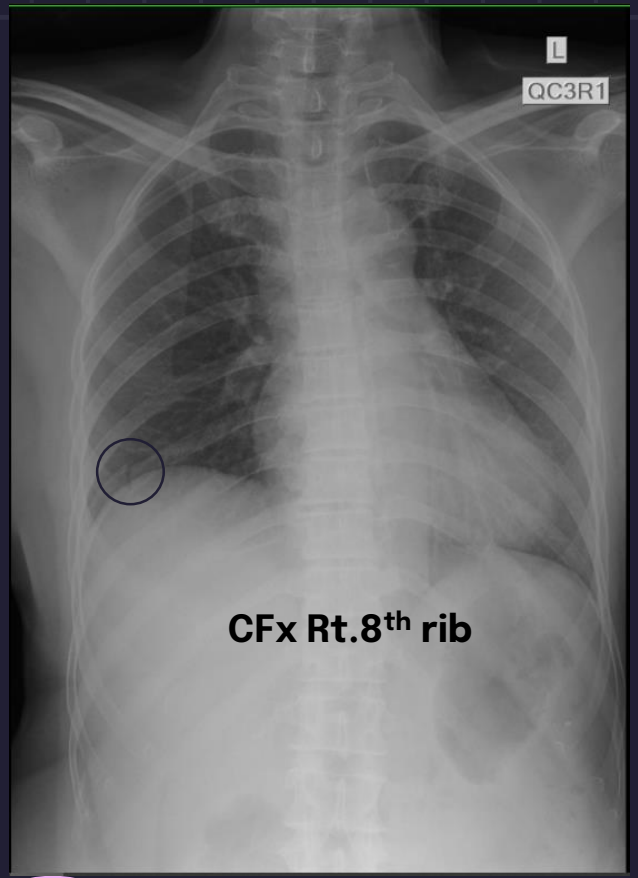
A: patent, not tender at C-spine, no stepping
B: no subcutaneous emphysema, RR 40/min, SpO_2 82% RA
C: BP 80/57 mmHg, PR 144/min, cold extremities,

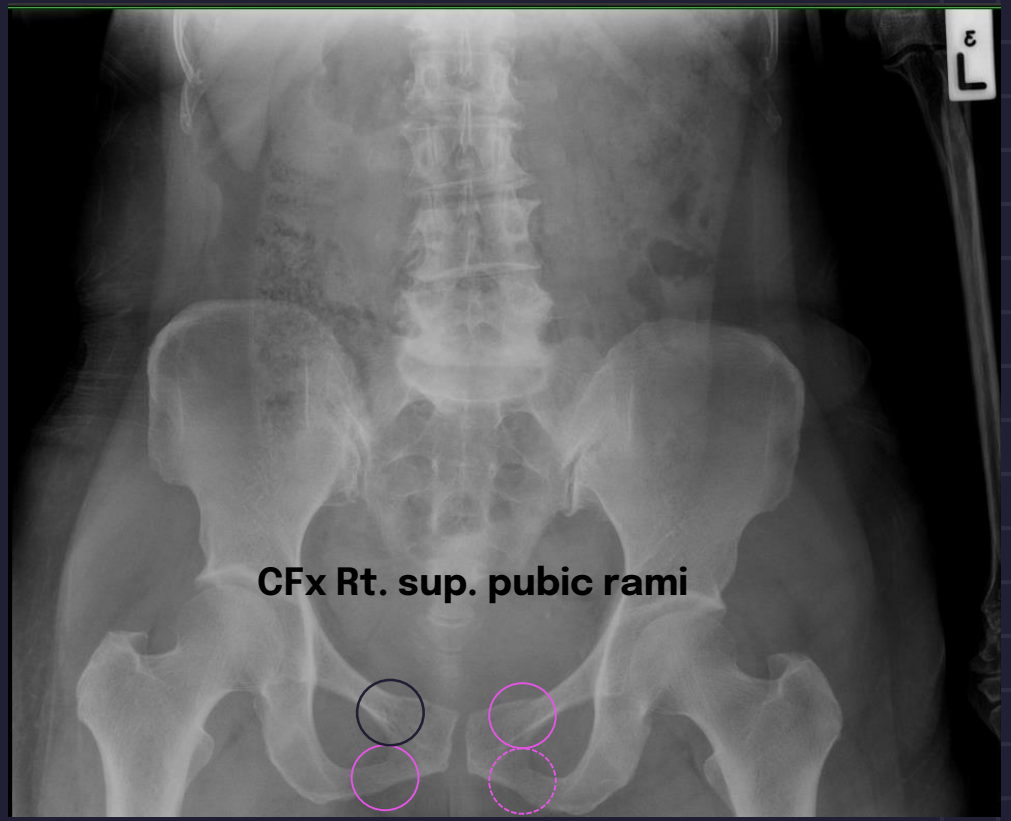
NE (4:250) IV 13 ml/hr

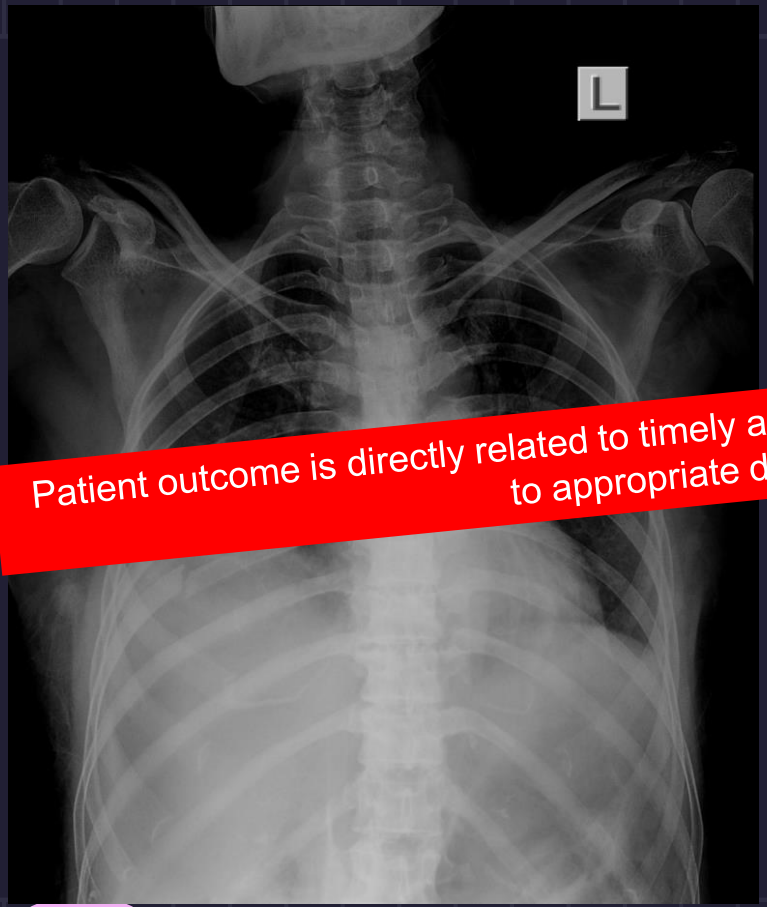
no active external wound, no long bone deformities
abdomen: tender at epigastrium
D: $E_4V_5M_6$, pupil 2.5 mm RTLBE

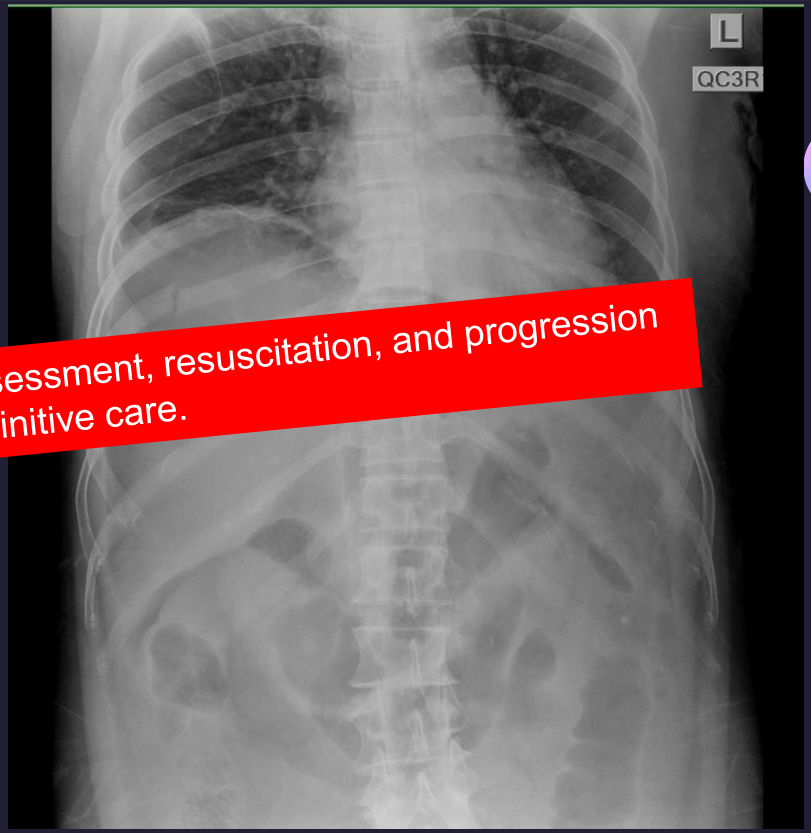
PRC 2 U
FFP 3 U

OR 19.50


L
QC3R1
CFx Rt.8th rib


L
CFx Rt. sup. pubic rami





Patient outcome is directly related to timely assessment, resuscitation, and progression to appropriate definitive care.


H
P
R
L
A
F


A
H
R
L
F
P

Progression

Admit 7-17/3/67

- Small bowel injury
  - S/P EL with jejunal repair with abdominal toilet
  - Delay suture wound 17/3/67
- Bilateral sup. pubic rami

What have we learned form this case?

Determining the need for patient transfer

Polytrauma ?
Early transfer >> recognizing when patient needs exceed capabilities in a facility

E-FAST

Re-evaluation >> re-EFAST
Limitation of E-FAST (false negative)

Treatment before transfer

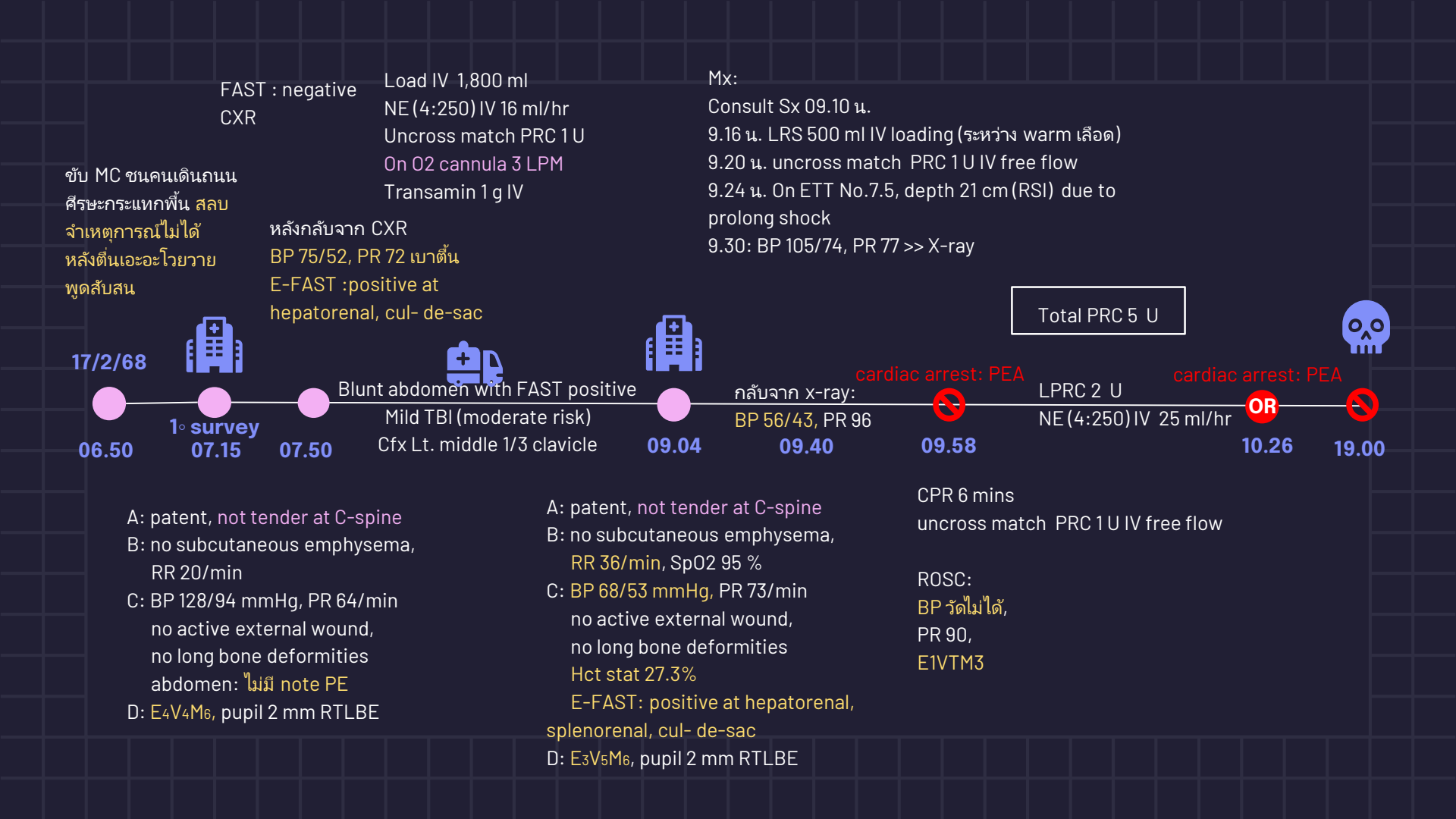
On ETT before refer
Be careful using NE >> blood component ?

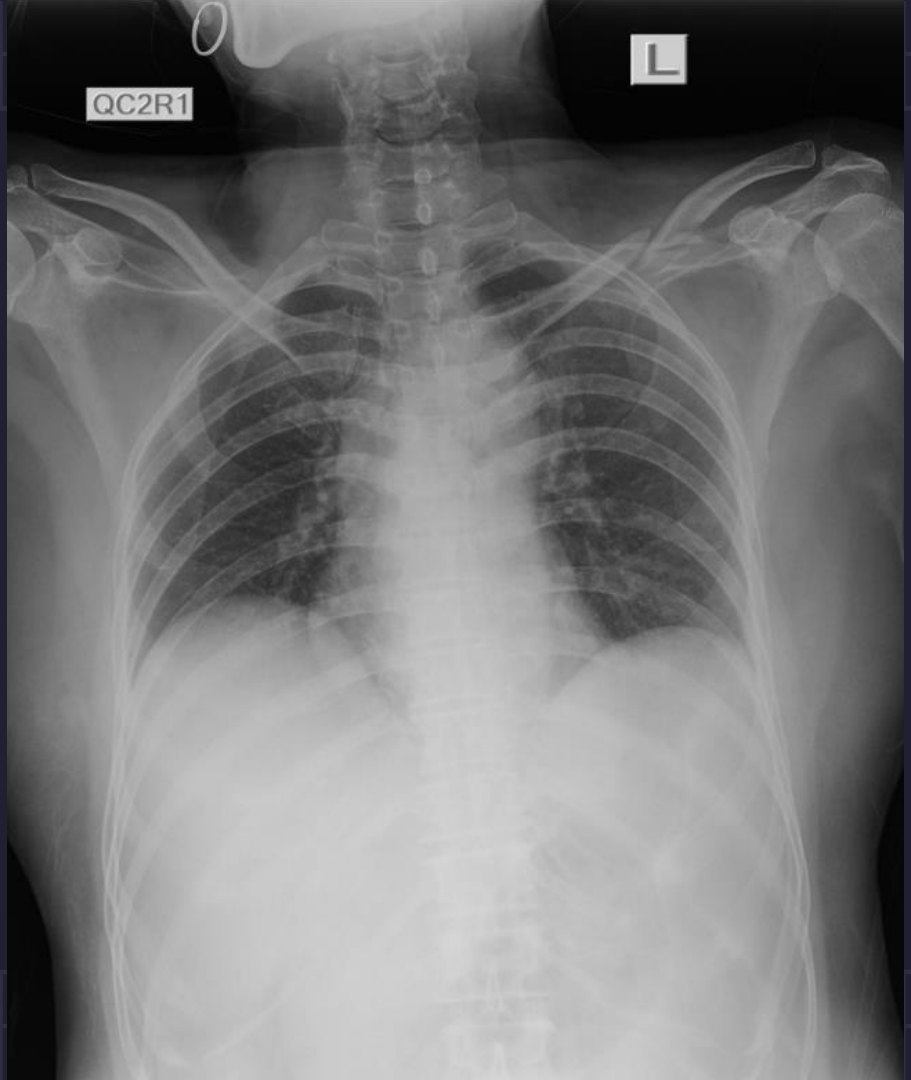
Major hemorrhage

Load balanced crystalloid 1,000 ml >>> blood component

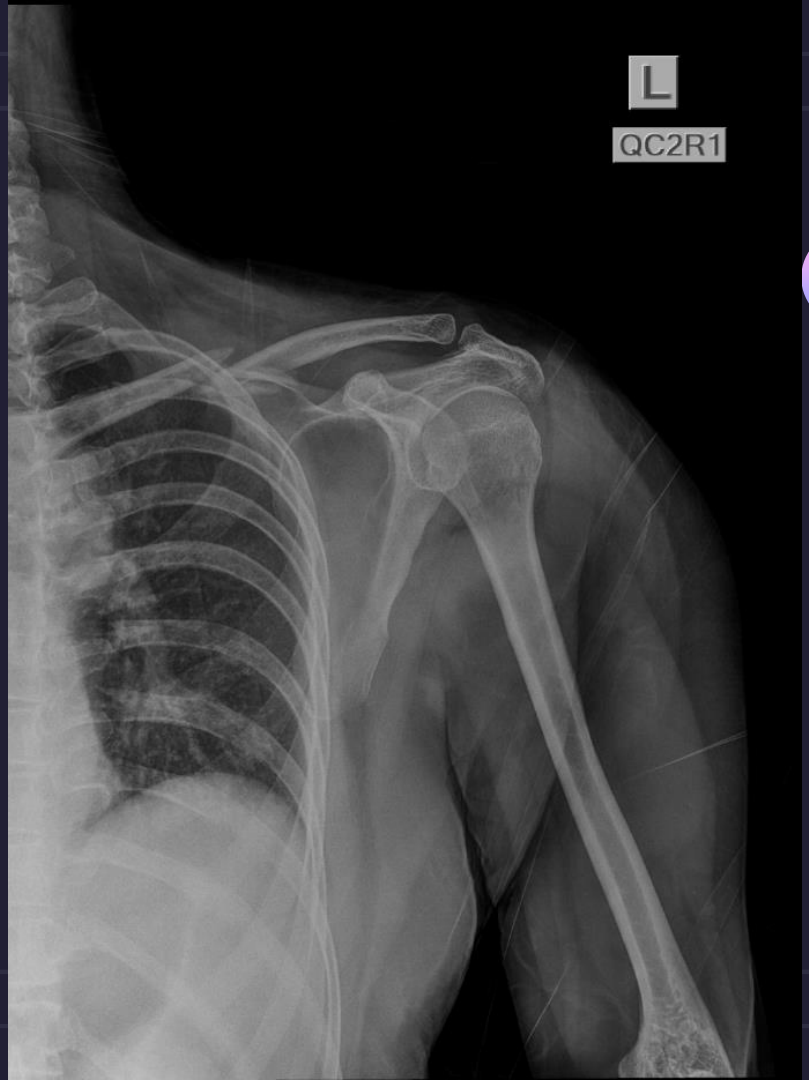
Case 3

54 ปี
ขับ MC ชนคนเดินถนน
สลบ ปวดท้อง 2 ชม.14 นาที


ขับ MC ชนคนเดินถนน
ศีรษะกระแทกพื้น สลบ
จำเหตุการณ์ไม่ได้
หลังตื่นเอะอะโวยวาย
พูดสับสน
FAST : negative
CXR
Load IV 1,800 ml
NE (4:250) IV 16 ml/hr
Uncross match PRC 1 U
On O2 cannula 3 LPM
Transamin 1 g IV
หลังกลับจาก CXR
BP 75/52, PR 72 เบาตื้น
E-FAST :positive at
hepatorenal, cul- de-sac
Mx:
Consult Sx 09.10 น.
9.16 น. LRS 500 ml IV loading (ระหว่าง warm เลือด)
9.20 น. uncross match PRC 1 U IV free flow
9.24 น. On ETT No.7.5, depth 21 cm (RSI) due to
prolong shock
9.30: BP 105/74, PR 77 >> X-ray
Total PRC 5 U
17/2/68
06.50
1◦ survey
07.15
07.50
Blunt abdomen with FAST positive
Mild TBI (moderate risk)
Cfx Lt. middle 1/3 clavicle
09.04
กลับจาก x-ray:
BP 56/43, PR 96
09.40
cardiac arrest: PEA
09.58
LPRC 2 U
NE (4:250) IV 25 ml/hr
OR
10.26
cardiac arrest: PEA
19.00
A: patent, not tender at C-spine
B: no subcutaneous emphysema,
RR 20/min
C: BP 128/94 mmHg, PR 64/min
no active external wound,
no long bone deformities
abdomen: ไม่มี note PE
D: E4V4M6, pupil 2 mm RTLBE
A: patent, not tender at C-spine
B: no subcutaneous emphysema,
RR 36/min, SpO2 95 %
C: BP 68/53 mmHg, PR 73/min
no active external wound,
no long bone deformities
Hct stat 27.3%
E-FAST: positive at hepatorenal,
splenorenal, cul- de-sac
D: E3V5M6, pupil 2 mm RTLBE
CPR 6 mins
uncross match PRC 1 U IV free flow
ROSC:
BP วัดไม่ได้,
PR 90,
E1VTM3


QC2R1
L


L
QC2R1


L
QC2R1


L

Progression

Admit 17-17/2/68

Postcardiac arrest due to major hemorrhage due to blunt abdomen

- Splenic injury gr. V with diaphragmatic injury with hypovolemic shock

S/P resuscitation thoracotomy with explore laparotomy with splenectomy with repair tail of pancreas with repair diaphragm with repair Lt. lung laceration

What have we learned form this case?

Treatment before transfer

On ETT before refer
Be careful using NE >> blood component ?
NG tube

Major hemorrhage

Load balanced crystalloid 1,000 ml >>> blood component
MTP (massive transfusion protocol)

C-spine protection

Can't evaluation/not sure >> on collar
NEXUS Criteria/ Canadian C-spine Rule

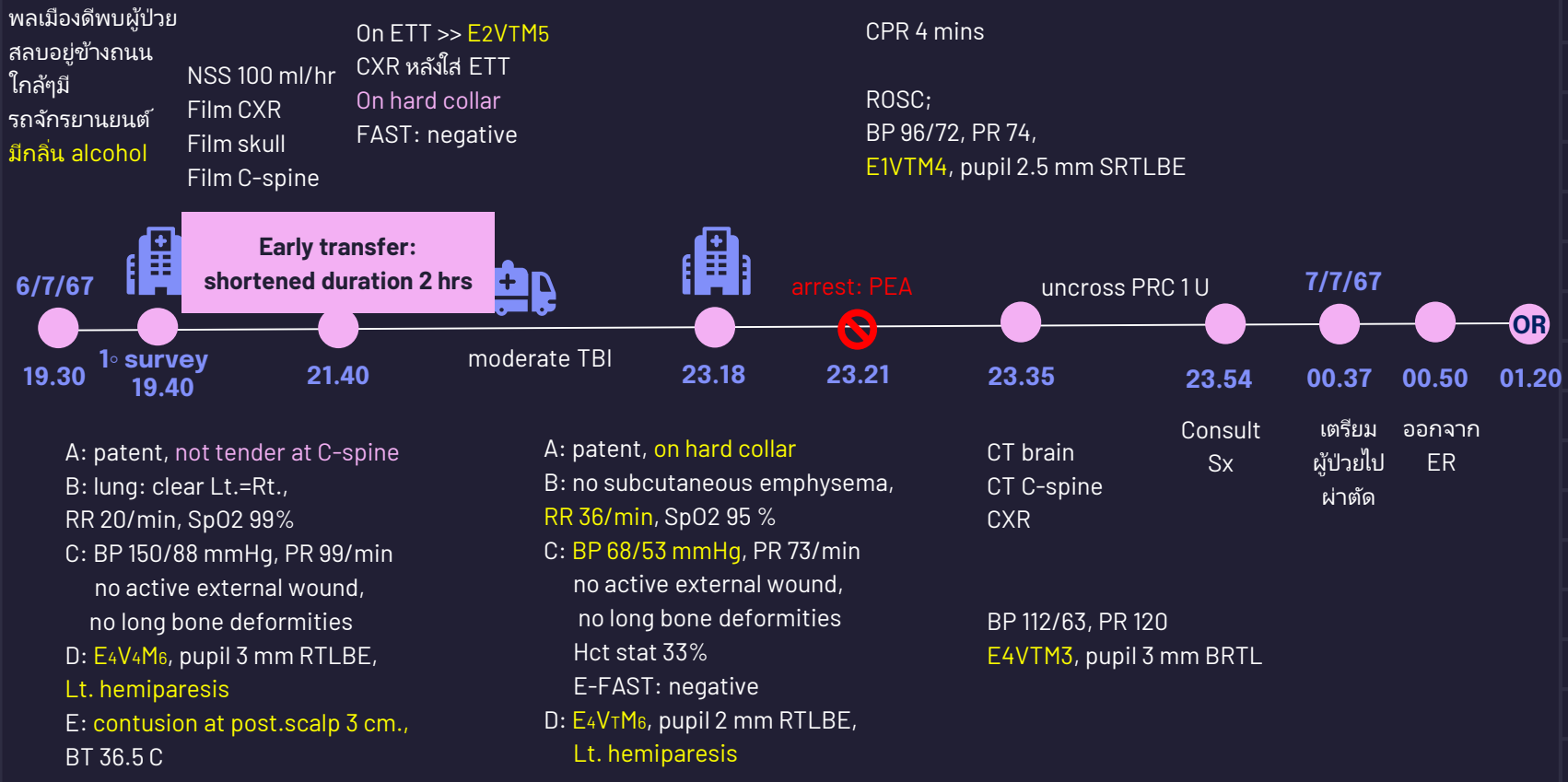
MTP

ABC ≥ 2

ATLS 11th

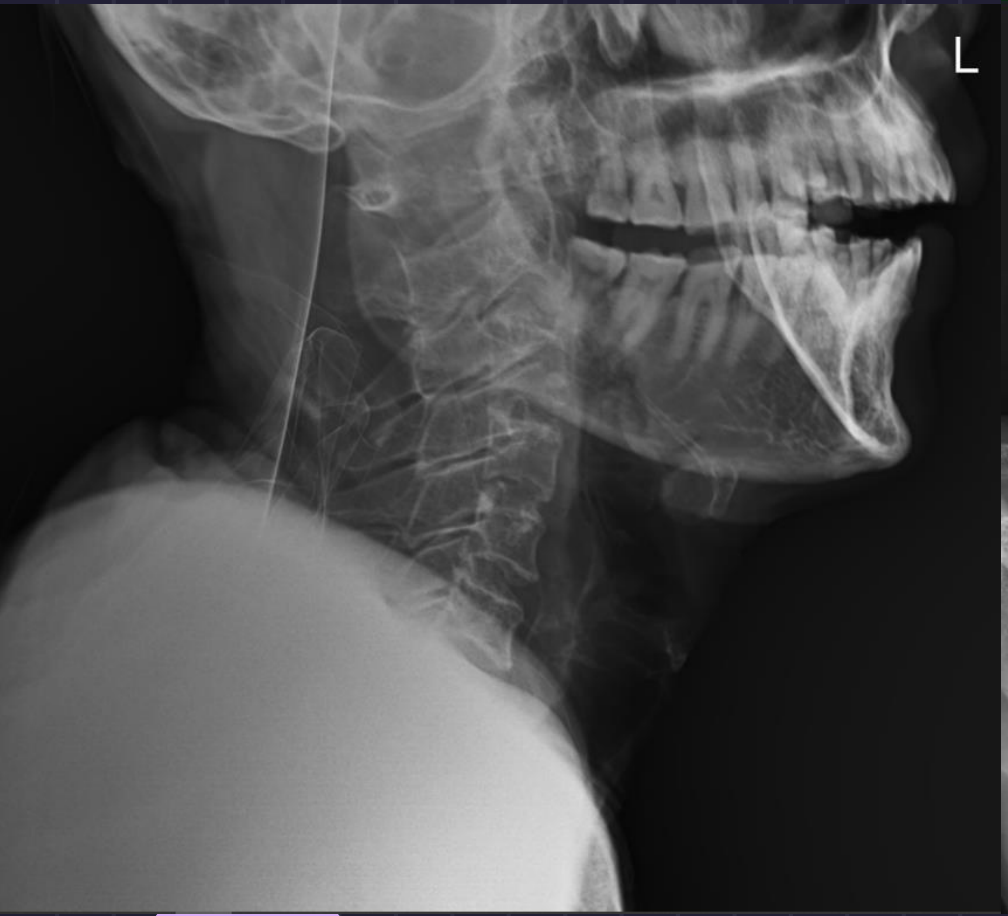
Case 4

52 ปี
พลเมืองดีพบผู้ป่วยนอนสลบอยู่
ข้างถนน 10 นาที ก่อน


พลเมืองดีพบผู้ป่วย
สลบอยู่ข้างถนน
ใกล้ๆมี
รถจักรยานยนต์
มีกลิ่น alcohol
NSS 100 ml/hr
Film CXR
Film skull
Film C-spine
On ETT >> E2VTM5
CXR หลังใส่ ETT
On hard collar
FAST: negative
CPR 4 mins
ROSC;
BP 96/72, PR 74,
E1VTM4, pupil 2.5 mm SRTLBE
Early transfer:
shortened duration 2 hrs
6/7/67
19.30
1◦ survey
19.40
21.40
moderate TBI
23.18
arrest: PEA
23.21
uncross PRC 1 U
23.35
7/7/67
23.54
00.37
00.50
OR
01.20
Consult
Sx
เตรียม
ผู้ป่วยไป
ผ่าตัด
ออกจาก
ER
A: patent, not tender at C-spine
B: lung: clear Lt.=Rt.,
RR 20/min, SpO2 99%
C: BP 150/88 mmHg, PR 99/min
no active external wound,
no long bone deformities
D: E4V4M6, pupil 3 mm RTLBE,
Lt. hemiparesis
E: contusion at post.scalp 3 cm.,
BT 36.5 C
A: patent, on hard collar
B: no subcutaneous emphysema,
RR 36/min, SpO2 95 %
C: BP 68/53 mmHg, PR 73/min
no active external wound,
no long bone deformities
Hct stat 33%
E-FAST: negative
D: E4VTM6, pupil 2 mm RTLBE,
Lt. hemiparesis
CT brain
CT C-spine
CXR
BP 112/63, PR 120
E4VTM3, pupil 3 mm BRTL

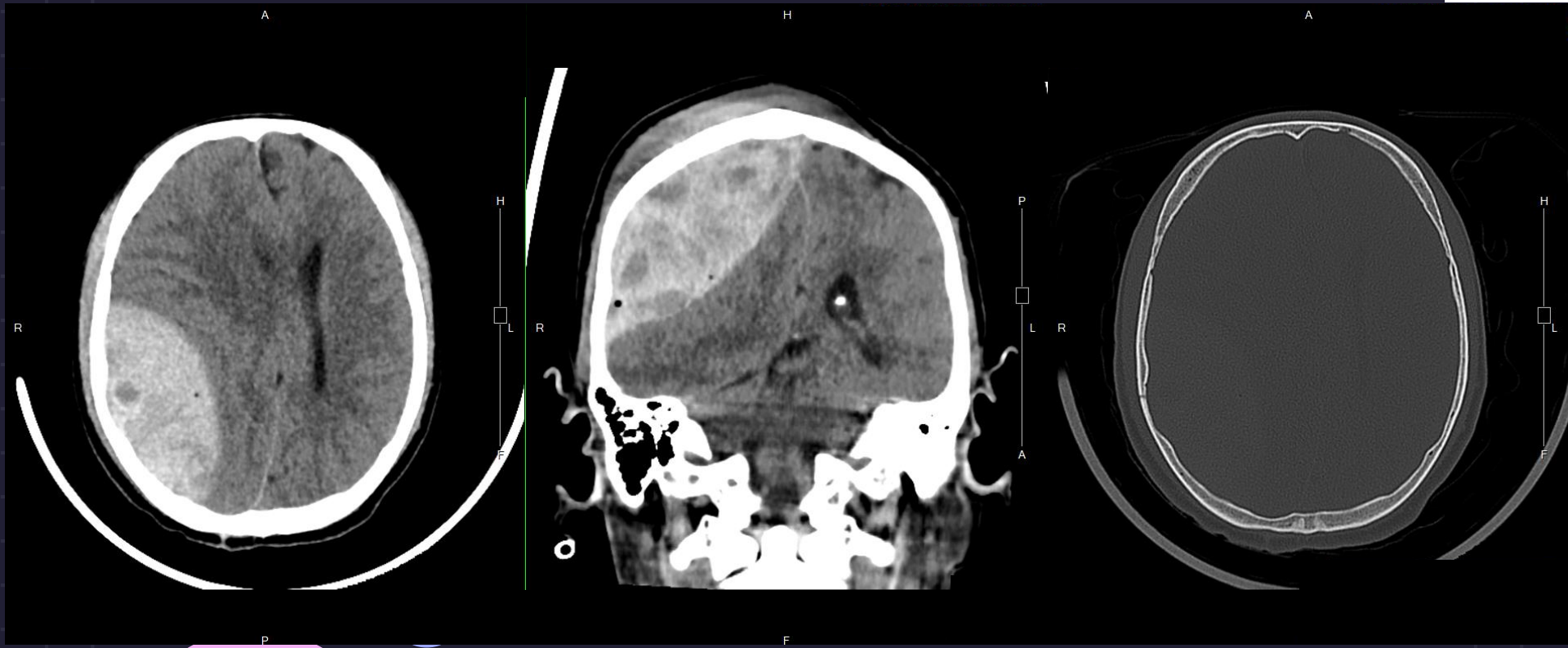

R
SUPINE


R
L


L


R


R
SUPINE


A
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Progression

Admit 09-19/7/67
Postcardiac arrest
Large acute EDH along right frontoparietotemporal convexity

S/P Rt.craniotomy with clot removal
with plate & screw fixing bone

What have we learned form this case?

Time to refer

Early transfer: shortened duration ?

Traumatic brain injury

Mild TBI (high risk) >> refer !!

Treatment before transfer

Film skull, c-spine in patient who has role of CT-brain/c-spine

On ETT before refer

C-spine protection

Can't evaluation/not sure >> on collar

NEXUS Criteria / Canadian C-spine Rule

NEXUS Criteria

NEXUS Mnemonic	
N	**N**euro deficit
E	**E**tOH (alcohol)/intoxication
X	e**X**treme distracting injury/injuries
U	**U**nable to provide history (altered level of consciousness)
S	**S**pinal tenderness (midline)

limit data, poor performance

No precise definition for distracting painful injury

- Any lone bone fracture
- A visceral injury requiring surgical consultation
- A large laceration, degloving injury, or crush injury
- Large burns
- Any other injury producing acute functional impairment

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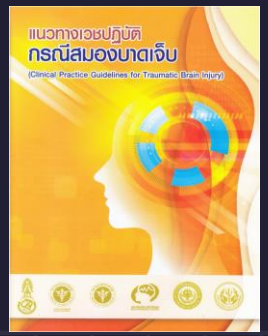
Traumatic brain injury

Low risk

- Asymptomatic
- GCS 15
- No headache

(ต้องมีครบทุกข้อ)



Moderate risk

- GCS 13-14
- GCS 15 และมี
  - Vomiting (< 2 episodes)
  - Loss of conciousness
  - Headache
  - Post-traumatic amnesia
  - Drug/alcohol intoxication
  - Risk of bleeding tendency
  - Dangerous mechanisms

(มีอย่างน้อย 1 ข้อ)

High risk

- GCS < 15 หลังได้รับอุบัติเหตุมาแล้ว 2 ชม.
- สงสัย opened skull Fx
- Vomiting (≥ 2 episodes)
- GCS ลดลงอย่างน้อย 2 แต้ม โดยไม่ได้มีสาเหตุมาจาก seizure, drug, shock หรือ metabolic factors
- มี focal neurological signs
- Post-traumatic seizure
- Age ≥ 65 + LOS or amnesia
- Use of anticoagulant

(มีอย่างน้อย 1 ข้อ)

Mild TBI (moderate risk)

- Inappropriate drowsiness or increasing difficulty in awakening patient (awaken every 2 hours during period of sleep)
- Nausea or vomiting
- Convulsions
- Severe headache
- Weakness or loss of feeling in arm or leg
- Confusion or strange behavior
- One pupil much larger than other, double vision, or other visual disturbances
- A very slow or very rapid pulse, or an unusual breathing pattern

Indications for Head CT

Age >16 with LOC or PTA (CDC / ACEP)	Consider CT without LOC or PTA
GCS < 15	GCS ≤15
Age greater than 60 years	Age >65
Physical evidence of trauma above the clavicle	Coagulopathy, Anticoagulant
Coagulopathy (supra-therapeutic international normalized ratio (INR) or thrombocytopenia)	Focal neurologic deficit
Headache	Severe headache
Vomiting	Vomiting
Drug or alcohol intoxication	Signs of basilar skull fracture
Short-term memory deficit	Ejection from motor vehicle
Posttraumatic seizure	Pedestrian struck by motor vehicle
Focal neurologic deficit	Fall down 5 stairs or >1 meter

ATLS 11th

EtCO2 in traumatic brain injury

Secondary brain injury

- Hypoxia

target SpO2 ≥ 94%

- Hypovolemia
- Hypercapnia/iatrogenic hypocapnia

≥ 60 mmHg (60-70)

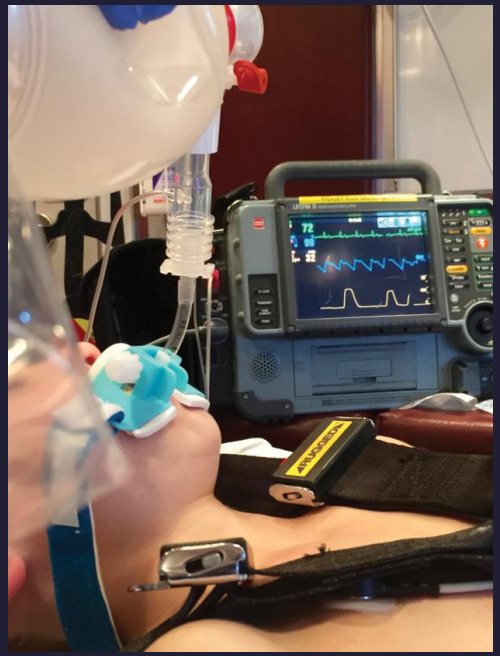
CPP = MAP- ICP

5-15 mmHg

use ETCO2 is maintained at 35-40 mmHg
adult ventilation rate 10-20 BPM

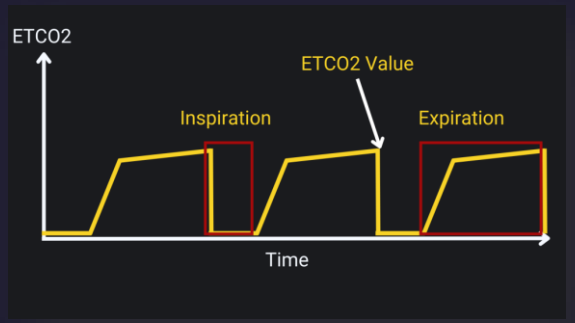
TBI >> PaCO2 target is closer to 35 mmHg

EtCO2



measures the presence of exhaled CO2

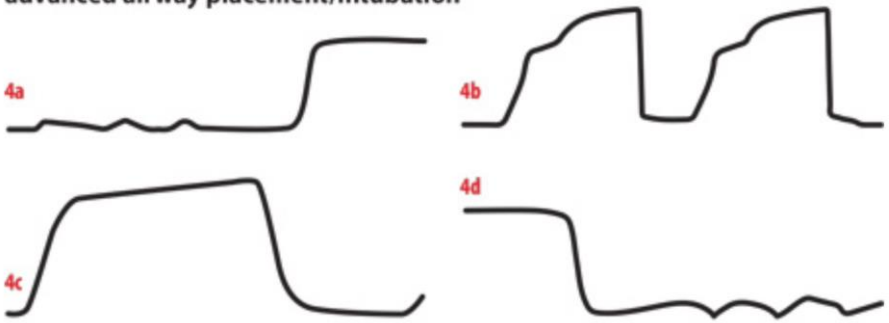
PaCO2: goal 35-45 mmHg
ETCO2: 30-40 mmHg



correlate with PaCO2

- ventilation
- perfusion
- metabolism

Figure 4a–4d: Capnography waveforms seen during advanced airway placement/intubation



4a: Near flat-line of apnea to normal rounded rectangle; **4b:** Irregular top indicating problem with airway placement; **4c:** Near-normal shape indicates successful airway placement; **4d:** Sudden drop indicating displacement of airway or cardiac arrest.

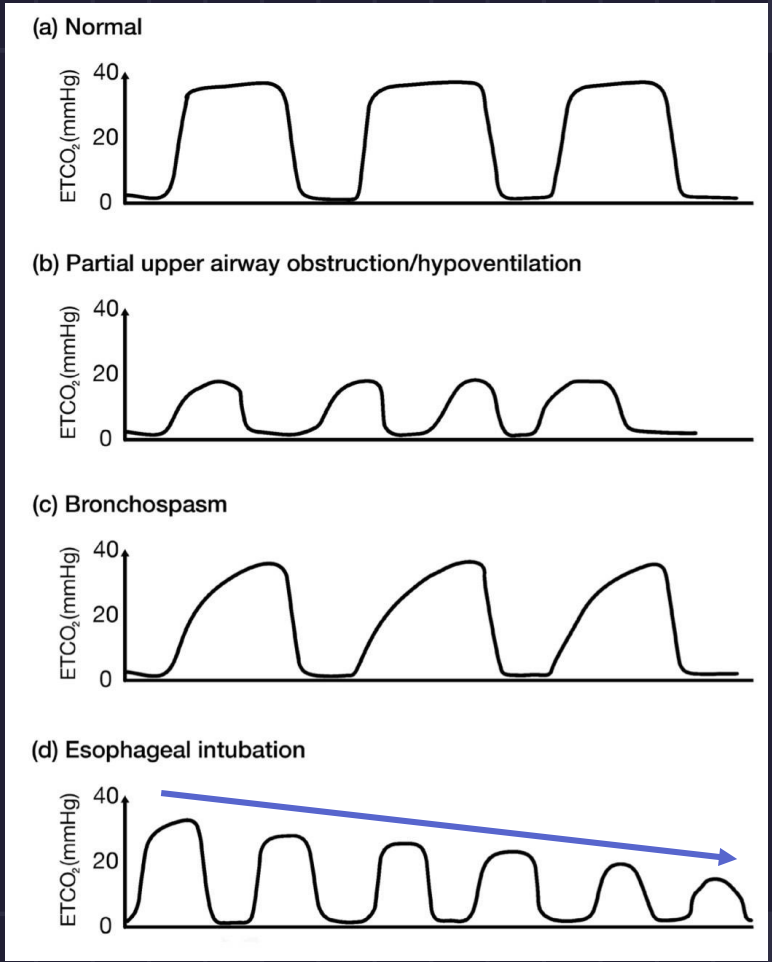
Figure 7: Capnography waveform trending down in shock

Figure 8: Capnography waveform indicating hypoxia due to asthma

Figure 9: Capnography waveform indicating hypoxia due to mechanical obstruction

Figure 10: Capnography waveform illustrating emphysema or leaking alveoli in pneumothorax

Figure 11: Capnography waveform indicating poor lung compliance also seen in obese and pregnant patients



sustained exhaled CO_2 (at least 7 breaths)
>> successful intubation

small, rounded waves

‘shark-fin waves’

initial CO_2 was detected
>> maybe from stomach

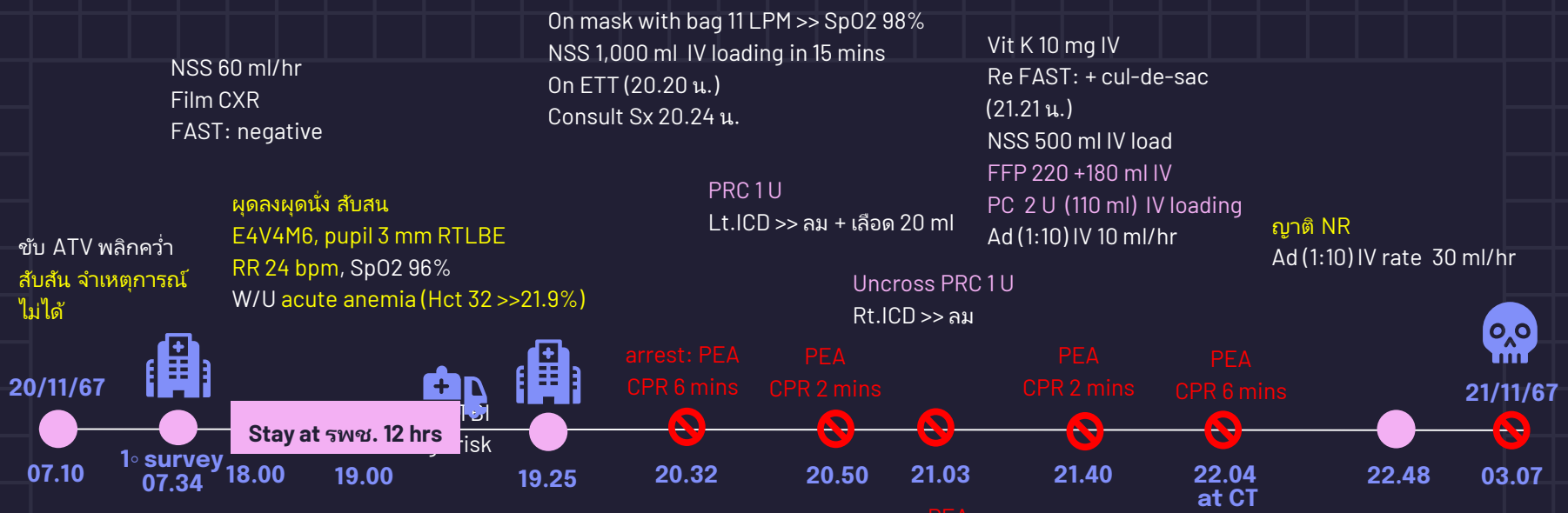
ATLS 11th

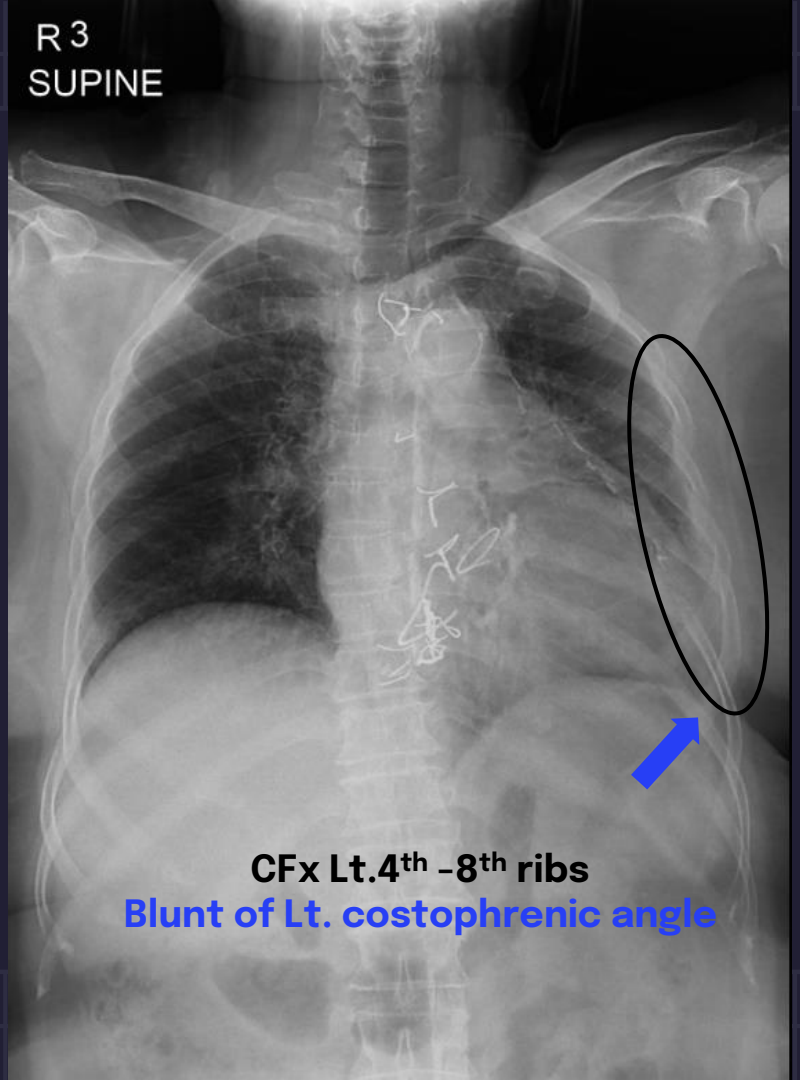
Optimal Values in TBI Management		
Category	**Parameter**	**Optimal Value**
Clinical Parameters	Systolic blood pressure	≥100 mm Hg
	Mean arterial pressure	>80 mm Hg
	Temperature	36–38°C
	Pulse oximetry	≥94%
Laboratory Parameters	Glucose	100–180 mg/dL
	Hemoglobin	> 7 g/dl
	International normalized ratio (INR)	≤1.4
	Serum sodium	135–145 meq/dL
	Serum osmolality	≤320 mOsm
	PaO_2	80–100 mm Hg
	$PaCO_2$	35–45 mm Hg
	pH	7.35–7.45
	Platelets	≥75 X 103 mm^3
Neurologic Monitoring Parameters	Cerebral perfusion pressure	60–70 mm Hg*
	Intracranial pressure	<22 mm Hg*
	$PbtO_2$	≥15 mm Hg

Case 5

67 ปี
ขับ ATV พลิกคว่ำรถล้มทับตัว 24 นาที ก่อน

U/D: HT,DLP, DVD with severe aortic stenosis S/P CABG with aortic valve replacement on warfarin


ขับ ATV พลิกคว่ำ
สับสัน จำเหตุการณ์ไม่ได้
20/11/67
07.10
1◦ survey
07.34
NSS 60 ml/hr
Film CXR
FAST: negative
A: patent, not tender at C-spine
B: lung: clear Lt.=Rt.,
RR 20/min, SpO2 99%
C: BP 189/102 mmHg, PR 91/min
no active external wound,
no long bone deformities
abdomen: soft, not tender
D: E4V5M6, pupil 2 mm RTLBE,
ผุดลงผุดนั่ง สับสน
E4V4M6, pupil 3 mm RTLBE
RR 24 bpm, SpO2 96%
W/U acute anemia (Hct 32 >>21.9%)
Stay at รพช. 12 hrs
18.00
19.00
A: patent, on hard collar
B: no subcutaneous emphysema,
RR 40/min, SpO2 98 % (RA),
lung: clear Lt.=Rt.
C: BP 153/86 mmHg, PR 130/min
no active external wound,
no long bone deformities
Hct stat 16.5 %
E-FAST: negative (20.00 น.)
D: E4V4M6, pupil 2 mm RTLBE,
no lateralizing sign
On mask with bag 11 LPM >> SpO2 98%
NSS 1,000 ml IV loading in 15 mins
On ETT (20.20 น.)
Consult Sx 20.24 น.
19.25
PRC 1 U
Lt.ICD >> ลม + เลือด 20 ml
arrest: PEA
CPR 6 mins
20.32
ROSC;
BP 169/60,
PR 140,
E1VTM1
PEA
CPR 2 mins
20.50
ROSC;
BP 127/93,
PR 122,
E1VTM1
Uncross PRC 1 U
Rt.ICD >> ลม
21.03
PEA
CPR 2 mins
ROSC;
BP 80/67,
PR 120,
E1VTM1
Vit K 10 mg IV
Re FAST: + cul-de-sac
(21.21 น.)
NSS 500 ml IV load
FFP 220 +180 ml IV
PC 2 U (110 ml) IV loading
Ad (1:10) IV 10 ml/hr
PEA
CPR 2 mins
21.40
ROSC;
BP 108/101,
PR 120,
E1VTM1
PRC 230 ml IV loading
(21.45 น.)
PEA
CPR 6 mins
22.04
at CT
ROSC;
BP 288/172,
PR 134,
E1VTM1
PRC 220 ml IV loading
(22.48 น.)
22.48
ญาติ NR
Ad (1:10) IV rate 30 ml/hr
Admit Sx
BP 163/96
PR 128,
E1VTM1,
pupil 2 mm
fixed
21/11/67
03.07



CFx Lt.4th -8th ribs

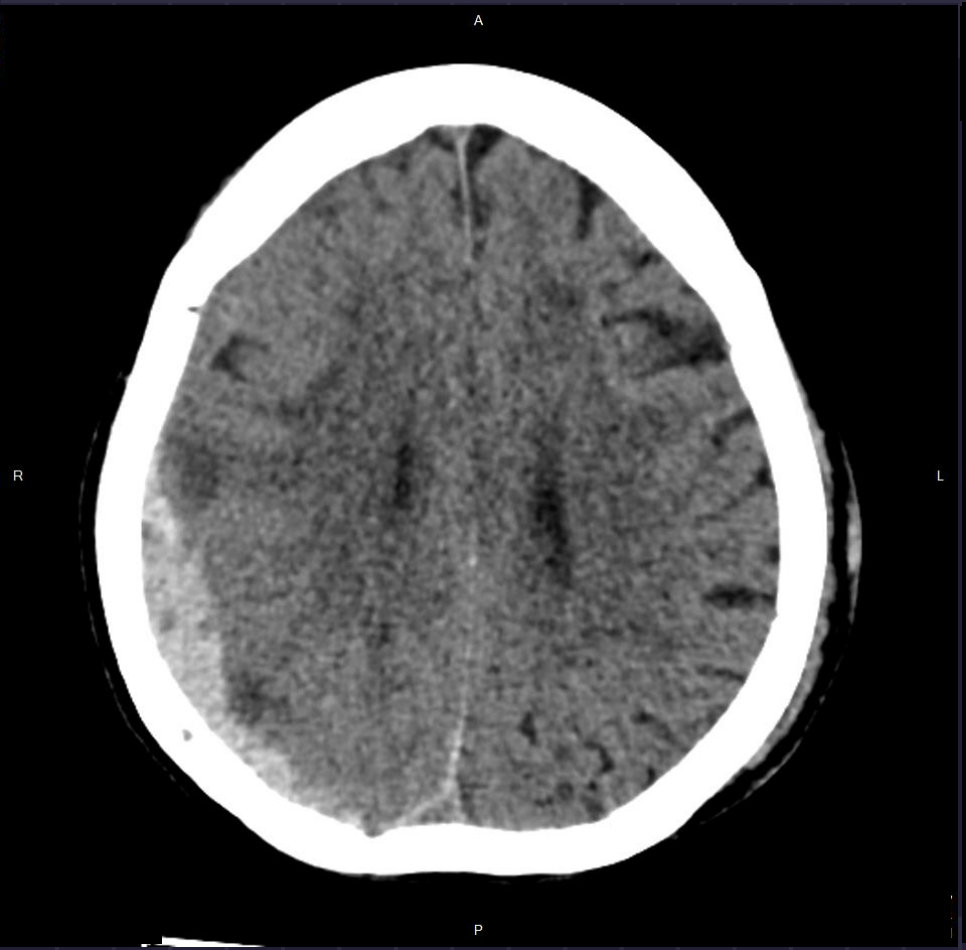
Blunt of Lt. costophrenic angle

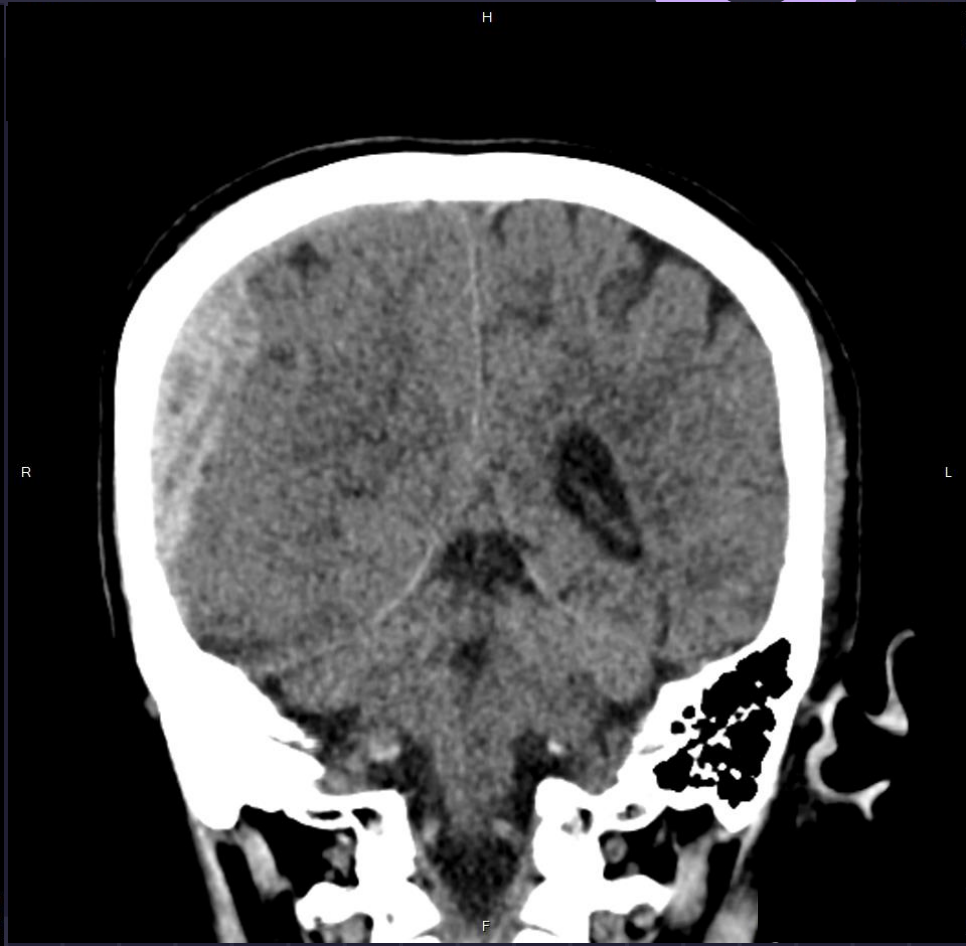

R 3

Progression

Admit 20-21/11/67

- Mild TBI (high risk) >> ASDH
- Blunt chest with multiple Lt. ribs Fx
- Hemorrhagic shock with FAST positive at cul-de-sac with r/o retroperitoneum bleeding
- Post-cardiac arrest (non-shockable rhythm)


A
R
L
P


H
R
L
F

What have we learned form this case?

Time to refer

After adjunct to primary survey

Traumatic brain injury

Mild TBI (high risk) >> refer !!

Treatment before transfer

On ETT before refer
On C-spine protection

E-FAST

Limitation of E-FAST: retroperitoneum

ATLS Transfer Checklist

1. x – Control Life-Threatening External Hemorrhage

- [ ] Check for exsanguinating or significant external hemorrhage (pooling blood, strike-through on dressings, bleeding distal to tourniquet).
- [ ] Apply direct pressure, tourniquet, or hemostatic dressings as needed.

2. A – Airway with Cervical Spine Protection

- [ ] Assess airway patency (altered sensorium, facial/neck/chest trauma, multisystem trauma).
- [ ] Verify that cervical spine protection (e.g., C-collar) is in place.
- [ ] Check if advanced airway is in place and functioning.
- [ ] Provide airway support if necessary (e.g., intubation, airway adjuncts).

3. B – Breathing and Ventilation

- [ ] Assess for significant pneumothorax or hemothorax (FAST, CXR, clinical signs).
- [ ] Ensure chest tube is in place and functioning if applicable.
- [ ] Confirm pulse oximeter is placed and functioning.
- [ ] Verify that respiratory status is stable if pneumothorax was treated without a tube.

4. C – Circulation with Hemorrhage Control

- [ ] Ensure large-bore IV access is in place and functioning.
- [ ] Assess if ongoing resuscitation is needed (fluids, blood products).
- [ ] Reassess for internal bleeding (e.g., FAST, clinical assessment).
- [ ] Ensure pelvic binder is properly positioned and tightened if applicable.
- [ ] Confirm fractures are splinted and splints are secure.
- [ ] Administer necessary fluids or blood products if required.

5. D – Disability (Neurological Status)

- [ ] Reassess neurological status (Glasgow Coma Scale, pupil checks).
- [ ] Reassess neurovascular function of all extremities.
- [ ] Ensure spinal motion restriction is in place (C-collar, flat positioning, modified log roll if needed).

6. E – Exposure/Environmental Control

- [ ] Fully expose the patient to assess for hidden injuries.
- [ ] Assess for hypothermia.
- [ ] Apply warming measures if necessary (blankets, warmed fluids).

Secondary Survey and Additional Considerations

- [ ] Review and reassess identified injuries from Primary and Secondary Surveys.
- [ ] Consider interventions to prevent progression of identified injuries.
- [ ] Confirm review of patient care preferences and goals of care.
- [ ] Ensure pain has been assessed and analgesics administered.
- [ ] Verify the function and security of all tubes and lines.
- [ ] Ensure documentation and imaging are bundled and ready for transfer.
- [ ] Confirm plan of care is discussed with patient, family, receiving team, and specialists.


THE LETHAL DIAMOND
SEVERE BLOOD LOSS
HYPOCALCEMIA
CITRATE EXACERBATES HYPOCALCEMIA LOSS
ACIDOSIS
INCREASED LACTIC ACID IN BLOOD
HYPOTHERMIA
DECREASED METABOLISM
COAGULOPATHY
DECREASED COAGULATION

Do not done at rural hospital

Film C-spine — Not adequate

Film skull — Not adequate

CT — Imaging that does not bear on the immediate treatment of life-threatening injuries should be avoided.

Film distal extremities — If not suspected vascular compromise (active bleeding or distal ischemia)

Take home message

eXsanguinating Hemorrhage	Stop external bleeding–direct pressure, suture wound, tourniquets, ant./post nasal packing
Airway Assessment and Management	suction, ETT, gastric tube
Breathing and Ventilation Assessment and Management	O2, chest drain
Circulation Assessment and Volume Resuscitation	2 large-caliber IV lines, crytalloid fluid + blood, Foley catheter to monitor urine, e-FAST, pelvic binder
Disability: Neurological Assessment and Management	Assist respiration in unconscious patients, restrict spinal motion

Transfer early !!!


L


12
14
16
18
110
112
114
116
118
120 cm
ICD NO.26-7

TRAUMA FAST TRACK

MAHARAJ NAKHON SI THAMMARAT HOSPITAL

M MAJOR VASCULAR INJURY

Major vascular injury
With hard sign
(active bleeding/expanding hematoma)

N NEURO

GCS ≤ 8
(Mechanism attributed to trauma)

S SHOCK

- SBP < 90 mmHg - Adult or <70+2(Age) - Child
- Sign of poor tissue perfusion
  Tachycardia with delayed capilla

T TRAUMA

- Blunt thoracoabdominal injury
  - FAST positive with shock
- Traumatic cardiac arrest
- Penetrating injury

Neck (platysma violation)
Chest (esp. w/ massive hemothorax, cardiac injury)
Abdomen (esp. FAST+, bowel evisceration, GI bleeding)

GOAL

trauma team arrival at ER within 15 min

Case Gen CVT

- WI/EMS: OR in 60 min.
- Refer: OR in 15 min
- Time ที่รพช. 30 min.
- พิจารณา Admit ICU

Decision to transfer within first 15-30 mins
ATLS 10th

Case neuroSx

- WI/EMS: CT in 25 min.
- Refer: CT in 10 min.
- Consult neuroSx in 45 min.
- OR in 120 min.
- พิจารณา Admit ICU

All cases : T R A U M A Sx Activation prehos/Refer/at arrival

You are one of the important parts that keep the patient alive.