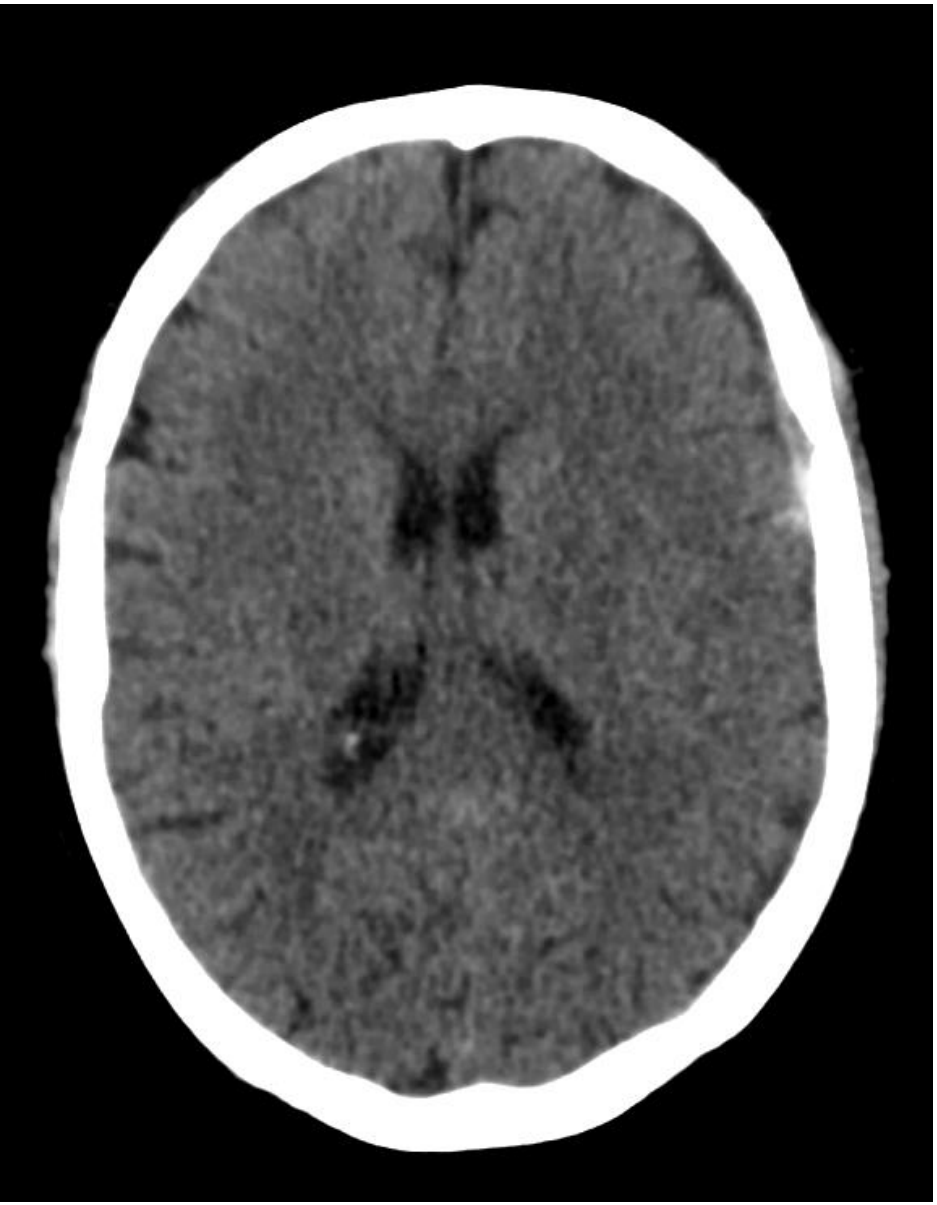
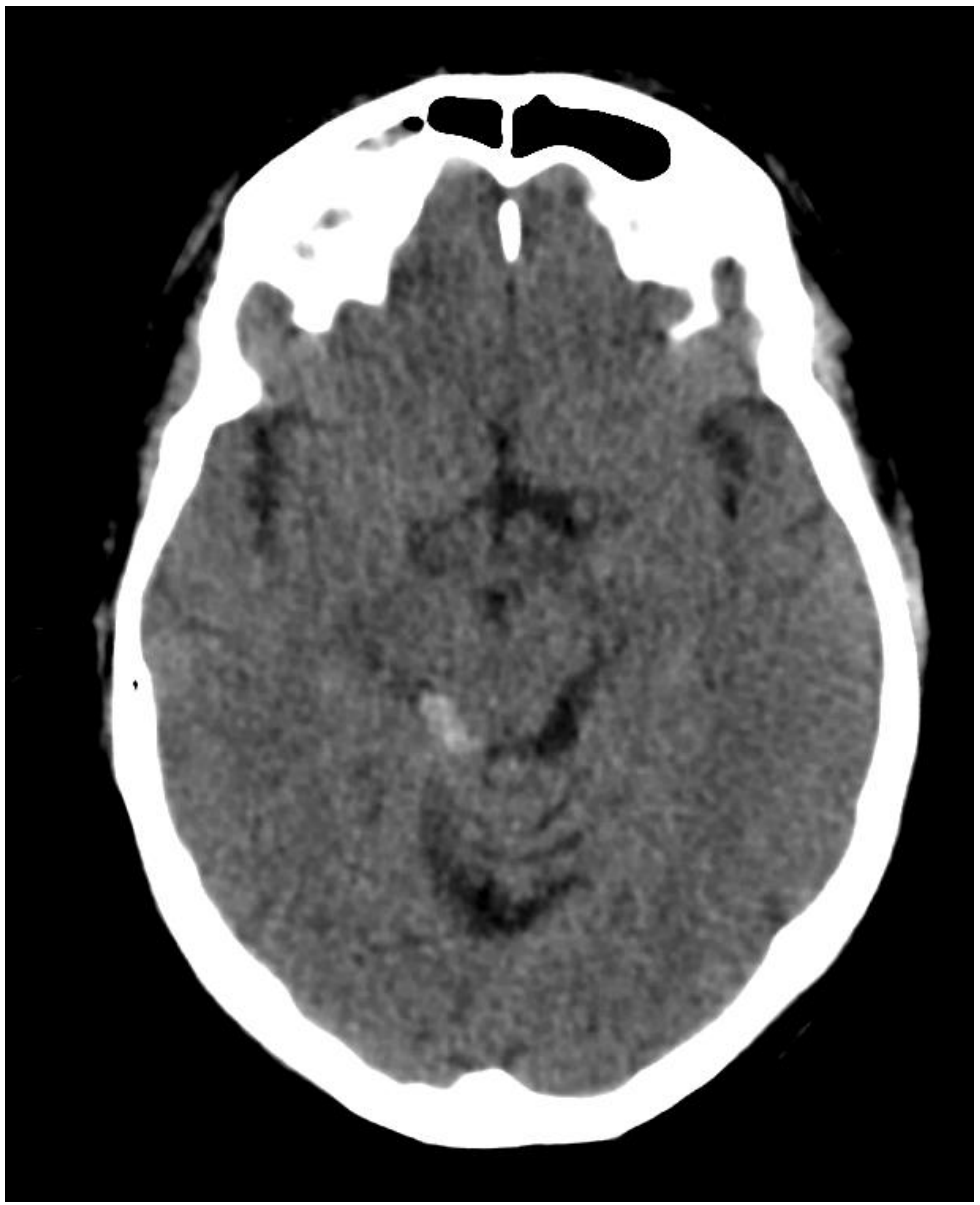
Acute LiverFailure

Clinical Case Scenario

- 36-year old patient with known alcoholic hepatic cirrhosis, was repetetively admitted to the hospital due to acute decompensation during the last several months.
- Now the emergency service is called because of loss of consciousness and seizures of his right arm and leg.
- On the scene, diazepam 15 mg i.v. is applied but the seizures do not subside, afterwards he is sedated with propofol and intubated.
- He is brought to the ER of University hospital on mechanical ventilation, sedated, hemodynamically stabilized.





- Urea 2.6 mmol/l
- Creat. 49 umol/l
- Na 133 mmol/l
- K 3.8 mmol/l
- Cl 105 mmol/l
- Ca 1.92 mmol/l
- P 0.96 mmol/l
- Mg 0.48 mmol/l
- Bi-tot. 90 umol/l
- ALT 0.25 ukat/l
- AST 0.71 ukat/l
- GGT 1.09 ukat/l
- ALP 0.73 ukat/l
- Blood proteins 53.8 g/l
- Albumin 21.6 g/l
- Glucose 5.9 mmol/l
- Triglycerides 0.9 g/l
- CRP 37.3 mg/l
- Procalc. 0.4 ng/ml
- Ammonium 88 umol/l
- Lactate 1.6 mmol/l
- B(a)pH 7.36
- B(a)pCO2 5
- B(a)pO2 16
- B(a)HCO3 20.8
- B(a)BD- -4

- Leukocytes 1.17
- Erythrocytes 2.16
- Hemoglobin 75.2
- Hematocrit 0.21
- MCV 98.4
- Platelets 40.2
- Cencetration of HGB 354

- Prothrombin time INR 1.76
- Prothrombin time s 22.1
- Prothrombin time R 1.58
- Fibrinogen g/l 1.95
- aPTT -ratio 1.4
- aPTT s 46.2

Child-Pugh Score

Clinical and Lab Criteria	Points*		
	1	2	3
Encephalopathy	None	Mild to moderate (grade 1 or 2)	Severe (grade 3 or 4)
Ascites	None	Mild to moderate (diuretic responsive)	Severe (diuretic refractory)
Bilirubin (mg/dL)	< 2	2-3	>3
Albumin (g/dL)	> 3.5	2.8-3.5	<2.8
Prothrombin time			
Seconds prolonged	<4	4-6	>6
International normalized ratio	<1.7	1.7-2.3	>2.3

Child-Turcotte-Pugh Class obtained by adding score for each parameter (total points)
Class A = 5 to 6 points (least severe liver disease)
Class B = 7 to 9 points (moderately severe liver disease)
Class C = 10 to 15 points (most severe liver disease)

Acute liver failure

- Liver has many functions, central role in metabolism
- Acute failure – up till 6 months from the beginning of signs and symptoms
- **Coagulopathy** and/or **encephalopathy** within 6 months of **icterus** = jaundice

- Up till 7 days **– fulminant** hepatic failure
- From 7 – 28 days **– acute** hepatic failure
- From 4 – 12 weeks **– subacute** hepatic failure

Acute hepatic failure - causes

- Viral hepatitis – A-E, HSV...
- Drug-induced – paracetamol...
- Toxins – mushrooms, tetrachlormethane...
- Vascular accidents – portal trombosis, Budd-Chiari syndrome...
- Pregnancy-associated – HELLP...
- Others – trauma, Wilson´s disease, alcohol abuse

Acute on Chronic liver failure

- Compensated liver cirrhosis
- Intercurrent infection or bleeding
- SIRS criteria have limited value !
- Spont. bacterial peritonitis, pneumonia, urinary tract infection...
- Bleeding from oesophageal varices

Hepatic Encephalopathy

- Elevated levels of ammonia

Grade	Clinical features	Neurological signs	Glasgow coma scale
0/subclinical	Normal	Only seen on neuro-psychometric testing	15
1	Trivial lack of awareness, shortened attention span	Tremor, apraxia, incoordination	15
2	Lethargy, disorientation, personality change	Asterixis, ataxia, dysarthria	11-14
3	Confusion, somnolence to semi-stupor, responsive to stimuli, fits of rage	Asterixis, ataxia	8-10
4	Coma	± Decerebration	< 8

Hepatic failure - therapy

- Therapy of the cause of AHF – virostatics, acetylcysteine
- Organ support – artificial ventilation, vasopressors ± inotropics, elimination methods, blood products
- Encephalopathy – non-resorbable antibiotics (rifaximine), lactulose, therapy of intracranial hypertension

- GIT detoxication was initiated, vitamin K and thiamin were supplemented. Terlipressin was given because of oliguria.
- Suspicion on spontaneous bacterial peritonitis was stated, cefotaxim was administered empirically.

Ascites analysis

- Leukocytes - 10^9/l 0.3
- Erythrocytes - 10^12 0.01
- Hemoglobin g/l 0.93
- Platelets 10^9/l 0.52
- Neutrophils % 40
- Lymfocytes % 32.5
- Monocytes % 12
- Eozinophils % 15.5
- Bazophils % 0
- Neutrophils x10 9 0.12 (<0.25)

- Sedation was stopped, organ function were stable. No epileptogenic activity was detected by EEG. After 24 hrs he was disconnected from the ventilator and extubated.
- During the next 2 days respiratory failure reappeared and the patient was reintubated. Temporarily aggressive mechanical ventilation due to alveolar lung oedema was needed. After diuretic therapy oxygenation improved, sedation was stopped with patient regaining consiousness.
- On day 4, the patient is agitated, tachycardic, hypertensive, tachypneic.
- Laboratory results including ammonia level are normal.

Delirium

- **Syndrome** present during various diseases (metabolic, intoxications, withdrawal syndrome, sepsis…) caused by disturbance of normal functioning of brain.
- Cca 1/3 – 1/2 of patients hospitalized in ICUs.
- Changes of consciousness - **qualitative** (hallucinations, desorientation) and **quantitative** (hyper- or hypoactive).

Delirium - therapy

- Correction of the underlying pathology.
- Supportive measures – nutrition, adequate analgesia…
- Repeated reassuring, reorientation, explanation.
- Night x day rhythm restoration – quiet environment.
- Early mobilisation, rehabilitation, vertical position.
- Medication – quetiapin, haloperidol, dexmedetomidine – no benefit for delirium itself, treats agitation only.

- After another 7 days and successful weaning the patient was finally extubated.

Orthotopic Hepatic Transplantation

- King´s college criteria

ACETAMINOPHEN-INDUCED ALF

Arterial pH <7.3 (regardless of HE)

OR all 3 of the following

- INR >6.5
- Creatinine >300 μmol/l
- HE grade 3–4

NON-ACETAMINOPHEN-INDUCED ALF

INR >6.5 (regardless of HE)

OR 3 of 5 of the following (regardless of HE)

- Age <10 or >40 years
- Etiology: indeterminate, drug-induced
- Time interval icterus to encephalopathy > 7 days
- INR >3.5
- Bilirubin >300 μmol/l

Bridging therapy – detoxifying systems (Prometheus, MARS = Molecular Adsorbents Recirculation System)