

A 54-Years-Old Man Known Case of Hypertension, Diabetes Mellitus, Obesity Having Pyogenic Meningitis Due to *Streptococcus Agalactiae* Complicated by Multiple Small Abscesses Over Meninges, Metabolic Acidosis, Acute Kidney Injury, Transaminitis, DIC And ARDS: A Rare Case Report

Khin Phyu Pyar^{*1}, Moe Zaw Myint², Khine Lwin², Sa Thiha³, Thaw Zin Oo³, Nay Myo Lwin⁴, Thidar Sein⁵, Hein Zaw Zaw⁶, Sai Naing³, Min Zin⁷, Ye Zarni³, Kyaw Wunna⁸, Hein Zaw⁹

¹Professor, Senior Consultant Physician and Nephrologist, Former Head of Department of Medicine/ Former Head of Department of Nephrology, Defence Services Medical Academy/ No. (1) Defence Services General Hospital (1,000-Bedded), Yangon, Myanmar.

²Senior Consultant Physician, Department of Medicine, No. (1) Defence Services General Hospital (1,000-Bedded)

³Consultant Physician, Department of Medicine, No. (1) Defence Services General Hospital (1,000-Bedded)

⁴Senior Consultant Intensivist, Intensive Care Unit, No. (1) Defence Services General Hospital (1,000-Bedded)

⁵Senior Consultant Radiologist, Department of Radiology, No. (1) Defence Services General Hospital (1,000-Bedded)

⁶Consultant Neurologist, Department of Neurology, No. (1) Defence Services General Hospital (1,000-Bedded)

⁷Junior Physician, Department of Medicine, No. (1) Defence Services General Hospital (1,000-Bedded)

⁸Senior Consultant Microbiologist, Department of Microbiology, No. (1) Defence Services General Hospital (1,000-Bedded)

⁹Consultant Pathologist, Department of Pathology, No. (1) Defence Services General Hospital (1,000-Bedded)

ABSTRACT

Case Summary

A 54-years-old man presented with 3 days history of fever and headache followed by acute confusion. He was a known case of hypertension and diabetes mellitus for 10 years. He was obese; neck rigidity was noted; Glasgow Coma Scale was 9/15 (E3,V1, M5). Cerebrospinal fluid examination showed high protein, low normal sugar with cells predominantly neutrophils compatible with pyogenic meningitis; *Streptococcus agalactiae* was detected in CSF. It was complicated by metabolic acidosis, acute kidney injury, transaminitis, DIC and ARDS. He passed away 58 hours after hospitalization. Autopsy findings were discussed.

KEYWORDS: pyogenic meningitis, *Streptococcus agalactiae*, metabolic acidosis, acute kidney injury, transaminitis, DIC, ARDS

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INTRODUCTION

Bacterial meningitis is an inflammation of the meninges, associated with the invasion of bacteria. It is a serious and life-threatening condition that requires prompt diagnosis and treatment (Zainel et al., 2021).

Bacterial meningitis represents a severe public health threat, particularly in vulnerable populations, such as older adults and those with underlying conditions. Despite the effectiveness of treatments like dexamethasone and antibiotics, the high mortality and morbidity rates emphasize

the importance of early and accurate diagnosis (Niemelä et al., 2023).

The etiologic agents vary by age group. Bacterial meningitis due to *Streptococcus agalactiae* is common for the neonatal period; and it is rare in adult (Cho et al., 2010) (Kuzume et al., 2019). However, one report pointed out an increasing incidence of cases in elderly patients and in adults with comorbidities (M. E. Tsaltas-Mladenov et al., 2022). And the mortality rate Bacterial meningitis due to *Streptococcus agalactiae* was high (Cho et al., 2010). Early recognition of

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the infection and early antimicrobial therapy are important for successful management.

CASE PRESENTATION

History was taken from patient's wife. The patient was 54 years old; the wife gave 3 days history of fever and headache. He was talking with inappropriate words and the behavior was abnormal on the night prior to admission. He was a

known case of hypertension and diabetes mellitus for 10 years; and he was obese. There was no history of head injury or substance abuse. He took alcohol 5 units/day; the last drink was 2 days prior to admission.

On examination, he was unconscious; febrile; Glasgow Coma Scale (GCS) was 9/15 (E3,V1, M5); neck rigidity was noted; blood pressure was 170/100mmHg; pulse rare was 120/minutes.

Table (1) Initial parameters on admission

	Parameters	Value	Normal range
1	Glasgow Coma Scale	9/15	
2	Blood pressure	170/100 mmHg	
3	Pulse rate	120/minutes	
4	Hemoglobin	13.7 gm%	
5	Total WBC count	13.1 X10 ⁹ /L	4-12 X10 ⁹ /L
6	Absolute Neutrophil count	12.4 X10 ⁹ /L	
7	Platelet count	143 X10 ⁹ /L	150-500 X10 ⁹ /L
8	AST	109.9 U/L	8-35 U/L
9	ALT	77.3 U/L	4-36 U/L
10	GGT	191 U/L	5-40 U/L
11	Total Bilirubin	0.69 mg/dl	0.1-1.2 mg/dl
12	Alkaline phosphatase	87.7 IU/L	44-146 IU/L
13	Blood urea	27.9 mg/dl	6-24 mg/dl
14	Serum creatinine	1.3 mg/dl	0.7-1.3 mg/dl
15	Serum sodium	139 mmol/l	135-145 mmol/l
16	Serum potassium	4.9 mmol/l	3.5-5.5 mmol/l
17	Serum chloride	97.1 mmol/l	95-105 mmol/l
18	CRP	21.93 mg/l	<10 mg/l
19	Random blood sugar	168.6 mg/dl	140-200 mg/dl
20	HbA1C	6.48 %	<5.7 %

Blood investigation revealed total WBC count was 13.1 X10⁹/L (absolute Neutrophil count 12.4 X10⁹/L; absolute Lymphocyte count 0.3 X10⁹/L); hemoglobin was normal (13.7 gm%); platelet count was low normal (143 X10⁹/L). Liver parenchymal enzymes were high; AST was 109.9 U/L; ALT was 77.3 U/L; GGT was 191 U/L; total bilirubin was 0.69 mg%; and alkaline phosphatase was normal (87.7 mg/dl). Blood uric acid was normal (5.91 mg/dl); total cholesterol was high (243.1 mg/dl); triglyceride was 155.5 mg/dl; HDL was 52.4 mg/dl; LDL was 160 mg/dl; blood urea was high (27.9 mg/dl); serum creatinine was high too (1.3 mg/dl); serum sodium was 139 mmol/l; serum potassium was 4.9 mmol/l; serum chloride was 97.1 mmol/l; CRP was high (21.928 U/L); total protein was 79.6 g/L; blood random glucose was 168.6 mg/dl; and HbA1C was 6.48%. Blood for malaria parasite (rapid test) was negative. Ultrasonogram showed mild hepatomegaly with fatty infiltration. Portable CXR was normal (photo 1). ECG revealed sinus tachycardia; no evidence of dilated cardiomyopathy in echocardiogram. Non-contrast CT head

(NECT Head) was normal. Photo 3 to 6 reveal CT findings. He was treated as a case of meningoencephalitis (bacterial or viral) with alcohol withdrawal syndrome with meropenem, amikacin and levofloxacin. Insulin therapy and thiamine replacement were given to control glycemic status and to prevent Wernicke's encephalopathy.

Twenty-four hours later, the clinical condition deteriorated very rapidly. He became deeply comatose; GCS was 4/15(E1,V1, M2); respiratory rate was 24/minutes; heart rate was 150/minutes; blood pressure dropped to 70/55 mmHg; SaO2 was 93% with O2 reservoir mask 15L/min; crackles were audible in both lungs. Chest radiograph was compatible with ARDS (photo 2). Therefore, two inotropes (noradrenaline and dopamine) were given titrating with MAP (mean arterial pressure). And, central venous catheter was inserted under aseptic condition; he was placed on non-invasive ventilatory support (NIV).

D-dimer was high (17.85 ug/ml); INR was 1.49 times high. Full blood count was done after 24 hours; hemoglobin was stable at 14.0 gm%; total WBC became higher (14.5X10⁹/L)

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with neutrophil leucocytosis); platelets count dropped to $90 \times 10^9/L$ suggestive of DIC. CRP became higher (27.051 mg/l). Blood urea rose to 165.9 mg/dl. Serum creatinine further rose to 2.44 mg/dl. Serum sodium and chloride became higher, 152 mmol/l and 125.3 mmol/l respectively. Serum potassium was stable at 3.98 mmol/l. Rapid rise in liver parenchymal enzymes within 24 hours was noted; ALT was 331.4 U/L (8 times normal); and AST was 704 U/L (15 times). Alkaline phosphatase was stable at 60 U/L. They were suggestive of acute hepatocellular injury due to septicemia.

Total and differential protein were normal; total protein was 65.5 gm/L; albumin was 36.5 gm/L; and, globulin was 29 gm/L. It indicated that he did not have chronic liver disease. Arterial blood gas examination was consistent with metabolic acidosis with normal anion gap; pH was 7.404; PaO₂ was 77.2 mmHg (70 mmHg -700 mmHg); PaCO₂ was 24.5 mmHg (30 mmHg -50 mmHg); HCO₃ was 15 mmol/l; anion gap was 17.6 mmol/l (12-16 mmol/l).

Lumbar puncture was done; CSF was slightly turbid; it did not come under pressure. CSF protein content was high (154 mg/dl) (normal <50 mg/dl) and sugar was normal (80 mg/dl) (normal 40-80 mg/dl); neutrophils were seen under microscopy (50 cells/cumm with polymorph 90%). It was compatible with acute pyogenic meningitis. CSF (Meningitis Panel) revealed *Streptococcus agalactiae*; it was not positive for virus panel nor fungus. CSF Xpert for *Mycobacterium tuberculosis* was not detected.

His blood pressure did not respond to inotropes; SaO₂ was falling with non-invasive ventilation NIV; he was in deep coma (GCS 3/15). Then, he got cardiac arrest. Although Endotracheal tube insertion, cardiopulmonary resuscitation CPR and advanced life support were applied, he passed away. Total duration of hospital stay was 58 hours and overall condition deteriorated rapidly 24 hours after hospitalization. Autopsy was done. The meninges were thickened and opaque with multiple small abscesses and yellowish exudates; vessels over brain were very congested and small pustule were seen; they were compatible with acute pyogenic meningitis. They were illustrated in photo 7 to 9. Evidence of atherosclerosis and dilated cardiomyopathy were seen in photo 13 & 14. Liver was congested and fatty changes were found (photo 10). Spleen was soft and septic (photo 12). Lungs were voluminous and congested (photo 15 & 16). Kidneys were normal in size; features of shock kidneys were seen (photo 11). Pancreas was normal (photo 17).

DISCUSSION

Bacterial meningitis is a bacterial infection of the meninges, which is the protective covering for the brain and spinal cord resulting in inflammation. The etiologic agents causing bacterial meningitis vary with age group. *Streptococcus pneumoniae* is the most common in all other age groups, with the exception of 11 - 17 year old, where *Neisseria*

meningitidis is still the most common cause. One study reviewed 1,670 cases of bacterial meningitis in US; and they found that *Streptococcus pneumoniae* was the predominant infective species (58.0%), followed by *Streptococcus agalactiae* (18.1%), *Neisseria meningitidis* (13.9%), *Hemophilus influenzae* (6.7%), and *Listeria monocytogenes* (3.4%) (Thigpen et al., 2011). *Streptococcus agalactiae*, is common in neonates; however, it is rare in adult patients (Cho et al., 2010). This case was one of the rare forms of acute meningitis caused by *Streptococcus agalactiae* (Kuzume et al., 2019). This is one reasons for case reporting. This case was one of the rare forms of acute meningitis caused by *Streptococcus agalactiae* (Kuzume et al., 2019) in adult. Clinicians must remain vigilant for bacterial meningitis and its changing epidemiology (Wall et al., 2021).

This patient had long standing diabetes mellitus for 15 years and he had high BMI. One review highlighted that an increasing incidence of cases with meningitis due to *Streptococcus agalactiae* in elderly patients particularly those with comorbidities (M. E. Tsalta-Mladenov et al., 2022) (Kuzume et al., 2019). Niemela found that the mortality rate of bacterial meningitis was nearly 100 percent even with optimal therapy (Niemelä et al., 2023) (Zaky et al., 2025) (Hasbun, 2022). Having comorbidities in this case also attributed to clinical severity and mortality.

The initial presentation was headache mainly; the study from Finland reported that headache was a poor prognostic factor (Niemelä et al., 2023). Meningitis due to *Streptococcus agalactiae* had high morbidity and mortality, especially in adults over 65 years of age (Abdelradi et al., 2020).

Clinically, bacterial meningitis is suggested by the symptoms of fever, altered mental status, headache, and nuchal rigidity; nearly all patients have at least one of the classic triads of fever, neck stiffness, and altered mental status. This patient had classic triad. Atypical presentations of bacterial meningitis were reported as cerebral infarct/stroke/hemiparesis (Khan, 2016) (M. Tsalta-Mladenov et al., 2022), fits (Germano et al., 2019) and dementia. Weyori et al reported that if patients presenting one and/or more of these signs and symptoms (neck stiffness, convulsion, altered consciousness, and abdominal pain) have a higher risk of testing positive for bacterial meningitis after statistically adjusting for age (Weyori et al., 2023).

Conscious level of this patient was 9/15 on admission; and it dropped to 4/15 in next 24 hours. Fall in conscious level might be related with local complications like cerebral edema, stasis in microvascular circulation or vasculitis (Ali et al., 2024) in addition to systemic causes like sepsis and hyponatremia. Moreover, the onset of hypotension as well as ARDS was very rapid in this patient. And, the sharp rise in liver parenchymal enzymes was remarkable over 24 hours. Furthermore, serum creatinine became double. Overall

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clinical condition rapidly deteriorated over 24 hours with multi-organ failure; it was highly suggestive of invasive *Streptococcus agalactiae*. Having diabetes mellitus and obesity in this patient were susceptible for invasive *Streptococcus agalactiae*. Although an immunocompetent person developed invasive *Streptococcus agalactiae* meningitis from acute otitis media infection with mastoiditis (Al-Bayati et al., 2020), this patient did not have ear or sinus infection. The use of proton pump inhibitor (PPI) was reported as a risk factor invasive *Streptococcus agalactiae* meningitis (Bîrluțiu et al., 2018); however, this patient did not take PPI.

Chen et al found that blood total WBC count in patients with bacterial meningitis was a protective factor (Chen et al., n.d.) (Pomar et al., 2023). The total WBC count in this patient was higher on admission; it rose further on next 24 hour. However, platelets count dropped; it was highly suggestive of DIC due to septicemia. The evidence of DIC was also supported by prolonged INR, high D dimer and higher CRP in this patient.

The glucose level in the CSF was a risk factor for development of complications in patient with bacterial meningitis (Chen et al., n.d.) (Pomar et al., 2023). However, the reverse was seen in this patient; CSF sugar was upper limit of normal (80 mg/dl) (normal 40-80 mg/dl).

The clinical condition of this patient deteriorated over 24-58 hours; septic shock and ARDS. In autopsy, very opaque meninges with purulent exudates and multiple pustules over meninges, very congested vessels over cortex of brain and cerebral edema were found. They pointed out the local invasiveness of *Streptococcus agalactiae*. Both clinical status and biochemical status (acute liver injury, raised serum creatinine, D-dimer and CRP) reflected systemic invasiveness and catastrophic inflammatory storm. Invasive nature of *Streptococcus agalactiae* infection in immunocompromised host (diabetes mellitus and obesity) led to rapid clinical deterioration and multiorgan failure; the main culprit for death in this patient.

This case scenario supported former reports. Hudson et al found that the clinical course meningitis due to *Streptococcus agalactiae* was progressed very rapidly. And the mortality rate of meningitis due to *Streptococcus agalactiae* was higher than other causes of bacterial meningitis (Hudson et al., 2023) (Niemelä et al., 2023). Therefore, timely diagnosis was crucial for better outcomes (Kuzume et al., 2019).

Initially, this patient was given empiric antibiotic therapy with meropenem, amikacin and levofloxacin. This patient had possible drug resistant *Streptococcus agalactiae* strain. Emerging antibiotic resistance of *Streptococcus agalactiae* was an upcoming challenge (Hoffman & Weber, 2009). The invasiveness of *Streptococcus agalactiae* meningitis in immunocompetent host (Hollasch et al., 2019). The SNP analysis on *Streptococcus*

agalactiae strain done in Italy highlighted the presence of mutations conferring pathogenicity to the strain and it could cause meningitis even in a healthy subject (Borriello et al., 2025). We should have done SNP analysis of *Streptococcus agalactiae* strain in this patient (Oyanguren et al., n.d.). Not only cerebrospinal fluid culture and PCR but also direct next-generation sequencing of CSF is essential for early detection of drug resistant strain of *Streptococcus agalactiae*.

CONCLUSION

Bacterial meningitis is a medical emergency; prompt diagnosis and targeted antibiotic therapy are essential. The mortality rate of bacterial meningitis is high. This case highlights the awareness of considering unusual pathogens, *Streptococcus agalactiae*, in immunocompromised patients.

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Our institution does not require ethical approval for reporting cases.

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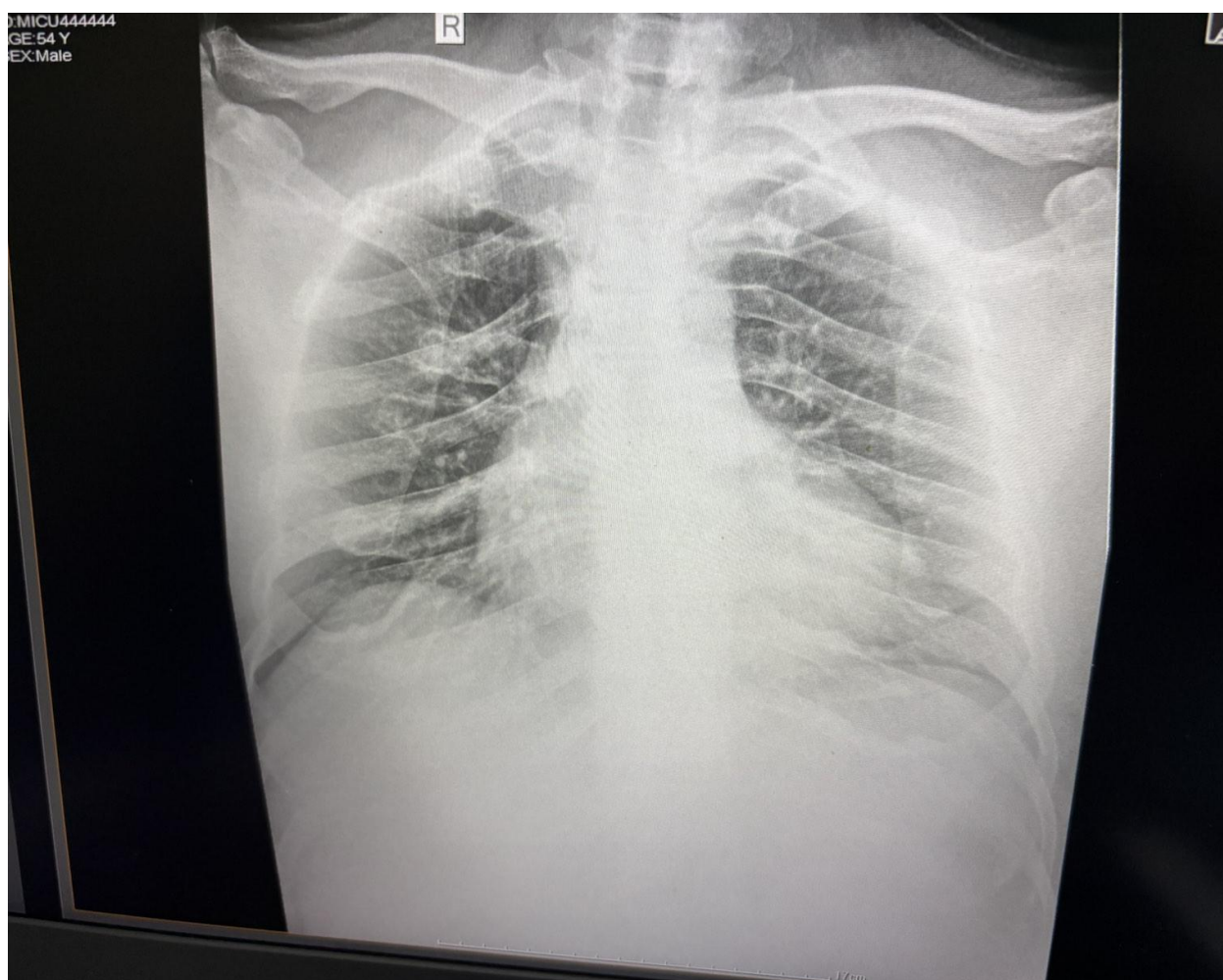


Photo (1) Portable chest radiograph on admission showing mild cardiomegaly with clear lung fields

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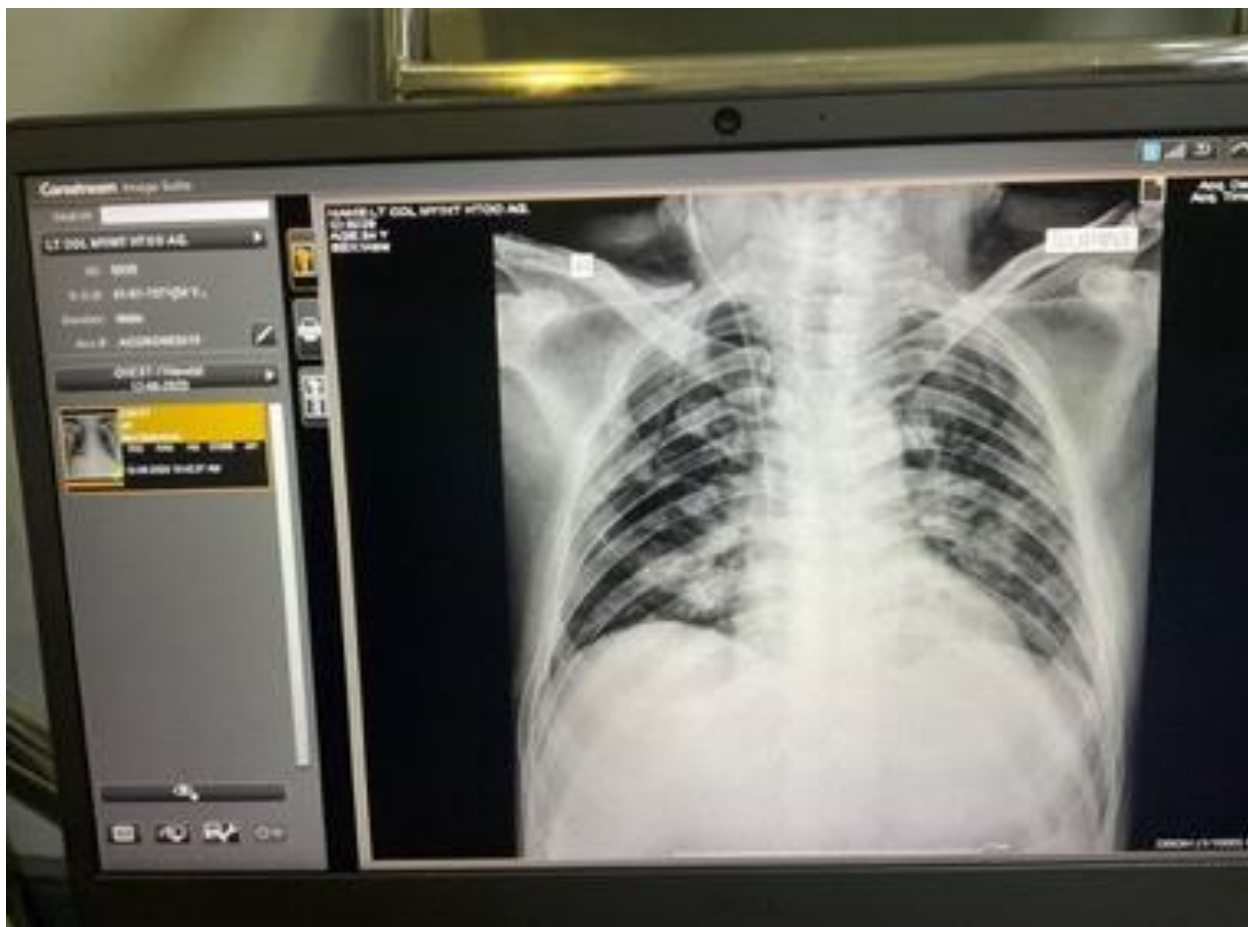


Photo (2) Portable chest radiograph 24 hours after admission, after insertion of central venous catheter, showing alveolar shadows in both lungs compatible with ARDS

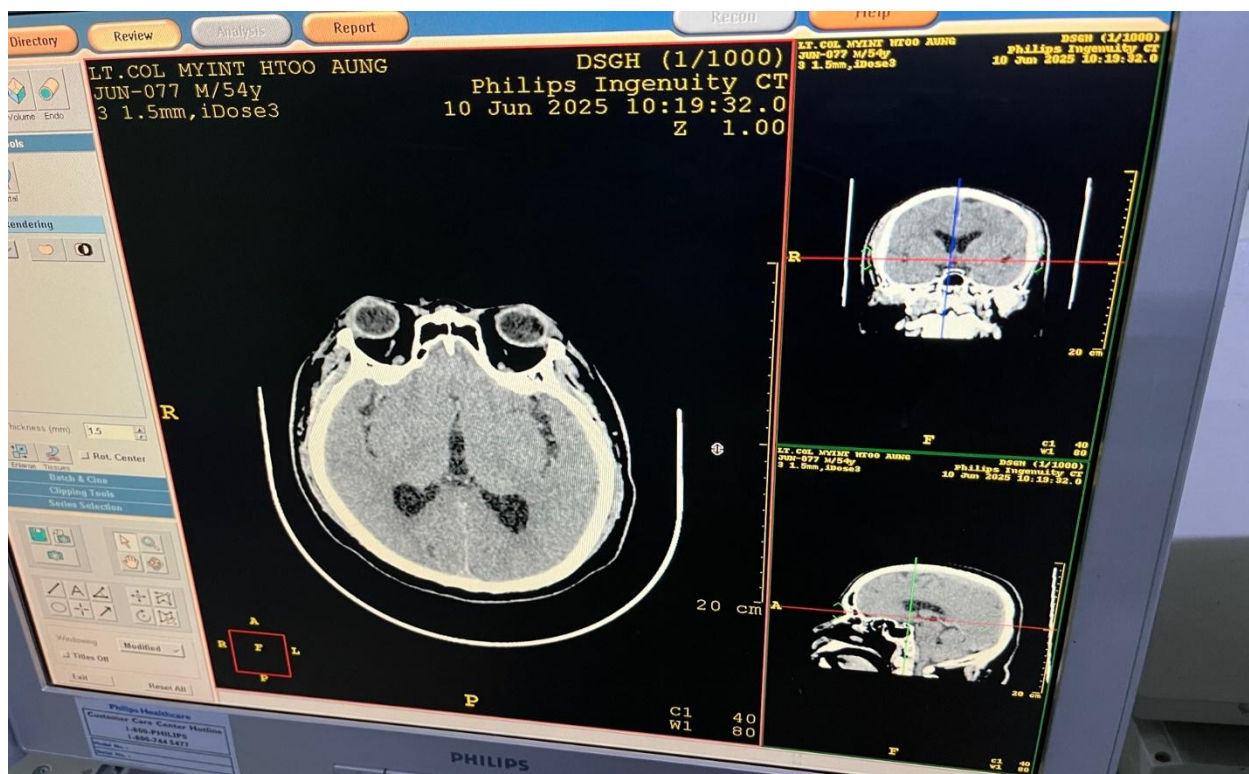


Photo (3.a) NECT Head cross sectional view (done on admission) was normal

A 54-Years-Old Man Known Case of Hypertension, Diabetes Mellitus, Obesity Having Pyogenic Meningitis Due to Streptococcus Agalactiae Complicated by Multiple Small Abscesses Over Meninges, Metabolic Acidosis, Acute Kidney Injury, Transaminitis, DIC And ARDS: A Rare Case Report

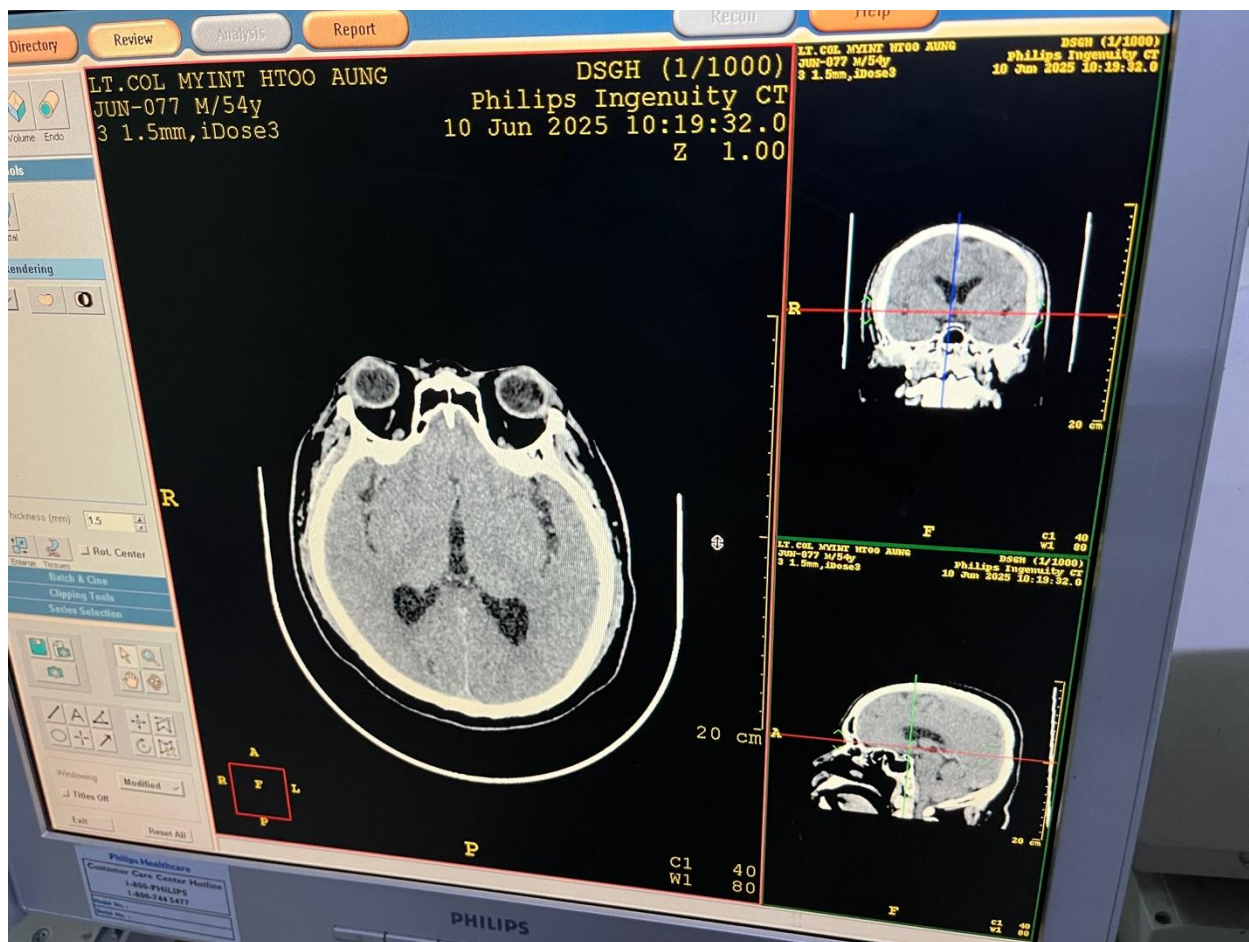


Photo (3.b) NECT Head cross sectional view (done on admission) was normal

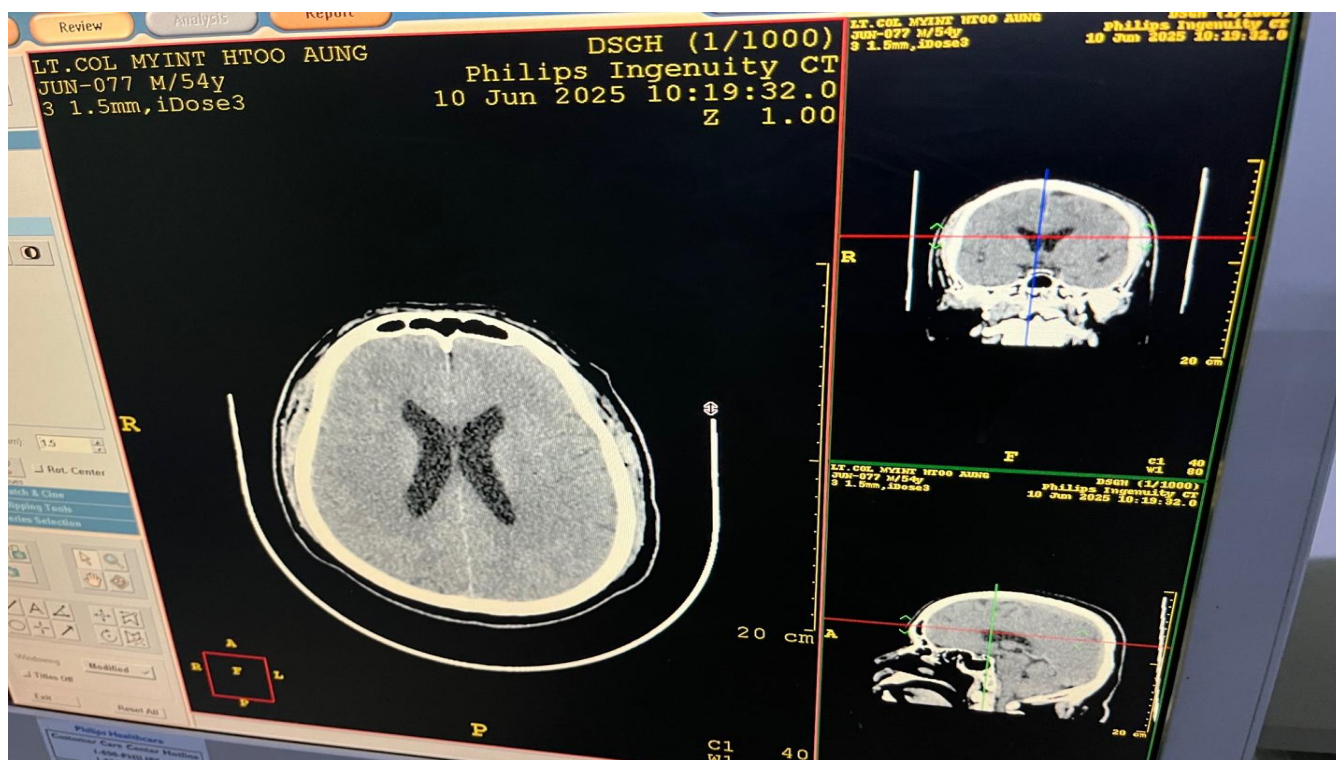


Photo (4) NECT Head cross sectional view (done on admission) was normal

A 54-Years-Old Man Known Case of Hypertension, Diabetes Mellitus, Obesity Having Pyogenic Meningitis Due to Streptococcus Agalactiae Complicated by Multiple Small Abscesses Over Meninges, Metabolic Acidosis, Acute Kidney Injury, Transaminitis, DIC And ARDS: A Rare Case Report

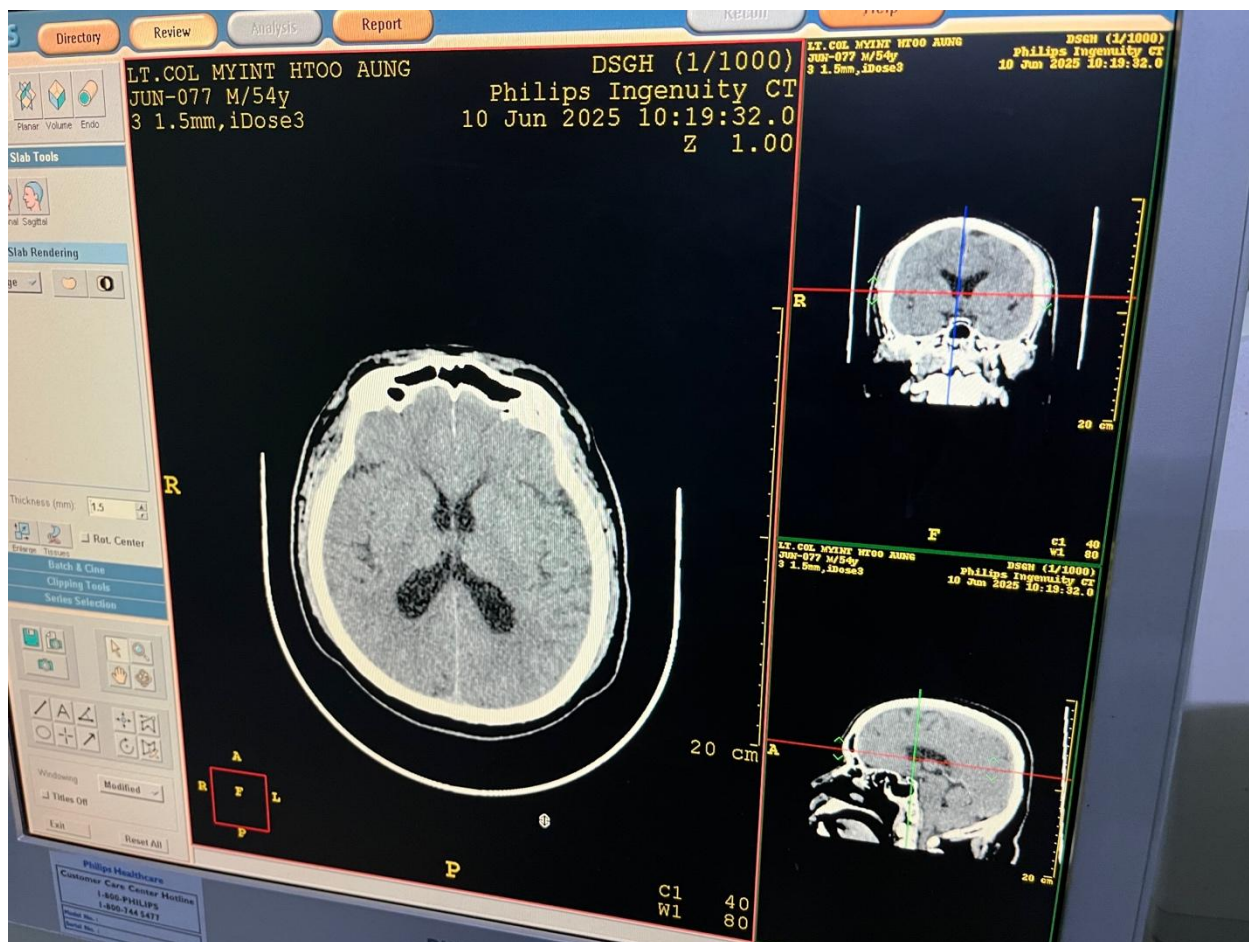


Photo (5) NECT Head cross sectional view (done on admission) was normal

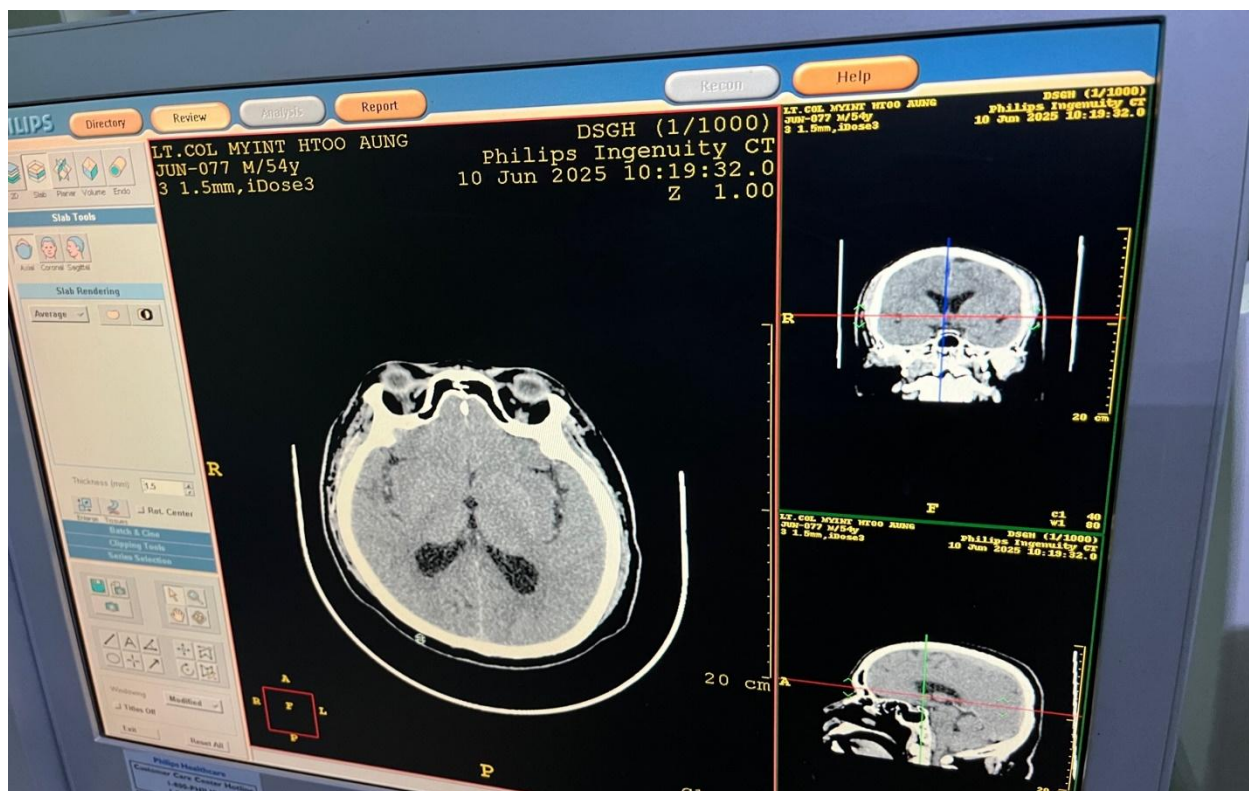


Photo (6) NECT Head cross sectional view (done on admission) was normal

A 54-Years-Old Man Known Case of Hypertension, Diabetes Mellitus, Obesity Having Pyogenic Meningitis Due to Streptococcus Agalactiae Complicated by Multiple Small Abscesses Over Meninges, Metabolic Acidosis, Acute Kidney Injury, Transaminitis, DIC And ARDS: A Rare Case Report



Photo (7) Autopsy of Head showing thick opaque meninges with congested vessels and a small pustule

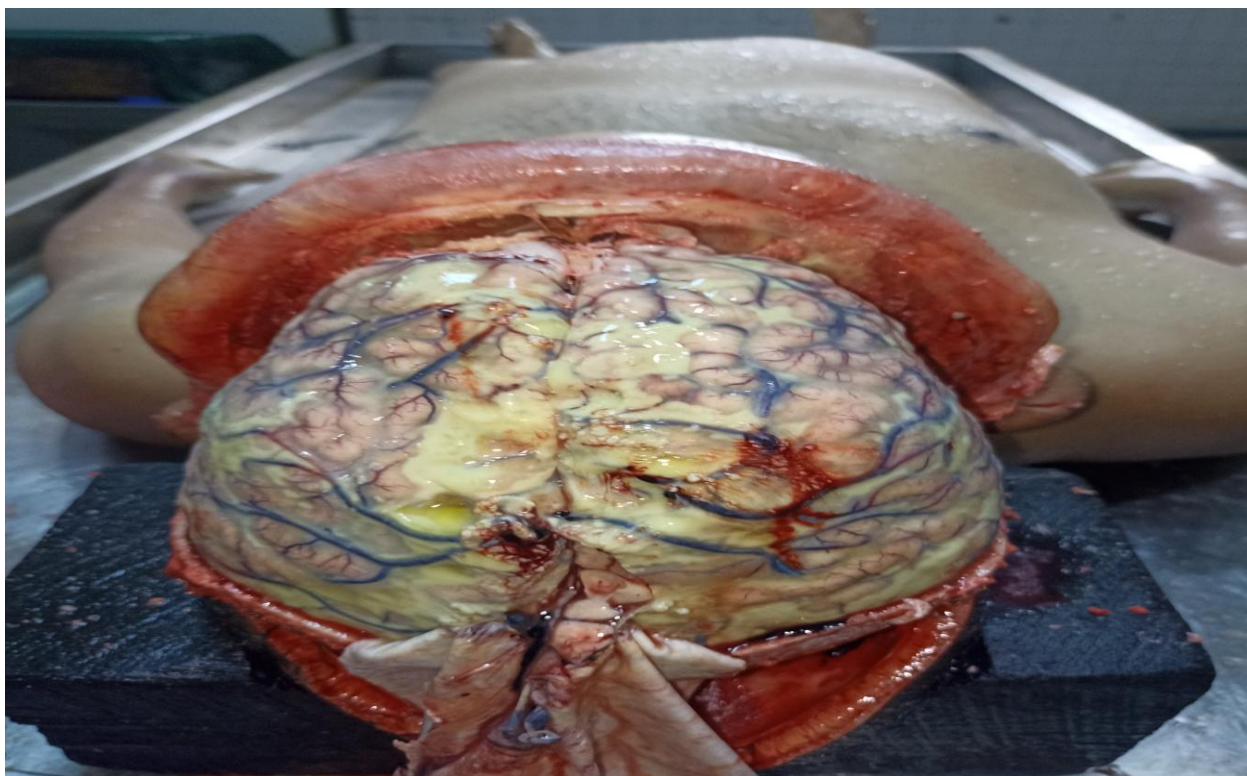


Photo (8) Autopsy of external surface of brain after stripping meninges showing yellowish purulent exudates with multiple small abscesses over cortex with congested vessels

A 54-Years-Old Man Known Case of Hypertension, Diabetes Mellitus, Obesity Having Pyogenic Meningitis Due to Streptococcus Agalactiae Complicated by Multiple Small Abscesses Over Meninges, Metabolic Acidosis, Acute Kidney Injury, Transaminitis, DIC And ARDS: A Rare Case Report

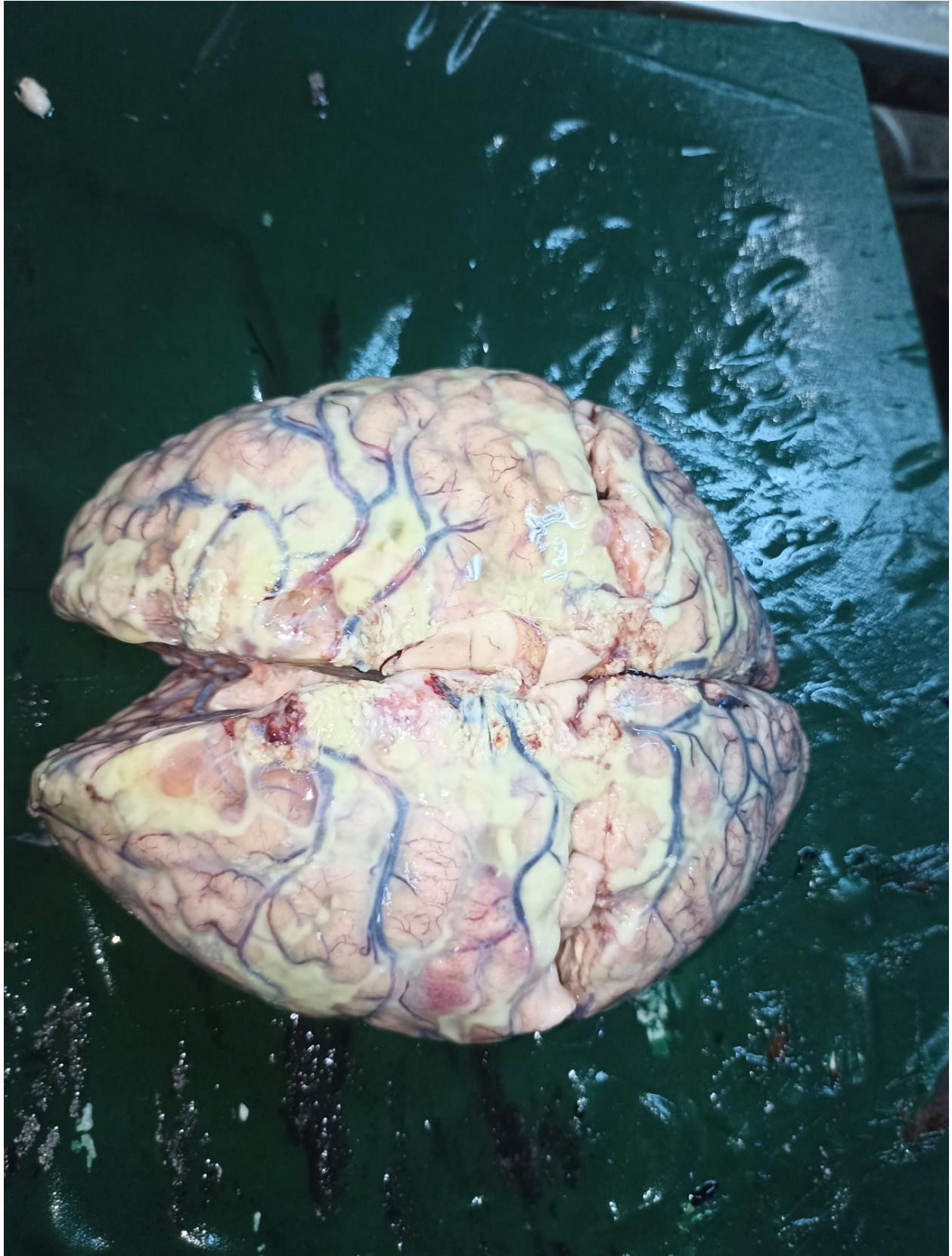


Photo (9) Autopsy of whole brain after removal from cranial cavity showing multiple small abscesses and yellowish exudates over whole surface of brain with congested vessels

A 54-Years-Old Man Known Case of Hypertension, Diabetes Mellitus, Obesity Having Pyogenic Meningitis Due to Streptococcus Agalactiae Complicated by Multiple Small Abscesses Over Meninges, Metabolic Acidosis, Acute Kidney Injury, Transaminitis, DIC And ARDS: A Rare Case Report



Photo (10) Autopsy of liver showing congestion and fatty changes



Photo (11) Autopsy of kidneys showing pale cortex with distinct cortico-medullary junction compatible with shock kidneys

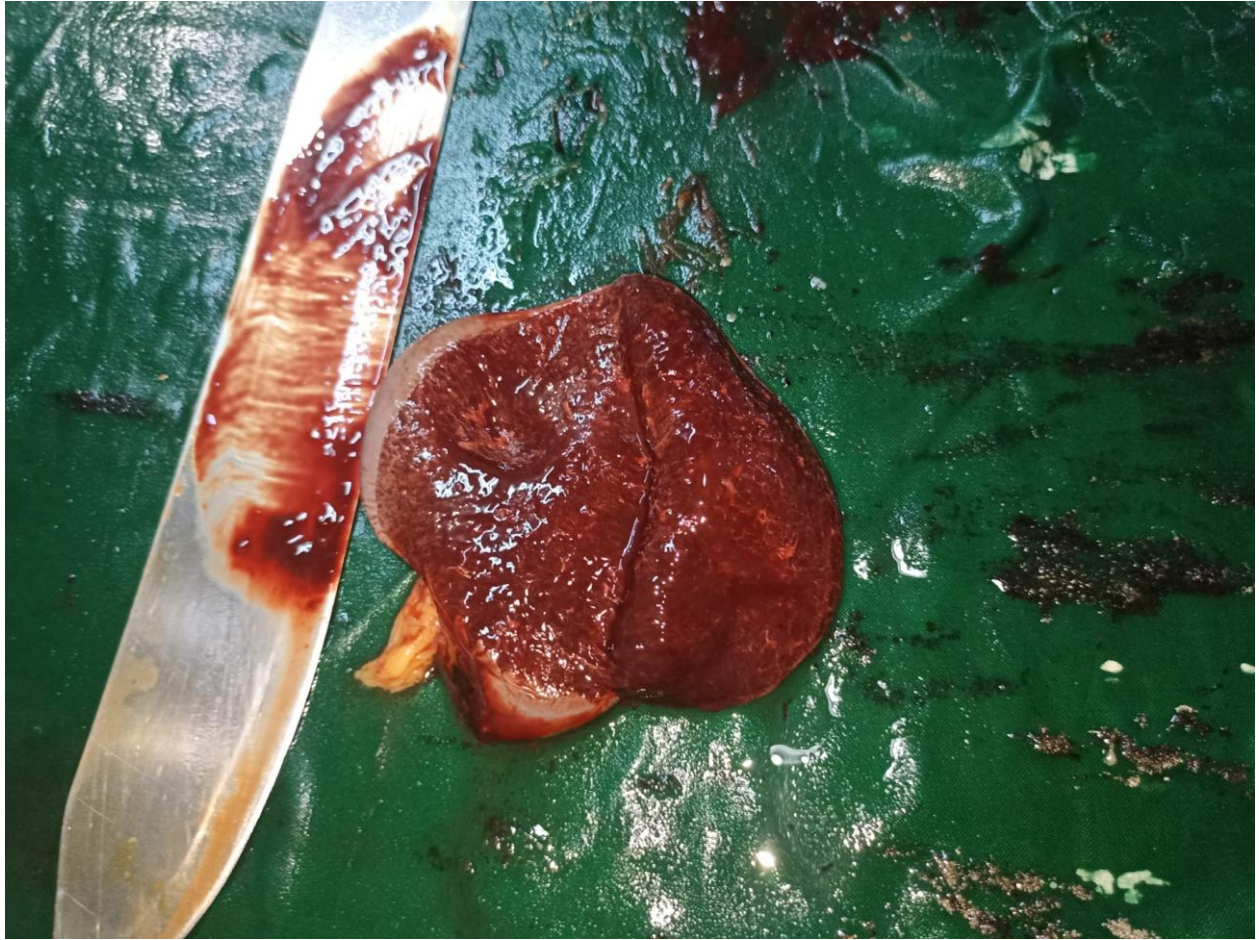


Photo (12) Autopsy of spleen which was soft and cut surface was compatible with septic spleen

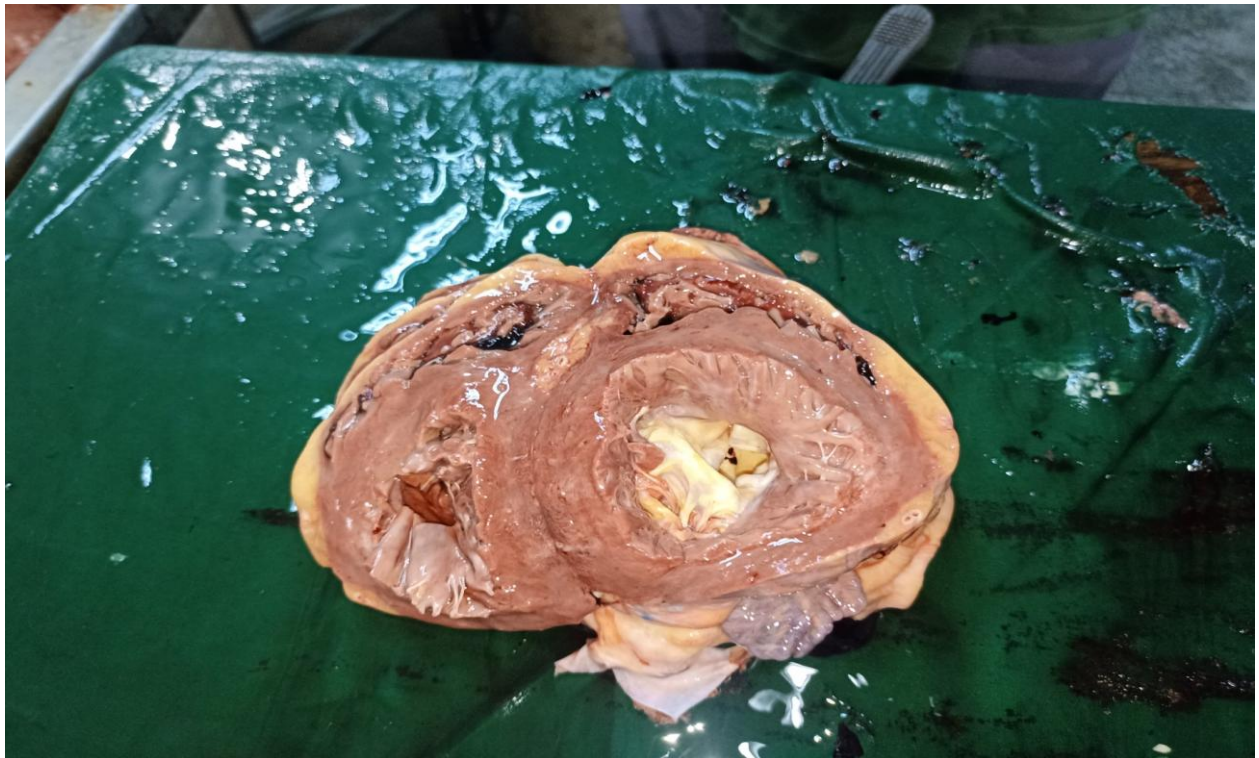


Photo (13.a) Autopsy of heart showing normal coronary ostium with atherosclerotic changes over endothelial surface of aorta

A 54-Years-Old Man Known Case of Hypertension, Diabetes Mellitus, Obesity Having Pyogenic Meningitis Due to Streptococcus Agalactiae Complicated by Multiple Small Abscesses Over Meninges, Metabolic Acidosis, Acute Kidney Injury, Transaminitis, DIC And ARDS: A Rare Case Report

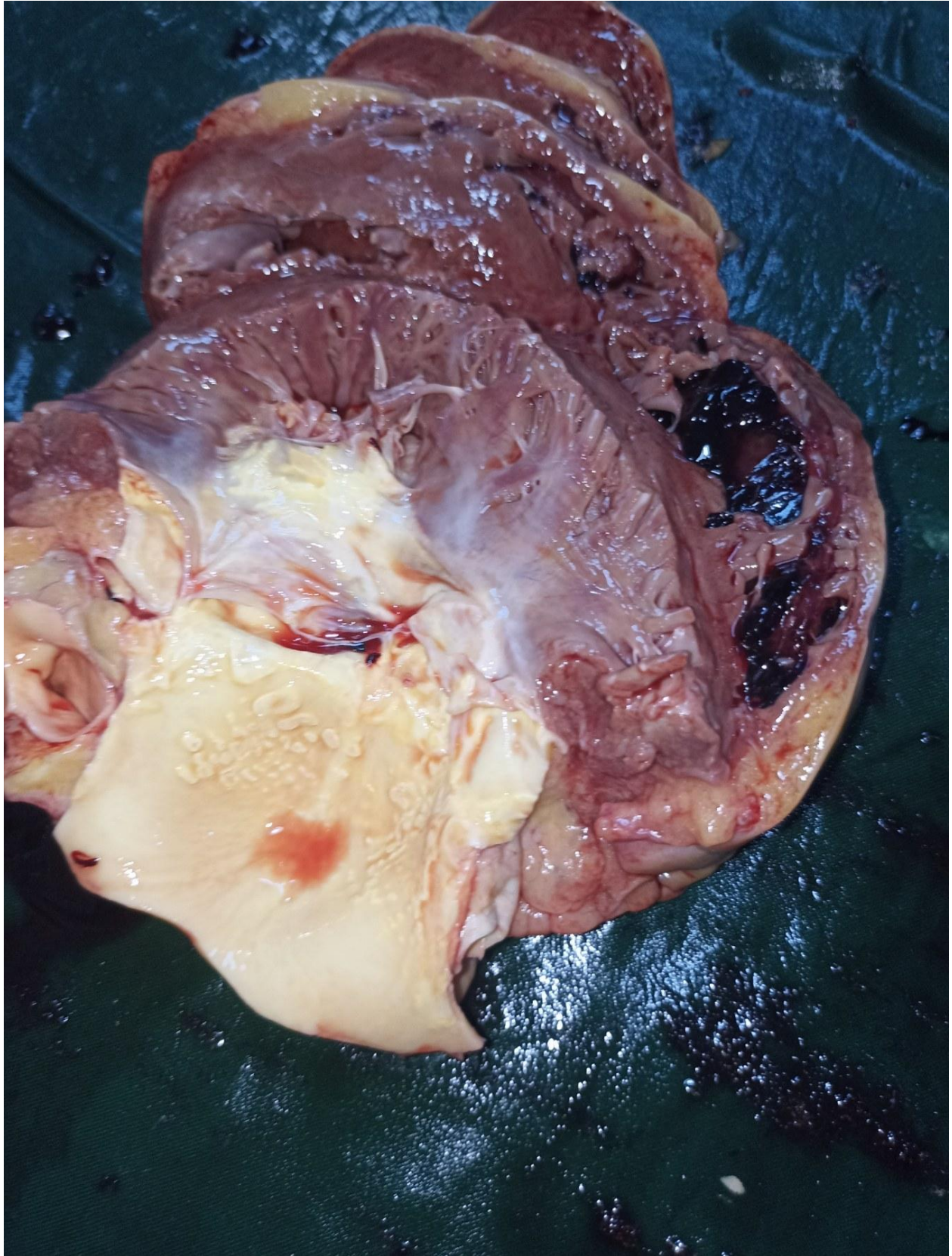


Photo (13.b) Autopsy of heart showing normal coronary ostium with atherosclerotic changes over endothelial surface of aorta (close up view)

A 54-Years-Old Man Known Case of Hypertension, Diabetes Mellitus, Obesity Having Pyogenic Meningitis Due to Streptococcus Agalactiae Complicated by Multiple Small Abscesses Over Meninges, Metabolic Acidosis, Acute Kidney Injury, Transaminitis, DIC And ARDS: A Rare Case Report

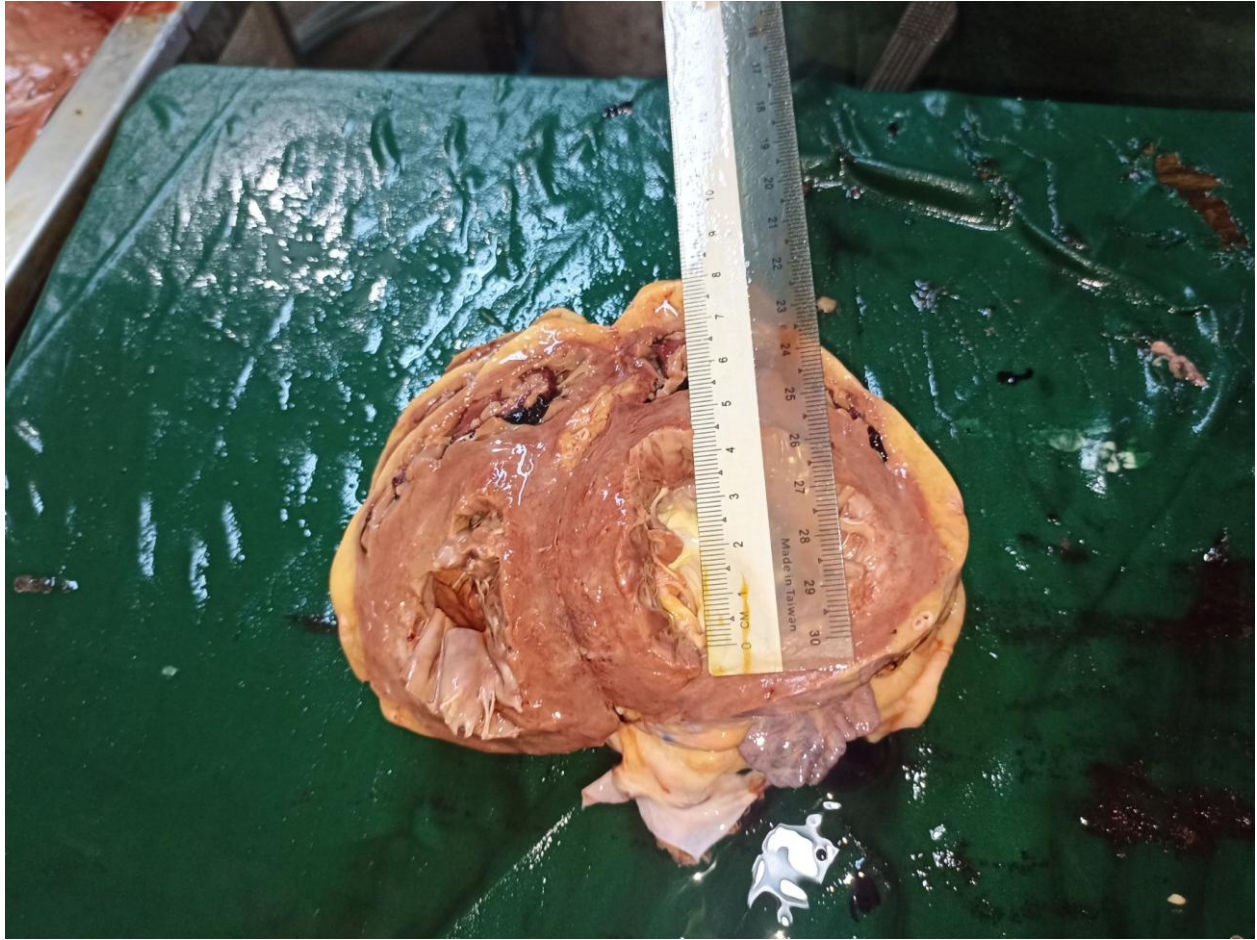


Photo (14) Autopsy of heart showing enlarged left ventricular cavity compatible with dilated cardiomyopathy



Photo (15) Autopsy of external surface of right lung showing nicotine staining

A 54-Years-Old Man Known Case of Hypertension, Diabetes Mellitus, Obesity Having Pyogenic Meningitis Due to Streptococcus Agalactiae Complicated by Multiple Small Abscesses Over Meninges, Metabolic Acidosis, Acute Kidney Injury, Transaminitis, DIC And ARDS: A Rare Case Report

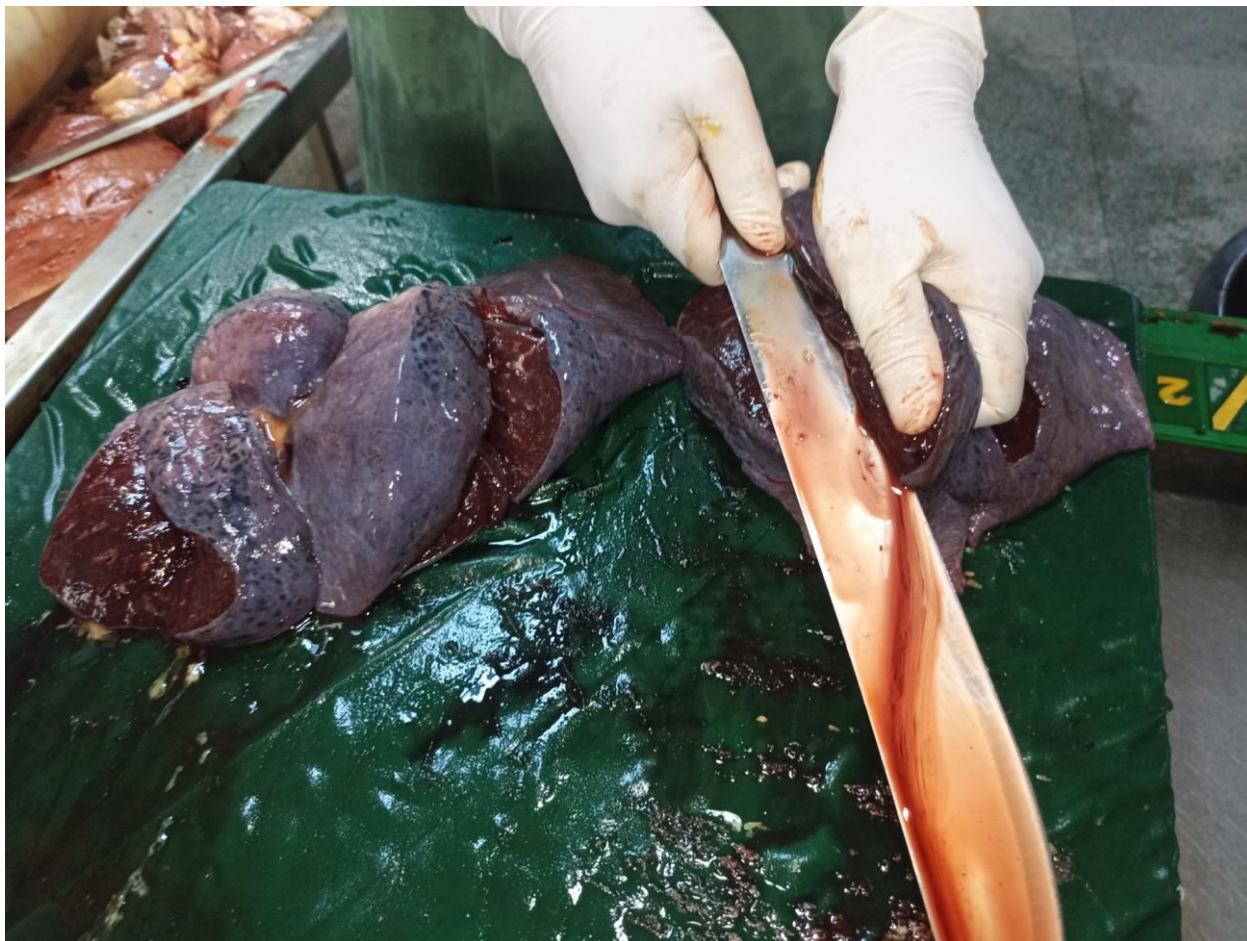


Photo (16) Autopsy of cut section of right lung showing congestion



Photo (17) Autopsy of pancreas which was normal