COLOR ATLAS OF

FORENSIC PATHOLOGY

RESPIRATORY SYSTEM

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Version 1

RESPIRATORY SYSTEM

ILLUSTRATIVE CASES

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FOREWORD

The greatest pleasure I experience as a teacher, is to see my students excel in their chosen careers and perform even better than myself. The series of e-booklets prepared to better equip medical officers to handle common conditions likely to be encountered in their day to day forensic practice by Professor Dinesh Fernando, is a good example of one of my students doing better than me!

Dinesh is the son of Emeritus Professor of Community Medicine, Former Head, Department of Community Medicine, Former Dean, Faculty of Medicine and Vice Chancellor of the University of Peradeniya, Malcolm Fernando, who was an illustrious medical academic. Following his father's footsteps, he joined the University of Peradeniya in 2003.

Dinesh was one of my post graduate trainees at the Department of Forensic Medicine and Toxicology, Faculty of Medicine, Colombo, and obtained the doctorate in Forensic Medicine in 2003. He underwent post-doctoral training at the Victorian Institute of Forensic Medicine, Melbourne, Australia, with my colleague and contemporary at Guy's Hospital Medical School, University of London, Professor Stephen Cordner. During this period, he served as the honorary forensic pathologist of the Disaster Victim Identification team in Phuket, Thailand following the tsunami, and was awarded an operations medal by the Australian Federal Police.

He has edited, and contributed chapters to, 'Lecture Notes in Forensic Medicine' authored by the former Chief Judicial Medical Officer, Colombo, Dr. L.B.L. de Alwis and contributed to 'Notes on Forensic Medicine and Medical Law' by Dr. Hemamal Jayawardena. He is the editor of the Sri Lanka Journal of Forensic Medicine, Science and Law. Continuing his writing capabilities, he has compiled an important and unique set of e-booklets which will be a great asset to undergraduate and post-graduate students of Forensic Medicine, and also to our colleagues. Its succinct descriptions of complicated medico-legal issues and clear and educational photographs are excellent. It makes it easy for the students to assimilate the theoretical knowledge of each topic as they have been augmented with histories, examination findings, macroscopic and microscopic photographs of actual cases. In some areas, photographs from multiple cases have been included, so that the students can better appreciate the subtle differences that would be encountered in their practice.

I sincerely thank my ever so grateful student Dinesh, for giving me this great honour and privilege to write the foreword.

Professor Ravindra Fernando

MBBS, MD, FCCP, FCGP, DMJ (London), FRCP (London)
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About the authors.....

Dr. Sulochana Wijetunge is a Senior Lecturer serving at the Department of Pathology, Faculty of Medicine, University of Peradeniya and Teaching Hospital, Peradeniya. She obtained her undergraduate education at the Faculty of Medicine, University of Colombo, and her postgraduate training from Postgraduate Institute of Medicine, University of Colombo, Sri Lanka. International exposure includes training at the University of Southern California, USA and Royal Marsden NHS Foundation Trust, UK. She has 17 years of experience in undergraduate teaching and 12 years of experience as a board certified histopathologist and a post graduate trainer. She has an interest in forensic histopathology and trains the forensic medicine postgraduate students in Pathology.

Dr. Dinesh Fernando is a merit Professor in Forensic Medicine at the Faculty of Medicine, University of Peradeniya and honorary Judicial Medical Officer, Teaching Hospital Peradeniya. He obtained his MBBS in 1994 with Second class honours from the North Colombo Medical College, Sri Lanka, and was board certified as a specialist in Forensic Medicine in 2004. He obtained the postgraduate Diploma in Medical Jurisprudence in Pathology from London in 2005, and possesses a certificate of eligibility for specialist registration by the General Medical Council, UK. He underwent post-doctoral training at the Victorian Institute of Forensic Medicine, Melbourne, Australia. He has also worked at the Wellington hospital, New Zealand, as a locum Forensic Pathologist and as an Honorary Clinical Senior Lecturer at the Wellington School of Medicine and Health Sciences, University of Otago, New Zealand. He was invited to visit and share experiences by the Netherlands Forensic Institute in 2019.

PREFACE

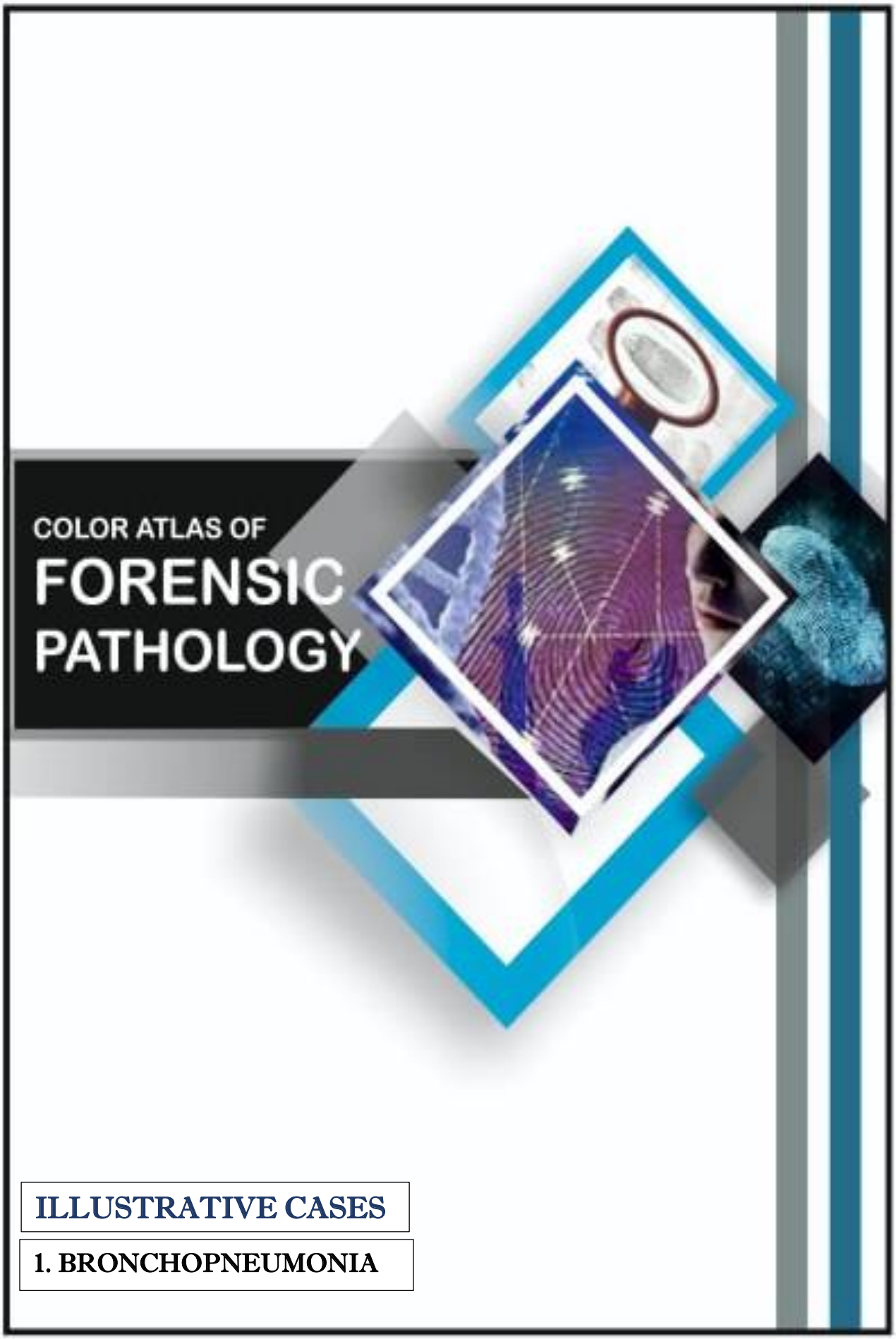
Forensic Medicine in Sri Lanka encompasses, both, examination of patients for medico-legal purposes and conducting autopsies in all unnatural deaths, in addition to those that the cause of death is not known. In the eyes of the justice system in Sri Lanka, all MBBS qualified medical officers are deemed to be competent to conduct, report and give evidence on medico-legal examinations of patients and autopsies conducted by them, as an expert witness. However, during their undergraduate training, they may not get the opportunity to assist, nor observe, a sufficient variety of representative of cases that may be encountered in the future.

Therefore, a series of e-booklets has been prepared to better equip medical officers to handle common conditions that are likely to be encountered in day to day forensic practice. The case histories and macro images are from cases conducted by Prof. Dinesh Fernando, while the microscopic images are from the collections of, either, Prof. Dinesh Fernando or Dr. Sulochana Wijetunge. The selection, photography, reporting of all microscopic images and the short introductions of the pathology of each condition was done by Dr. Sulochana Wijetunge. Most of the macro images used were taken by Louise Goossens – a medical photographer par excellence.

Dr. Madhawa Rajapakshe contributed immensely in preparing the photographs for publication. Ms. Chaya Wickramarathne did a yeomen service in design, lay out and formatting the booklet. If not for the many hours she spent in discussing with the two authors, and editing these cases over several months, these booklets would not have seen the light of day. This is being continued by Ms. Isuruni Thilakarathne.

The content herein may be used for academic purposes with due credit given. Any clarifications, suggestions, comments or corrections are welcome.

Prof. Dinesh Fernando
Dr. Sulochana Wijetunge



ILLUSTRATIVE CASES

1. BRONCHOPNEUMONIA

BRONCHOPNEUMONIA

Pneumonia is defined as inflammation of the substance of the lung. Commonest causative organism is bacteria. Pneumonia presents as an acute illness with symptoms such as productive cough with purulent sputum, shortness of breath and fever along with physical signs compatible with consolidation. There are two anatomic patterns called bronchopneumonia and lobar pneumonia. In bronchopneumonia multi lobar patchy consolidation frequently involving bilateral and basal lung parenchyma is seen. The initial infection starts within the bronchi and bronchioles (bronchocentric) and extends into the adjacent alveoli later. The adjacent areas of consolidation are usually hyperaemic and oedematous.

Lobar pneumonia shows uniform distribution of inflammation, usually in a single lobe, which is not bronchocentric. It evolves through four stages called congestion, red hepatisation, gray hepatisation, and resolution. The pleural reaction (fibrinous or fibrinopurulent pleuritis), which may leave fibrous thickening or permanent adhesions is more commonly seen in lobar pneumonia.

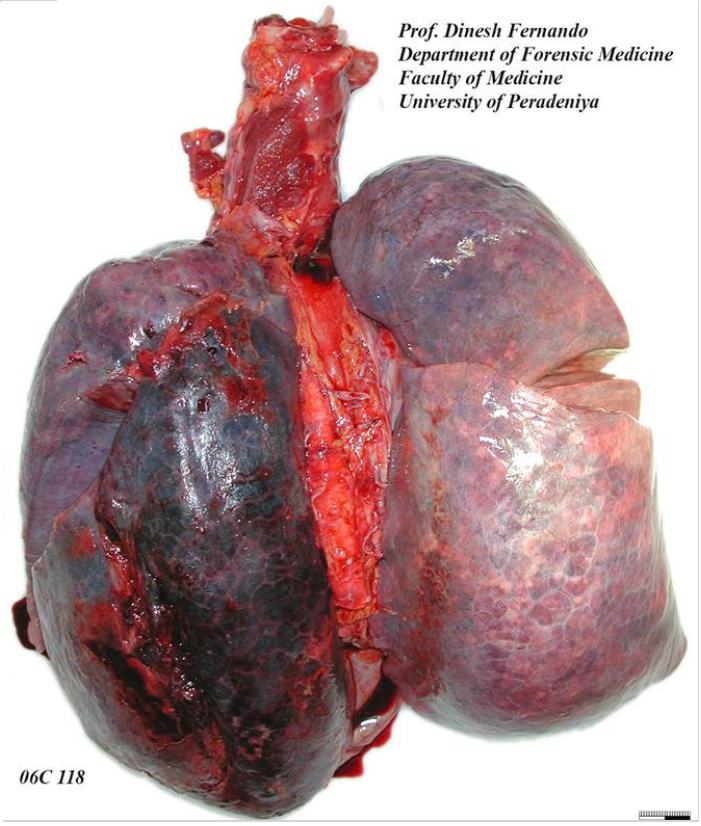
History

A 35-year-old male sustained a head injury with subdural haemorrhage following a fall from a height of 5 to 6 metres. He was in the ICU and had been ventilated. He was unconscious and died after 2 days without regaining consciousness.

Internal examination

Respiratory Tract: The left pleural cavity contained 100 ml and the right pleural cavity contained 50 ml of straw-coloured fluid. There were fresh adhesions between the right lung and the pleural cavity and fibrinous tags were present on the pleural surfaces, lower lobes of both lungs and between lobes. The larynx, trachea and mainstem bronchi had congested mucosal surfaces. The right and left lungs weighed 1,230 grams and 1,100 grams respectively. The pulmonary parenchyma manifested a variegated appearance and had pus like material exuding from the cut surfaces of the bronchi. Both lower lobes were firm to touch.

Macroscopic Examination



(a)

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Figure 1(a, b & c): Macroscopic appearance of the lungs

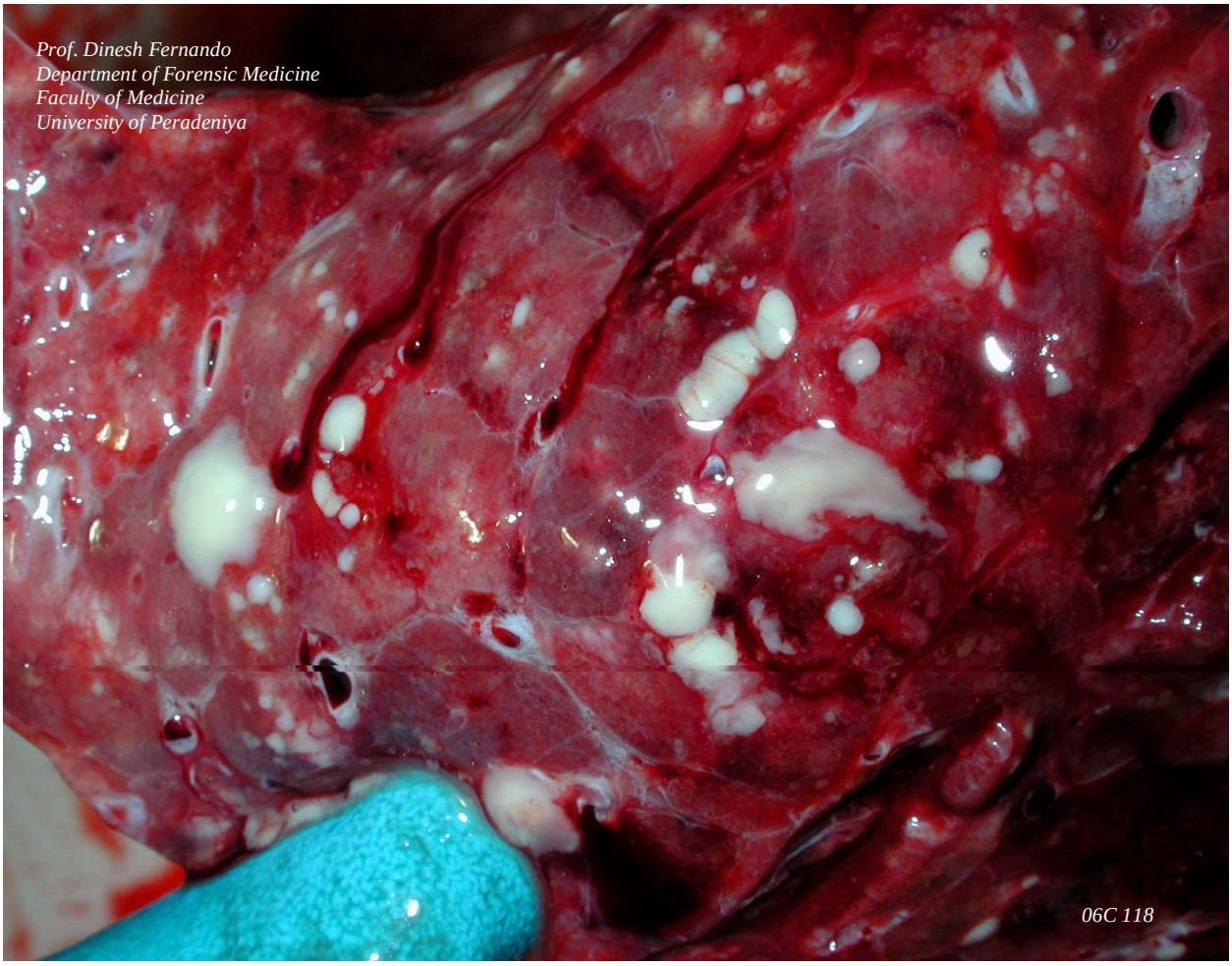

Figure 2: Congested parenchyma with pus-like material from bronchi

Microscopic examination

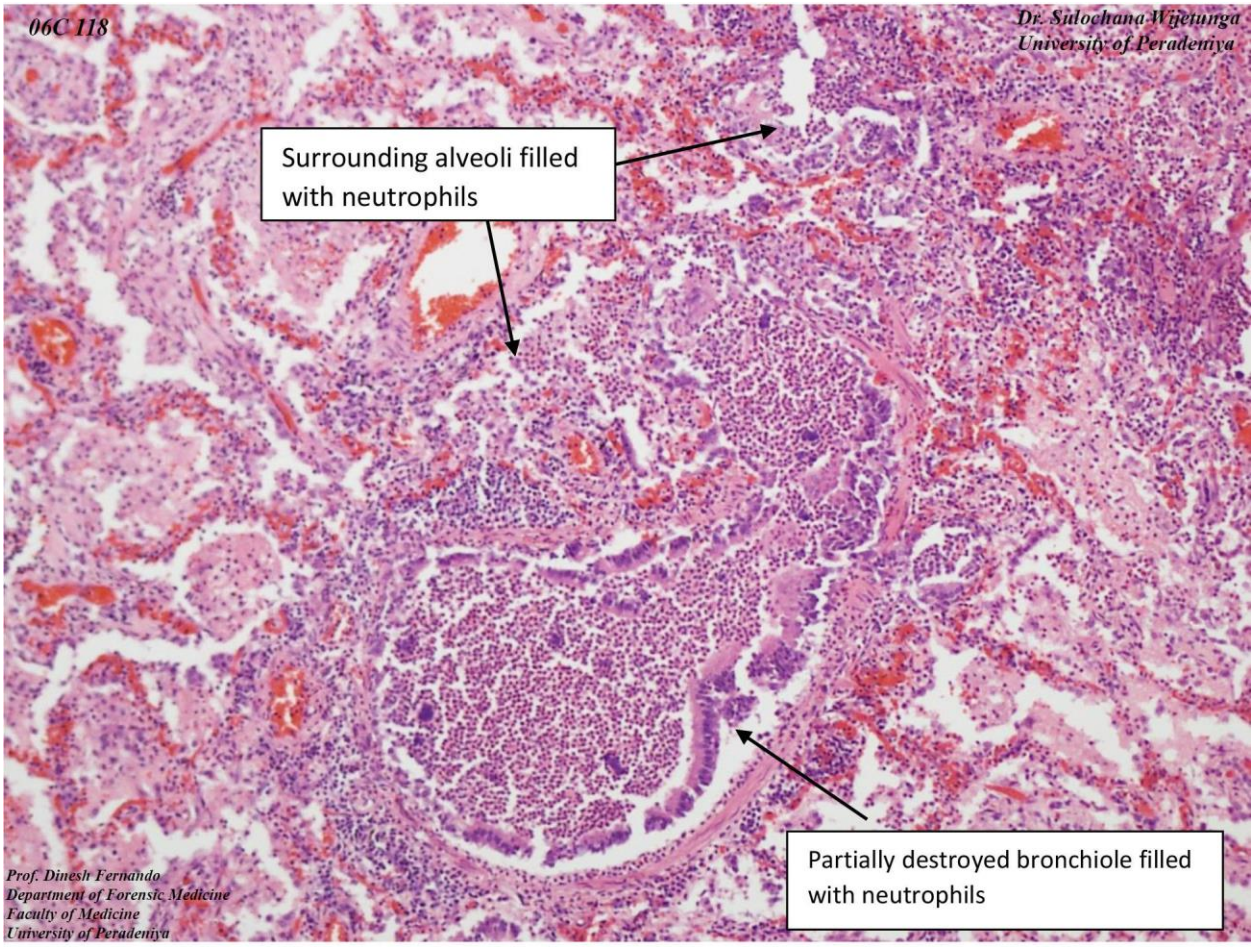

Figure 3: A bronchiole partially destroyed by a neutrophil infiltration and the surrounding alveoli filled with neutrophils

Bronchopneumonia is characterized by bronchocentric acute inflammation in the lung parenchyma. Bronchopneumonia has a patchy distribution. Whereas, lobar pneumonia shows uniform distribution of acute inflammation in the affected area and is not bronchocentric.

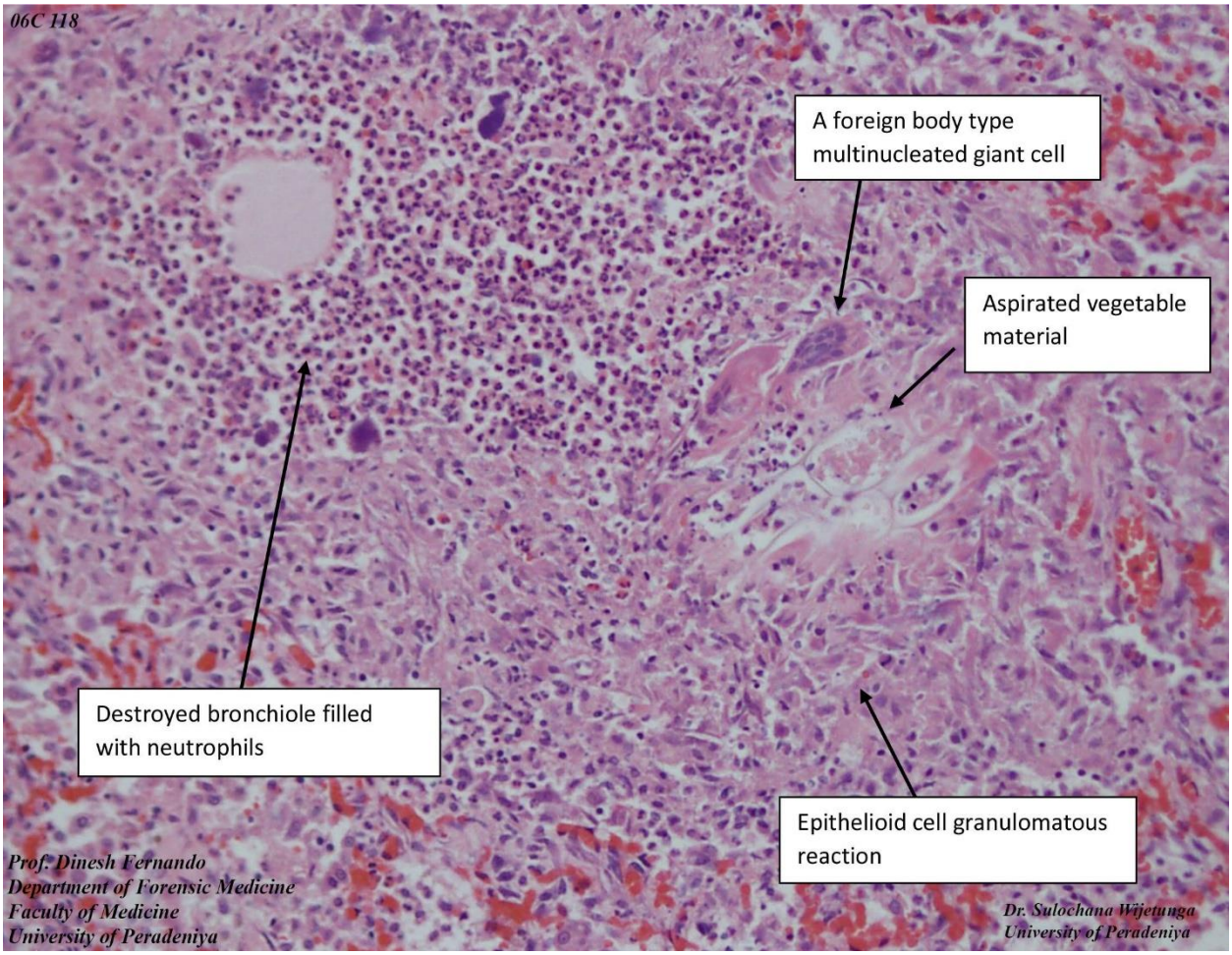

Figure 4: A completely destroyed bronchiole by the inflammation

- Bronchiolar lumen is filled with neutrophils. The wall is destroyed by a foreign body type granulomatous reaction to aspirated material.

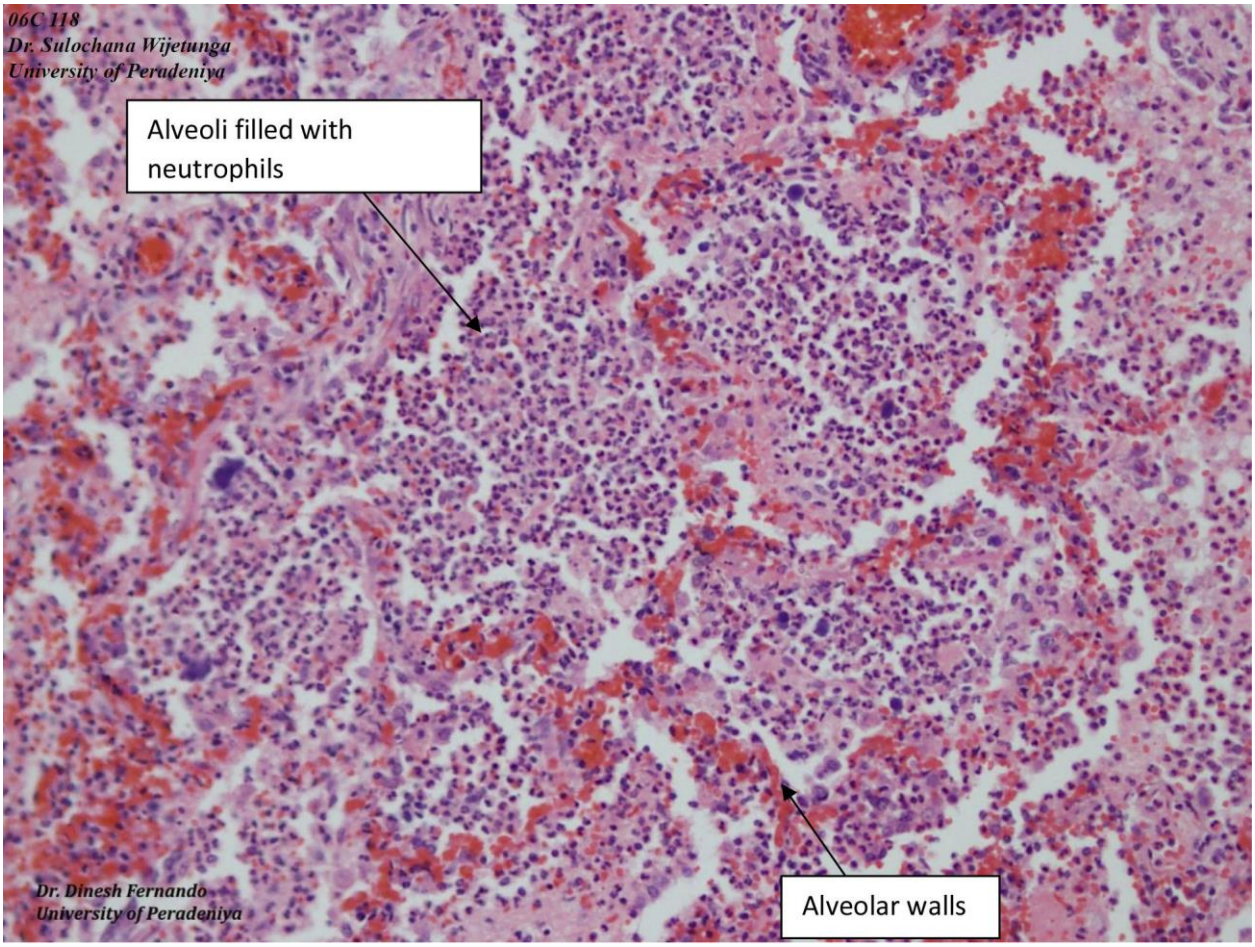

Figure 5: The alveoli surrounding the inflamed bronchiole (high power)

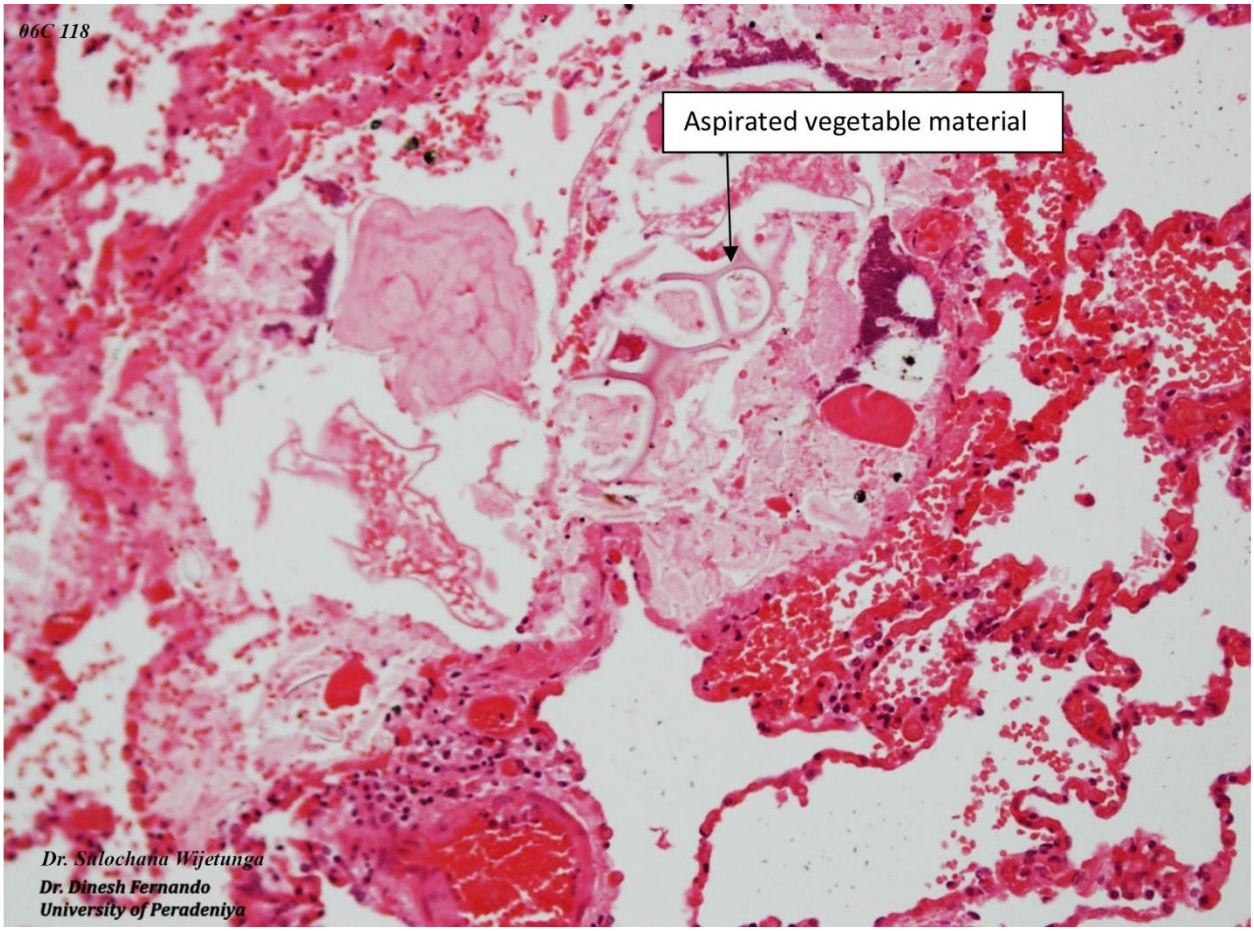

Figure 6*:* Aspirated vegetable material in the lung parenchyma. The bronchopneumonia in the diseased is an aspiration pneumonia.

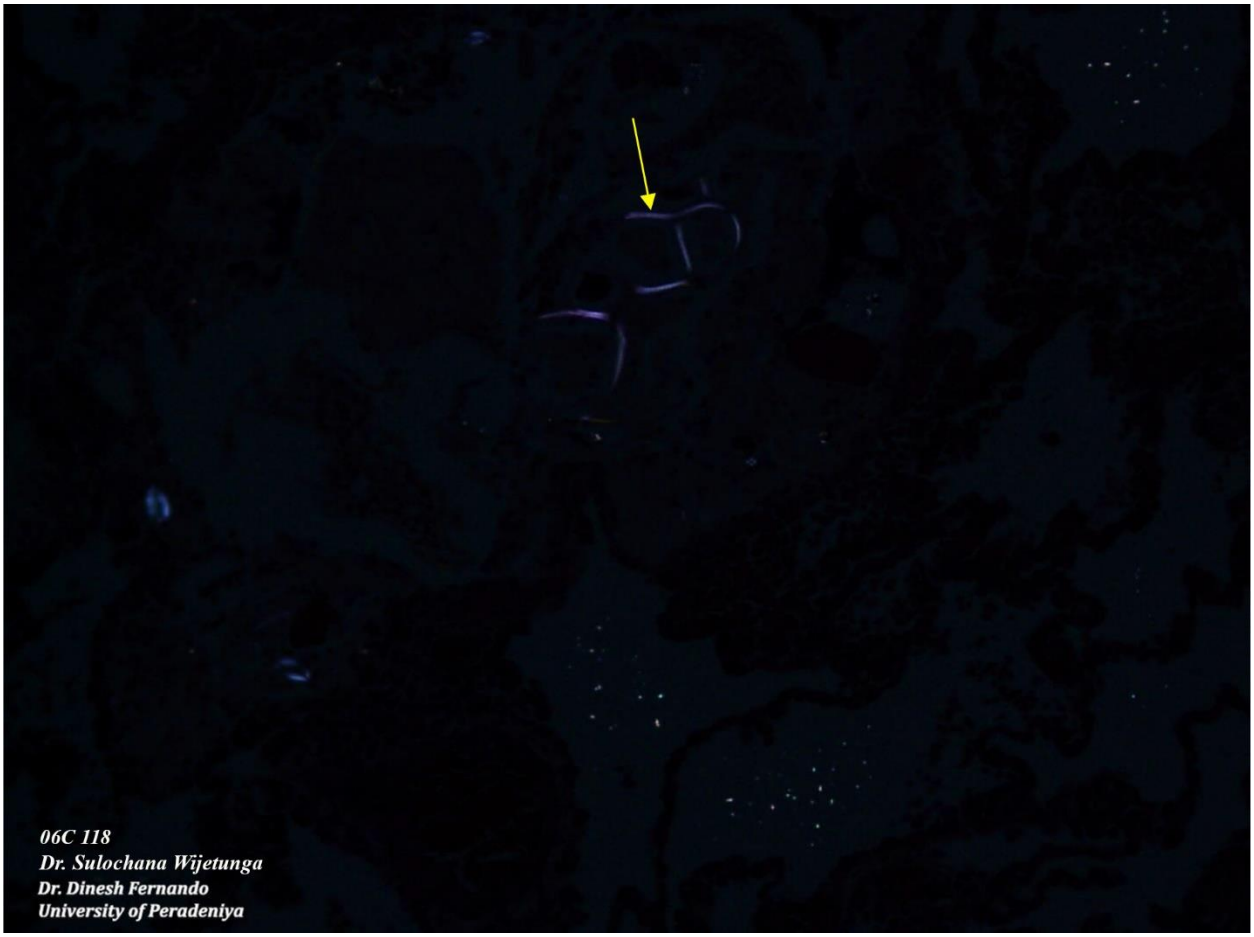

Figure 7: Aspirated vegetable material highlighted by polarized light

Cause of death

Bronchopneumonia due to prolonged unconsciousness due to head injury sustained from a fall from a height.

In order to demonstrate the aspects of Lobar pneumonia lung, microscopic images of a different case are illustrated as follows.

Lobar Pneumonia

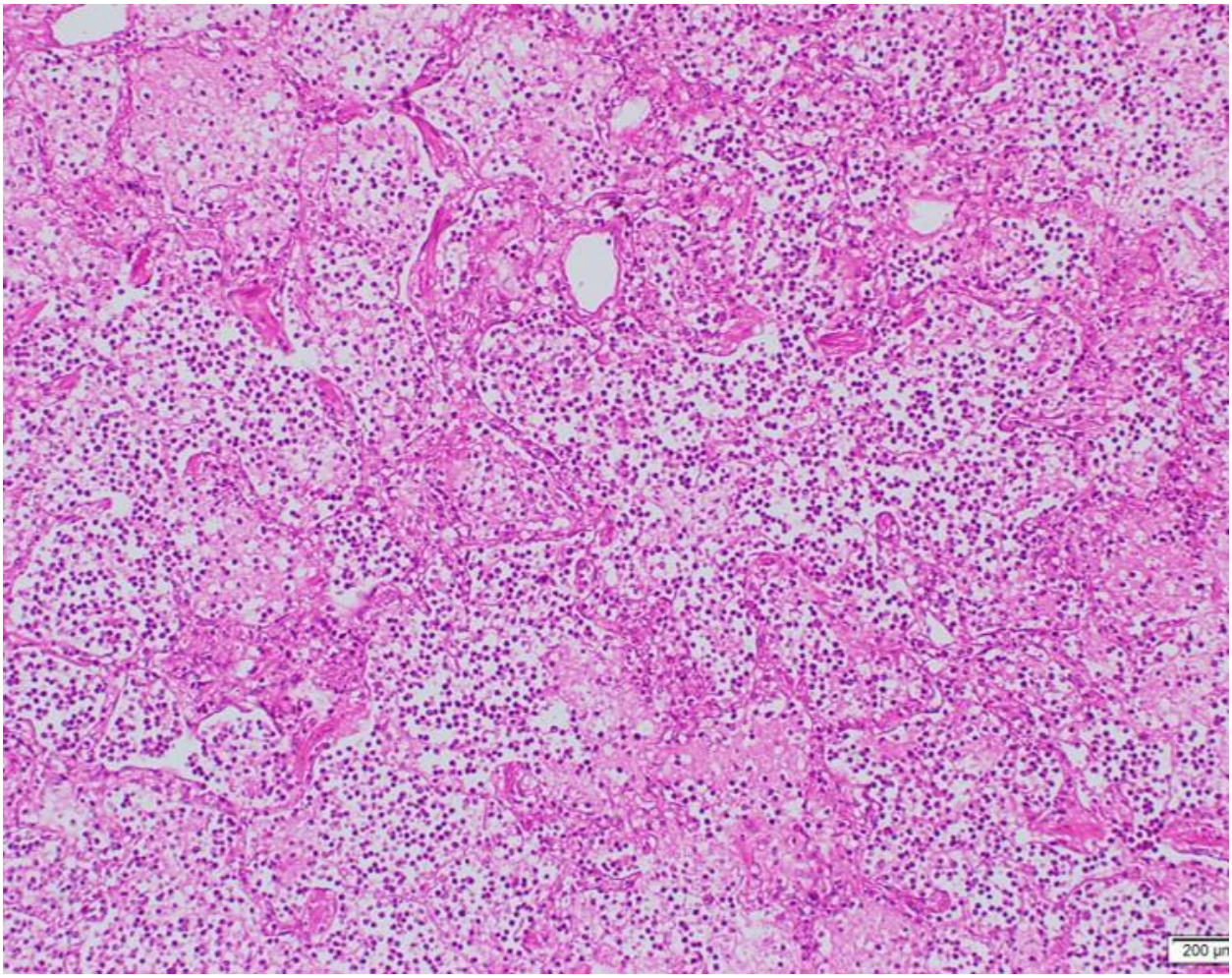

Figure 1: Diffuse lobar pneumonia

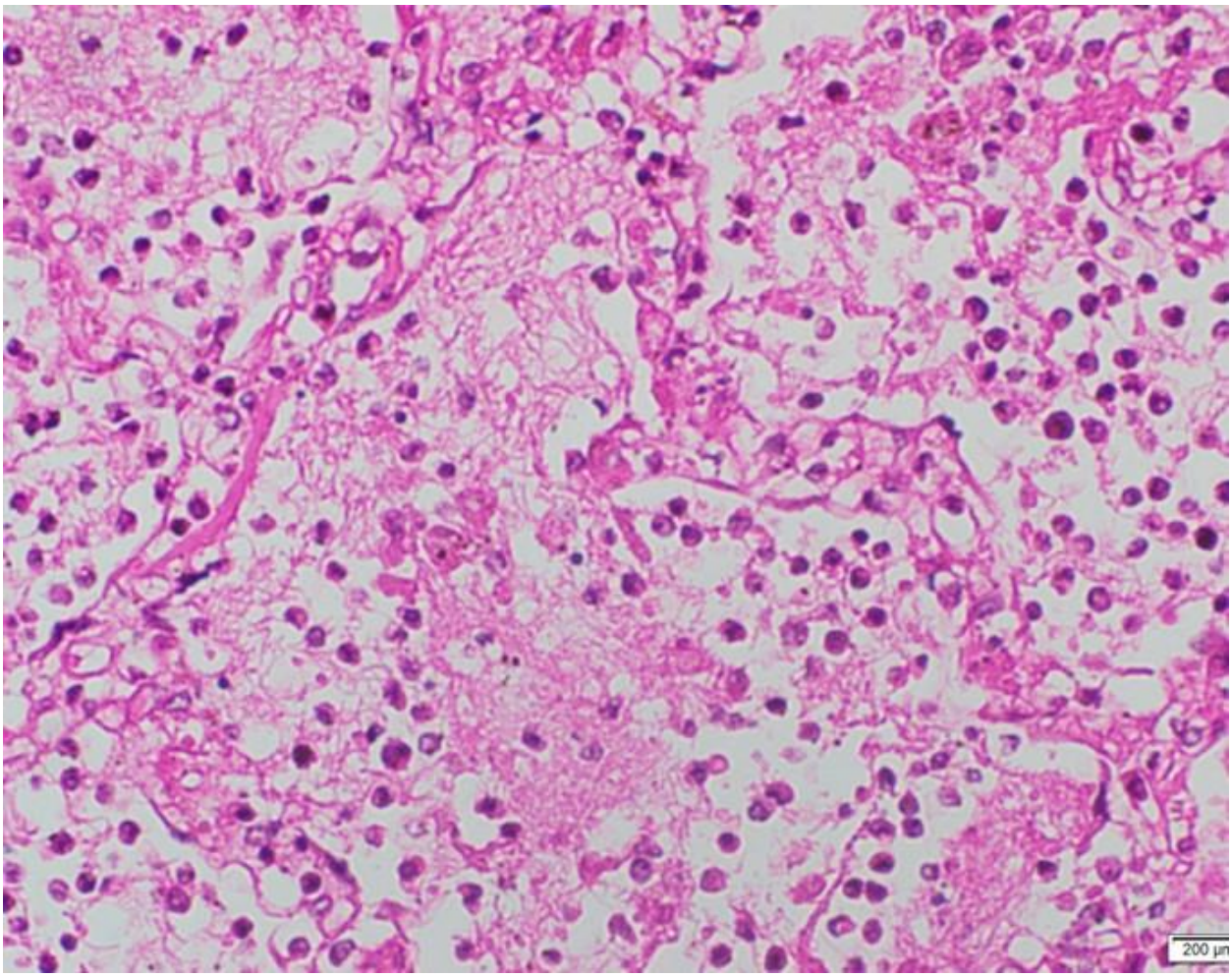

Figure 2: Diffuse lobar pneumonia (High power)

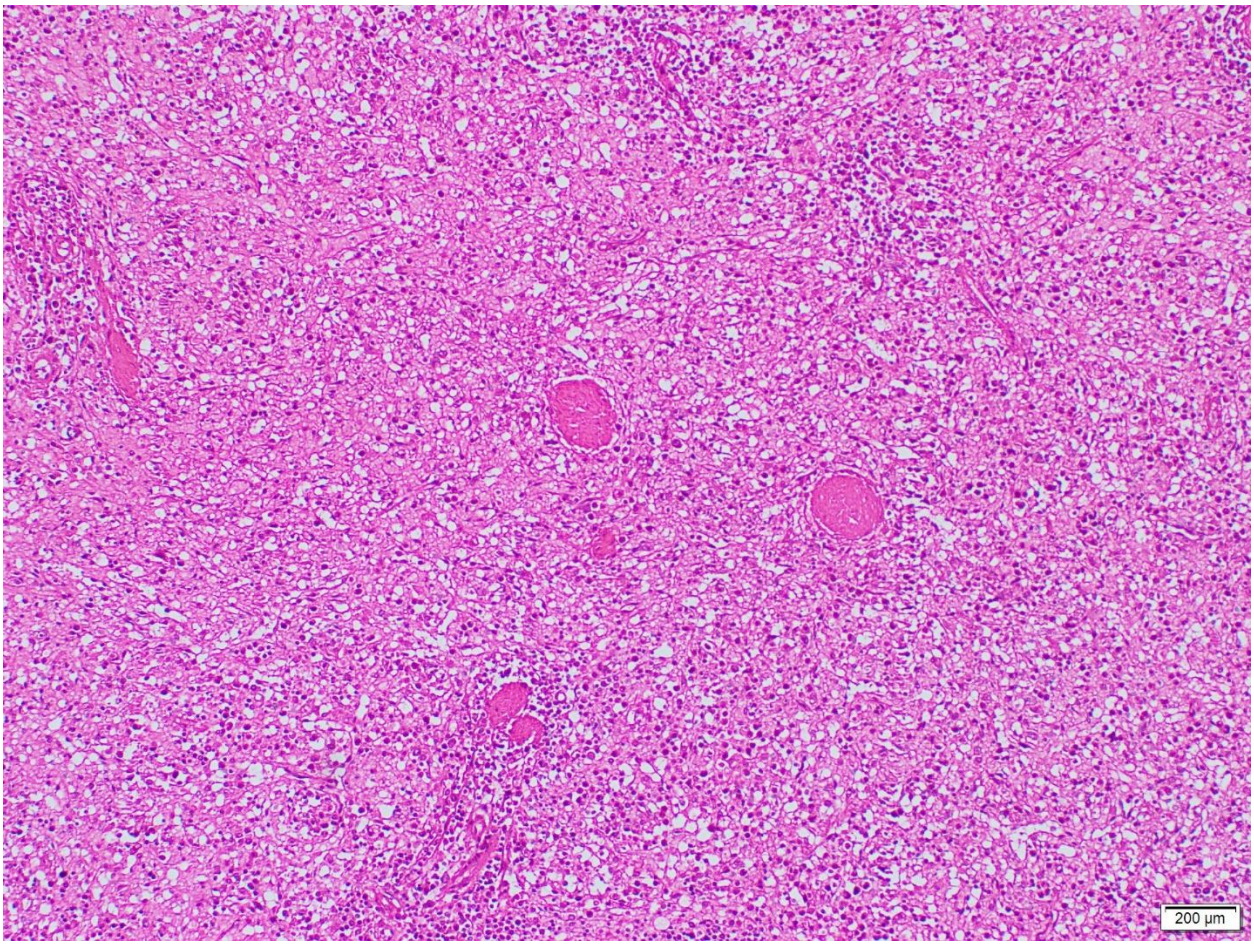

Figure 3: Thrombi lung

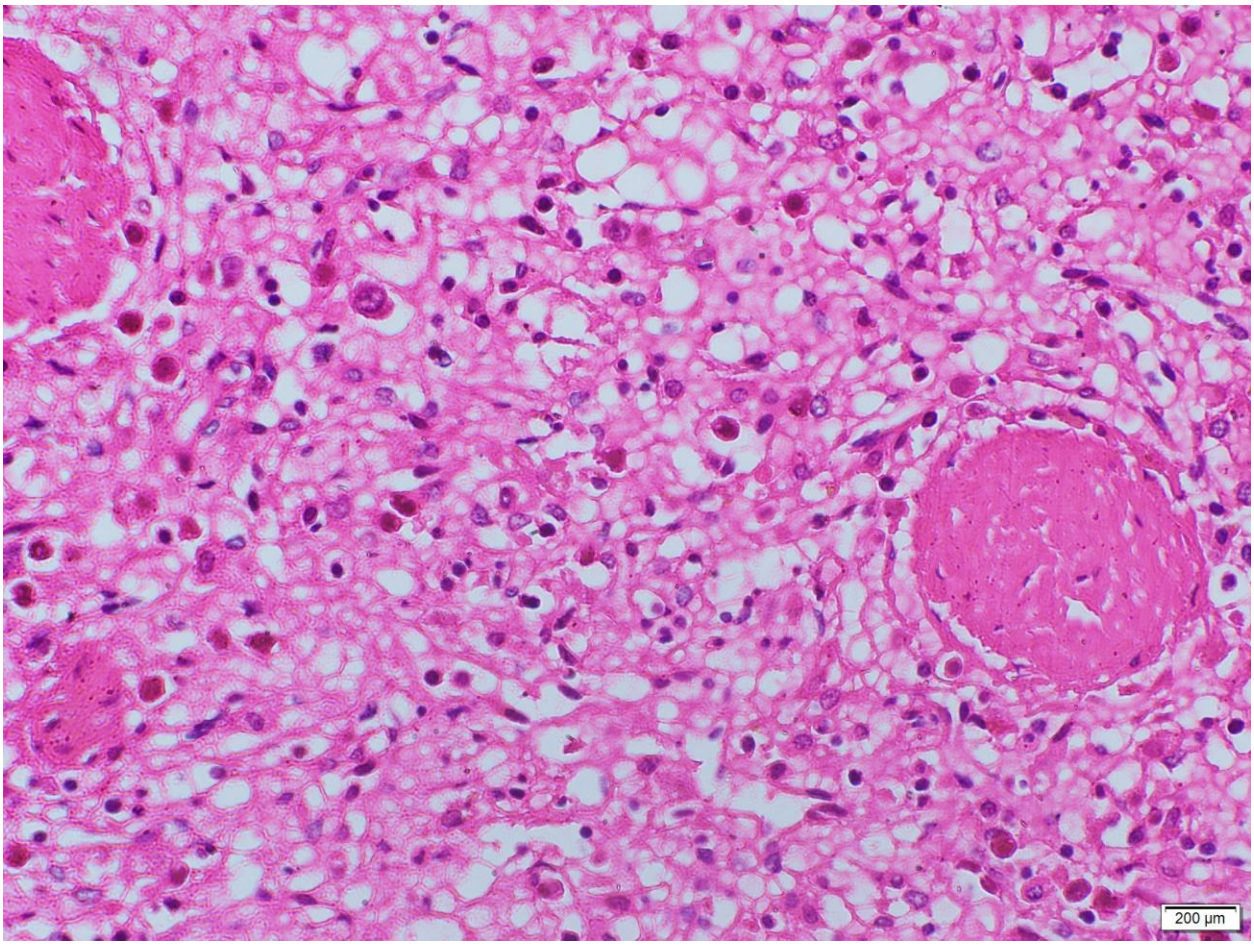

Figure 4: Thrombi lung (high power)

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2. Kumar P, Clark ML. *Kumar & Clark's Clinical Medicine*. 8th ed. Edinburgh: Elsevier Health Sciences; 2012.