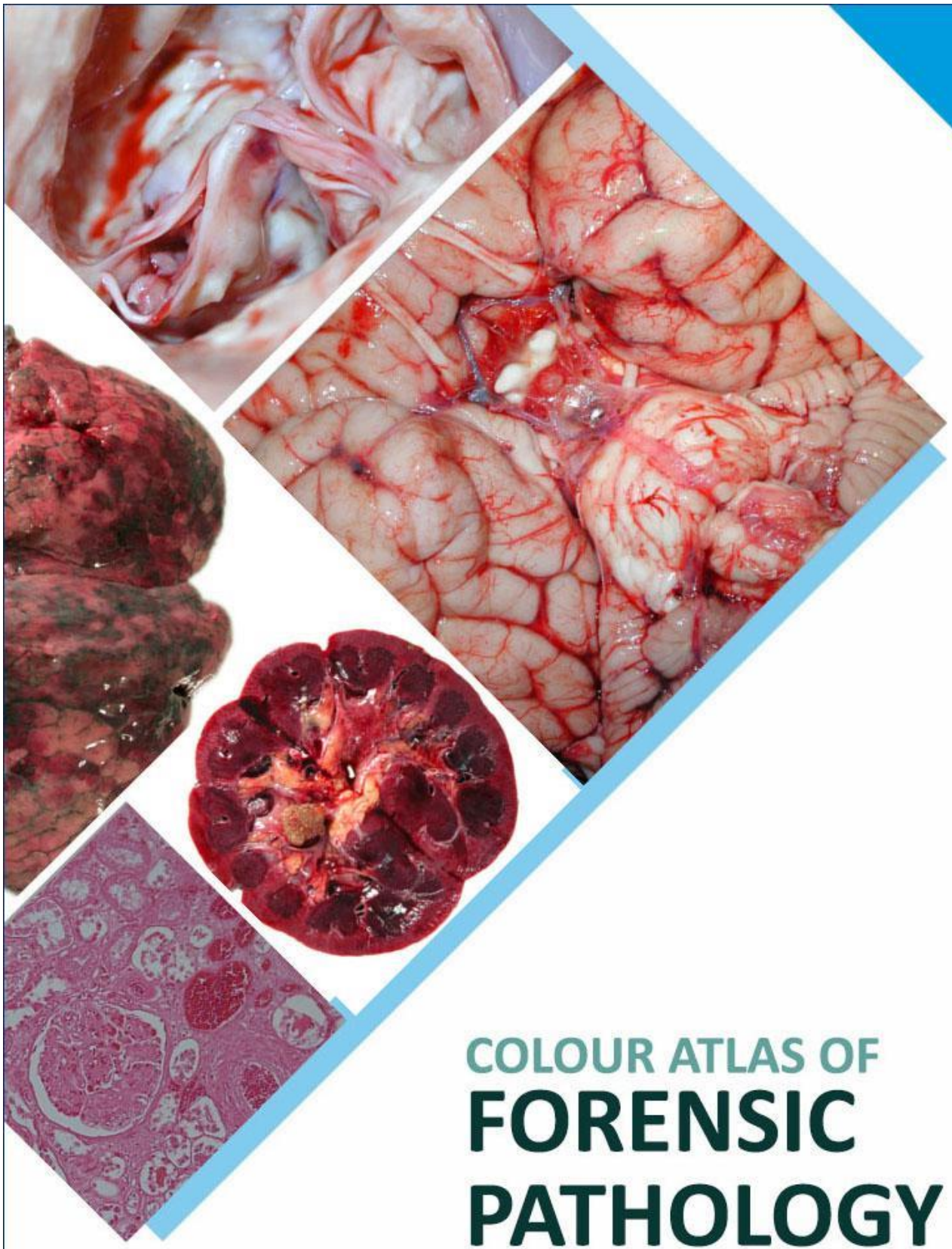

COLOUR ATLAS OF FORENSIC PATHOLOGY

RESPIRATORY DISEASES

COLOR ATLAS OF FORENSIC PATHOLOGY

Version 1

RESPIRATORY DISEASES

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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

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About the authors……..

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. He was conferred a Fellowship by the College of Forensic Pathologists of Sri Lanka in 2021.

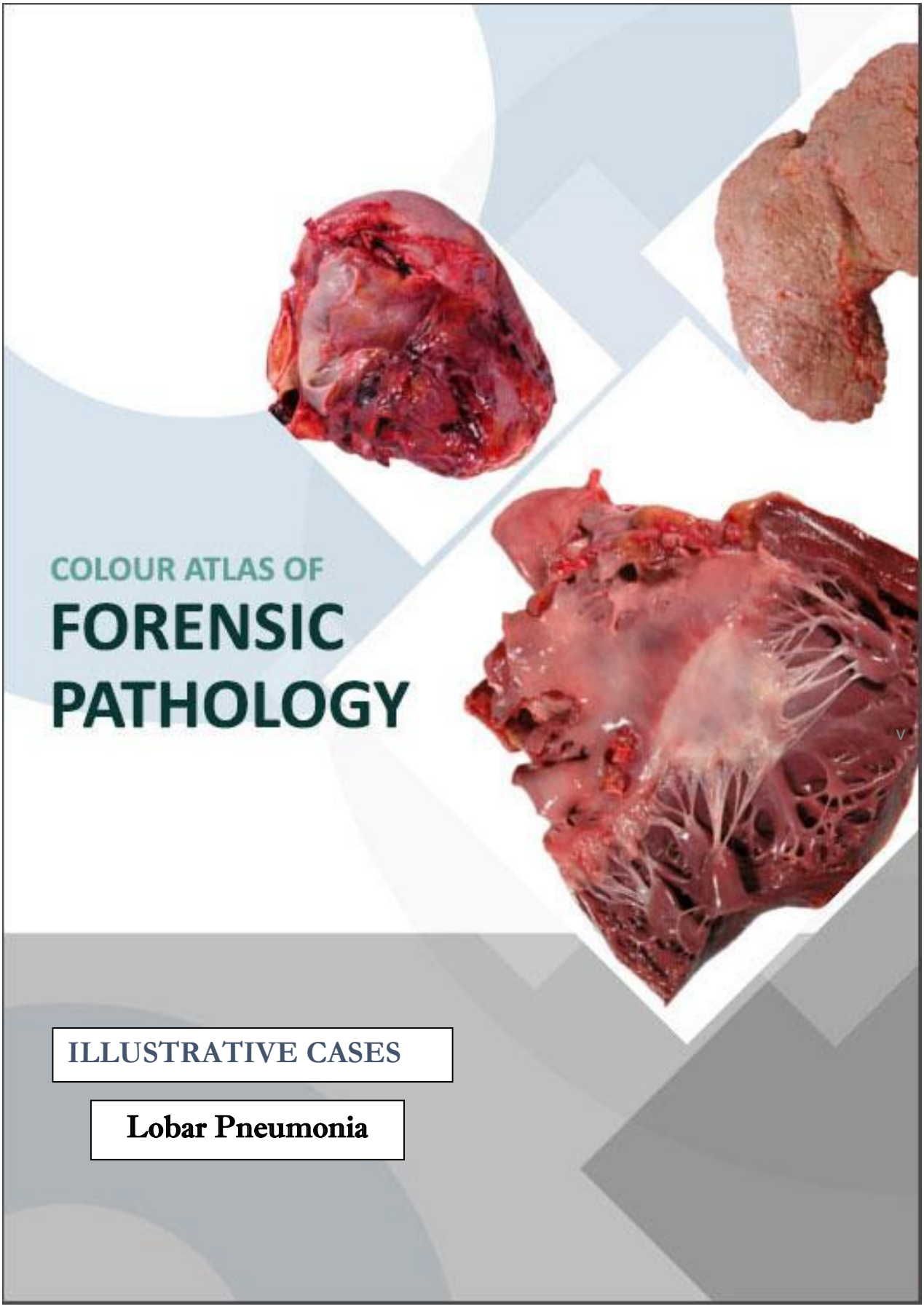
Dr Samadika Wimalarathne is a Temporary Lecturer at the Department of Forensic Medicine, Faculty of Medicine, University of Peradeniya. She obtained her MBBS in 2022 with Second class honours from the Faculty of Medicine, University of Peradeniya. She received 10 distinctions, including a distinction in Forensic Medicine.

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, macro and micro images are from cases conducted by Prof. Dinesh Fernando. The compilation of the case and photographs for publication was done by Dr. Samadika Wimalarathne. Ms. Chaya Wickramarathne did a yeomen service in design, lay out and formatting the booklet.

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


COLOUR ATLAS OF
FORENSIC
PATHOLOGY
ILLUSTRATIVE CASES
Lobar Pneumonia

Lobar Pneumonia

Pneumonia is a disease entity in which inflammation of the lung tissues occurs forming an exudate in intra alveolar spaces. Lobar pneumonia involves the anatomically defined segments of the lobes of the lungs, entire lobe or the entire lung. In contrast, in bronchopneumonia, there is a patchy involvement of lung tissues.

The pathogenic organism that causes lobar pneumonia in 90% of the cases is *Streptococcus pneumoniae. Klebsiella* species are responsible for causing lobar pneumonia in diabetics, alcoholics and other immunocompromised patients. Other organisms known to cause pneumonia in immunocompromised patients are *Legionella, Haemophilus influenzae* type b, *Cytomegalovirus, Neisseria meningitidis* is as well as *Campylobacter, Cryptosporidium* and Giardia. *Mycobacterium tuberculosis* should also be considered in tropical regions like Sri Lanka. Covid 19 should be considered when there is lobar pneumonia on chest X ray together with out of proportion hypoxia.

Lobar pneumonia is rare in extremes of age, in contrast to bronchopneumonia which is commoner among infants and older people. Lobar pneumonia affects males more than females.

Cardinal symptoms of lobar pneumonia are fever, productive cough and rusty or purulent sputum. Lobar pneumonia is a frequent cause of death worldwide. The commonest causes of death related to early lobar pneumonia are heart failure and sepsis. In later stages, meningitis can be a fatal complication.

There are four pathological stages of lobar pneumonia; congestion, red hepatisation, grey hepatisation and resolution. Congestion occurs in the first 24 hours of the illness. There are numerous bacteria, whereas inflammatory cells are low in number. Blood vessels of the lungs are dilated giving rise to a reddish, swollen appearance of the lungs.

During the red hepatisation phase, there are numerous white blood cells, red cells and cellular debris along with bacteria. Cellular debris sometimes can clog smaller airways. Lungs become dry, airless and more granular. Consistency of the lung becomes somewhat similar to that of liver hence giving the name of red hepatisation. This phase lasts from 48 hours to 72 hours of infection.

The phase of grey hepatisation lasts from day 4 to day 8. Lungs look yellowish grey in colour. Macrophages start to be formed. Lysis of fibrin, hemosiderin and red cells gives rise to a fluid like exudate.

In the resolution phase, fluid and the breakdown products are reabsorbed.

History

A 64-year-old female, with a past medical history of hypertension, treated hypothyroidism and had suffered an anterior MI 10 days previously was admitted to the intensive care unit with shortness of breath and chest pain. As a diagnosis of cardiogenic shock and hypotension due to mitral valve prolapse secondary to papillary muscle rupture was made, surgery for mitral valve repair and two vessel coronary artery by-pass graft was conducted. Post operatively she was hypotensive, while on inotropes. She developed kidney failure and an infection associated with the arterial catheter which required a further operation.

On the following day she developed atrial fibrillation and hyperglycaemia. On the seventh day following the operation, she developed anuric renal failure. Her Glasgow Coma Scale score was deteriorating and there was evidence of sepsis without a clear focus. She passed away on the thirteenth day following the surgery.

Internal Examination

The pleural cavities contained approximately 200 ml of clotted and liquid blood on each side. The larynx, trachea and main stem bronchi had congested mucosal surfaces. The right and left lungs weighed 566 grams and 442 grams respectively. The pleural surfaces had patchy mottling with subpleural haemorrhages. Some areas of the lungs were hyperexpanded while others were solid. The pulmonary parenchyma manifested intense congestion in some areas, with a mottled appearance in other areas.

The right coronary artery, left anterior descending artery and left circumflex artery showed evidence of occlusion and presence of atheromatous plaques. Bypass vessels and prosthetic mitral valve were intact.

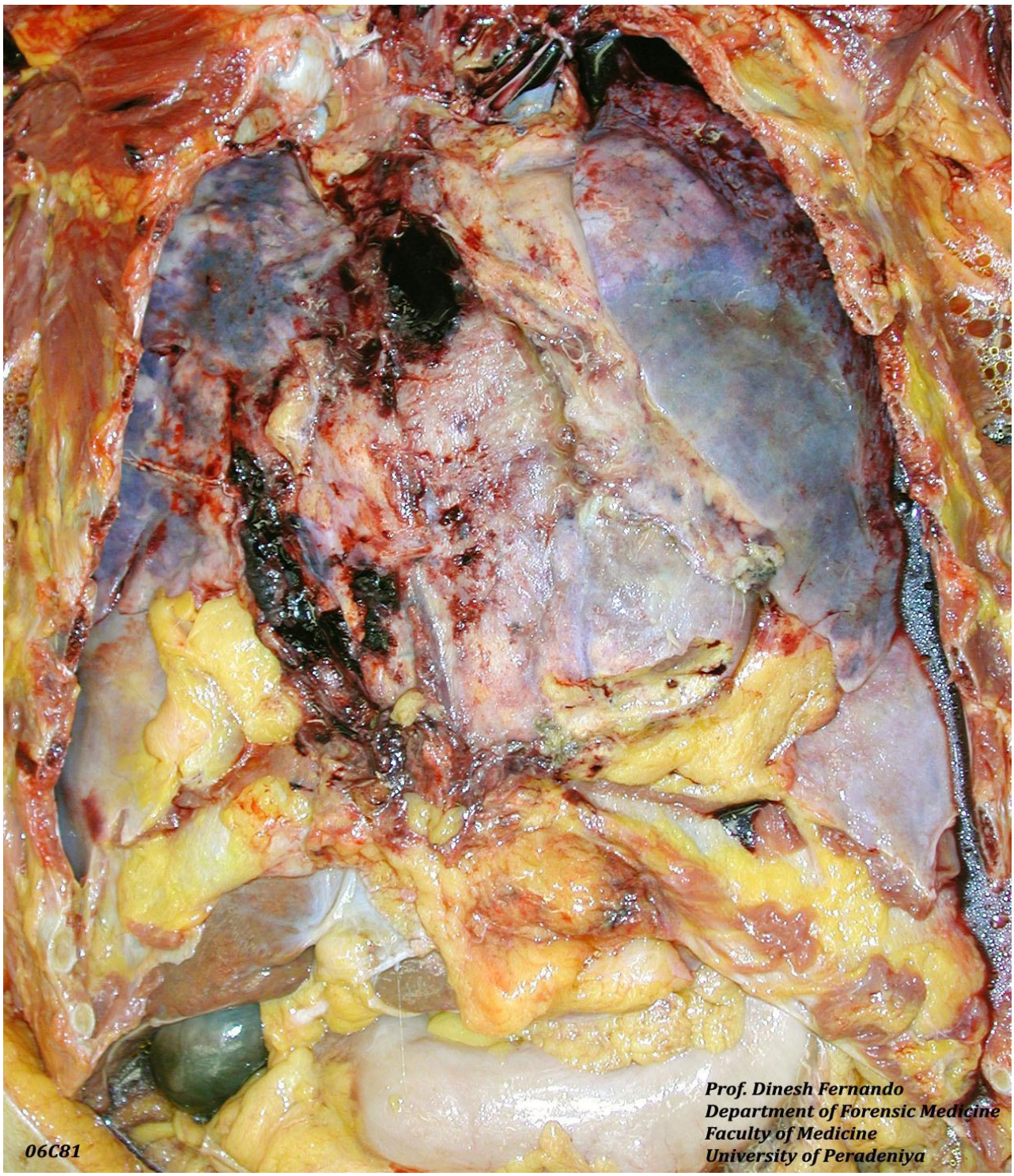


Figure 1: Congested and expanded lungs with mottled appearance. Note coronary by-pass grafts

Microscopic examination

Sections of the lungs showed pneumonia and acute diffuse alveolar damage.

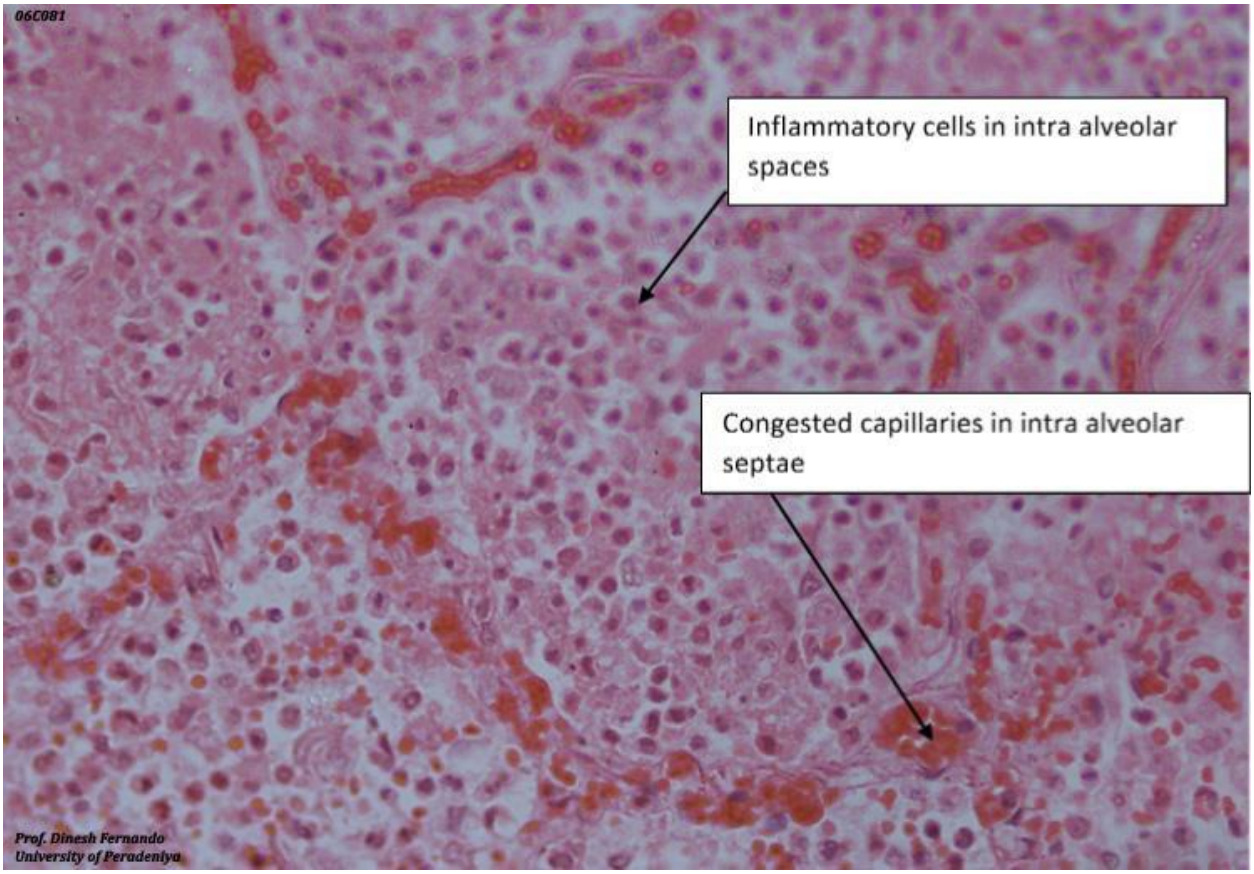


Figure 2: Acute phase of lobar pneumonia showing numerous inflammatory cells and congested blood vessels.

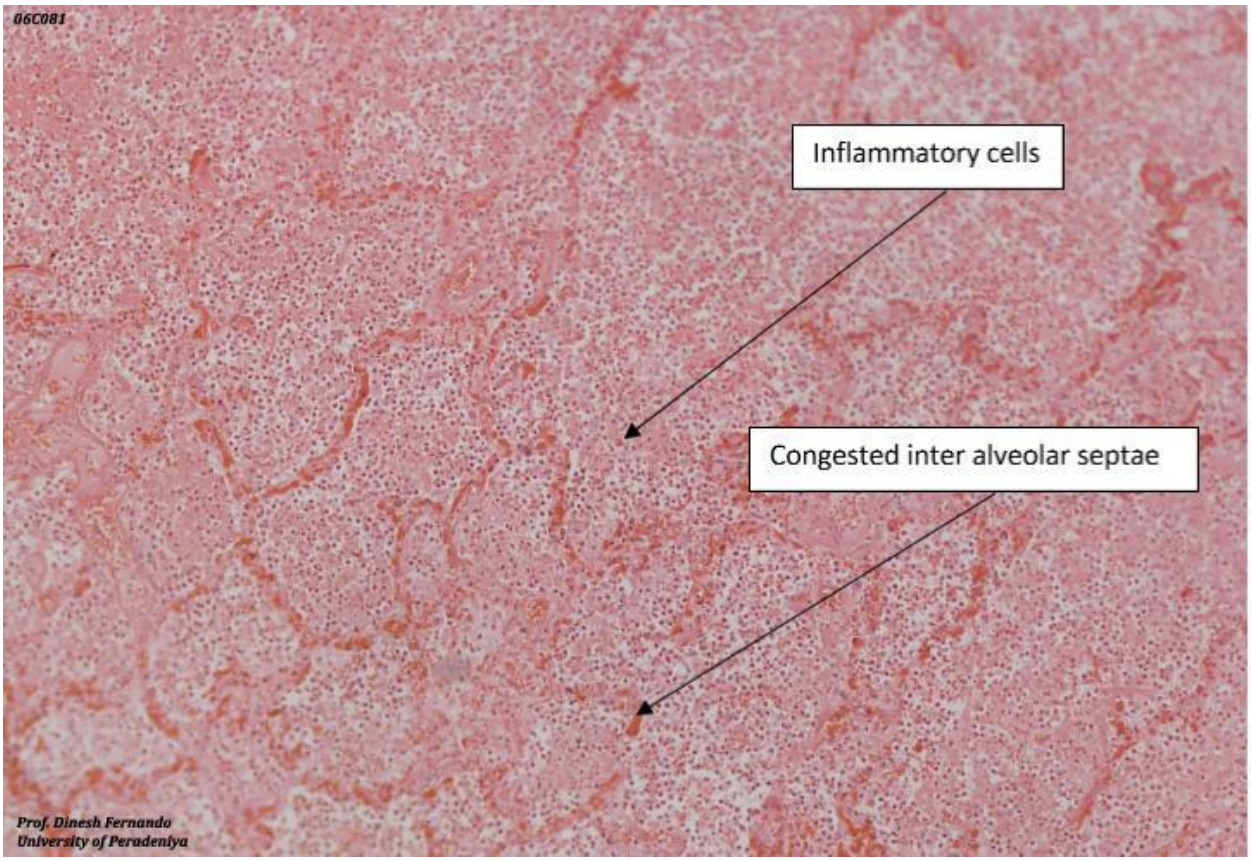


Figure 3: Acute phase of pneumonia showing numerous inflammatory cells and congested appearance of inter alveolar septae.

Cause of death

Death was due to multi organ failure due to acute myocardial infarction complicated by papillary muscle rupture 10 days earlier. The myocardial infarction was due to coronary artery atherosclerosis to which hypertension has acted as a contributory factor.

History

A 59-year-old male patient with a history of organic brain damage from viral encephalitis was admitted to hospital with bowel obstruction. While in hospital, he developed pneumonia and was treated. His bowel obstruction spontaneously resolved. On the day he was supposed to be discharged, while in the shower, he fell forward onto his face and died.

Internal Examination

The right and left lungs weighed 680 grams and 530 grams respectively. Sectioning of the lungs revealed thrombi in the pulmonary arteries. The lower lobes of the both lungs were solid to touch and friable. No frank pus was seen.

Dissection of the left calf muscle revealed thrombi in the deep veins.

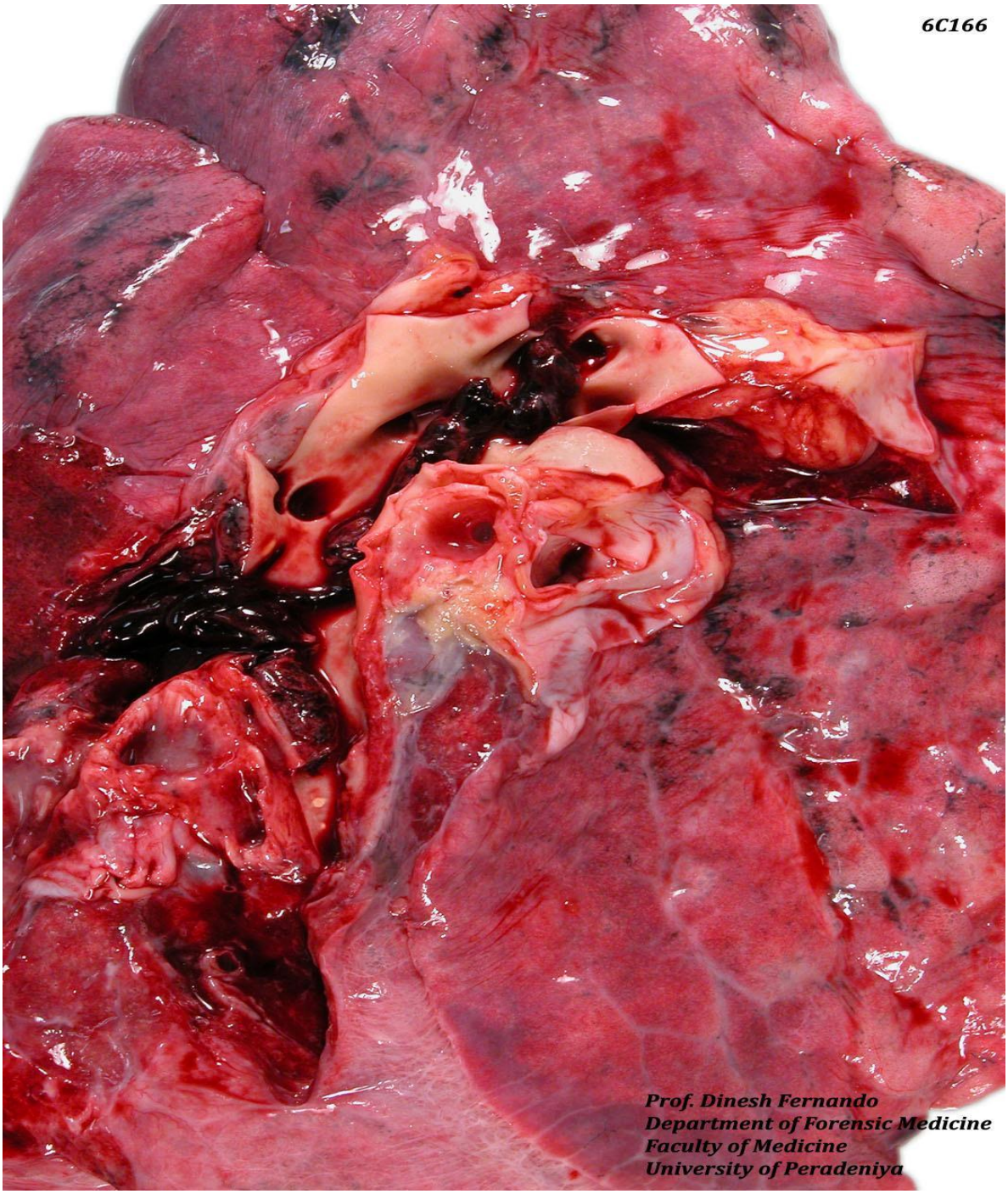


Figure 4: Thrombi in pulmonary arteries. Lung is congested.

Microscopic examination

Sections of the lungs showed aspiration pneumonia and thromboemboli in some small pulmonary vessels.

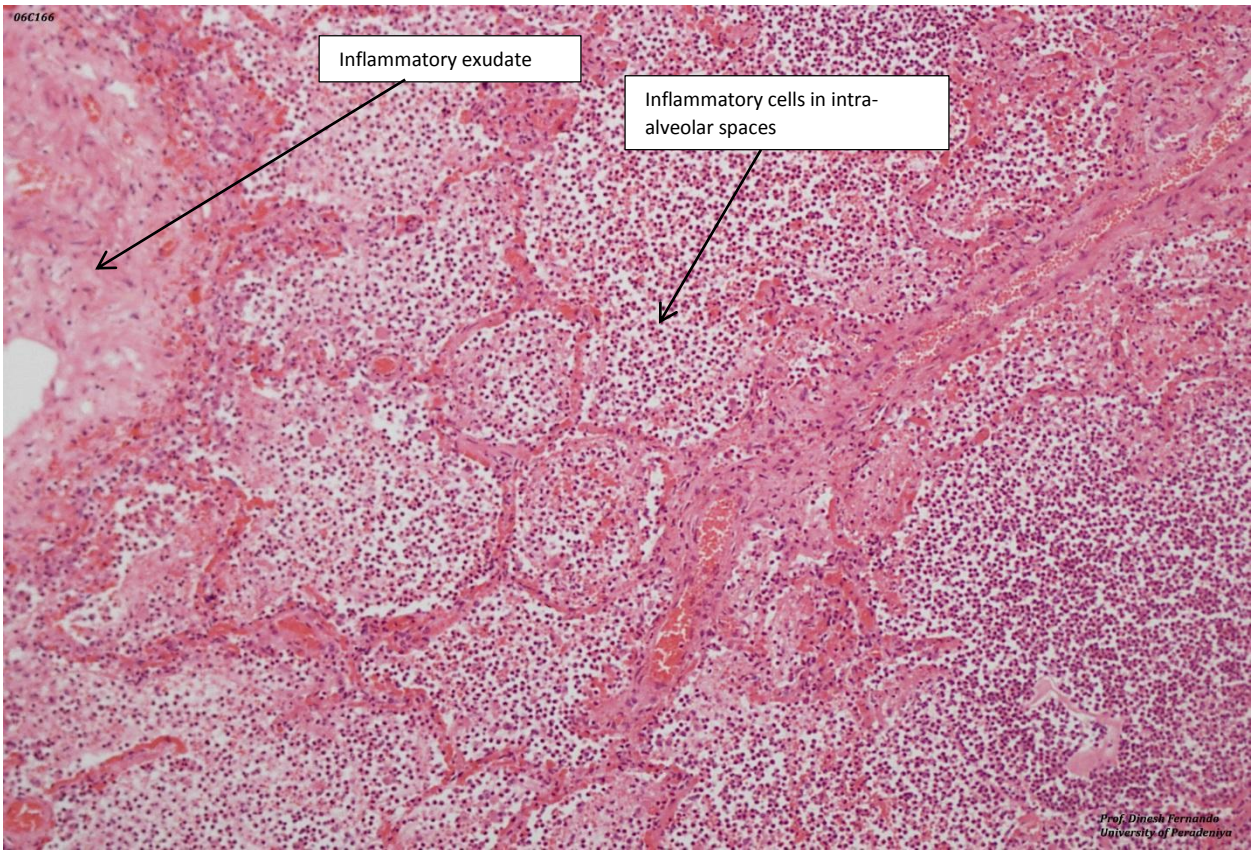


Figure 5: Numerous inflammatory cells in intra alveolar spaces and thickened inter alveolar septae.

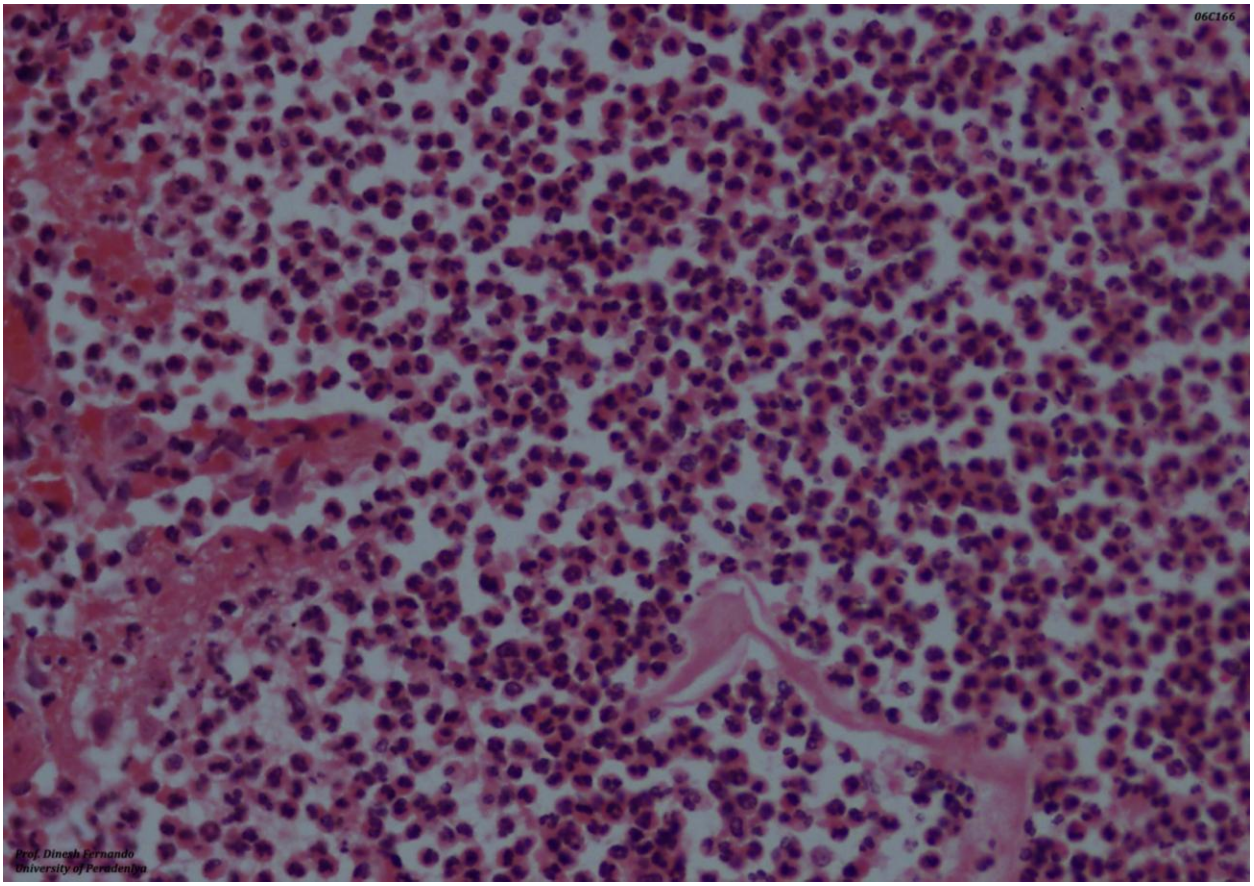


Figure 6: Inflammatory cells in intra alveolar spaces (High power)

Cause of death

Death was due to pulmonary embolism due to deep vein thrombosis in the left leg due to aspiration pneumonia secondary to an old cerebral infarct.

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