

# **COLOR ATLAS OF FORENSIC PATHOLOGY**

### Version 1

# RESPIRATORY SYSTEM ILLUSTRATIVE CASES

Prof. Dinesh Fernando MBBS, MD (Forensic Medicine) DLM, DMJ (Lond) Dept. of Forensic Medicine Dr. Sulochana Wijetunge MBBS, MD (Histopathology) Dept. of Pathology

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In case of any questions, comments, suggestions or errors, please mail the authors on <a href="mailto:dineshf@pdn.ac.lk">dineshf@pdn.ac.lk</a> / <a href="mail

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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) FRCP (Glasgow), FRCP (Edinburgh), FRCPath. (UK)

Senior Professor of Forensic Medicine, General Sir John Kotelawala Defence University, Ratmalana. Emeritus Professor of Forensic Medicine and Toxicology, Faculty of Medicine, University of Colombo

## 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**

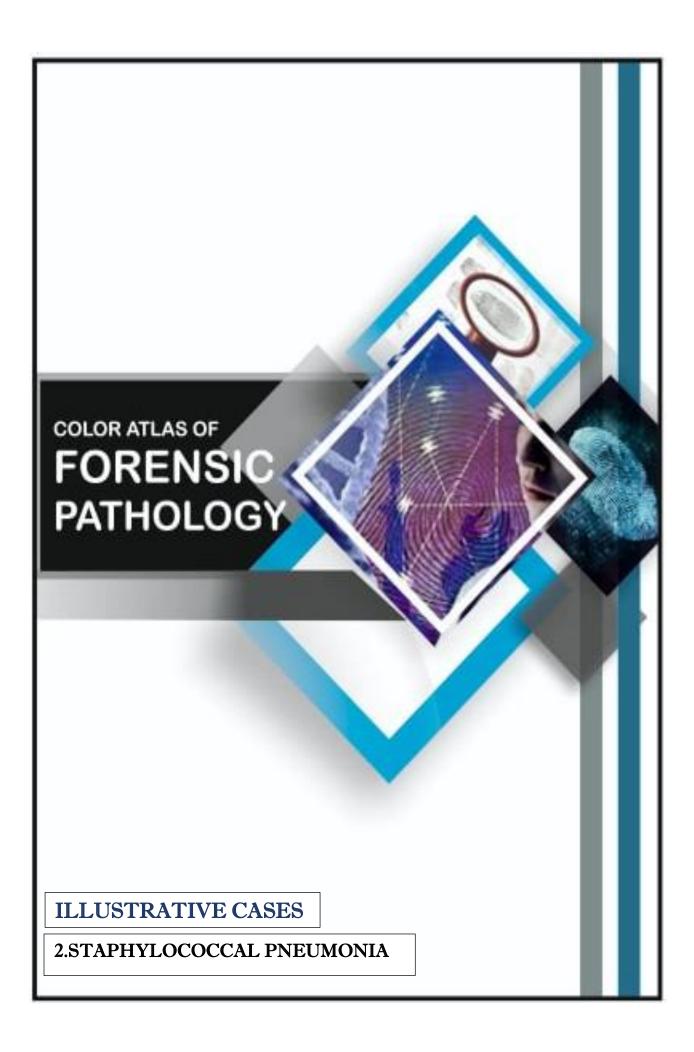
Forensic Medicine in Sri Lanka encompasses, both, examination of patients for medico-legal purposes and conducting autopsies in all unnatural deaths, in addition to those that the cause of death is not known. In the eyes of the justice system in Sri Lanka, all MBBS qualified medical officers are deemed 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





#### STAPHYLOCOCCAL PNEUMONIA

Staphylococcus aureus is an important cause of secondary bacterial pneumonia in children and healthy adults following viral respiratory infections. Those with diabetes mellitus, head trauma, and patients in intensive care units are more susceptible. Methicillin-sensitive strains are much commoner, but an increasing incidence of methicillin-resistant disease is now observed. It is associated with many complications such as necrotizing cavitating lesions, empyema with bilateral infiltrates. Especially in injecting drug users, septic emboli containing staphylococci can gives rise to multiple abscesses in the lung.

#### History

A 67-year-old female who had a past history of asthma, diabetes and angina had been having a productive cough for several days. A day before her death she had been coughing up blood. She was found dead next to her bed lying on her right side. She was last seen alive approximately 12 hours previously.

#### **Internal examination**

Respiratory Tract: 50 ml of straw-coloured fluid was present in the right pleural space and 100 ml was present in the left. The right lung was adherent to the chest wall. The larynx, trachea and mainstem bronchi had congested mucosal surfaces. The right and left lungs weighed 564 grams and 686 grams respectively. Multiple adhesions were present between the lobes of the right lung, the diaphragm and the chest wall. Multiple bullae were present on both lungs. A calcified circular mass measuring approximately 1cm in diameter was situated sub pleurally on the lower part of the right upper lobe. On cut section, a necrotic centre was present. The rest of the right upper lobe was necrotic and had puslike material within dilated spaces. The cut section of the left lung revealed multiple dilated spaces within the parenchyma filled with pus-like material. The pulmonary arteries had atheroma. The bronchi were thick-walled and prominent. Gross pulmonary oedema was present.





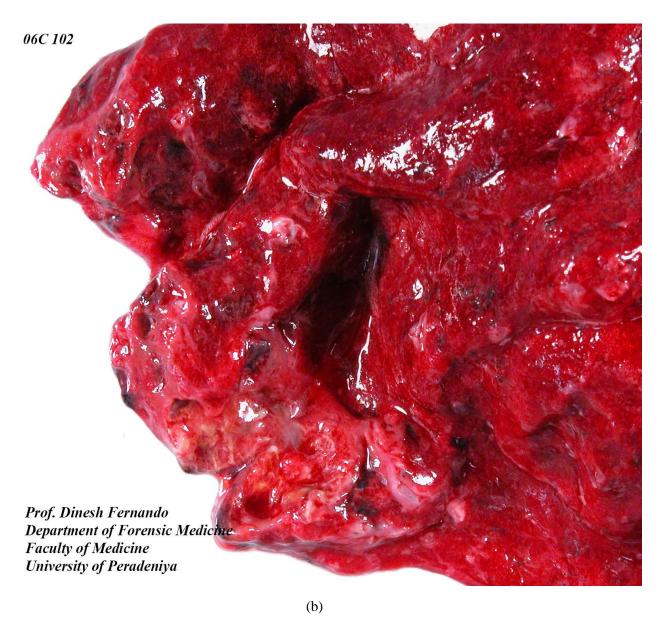
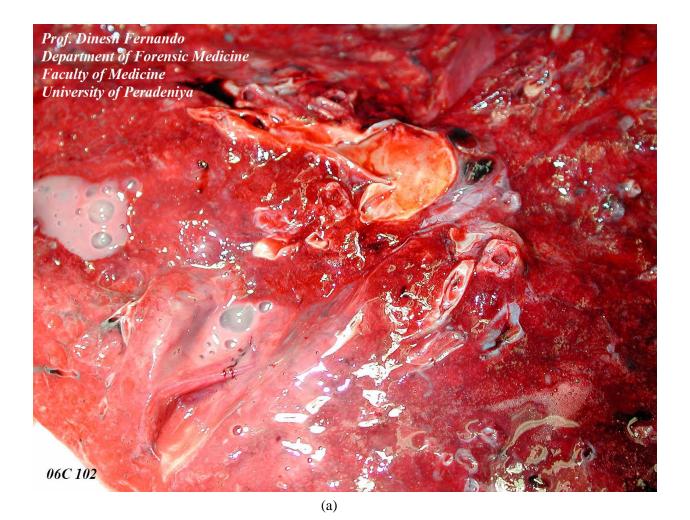


Figure 1(a & b): Cut section of lung showing congestion, dilated spaces and pus-like material especially in the lower lobe





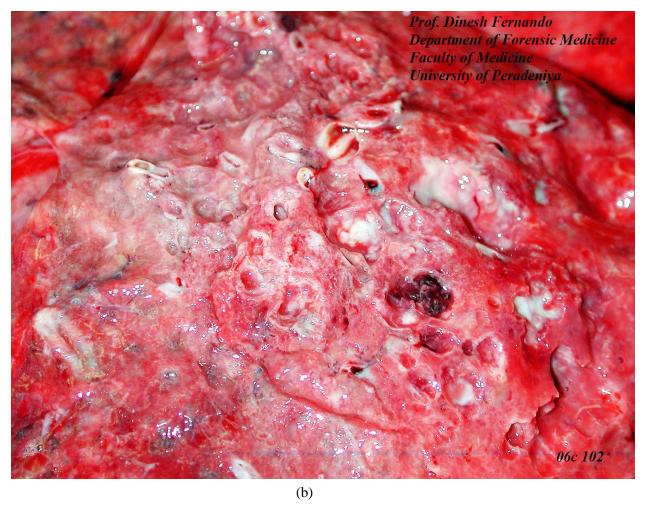


Figure 2(a & b): Congested parenchyma with pus-like material from bronchi

# **Microscopic Examination**

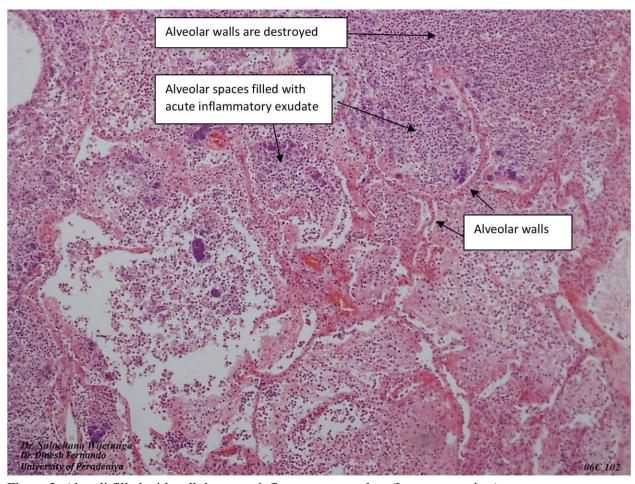


Figure 3: Alveoli filled with cellular acute inflammatory exudate (Low power view)



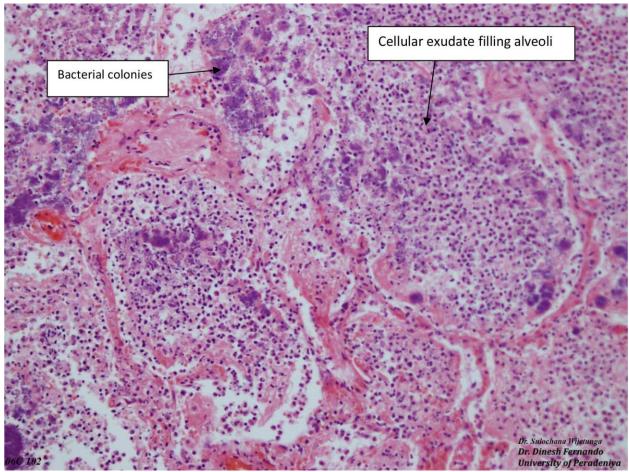


Figure 4: The alveolar cellular exudate mixed with bacterial colonies (High power view)

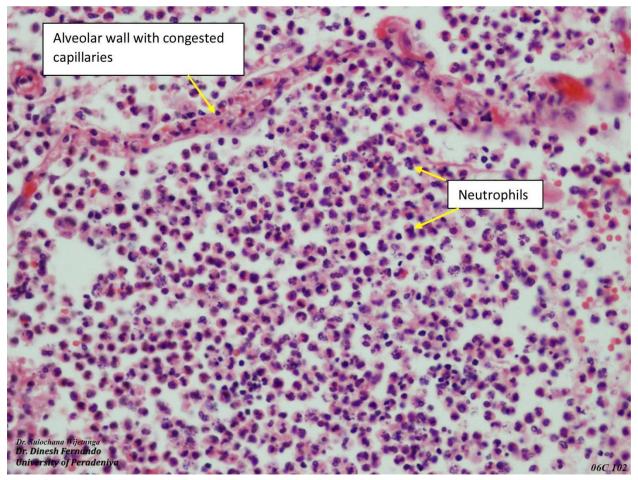


Figure 5: Abundance of neutrophils within alveoli. Neutrophils are recognized by their lobulated nuclei (High power view)



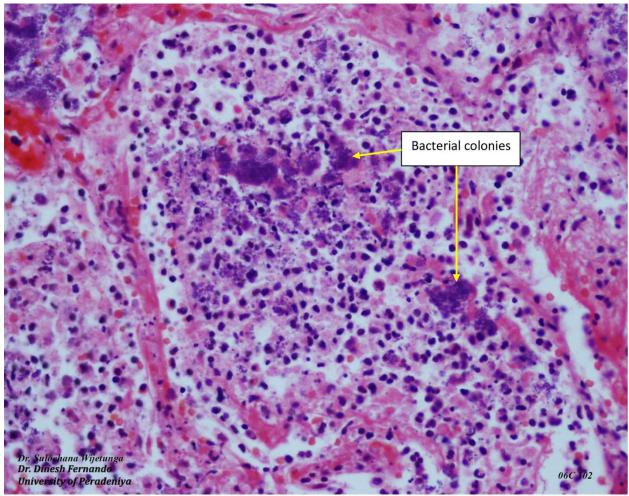


Figure 6: Bacterial colonies observed as densely basophilic powdery material (High power view)

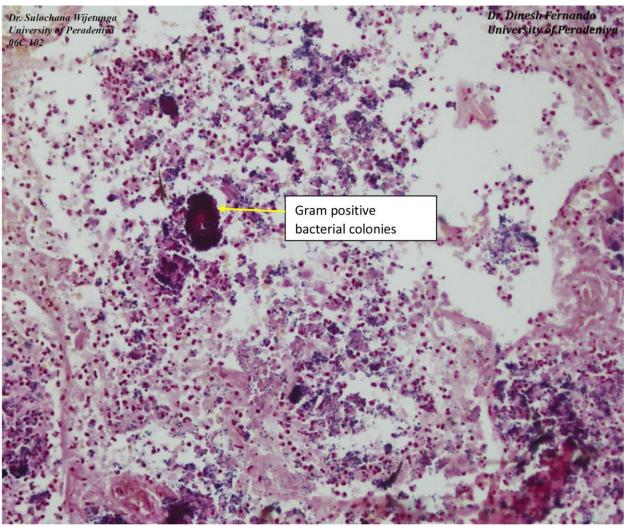


Figure 7: Gram positive bacterial colonies observed on gram stained sections



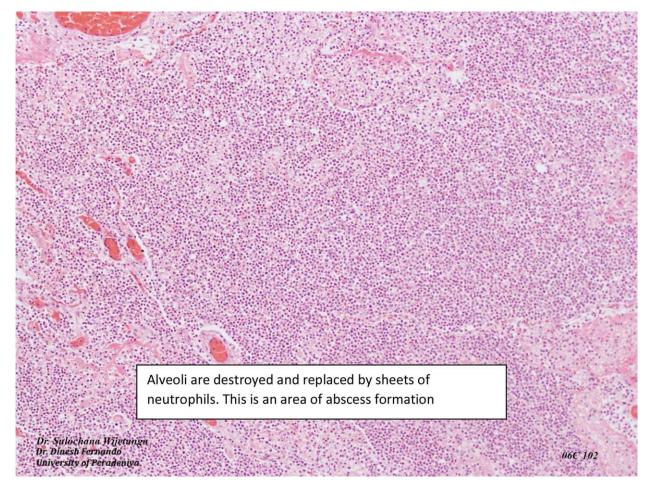


Figure 8: An area of abscess formation, which is a result of localized extensive tissue damage by acute inflammation

• Pneumonia is histologically characterized by presence of an acute inflammatory exudate in the lung parenchyma, namely within alveoli, with, or without bronchiolar involvement. The acute inflammatory exudates are predominantly composed of neutrophils with fibrin, cellular debris and oedema.

### Cause of death

Staphylococcal pneumonia

# Bibliography

- 1. Kumar A, Abbas AK, Aster JC. *Robbins basic pathology*. 9th ed. Philadelphia: An Imprint of Elsevier; 2013.
- 2. Kumar P, Clark ML. *Kumar & Clark's Clinical Medicine*. 8th ed. Edinburgh: Elsevier Health Sciences; 2012.