COLOR ATLAS OF

FORENSIC PATHOLOGY

ENDOCRINE SYSTEM

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Version 1

ENDOCRINE 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

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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.

Prof. Dinesh Fernando
Dr. Sulochana Wijetunge

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ILLUSTRATIVE CASES

1.ADRENAL HAEMORRHAGE

ADRENAL HAEMORRHAGE

Adrenal haemorrhages, which are frequently bilateral, leads to rapid destruction of the adrenals and precipitates acute adrenal insufficiency. The patient presents with symptoms of adrenal insufficiency, shock or in acute adrenal crisis.

Waterhouse-Friderichsen syndrome is a rare clinical syndrome with bilateral adrenal haemorrhages seen mainly in meningococcal or pseudomonas septicaemia in children, but also several other bacterial and viral infections can cause it. Other causes of bilateral adrenal haemorrhage include coagulation disorders (eg, antiphospholipid syndrome), adrenal vein thrombosis, adrenal metastases, traumatic shock, severe burns, abdominal surgery, and obstetric complications etc.

Pathophysiology of bilateral adrenal haemorrhage is still debatable. According to literature it is said to be a manifestation of stress response which leads to an increase serum adrenocorticotrophin (ACTH) followed by synthesis of cortisol and adrenaline. This will ultimately raise adrenal blood flow, which increases pressure within the vessels leading to rupture.

Unilateral adrenal haemorrhages are uncommon and it is most frequently seen in direct trauma causing traumatic adrenal rupture.The inner cortex and medulla are almost entirely replaced by haematomas.

History

A 35-year-old male sustained a head injury following a fall from a height of 5 to 6 metres.
The injuries sustained in the head included; a left sided subdural haematoma with extension into the subarachnoid space, associated with cortical contusion, oedema and midline shift.

The upper pole of the right kidney was lacerated.

A craniotomy for the subdural haematoma and decompression was done and a large amount of blood (approximately 500mls) was drained. He was ventilated and died after 2 days without regaining consciousness.

Internal examination

Endocrine system: The left adrenal was of normal size with thin yellow cortex and grey tan medulla. The right adrenal had a large haemorrhage and the haemorrhage plus adrenal gland weighed 38 grams.

Central Nervous System: The brain was herniating out of the craniectomy site. An organising extradural haematoma which measured approximately 25mls was present on the left temporo-parietal region in relation to the craniectomy site. Another extradural haematoma which measured approximately 50mls was present in the right occipital area and was composed of relatively fresh blood.

Macroscopic Examination

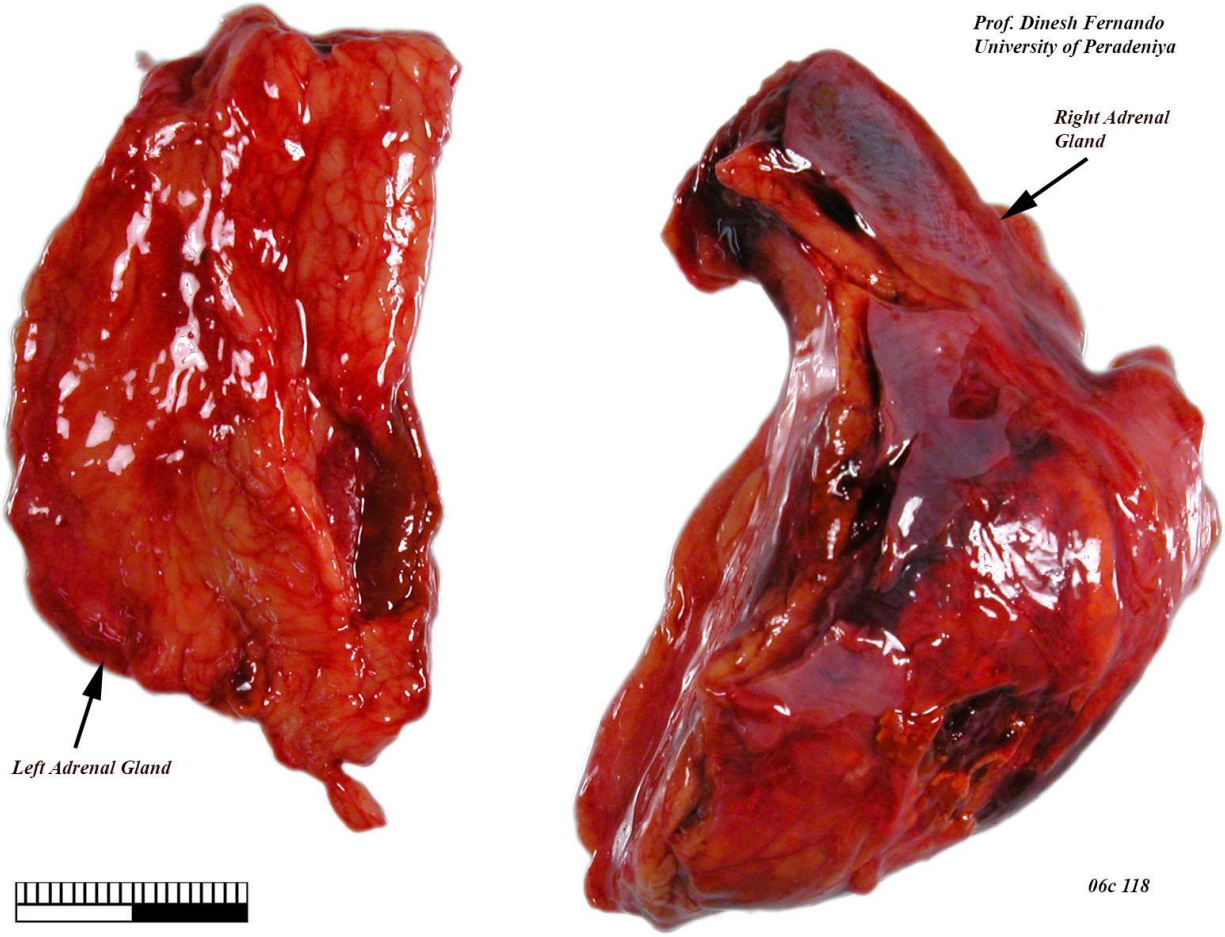

Figure 1: Left and right adrenal glands

(a)

(b)

Figure 2(a & b): Haemorrhage within the right adrenal gland

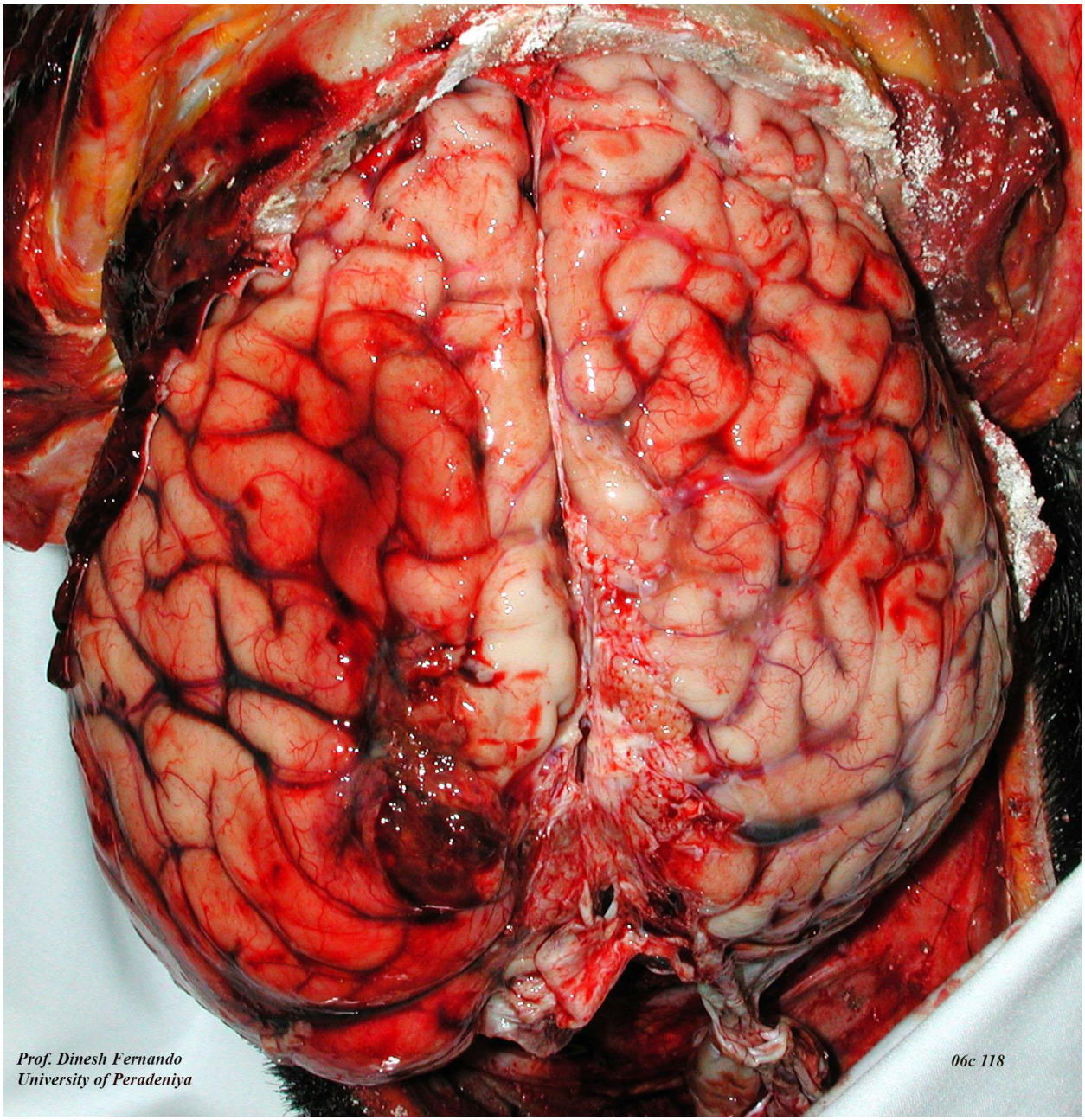

Figure 3: Oedema of left cerebral hemisphere

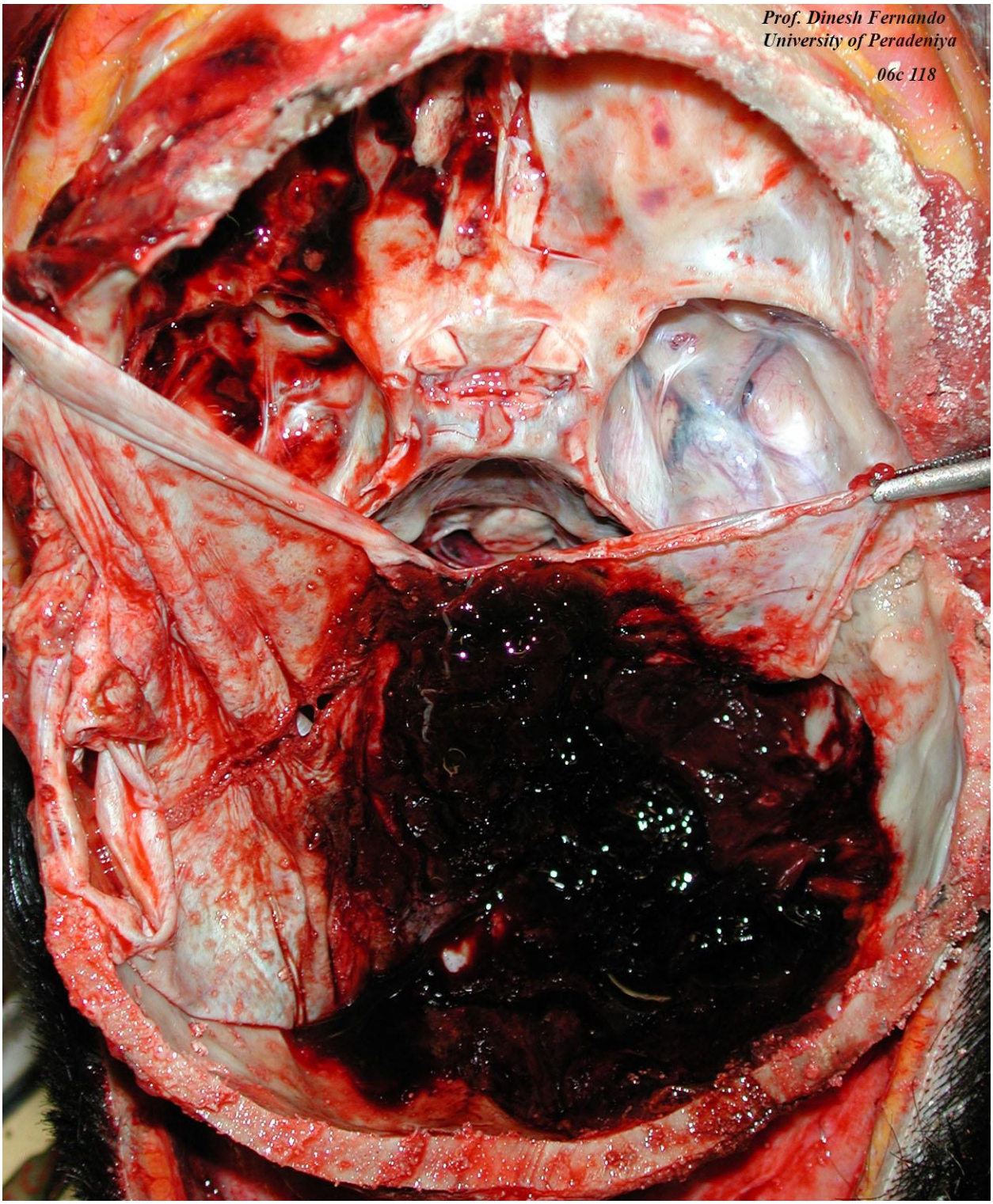

Figure 4: Extradural haematoma in occipital area

Figure 5: Dura with extradural haematoma

Microscopic Examination

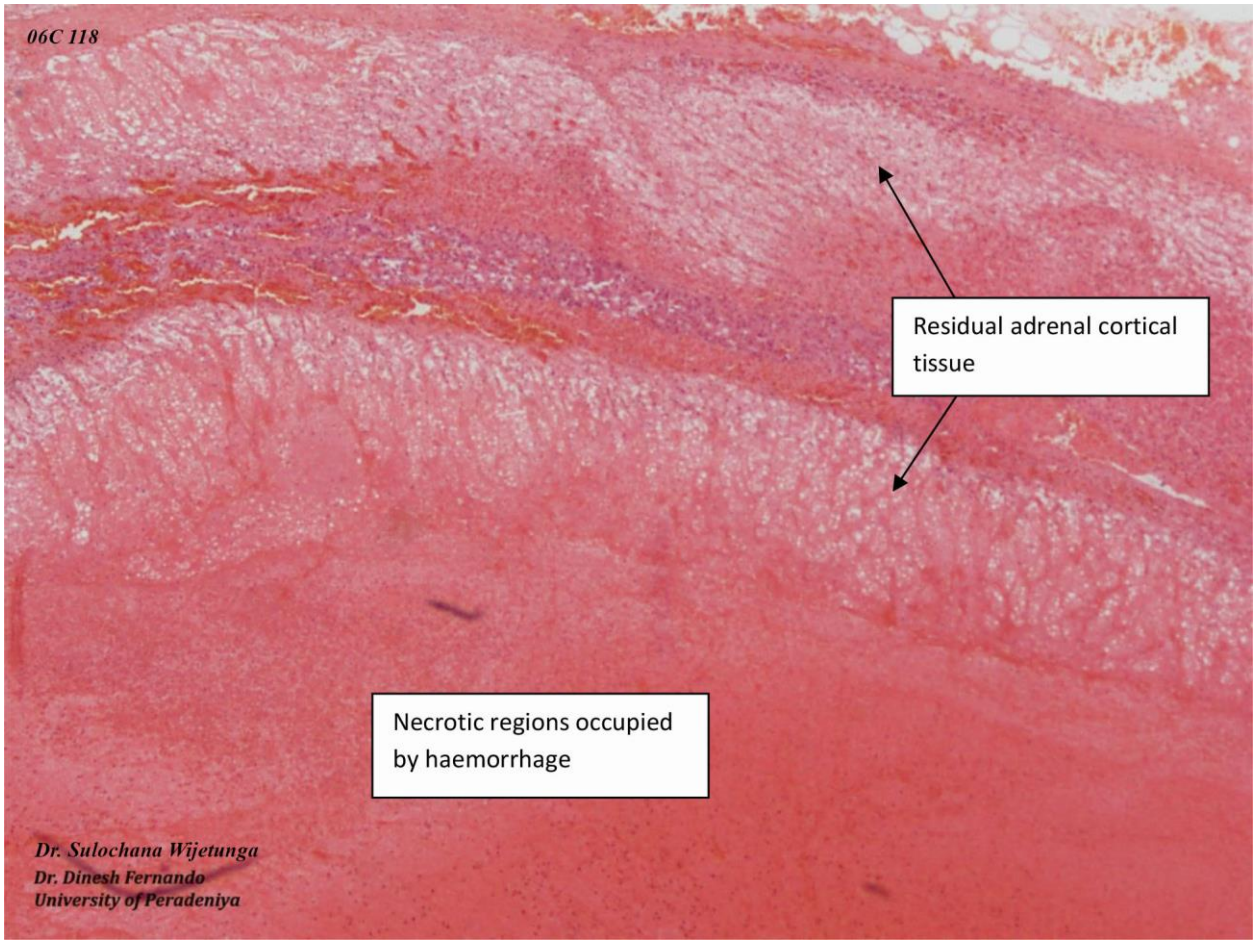

Figure 6: There is some residual viable cortical tissue

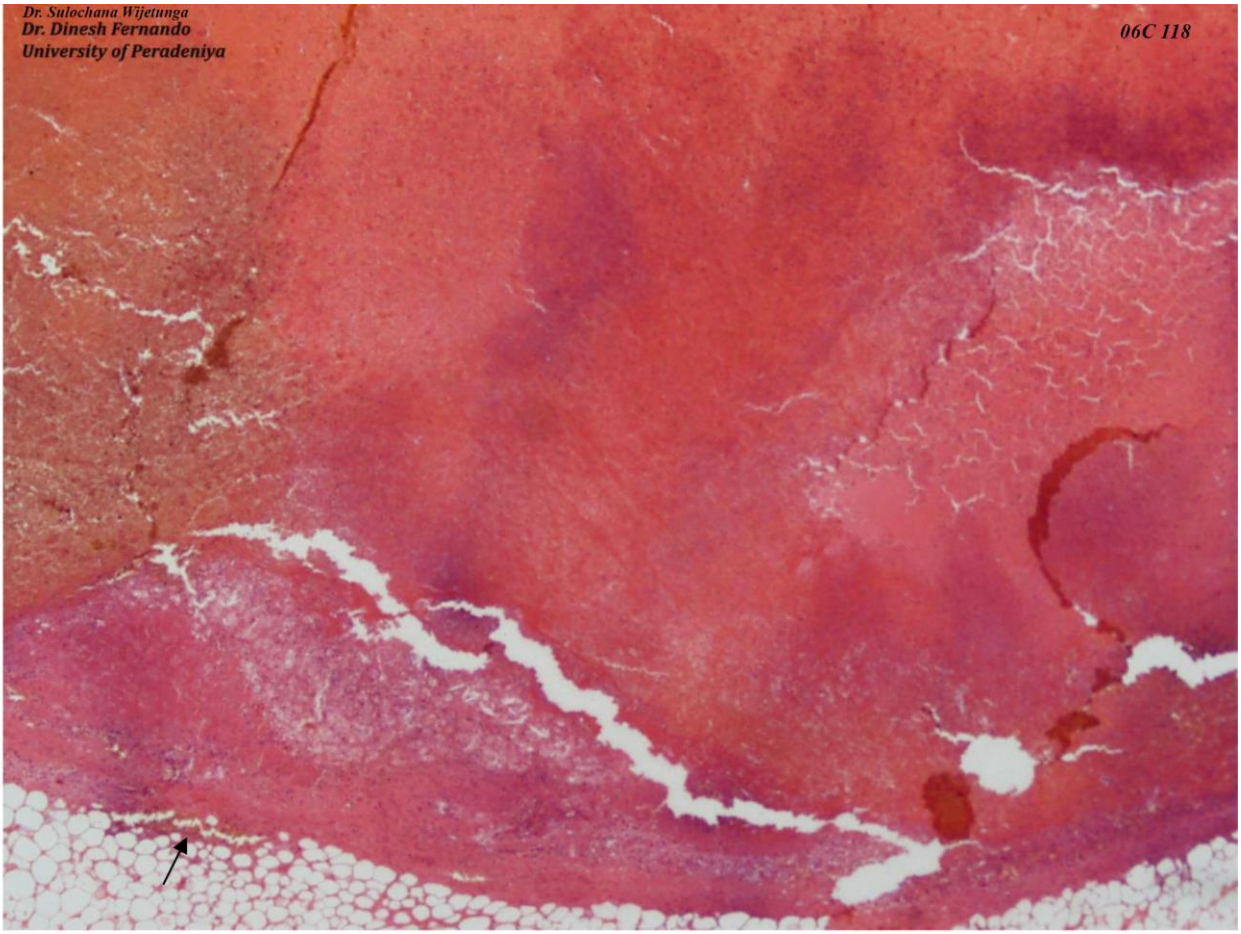

Figure 7: No viable tissue is seen and the entire region is necrotic occupied by a haematoma. There is bleeding extending to peri renal tissue (arrow)

There is extensive necrosis of adrenal tissue with haemorrhage.

Pathogenesis of adrenal haemorrhage in non-traumatic situations is not clear. It has been attributed to the limited venous drainage of the gland, i.e., although adrenal gland has a good arterial blood supply, its venous drainage is by a one single vein making it vulnerable to congestive necrosis and secondary haemorrhage. Adrenal vein spasms in extreme stressful situations, adrenal vein thrombosis in sepsis and other hypercoagulable situations such as heparin induced thrombocytopenia, anti-phospholipid syndrome and DIC have been implicated.

Extensive bilateral adrenal haemorrhage lead to acute adrenal failure, adrenal crisis, shock and death.

Cause of death

Adrenal Haemorrhage

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