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.

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

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ILLUSTRATIVE CASES

1. ACUTE PANCREATITIS

ACUTE PANCREATITIS

Acute Pancreatitis is characterized by reversible pancreatic injury due to an acute inflammatory reaction. It occurs due to an inappropriate release and activation of pancreatic enzymes which destroys the pancreatic parenchyma. The injury varies in severity, ranging from focal oedema and fat necrosis to widespread parenchymal necrosis. Also, the destruction of blood vessels leads to interstitial haemorrhage.
The released pancreatic enzymes are responsible for the secondary systemic response. Lipolytic enzymes self-digest pancreatic tissue and peripancreatic fat. The lysis of those fat cells releases fatty acids which precipitates with serum calcium in the form of soap. This is the phenomenon known as fatty saponification. It is thought to be responsible for the hypocalcemia which is seen in severe acute pancreatitis. There are two types of acute pancreatitis according to the presence or absence of necrosis; the mild (interstitial-oedematous) and severe (necrotizing pancreatitis). The necrosis may be seen in, either, the pancreatic gland, peripancreatic fat or mostly seen in both.

Gallstones and alcohol are the most common causes, while infections, drugs and metabolic disorders that injure the acinar cells or damage the duct epithelium, can also trigger acute pancreatitis. It presents with a sudden onset of epigastric pain which radiates to the back and is relieved on bending forward. There is associated nausea and vomiting. Cullen's sign (periumbilical bruising), Grey Turner sign (flank bruising) and Fox's sign (bruising over the inguinal ligament) are specific clinical features that may be seen rarely. Three-fold or greater rise in serum amylase or lipase supports the diagnosis.

History

A 77-year-old male who had several strokes over the past six years and had pancreatitis for the past four years presented to the local hospital with a productive cough of a few days and severe abdominal pain, especially in the right upper quadrant. He had vomited bile. Investigations showed raised amylase. He was tachypnoeic with a respiratory rate of 36. The blood pressure had been 120/60 & GCS was 13/15. His condition had deteriorated and he had transferred to a tertiary care hospital ICU on the evening prior to his death. During transfer in the ambulance he had increasing respiratory distress and became more tachypnoeic with saturation being in the low to mid 90s. He had been ventilated in the ICU for 19 hours. Gradually, his condition worsened and treatment was subsequently withdrawn.

Internal Examination

Endocrine system: The thyroid was unremarkable. The pancreas appeared haemorrhagic but macroscopic fibrosis or saponification was not seen.

In order to demonstrate saponification, images from a different case are shown below from Fig 4 to Fig 8. In addition, liver necrosis is shown from Fig 9 to Fig 12.

Central Nervous System: A gelatinous area was present on the inferior aspect of the left occipital lobe close to the midline. Multiple atheromatous plaques were present in the Circle of Willis which had dilated vessels. Multiple sections of the cerebral hemispheres revealed an area of old necrosis in the inferior left occipital lobe. For images see 'Cerebral Infarction' in Brain and Spinal cord.


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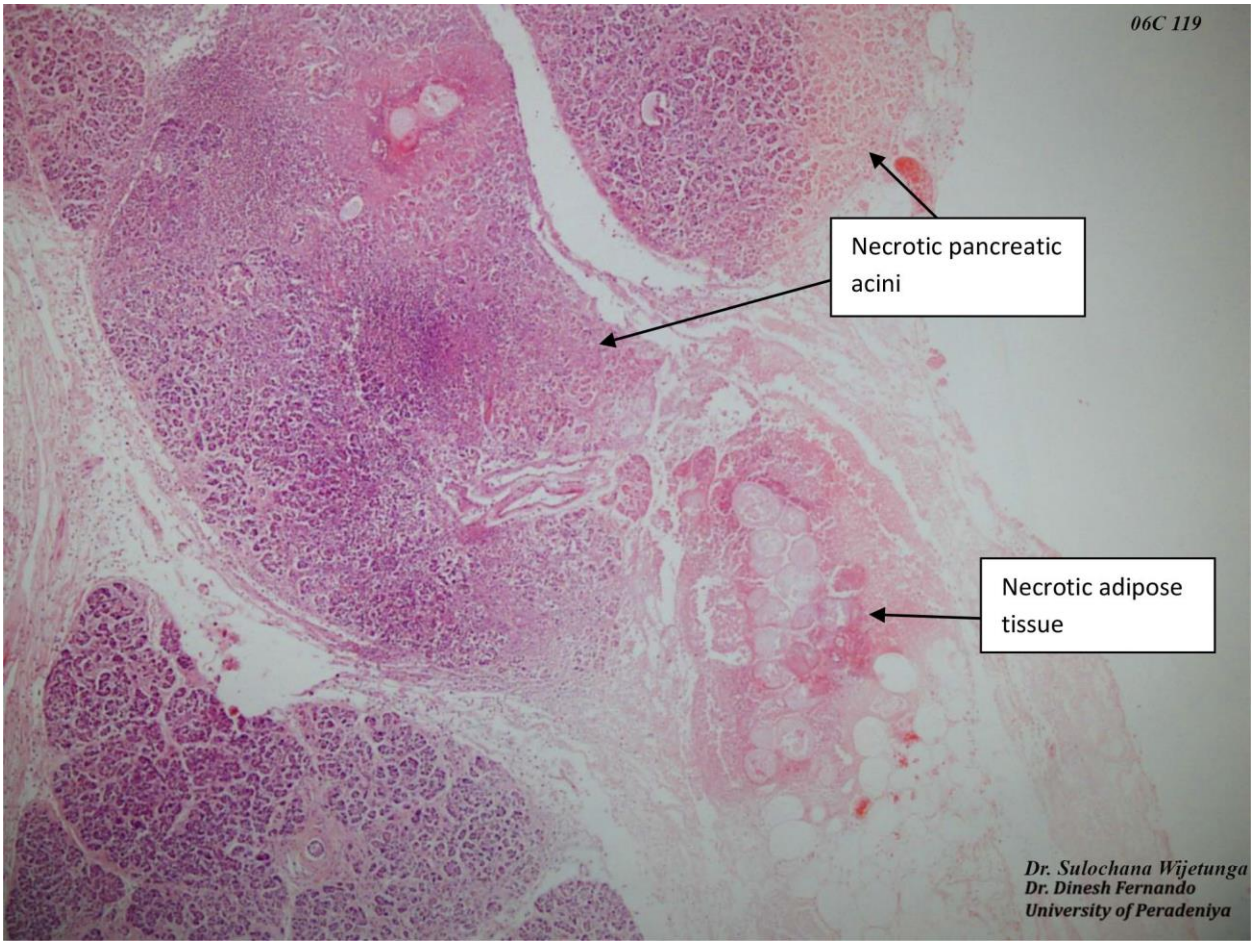
(a)

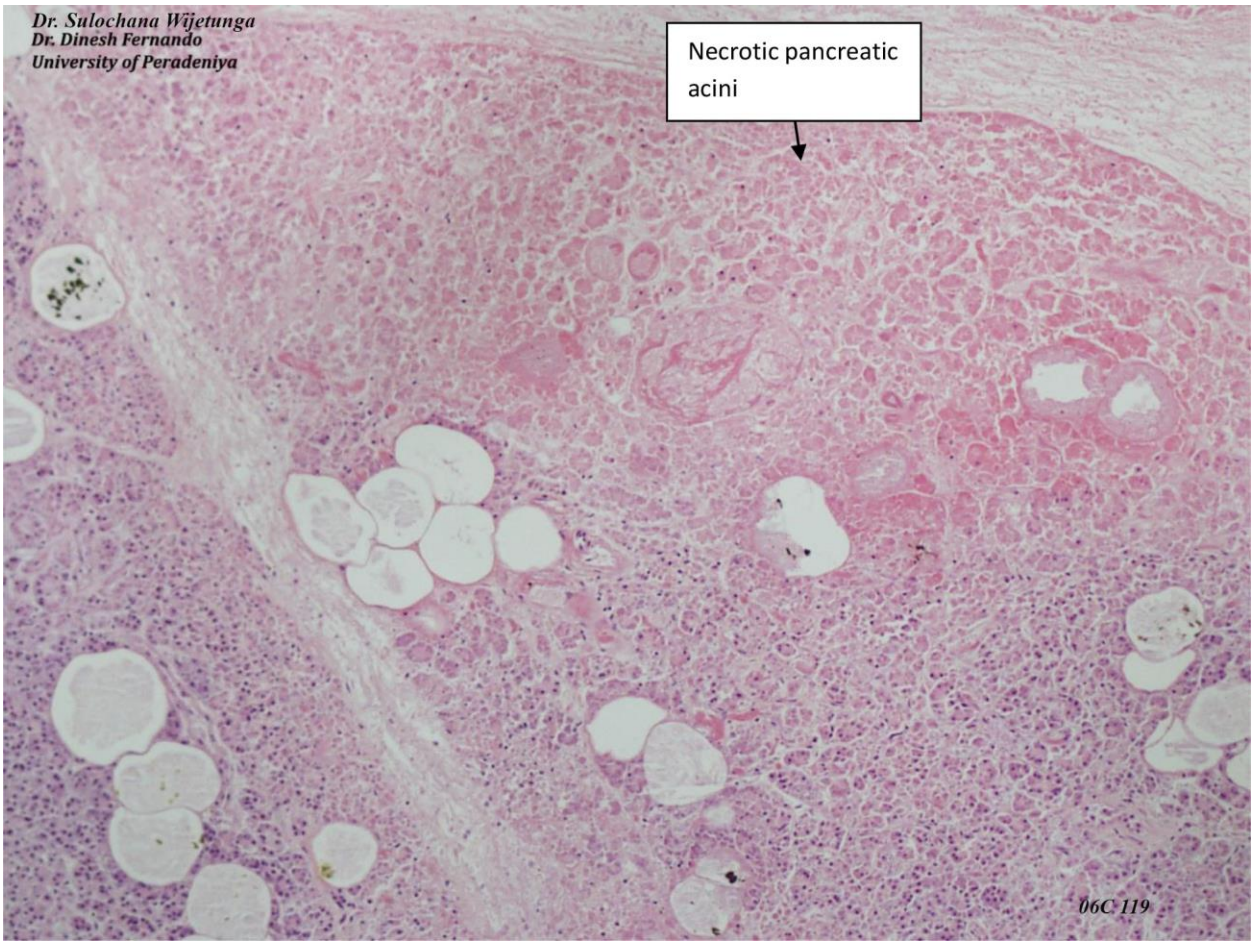
(b)

Figure 1(a & b): Cut section of pancreas showing haemorrhage

Microscopic Examination



(a)


Dr. Sulochana Wijetunga
Dr. Dinesh Fernando
University of Peradeniya
Necrotic pancreatic acini
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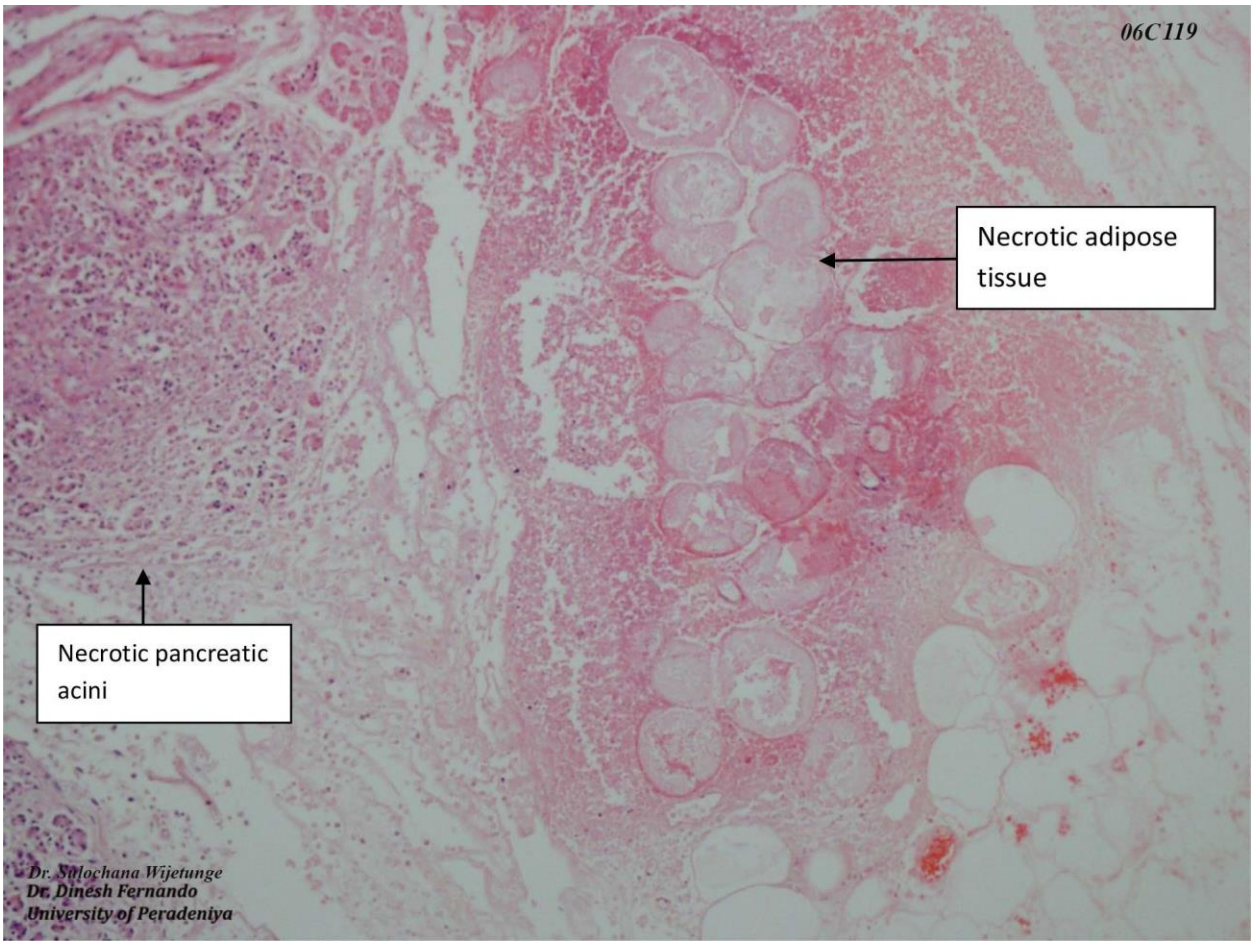
(b)



(c)

Figure 2 (a, b, & c): Pancreatic acini are necrotic and the surrounding adipose tissue undergo enzymatic fat necrosis. Fatty acids released from necrotic adipose tissue form calcium salts and produce chalky white deposits within the peritoneal cavity. (Calcium deposits are seen as deeply basophilic material with haematoxylin and eosin stained histology sections)

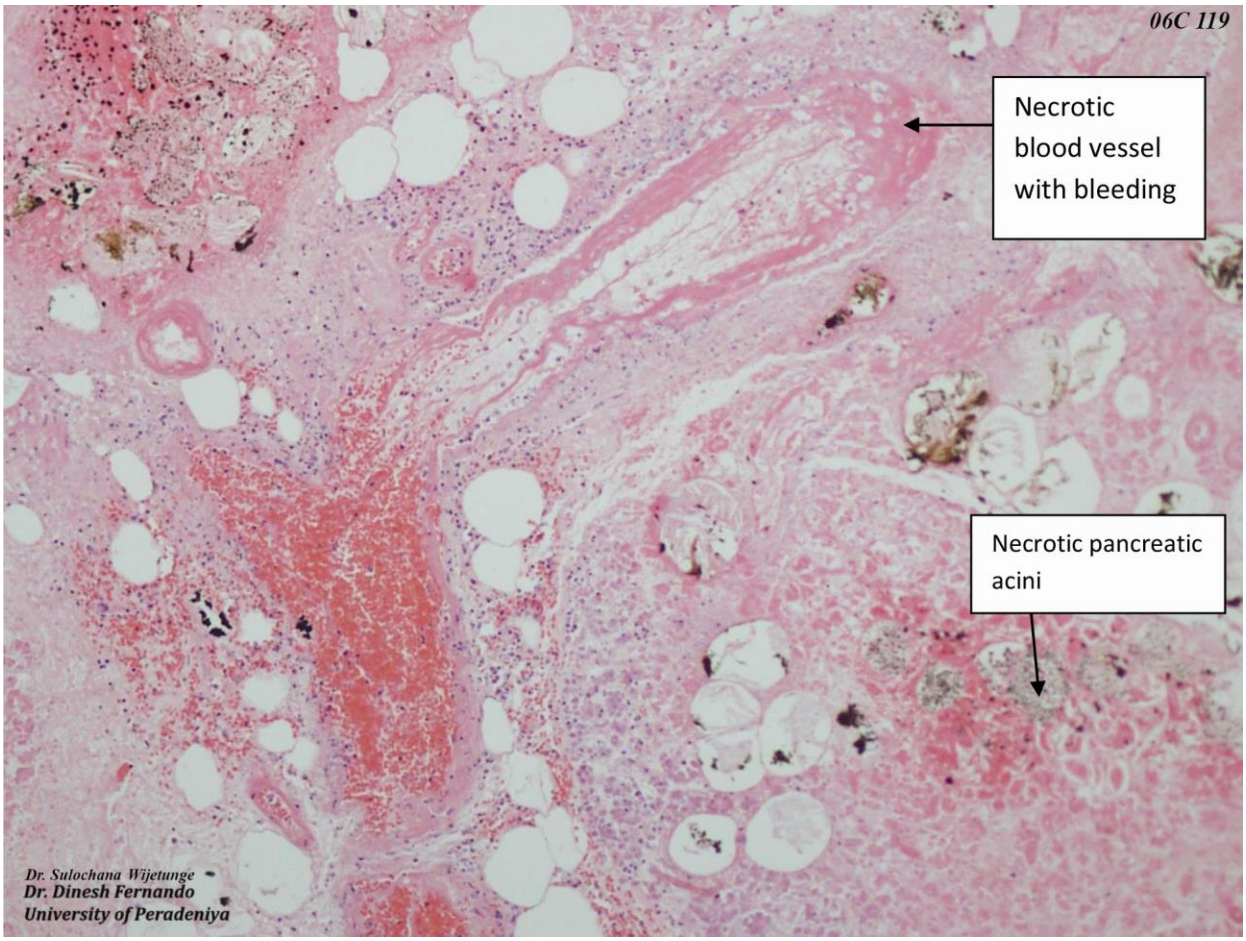


Figure 3: Necrotic blood vessel in the pancreas with bleeding

Blood vessels get digested due to released elastase from necrotic acini. In severe forms of acute pancreatitis with a lot of tissue necrosis extensive blood vessel injury could produce acute haemorrhagic pancreatitis.

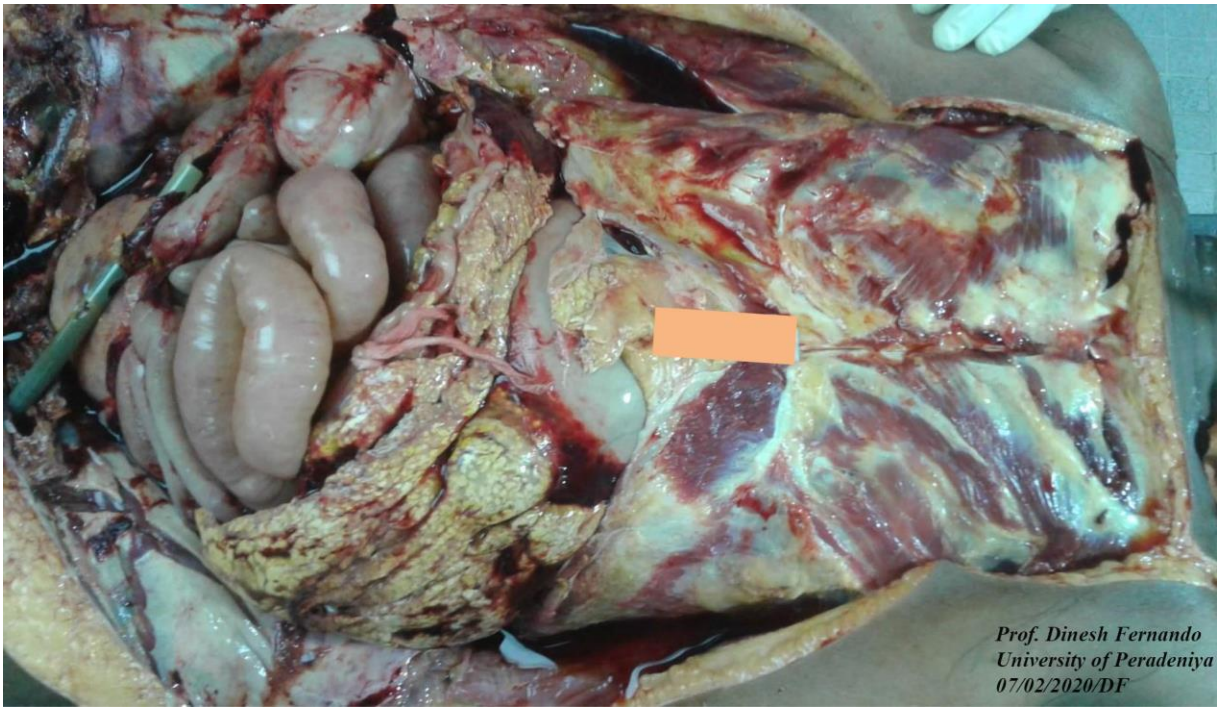
Cause of death

Acute pancreatitis in a person with previous cerebral infarction

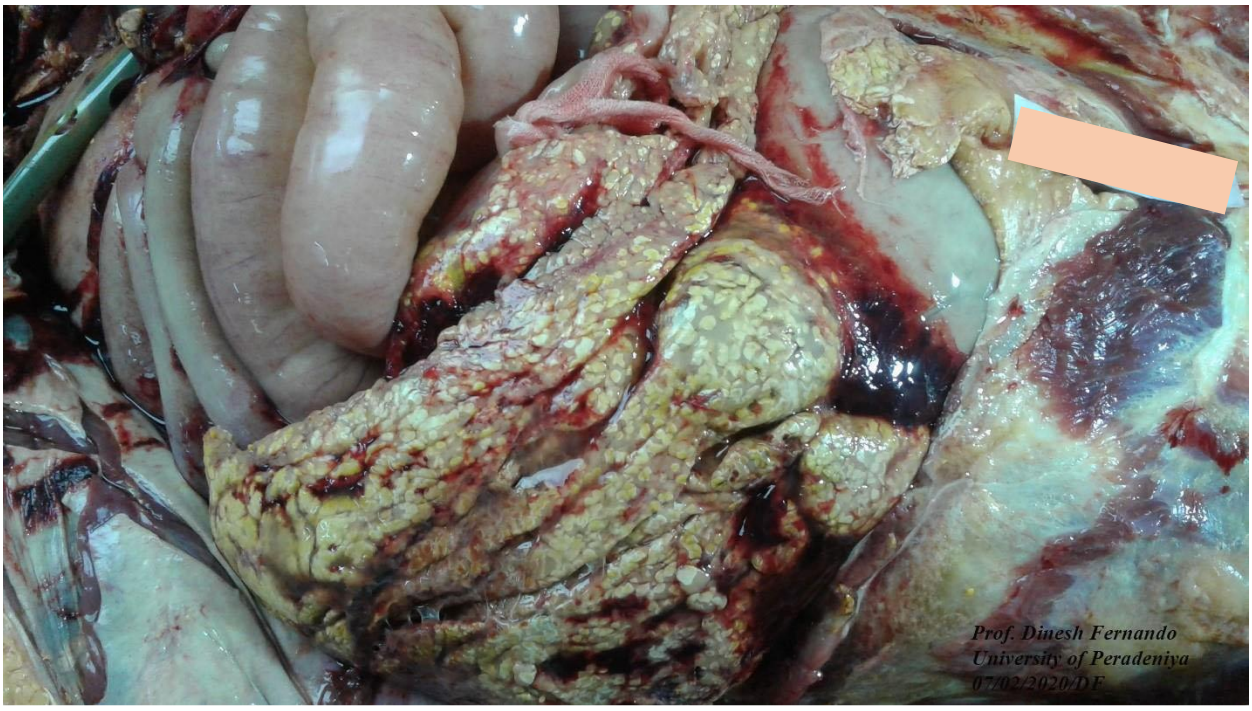
Illustration of Saponification and Liver cell necrosis from a different case is given below.

Saponification

Macroscopy



(a)



(b)

Figure 4(a & b): Opened abdominal cavity showing saponification of omentum

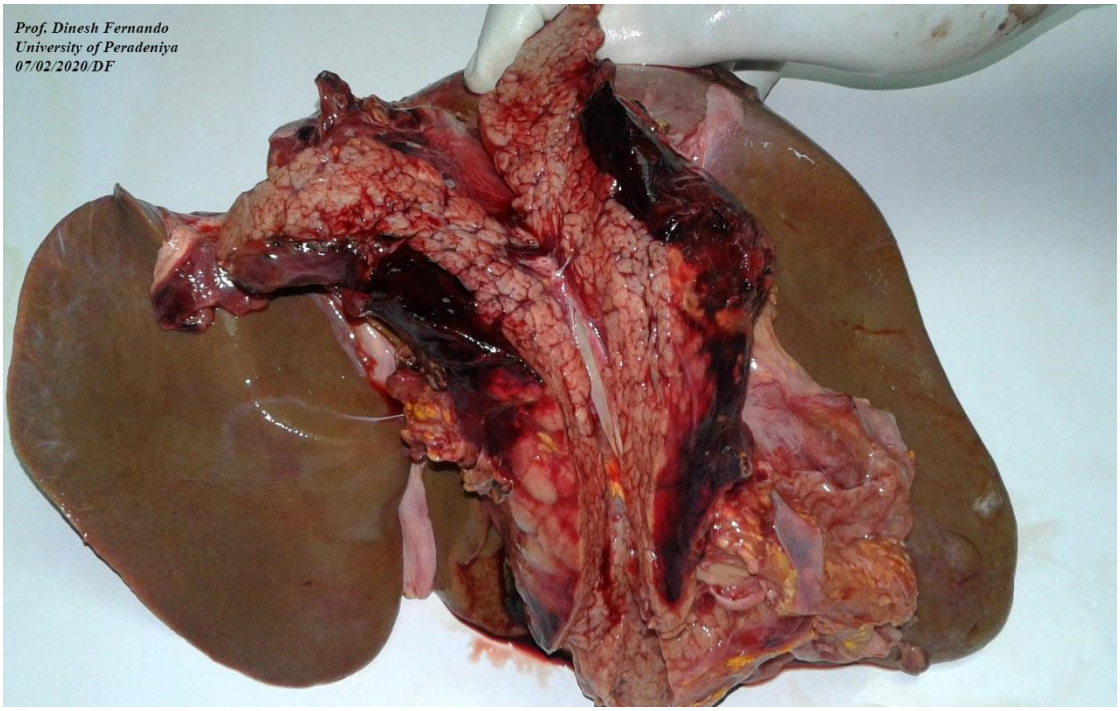


Figure 5: Haemorrhage around the pancreas

Microscopy

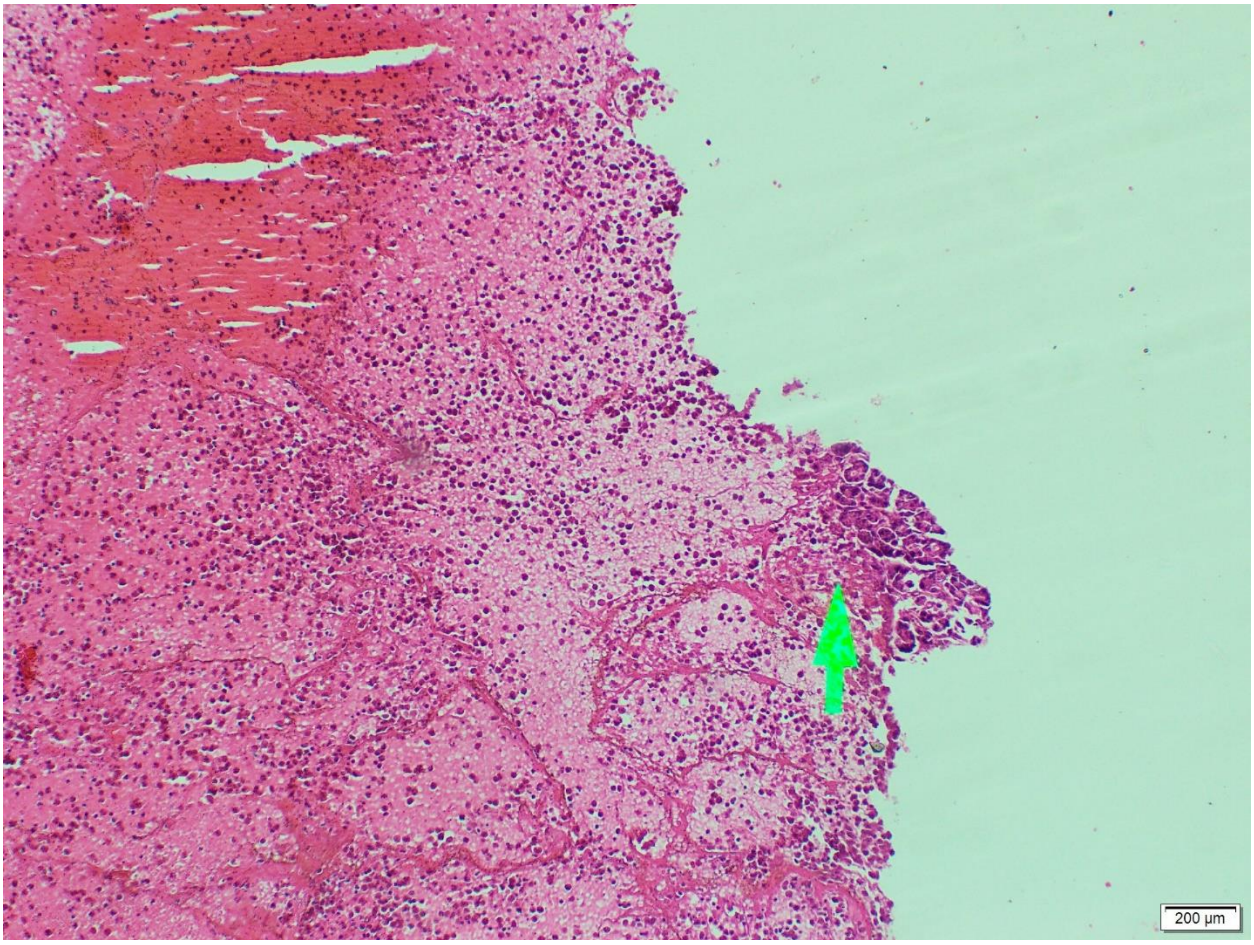


Figure 2: Pancreatic necrosis and haemorrhage with remaining pancreatic acini indicated by the arrow

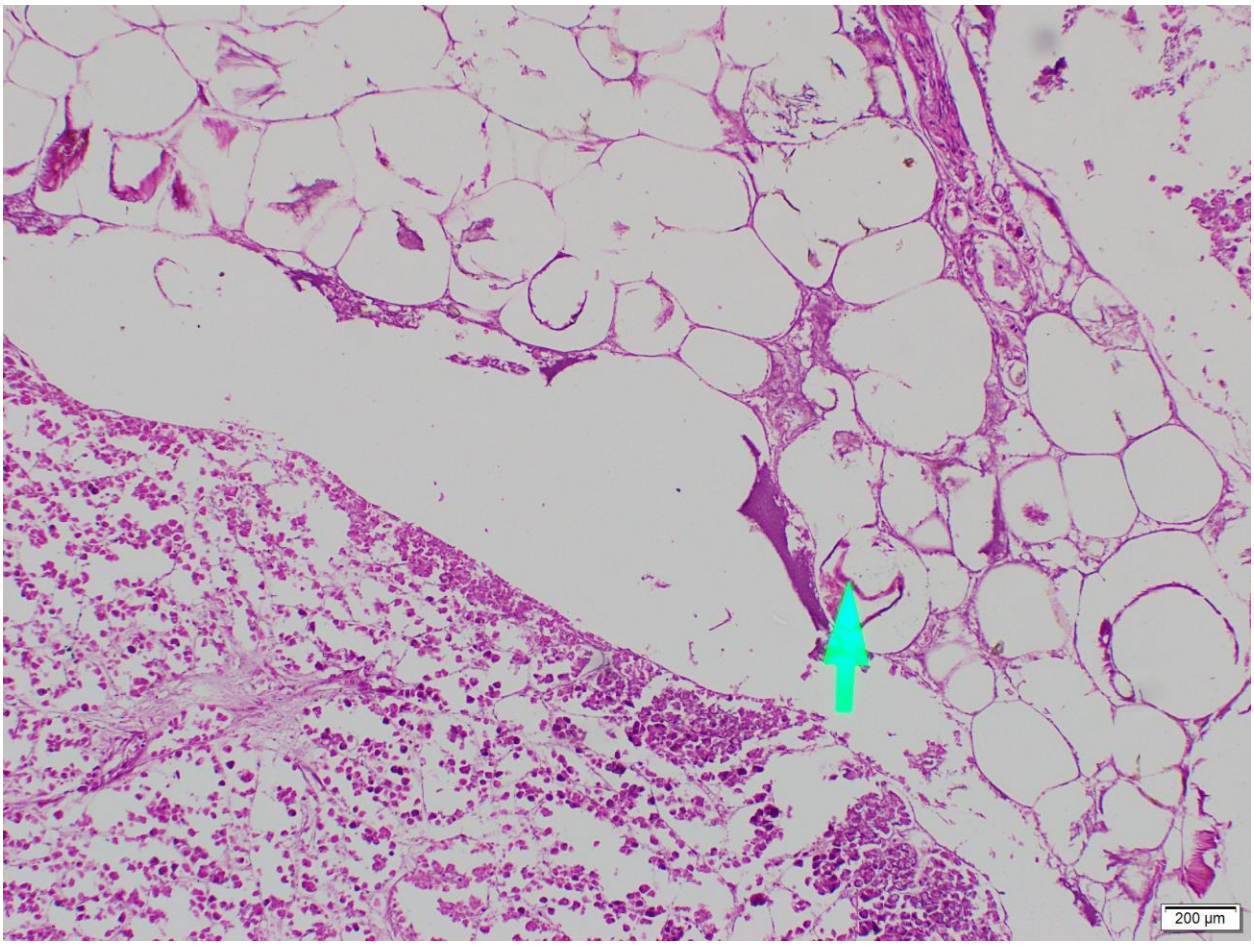


Figure 3: Saponification of the peripancreatic adipose tissue

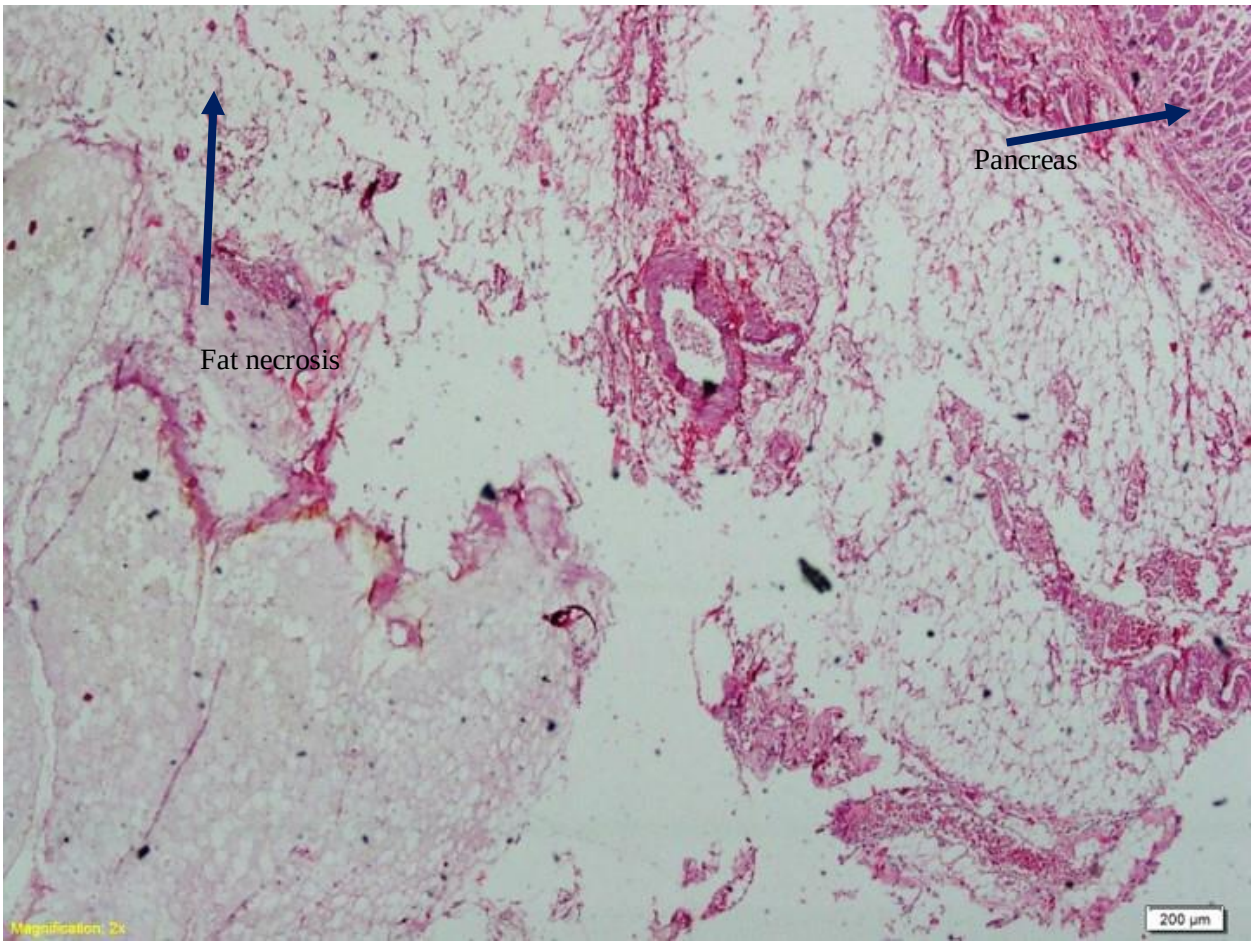


Figure 4:Areas of fat necrosis in the peripancreatic adipose tissue

Liver Cell Necrosis

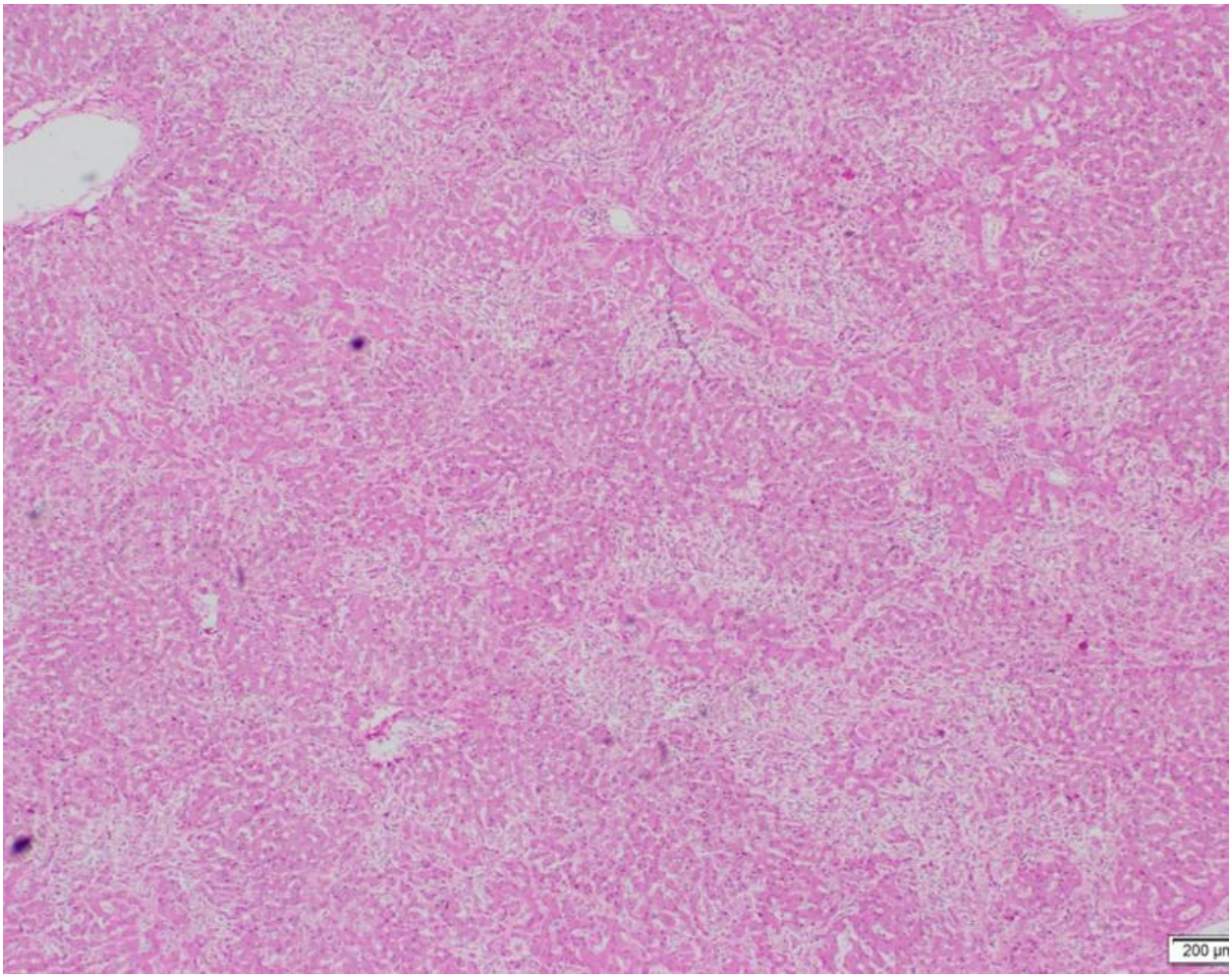


Figure 9: Diffuse bridging necrosis in the liver.

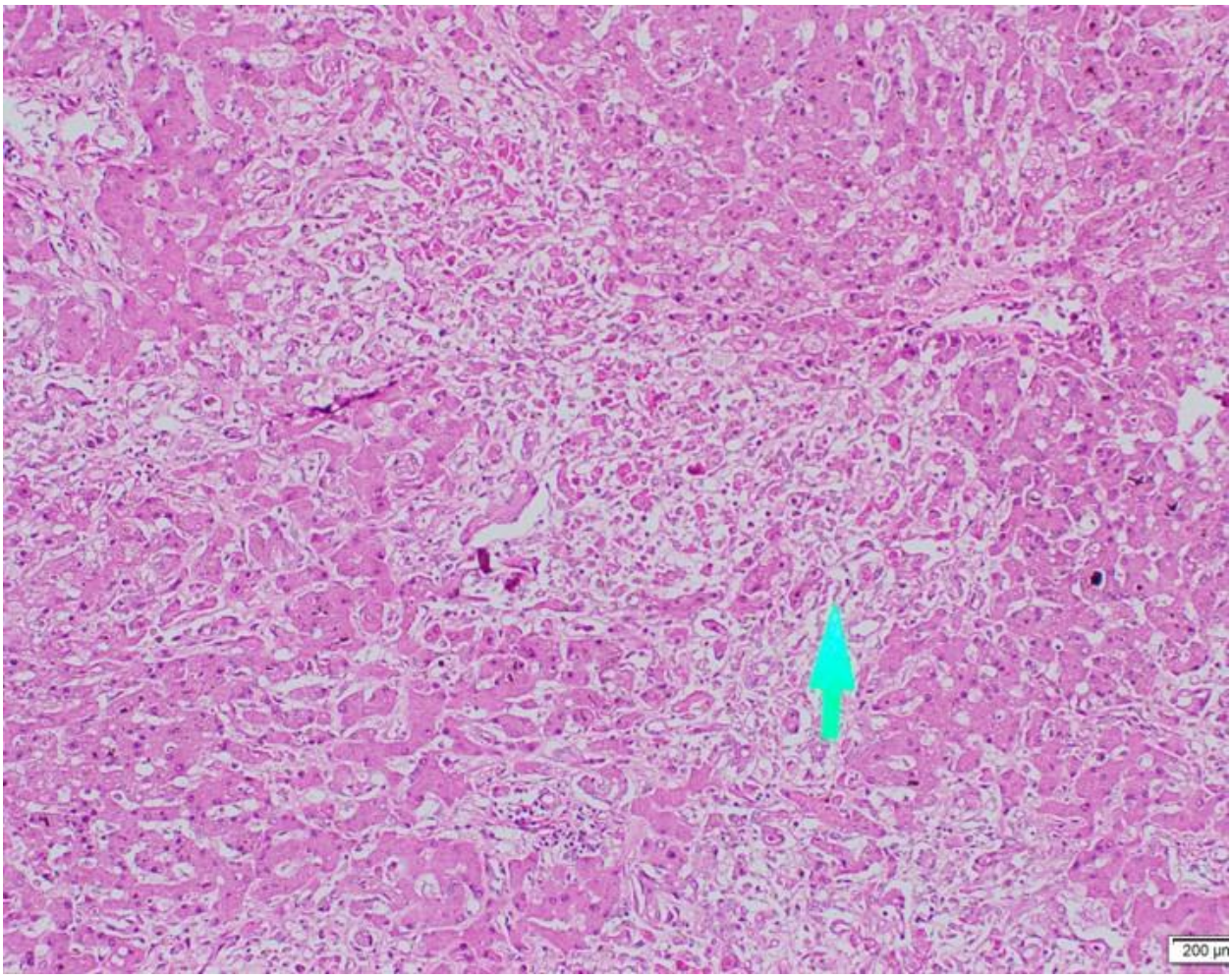


Figure 10: Liver cell necrosis

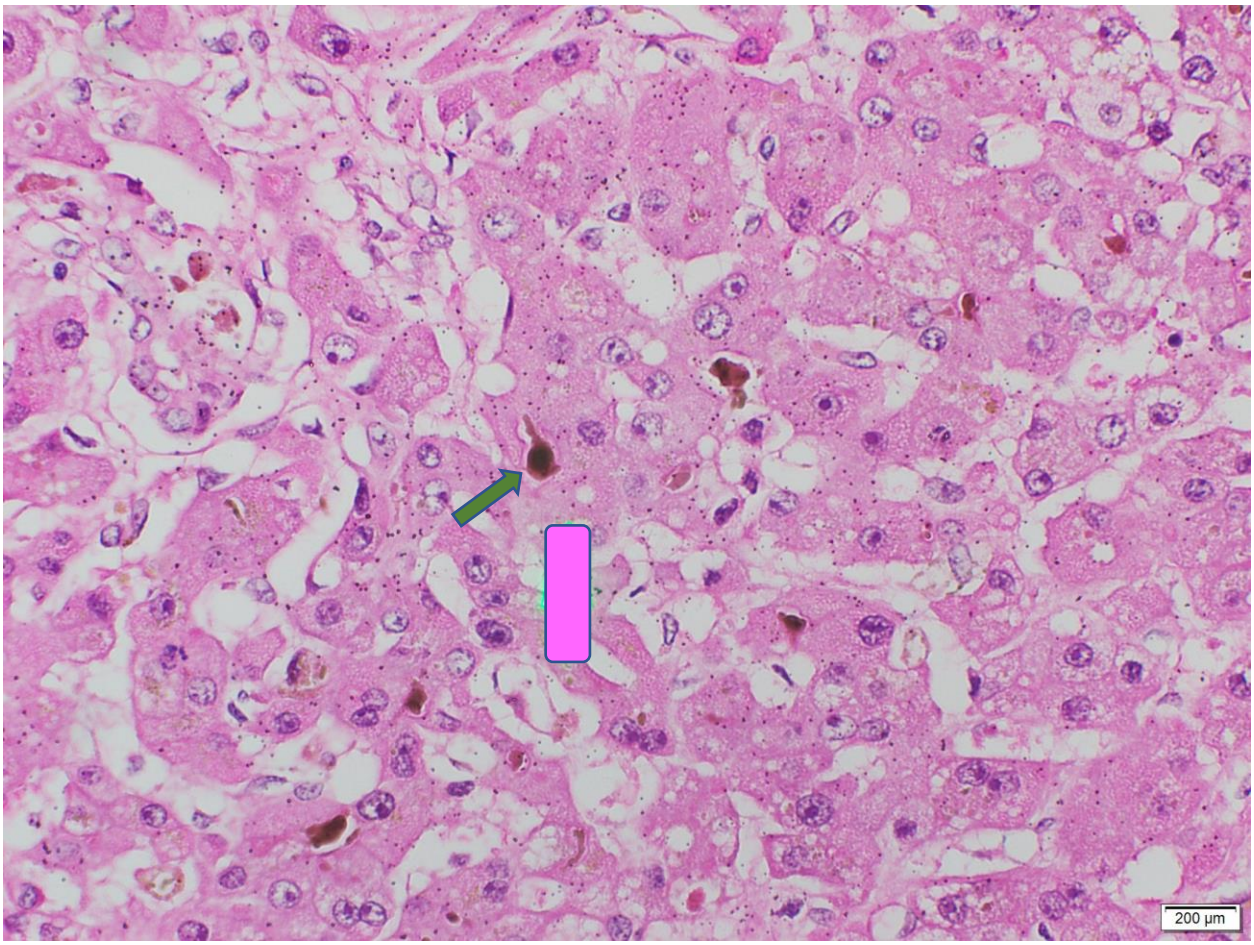


Figure 11: Liver with intra canalicular bile stasis (arrow)

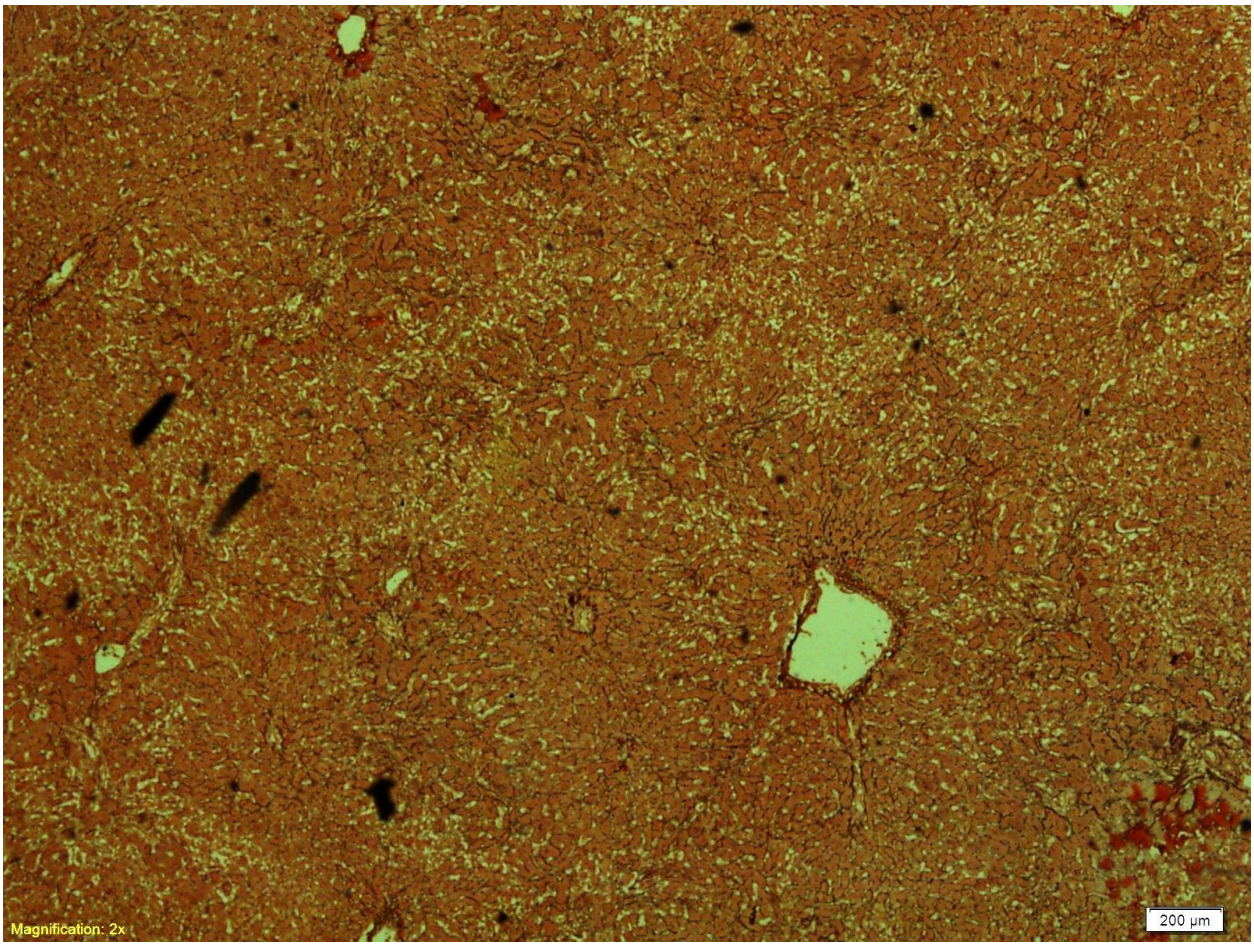


Figure 12: Liver necrosis (Reticulin stain)

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