

TABLE OF CONTENTS

	PAGE
LIST OF ILLUSTRATIONS	xxvii
INTRODUCTION	
What is Radio-diagnosis?	1
Radiological Anatomy and Physiology	3
<i>Part I. TECHNIQUE</i>	
CHAPTER I	
ROUTINE AND TECHNIQUE	5
The Importance of Routine	5
Prejudgment	7
The Importance of Complete Examinations	7
Hospital Routine	8
The Opaque Mixtures	9
The Food used for the First Meal	9
The Food used for the Second Meal	10
The Opaque Enema Mixture	11
X-Ray Cinematography	11
CHAPTER II	
TECHNIQUE OF SCREENING, PALPATION AND REPORTING	12
Historical	12
Routine for Examination	14
Preparation of the Patient	14
The History	15
Intensity of Radiation for Screen Examinations	16
Preparation of the Observer's Eyes	16
"Visual Anaesthesia"	17
Radiological Palpation	18
Gloves	18
The Technique of Palpation	18
Pressure Sense in Palpation	20
The Technique of the First Examination	21
The Study of Mucosa	23
Pylorus	24
Duodenal Cap	24
The Technique of the Second Examination	25
The Technique of the Opaque Enema	26
The Radiologist's Report	29
Precepts for Examinations	31

TABLE OF CONTENTS

	PAGE
CHAPTER III	
RADIOLOGICAL RISKS AND THEIR AVOIDANCE	32
A. RISKS OF THE RADIOLOGIST AND HIS STAFF	32
Conditions that have been tolerated	33
The Safety Limit	34
(1) Dangers from Exposure to X rays	35
Inspection of Equipment	35
Working Precautions	36
Secondary Radiations	37
Precautions against Dangers arising from Secondary Radiations	38
Can Fluoroscopy be reasonably safe?	39
The Upright Screening Stand	41
Protective Aprons	41
Tube Boxes	43
Radiography during Screening	43
Measurements of the Danger	44
(A) The Upright Screening Stand	44
(B) Screening on the Couch	45
(C) In Radiography	45
(2) Dangers from Electrical Shock	46
(3) Dangers from General Conditions	48
B. RISKS TO THE PATIENT	49
Idiosyncrasy	51

Part II. THE RADIOGRAPHIC EXAMINATION OF THE
"NORMAL" GASTRO-INTESTINAL TRACT

CHAPTER IV

THE VALUE OF THE OPAQUE MEAL	53
History	53
Fallacies in Methods of Observation	55
(1) Studies of the Abnormal	55
(2) Studies under Anaesthesia	57
(3) Studies of Animals	57
(4) Indirect Methods	58

TABLE OF CONTENTS

xvii

SECTION I: ANATOMY

THE ANATOMY OF THE "NORMAL" STOMACH AND THE INHERENT
MOBILITY AND ADAPTABILITY OF THE ABDOMINAL VISCERA

	PAGE
CHAPTER V	
THE STOMACH: SOME ANATOMICAL CONSIDERATIONS	62
The Varying Thickness of the Stomach Wall	63
The Nerve Supply	63
The Muscular Coats of the Stomach	65
Some Electrical Experiments on the Stomach Muscles	67
The Mucous Membrane	69
The Pyloric Sphincter	71
CHAPTER VI	
THE FACTORS INFLUENCING THE FORM AND POSITION OF THE STOMACH	73
Technique of the Composite Pictures	74
Superimposing the Tracings	75
The Fallacies of the Composite Pictures	76
Description of the Composite Pictures	77
The Cardiac Orifice	77
The Pylorus	78
The Shape of the Stomach (Erect Posture): Mid-Phase of Respiration	79
Lateral View	81
The Form in Children	83
The Part played by Gastric Tone	83
"Atony"	87
The Stomach in the Operating Theatre	88
Gastric Spasm	89
The Effects of Posture on the Stomach	91
Recumbent-Supine Position, antero-posterior view	91
Recumbent-Supine Position, lateral view	91
Recumbent Position, lying on the left side	91
Recumbent Position, lying on the right side	92
The Effects of Respiration on the Stomach	92
Deep Inspiration	92
Forced Expiration	93
Models of the Stomach	93
CHAPTER VII	
EFFECTS OF POSTURE AND RESPIRATION ON OTHER VISCERA	96
The Large Intestine	96
Caecum and Appendix	96
Colon	97

TABLE OF CONTENTS

	PAGE
The Pancreas	98
The Kidneys	99
The Liver	100
The Spleen	101
Transposition of Viscera	102
A Demonstration of Mobility	103
CHAPTER VIII	
THE MOBILITY AND ADAPTABILITY OF THE VISCERA	105
Previous Work	106
Previous X-ray Observations	107
Abdominal Belts and Fixation Operations	110
The Failure of Fixation Operations	110
Fluid Anatomy	111
Nature's Mechanics	113
CHAPTER IX	
THE DIAPHRAGM	115
The Normal "At Rest" Position	115
The Costo-Phrenic Angle	116
The Levels in Respiration	118
The Effect of Posture	119
Lateral Recumbent Position	121
The Tonic Control of the Diaphragm	121
Independent Control of the Two Sides	122
The Technique of Investigation of the Diaphragm	123
SECTION II: PHYSIOLOGY	
THE MOVEMENT OF FOOD FROM MOUTH TO ANUS	
CHAPTER X	
THE NORMAL MECHANISM OF SWALLOWING	126
Gravity	128
Current Views	128
A Subjective Study of Swallowing	130
The Process seen Radiographically	131
The Pharynx	132
The Laryngeal Pharynx	134
The Anatomical Segment concerned with Swallowing	136
Experimental Proof of the Negative Pressure	137
Animal Observations	139
The Concept of Negative Pressure	141

TABLE OF CONTENTS

xix

	PAGE
CHAPTER XI	
THE OESOPHAGUS AND STOMACH	143
The Cardiac Orifice	144
The Stomach	147
Gastric Peristalsis	149
"Churning"	152
Factors affecting Peristalsis	155
Hunger Movements	156
The Control of Peristalsis	156
"The Gradient"	157
The Control of the Pyloric Sphincter	158
CHAPTER XII	
THE INTESTINES	163
The Duodenum and Small Intestine	163
The Terminal Ileum	166
The Gastro-ileac and Ileo-gastric Reflexes	167
The Ileo-caecal Valve	168
The Large Intestine	169
The Appendix	169
Caecum and Colon	170
"Mass" Movement	170
The Mechanism of Mass Movement	173
Other Movements	174
Recent Work with Cinematograph Films	175
Defaecation	175
Constipation	176
Part III. PATHOLOGY	
Introduction	181
CHAPTER XIII	
THE OESOPHAGUS	184
Methods of Investigation and their Limitations	184
Oesophageal Bougie	184
Oesophagoscope	184
X ray	184
Oesophageal Diverticula	185
Thoracic or Oesophageal Stomach	187
Displacements of the Oesophagus	187
Oesophageal Varix	188
Oesophageal Obstruction	189
The Causes of Oesophageal Obstruction	190

TABLE OF CONTENTS

	PAGE
(1) SOURCES OF EXTERNAL PRESSURE (OESOPHAGEAL COMPRESSION) .	190
Pharyngeal Pouch	190
Symptoms	190
Diagnosis	191
(2) CHANGES IN THE WALLS	196
Oesophageal Spasm	197
A. New Growths of the Oesophagus	198
B. Peptic Ulcer of the Oesophagus	199
Abscess	201
(3) FOREIGN BODIES IN THE OESOPHAGUS	201
(4) REFLEX CAUSES	204
Neurotic and Hysterical Obstructions	204
Globus Hystericus	205
Vallecular Dysphagia	205
Paralysis of the Oesophagus	205
The Stages of Oesophageal Obstruction	206
Stage 1: Difficulty in Swallowing	206
Stage 2: Pain after Swallowing	207
Stage 3: Dilatation	207
Back-Pressure Dilatation	209
Achalasia of the Cardia	209

CHAPTER XIV

THE DIAPHRAGM	214
Unilateral Elevation of the Diaphragm	214
Physiological	214
Paralysis of the Phrenic Nerve	215
Eventratio Diaphragmatica	215
Diaphragmatic Hernia	216
Traumatic Diaphragmatic Hernia	217
Congenital Absence of the left half of the Diaphragm	219
Oesophageal Orifice Hernia	219
Sub-phrenic Abscess	221
Sub-hepatic Abscess	222
Hydatid Cyst	222
Spasm of the Diaphragm	222
Free Gas in the Peritoneal Cavity	224

CHAPTER XV

GASTRIC, DUODENAL AND JEJUNAL ULCERATION	225
Introductory	225
Indirect Signs	226
Pain	228

TABLE OF CONTENTS

xxi

	PAGE
THE FREQUENCY AND DISTRIBUTION OF ULCERS	230
Other Statistics	232
THE ULCER CRATER	232
The "Penetrating" Ulcer	235
ULCERS IN SPECIAL REGIONS	238
(1) Fundus and Upper Stomach	238
(2) Body of the Stomach	239
Hour-glass Contraction	240
(3) Pylorus	243
Indirect Signs of Pyloric Ulcer	245
(4) Duodenal Ulcer	245
Perforation into Biliary Passages	249
(5) Post-Operative Ulcer: Jejunal Ulcer	249

CHAPTER XVI

NEW GROWTHS OF THE STOMACH AND DUODENUM	252
(1) The Ulcerative Type	252
(2) The Fungoid Type	254
Differential Diagnosis of Fungoid Cancer	257
(3) Linitis Plastica: Scirrhus or Fibroid Carcinoma	257
The Relation of Cancer to Ulcer	258
New Growth of the Duodenum	260
Diagnosis	262

CHAPTER XVII

OTHER CONDITIONS OF THE STOMACH AND DUODENUM	263
Delay in Emptying	263
In a Stomach of Good Tone	263
In a Stomach of Poor Tone	264
Pyloric Obstruction	265
Acute Cases	265
Chronic Cases	266
Abnormal Peristalsis	266
Reverse Peristalsis	267
Vomiting	267
Merycism (Rumination: Cud-chewing)	270
Gastritis	270
Syphilis	272
Tuberculosis	274

B D T

b

	PAGE
Adhesions	274
Polypi	274
Foreign Bodies	275
Hair-ball	276
Excess of Air in the Stomach	277
Air-Eating	277
Aerophagy—Air-Swallowing	278
Oesophageal Aerophagy	279
Air-sucking	280
Gastric Borborygmi	280
Gastroptosis	282
Diverticula of the Stomach	283
Hypertrophic Stenosis of the Pylorus	284
Congenital Pyloric Stenosis	285
The Post-Operative Stomach	287
Other Duodenal Conditions	289
Duodenitis	289
Adhesions	293
Duodenal Diverticula	293
Pseudo-diverticulum of the Duodenum	293
The Looped Duodenum	294
Duodenal Ileus, Chronic Intermittent Obstruction and Duodenal Stasis	295
Tumours outside the Gastro-Intestinal Tract	297

CHAPTER XVIII

THE SMALL AND LARGE INTESTINE	298
Small Intestine	298
Colic	298
Organic Lesions of the Small Intestine	298
Jejunal Diverticula	300
Meckel's Diverticulum	300
The Terminal Ileum	301
Appendix	301
Chronic Lesions	302
Acute Conditions	302
Caecum	304
Chronic Hyperplastic Tuberculosis	305
Migratory Caecum	305
Constipation	305
Colon	305
Colitis	305

TABLE OF CONTENTS

xxiii

	PAGE
Intussusception	311
Diverticulitis	311
The Pre-Diverticular Stage	312
The Diagnosis of Diverticulitis	313
Polypoid Conditions	314
Carcinoma of the Large Intestine	314
Indications of Growth	316
Differential Diagnosis	317
Hirschsprung's Disease: Idiopathic Dilatation of the Colon	317
 CHAPTER XIX 	
THE GALL-BLADDER	319
Anatomy and Physiology	319
Constituents of Bile	322
Pathology	322
A Study of Excised Specimens	325
Preparation of the Patient and Administration of the Salt	327
The Oral Method	328
The Intravenous Method	330
Cholangiography	330
Radiographic Technique	330
The Diagnosis of Gall-stones	332
A. The Direct Method	332
B. Cholecystography	333
The Significance of Gall-stones in a Gall-bladder that is functioning satisfactorily	335
Indications from the Opaque Meal	335
Other Conditions of the Gall-bladder	336
 APPENDIX I 	
THE ORGANISATION AND EQUIPMENT OF AN X-RAY DEPARTMENT	340
The Essentials of an X-ray Department	340
Provisions for a Radiologist	341
Staffing an X-ray Department	342
Planning a Suitable Department	344
Housing the Department	344
Position of the X-ray Department	347
Size of Rooms	348
Floors	348
Ordered Sequence of Rooms	349
Protective Material for Walls and Floors	349
Windows	349
Ventilation	350
Doors	350

b 2

TABLE OF CONTENTS

	PAGE
Decoration	350
The Dark Room	351
Organisation of the Dark Room	351
Recovery of Silver	353
Layout of Apparatus	353
Main Current	354
Wiring	354
Plugs	355
Earth Wires	355
Telephone and Bells	355
Lighting	355
Office Work	356
Filing and Indexing	357
Teaching and Museum Films	361
APPENDIX II	
THE RADIATION RISKS OF THE ROENTGENOLOGIST	363
An Attempt to Measure the Quantity of Roentgen Rays used in Diagnosis and to assess the Dangers	363
Assumptions	364
Basic Standard—The Unit Skin Dose	364
Instrumentation	364
Calibration of the Instrument	365
Known Conditions of Tolerance to Roentgen Rays	365
Deduction of a Safety Limit—0.0014 u.s.d. (0.63r) Daily	367
Applying the Safety Limit to Roentgenography	368
Secondary Radiations	369
Deductions for Roentgenography	370
Applying the Safety Limit to Roentgenoscopy	371
Quantity of Radiation employed	371
Secondary Radiations in Roentgenoscopy	372
Deductions for Roentgenoscopy	374
Blood Changes	375
Measuring the Safety Limit in Practice	376
Comparison	377
Conclusions	378
APPENDIX III	
NOTE ON SECONDARY RAYS	379
APPENDIX IV	
NOTE ON THE EFFECTS OF POSTURE ON THE BLOOD SUPPLY TO THE ABDOMEN	381

TABLE OF CONTENTS

xxv

APPENDIX V

	PAGE
INTERNATIONAL RECOMMENDATIONS FOR X-RAY AND RADIUM PROTECTION	383
I. Working Hours, etc.	383
II. General X-ray Recommendations	383
III. X-ray Protective Recommendations	384
IV. Electrical Precautions in X-ray Rooms	385
V. Radium Protective Recommendations	385
(A) Radium Salts	385
(B) Emanation	386

APPENDIX VI

THE LEGAL OWNERSHIP OF X-RAY FILMS	387
--	-----

APPENDIX VII

THE PHOTOGRAPHIC METHOD OF ESTIMATING EXPOSURE TO X RAYS	390
BIBLIOGRAPHY	393
AUTHORS' INDEX	405
GENERAL INDEX	409