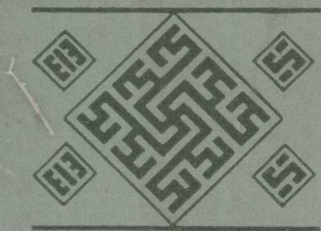


*THIRD
EDITION*



ROENTGEN
EXAMINATIONS
IN ACUTE
ABDOMINAL
DISEASES

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J. FRIMANN-DAHL, M.D., Ph.D



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In Acute

Abdominal Diseases

By

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PREFACE

SINCE THE PUBLICATION of the Second Edition of this book on roentgen examination in acute abdominal diseases, considerable new experience has been accumulated. The organization of this material, however, has taken a long time, and as a result, this Third Edition is just now being published. Because the Second Edition is no longer available, the Publisher urged me to write a Third Edition, and I am very grateful to him for his support and willingness to embark on this venture.

Over the years, roentgen examination in acute abdominal disorders has become more important, and in most large clinics emergency examinations have been established as routine. In addition, an increasing number of patients with blunt trauma to the abdomen, many due to traffic accidents, are now sent for roentgen examination, which increases the importance of this procedure. The examination must be performed immediately, and doctors, nurses and technicians must be on duty day and night. This is a burden to the staff of the x-ray department, a problem which in some way must be solved. The roentgen examination is all important to advanced surgery and therefore these disciplines must work in close cooperation. The training of a staff in the diagnosis of acute abdominal disorders is indeed a challenge which takes many years to master, and there will always be surprises and new experiences. The diagnosis must be made following only a short observation and often there is not time for prolonged consideration. Therefore, it is of importance to have a text in which advice and information can be sought concerning the actual findings.

This book is meant to be an introduction for students and a guide for radiologists not only in their training period, but also in daily routine work. It should also be an aid to the surgeon whose cooperation certainly is fundamental to the final result. If the Third Edition contributes to better knowledge and improves treatment in this field of medicine, its writing has been justified.

INTRODUCTION

ACUTE ABDOMINAL DISORDERS are among the most frequent lesions found in patients admitted to the general clinics. Often the diagnosis can be made easily by clinical examination, but in other instances it is impossible to arrive at a definite result. The roentgen examination has similar aspects; sometimes the diagnosis is evident, and in other cases it is obscure. This varies from case to case, and paradoxically the findings may be certain where the clinical examination is vague and, vice versa, the clinical examination may be definite while the roentgen findings are few. Therefore, cooperation between the clinician and the roentgenologist is the only sensible solution and the only way to obtain a final result which will benefit the patient. Certainly, most of these patients are admitted to the surgical department, but some are also seen in medical wards. Some are borderline cases and may need observation by different specialists.

Certainly, difficulties arise as to the definition of when abdominal disturbances become an "acute abdomen" requiring prompt medical attention. It has constantly been the task of the writer to keep the theme within such limits.

CONTENTS

	Page
<i>Preface</i>	3
<i>Introduction</i>	7
<i>Chapter</i>	
I. Procedure and Technic	7
1. Apparatus	7
2. Quality of the Films	8
3. Use of Contrast Media	12
II. Normal Findings	12
1. The Peritoneal Cavity	16
2. Development of Peritoneum and Alimentary Canal	17
3. Roentgen Anatomy of the Abdomen	26
III. Roentgen Anatomy of the Intestinal Tract	26
1. Normal Variations	32
2. Roentgen Anatomy of the Flanks	35
3. Normal Variations in the Flank	37
4. Accumulation of Gas and Occurrence of Fluid Levels	40
IV. General Pathological Findings	41
1. Factors Influencing the Absorption of Gases	45
2. Local Changes in the Bowel	46
3. Fluid in the Intestine	46
4. Pneumoperitoneum	59
5. Free Fluid in the Peritoneal Cavity	60
6. Fluid in the Minor Pelvis	67
7. Fluid in the Flanks	73
8. Ascites	

Chapter	Page
V. Lesions in the Chest	78
1. Diaphragmatic Signs	78
2. Pleural Signs	79
3. Pulmonary Lesions	80
4. Pulmonary Embolism	82
VI. Special Pathological Findings	88
(Stenosis and Obstruction)	
1. Acute Dilatation of the Stomach (Gastrectasia)	88
2. Acute Duodenal Obstruction	98
3. Intestinal Obstruction (Mechanical Ileus)	99
4. Simple Occlusion	103
5. Roentgen Findings in Small Bowel Obstruction	108
6. Experimental Investigations	111
7. Obstruction in Proximal Portion of the Small Bowel	114
8. Mechanical Obstruction in the Middle and Lower Part of the Small Intestine	121
9. Location of Stenosis	131
VII. Strangulating Obstruction	137
1. Roentgen Findings in Strangulating Obstruction	138
2. How Early Can the Diagnosis "Obstruction" Be Made?	148
3. Examination with Contrast Media in Obstruction	150
4. Intubation	156
5. Therapeutic Importance of the Findings	162
6. Incomplete Obstruction	163
VIII. Obturating Obstruction	166
1. Gallstone Ileus	166
2. Food Obstruction (Alimentary Ileus)	176
3. Obturation Due to Enteroliths	180
IX. Mechanical Obstruction of the Large Bowel	185
1. Obstructions Due to Stenosis of the Cecum	186

Chapter

Page

	2. Obstruction Due to Stenosis of the Flexures and Transverse Colon	187
	3. Obstruction Due to Stenosis of Sigmoid and Rectum	191
X.	Congenital Malformations Causing Intestinal Obstruction	199
	1. Atresia	199
	2. Imperforate Anus	201
	3. Meconium Ileus	204
XI.	Hernias	210
	1. Strangulating External Hernia	213
	2. Inguinal Hernia	215
	3. Obturator Hernia	217
	4. Umbilical and Incisional Hernia	218
	5. Diaphragmatic Hernia	220
	6. Hiatus Hernia	221
	7. Diaphragmatic Hernia of Traumatic Origin	222
	8. Internal Hernias	228
XII.	Intussusception	233
	1. Intussusception in Adults	233
	2. Invagination of the Stomach	233
	3. Intussusception in Operated Stomachs	234
	4. Intussusception of the Small Intestine	238
	5. Intussusception in Pregnancy	244
	6. Intussusception of Meckel's Diverticulum	244
	7. Invagination of the Colon	246
	8. Invagination of Colonic Haustra	247
	9. Intussusception of the Appendix	247
	10. Infantile Intussusception	248
	a. Examination with Barium Enema	254
	b. Barium Enema as a Therapeutic Procedure	256
	c. Technical Procedure	257
	11. Intussusception Starting in the Colon	258

xii	<i>Roentgen Examinations in Acute Abdominal Diseases</i>	
<i>Chapter</i>		<i>Page</i>
XIII.	Volvulus	260
	1. Volvulus of the Stomach	261
	2. Volvulus of the Small Intestine	264
	3. Volvulus of the Large Bowel	279
	4. Volvulus of the Cecum	279
	a. Pathogenesis	280
	b. Classification	281
	c. Clinical Diagnosis	282
	d. Roentgen Diagnosis	283
	e. Differential Diagnosis	289
	5. Volvulus of the Transverse Colon	291
	6. Volvulus of the Flexures	291
	7. Volvulus of the Sigmoid	292
	a. Anatomy and Pathogenesis	293
	b. Occurrence	295
	c. Mechanism of Volvulus	297
	d. Examination with Barium Enema	305
	e. Treatment	308
	f. Stenosis Localized to One Limb of the Loop	313
XIV.	Intestinal Knot Syndrome (Compound Volvulus)	316
XV.	Mesenteric Thrombosis—Intestinal Infarction	324
XVI.	Mesenteric Strangulation	333
XVIII.	Inhibition Ileus (Paralytic)	338
	1. Peritonitis	339
	2. Divergences	344
	3. Postoperative Ileus, Intestinal Paralysis	347
XXI.	Acute Appendicitis	368
	Acute Typhlitis	384

<i>Chapter</i>	<i>Contents</i>	<i>xiii</i>
		<i>Page</i>
XXV.	Ulcer Perforation of Stomach and Duodenum.....	414
	1. Indirect Signs	416
	2. Direct Signs	421
	3. Use of Contrast Media.....	423
XXVI.	Local Inflammations	431
	1. Inflammation in the Flanks	432
	2. Circumscribed Abscesses	432
	3. Diffuse Inflammations	435
	4. Abscesses in the Lesser Pelvis.....	437
	5. Interintestinal Abscesses	438
	6. Subphrenic Abscesses	443
XXIX.	Roentgen Examination in Abdominal Trauma.....	473
	1. Rupture of the Diaphragm	474
	2. Rupture of the Liver	476
	3. Rupture of the Spleen	480
	4. Rupture of the Kidney	489
	5. Rupture of the Stomach	507
	6. Rupture of the Duodenum	507
	7. Rupture of the Small Intestine	508
	8. Rupture of the Pancreas	513
	9. Rupture of the Mesentery	514
	10. Rupture of the Colon	515
	11. Rupture of Aneurysms	516
<i>References</i>		539
<i>Author Index</i>		561
<i>Subject Index</i>		569

<i>Chapter</i>	<i>Contents</i>	<i>xiii</i> <i>Page</i>
XXV.	Ulcer Perforation of Stomach and Duodenum.....	414
	1. Indirect Signs	416
	2. Direct Signs	421
	3. Use of Contrast Media.....	423
XXVI.	Local Inflammations	431
	1. Inflammation in the Flanks	432
	2. Circumscribed Abscesses	432
	3. Diffuse Inflammations	435
	4. Abscesses in the Lesser Pelvis.....	437
	5. Interintestinal Abscesses	438
	6. Subphrenic Abscesses	443
XXIX.	Roentgen Examination in Abdominal Trauma.....	473
	1. Rupture of the Diaphragm	474
	2. Rupture of the Liver	476
	3. Rupture of the Spleen	480
	4. Rupture of the Kidney	489
	5. Rupture of the Stomach	507
	6. Rupture of the Duodenum	507
	7. Rupture of the Small Intestine	508
	8. Rupture of the Pancreas	513
	9. Rupture of the Mesentery	514
	10. Rupture of the Colon	515
	11. Rupture of Aneurysms	516
<i>References</i>		539
<i>Author Index</i>		561
<i>Subject Index</i>		569

CHAPTER I

PROCEDURE AND TECHNIC

ROENTGEN EXAMINATION in acute abdominal emergencies must be performed quickly, but with the greatest care and accuracy. Transport and handling of the patient should be rapid and smooth. Preferably the roentgen and the surgical department should be located in close proximity so that the surgeon can enter the viewing room of the x-ray department and discuss the findings with the radiologist. Moreover, the radiologist should go to the operating theatre whenever he can to observe the findings so that he can check the diagnosis and assist in good treatment of these patients.

The examination is usually based on plain films of the abdomen. Occasionally the findings may be obscured by bowel contents, but an attempt to empty the bowel by water enemas should be avoided. This could result in increased pain and the enema provides retention and formation of fluid levels. These may give a confusing picture easily mistaken for pathological conditions, for instance, a peritoneal irritation or a gastroenteritis. In normal conditions a water enema produces small fluid levels which vanish after two to three hours, but when the bowel is parietic for some reason or other, the levels may be larger and of long-standing duration. Defecation prior to examination is advantageous, but no laxative should be given to bring this about because irritation of the mucous membrane and small fluid levels may result.

Usually, these patients have not taken a meal since the onset of symptoms. For routine examination this is unimportant. Some food or liquid prior to roentgen examination will not interfere with the interpretation of the films, but in general one should ask the patient not to eat or drink before the examination.

Before the examination the urinary bladder should be emptied. A filled bladder may be mistaken for fluid in the pelvis or a tumor-

like mass. If the patient cannot evacuate the bladder spontaneously, catheterization must be considered. One should remember that some air may enter the bladder during this procedure causing a fluid level if the patient is filmed with horizontal rays.

One may object to catheterization due to risk of infection, particularly in men. This complication may be avoided by intravenous injection of water soluble contrast as in ordinary urography. The contrast collects in the bladder after 15 to 30 minutes, and one is able to determine if the supposed density is the bladder or not. Indentations upon the bladder may, as will be shown later, be a valuable sign.

Preferably, the examination should be performed in a special emergency room. Work here should be exempt from the daily routine programme. The patient should be examined on a special stand which must have movable Bucky's both for vertical and horizontal rays. With modern stretchers the patient can be slid over the Bucky table, and raised and lowered by pneumatic force. In the same room a stand for fluoroscopic television should be available so the patient may be fluoroscoped whenever there is suspicion of a lesion in the lungs. One should also check the movements of the diaphragm. Likewise, in a number of these cases, there is also a need for fluoroscopic examination of the abdomen, i.e. of various sections of the intestinal tract, their movements and position, palpation of tumor-like densities and so forth. This, however, will be presented in detail later in the text.

If the patient is in such poor condition that the examination must be made while in bed, a stationary grid is used and placed directly on the cassette (size 30 x 40 cm 14 x 17 inch), the patient in the supine position. One should also try to obtain two separate films in both lateral decubitus positions with horizontal rays and with both the left and right side down. Furthermore, if a perforation is suspected, a film is also taken with horizontal rays and the patient supine.

When there are no objections, the patient should be lifted from the bed to the x-ray table. The roentgenologist should always avail himself on the most important details of the history, and also make a short clinical examination of the patient in order to get a preliminary impression of the condition.

The roentgen examination may vary in its technique depending on the lesion suspected and may be modified during the course of the examination. However, a certain standard procedure should be established, and films taken in the supine position, in lateral decubitus positions, preferably with the left side down but very often also with the right side down in cross table projection, and finally in the upright position with horizontal rays.

The supine plain films are taken as in any conventional survey, care being taken to place the lower edge of the film exactly at the level of the symphysis (Figure 1). The tube is centered to the middle of the cassette with no further precautions needed to obtain

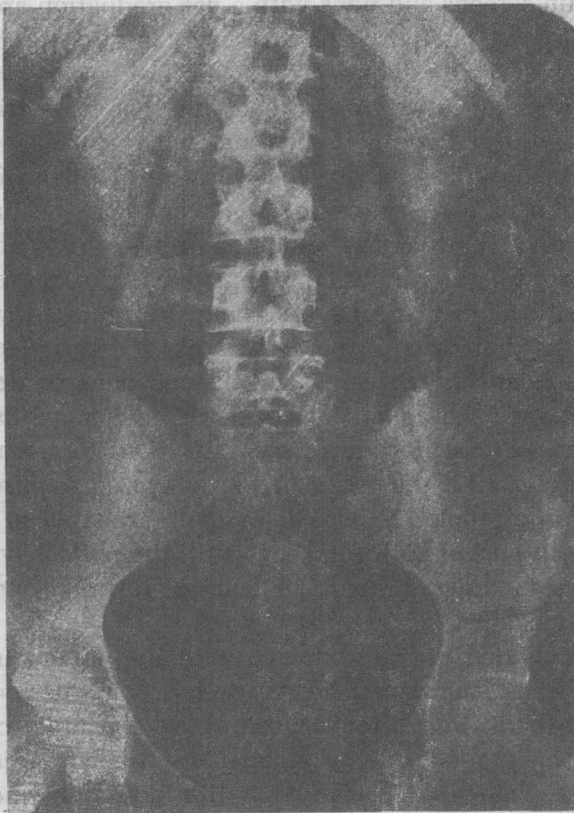


Figure 1. Plain film of the abdomen. Intestines nearly devoid of gas. Psoas margin sharply defined.

a perfectly centered picture. Occasionally, a few patients have such a long abdomen that additional films are needed to include the upper part.

The flanks are best examined on a film 30 x 40 cm, transversely positioned, and should be equally exposed for comparison on the same film. When a collection of fluid or inflammation is suspected it may be of advantage to make special properly exposed films of the flanks without too much blackening. Wedges of aluminum or grain sacs have been recommended for this purpose and are at times convenient, particularly in heavy patients, and when automatic exposure devices are used. When carefully positioned, the Saab Dodger is useful for obtaining good pictures of the flanks.

Fine grain screens and films with a flat graduation are best suited for this purpose, but fairly good results can also be obtained with ordinary screens. The flanks in particular are better visualized with a film-focus distance of 1.20 m, and this should be tried not least in patients with a large abdomen and bulging flanks.

In certain instances, when an abscess in the flank is suspected, a special film of each side must be taken with the tube centered over the lateral part of the abdomen. When fat is abundant and the flanks are bulging, the tube is angled 10 to 15 degrees obliquely from the side. Other special films may be required; for example, of the epigastrium when a perforated ulcer is suspected, or of the right hypochondrium in cases of gallstone ileus to determine the presence of gas in the biliary ducts. Additional small films are taken of the pelvis in cases of an abscess, a twisted tumor and so forth. The diaphragm and the bases of the lung also require special attention. For example, to visualize small exudates in the pleura, films are made using horizontal rays with the patient lying with the suspected side down turned 20 degrees dorsally, and the pelvis somewhat elevated.

For examination of the abdomen with the patient in the lateral position, the patient should lie on the left or right side, positioned so that the flanks are lifted a little above the table by a support that gives no shadow on the films. Thus the side adjacent to the table is also well exposed, which is often desirable when searching for exudates in the peritoneal cavity.

As will be shown later, examination of the lungs is important in

acute abdominal cases, partly because pain from intra-abdominal lesions is often referred to the lungs and pleura, and also because the patient may complain of abdominal pains while the actual lesion is in the thorax. Therefore fluoroscopy should be performed whenever a lesion of the lung or pleura is suspected. A chest film is advisable as a routine in these cases.

1. APPARATUS

Many different types of apparatus are suitable for obtaining good films of the abdomen. A rectifier with four valves is nearly as good as a six-valve machine as far as the quality of film is concerned, but in our opinion, preference should be given to the three phase unit. With such an installation the kilovoltage can be kept lower, the exposure shorter and the radiation hazard is also smaller. In general it is advisable to keep the milliamps relatively low in accordance with the aforementioned principle of having the central part well penetrated without the flanks showing too much blackening. Obviously there are no great conflicts between using smaller or larger units if only this main point is kept in mind.

Ceiling devices for the tube stand are being used more frequently and are very well suited for taking good films of acute abdominal cases. The movable Bucky should be mounted on a pedestal which can be adjusted up and down or on a wall stand.

As to fluoroscopy, it is of advantage to have an image intensifier with a large field (up to 32 cm that is a 9 x 12 inch unit). With this size it is easier to obtain a survey of the entire abdominal field. The intensifier should be mounted on a motor-driven table so that the patient can be raised and lowered easily. Attention is also drawn to modern devices where the tube and the intensifier are mounted in an arc, making different projections very handy.

2. THE QUALITY OF THE FILMS

In the examination of the acute abdomen good films are all-important. It is imperative that a certain standard quality is achieved and the radiologist must become accustomed to judging small deficiencies in density, e.g. by exudate and abscesses.

The problem of making good films will constantly meet with the requirement of keeping the dosage as low as possible. The fol-