walls, filling the lumina with epithelial and round connective-tissue cells. The absence of polymorphonuclear cells in bronchi or elsewhere was a conspicuous feature. No evidence whatever of a tuberculous lesion was found, or of acute pneumonic consolidation.

Asbestosis Bodies

The curious asbestosis bodies, so prominent a feature in cases already described by Cooke,⁷ Simson,⁴ Stewart,⁸ and Lynch and Smith,⁹ were abundantly present in all areas of both lungs. The bodies were generally golden-yellow in colour, and of great variety of shape and size. Many showed core, thought to be asbestos fibre, running down the centre of the body (Fig. 1); and in a few places the bare, translucent fibre itself was seen, with yellow deposit confined to the ends. Usually, however, the fibre was uniformly coated or encrusted with the yellow deposit (Fig. 2). The deposit gave the prussian-blue reaction for iron. The probable mode of formation of these bodies has been described in detail by McDonald.⁷ In addition to the bodies, much yellow pigment in the form of granules and globular masses was seen (Fig. 2). All were to be found lying free or phagocytosed inside air vesicles and bronchioles, and embedded in the alveolar walls, or in

the interstitial connective tissues (Fig. 1). Much of the finer dust was found within the endothelial cells of blood vessels, and in the peribronchial lymphatic glands. A few of the smaller bodies were also seen inside the lymphatic glands. A large amount of black carbon pigment was present throughout the tissues. Frequently both yellow and black pigments were phagocytosed within the same cell.

The photomicrographs are by Mr. Boot, Public Health Department, Glasgow.

REFERENCES

- ¹ Seiler, H. E.: *British Medical Journal*, 1928, ii, 982.
- ² Departmental Committee on Compensation for Industrial Diseases. Minutes of Evidence, Appendices, and Index: 1907, Cd. 3496, 127; Report, 1907, Cd. 3495, 14.
- ³ Cooke, W. E.: *British Medical Journal*, 1924, ii, 147.
- ⁴ Simson, F. W.: *Ibid.*, 1928, i, 885.
- ⁵ Merewether, E. R. A.: *Journ. Indust. Hyg.*, 1930, xii, 198.
- ⁶ Wood, W. B., and Page, D. S.: *Tubercle*, 1929, x, 457.
- ⁷ Cooke, W. E.; McDonald, Stuart; and Oliver, Sir T.: *British Medical Journal*, 1927, ii, 1024.
- ⁸ Stewart, M. J., and Haddow, A. C.: *Journ. Path. and Bact.*, 1929, xxxii, 172.
- ⁹ Lynch, K. M., and Smith, W. A.: *Journ. Amer. Med. Assoc.*, 1930, ii, 659.

ROUTINE RADIOGRAMS FOR INVESTIGATION OF INTESTINAL OBSTRUCTION

BY

E. T. C. MILLIGAN, M.D., F.R.C.S.

AND

GEORGE SIMON, M.B., D.M.R.E.

CHIEF ASSISTANT, X-RAY DEPARTMENT, ST. BARTHOLOMEW'S HOSPITAL

(With Special Plate)

Localization of the site of intestinal obstruction before operation for its relief facilitates the surgeon's task, and so is of incalculable advantage to the patient.

Opaque meal and enema given for x-ray investigations in these cases are not infrequently a source of peril, precipitating complete obstruction where partial obstruction already exists, and, apparently, subjecting all cases of abdominal section to the risks of post-operative paralytic ileus if time, which can often be ill spared, is not taken to clear the alimentary tract of residual barium. Furthermore, delay in operative treatment for the necessary x-ray examination and emptying of the bowel is frequently detrimental to the patient's interest; indeed, in some cases where urgent symptoms are present, evacuating methods must be abandoned, although harmful barium still lies in the bowel.

Discussions and writings on such topics as blind caecostomy and methods of search for the site of obstruction at operation are tacit admissions of inability, in many cases, to localize the site of obstruction by clinical methods until surgical exploration is performed. Enlightenment in this difficult matter of localization would therefore be acceptable, since a feeling of assurance would be inspired and a convenient abdominal wound might be substituted for an unsatisfactory exploratory incision. Instances are not wanting where, after a difficult, dangerous, and fruitless search (through an ill-planned incision) among greatly distended intestines, a colostomy or caecostomy has been performed, and the site of obstruction revealed only by subsequent x-ray investigation with opaque materials, or by further operation of an exploratory nature.

Invaluable information in cases of intestinal obstruction, paralytic and organic, in the small or large gut, is obtained by a routine simple radiogram of the distended abdomen before operation, without the aid of opaque substances

(barium enema or meal), and without preparation of any kind. Imprisoned gases outline with striking definition the position, size, and extent of the distended bowel on an x-ray film, the distended large gut being readily distinguished from the small intestine. The gas-filled caecum stands out prominently and characteristically. The site of obstruction in large bowel is marked by an abrupt ending of the gas-distended bowel. The contracted bowel, empty of gas, below the obstruction is not apparent on the film, thus lending striking definition to the place of obstruction.

The mitations and applications of this somewhat neglected and unfamiliar method will soon be learned by the surgeon who checks and confirms the x-ray interpretations by his operative findings. We have found that routine pre-operative x-ray investigation has given invaluable diagnostic aid in cases of small intestine obstruction, paralytic ileus, and large intestine obstruction; and often reveals, what is so important to the surgeon, the site of obstruction.

X-RAY TECHNIQUE

The examination should be carried out as soon as the patient reaches the department, and must be conducted rapidly, with as little disturbance as possible. A single posterior view of the abdomen is usually sufficient. Owing to the gaseous distension large films (17 by 14 inches) should be used if available, or important distended coils may be missed. Alternatively, two exposures at different levels on smaller films (15 by 12 inches), placed horizontally, may be employed. The Potter-Bucky diaphragm is essential, and very gentle compression helps to steady the parts. A soft ray, produced by not more than 75 K.V.P., will bring out the translucent gas areas to the best advantage, while a sufficient milliamperage should be used to enable the exposure to be made in less than four seconds, as the patient is usually too ill to hold the breath longer.

Six illustrative radiograms with explanatory notes are reproduced on the Special Plate. It should be noted that Fig. 3 has been turned through a right angle.

We acknowledge our great indebtedness to the radiological departments of the Croydon General Hospital, St. Mark's Hospital, the Weir Hospital, and the Woolwich War Memorial Hospital for their ready co-operation in the immediate radiographic investigation, often at inconvenient hours, of cases of intestinal obstruction on which this article is based.

E. T. C. MILLIGAN AND GEORGE SIMON: ROUTINE RADIOGRAMS FOR INVESTIGATION OF INTESTINAL OBSTRUCTION

FIG. 1.—Constricting carcinoma of the sigmoid colon. Sub-acute obstruction. Male, aged 87. Excision of growth by Devine's modification of Paul's method. Note.—The gas-ballooned proximal sigmoid ends abruptly at the site of obstruction. Distinctness of the site of obstruction, thereby produced, equals that indicated by barium and in the rectum.

FIG. 2.—Carcinoma of the sigmoid colon. Intestinal obstruction. Female, aged 55. Excision of growth by Devine's modification of Paul's method. Note.—Characteristic gas ballooning of the cæcum, ascending and descending colon with abrupt ending localizing the site of obstruction. Small intestine is undilated and so does not show in the film.

FIG. 3.—Fibrous obstructing stricture of the sigmoid colon in a very corpulent female. Note.—Enormous distension of the cæcum which reaches across the midline showing main incidence of obstructive dilatation. The dilated transverse colon is seen in the upper part of the film, and therefore indicates site of obstruction below this point. Another film of this patient, not exhibited, revealed the actual site of obstruction in the sigmoid colon, suggesting that if the first film does not reveal the site of obstruction very clearly another taken only a few minutes later may do so.

FIG. 4.—Paralytic ileus following operative relief of small gut obstruction by adhesions. Note.—Universal gas distension and increase in calibre of small gut. The transverse striations in distended small bowel are thinner and more closely spaced than in dilated large gut. Furthermore, adjacent walls of distended small gut pressed together by gas show as striking dark bands running obliquely or transversely across the abdomen, contrasting with the clear gas-filled translucent areas between.

E. T. C. MILLIGAN AND GEORGE SIMON: ROUTINE RADIOGRAMS FOR INVESTIGATION OF INTESTINAL OBSTRUCTION

FIG. 5.—Strangulated femoral hernia. Female, aged 75; operation; recovery. Radiogram shows very early localized stage of dilated small intestine in small gut obstruction. The colon is undistended.

FIG. 6.—Carcinoma of the rectum producing obstruction. Note.—Distension of whole of large gut with gas and faeces. Site of obstruction indicated by gas is as distinct as indicated by barium in rectum.

H. HILTON STEWART AND J. H. BIGGART: ACUTE BRONCHIOLECTASIS

FIG. 1.—Low power view of bronchiolectatic cavity; (a) lumen of bronchiole filled with purulent exudate; (b) remnants of bronchiolitic wall; (c) surrounding lung alveoli partially collapsed and pneumonic.

FIG. 2.—High power view of wall of bronchiole; (a) the exudate is composed of polymorphonuclears; (b) the congested wall of the bronchiole from which the epithelium has disappeared; (c) the partially collapsed alveoli.