

secs. Each should form an independent opinion and then in consultation try to agree on a diagnosis; likewise the radiologist and—may I suggest it?—the physician, should be present at the operation, to see how far the condition found is in accordance with their previous conceptions. Such a practice would be to their mutual advantage, and would lead to greater accuracy in diagnosis.

Above all, we must keep a sense of proportion. Too much science may mean too little common sense. Radiology, like any other invention, must be used with discretion and with that

“ Good sense, which only is the gift of Heaven,
And tho' no science, fairly worth the seven.”

THE FALLACY OF X RAYS IN ABDOMINAL DIAGNOSIS.*

BY

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I FIND some difficulty in making a suitable reply to Mr. Paterson's remarks, because, in the first place, I agree with many of his statements; and secondly, where I find myself differing, the defence seems so easy that I am inclined to distrust it, and to wonder if I have overlooked vital points. An unpleasant vision obtrudes itself of Mr. Paterson—in the final broadside which, as opener, he will be privileged to deliver—pulverizing the whole position, and leaving the radiologists disconsolate among the smoking ruins.

However, this risk must be taken, and I will fire my first shot by challenging Mr. Paterson's statement that the barium meal is of little value in the investigation of intestinal stasis. Mr. Paterson prefers the administration of charcoal. I myself, following a *tu quoque* method, might inquire whether or not steps were taken to make sure that the whole of the charcoal passed in forty-two hours. One would be justified in asking this question, because in opaque meal work one may see a small part of the barium meal reach the rectum in a few hours, although the main mass lags far behind. The fallacy of the charcoal method lies, however, in the fact that no one can tell for how long it lay in any particular part of the alimentary canal. With the barium meal localized stasis can be observed. A good practical rule is to disregard stasis up to twenty-four hours; this will eliminate most cases of so-called ileal stasis, and leave us with two important sites—the caecum and the rectum. I shall return later to the question of caecal stasis; stasis in the rectum, sometimes known as the dyschezia of Hurst, is a most important clinical entity; its existence may be suspected from symptoms, but can be proved only by x-ray examination.

As regards spasm shown by the barium meal, the significance of this appearance, and the means of differentiating it from local organic trouble, have occupied the best minds in radiology for three decades. It was originally taught by the late Dr. Carmen of the Mayo Clinic that persistent spasm of the stomach or duodenum which was not due to intrinsic disease could be abolished by belladonna. This doctrine now requires modification; but it remains a fact that spasm which resists all variation of posture, is present over long periods, and is not affected by belladonna given to the point of causing a dry throat and enlarged pupils, is nearly always an indication of organic disease somewhere in the alimentary tract or its offshoot, the gall-bladder. Mr. Paterson's case was no exception, as there was a chronic appendix. It should also be remembered that, in some cases, the spasm, so far as the patient is concerned, constitutes the disease; if one can find a drug which controls the spasm, the symptoms are relieved. In short, the demonstration and differentiation of spastic contraction is a most important part of radiological diagnosis. Referring again for

one moment to Mr. Paterson's case, the question arises whether a complete personal examination of the alimentary tract was made by the radiologist, as it would be unusual, though not impossible, for the appendix to escape notice under such circumstances.

Failure to find an organic lesion by x rays is, of course, no proof that such does not exist. Such negative evidence should not, however, be despised. In a case where the suspicion is slight, it is a point in favour of a verdict of “not guilty”; when the clinical evidence is weighty, negative x-ray findings at least exclude obstruction and gross deformity.

The importance of a proper technique is self-evident. The more frequent the examinations in a barium meal, and the greater the number of angles from which films are taken, the better are the chances of detecting an obscure lesion. Practical considerations, however, impose definite limits, and no doubt failures sometimes occur on this account.

As to fallacies due to misdirection, I think it is scarcely fair to include them at all. The demonstration of any possible cause of obscure symptoms should always be helpful. The trouble usually is that the radiologist has not a sufficiently free hand. A partial examination of the abdomen may result in misdirection, but a complete one should rarely do so. In Mr. Paterson's calculus case, as in his case of gastric spasm, complete examination by an experienced radiologist would most likely have called attention to the appendix. A complete radiological examination includes barium meal, barium enema, cholecystography, genito-urinary tract, and the teeth; the latter are often omitted, or done by someone other than the radiologist making the principal examination. Hence sometimes an early recurrence of symptoms after operation. In hospital work especially it is often necessary to bring heart and lungs into the field of investigation. To use a single method of diagnosis in itself is a sufficient limitation; but when that single method is not fully employed, misdirection, as Mr. Paterson calls it, is bound to occur.

Arriving now at fallacies of interpretation, we really come to grips with the matter at issue. There will always be errors in interpretation in x-ray work, as in other methods of diagnosis. I do not think, however, that the opener of the discussion has been fortunate in his instances, not one of which would be likely to mislead a competent radiologist who had seen the patients concerned, and knew their medical histories.

As to gall-stones, a large calculus may fail to show because of lack of calcium content; and no one can exclude isolated stones by any known method. A bag of stones, however, if it does not show positively, will nearly always give negative shadows with cholecystography. As to scybalous masses, a combination of castor oil, enemata, and cholecystography will always clear up such a case beyond a doubt.

No radiologist of experience will attempt, on purely radiological grounds, to distinguish between an inflammatory mass, including penetrating ulcer, and malignant disease. If, however, an elderly patient shows gastric deformity, with or without ulcer niche, and gives a history of stomach trouble dating back only a few weeks or months, experience teaches him that in over 90 per cent. of cases there is cancer. In writing his report he should, of course, carefully distinguish between x-ray findings and deductions which may in part be based upon history and symptoms. Those who consider that the radiologist has no concern with anamnesis and symptomatology should employ a lay radiographer to assist them, who would confine himself to technical matters.

A filling defect in the colon may, as Mr. Paterson says, be due to impacted faeces. It should never be accepted as due to growth until castor oil and soap enemata have done their worst upon the unfortunate patient. And even if it vanishes under such treatment its discovery has nevertheless been valuable as a warning. Very early carcinomata seem to cause, at times, a sort of physiological block which results in faecal collections. If the block occurs a second time I should consider exploration imperative; and I am not at all sure that it ought not to be done without waiting for a second time. I laid

* Read in opening a discussion at a joint meeting of the Sections of Surgery and of Radiology and Physio-Therapeutics of the Annual Meeting of the British Medical Association, Cardiff, 1928.

stress on these points at a discussion held at the Royal Society of Medicine last year.

To fail to distinguish between a distended ileum, a pelvic caecum, and a dilated rectum is a radiological crime of the first magnitude. The clinical significance is in each case so different that the matter cannot be left in doubt. A caecum in its normal place can nearly always be seen separately from a distended ileum by manipulation in the oblique position; where the caecum is pelvic the matter presents difficulties. But a picture which is confusing at six or eight hours is often quite clear somewhat later. A pelvic caecum is fairly common; a distended ileum rare. In the few cases in which doubt remains after the meal examinations a full opaque enema will usually clear the matter up. A simple manoeuvre serves to differentiate the rectum; a small injection, or even a glycerin suppository, will, if the mass is rectal, cause its partial or total disappearance.

As to the x-ray diagnosis of adhesions, manipulation under the screen is very unreliable. Often a picture taken a few hours later will show that an apparently immovable portion of gut has in fact moved considerably. Suspected adhesions about the colon can, however, often be put to the test by an opaque enema. A pelvic caecum is in itself of little importance, but one which does not rise on injection should always be regarded seriously, especially if it contains dense residue twenty-four hours after the main meal has passed on. Such a caecum usually has behind it an unhealthy appendix, which may give no localized signs or symptoms, and yet be responsible for gastric or duodenal disturbance. Hence the undesirability of x-ray examination confined to the upper part of the alimentary tract.

The demonstration of a genuine pelvic caecum, with a pool at twenty-four hours, and a probably infected appendix, can be accomplished only by x rays. A chronic appendix in the ordinary position could no doubt always be detected clinically, but, in fact, is often overlooked. The reason is, I think, that pain in such cases is very sharply localized, and the radiologist, palpating a visualized organ, is unlikely to overlook what may easily be missed when the hand is unaided by sight. I have heard it said that heavy x-ray gloves will cause tenderness almost anywhere if used for palpation. Apart from the fact that strictly localized tenderness is alone of diagnostic value, the statement simply is not true. I have palpated with x-ray gloves thousands of patients in the past eighteen years, and I can certify that only a small percentage complained of pain in the right iliac fossa, and in a still smaller percentage was tenderness localized in the appendix. It is, of course, a fallacy to declare an appendix necessarily free from infection because it cannot be incriminated by radiological methods.

Mr. Paterson's last criticism is of the value of x-ray evidence in demonstrating the healing of a gastric ulcer. The facts are simple. The ulcer makes a wide-mouthed pocket which fills with barium. With proper technique this pocket can be shown at will. If a time comes when the same process several times repeated fails to show the pocket, its mouth must be closed. And when, a year or two later, the symptoms return, the demonstration is complete, for the pocket is found again to be present. Here I am, for once, prepared to be dogmatic, and to say that seeing is believing.

In conclusion, I cannot allow to pass without adverse comment Mr. Paterson's dictum that if the x-ray findings do not support the clinical signs and symptoms they should be disregarded. This I consider to be a most dangerous statement, not, perhaps, as Mr. Paterson means it, but certainly as it will be interpreted by many who read his remarks. For example, if the history and symptoms call attention to the digestive system, and the radiological examination reveals changes in the lungs suggestive of tuberculosis, are these findings to be disregarded? This is no fanciful example, but has happened several times in my own practice; the course of events subsequently proving that the dyspepsia was secondary to the lung trouble. To say that there is no such thing as a purely radiological diagnosis is to play with words. No physician practising radiology makes his report with-

out taking into consideration the patient's history and symptoms. History and symptoms *plus* x-ray findings often leave no practical doubt as to the patient's complaint; just as history and symptoms *plus* physical examination may in other cases be virtually conclusive.

So far my argument has been, in the language of another profession, that there is no case to go to the jury. But I am pleased to be able to close on a note of agreement with Mr. Paterson. I do believe in co-operation between surgeon and radiologist. In particular I think it essential that both should obtain the history of the case. A patient will often tell quite a different story to separate catechisms, and it is important that these histories should be correlated.

ERRORS IN THE INTERPRETATION OF RADIOGRAMS OF THE CHEST:

THEIR CORRECTION BY TELE-RADIOGRAPHY.

BY

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(With Special Plate.)

In the ordinary method of radiography of large and deep parts of the body such as the chest, when the x-ray tube is situated at 2 ft. or less from the film, considerable errors are introduced owing to the divergence of the rays. Though these errors are known to exist, their magnitude and importance are, in this country at any rate, not sufficiently recognized. It is the purpose of this article to show how misleading such errors may be, and how by the simple method of tele-radiography they can be reduced to a minimum.

The errors are of two kinds: (1) errors of position, (2) errors of size; in addition there is (3) faulty definition.

1. ERRORS OF POSITION.

Fig. 1 illustrates the projection upon the film of the ordinary postero-anterior view of the chest, the central

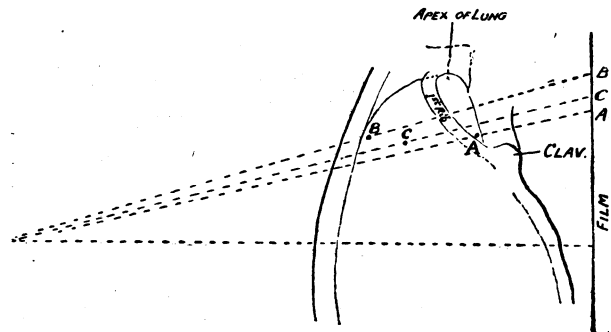


FIG. 1.—Postero-anterior projection through the upper part of the lung, showing displacement. See text.

ray passing through the mid-line of the body at the level of the third costo-sternal articulation. A and B are two points lying in the same horizontal plane, on the anterior and posterior surfaces of the lung respectively. As projected upon the film (A'B') A appears to be higher than B. Moreover, a point, C, lying at a lower level than A and B, is projected above A but below B. Fig. 1 (plate) shows the postero-anterior view of the chest, the distance between the tube and the film being about 2 ft. On the chest four coins of equal size have been placed. Coin A lies on the anterior wall just below the inner end of the clavicle; B lies on the posterior wall opposite the fifth rib in exactly the same horizontal plane as A. The central ray is at the level of the third costo-sternal articulation. It will be seen that B appears to be supraclavicular, whereas its true position is well below the apex of the lower lobe. The two coins C and D are placed on the anterior and posterior walls of the chest respectively in the same horizontal plane (level of the third costo-sternal articulation), through which the central ray passes. They are both 3½ in.