FROM THE ROENTGEN DEPARTMENT (DIRECTOR: DOCENT SÖLVE WELIN), MALMÖ ALLMÄNNA SJUKHUS, UNIVERSITY OF LUND, SWEDEN

ROENTGEN DIAGNOSIS OF SMALL POLYPS IN THE COLON AND RECTUM

by

Lars Andrén, Sture Frieberg and *Sölve Welin*

"Polyp detection is cancer prevention" runs a slogan, launched a few years ago by the American Cancer Society. For American investigators seem to be fairly well agreed that there exists a very close connection between cancer and polyps — of which 70 % are adenomas — in the digestive tract; this is considered to be especially so in the case of the large bowel. It is believed that it has been possible not only to show a definite tendency for adenomas to become malignant but in many cases to demonstrate the direct development of a benign polyp to a malignant growth. It is also supposed that the majority of carcinomata of the colon arise from a polyp. The proof of the etiologic connection would appear to be, firstly, the repeated histologic findings of cancerous tissue within a limited area in an otherwise benignant polyp; secondly, the frequent development of carcinoma where previously a polypoid lesion had been diagnosed; thirdly, the frequency with which the presence of one or several polyps have been shown in the vicinity of an adenocarcinoma — this is especially true of multiple cancers; and finally, polyps and carcinomata reveal about the same rate of distribution in the different segments of the large bowel. Stress should perhaps be laid on the very pronounced tendency to malignancy in the familiar polyposis.

Should it be agreed that adenomata are potential carcinomata, then their detection and removal should constitute a prophylaxis against carcinoma in the large bowel. That this condition is relatively common is seen in statistics published in 1945 by the American Life Insurance Company. According to these figures, not less than 17 % of all deaths from cancer originate in malignant growths in the colon and rectum.

It has therefore become of urgent necessity to render still more effective the roentgenologic examination of the colon; for only rarely may small polyps be detected by the older technique, based on the ordinary barium

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sulphate enema. WEBER, who is one of the outstanding figures in this field, maintains that we must improve our diagnostic methods by all the means at our disposal so that we may eventually diagnose polyps, even only 5 to 10 mm in diameter. The method we have chosen to follow is based partly on that of FISCHER, the so-called double contrast method, partly on the mucosal pattern examination after the addition of 1 % tannic acid to the opaque enema, and partly on the use of the high voltage technique with a semi-transparent contrast medium, initiated by LEDOUX-LEBARD and GARCIA-CALDERON. In addition, efforts have been made to improve the contrast agent. Colloidal barium has been used in some quarters while in others, various substances, such as carboxymethylcellulose and dextran, have been added to the contrast medium. To judge by results, not one of these new contrast agents has hitherto brought about any remarkable improvement.

The first condition for more effective diagnostics of the colon — whatever method be chosen — is that the intestines must be as clean as possible. This is partly achieved by the use of evacuation agents, of which castor oil is still the most important, partly by a cleansing enema, and partly by diet. An ordinary water enema, however, is usually partially retained in the bowel. A colon contracting agent is therefore added. One of these is tannic acid, although 'Neodrast' or dioxyphenylisatin, which is closely related to the purgative Isacen, is far more effective. The latter produces especially vigorous contracting movements in the large bowel, and frequently such a complete evacuation of the contrast enema is obtained that none is visualized in the subsequent roentgenograms.

Another factor of importance is that the amount of mucus coating the colonic walls should be as small as possible; on the one hand, the mucus prevents adhesion of the contrast medium, and, on the other, small polyps may be obscured by its retention. Our patients are, therefore, always prepared with belladonna, which reduces the mucous secretion. According to WEBER, belladonna should, moreover, facilitate the patients' ability to retain the enema. Tannic acid also decreases mucous secretion and brings about an improved adhesion of the contrast medium. For this reason, we also add tannic acid to both the cleansing and contrast enemas and generally obtain a barium coating of the intestinal wall sufficient to demonstrate the mucosal pattern. It is also of great importance to keep the patient on a light diet the day before the examination. This greatly facilitates the clearing of the large bowel.

Technique

We prepare and examine our patients in the following manner.

1. The day preceding the examination, before noon, the patient is given an ounce (30 ml) of castor oil. He is kept on a light diet and a wash-

out is given in the evening. A similar wash-out is administered on the morning of the examination.

2. On arrival at the department, the patient at once receives 15 mg of Extractum belladonnae, followed by a second cleansing enema, to which is added 1 tube of Neodrast, containing 50 mg of dioxiphenylisatin, and tannic acid solution to constitute a 0.75 % solution. As the enema runs in, the patient is directed first to lie on the left side, and then on the right. He must then be given adequate time for the evacuation of the enema.

3. It may be said that we use a combination of the three previously mentioned methods of roentgen examination except that we employ a fairly dense contrast medium in place of a semi-transparent one. In order to achieve what in our experience is the most suitable contrast coating of the mucous membrane of the bowel, the solution is standardized at 6.5 by Philips' barium tester. Neodrast and tannic acid are added in the same proportions as in the previous wash-out.

The contrast enema is allowed to flow only as far as the middle of the transverse colon, when the usual postero-anterior, oblique and profile views of the rectum and sigmoid colon as well as the splenic flexure, are obtained. Should more of the large bowel be filled, there is risk of the material, on evacuation, forcing its way into the small bowel. Visualization of the sigmoid colon is then rendered difficult by super-imposition of contrast-filled coils of the ileum.

4. The patient is then directed to evacuate the enema, and it is decided by fluoroscopy whether the evacuation has been sufficient for the mucosal pattern relief film. If this is not the case, the patient is instructed to attempt to evacuate more of the bowel contents. In spite of the contrast enema being only allowed to reach the middle of the transverse colon, a thin coating of the greater part of the large bowel is usually obtained. In American quarters, it is claimed that lesions down to one centimetre in diameter may be diagnosed from such a mucosal pattern roentgenogram; this, however, would not appear to be always possible.

5. Before insufflation, more contrast medium is injected. The quantity required varies from case to case, but must be sufficient to ensure filling of the bowel as far as the middle of the sigmoid colon.

6. Air is now blown into the bowel by means of a clysto pump. The patient is rotated fully to the left, preferably several times, in order that air and contrast medium shall be equally distributed over the entire intestinal wall. After controlling by fluoroscopy that the caecum has been outlined, the patient should be fully rotated once or more to the right. The contents of the rectum are then drained off by means of an enema pipe with the patient in the prone position. This procedure may have to be repeated one or more times if too much material is left in the bowel.

Should too much air escape during these drainings, more must be pumped in so that the entire bowel becomes satisfactorily distended.

As rotation of the patient is, in our experience, a most satisfactory method of ensuring filling, the use of more complicated insufflation instruments such as 3-way taps and similar apparatus appears to be unnecessary.

7. Films are now taken of the colon in oblique projections in both the prone and supine positions; a profile view of the rectum and sigmoid colon may also be included. Views are then taken with a horizontal beam in both the standing and right and left recumbent positions. In both of the last-mentioned projections, care should be taken to see that the whole of the rectum is included. In order to achieve good quality roentgenograms in spite of the fact that the distended bowel often lies at a considerable distance from the film, a long focus—film distance is required. We ourselves use a distance of 1.5 metres. In addition, it is desirable to employ a roentgen tube of fine focus (1.2 mm in diameter). Since there are scarcely any movements in the distended bowel, we have found it more suitable to use a small focus and relatively long exposure than a larger focus and shorter exposure.

8. After all the required radiographs have been taken, the air is released with an enema tube, the patient being on his right side and in the prone position.

Material

1,274 patients have been examined with this procedure (1/12/1953—15/8/1954) which has now become a routine method. The patients are drawn from ordinary out- and in-patients; there is no question, therefore, of a specially selected material. Only patients who are very weak or seriously ill are examined with the older, simple contrast medium enema; it must be admitted that the accompanying pain caused by Neodrast and tannin, undoubtedly constitute a certain strain. In cases of suspected chronic appendicitis, the older method is also employed.

Results

Using the technique described, we have found one or more polyps in 159 patients in the period. It is, of course, true that cases that have not yet been surgically verified are also included in this figure, but the majority of these have been examined twice with similar results. Of the 159 positive cases, 81 were men and 78 women. Their ages are given in Table 1. As shown in the table, the low figures in the higher age-groups are due to the number of patients examined being considerably smaller. Since we have examined a total of 1,274 patients (624 male, 650 female) during the above-mentioned period, a positive result in 12.5 % has been obtained.

This is in good agreement with the frequency found in the section material (BUIE, STEVENSON).

Table 1

Age distribution of cases of polyps

	No. of cases of polyps	No. of cases examined	%
0—10 years	3	15	20
11—20 »	3	23	13
21—30 »	8	99	8
31—40 »	23	210	11
41—50 »	29	260	11
51—60 »	42	309	14
61—70 »	39	260	15
71—80 »	11	89	14
81—90 »	1	9	11
Total:	159	1,274	12.5 %

The situation of the polyps is shown in Table 2. In drawing up the latter, we have throughout placed distally polyps found at the junctions of the different intestinal segments. Details regarding positions are, nevertheless, only approximate on account of the considerable displacement of which polyps are capable.

Table 2

Frequency in different intestinal segments

	No. of cases	%
Rectum	99	46.4
Sigmoid colon	45	21.0
Descending colon	29	13.6
Transverse colon	29	13.6
Ascending colon and caecum	12	5.4

The table shows that we have diagnosed a remarkably high number of polyps in the rectum. This is due to the patients, before proctoscopy, generally being roentgenologically examined. Proctoscopy, during this period, has only in one case revealed polyps which had not been diagnosed at the previous roentgen examination. On the other hand, repeated proctoscopies have had to be carried out in order to demonstrate polyps already shown by roentgen examination. This would suggest that the roentgenologic investigation of the rectum can well hold its own with proctoscopy as far as the diagnosis of polyps are concerned.

The table further shows that in approximately half the cases the polyps were situated above the level of the proctoscope. In comparison, STEVENSON's figures may be quoted. He found polyps above the proctoscopic level in 1.9 % of 1,500 patients examined with the double-

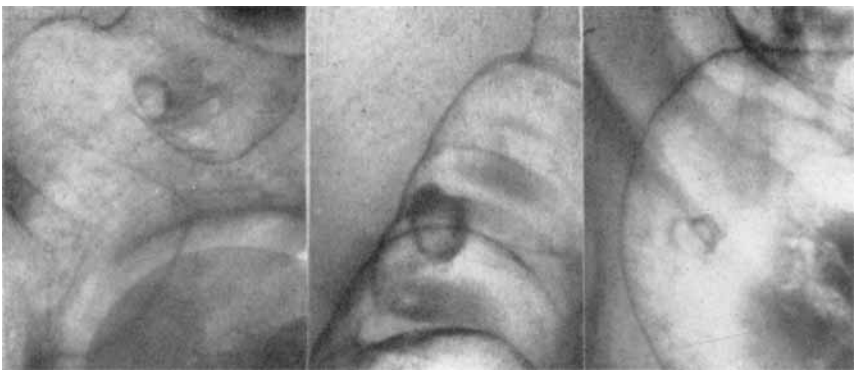

Fig. 1. Examples from cases of small polyps of the colon.

contrast technique. Five hundred of these had rectal bleeding or previously demonstrated polyps; polyps were found in 5 % of this group. Of the remaining 1,000 patients who had not had bleeding nor previously shown polyps, only 0.4 % were found to have polyps. Our corresponding figures for polyps above the proctoscopic level were about 12 % and 5.4 % respectively.

The sizes of the polyps are given in the table below.

Table 3

The sizes of the polyps measured in the radiographs

Size	No. of cases
0— 5 mm	131
5—10 »	60
10—15 »	12
15—20 »	4
20—25 »	4
25—30 »	1
over 30 »	2

The table shows that not less than 191 of the 214 (90 %) polyps demonstrated were less than 1 cm in diameter. It should also be noted that the mensuration was made in the radiograph without any reduction for the degree of enlargement. Furthermore, it should be pointed out that 131 (60 %) polyps were less than 5 mm in diameter, and some of those verified were as small as 1 to 2 mm (see Figs. 1 and 2). The increased frequency of polyps in our material in comparison with others may be ascribed to the fact that we largely succeeded in detecting the smaller polyps. This is in all probability a result of the tele-roentgenography combined with a fine focus, of the use of a dense contrast medium, and of the fact

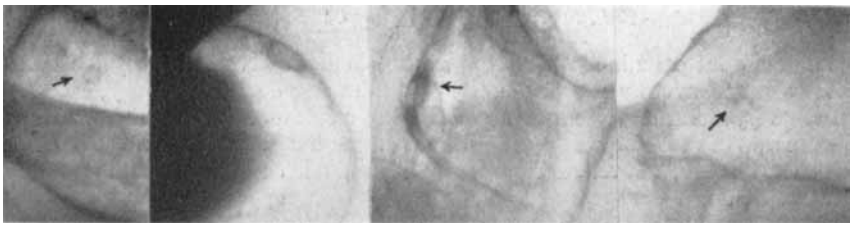

Fig. 2. Examples from cases of very small polyps of the colon.

that in so many cases we were able to achieve satisfactory clearing of the large bowel.

It is striking how small the pedicle appears in the greatly distended bowel. This would seem to be due probably to the pedicle on distention becoming part of the intestinal wall, thus ensuring a more exact localization of the polyps than in the mucosal pattern films or in the ordinary contrast enema.

Of the polyps demonstrated roentgenologically, 66 have been verified either by means of surgical intervention, laparotomy + colotomy (15 cases), or by proctoscopy + excision (51 cases). A number of cases of polyps from the autumn of 1953 — when the technique was still being worked out — are also included in these figures.

Of the polyps removed, 12 % (8 cases), were undoubtedly carcinomata. In this connection we wish to point out that these cases were not differentiated from the ordinary ones, clinically, macroscopically, nor roentgenologically; one of these polyps did not measure more than 2 × 2 mm in diameter. Furthermore, in the opinion of our pathologist, 30 % in all were clearly precancerous.

SUMMARY

A material of 1,274 cases was examined with the so-called double-contrast enema method and polyps were found in 12.5 %; of these, approximately 90 % were under 1 cm and 60 % under 0.5 cm in diameter. The result is ascribed to careful preparation, special techniques giving true double-contrast representation of the entire colon, tele-roentgenography, the use of fine focus tubes and a dense contrast medium.

ZUSAMMENFASSUNG

Ein Material von 1,274 Fällen ist mit der sog. Doppelkontrasteinlaufmethode untersucht worden. In 12.5 % der Fälle fand man Polypen; von diesen hatten ungefähr 90 % einen Durchmesser von weniger als 1 cm und 60 % von weniger als 0.5 cm. Die Ergebnisse werden mehreren Faktoren zugeschrieben, nämlich sorgfältiger Vorbereitung, spezieller Technik zur Erzeugung wirklicher Doppelkontrastdarstellung des ganzen Colon, der Teleröntgenographie, der Benutzung von Feinfokusröhren und einem dichten Kontrastmittel.

RÉSUMÉ

Les auteurs ont examiné 1,274 cas par la méthode du lavement baryté dit en double contraste et ont trouvé des polypes dans 12.5 % des cas; de ceux-ci, 90 % avaient moins de 1 cm et 60 % moins de 0.5 cm de diamètre. Ces résultats sont attribués à une préparation soigneuse, à des techniques spéciales donnant une image en véritable double contraste du colon en son entier, à la téléradiographie, à l'emploi de tubes à foyer fin et à un produit de contraste dense.

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