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THE SURGICAL TREATMENT OF CHRONIC ULCERATIVE COLITIS*

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Chronic ulcerative colitis is an important and serious disease, not only because of its obscure aetiology, but because of its variable response to treatment, its liability to relapse, and its serious economic effects—the chronic invalidism, the loss of working time, and much hospitalization that often result.

There is a general impression, I believe, that ulcerative colitis has become more common in this country in recent years; no doubt a steady increase has taken place, particularly in the past five years, in the number of cases referred for consultation and surgical treatment. When on a visit to Spain recently, I was interested to learn that it is extremely rare in that country. Why this should be so I do not know, since in the great cities like Madrid and Barcelona the pressure of life seemed to be as great and the hours kept by most people were appreciably longer than here.

In recent years much interest has been taken in the possibility of curing this disease by colectomy, and many important papers have appeared from clinics on both sides of the Atlantic. It is generally agreed that 15 to 20% of cases advance to the stage where surgery becomes necessary. For instance, Bacon and Trimp (1950), in a series of 249 cases, operated on 45 (18%), Garnet Ault (1949) operated on 23 patients out of 120 (19%), and Cattell and Sachs (1948), in a group of 630 patients, operated on 166 (26%).

One of the chief problems is to decide when purely medical treatment should be terminated and surgery instituted, and in each case this is a matter for careful consideration between physician and surgeon. All observers agree that the moment for surgical assistance should not be left too late: the "last ditch" ileostomy carries a far higher mortality than the operation which is done in good time.

Indications for Surgical Treatment

Failure of Medical Treatment.—This phrase does not imply the total failure of medical treatment, since almost all patients will for a time respond in varying degree to rest in bed, good nursing, and one or other of the varied medical measures which are available, especially blood transfusion. Failure is more often seen in persistent relapse in spite of repeated courses of treatment. When we see a patient who has been in and out of hospital for nine or ten years with ulcerative colitis we may be sure

that the stage has been reached when surgical intervention must be urgently considered, and in such cases this decision will surely be supported both clinically and radiographically.

Evidence of Pseudo-polyposis.—This is without doubt the most important—in fact, the absolute—indication for major surgery. The evidence may be as follows: (1) *Clinical indications:* If digital examination of the rectum reveals small firm rounded nodules or irregularities in the rectal wall they are almost certainly present higher up too, and sigmoidoscopy will confirm this; if pseudo-polyposis is present in the rectum and recto-sigmoid we can say without hesitation that ileostomy and total colectomy are necessary. The differential diagnosis between true polyposis intestinalis and the pseudo-polyposis of chronic ulcerative colitis is quite easy. In polyposis intestinalis the sigmoidoscope shows multiple bright-pink polypi of varying sizes set on a normal pale mucosa with a normal lumen and probably normal stools, and no free blood or mucus or pus. In ulcerative colitis, however, there is a contracted lumen with mucopus and perhaps free blood in the lumen; no normal mucous membrane will be seen, but instead a highly hyperaemic background which may be obviously ulcerated or covered with sloughs, mucopus, or debris, with granulomata peering through. (2) *Radiological evidence:* This is obtained by a barium enema examination. No special technique is required, and as a rule air inflation is neither necessary nor advisable, since many areas may be thinned, fibrotic, and unused to air distension, and no one would care to court a disaster from the x-ray department. The least suggestion of mottling, whether fairly generalized throughout the colon or limited to one or more areas, can be taken as certain evidence of pseudo-polyposis.

The need for regular radiographic control in these cases is shown by Fig. 1: the interval between these two examinations was five and a half years, and when the patient was finally admitted to hospital, as soon as possible after the last x-ray film, she was moribund, dying a few hours later. The alarming speed at which the condition of the colon can deteriorate is shown in Figs. 2 and 3. Fig. 2 shows the appearance of the colon in August, 1949, in a long-standing case of ulcerative colitis previously treated (1938) by appendicostomy; three months later (November, 1949) her general condition had deteriorated suddenly and a fresh x-ray film showed clear evidence of pseudo-polyposis and stricture

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FIG. 1.—X-ray films of case of ulcerative colitis. (A) July, 1943, at which stage patient had a mild granular proctocolitis. (B) January, 1949; patient extremely ill and very anaemic. Film shows a severe ulcerative colitis with pseudo-polypoid. Patient was moribund when admitted into hospital, and the post-mortem examination showed perforation of the colon and peritonitis.

FIG. 2.—Barium enema films at intervals of three months. (A) Film taken of case of chronic ulcerative colitis 11 years after appendicectomy shows moderate haustration and no gross changes. (B) View three months later showing pseudo-polypoid and stricture formation in transverse colon, but operation revealed six separate carcinomas in the colon, with cirrhosis and secondary deposits in the liver: the largest growth was a high-grade anaplastic carcinoma in the recto-sigmoid region.

FIG. 3.—Barium enema films at intervals of three and half months; B shows advanced ulcerative colitis with pseudo-polypoid. Ileostomy and total colectomy were done in three stages; patient alive and well.

formation in the transverse colon. Ileostomy and subtotal colectomy were performed, but by this time her liver showed advanced cirrhosis, with secondary malignant deposits; the large intestine presented six separate adenocarcinomas. Five of these were in the specimen removed by subtotal colectomy, and the sixth, which was the largest, was a high-grade anaplastic carcinoma situated in the recto-sigmoid region, and was removed post mortem (she died on the sixteenth day after operation).

Another example of very rapid deterioration is seen in Fig. 3, the interval here being only three and a half months. In this case, however, the ileostomy and total colectomy were done in time, and the patient is now very well.

Relationship Between Ulcerative Colitis and Malignant Change

There is general agreement that the incidence of malignant change is fairly high in long-standing cases of chronic ulcerative colitis. Cattell and Sachs (1948) reported having had 12 patients in whom carcinoma had developed from ulcerative colitis—an incidence of 7% of the patients operated upon. Scarborough and Klein (1948) made a special study of the mucosal hyperplasia and pseudo-polypoid of chronic ulcerative colitis, and concluded that malignant degeneration was common enough to warrant classification of these changes as pre-cancerous, seeing that 4 of their 15 cases of pseudo-polypoid developed carcinoma (27%), three of the four being inoperable.

In my series of 68 cases of chronic ulcerative colitis treated surgically in the past 10 years carcinoma developed in six instances, or 9%. The noticeable features were the insidious onset, the rapid progress of the disease, the high grade of malignancy, and the fact that in every case the colitis had been present for more than 10 years; in the six cases the duration of the disease had been 12, 13, 14 years (one each), 20 years in two cases, and in one for 38 years. This last patient was a man aged 60 at the time of his colectomy in April, 1950, and he is the only one who has survived. His growth was a diffuse one, involving about 6 in. (15 cm.) of the descending colon, and was suspected only at the time of operation by reason of the presence of slightly more thickening and induration in the wall of the colon than one usually finds in these cases.

Evidence of Fibrosis or Stricture Formation.—If a case of chronic ulcerative colitis is found to be developing a rectal stricture which can be felt with a finger or be seen through a sigmoidoscope, one may be sure that a similar process is occurring higher up in the colon. Radiographic evidence of stricture formation, usually in the transverse colon or down the left side of the colon, can easily be obtained. The strictures are fusiform, as opposed to the stricture with a sharp right-angle edge seen in malignant disease, and are often multiple. A general

narrowing with complete loss of haustration, constitutes the so-called "gas-pipe" colon, and is certain evidence of a late and irreversible stage of the disease.

Arthritis.—This is a fairly common complication of long-standing ulcerative colitis and may be seen in fingers, knees, hips, and spine. The development of multiple arthritis is in effect evidence that surgical treatment has been delayed too long, but there is the cheerful prospect that practically all cases will improve more or less after ileostomy and colectomy. For instance, one of my patients who at first was bedridden with severe flexion deformities of knees, hips, and fingers was ultimately able to get about quite nimbly after total colectomy, and later used only one stick. In another case the pain and swelling in one knee-joint disappeared two or three days after her subtotal colectomy.

Surgical Complications.—These may be *abdominal*—for instance, perforation of the colon with localized or generalized peritonitis, or subacute obstruction from one or multiple fusiform strictures in the colon. *Rectal complications*, such as intractable stricture or severe recurrent perirectal suppuration, are good indications for surgical intervention. *Spreading ulceration of the skin*, usually affecting the legs, has been described and illustrated by Butler (1948) and by Corbett (1952); this complication is not likely to respond to treatment except by ileostomy and colectomy.

Surgical Technique

As in other operations on the colon, the procedures have varied a great deal, but opinion is now crystallizing very definitely in favour of ileostomy and colectomy.

Although ileostomy alone gives dramatic relief in some severe cases, the disease is not cured; ulceration persists in varying degrees, severe haemorrhage may recur, and, above all, there is the risk that carcinoma may develop at one or more points in the colon. We can therefore take it that once an ileostomy is decided upon it should be regarded as a permanency, and it should be followed in most cases by a total colectomy.

The results in my series of 50 cases in which a three-stage procedure has been or is being carried out as described by Cattell and Sachs (1948), of Boston, show that the mortality of these operations is now very low. Although many of these cases were in a serious condition when surgery was first instituted, the progressive improvement in weight and well-being as the various stages were carried out has been remarkable. So far I have not seen any reason to risk a successful outcome by doing a major resection of the colon before a satisfactorily functioning ileostomy has been established and a noticeable improvement has become evident in the patient's general condition.

Ileostomy

This operation has been done in 50 cases. In my earlier cases it was either a loop type of ileostomy, fixed by a glass rod as for a colostomy, or a disconnected type of ileostomy in the right iliac fossa. I very quickly saw the disadvantages of these methods. The loop type of ileostomy exposes a large area of mucous membrane with much discharge, and it is difficult to fit with an appliance: the ileostomy with proximal and distal openings is equally difficult to manage, and when it comes to the point there is *no object whatsoever* in having a distal stoma. The colon in these cases requires only rest, and in several of my earlier cases whenever we tried to irrigate the colon with mercurochrome or saline lotion a sharp spike in the temperature resulted.

I have no hesitation in strongly recommending a terminal ileostomy, which is best made through a short right transverse incision. The subsequent colectomy procedure is facilitated by applying the Parker-Kerr clamps *close to the caecum*—that is, about $\frac{1}{4}$ in. (1.9 cm.) proximal to the ileocaecal valve. The distal end is closed so that when the

returning layer of the Mikulicz stitch is completed the closure is flush with the caecal wall, and if possible a tag of fat or a piece of the fatty meso-appendix is sewn over it; this manœuvre greatly helps the next operation, when the caecum has to be mobilized, and saves time and trouble in not having to mobilize an adherent ileal stump.

The proximal end of the ileum is mobilized sufficiently for it to be exteriorized comfortably (about $1\frac{1}{2}$ in. (3.8 cm.) outside the abdominal wall), and care is taken not to close the abdominal parietes too firmly round the bowel or there will be trouble with constriction. In only one case have I had to resect about 12 in. (30 cm.) of the terminal ileum on account of apparent involvement as shown by thickening and hyperaemia.

The terminal ileostomy should be placed about $\frac{1}{4}$ –1 in. (1.3–2.5 cm.) below and to the right of the umbilicus and no lower. An ileostomy is much easier to manage in this position, whereas if it is placed lower down in the right iliac region it is a nuisance to the patient, since the ileostomy apparatus tends to ride up and become displaced, especially when the patient is sitting.

At the conclusion of the ileostomy operation dry dressing gauze is applied round the ileum and is kept in position by means of Michel clips. The ileum is decompressed by a small-bore Paul's tube, and this usually drains effectively for about six days, thus keeping the wound perfectly clean. As soon as the Paul's tube is removed steps are taken to prevent that common trouble with ileostomies—namely, stenosis—and the ward sister is asked to pass a finger into the ileostomy each day.

It is remarkable how slight is the disturbance produced, as a rule, by ileostomy, and only a few very ill patients require intravenous fluids. If any post-operative distension takes place it is most probably due to spasm in the terminal ileum, and the situation can be relieved by removing the Paul's tube and passing a soft rubber catheter into the ileum and leaving it in-dwelling for 12–24 hours: a large safety-pin put through its outer end prevents it slipping into the ileum.

My mortality in 50 cases of ileostomy is shown in Table I. The operative mortality is 6%—one of these cases having an advanced diffuse carcinoma of the pelvic colon. Three

TABLE I.—Results of Ileostomy (1941–51)

Operative deaths (operative mortality 6%)	3 (2 fulminating disease, 1 inoperable carcinoma of pelvic colon)
Hospital deaths during 2nd and 3rd months after operation	3 (1 toxæmia, 1 amyloid disease, 1 perforation of ileum)
Recovered and relieved; no further operation	5
Recovered but died later	3 (2 toxæmia (10 and 12 months), 1 carcinoma of colon or rectum (19 months).)
Recent cases waiting for colectomy	4
Had subtotal colectomy later (see Table II)	32
Total	50

other patients died in hospital within three months—one from toxæmia and severe perirectal suppuration, one from peritonitis due to perforation of an ileal ulcer, and one from amyloid disease. Subtotal colectomy has been done in 32 cases (see Table II) and four recent cases are awaiting colectomy.

TABLE II.—Chronic Ulcerative Colitis Treated by Subtotal Colectomy Following Ileostomy

Operative deaths (operative mortality, 6.25%)	2	{ 6th day, intestinal strangulation and mesenteric thrombosis 16th day, multiple carcinomas of colon with cirrhosis and secondaries in liver
Subsequent deaths	2	{ 4 months, recurrent carcinoma of transverse colon 10 months, perforation of ileal ulcer
Recovered and later had perineo-abdominal excision of rectum (see Table III)	21	{ 28
Recovered and now awaiting excision of rectum	7	
Total	32	

Subtotal Colectomy

This operation can usually be done three to four weeks after the ileostomy, or it can be postponed according to the patient's general condition. If a complication such as arthritis or pseudo-polyposis is present the sooner colectomy can be carried out with reasonable safety the better.

With the ileostomy nicely established just to the right of the middle line both sides of the abdomen are available, and I make a practice of doing a colectomy through two incisions as follows:

(1) A relatively short curved right oblique incision enables the caecum, ascending colon, and right half of the transverse colon to be mobilized and the necessary vessels (ileo-colic and right colic) to be ligated and divided; the bowel is then pushed into the abdomen and the wound is closed, with stainless steel wire to the external oblique. In one recent case it proved possible to close the space to the right of the ileostomy by means of a running stitch before closing the right oblique incision, and this promises to give protection against internal strangulation here. This space has been referred to by Brooke (1951) as the "para-ileal gutter."

(2) A left paramedian incision gives good access to the rest of the colon, and a lateral-tilting table assists in mobilizing the splenic angle; at this stage it is usually a great help to grab the descending colon just *below* the splenic flexure and, after incising the peritoneum on its lateral aspect, to work up towards the splenic flexure rather than to proceed in a clockwise direction along the left half of the transverse colon. At any rate, when the splenic flexure has been reached and the long specimen of thickened diseased colon is lying on the patient's abdomen, we can feel that the operation is getting along nicely. At this stage I sometimes remark that we seem to have got round Tattenham Corner satisfactorily and are now going down the straight. The colon is mobilized down to the iliac portion, the left colic artery and perhaps the first sigmoid branch being ligated, and the entire specimen is then passed intact through a short left oblique incision, with closure of the lateral space. The left paramedian incision is closed without drainage after haemostasis is confirmed, and the emerging colon is divided in between de Martel clamps, leaving one clamp on the colon about 1 in. (2.5 cm.) outside the abdominal wall, and dry dressings are applied. A routine blood and glucose-saline drip is given after this for 24-48 hours, and usually the patients pick up very quickly. The mortality for this operation in my hands so far has been 6.25% (see Table II).

Total Colectomy

The final combined operation for removal of the remaining recto-colic segment is one which I usually postpone for three to six months after the subtotal colectomy. By this time the patient should have put on weight, and in fact this has sometimes been a cause of difficulty—so much so that in a few instances I have thought it advisable to recommend some weight reduction before the final operation.

A perineo-abdominal excision done blind from below proves ideal for these cases. The rectum is mobilized, the peritoneum is opened from below, and the rectum is then pushed up into the pelvis encased in a sterile rubber glove. The perineal wound is closed round a drainage tube, and the operation is quickly completed from the abdominal aspect through the lower part of the previous left paramedian incision. The old colostomy stoma by now often proves to have become completely healed over; it is dissected up and taken inwards, the inferior mesenteric vessels are ligated in the usual manner, and the specimen, consisting of the rectum and pelvic colon, is thus removed unopened. Care should be taken not to damage the ileostomy with retractors. The results of total colectomy are given in Table III.

TABLE III.—*Total Colectomy. Final Perineo-abdominal Excision of Remaining Recto-colic Segment for Cases of Chronic Ulcerative Colitis*

No. of cases	21
Plus disrupted Devine's operations—i.e., restoration of ileostomy and later excision of rectum	2
Operative mortality, nil. These patients are all alive and in good health.	

Special Problems

There are one or two special problems which I should like to mention.

1. Patients are occasionally seen with severe chronic ulcerative colitis who minimize their symptoms, insisting that they are well, and whose general condition is reasonably well maintained in spite of radiological evidence that a typical fibrosing ulcerative colitis has developed. In such cases I am sure that it is wise not to press for immediate surgery, and I fully agree with Brooke (1951) regarding the importance of gaining the patient's confidence, getting him to realize that major surgery is necessary, and obtaining his acquiescence in the necessity for ileostomy life. In the type of case I have mentioned it is surely best for the patient to carry on with medical treatment and remain under close observation until some crisis or complication takes place which renders surgical measures acceptable.

2. Segmental colitis presents a difficult problem, especially when it involves the left side of the colon only, and even more so when the pelvic colon is chiefly affected. In these cases we must resist the temptation to do a colostomy proximally to the *apparent* area of disease. A colostomy is doomed to failure, because sooner or later the disease will surely spread upwards, and a patient with a colostomy in an area involved by colitis, especially if pseudo-polyposis develops in the exposed mucous membrane, as it is apt to do, is in a very unhappy situation; so also is the surgeon responsible. Attempts to close the colostomy usually fail owing to the breaking down of the wound, and the patient is left with a faecal fistula discharging blood, pus, and faeces, during which time the disease is gradually progressing. In such cases the correct treatment is, of course, an ileostomy followed by colectomy, and the part of the colon involved in the previous colostomy (whether transverse or iliac) is resected in the course of the colectomy. A caecostomy is equally ineffective for cure or relief of ulcerative colitis, and may prove to be a grievous burden to the patient.

3. Chronic ulcerative colitis is rarely seen with the rectum and recto-sigmoid apparently normal or almost normal; in the large series reported on by Kiefer and Jordan (1946) the rectum was free from disease in only 6% of cases. The sigmoidoscope may show an adequate lumen with only a very slight degree of friability of the mucosa, yet with radiological evidence of severe fibrosis and ulceration in the colon. In such cases the surgeon's thoughts naturally turn on the possibility of resecting the major portion of the colon and restoring continuity by an ileo-colic or ileo-rectal anastomosis. This can be done either by a suture anastomosis or by a crush anastomosis as advocated by Devine (Devine and Devine, 1948).

My experience of Devine's operation has been limited to six cases, all carefully chosen on account of apparent freedom from rectal ulceration. There was one operative death on the 18th day, probably from small-gut strangulation. Of the remaining five patients, who all recovered and in due course had their ileocolic anastomosis closed, four have had to be put back to a permanent ileostomy after an interval of one, one, two, and three years respectively: the indications for doing this were severe perianal and perirectal suppuration (two cases), recurrent severe rectal haemorrhage associated with attacks of internal strangulation (one case), and an acute flare-up of rectal ulceration (one case). Of these four cases two have had a perineo-abdominal excision of the remaining recto-colic segment successfully done, and the other two await their final operation.

Subtotal colectomy with a sutured anastomosis between the ileum and lower pelvic colon is an operation which I have done in three cases. There was one death, on the 11th day, probably

from internal strangulation, and the remaining two patients have remained well for approximately two years, although somewhat bothered by the need to have a bowel action three to four times daily.

Other Operations

One-Stage Ileostomy and Colectomy.—Subtotal colectomy and ileostomy in one stage has been recommended by Miller, Gardner, and Ripstein (1949), who have ably set out the arguments in favour of this procedure—namely, the immediate removal of the diseased bowel (which must act as a source of toxic absorption and contributes to blood and protein loss), the elimination of multiple-stage operations, and the absence of immediate mortality: in 24 cases there were no operative deaths, although two patients died subsequently, one from haemorrhage and one from infection from the remaining rectal segment. A one-stage colectomy and ileostomy has also been recommended by Dr. Henry Cave (1949), of New York, and by Bacon and Trimpi (1950), of Philadelphia. There seems to be general agreement that it is safer to bring out a distal colonic stoma than to attempt an intraperitoneal closure, and personally I favour a stoma in the left iliac region in order that the lateral space may be closed and a potential source of internal strangulation obviated, such as must be present if the colon is brought out through the lower end of the paramedian incision.

The merits of this one-stage procedure seem fairly obvious and will no doubt be settled in due course. I propose to start such a series immediately, especially in those cases with pseudo-polypoidosis and those with persistent blood loss which fails to be met by repeated transfusions. In such cases it would appear to be reasonable to remove the colon at the earliest possible date.

Vagotomy.—I have had no experience of vagotomy in ulcerative colitis, and cannot believe that this procedure will alter the course of the disease in the later stages which we are considering, when fibrosis and pseudo-polypoidosis have developed.

Ileo-anal anastomosis as proposed by Ravitch (1948) is another possible surgical procedure. It seems to me, however, to be a pity to risk giving a patient a troublesome anal ileostomy instead of a well-placed and easily managed abdominal ileostomy. The researches of my colleague Goligher (1951) on this matter are illuminating, and personally I have no intention of attempting this procedure. These colitis patients are, for the most part, nervous and sensitive people who have had much trouble in the past, and I think that if they submit to operation they should have a well-tried procedure and one which gives the greatest security—that is, total colectomy—with the minimum of risk not only in regard to the operation but in regard to the risk of setbacks and prolonged stay in hospital and possible disappointment.

Appendicostomy is now a discredited operation so far as cure is concerned, and the indications for its performance are very rare. Two of my old appendicostomy patients ultimately developed inoperable carcinoma of the colon after the lapse of 10½ and 12 years respectively. Two others have remained well for 18 and 22 years respectively, but in one of these there is now x-ray evidence of pseudo-polypoidosis in the iliac colon, and I think ileostomy and colectomy must be done fairly soon. The chief indication for appendicostomy in the present day is in those rare cases (1) when the physician considers that no further improvement can be got by medical treatment and the surgeon feels that the disease is not severe enough for an ileostomy—for instance, in cases of ulcerative proctitis; (2) when the patient is considered to be temperamentally unfitted for an ileostomy and colectomy; or (3) when an ileostomy is steadfastly refused. Under such conditions an appendicostomy may reasonably be undertaken as a minor temporizing operation which provides a means of introducing oils or emulsions into the caecum, as well as the best possible access for irrigating the large bowel and clearing it of pus and debris. An appendicostomy can be regarded as a half-way house—

part way towards relief in the less severe cases, especially in refractory cases of ulcerative proctitis; or, if necessary, it provides a basis for proceeding to an ileostomy and colectomy later if indicated by general deterioration of the patient or extension of the disease as shown radiographically.

Summary

Of the many indications for surgery in chronic ulcerative colitis the most important are failure of medical treatment, x-ray or sigmoidoscopic evidence of pseudo-polypoidosis, and arthritis.

When fibrosis and pseudo-polypoidosis have developed, ileostomy and total colectomy give a good prospect of cure, provided that the radical operation is done *before* the onset of malignant disease.

In a series of 68 cases treated surgically during the past ten years, carcinoma is known to have developed in six cases, or 9%. The average duration of the disease in these cases was 19 years.

A three-stage operation for total colectomy is recommended, and the operative mortality for these three stages has been indicated in a personal series of 50 cases—namely, of 6% for ileostomy, 6.25% for subtotal colectomy, and none for the final recto-colic excision.

Little success can be reported with operations which have the object of preserving the rectal function, and my belief is that these operations, although perhaps temporarily successful, are apt to be followed at some future date by relapse and involvement of the remaining rectal segment.

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Employment of tuberculous patients is the subject of a Ministry of Health circular just issued to local health authorities. The Standing Tuberculosis Advisory Committee has stated that there need be nothing against placing these people in ordinary jobs provided there is medical approval of the suitability of the work. The Disabled Persons (Employment) Act enables the employment of infectious tuberculous patients to be medically controlled. It is preferable that jobs should be found for them in this way rather than that they should go into unsuitable ones and not say that they are tuberculous. Disablement resettlement officers are therefore encouraged to help these patients to find work. Their capacity must be assessed by a chest physician and reported to the D.R.O., who then knows the type of work to look for. Co-operation is required between the local medical officer of health, who is generally responsible for public health, the chest physician, with his first-hand knowledge of the patient, and if possible the patient's own doctor. Details of the necessary procedure are given. The D.R.O. must first submit the case to the medical officer together with the chest physician's report. When a decision has been reached the medical officer informs the resettlement officer. Should employers hesitate to take on a tuberculous patient the D.R.O. can of course ask the help of the medical officer and the chest physician, who can do much to remove prejudice or apprehension. Finally, when such a patient has been engaged medical supervision should be continued.