events there was strong indication for making an exploratory incision (at least for a surgeon) to make out the real cause. I did this at once without waiting to see if more ice, more opiates, more leeches, more water pumped into the rectum and colon would not possibly alleviate the symptoms. And I was amply rewarded by finding the volvulus and the incarceration by the half-knotted processus vermiformis.

Unfortunately the processus vermiformis, which was ordered to be sent to the Pathological Anatomical Institute at once, was thrown away and could not be found again. I cannot, therefore, be sure of my theory, but I think that it is most probably true.

If this patient had been treated as "a medical case" only for twelve hours more, I feel sure that no remedy except excision of a long piece of the small intestine could have saved him, and we all know the bad chances of recovery after this operation. If no operation had been done there would have been no possibility at all of saving him, therefore I cannot understand how it can be thought right and advisable in such cases to prolong the very unsafe working in the dark, namely, the internal treatment of ileus, for a period longer than twenty-four hours or so. By an exploratory incision made on a cleansed part of the body, with clean instruments and clean hands, you cannot possibly do any harm, but surely an immense deal of good in finding out the real cause of the mischief, and then curing it if it is to be cured by operative measures, and, if not, there is scarcely any other means than a miracle—the internal use of "physic" cannot possibly effect it.

In the lapse of about a year this man had two attacks of severe pain, with vomiting and obstructed bowels. These may have been brought on by a partial twisting of the same or another coil of the small intestines, the twist going back again of itself; but I think it more probable that it was caused by adhesion between the once twisted gut and the parietal peritoneum, or another part of the gut which was not allowed a free peristaltic movement, and was wholly unsatisfactory when larger masses of intestinal contents had to be advanced through the more or less fixed part of the intestinal canal. I dared not draw the omentum majus down between the incarcerated part of the intestine and the incision in the abdominal wall, because I thought it safer to have this part of the intestine as near the incision as possible, in the case of a perforation in the gut, that it might find its way out through the incision without infecting the whole peritoneal cavity. If I had known then the method of Professor Dr. N. Senn, namely, the shortening of the mesentery by stitching it together in a fold, I think I should have tried it.

ON REINFECTION IN PHTHISIS.¹

By ARTHUR RANSOME, M.D., F.R.S.,

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In his great work, *Traité de l'Auscultation Médiate*, Laennec expresses (p. 699) the opinion that "no consumptive succumbs to a first attack of the tuberculous affection." He also gives his reasons for believing in the complete arrest of the disease in certain cases. The truth of the latter belief has now been abundantly proved, not only by the experience of all who have closely watched the progress of the disease, but also by the results of *post-mortem* examinations; and these last have the further advantage that they not only prove the possibility of cure, but demonstrate the very large proportion in which cures take place. Different observers give different proportions, varying from 50 per cent. (Cruveilhier, Rogée, Degerini) to 26 (Standecker, Bollinger). The researches of Marsini and Dr. Harris, of the Manchester Royal Infirmary, come near the mean at 39 per cent. of all the necropsies upon persons over 20 years of age who have died of other diseases than phthisis. It is natural that the figures should differ at different places owing to variations in the degree of infection, apart from differences of method, but it is obvious that in all places there must be a large number of persons in whom one

attack at least had been recovered from, and who are most of them unconscious of the peril through which they have passed.

In a very large number of cases, also, Laennec's first proposition is true; and we may extend it by saying that not only do they not die of the first attack, but not a few recover from it, and have no more seizures. Unfortunately, this occurrence is not so common amongst the patients of our consumptive hospitals as it is amongst the rich or amongst those who can take the necessary precautions against further attacks.

This difference in the results naturally opens up another question—Why in so many cases the patients suffer from a series of attacks, until ultimately they end in death? And, again—Whether there may not be something in the homes of the poorer class of patients that renders them more liable to a return of the disease?

The usual, and in many instances the correct, answer to this question is, that tuberculosis is an infective disease, that it spreads along the lymphatics or blood vessels, and that though the bacilli may cease for a time to irritate, and may many of them be discharged from the body, yet a sufficient number remain behind to sporulate and spread through the lungs or through this system, and this occurrence is most likely to occur in unhealthy conditions of life. According to this theory, recovery only takes place because the tissues are so well nourished or otherwise protected that the bacilli cannot spread from their first focus, and at length are either entirely discharged or die out. If any subsequent attacks occur, this desirable result has not been obtained, but the bacilli or their spores have taken advantage of some temporary weakness or of some catarrh to make a fresh start into surrounding parts.

But there is at least one other explanation of a revival of the disease, and that is by a *reinfection from external sources*. It will no doubt be extremely difficult to prove in any given case that such reinfection has taken place, and that any particular outbreak of the disease has been due to such a cause; but a few considerations will show not only its possibility but its extreme probability in a large number of cases.

1. We have now the certainty that the primary infection must have come in most cases from external sources, and hence there can be nothing unusual in a second infection or even in multiple infection from similar surroundings.

2. The patient has already proved himself to be susceptible of the disease, or vulnerable by the bacillus, and is therefore probably by nature more liable than others to the disease.

3. By reason of his first attack, also, he is especially prone to become for a second time the host of the invading parasite. His damaged lung is less elastic, and less provided with the natural safeguards against its lodgment. We may also presume that the antimicrobial influences of the body, whether phagocytic or antitoxic, are weaker than in the generality of human beings.

4. It is almost certain that the primary source of infection was to be found in the unhealthy house, or in some usual haunt of the patient, and when he returns to his former condition of life he will probably meet again with a contingent of the same enemy that made the first attack on his lungs.

5. There is abundant evidence as to the existence of infected houses and infected workshops. The distribution of phthisis in towns and in places where bacillus-laden dust is most likely to be met with; its favourite haunts in badly-ventilated, badly-drained tenements; the evidence that now exists of the introduction of infection into houses; the discovery of the organism in these houses and in places inhabited by consumptives—all these facts show the presence of the poison in the places from which most of our patients in hospital come, and make it most probable that the inhalation of the bacillus will take place again and again, and that it will be received into susceptible lungs.

6. Under this head, also, we may note the longevity of the bacillus of tubercle in the presence of respiratory impurity, polluted ground air, or other organic filth. If it does not gain in virulence under these circumstances (a not improbable event) at least it is kept alive for long periods; and the presence of a former consumptive, and the probability of his having left the specific poison somewhere in the house,

¹ Presented to a meeting of the Lancashire and Cheshire Branch of the British Medical Association.

makes it still more likely that his home is a source of infection.

7. Lastly, we come to the experience of individual medical men, and, although for reasons already given it will be impossible to affirm that reinfection *ab extra* has taken place in any one case, yet a frequent repetition of cases open to this interpretation will enhance the probability that some of them at least are of this character.

The preceding series of considerations will also tend to strengthen the case for reinfection. There are few hospital physicians who have not suffered the disappointment of seeing cases of phthisis deteriorate rapidly upon their return home, after they had greatly improved in hospital, and had even shown signs of cure. It is one of the most disheartening facts connected with the treatment of this disease in hospital, whatever may be the nature of the medicinal treatment. After the first two or three weeks most of the cases begin to improve, fever diminishes, the cough and expectoration subside, and they gain weight sometimes to a considerable extent. But when they are discharged after a few weeks or months of residence, and are obliged to return to their former occupations or to their old homes, they frequently break down and come back to the outdoor department with a fresh development of the disease.

This—a common experience at most consumptive hospitals—is, of course, open to the explanation that the fresh air and good food and healthy surroundings of the hospital kept the enemy at bay for the time, but that it again advanced when the poor food and unhealthy conditions of the dwelling had so far lowered the patient's vital power that he could no longer resist its attacks.

No one can affirm that such a course as this is not in accordance with what we know of the natural progress of the disease, and yet, from the considerations which have just been noted, it is at least as likely that the virus, instead of coming from within the body, has been derived from the poisonous atmosphere of the home. And in some of these cases there are certain facts to be noted that make the latter the most probable explanation of the case:—

1. In not a few instances the disease, instead of spreading in a natural and usual fashion along the track of the absorbents, commences afresh in some part of the opposite lung or in the larynx.

2. In other instances the patient does not return home at once after leaving the hospital, but goes to stay with friends in the country, with people who are as poorly off as himself, where the main difference between his own home and the place of his temporary sojourn is fresh country air. Whilst he is under these otherwise unfavourable conditions he still continues well, and gains in weight; but after he finally returns home, and has remained there only a few weeks, the disease again breaks out, makes rapid progress, and soon comes to a fatal end.

3. In some of the cases the interval between the first return home and the fresh outbreak of the disease is from three to six weeks, just about the usual incubation period of tuberculous infection.

4. Lastly, it is fair to count the numerous cases now known to have remained free from fresh outbreaks after change of residence as, for the most part, instances of escape from reinfection from without. If, as some physicians contend, after a first attack the disease remains latent, waiting only for an opportunity to develop, it is difficult to understand why so many of these cases escape, in spite of the many depressing circumstances that often attend the change of residence and change of occupation. It is precisely among those persons who take to a hard life, with exposure to outdoor influences, often with poor and insufficient food, that we find our best instances of permanent cure. In many cases, in order to avoid the foul air, which I and so many others consider the chief source of danger, our poor patients often have to descend into a lower grade of labour, such as agricultural employment, omnibus-conducting, ship-stewardship, and so on, and yet the so-called latent tubercle finds no fresh point of attack, and the disease only reappears when the patient has been exposed to new sources of infection from without. To my mind, the theory of redevelopment of latent tubercle under these circumstances is contrary to all the canons of scientific evidence.

Cases of Phthisis who have Changed their Residence.

L. Living.

D. Died.

No.	Name.	Sex.	Age.	Stage.	Duration of Life.
1	McK.	Male	34	III	L. 7 years after
2	Mrs. C.	Female	35	I	D. 20 " "
3	L. C.	"	30	I	L. 26 " "
4	Miss R.	"	25	I	L. 15 " "
5	Mrs. J.	"	30	II	L. 20 " "
6	G. S.	"	18	I	L. 17 " "
7	Th. J.	Male	45	I	L. 20 " "
8	F. R.	"	36	I	L. 14 " "
9	W. W.	"	45	I	L. 10 " "
10	Mrs. M. W.	Female	25	III	L. 17 " "
11	Mrs. K.	"	39	II	L. 12 " "
12	Mrs. S.	"	30	I	L. 20 " "
13	Mrs. D.	"	30	I	L. 18 " "
14	J. G.	Male	28	II	L. 40 " "
15	A. B.	"	19	I	L. 20 " "
16	F. G.	"	18	I	L. 18 " "
17	C. C.	"	47	II	L. 30 " "
18	A. H.	Female	18	I	L. 20 " "
19	D. W.	Male	30	III	D. 40 " "
20	H. B.	Female	20	II	L. 8 " "

The following cases will illustrate one or more of these points tending to incriminate the infected home.

CASE I.—J. T. J., aged 19, was admitted to hospital on January 10th, 1888, with softening tubercle at the right apex, and slight consolidation on the left side. His weight on admission was 108 lbs.; under treatment by iodoform, cod-liver oil, and ozone inhalations (5 cylinders daily) he improved steadily, the disease remaining absolutely stationary though bacilli were abundant in the sputum. He was discharged on April 27th weighing 124½ lbs., a gain of nearly 17 lbs. He then went to stay with friends at a farm in Wales where the food was scanty; but he continued to improve, and gained 10 lbs. more in weight in the course of this year and the next. He returned to his own home in the autumn of 1889, and he was readmitted to the hospital on November 22nd, 1889. He still looked robust and well, and weighed 135 lbs. His left lung was normal, and there were no signs of extension of disease on the right side, but his voice was hoarse, and on laryngoscopic examination tuberculous infiltration of the epiglottis was found to be commencing. From this time he steadily lost ground, the disease spreading through the right lung and in the larynx, and he died in the spring of 1891.

CASE II.—E. F., male, aged 29, was admitted to hospital on July 18th, 1888, with a twelve months' history of phthisis, now in the second stage, on the left side, and slight consolidation at the right apex. His weight on admission was 141½ lbs., and after four months' treatment with cod-liver oil and ozone inhalations he gained 5½ lbs. in weight, and the disease in the lungs remained stationary. He was discharged on November 5th, but was readmitted on January 11th, 1889, having lost 10 lbs. in weight, and with an extension of disease in the right lung, and a cavity in the apex. He regained 7 lbs. in weight in the next two months, and improved for a time, but after his discharge he again rapidly lost ground, and died in the autumn.

CASE III.—R. H., male, aged 17, admitted May 5th, 1889. Had hæmoptysis six months before, now a cavity in the right apex, left side normal. He was treated with iodoform, cod-liver oil, and ozone inhalations (3 cylinders thrice daily), and on September 10th he was discharged, having gained 6 lbs. in weight, and with the note that "the disease had not progressed in the slightest." He returned home, but was readmitted on November 19th, having lost 7 lbs. in weight, with softening tubercle on the left side, considerable extension of the disease on the right, and with tuberculous laryngitis. He died a few months later.

CASE IV.—J. B., male, aged 29, clerk. Admitted to hospital April 17th, 1885, with softening tubercle at both apices (one year's history). He remained five weeks, taking chiefly iodoform and cod-liver oil, and improved very much, gaining 15 lbs. in weight. He then (in June, 1885) went to Canada, but returned in 14 months. He had been employed as a farm labourer, and found the food inferior and the hardship great, but notwithstanding this he had gained weight and the disease had not advanced in the least. In September, 1886, he went home, and in March, 1887, he was admitted as in-patient, with increased disease on the right side. He again improved, however, and left in June, weighing 121 lbs. He returned to work and to his old home, and in April, 1889, he was again received as an in-patient, having lost 19 lbs. in weight, and with a large vomica in the left upper lobe.

CASE V.—A. W., female, aged 16, weaver, had hæmoptysis in September, 1890, and twice in the spring of 1891; she was admitted to hospital on May 20th, 1891, with a vomica at the left apex and slight consolidation of the right. Sputum crowded with bacilli (B. 3). She was treated with creasote and cod-liver oil, and carbolic inhalation, afterwards with iodoform, and was discharged on December 11th, having gained 20 lbs. in weight, the cavity contracting, the sputum much diminished in quantity, and the bacilli reduced to (B. 1). A place as waiting-maid was found for her in the country, but before going to it she went home to Bradford, in Manchester, for a week. Three weeks after going to her situation she fell ill, with increased cough and expectoration, fever and night sweats which lasted several weeks. Three months after her recovery she came to the out-patient department and was examined, and although the disease was again quiescent it was evident that there had been an extension of the disease in the right lung.

CASE VI.—S. D., a box maker, with a phthisical history of three years, was admitted to hospital May 13th, 1889, with a large cavity in the right apex; left side doubtful consolidation at apex. In three months she gained 21 lbs. in weight on cod-liver oil and iodoform. She returned home and to work six or seven hours a day; cough returned three

months later, and she lost 13lbs. in weight. She was readmitted October 4th, 1890, with softening tubercle in the left upper lobe, no extension of the disease on the right side.

These cases are not to be regarded in any sense statistically. They are merely examples of a numerous series of instances of a similar character which have come under my notice at the Manchester Hospital for Consumption. Not one of them can be recorded as a distinct and undoubted instance of reinfection, for in each there is the possibility that the subsequent outburst of disease has had an internal source; but the repeated occurrence of such cases, viewed in connection with the *a priori* considerations which have been mentioned, has left a profound impression on my own mind, and has led me to affirm the strong probability of reinfection upon a patient's return to previous conditions of life. It also leads to the inquiry as to the best means of preventing such an occurrence, especially in the numerous class of cases in which removal to another dwelling cannot be carried out, and I venture to think that the practical lessons to be drawn from the facts are: 1. The need either of change of residence or the thorough disinfection of premises occupied or frequented by consumptive persons. 2. The duty of constantly destroying by fire or corrosive sublimate the sputum from these patients. These measures have hitherto been chiefly advocated on the plea that they are necessary for the protection of other members of the family or of the public, but if it be true that in many cases of phthisis the primary lesions would entirely heal unless fresh infection takes place, it becomes a part of our treatment for the cure of these cases to take care that these measures are carried out.

REMARKS ON THE USE OF GLASS TUBES FOR DRAINING THE BOWEL IN COLOTOMY, EXCISION OF THE RECTUM, INTESTINAL OBSTRUCTION, AND COLECTOMY.

By F. T. PAUL, F.R.C.S.,
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In July, 1891, I published in the BRITISH MEDICAL JOURNAL some cases of inguinal colotomy in which the bowel was opened at once, and contamination of the wound and peritoneum guarded against by securely ligaturing into the opening a large glass draining tube. Such a proceeding, perhaps, seems somewhat rough and crude, and met with adverse criticism from Messrs. Harrison Cripps, Herbert Allingham, and Mayo Robson. But during the past year I have had the opportunity of repeating it under various conditions, and have met with such uniform success, that my colleagues at the Royal Infirmary have approved and adopted it, as well as surgical friends practising at other hospitals. I, therefore, feel more confidence in bringing it again under the notice of the profession generally.

In the three cases previously published in the JOURNAL I adopted the form of inguinal colotomy practised by Mr. Jessett, and though it yielded admirable results I was quite willing to accept the opinion of the two former of the above-mentioned surgeons, that this operation is less safe than the plan advocated by them. In all subsequent cases I have used their operation. It is certainly easier and quicker, and therefore should be safer. The steps of this glass tube method as at present practised are (1) to make the incision and withdraw the bowel as described by Mr. H. Allingham; (2) to pack round the bowel with aseptic gauze, make a longitudinal opening on its convex border just large enough to admit the bent glass tube (Fig. 1) previously plugged with wool, and to insert this tube, and securely fix it with a tight ligature; (3) if deemed necessary to apply any of the further sutures employed by Mr. Allingham, and to dress the wound, covering the dressing with jaconet, through which the tube projects. When a great rush of motion is expected it is simply caught in basins as it flows from the curved tube; but when the previous obstruction has not been severe a jaconet bag containing wood-wool or other absorbent is tied on to the end to receive the discharge. The tube gives rise to no inconvenience, and always remains secure for three days. Sometimes it does not

slough out for a week or more, apparently owing to a subsequent relaxation taking place in the ligatured tissues, which permits a partial re-establishment of the circulation. That this does occur has been shown by the presence of a little blood oozing from the cut in the bowel an hour afterwards, though the ligature was tied tightly at the time. The operation is not longer than Mr. Allingham's, as the catgut sutures used by him to fix the bowel to the wound are unnecessary, and I rarely employ them. At present the series of cases is too small to afford any useful statistical information; but I have not yet heard of any death within the fourteen days' limit fixed by Mr. Allingham. One died shortly after that date from the shock of the supplementary operation, performed not with his special clamp, but with the thermo-cautery.

In the large and valuable series of cases published by Mr. Allingham in the BRITISH MEDICAL JOURNAL for May 14th, he has the good fortune to have to record only two deaths during the first fourteen deaths. Certainly such results are very creditable and encouraging, but the accident to which he attributes death in each instance would have been practically impossible if the tube had been used. In the one the bowel could not have slipped back into the abdomen, and in the other the obstruction and distention would have been at once relieved, and the small intestine would not therefore have been forced out of the wound. In his former communication he expressed the opinion that distended bowel could not be opened at the time of the operation without risk of contaminating the peritoneum. I may assure him that his opinion is a mistaken one. The piece of bowel outside the wound, no matter how distended, can be controlled by clamp or assistant, whilst the operator makes the small incision necessary for the insertion of the tube. There is really no difficulty and no danger in any part of this simple proceeding, and I hope before Mr. Allingham abandons the inguinal to return to the old lumbar operation in cases of prolonged obstruction he will allow me to persuade him to give the tube a trial.

Another class of case in which the larger tube has proved serviceable is in extensive excision of the rectum by Kraske's, or, as we call it here, Alexander's, method. In such cases the peritoneum is invariably opened, and a rush of faeces usually follows the operation. In the three in which I have tied the tube into the cut end of the rectum, we have experienced no difficulty in keeping the immense wound quite aseptic during the first four or five days, notwithstanding that no preliminary colotomy was done, and quantities of motion escaped daily.

Intestinal Drainage Tubes. 1. For use in the cæcum, colon, and rectum; measures 5 inches in length by 1 inch in diameter. 2. For use in small intestine; measures 2½ inches in length by ½ inch in diameter.

The smaller tube is intended for use in those cases of acute intestinal obstruction in which it is imperative to relieve the distended and paralysed bowel. Even when the original cause of obstruction has been entirely removed, the paralysed intestines are often quite unable to help themselves, and the operation is without avail. It is then necessary to give a very free and easy vent for the thin faecal matter and gas with which they are distended. I have on three occasions inserted one of the smaller tubes into the bowel above the obstruction in such cases; but, unfortunately, though the patients all experienced great relief, none of them ultimately recovered. One was a robust man with septic peritonitis from sloughing appendix. Another was a previously healthy but collapsed individual with acute intestinal obstruction. And the third was a delicate consumptive man with obstruction of nine days' duration, due to adhesions nipping a coil of ileum. The