the dura at the part be so thin as to be capable of stretching, inasmuch as the dura around the opening is adherent to the inner table, and without separation from it, or stretching of the part exposed, it cannot bulge. Further, as a rule, the dura mater is not only thicker in general paralysis, but it is more adherent to the bone.

3. *Fluid* in all the cases, when the dura was incised, escaped in variable quantity. It was a clear limpid stream of serous fluid, which contained no flakes. In two cases the fluid spouted out for a distance of at least one inch.

In Case v, after the dura was incised on the left side, and the subdural fluid allowed to escape, some time was taken to closely examine the pia arachnoid, and to note the pulsations of the brain; and later, when the dura on the right side was cut into, very little fluid escaped, and at the moment of puncture it was observed that the brain surface was not apposed to the under surface of the dura. It would seem probable, from a consideration of this case, that a very free communication between the fluid on the two sides of the head exists. In Case III, after the dura was incised, great bulging into the trephine opening occurred, so that the appearance of a cyst was produced. This was due to the opening being immediately over a sulcus, and to the fluid under the pia arachnoid membrane forcing that membrane upwards. On opening the cyst-like swelling the fluid which escaped resembled the fluid from the subdural space.

4. The *pia arachnoid* membrane in every case was distinctly redder and more vascular than usual. In two cases there was a milky appearance along the vessels. On incising the membrane, fluid similar to that in the subdural space escaped, but only a small quantity. In two cases where an endeavour was made to separate the pia from the summit of the convolutions, it was found impossible to do so. In regard to the greater congestion of the pia apparent in these cases, it should be remembered that the intracranial pressure having been much diminished, it is possible that some dilatation of the vessels occurred, giving rise to a pinkness, very marked in Cases III and v, which might have disappeared had they been longer under observation, the vessel walls regaining their tonicity.

5. *Pulsation* in every case was less than normal before the dura was opened, but after the fluid was evacuated, pulsation was marked. In Case III it became so alarmingly influenced by respiration, that it was thought inadvisable to open the other side of the head. In this case the sucking in of the brain during inspiration produced a depression of about three-quarters of an inch.

From a consideration of the above series of cases we have come to the following conclusions:

Surgically, all the cases have progressed uninterruptedly to recovery. At the end of eight days the wounds were in every case firmly united, and in none was there a drop of pus. None of the patients seemed to suffer in the least degree from the operation. Undoubtedly, much of the surgical success was due to the able assistance which we from the outset received from Dr. Skeen, assistant physician at the asylum. We are deeply indebted to him for the assiduity with which he carried out all our directions, the assistance he gave at the operations, and the untiring interest he has taken in the after-progress of the cases.

Medically.—In all the cases, with one exception (No. 2), there was a marked improvement in the mental symptoms, lasting for from one to three weeks. This may be fairly accounted for as the result of the operative procedure. We consider that the relief of pressure by the removal of fluid, the greater freedom allowed by the removal of bone for cerebral expansion and pulsation, and, perhaps, the relief of the inflammatory condition by the local depletion of the vessels of the scalp, diploë, and brain membranes, necessitated during the operation, may all have combined to produce the change we noted.

It is significant that concomitant with the cicatrization and increasing density of the scalp and fibrous membranes over the openings there took place a gradual deterioration in the patients' mental and motor symptoms. In Case v, where an attempt was made to drain the pia arachnoid sac by means of horsehair, the difficulty of preventing rapid healing of the wounds over the horsehair was found to be insuperable, and made its function of draining nugatory. Therefore we are un-

able to state from our experience whether such a mode of drainage would be beneficial.

We are inclined to regard the removal of subdural fluid a means towards the alleviation of the inflammatory condition of the pial vessels involved, and not the primary object of the operation. In connection with this we have noted that immediately after the operation, and in the after-history of the cases up to the present date, there has been no bulging of the scalp over the openings, which one would naturally have expected from the overpressure of fluid; but, on the contrary, that the scalp has been sucked in, so to speak, and formed a cup-shaped depression. Again, as the membranes have hardened over the openings, the pulsation of the brain has become less and less apparent on palpation. The absence of bulging and pulsation might be accounted for by shrinkage of the brain tissue proper were it not that the depression occurred from the first in cases in which there was no apparent atrophy of the convolutions.

That this cup-shaped depression is not due to adhesion of the scalp to the underlying membranes of the brain we are justified in stating, from the result of the *post-mortem* examination of Case I, who died three months after the operation, and in whom no such adhesion was found. The absence of adhesion is, of course, fatal to Mr. Harrison Cripps's theory that a lymphatic communication might be established between the membranes of the brain and the scalp tissues.

We regret to record, as the result of our experience, that no permanent or marked benefit was conferred upon our patients by the methods of surgical treatment we were led to adopt in the manner described. In Case III we believe that the motor symptoms of the disease were, and continue up to this date, relieved by the operation, but the delusional state is as bad as ever. We do not wish to discourage others from further attempts in the same direction. In our hands the operations proved, from a surgical point of view, eminently successful, and no bad results of any kind were suffered by our patients.

We would remark, finally, that it seems as if the operation, to be of material benefit, should be performed at an earlier stage of the disease than in our cases. In all the cases we trephined, the pathological appearances were such as to lead us to infer that the disease was fully established. We believe that the present state of our knowledge of general paralysis, and our power to diagnose the disease at a sufficiently early stage, is so imperfect that as yet surgical treatment—at all events, by the method adopted by us—can be of no material benefit whatsoever.

VOLVULUS: INTERNAL STRANGULATION: LAPAROTOMY: EXCISION OF THE VERMIFORM APPENDIX: RECOVERY.

By JULIUS NICOLAYSEN, M.D.,
Professor of Surgery in the University of Christiania.

E. O., aged 27, a tradesman, was sent to the Royal Clinical Hospital, Christiania, on September 30th, 1889, in the forenoon. He had been in good health until September 25th, when he was seized suddenly with severe pain in the lower part of the abdomen. After the use of embrocations of chloroform oil the pain disappeared, and the following days he was well and carrying about a heavy bundle of worsted articles for sale.

On Sunday morning, September 29th, while in bed, he was seized with very violent pains below and to the left of the umbilicus; he could not indicate any cause. The abdomen grew very painful on palpation. Morphine was administered subcutaneously, and laudanum was given internally without any alleviation of the pain. He grew sick, and in the afternoon had more and more frequent vomiting. When admitted there was great weakness; the face was pale, haggard, and had a suffering expression. No external hernia could be found anywhere. The abdominal wall was tensely contracted, and the right iliac region especially was very tender on the lightest pressure. In this region, and towards the symphysis pubis, there was felt a more resistant and prominent part of

the size of a large fist. The percussion sound was here of a higher tone and a little less tympanitic than anywhere else in the abdomen. He was brought under the influence of chloroform, but the abdominal wall did not become less tense. He had an enema the day before, almost without any effect, and numerous leeches on the painful part of the abdomen and reiterated doses of laudanum, and subcutaneous injections of morphine had not lessened either the pain or the vomiting. The pulse was between 54 and 60 in the minute, regular and strong. The respiration was rather superficial—30 in the minute.

At 10 A.M. I proceeded to make an exploratory laparotomy, after thoroughly cleansing and shaving the abdomen and the external genitals. The bladder was emptied by a catheter. An incision 4 centimetres long was made in the middle line, 5 centimetres above the symphysis. Through the opening flowed a stream of blood-coloured serum. The forefinger was introduced, and a very tense coil of the small intestine, filled with air, could be followed down into the pelvis minor and upwards to the right; near the cæcum it very suddenly got smaller, and a tense string was here felt strangling the gut.

The incision was lengthened 5 centimetres, and, as the intestines escaped, they were gathered together and kept in napkins in warm boric solution (2 per cent.) Then the strangulated part of the small intestine showed itself distinctly by its dark red-brown colour. The gut was very much distended (5 centimetres in diameter), but the visceral peritoneum on it was shining and smooth. The whole discoloured coil was cautiously drawn out. It measured about half-a-yard in length. The coil was seen to have been twisted about 180 degrees from left to right, and the above-named cord was the processus vermiformis, which had followed the gut in the twisting movement and formed half a knot about it. The end of the processus vermiformis was swollen for a length of 2½ centimetres and as thick as a finger, having been compressed by interlacing with the upper part.

By turning the coil 180 degrees in the opposite direction, I felt a slip, the processus vermiformis was free, and all incarceration both from strangulation and from volvulus was done away with. The processus vermiformis had its mesentery, and 7 to 8 centimetres in length. On the spot of incarceration of the small intestine, there was a furrow of the size of a goose quill, of anæmic colour, but smooth and shining. After a few minutes, the pale colour grew normal, and at the same time the brown-red hue of the incarcerated coil became lighter and lighter. The processus vermiformis was excised about 2 centimetres from the cæcum, and the mucous membrane first sutured, then turned upon itself, and by a peritoneal suture (fine silk) fixed and made tight; the mesentery was sewn to the end of it by a few stitches.

The peritoneal cavity was now flushed with rather warm (50° Celsius) solution of boracic acid (1 per cent.), the intestines replaced for the most part by lifting and stretching the borders and angles of the incision in the abdominal wall, the previously incarcerated coil was placed uppermost just beneath the wound, to have it near if anything should happen. Deep and superficial silk sutures were applied, and an iodiform-sublimate bandage.

Two subcutaneous injections of ether were given, and one of morphine (0.01 g.). A teaspoonful of hot milk was ordered every ten minutes, and an enema containing extractum carnis g. 150 given. He had pain sometimes during the day, but not very violent nor of long duration, but no vomiting. In the evening the pulse was 68, strong; the temperature 38.5° C.; the urine was withdrawn by catheter.

On October 1st he looked much better; there was no pain; the abdomen was softer; the pulse 56 to 60; the temperature 38°. He had some sleep. On the following night he slept well. He suffered no pain, and had passed flatus. The abdomen was soft, not distended and not tender. The temperature was 37.5° C.; pulse 48 to 52. Milk and milk broth were ordered to be given in tablespoonful doses every half-hour. On October 3rd, he passed his water without catheter.

From this time he was convalescent in every respect; he took more food daily and had no pain; the bowels acted after enema of lukewarm water, and after October 8th spontaneously. He was up about the middle of the month with an abdominal supporting bandage, and left the hospital on October 22nd.

He felt well until November 29th, 1889, when he was seized with great pain after a rather hearty meal. He was treated in the medical part of the Royal Hospital from November 30th to December 14th, under the diagnosis "dyspepsia acuta." There was hiccup, and some tenderness on pressure over the whole abdomen. The pulse was 48, strong; the temperature 37°. The pain was especially great in the epigastrium; but after a few days it disappeared and he was well.

In July 5th, 1890, he was sent into my part of the Royal Hospital. He looked haggard and worn, the eyes sunken; he was complaining of great pain in the abdomen, which was not distended, and where no abnormal resistance could be felt. Percussion was tympanitic over the whole abdomen, but the tone was a little higher in the right iliac region. Since the previous day he had suffered from the pains, and during the night had frequent vomiting. The pulse was 72, strong. By washing out the stomach a brownish fluid without any bad smell was obtained. He was ordered tr. opii m. xv.

He passed a tolerable night with some sleep, and felt much better the next morning. An enema of 300 cubic centimetres of salt water was given, and the bowels moved abundantly and much flatus passed.

Early in the morning of July 7th, suddenly, great pain was experienced in the abdomen and the back, and he vomited several times. The pulse was 56, strong; the temperature was normal. Application: Cingulum Neptuni; laudani liq. Sydenh. gtt. xv.

July 8th. More vomiting and pain, especially in the epigastric region. The percussion sound was tympanitic over the whole abdomen; the resistance normal. The ventriculus was flushed with warm water. An enema was administered, followed by abundant stools.

On July 9th he felt much better, and had no more vomiting or pain. On the next day he felt well. The bowels had been moved spontaneously.

In a few days he was out of bed, and left the hospital on July 14th, 1890.

REMARKS.—I think it is almost unnecessary to do more than point to the most prominent features of the case. For me the evolution of the case is as follows: The mesenterium of the small intestines was congenitally too long, or became lengthened owing to his manner of feeding; thus arose a disposition to more or less twisting movements of one or other coil of the intestines. Then inflammation of the mucous membrane of the processus vermiformis occurred, and about September the irritation of the mucous membrane (I think there must have been some ulceration in it) had reached its peritoneal covering, and there had been adhesion between the processus and the nearest coil of the small intestine just lying in front. The adhesive process was complete about September 25th, the first time he had pain in the abdomen. Four days later the coil of the intestine, hanging low down in the pelvis minor, made a turn from the left to the right, and thus, so to say, knit the processus vermiformis in a tight ring about the upper part of the coil, which by this movement, and by the compression of the adherent processus vermiformis, was completely emptied, so as to endanger the circulation in the vessels to the lower part of the coil. The peritoneum of the processus vermiformis speedily became adherent to the whole of the gut which had come into its grasp, and a spontaneous undoing of the volvulus was no longer possible. We cannot know what was the cause of the twist, but as there was no external cause, and no sudden or violent movement of the body preceded it, it is probable that it was a strong peristaltic or antiperistaltic motion in the somewhat fixed coil which led to a twist about the adherent part.

All the characteristic symptoms now set in in a very short time—great pain about the location of the volvulus, with tenderness on pressure, sickness, vomiting, restlessness, and pale, haggard face. In this patient the pulse, every time he had the pains, at first grew rather slow, which I think is seldom the case.

The symptoms of ileus, the fact that opiates did not alleviate them, that enemata did not open the bowels, and especially the greater resistance in the iliac region and the circumscription of it with the higher tympanitic percussion sound limited to the more resistant spot, brought me to the diagnosis of volvulus, but I could not exclude a perforation of the processus vermiformis with peritonitis in the surroundings. At all

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.