left cord, the latter being in the cadaveric position." Finally, on page 205, I quite distinctly state that stimulation of the gyroprefrontalis (at a spot marked in the figures accompanying my essay) brings about the following results: "partial or total closure of the glottis and aditus laryngis."

As to the "cadaveric position," I write, on page 206: "Experiment performed July 15th, 1882. On changing the position of the electrodes upwards to the extreme lateral margin of the sulcus cruciatus, there results (again) the position of the cords midway between phonation and deep inspiration;" and again, page 205: "Experiment performed June 26th, 1882. In one case, all the muscles apparently being in a state of tension, that position of the cords midway between phonation and deep inspiration was noticed which Ziemssen calls 'cadaveric position,' but which, there being tension of all the muscles, we must consider as a condition of total equilibration of all the muscles acting on the arytenoid cartilages." We thus see that abduction may also be brought about by stimulation of this area, in contradiction to the assertion of the authors who say: "(2) We have not been able to find an area of representation in the cortex of the abductor movements of the vocal cords."

As to point (3) touching their experiments on extirpation of one of these cortical areas, after which "no paralysis of the cords is observed," I beg to compare their results with my own. I performed⁵ unilateral extirpation of this area on ten dogs, and subsequently removed the corresponding area of the opposite side. These animals were kept alive four to five months. Now, I have shown that, "after the first extirpation (on the left side), no essential or permanent disturbance of the voice occurred; I have even shown that, after double extirpation, the dogs have only lost the psychical representations of the movements of the vocal cords necessary to phonation, and that some of them had preserved the rude reflex approximation of the cords as we find it in the newborn animal with its squeaking, whining voice."

4. The authors continue: "We have observed that on powerful long-continued excitation of the laryngeal area true epilepsy of the vocal cords supervenes, gradually spreading to the neighbouring muscles of the face, neck, head, and upper limbs." Against this I point to page 205: "Experiment performed July 4th, 1882. During continued excitation respiration ceases completely. After the third excitation convulsions occur, in which, besides the muscles of the neck and fore limbs, those of the larynx participate in such a manner that complete closure of the glottis immediately alternates with slight opening of the same (as we observe it laryngoscopically during the act of laughing)."

I think that the above comparison and juxtaposition of the respective results show an almost complete coincidence, so that I could only be flattered to find them in so perfect an agreement with myself; if the authors in this, their "preliminary communication," had not altogether omitted my name, and simply replaced it by the sentence: "We carried out...experiments... with a view of investigating the central motor innervation of the larynx."

This vindication of their right of discovery seems to me to be all the more out of place as this right belongs neither to me nor to the authors; for whilst I simply investigated an area previously mapped out with almost mathematical accuracy by Professor H. Munk on the surface of the cerebral cortex, there remained for the authors only to show that not only the dog, on which I experimented, but also the monkey, cat, and rabbit enjoy the privilege of having their vocal mechanism presided over by a motor centre in the cortex.

ACUTE INTESTINAL STRANGULATION DUE TO A BAND WITH ACTIVE TUBERCULAR PERITONITIS: LAPAROTOMY: CURE.

By ARTHUR E. J. BARKER, F.R.C.S.,
Surgeon to University College Hospital, etc., etc.

I DESIRE in this short paper to record somewhat in detail a case belonging to a group of diseases at the present time attracting the closest attention both of physicians and surgeons. The pathology of tubercular affections generally appears to be gaining daily in interest, and doubtless this is due in some measure to the opportunities which surgery affords of studying the processes in

actually living tissues, and in parts hitherto considered inaccessible to inspection during life. Surgery offers opportunities, moreover, of examination of the tissues involved at a stage of the disease far earlier than that usually met with in the *post-mortem* room, and consequently in a condition much more likely to yield accurate information to the pathologist.

Among all the tubercular affections none are of more absorbing interest than those of the serous membranes, and first among the latter stands the peritoneum.

Tubercular peritonitis has been so recently and fully discussed by Dr. Douglas Powell and other leaders of the profession,¹ that all general questions regarding the disease need not be alluded to here. I wish simply to describe a case which presented many points of interest, and leave it for the study of others, after a few suggestions of my own.

The case is briefly as follows:—A. A., aged 23, a domestic servant, was admitted into University College Hospital on April 27th, 1889, at 9.45, with severe symptoms of intestinal obstruction. She was a delicate girl, and wore an anxious expression. Her family history was good, and she herself had hitherto enjoyed excellent health, except that about three months ago she had an attack of pain low down in the abdomen lasting one day, but unaccompanied by vomiting or constipation. For some weeks before the present attack she had diarrhoea on and off. On Tuesday, April 23rd, patient was, however, in her usual health. On Wednesday, 24th, while travelling by rail, she was suddenly seized with severe pain across the abdomen below the umbilicus. She had had a simple meal a short time previously. At 10 p.m. she vomited some frothy fluid. After this the pain remained almost constant, though not so severe as at first. There had been no action of the bowels or passage of flatus since the onset, and vomiting had been frequent, and always after food. The matters rejected became green soon after the commencement, and on the 27th are said to have first become stercoraceous. She was treated outside the hospital, first with half an ounce of castor oil on the 24th, and later with opium pills and enemata.

When I first saw her at 9.45 P.M., on April 27th, soon after admission, the pulse was 80, and irregular in rhythm and strength. She had also a loud mitral systolic murmur. The abdomen was uniformly distended, not tense, and was perhaps a little fuller over Poupart's ligament on the right. Pain was general, but chiefly noticed below the umbilicus. Tenderness was also general, but was most felt in the iliac fossæ. There was no mapping out of the intestines. The abdominal respiratory movements were fairly and equally marked on both sides. The percussion note was tympanitic, but there was slight deficiency of resonance in both flanks. There was no increased resistance to pressure anywhere. The tongue was moist and slightly furred. Examination by vagina and rectum, negative; no signs of hernia.

REMARKS.—The very sudden onset of the attack, with early vomiting and complete obstruction of bowels from the first, suggested mechanical strangulation as by a band or twist. The evidence of peritonitis, however, was rather against this diagnosis, and appeared more to point to perforation of the vermiform appendix, as did also the slight extra fullness in right iliac fossa. Rupture of any other part of the intestine seemed to be excluded by the absence of collapse and the duration of the symptoms. I therefore decided to explore the neighbourhood of the cæcum by a short incision, and if nothing was found there, to make a formal exploration of the abdomen by median incision.

Operation.—The usual antiseptic precautions having been taken a two-inch cut was made obliquely downwards and inwards, about an inch to the inside of the right anterior superior spine of the ilium. On opening the peritoneum some clear amber-coloured fluid escaped, but nothing abnormal could be felt with the finger. Some small intestine, however, which presented in the opening, was drawn out and was found to be studded thickly with tubercles of varying size. This coil was empty and relaxed, suggesting obstruction higher up. I then made a median incision below the umbilicus for four inches. The first thing noticed here was adhesion of the omentum to the abdominal wall at the seat of incision, and a quantity of clear fluid with flocculi. The small intestine which presented was much distended and congested, and thickly studded with countless tubercles, as was also the omentum, but the transverse colon above was clear of them. On passing the fingers down to the right side of the pelvis, a round pocket was entered behind. This was found to be produced by a twist of the mesentery on itself. The gut at this spot was fixed

⁵ Loc. cit., p. 206.

¹ British Medical Association Meeting, 1889; the JOURNAL, December 14th, 1889

to the brim of the pelvis by a strong band of organised lymph as thick as a crow quill. By very strong traction this was torn through at its pelvic end, and then came into view as a spur about two-thirds of an inch long attached to the intestine at one end, the other being freshly torn. A little higher up the intestine was marked with a transverse constriction, evidently caused by being crossed by this band, and above this groove it was distended and congested, while below it was small and empty. A little below the band there was also a slight kink in the gut, due to an adhesion of the peritoneal surfaces around a tubercle as large as a hemp seed. This mass was cut through, and its contents, which were cheesy, were squeezed out, the kink being thus relieved.

All obstruction having now been overcome the peritoneum was carefully sponged dry after the cavity immediately under the wound had been flushed out freely with hot boiled water. Several drachms of iodoform emulsion were then poured into both wounds among the intestines, and the abdomen was completely closed with silk sutures in the usual manner. No drain tube was inserted. A salicylic wool dressing completed the operation, which had lasted forty-seven minutes. The pulse at the end of this time was 125, and weaker than before, but not alarmingly so.

At 2 A.M. 3 minims of morphine solution were given hypodermically. At 4 A.M. the patient vomited 8 or 10 ounces of dark green bile-stained fluid. At 8 A.M. 2 minims of morphine solution were given, soon after flatus was passed. At 11 A.M. a "large quantity" of bile-stained fluid was again vomited. I now ordered enemata of 5 ounces of hot water with 2 drachms of brandy every two hours and peptonised suppositories of beef and milk alternately every four hours, and also 2 minims of morphine solution *quartis horis*. Nothing at all was to be taken by the mouth. The hot water enemata were given to allay thirst, as I have been in the habit of using them for this purpose for some years past in allied cases.

After the first twelve hours there was no vomiting for some days, and there was nothing special to note. Twenty-four hours after the operation the temperature was 101 and pulse 88, regular, and good. Thirty-six hours after admission she seemed very well, and complained of nothing but hunger. Temperature 100°, pulse 92, respirations 22. On the fourth day the hot water enemata were only given every fourth hour, and she was allowed to have a little iced tea. The morphine was continued as before. On the fifth she was not so well and she vomited in one act about 8 ounces of greenish brown fluid, and hiccupped for some time after. This was the last attack of vomiting. The brandy was stopped, and she was given a little liquid peptone. She had three offensive fluid motions during the day. On the sixth day she felt much better and only complained of hunger; peptones as before; three stools during the day. On the eighth day, after drinking some tea, she felt nausea, but did not vomit. After this there is nothing to note except uninterrupted convalescence. The first dressing took place on the tenth day, when I found perfect union of the wounds everywhere. The stitches were then removed and a firm bandage was applied over wool. The abdomen was flat and soft everywhere and not tender. Hunger was now her only complaint, and a desire to be allowed to get up (eleventh day), about which she got very cross until the risks were fully explained to her. On the fourteenth day the abdomen was encircled with a broad strip of American adhesive plaster in order to support the parts when the patient should get up. This was permitted on the thirty-first day after operation, and a week later she went to the Convalescent Home at Eastbourne. All symptoms of tubercular peritonitis had completely disappeared, and the abdomen seemed normal in all respects.

Several points about this case appear to me to deserve special notice. In the first place, the patient's family history was good; the only trace of evidence of tubercle among her near kin discoverable was that one brother had "abscess in the neck." The patient's health, too, had been excellent, and, except for an attack of pain in the lower part of the abdomen three months before admission, we can learn of no illness. Whether this pain had anything to do with the beginning of the tubercular peritonitis or not must remain uncertain; but it appears not improbable that it followed on the rupture of a caseating gland in the mesentery, as also that the occasional diarrhoea noted above may have followed the inoculation at that time of the peritoneum. I think that the most reasonable hypothesis in regard to the onset of the disease of the peritoneum in this case may be stated as follows. That it started at the time the first pain was felt with the softening and rupture of a caseous mesenteric gland into the serous cavity by

which the latter was inoculated directly in the immediate neighbourhood of the escaped matter. If it had started as a blood disease, why should it have affected one part of the peritoneal cavity and not the rest? The tubercle bacilli or their spores, if present in the blood, might have infected a limited part of the serous covering, if this had been damaged by any antecedent disease depressing its vitality. There is, however, no history of any abdominal complaint until immediately before the present attack. There was, to be sure, some diarrhoea off and on for some weeks before the latter; but this was most probably subsequent to the infection of the peritoneum, to judge by the state of maturity of many of the tubercles observed at the operation. But if we suppose the patient to have received tubercular matter with her food while in fair health—as, for instance, through infected milk—the whole process is not difficult to explain. Here the *matrices morbi* would be taken up by the surface of the intestines and carried to the nearest lymphatic glands. There may possibly have been only enough to infect one group of the latter, and, the patient being comparatively vigorous, the tissue elements of the gland may have got the better of the bacilli and encapsulated them for a time completely. Ultimately, we may suppose that the focus of hyperplasia in the gland underwent the usual fatty degeneration, and the resulting caseous matter ruptured into the abdominal cavity and inoculated all the serous surfaces in the neighbourhood. This sequence of events, at all events, appears to be common. Once the peritoneum becomes the seat of tubercle, the tendency to form bands of adhesion is great, as is well known. The inflammatory exudation is in many cases just enough to throw out plastic lymph around some of the foci, and this is drawn out into bands and threads while being organised into fibrous tissue. And here, as Dr. Powell remarks, is one of the gravest dangers of tubercular peritonitis. For, though the infective process may subside, these bands are very prone to cause internal strangulation sooner or later, as in the present case. Whether this patient would have recovered from the peritonitis if the sudden onset of internal strangulation had not called for laparotomy, which, besides averting the immediate risk from complete obstruction, enabled me to cleanse the tuberculised area, it is impossible to say. But one fact is remarkable as bearing upon this point, namely, that many of the tubercles were already caseating. This would appear to indicate that, at all events, there was some tendency in the disease to obsolescence. On the other hand, however, there were countless remaining which presented the well known pearl grey, translucent appearance of active growth.

But whether the patient might have ultimately recovered from the tubercular process or not without the benefits of operation, I cannot help thinking that the latter contributed much to the rapid cure. For though the tubercles themselves were not and could not be removed, a large quantity of fluid, probably charged, if not with bacilli at all events with their spores, was washed and sponged away, and so the dosage of the poison was reduced, the further spread of inoculation over fresh surfaces was arrested, and, perhaps, no more morbid material was left behind than could be disposed of by the tissue elements of a fairly vigorous individual. Again, whether the iodoform and glycerine emulsion poured freely over the affected intestines may have contributed also to the arrest of the tubercular process cannot of course be proved. But from what I have seen of its action when injected into tubercular abscesses elsewhere, I am forced to the belief that either the iodoform or the glycerine does exercise some inhibitory or destructive action on tubercle growth. Some months ago I published in the JOURNAL an account of an original method of carrying out this principle of thoroughly flushing out and cleansing tubercular abscesses connected with hip disease after excising the diseased joint surfaces, where the results have shown a complete parallel to the present case; and I hope soon to produce four or five fresh cases treated similarly at one of the societies. In some of these the procedure mentioned, combined with the injection of the cavity with iodoform emulsion, has resulted in complete arrest of the tubercular disease as well as by union by first intention of the wound.

In these four cases the immediate arrest by operation of a tubercular process which had been visibly and steadily advancing in the hip for months in spite of treatment was the most remarkable thing of the kind I have ever seen. The only parallel appears to be in cases such as that now recorded, and it appears to me complete. In both a large quantity of tubercular matter was removed thoroughly from an area apparently involved in active growth, and

all the surfaces affected were soaked in iodoform emulsion. In neither the abdominal nor hip cases was any drain tube employed, so that there could be no question of the carrying off gradually and continuously of the disease products subsequently to the operation. In both instances the same procedure seems to have put an end to the local disease.

Of course all these cases are being watched carefully at short intervals for a possible return of the local or general affection; but though many months have elapsed since some of them were operated on, there is no evidence up to date of local mischief except in one, and the general condition continues steadily to improve.

A METHOD OF ADMINISTERING ETHERISED NITROUS OXIDE AS A GENERAL ANÆSTHETIC IN MINOR SURGERY.

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In selecting an anæsthetic for use in minor surgery the following points should be attended to, namely:

1. It should be as nearly as possible "safe."
2. Little or no previous preparation of the patient should be required.
3. The anæsthesia induced should be perfect.
4. The after-effects should be practically *nil*.

Of known anæsthetics, nitrous oxide is the one that fulfils more of these requirements than any other, and one is strongly tempted to direct one's attention to the possibility of utilising it in some form or another in all cases.

Fig. 1.—Apparatus arranged for direct administration. A, gas bottles; n, conducting pipe, a section of which is represented above; c, reservoir bag; d, face-piece.

I would remind you in the first place that nitrous oxide anæsthesia in its purest and most unobjectionable form is not, as some would have us believe, merely a matter of asphyxia; and, on the other hand, that the specific anæsthetic properties of the gas are such that its administration absolutely undiluted with air has hitherto been considered essential for the production of satisfactory narcosis. Now it is obvious that this exclusion of air,

although it may intensify the specific action, can only be continued for very short periods, for periods so short in fact that the full specific anæsthetic effects have barely time to develop before phenomena due simply and solely to arrested tissue metamorphosis or oxygen starvation make their appearance. In other words, the period of primary narcosis, or that due to a single continuous application of the facepiece without the admission of air, is short, and hence the objection to the use of gas alone in minor surgery. In order to overcome this difficulty you will see at once that two courses are open to us. We may either administer the gas mixed with air or some other oxidising agent, or we may increase the specific anæsthetic power of the gas, so that a deeper narcosis may ensue before the development of symptoms of oxygen starvation. The first of these alternatives hardly as yet comes within the range of practical anæsthetics, but the second has been in vogue for some time, and it is to a method of doing this that I venture to draw attention.

The production of full ethereal anæsthesia I do not propose to describe, the ether in the following method is used simply as an adjunct to the nitrous oxide, which is the main anæsthetising agent.

The accompanying figure (Fig. 1) represents the apparatus which I usually employ myself for the administration of nitrous oxide alone. Full details of the working of this apparatus, and of the phenomena of nitrous oxide anæsthesia, are contained in my little manual on the subject, and I do not, therefore, propose to discuss the matter at any length here. I may, however, point out that the main features of the apparatus in question are: a pair of steel bottles (A) containing the liquefied gas, which on escaping through the conducting tube B expands fully in the reservoir bag C, and is inhaled through the facepiece D; between C and D is a three-way stopcock, by working which we are enabled either to shut off the gas from the facepiece entirely, or to admit the gas during inspiration only, or to allow of free in-and-out respirations into the bag. The question now is, How is it possible to adapt this apparatus and method so as to permit of the admixture of small quantities of ether vapour with the gas inhaled? Many plans have been suggested, and many forms of apparatus have been contrived; the one to which I would now draw attention recommended itself to my notice mainly on account of its simplicity and lightness, and having used it a good many times I can say confidently that for the purpose for which it is intended it is quite effectual.

Fig. 2.—Miniature ether chamber in position for the administration of etherised nitrous oxid.

Fig. 2 represents the apparatus in position. Those who are familiar with the portable ether apparatus devised by the late Mr. Clover will at once recognise the principle of the chamber I am describing. It consists simply of a metal reservoir, surrounded in half its extent with a water jacket; the air or gas inhaled becomes charged with ether vapour by passing through a central tube and over the liquid ether. It differs from Mr. Clover's apparatus in the following particulars:

1. It is much smaller, holding only half an ounce of ether.
2. The central tube passes right through the chamber, so that the latter can rotate freely and independently of either bag or face-piece.

If we wish to administer etherised gas to a patient with this apparatus the central tube is removed, half an ounce of ether is