the mucous membrane soft, and helps to prevent crust formation.

Complications.

This operation is not without certain minor dangers, most of which can be avoided by careful management. Operations within the nasal cavities usually do very well, septic troubles being almost unknown. The few complications which occurred in the 100 cases under consideration are briefly mentioned.

Haematoma of the Septum.—In this case the nose was plugged on one side only with gauze strips. A few hours after the completion of the operation the patient sneezed violently and a portion of the plug was blown out, the patient pulling out the rest of it as its purpose was unknown to him. When I saw him the following day both nostrils were completely blocked by a typical haematoma of the septum. It was not incised, and the ultimate result was not unsatisfactory.

Perforation of the mucous membrane occurred in a small number of cases. I have not found it to be detrimental, but if it be recognized that a small perforation has been made, *make it a big one*. Small perforations are troublesome; large ones never are.

Haemorrhage may complicate the operation if undertaken with general anaesthesia. It is rare with local anaesthesia.

Secondary haemorrhage after the operation may also occur. Frequently it can be arrested without plugging if the patient be instructed to sniff (forcible inspiration), which has the effect of emptying the veins of the head and nasal cavities.

Synechia may form if adjacent surfaces of turbinal and septum be injured, but this is rare.

"Toothache," involving the incisor teeth of the upper jaw, is sometimes complained of after operation. It is usually only temporary, and is due to injury of the branches of the large palatine nerve in removing the crest.

Acute otitis media occurred in one case where the plugging had been continued longer than usual. A plug in the nose, no matter how small it be, always gives rise to an acute rhinitis, and it is just as well to warn your patient beforehand that for a short time after the operation the obstruction may be greater than it was previously. Complications, such as acute otitis, are more due to this than to the operation. In this case paracentesis of the drum became necessary, and gave the requisite relief. Recovery was uneventful.

Acute frontal sinusitis occurred twice, and was undoubtedly due to plugging. One case recovered by expectant treatment, rest in bed, warm fomentations, and strict attention to the nasal toilet, but in the other removal of the middle turbinal body was required with lavage of the affected sinus.

Tonsillitis was much more frequently observed, and this may also be traced to the plugging of the nose. It was usually mild in form, responding quickly to treatment.

A complication which is said to develop later is *atrophic rhinitis*. So far none of my cases have developed it, although, in a few, crusts which are difficult to expel continue to form.

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A CASE OF TONSILLAR CALCULUS.

BY

JUSTIN McCALLUM MCCARTHY, M.D. DURHAM,
M.R.C.S. ENG.

THE patient in the following case, T. D., aged 30, a machinist, worked solely amongst metals. On January 7th, 1911, he consulted me at my house for inconvenience in the throat; he described it as "a tickling or roughness in the back of the mouth," which had troubled him for a month or more, but was increasingly troublesome during the last fortnight. He had worked all along until the day he called on me.

Previous History.—He had had only one illness, which occurred when he was a boy; it lasted about a month, and, from his account of the matter, it would seem to have been rheumatic fever.

State on Examination.—A swelling of the right tonsil was found, and between the pillars there was seen what looked like yellow membrane. Diphtheria being suspected, a swab was applied and the substance found to be very hard. Further examination with sinus forceps proved the substance to be something embedded between the pillars, but non-adherent to the wall.

Treatment.—On applying laryngeal forceps, they slipped twice. Fearing that if this occurred when extracting the body it might slip down the throat with disastrous consequences, one was forced to find a safer method of dealing with it. A pair of ovum forceps suggested themselves, and were applied. They held the body securely, and with steady traction it was brought through the opening, the parts being severely stretched, but there was no blood, nor any tearing of the tissue.

Result.—The body proved to be a calculus, of which the following is a report by the Clinical Research Association:

This specimen is about 2.5 cm. in greatest length, 2.5 cm. in greatest breadth, and about 1.5 cm. in depth, and weighs 4.635 grams (71.59 grains). It is but slightly nodular and has one surface very irregular and indented, but the others are roughly polished. Chemically it consists for the most part of calcium phosphate with a fair admixture of calcium carbonate and a trace of magnesium phosphate.

A part was decalcified and was found to be composed of necrotic calcareous debris, and no doubt represents a "plug" from a tonsillar crypt.

The urine, in consequence of this report, was subsequently examined, with the following result: Specific gravity 1020, slightly acid; neither albumen nor sugar; phosphates.

Microscope.—Numerous small crystals of oxalate of lime.

REMARKS.

Two features seemed to make this case worthy of a report:

1. The rare size for a tonsillar calculus.
2. The minimum of discomfort to the patient, he not losing from first to last an hour's work on account of it.

THE TREATMENT OF PULMONARY TUBERCULOSIS BY INDUCING AN ARTIFICIAL PNEUMOTHORAX.

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THE method of treatment of pulmonary tuberculosis by inducing an artificial pneumothorax is not new. It was first tried apparently by James Carson, who lived about 1840; recently Forlanini, Späth, and Murphy have improved the necessary technique, and reported many successful cases. Now Ludolf Brauer of Marburg, Lucius Spengler of Davos, and Saugman of Norway have carried out the treatment extensively, and, on the whole, very successfully.

The recent literature on the subject published in England seems to be limited to three articles in the *Lancet* of July 15th, 1911, advocating the method used by Saugman. I have learnt and practised Brauer's method, and from the cases I have studied and the literature I have read I think his method seems to offer a greater chance of success, and, on the whole, less danger to the patient.

The indications for this treatment are: (1) Pulmonary tuberculosis limited almost, if not entirely, to one lung. (2) Recurrent haemoptysis if at all severe. (3) Continued fever, cough, and general increase of disease on one side, while the other lung is healing, or only slightly affected. Slight inactive disease in the fairly sound lung is not a contraindication. The increase in the blood flow through this lung seems to influence the healing process favourably. In some cases it is impossible to produce a pneumothorax, owing to extensive pleural adhesions.

The operative procedures divide themselves into two distinct stages: the preliminary operation and the after-filling.

The patient's chest is examined with the *x* rays, and a site for the operation chosen where the pleura appears thinner and the disease less pronounced. The patient is given an injection of morphine. He lies on his side with a pillow under the sound chest. The skin and subcutaneous tissues are anaesthetized with novocain and adrenalin solution, after careful sterilization of the skin by painting with iodine, etc. The whole operation must be carried out under the strictest aseptic conditions. An incision is made over the selected intercostal space, and the tissues are separated so that the external surface of the parietal pleura is exposed; this is facilitated by the use of the retractors invented by Brauer and Spengler. When a space about a quarter of an inch square has been defined, bordered by ribs and retractors, and having parietal pleura for its base, the latter is punctured in an oblique direction by a blunt hollow needle, shown in the illustration. If the operation is immediately successful, one hears a rush of air into the pleural space, and the needle is at once connected with a manometer having a three-way cock, so that nitrogen may be introduced through the needle, while the pressure is measured. The blunt needle and open operation obviate to a large extent the dangers of nitrogen or air embolism and of puncturing the lung tissue. Five hundred to a thousand c.cm. of sterilized warm nitrogen are allowed to flow into the pleura or injected under a pressure equal to 2 or 3 cm. of water. The warmed nitrogen obviates the possibility of pleural reflex. If the patient experiences much pain or seems faint, or his condition otherwise deteriorates during this injection, it must be stopped at once, but the idea is to make as large an air bubble in the pleura as possible, so that the after-fillings may be made with greater success and less danger of puncturing lung, adhesions, visceral pleura, etc. After a sufficiency of nitrogen has been introduced, the wound is sewn up, an antiseptic air-tight dressing is applied, the chest is examined again with the *x* rays, and the pneumothorax which has been induced is observed, and its limits as far as possible defined.

If the blunt needle does not at once tap the pleural space, it may be necessary to pass a gum-elastic sound down its lumen to clear away any obstruction from the orifice of the needle or its immediate vicinity.

Two days later a sharp-pointed hollow needle, either such as that used by Saugman for his operation, or a blunt cannula of similar calibre and length with a trocar which can be removed, is introduced into the nitrogen bubble in the pleura, and a further 500 or 1,000 c.cm. of nitrogen are injected under a slight pressure (from 3 to 5 cm. of water). If adhesions are very dense this injection may be painful. The more these adhesions can be stretched, the more successful will the treatment be, and if some of the firm ones are broken down the lung collapse will be more complete, and in consequence the lung rest gained will lead to a more certain healing of the ulcerating and inflamed lung tissue. This after-filling must be repeated at varying intervals for at least two years.

The indications for refilling are pain or discomfort in the chest, slight fever, or return of the cough. In a certain proportion of the cases (about 30 per cent.) an effusion forms in the pleura during the three or four months succeeding the commencement of this treatment. Patients who suffer from this complication often complain of much pain when the fluid is forming, but do not seem to progress less favourably; the fluid eventually clears up under a dry diet, and it is probably never necessary to aspirate the effusion.

It is most important to examine the chest with the *x* rays before each after-filling, observing the size of the pneumothorax and the shape of the lung as determined largely by pressure in the pleura and pull of pleural adhesions.

The apparatus which I use is similar to that used by Dr. Lucius Spengler, who, with Drs. Frey, Neumann, and Noble, I have to thank for much instruction and help in acquiring knowledge of the subject.

The bottle B is filled with 1 in 1,000 perchloride of mercury solution, and nitrogen is forced into it from a cylinder through sterilized cotton-wool, the displaced sublimate solution flowing into the bottle A, then the tubes leading from A to B and from B to C are clamped until the patient is ready for the filling; C is a three-way cock, which makes it possible for nitrogen to flow from B to the hollow needle L at a pressure measured by

the manometer I. There are two manometers; one guarded by the stopcock F is a mercury manometer, the other guarded by the stopcock E is a water manometer. The former is used when, for any reason, coughing, excessive negative pressure in the pleura, etc., the oscillations in the water tube are too great

and the fluid tends to overflow. L is a Saugman needle; M is Brauer's blunt needle for the puncture of the pleura in the initial operation; N the sound to pass down the needle M; and O one of the retractors. (The apparatus was made by the Holborn Surgical Instrument Company.)

The results of this operation are, on the whole, most encouraging. Since the first case which I saw five years ago at the Clavadel Sanatorium I have seen a large number of patients treated by this method, and there is no doubt that several of my friends and patients have recovered from an apparently quite hopeless condition, and are now enjoying life as the result of this treatment.

One patient I am treating at present, who has been seen frequently by Dr. James Calvert, was operated on by Brauer rather more than a year ago, and has been free from fever, cough, or other unpleasant symptoms since the operation. She is exceedingly well in general health, although at the time of the operation—four years after she was first treated for consumption—the note upon her condition shows that there was consolidation and excavation of the upper lobe, bronchial catarrh, and pleural thickening, adhesion, etc., in and over the lower lobe on the left side, and harsh breathing with some crepitation from the apex to the level of the second rib on the right side in front and to the angle of the scapula behind. The sputum contained numerous tubercle bacilli and many elastic fibres. The temperature was always raised, the pulse was 98, and the cough most distressing. The signs in the right lung have disappeared and the left lung is well collapsed, showing a good pneumothorax with a little fluid at the base. She lives a healthy open-air life, tempered by visits to London, to theatres and garden parties, and says she never felt better.

Another patient whom I have had many opportunities of examining had a very large cavity in the left lung, and from this such severe haemorrhage—recurring fifteen or sixteen times in a fortnight—that it was thought he could not possibly live. Although there was a considerable amount of disease in the upper part of the right lung, Dr. Frey, of the Clavadel Sanatorium, decided to ask Dr. L. Spengler to produce a pneumothorax on the left side. The result was most satisfactory; the haemoptysis ceased, and only recurred slightly before one of the subsequent after-fillings. The temperature became normal and the cough was much decreased in severity. This patient suffered very much from breathlessness, owing partly to the high pressure in the pleura produced for the purpose of completely collapsing the walls of the cavity and thus stopping the haemorrhage. This breathlessness necessitated almost continuous inhalation of oxygen during two or three months.

In their last book on this subject (*Rhinesche Beobachtungen bei Kunstlichen Pneumothorax*), Professor Brauer and Dr. Lucius Spengler detail the facts about some 87 patients treated by Brauer's method. In all these a pneumothorax was produced. They mention 26 more in which it was found impossible to produce a pneumothorax.

After a careful study of these accounts, I have compiled the following statistics:

1. In 17 patients the disease is apparently arrested.
2. In 39 patients the lung condition has been greatly improved and the prognosis is favourable.
3. In 14 patients the lung condition has been improved, but for some reason, such as abdominal tuberculosis, carelessness,

or fresh infection of the other lung, they have done on the whole badly.

4. In 17 patients there has been no good result.

5. Of the whole number 21 patients are now dead.

These results have been obtained in patients who were all seriously ill and becoming worse. There has been no selection of cases for statistical purposes.

Dr. Niehans, who has charge of the Basle Heilstätte at Davos, has performed this operation according to Brauer's method 24 times.

In 7 cases he did not succeed in producing a pneumothorax.

Of the remaining 17, 1 died nine months later of hæmorrhage from an incompressible cavity.

Seven are fit for or at work.

Nine are still under treatment, and the prognosis in these cases is described as good.

A NOTE UPON THE MECHANICAL EFFECTS OF A MASSIVE LEFT-SIDED PLEURAL EFFUSION.

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THE following case is the third of a series illustrating the effects of a pleural effusion in producing displacements of the thoracic and abdominal viscera, which have been prepared in and described from this department. The two previous ones (1 and 2) have dealt with right-sided pleural effusion. In this case the left side was affected and the study of it is therefore complementary to that of the other two.

The subject was a male aged 69 years. The tissues had been preserved by the injection of a solution of 15 per cent. formalin, the form and relations of the viscera being thereby accurately retained.

The accompanying photograph was taken after removing the anterior thoracic wall and sectioning in a coronal plane the contained structures from the level of the innominate vein to the upper surface of the liver, the diaphragm being thus included in the section.

OBSERVATIONS.

The Thoracic Viscera.

1. The capacity of the left pleural cavity is greatly increased and its walls are covered by a thick gelatinous coagulum.

2. The pleura is greatly thickened. The thick white layer seen in the photograph between the collapsed left lung and the thin cut edge of the

pericardium is evidence of the long-standing nature of the condition.

3. The shape of the left lung is retained despite its greatly decreased bulk. This is especially noticeable in the still well-marked basal border. Firm adhesions retain the rounded dorsal border in the costo-vertebral sinus of the pleura.

4. The heart is translated to the right and is raised within the thorax. It is rotated clockwise through 22 degrees around an antero-posterior axis which passes through the aortic arch. There is, in addition, rotation of the organ, clockwise, around a nearly vertical axis connecting the arterial and venous stems, where continuous, above and below, with the base of the heart.

5. The curve of the ascending aorta is straightened, causing relaxation of its coats and increase in the capacity of the aortic sinus, due to the shortening of the vessel. The mode of origin, position, and direction of the branches arising from the aortic arch are secondarily affected. The roots of the vessels seem as if partially intussuscepted within the lumen of the arch. This results in the formation of transverse folds between their mouths. One of these (that between the innominate and left common carotid) is seen in the photograph. The innominate artery is more transverse in direction and crosses the trachea at a higher level than is usual.

6. The trachea deviates markedly to the right.

Further dissection than that seen in the photograph reveals that:

7. The left pulmonary vessels run obliquely upwards to the lung root; they are stretched and the veins narrowed.

8. The oesophagus, in its course behind the pericardium, is bowed to the right, and the sectional form of the tube is changed by the edge of the distended costo-mediastinal sinus of the pleura. The greatest convexity of the bow lies over an inch to the right of the middle line.

9. The descending thoracic aorta is displaced on to the front of the vertebral column, except at its commencement. It appears markedly flattened between the costo-mediastinal sinus of the pleura and the bodies of the vertebrae.

10. The vena azygos major, where it arches forward over the root of the right lung, is markedly convex to the right, due to the pressure of the displaced oesophagus and trachea in its concavity.

11. The thoracic duct shows considerable dilatation below the level at which it crosses the median plane, and it is very tortuous above that point.

The diaphragm shows a most interesting change. Its left dome is much flattened, and is thrown into numerous folds, whilst its right dome is abnormally high and of smooth surface, as if stretched.

The Abdominal Viscera.

1. The abdominal contents deviate slightly to the right.

2. The spleen, tail of the pancreas, and left kidney are considerably depressed, the lower pole of the last organ reaching $\frac{1}{2}$ in. below the iliac crest. The interrelations of the three viscera are retained.

3. The liver is rotated clockwise so that the right lobe lies well up in the deep right dome of the diaphragm. Further, the organ is compressed transversely, making it deeper than usual. As a result of these two changes the left lobe transgresses only by a very little the median plane.

Comments.

The main factors in the production of these various changes are two, namely:

The alteration in the form of the diaphragm.

The distension of the costo-mediastinal sinus of the pleura.

By reason of the former factor the kidney, the tail of the pancreas and the spleen have descended about 5 cm., and the encroachment on the volume content of the abdomen by the depression of the left dome of the diaphragm has necessitated a compensatory raising of the right dome and, with this, of the liver. The effect of this is to raise the heart bodily and relax all the mediastinal structures running through the length of that space, especially those in the superior compartment, at the same time producing the first of the two rotations of the heart above noted. Under these circumstances respiration would be abdominal in type and carried on almost solely by the right half of the diaphragm, the costal mechanism being incapacitated by the marked distension of

the left side, resulting in a generalized inspiratory position of the whole thoracic parietes. By reason of the latter of the two factors mentioned the whole of the mediastinal structures are pushed over to the right, to the greatest extent at the mid-level of the thorax. In this connexion it is worthy of note that the aorta, oesophagus, and thoracic duct seem to have been affected separately, and their position and relations altered in detail rather than *en bloc*, the pleural sac having insinuated itself between the two former.

The physical signs over the right lung would be altered, as a whole, by a combination of indirect and direct encroachment upon its containing space, whilst the movement of the posterior mediastinal structures would result in the production of an area of dullness on percussion to the right of the vertebrae from the fourth thoracic downwards.

I am indebted to Professor Geddes for the opportunity of publishing this, and to Mr. William Gill for the accompanying photograph.

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THE late Dr. George Fielding Blandford left net personalty of the value of £88,244. Dr. Hughlings Jackson left estate valued at £22,637 gross, with net personalty £22,568.