nature of some of them, is a sufficient indication of their uncertain value, and has induced me to publish the operation now described. Its advantages are great simplicity and, as far as I have practised it, reliability; while it permits of the complete removal of the fistula and surrounding scar tissue from the cheek with primary union of the remaining linear incision at one operation.

I have performed this operation in three consecutive cases.¹ In two the fistula was due to a gunshot wound in the malar region, and in one it followed the external rupture of an alveolar abscess. In each case the fistula was situated immediately in front of the anterior border of the masseter, and had been in existence for over a year. In one case a course of several months' treatment with the hard x-ray tube had failed to effect any improvement, and in another the fistula had previously been dissected out and the cheek closed by a plastic operation, without alleviating the condition.

The Operation.

Two horizontal incisions, about a quarter of an inch apart, are made, the one above and the other below the fistula.

Fig. 1.—Showing the incisions. A probe has been inserted into the fistula. The triangular areas of skin on either side of the area bearing the opening are discarded.

once until it enters the mouth immediately below the reflection of the mucous membrane opposite the upper molar teeth. In one case this area of the cheek was adherent to the alveolar border owing to scarring following the injury, and was mobilized by means of an epithelial inlay some weeks prior to the operation. The probe is now withdrawn, and small cat-gut mattress sutures inserted in the anterior and posterior lips of the skin button, and drawn through the wound into the mouth. Similar mattress stitches are inserted in the lips of the opening of the buccal mucous membrane, and these are now

Two short vertical incisions serve to isolate a small button of skin bearing the fistulous opening. The posterior of these incisions is cautiously deepened, a probe being meanwhile retained in the duct lest the latter should be too closely encroached upon (Figs. 1 and 2). The anterior vertical incision is deepened at

Fig. 2.—The island of skin bearing the fistulous opening in course of mobilization. Deepening the posterior incision, with probe in position in the duct.

Fig. 3.—Semi-diagrammatic horizontal sections showing: a, The condition of duct and fistula prior to operation; A and B, position of incisions. b, The mobilized area of skin bearing the fistulous opening, and containing the salivary duct in its pedicle; A and B, anterior and posterior lips of mobilized skin area; C and D, lips of the opening through the mucous membrane. c, The mobilized skin area seen in b has been inverted, and its edges sewn to those of the opening in the mucous membrane. The letters A, B, C, D have the same significance as in b.

tied together within the mouth. The original anterior edge of the skin button is stitched to the posterior lip of the opening in the mucous membrane, while the posterior edge of the latter is tied to the anterior lip.

(Fig. 3, a, b, c, shows diagrammatically the successive stages in this process.) No attempt is made to mobilize the skin button sufficiently to allow of its complete reversion. If it is turned over to face forwards and slightly inwards, the elasticity and loose attachment of the oral mucous membrane will allow of the latter being drawn up to the button, the post-operative appearance in the mouth being that of a conical recess of mucous membrane, passing backwards and outwards to the fistulous opening. The lips of the original incisions are now very slightly undercut and brought together, thus covering the reversed surface of the skin button bearing the fistulous opening.

In one of the three cases the tip of a defective probe remained in the duct, and was subsequently discharged through the operation wound. This has resulted in a slight external leakage, which, however, does not amount to a complete drop during a meal. In the other two cases healing was by first intention, and the wound has remained dry since the operation, now more than two years ago. In all three cases there is now a free and normal discharge of the parotid secretion into the mouth.

ADRENALIN IN RESUSCITATION FROM APPARENT DEATH.

BY

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ANAESTHESIA, asphyxia, the passage of a powerful electric current, violent emotion, and violent sensory stimulation may place the body in a state which resembles that of a clock which has been stopped, but not permanently damaged; if the machinery can be restarted it will continue to run automatically. Relatively simple means will often suffice to set things in motion again, as a mere shake will serve to start a clock. Sometimes it appears as though a more accurately fitting stimulus were required, like a swing in time with that of the pendulum.

Mr. Welby Fisher, in a very interesting paper,¹ advocated cardiac massage applied through an epigastric incision. He makes no reference to the use of adrenalin. The following notes of a limited experience may be of interest.

Adrenalin applied to the heart muscle acts on the sympathetic neuro-muscular junction, and very greatly increases both the excitability of the tissue and the energy output of the muscular contractions. In some twenty cases of death from various causes, when all signs of life had ceased for several minutes, I have injected a minim or two of 1 in 1,000 adrenalin chloride directly into the heart muscle. A fine needle was passed through the fifth left intercostal space, just mesial to the lung resonance; the point was directed slightly inwards and upwards, and could be felt to enter the apex of the heart; when firmly imbedded in the muscle the injection was made. Several of these needle tracks were examined *post mortem*, and in no case did it appear that any drawback would have ensued had the patient survived.

In most of the cases death had occurred as the result of long established disease, and adrenalin was neither expected nor observed to have any effect (a fact not without interest). In the following three cases circumstances were more favourable.

CASE I.

A splendidly built young man had received a powerful electric shock while fitting an electric lift, and all appearance of life had instantly ceased. When seen by me it is estimated that about twenty minutes had elapsed; there were no signs of circulation, the upper parts of the body were pale, the lower were dusky, showing that the blood distribution was determined by gravity; the skin was already cool. Artificial respiration was applied, adrenalin injected into the heart muscle, the needle shaken *in situ*, the heart was massaged, but without abdominal incision, and was stimulated faradically. There was no response.

CASE II.

A child of 11 months during a circumcision under chloroform had stopped breathing, and became pale and flaccid; the pupils were dilated, no pulse could be felt, and no heart sounds could be heard. Artificial respiration was started, and the heart was massaged by pressing the fingers under the costal margin; in this case the heart could be felt, and almost gripped between the fingers. There was no response, and the body was cooling perceptibly. Adrenalin was injected into the heart muscle, and immediately the heart started beating; shortly after respiration recommenced, and in a few minutes the child appeared normal. The time was not accurately observed, but it is estimated that at least four minutes had elapsed between the stoppage of the

¹September and December, 1918, and May, 1919.

pulse and the injection of adrenalin. The anaesthetist's estimate is considerably greater. The child was seen at intervals for three or four weeks; not the slightest ill consequence was detected.

CASE III.

A woman of 30, with empyema, had just had an exploring needle passed into an intercostal space. Suddenly she became limp and pale, she murmured a word or two, but the sound diminished into silence. She dropped back apparently dead. The muscles were quite flaccid and motionless, no pulse could be felt nor heart movement heard; jaw and eyes were in the cadaveric position. Artificial respiration was commenced, and adrenalin was sent for. Suddenly the pulse returned, beating strongly under the fingers, the patient flushed, and a few minutes later she was sitting up and talking. She had passed through a Stokes-Adams attack, subsequently repeated. Possibly more detached observation would have detected an auricular pulsation in the jugular veins. Had the adrenalin arrived half a minute sooner a striking success might erroneously have been ascribed to it.

Although Case III shows the need for caution in interpreting results, Case II suggests that injection of adrenalin into the heart muscle may restart it when other means fail.

Conceivably the needle might be pushed on into the cavity of the left ventricle and Ringer's solution containing adrenalin might be run in under pressure through a tube and funnel; on passing through the coronary arteries the adrenalin would be brought much more intimately into contact with the heart muscle, and would reach the more excitable sinus node and auriculo-ventricular bundle. The flow of Ringer's solution, preferably oxygenated, would also supply a temporary artificial circulation. Reports on wounds of the heart suggest that the risks of passing a fine needle through the apex of the heart are small compared with those of the desperate condition in which such means would be used. The method seems sufficiently promising to invite preliminary experiments on animals.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, November 6th, 1920, p. 698.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

COMPLEMENT FIXATION TESTS IN THE DIAGNOSIS OF TUBERCULOUS INFECTIONS.

(A Preliminary Note.)

ONE of the writers began to study complement fixation tests in the diagnosis of tuberculous infections in the autumn of 1919. He was joined by his colleague later in the year. Our work is not yet finished, but it is hoped that the results will be advanced sufficiently for publication within a few months.

Complement fixation tests in tuberculosis have been studied by numerous workers since 1901. Varying results have been obtained, attributable to differences in technique and the characters of the antigens used.

We have attempted (1) to test the relative value of types of some of the chief antigens which have been used in the past; (2) to devise a reliable technique. We have tested four antigens up to the present time:

- (a) A saline emulsion of living tubercle bacilli.
- (b) An alcoholic extract as proposed by Craig.
- (c) An alcoholic extract as used by Dudgeon.
- (d) An antigen prepared by Wang and Crockett's method.

We find, on the whole, that the antigen of Wang and Crockett is reliable, and probably the best one that has been used to any extent up to the present time. With this antigen, and using a technique modelled on the ordinary Wassermann methods, we have tested cerebro-spinal fluid and serum from cases of tuberculosis, and from non-tuberculous cases, including normal serums and serums from patients suffering from various diseases. We obtained 61 positive results in 85 cases of definite active tuberculosis, and negative results in 50 non-tuberculous cases. We also obtained some positive reactions with serums giving a strongly positive Wassermann reaction, as previously found by Wang and Crockett. Our work is now being applied mainly to the investigation of tuberculous disease in children.

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LETHARGIC ENCEPHALITIS.

As it has been my fortune to see no less than seven cases of this disease in the past fortnight, though previously for some months I had met with no fresh case, it would appear that a temporary recrudescence of intensity of the epidemic is occurring. The virulence of infection also has not notably lessened, two of these cases having already died.

As with all diseases named after a prominent symptom, lethargy is not an invariable occurrence in this form of encephalitis, and one feature that has been prominent in at least two of my recent cases, namely, quiet delirium and delusions, may lead to a mistaken diagnosis of insanity; indeed, one of my patients was brought to me by his friends from a distant suburb because the doctor in attendance said it was a mental case and should be sent to an institution. Another I have just seen has been treated for nine weeks for nervous breakdown, as he complains that his brain is not right. He has been observed frequently talking to himself about business troubles, worried much about his bladder, unnecessarily so according to his wife, and one day said to his doctor that he had 37s. 6d. in his bladder which he wanted to pass! He showed no drowsiness and was allowed to go about as usual, but the clue to recognition of the encephalitis lay in his mask-like facies resembling paralysis agitans, with marked tremor of one hand, small irregular pupils reacting poorly to light, and a pulse of 90.

Many patients complain early of blurring of vision, scarcely diplopia, and then nystagmus is usually present, perhaps most intense on looking downwards. Pyrexia of 101° F. or more and a rapid pulse are bad signs, the prognosis as regards life being almost in proportion to the degree of tachycardia. Quite a number of cases show no ptosis or drowsiness, and with the absence of ocular symptoms the recognition of this disease may be overlooked unless its present prevalence be constantly kept in mind. In others muscular twitchings are prominent, and sometimes headache, though usually no pain in the head is complained of.

It is important that cases of this disease should be kept at rest and free from worry, using sedatives and hypnotics, such as ammonium bromide and chloralamide if required, in order to limit the liability of permanent cerebral lesions occurring, which have been only too frequent. Many such cannot be avoided, one of the commonest being a permanent mask-like rigidity and perhaps tremor, resembling paralysis agitans closely, and due to lesions in the lenticular nucleus, as in that disease.

London, W.

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A CASE OF CARDIAC MASSAGE.

AFTER reading Mr. Fisher's article on resuscitation in death under anaesthesia in the JOURNAL of November 6th, 1920, I think it may be interesting to publish notes on the following case; though the treatment was not finally successful, yet the response was so marked as to emphasize the importance of the method.

The patient was a weak thin man of 45 to 50. On August 21st, 1920, the operation of gastro-enterostomy was being performed by Mr. F. O. Lasbrey for continual pain and vomiting. It was largely completed when the patient stopped breathing. Artificial respiration was performed and breathing very soon started again, but the pulse was very weak. The operation was continued, but in a few minutes breathing stopped again, and the pulse could not be felt. Artificial respiration, strychnine, ether under the skin, hot cloths to the epigastrium were all tried without avail. The gloved hand was inserted in the abdomen through the operation incision and an attempt made to massage the heart through the diaphragm, but the heart could not be felt at all. Finally, after half an hour, during which time there had been no voluntary breathing and no pulse or audible heart sounds, the case appeared quite hopeless. Then direct massage of the heart was tried. I cut through the anterior left fibres of the diaphragm and passed my gloved hand, by means of the abdominal incision, through into the chest cavity. I found the heart small, flabby, and empty, and quite without movement. I grasped and squeezed it, and kept up continued massage on it, artificial respiration being continued meanwhile. After some considerable time, at least five minutes, the heart began to respond, inasmuch as it became firmer and larger, and on squeezing it empty it automatically filled again. Massage was continued. Shortly after, on ceasing the massage for a brief period, a very small beat, feeling almost like a tremor, continued, but only for a very short time. Pituitrin extract, 1 c.cm., was given, and soon after, on ceasing the artificial respiration, the patient took one respiration himself,