No.	Animal.	Remarks.	Blood Sugar, mg. per 100 c.cm. when sample taken.	Readings on successive days. Degrees.	Reading calculated for reduction. Degrees.	[α] D of lowest reading. Degrees.	Volume of Blood taken. c.cm.	Time required by process. hrs.
1	Rabbit	Normal	—	0.07, 0.07, 0.17, 0.17	0.17	21	100	6
2	"	"	—	0.03, 0.10, 0.07, 0.10	0.17	25	85	6½
3	"	"	—	0.03, 0.10, 0.10	0.20	27	100	7½
4	Dog	"	—	? 0.07, 0.18, 0.20, 0.18	0.21	13	100	9
5	"	"	—	0.07, 0.15, 0.20	0.21	18	100	9
6	"	"	—	0.23, 0.25, 0.30, 0.31, 0.31	0.30	39	95	—
7	Rabbit	Epinephrine	300 & 400	0.58, 0.55, 0.53, 0.53	0.50	56	75	6½
8	Dog	Struggling	222	0.28, 0.28, 0.28	0.34	43	100	7½
9	"	Epinephrine	147	0.20, 0.20, 0.20	0.21	47	100	10½
10	"	"	230	0.63, 0.61, 0.70, 0.70, 0.68	0.70	48	100	—
11	"	Epinephrine + insulin	300	0.08, 0.15, 0.28, 0.31, 0.28	0.20	22	100	10½
12	"	"	240	0.38, 0.50, 0.47	0.50	39	100	—
13	"	"	145	0.17, 0.25, 0.23, 0.23	0.13	66	100	5½
14	"	"	176	0.22, 0.16, 0.18, 0.16, 0.16	0.20	42	100	6½

For the calculation of rotating power from reducing, $[\alpha]_D = 52.5$ was used.

dog also three experiments were done. In each of these there was a gradual rise in the rotating power until it coincided with that calculated from the reducing power.

(b) *In Hyperglycaemia.*—One experiment was done on a rabbit. Here there was a fall in the rotating power until it reached a value equal (within the limits of error) to that calculated from the reduction. In the three experiments on dogs two showed no change in rotation, although one of them was a little below the value calculated from reduction. In the third there was a slight rise to this value.

(c) *Following Insulin and Epinephrine.*—In these experiments 5 c.cm. of 1 in 1,000 adrenaline was given in diluted divided doses, followed by insulin, the blood being taken about half an hour later. In all but one of these there was a rise in the rotating power, which in two cases was considerably greater than the rotation calculated from reduction. The specific rotations for the lower readings recorded have been calculated. For normal blood they are very low (with one exception) and do not approach that of α , β glucose. For blood with epinephrine hyperglycaemia they are in the neighbourhood of that for an equilibrated mixture of α , β glucose, but show a tendency to be low. After epinephrine and insulin, in spite of the hyperglycaemia two of them are about the same as for normal blood.

Experiments were made to see if alcohol in acid solution had any effect on pure glucose. These were uniformly negative, although the acid alcohol was warmed with glucose in the presence and absence of phosphate for periods of the same length and much longer than those in the experiments with blood filtrates.

My thanks are due to Professor A. Hunter and Professor J. J. R. Macleod, under whose direction the experiments were done.

[It would be rash at the present juncture to conclude that the highly reactive forms of glucose, called gamma glucose, are necessarily responsible for these results. The long and complicated chemical procedure used to prepare the solutions for the polariscope may be responsible for the production of substances with a lower rotating power. The slowness of the change in rotating power (intervals of days), also, does not suggest the presence of a highly reactive substance. Further investigation will therefore be necessary before the important hypothesis suggested by Winter and Smith can be considered as established.—J. J. R. M.]

REFERENCES.

- ¹ Eadie, Macleod, and Noble: *Amer. Journ. Physiol.* (in press).
² Winter and Smith: *Journ. Physiol.*, 1923, lvi, 100; *BRITISH MEDICAL JOURNAL*, January 6th, 1923; *Ibid.*, April 28th, 1923; *Ibid.*, May 26th, 1923.

A CASE OF ACTINOMYCOSIS WITH RECOVERY.

BY

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THE following case is worthy of record on account of certain interesting clinical features which it presented, but especially for the extraordinary recovery which occurred.

A man, aged 22, was admitted to the David Lewis Northern Hospital, Liverpool, on October 8th, 1922, with a history of lobar pneumonia on board ship while crossing from Canada to England; crisis was said to have taken place. The temperature chart which accompanied the patient showed that the maximum temperature had been 103.8°, and that on the fourth day it had fallen to 100°, rising to 101° on the sixth day, and falling to normal on the seventh day (the day before his admission to hospital).

On admission the temperature was 100°, the pulse was 120, and respirations 56. He was cyanosed, exhausted, and had marked dyspnoea. Signs of fluid were detected in the right pleural cavity, and percussion over the right lung caused pain, a common sign of empyema. Exploration of the right chest yielded fluid, and an hour later a rib was resected and the pleura drained. The fluid withdrawn was serous with a flaky deposit, but was not definitely purulent. Pathological examination of the fluid revealed nothing.

The patient's general condition did not improve, though the wound drained freely and only fluid of a serous nature exuded. The pulse rate varied from 100 to 120, the temperature was normal, but the dyspnoea became more and more urgent. The pleural cavity was probed with the hope of finding a loculation of fluid, but without result. The respirations reached 60, and death appeared imminent. With great difficulty Dr. Oram made an x-ray examination, and reported: "The whole of the lower part of the chest on the left side is opaque, the upper border of the opacity following the line of the sixth rib. I fear that it is not possible to say whether this is fluid in the pleura, heart shadow, or pericardium."

On October 14th the patient still appeared to be on the point of death, and it became increasingly evident that the dyspnoea was due to mechanical obstruction and not to a general toxæmia. The cardiac dullness was greatly increased, but breath sounds could be heard clearly all over the dull area, while the heart sounds too were distinctly audible in the region of the nipple. No pericardial friction sound could be heard. Dr. John Owen of the Royal Infirmary saw the patient in consultation, and it was decided that there must be some mediastinal swelling, possibly a pericardial effusion covered by a thin shell of lung. Such a diagnosis was the only possible explanation of the anomalous physical signs, and yet there was the fear that the dullness might be due to a dilated and displaced heart. Exploring needles were inserted, but with such caution that nothing was found.

During the evening, on hearing that the patient was, if possible, worse and unlikely to live till the morning, the pericardium was explored under local anaesthesia, and about 25 ounces of sero-purulent fluid were allowed to escape. Through the incision in the pericardium a typical "bread-and-butter" appearance of the heart could be seen. The fluid was examined bacteriologically, but all cultures were sterile. The patient was very collapsed, but next day his condition improved, though he was still very dyspnoeic.

On October 19th, signs of a pleural effusion on the left side having developed, the cavity was tapped, and 21 ounces of clear fluid were withdrawn; the pathological report on this fluid was: "No tubercle bacilli or other micro-organisms found. Numbers of lymphocytes and lymphoid cells present." Abdominal distension now occurred, but yielded to eserine and pituitrin.

About October 18th it was noticed that the character of the discharge coming from the right pleura and the pericardium had changed, and that it was now thick and yellow. The discharge was examined by Professor Glynn at Liverpool University, and in the material from the right pleural cavity numerous actinomycosis organisms were found. Attempts were made by Professor Glynn to cultivate the organism anaerobically in order to determine its type, but unfortunately the streptothrix would not grow. The sputum was repeatedly examined for the ray fungus, but always with negative results. The pericardial fluid yielded a pure culture of *Staphylococcus aureus*.

The patient still remained in an extremely critical condition; the temperature was intermittent, the pulse rate remained high, and the respiration rate averaged about 50. It was decided that the only hope of saving the patient's life lay in giving iodine as intensively as possible. Accordingly the following treatment was instituted: (1) The right pleural cavity and the pericardium were irrigated twice daily with a solution containing collosol iodine (Crookes). (2) Potassium iodide was given by mouth (25 grains three times daily), but later this was changed to iodopin 1 dr. thrice a day. (3) Collosol iodine was given intravenously. The doses were as follows: 10 c.cm. on the first day; 20 c.cm. on the third day; 30 c.cm. on the fifth day; 50 c.cm. on the seventh day; and 80 c.cm. on the ninth day. This maximum dose was repeated at two-day intervals so long as any non-thrombosed veins could be discovered. It is interesting to note that no symptoms of iodism appeared during the course of the treatment. During all this time the patient was very ill and his dyspnoea and intermittent fever continued.

On November 2nd x-ray examination showed that the chest was much clearer; on November 14th the temperature showed signs of settling down, and a few days later became normal. The discharge from the drainage tubes became less and less, and the ray fungus more and more difficult to find. Early in December it was decided to give the patient an autogenous vaccine of *Staphylococcus aureus* derived from the pericardial discharge; injections of this vaccine caused a great reaction, and the empyema wound began to give trouble again. A probe discovered loculated pus, and its removal gave great relief. Again abdominal distension occurred, and albuminuria, which had been present before, became more marked. About December 12th it was obvious that the patient had developed acute nephritis. The urine diminished to 16 ounces in twenty-four hours, and general anasarca with ascites appeared. The urine was examined by Dr. H. S. Pemberton, who reported: "Protein in very large quantities (vast preponderance of serum albumin over serum globulin). All kinds of casts—epithelial mainly—leucocytes and red blood corpuscles present." Paracentesis abdominis was performed on three successive occasions, and 31, 32, and 28 ounces respectively were withdrawn. The fluid was yellow, contained no organisms, and coagulated on standing. Shortly after this the urine cleared up, the anasarca disappeared, and the patient became comfortable again, although the respiratory rate still varied between 36 and 44.

From this time onwards the patient never looked back. Between December 24th, 1922, and February 6th, 1923, he gained 30 lb. in weight. Repeated radiograms were taken, and all showed a great and increasing improvement in the chest condition, though the right diaphragm remained raised.

The serum Wassermann reaction was completely negative, and blood urea estimation showed 15 mg. per 100 c.cm. of whole blood.

On his discharge from hospital on February 13th, 1923, the condition was as follows: General condition very good, no fever, urine contains a slight trace of albumin. The drainage wounds are all healed except for a very small sinus in the pericardial incision. The heart appears normal except that the apex beat is about half an inch outside the nipple line in the fifth space.

As regards the further progress of the case extracts from the patient's letters are interesting. On March 6th, 1923, he wrote to say that he was as well as he had ever been before his illness, but that the sinus was still discharging a bead of pus. This was dressed and potassium iodide was taken regularly.

On May 16th he reported that the sinus was healed, and that he was so well that he intended to resume his work in Canada.

Remarks.

How and where the actinomycosis infection was contracted is a complete mystery. The man was employed in a cardboard box manufactory in Canada, and previous to that had been in the army and had seen active service on many fronts. While on military service he had looked after horses, and it is possible that the infection was contracted at that time and that it had remained dormant until his attack of pneumonia. It is certain that the infection was quite recent so far as its clinical manifestations are concerned, for the man was in apparently normal health on sailing from Canada. Whether the original focus was in the liver with extension to the lung through the diaphragm, or whether it was primarily pulmonary, it is impossible to say.

The patient's recovery was little short of miraculous, as on many occasions his life was despaired of. Despite recent criticisms upon the potency of collosol iodine, it would appear that in this case the drug was of great value and played an important part in the recovery. It is, of

course, impossible to draw conclusions from one case, but we feel that by publishing this note other workers will be encouraged to persevere in more intensive iodine treatment in the fight against this almost mortal infection.

There can be no doubt that the very recent infection in this case, together with the patient's extraordinary pluck and vitality, were most important factors in his recovery.

In conclusion our thanks are due to Mr. Rawlinson for his surgical procedures and to the numerous colleagues who aided and encouraged us in what appeared to be a hopeless battle.

SUCTION IN THE TREATMENT OF SEPTIC EARS.

BY

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It is essential that the practitioner, who in almost all cases has the patient suffering from a discharging ear under his treatment for some time, it may be for months, should realize the disadvantage, not to say danger, of aural syringing. He sees the patient in the earliest stages, and has a much better opportunity than the specialist, who commonly only comes on the scene after the trouble has been long established or complications have arisen.

The intricate anatomical arrangement of the middle ear and its accessory recesses is favourable to bacterial activity. The best known methods of combating bacillary ravages in this region, other than a surgical operation, consist of forcibly syringing out accumulated discharges, and the instillation of antiseptic drops. But the risks involved in syringing out the middle ear in the presence of a chronic discharge are very great. This is aptly illustrated in the case of cholesteatoma. Even the advocates of forcible syringing invariably add a word of caution when dealing with this. Usually, in cholesteatoma, especially if it has arisen, as is almost invariably the case, after prolonged sepsis, there is found an enlargement of the normal aural cavities and mastoid cells, and any watery lotion, if powerfully injected, can easily be driven far afield into the recesses. The effect of syringing is to cause swelling of the semi-desiccated accretions and accumulations, and pressure on the surrounding brain and labyrinth. All watery fluids encourage septic change and bacterial growth.

I have seen many cases in young children, in whom the syringing of running ears has been ordered, where the immediate result of a more than usually forcible injection by the child's mother has been acute mastoiditis and abscess. Indeed, but few cases of acute mastoiditis in children have come under my notice where syringing has not been the customary treatment, with the result that an immediate cortical mastoid operation which might otherwise have been unnecessary was rendered imperative. I cannot, therefore, condemn syringing too emphatically. I wholly disapprove of syringing the ear in the presence of a discharge. I order my patients boracic wool, with directions to twist it up and to wipe out the ear as often as necessary. Syringing may have the effect of driving the sepsis further afield, and on into the most dangerous positions, such as the attic, aditus, antrum, and mastoid cells, becoming in this manner a cause of abscess over the mastoid region. Owing to my dissatisfaction with all forms of ablation and irrigation, and with much of the instillation of ear drops that is still so popular, I have for some years been employing suction to get rid of discharge from the ear and its annexes. This suction method of thoroughly clearing the septic ear of discharge is so successful, that I am anxious to bring it prominently to the practitioner's notice, who, as he sees these patients in the earliest stages of the trouble, can adopt it with more telling effect. The suction method is so easily applied and is so safe and effective that it is eminently adapted to the use of the busy and overworked medical man; and, if adopted by him, would serve to prevent so many septic ears drifting into a serious condition and the patient having to be sent