Mental Changes.—These are almost invariable when the condition has been of such severity that coma has been a part of the clinical picture. Irritability, confusion, and disorientation in time and space are common. Korsakoff's psychosis, characterized by disorientation and pseudo-reminiscences, is occasionally observed,^{5 6 7} but was not noted in this series.

The Fundus Oculi.—Although they are not invariable, changes in the eye grounds are very common and sometimes of great diagnostic value. Three phenomena have been described—namely, papilloedema, retinal haemorrhages, and vitreous haemorrhages. According to Riddoch and Goulden,¹² these appearances can all be attributed to the presence within the optic sheath of blood which, by raising the pressure therein, interferes with the venous return from the eye; and histological examination suggests that the intraocular haemorrhages are never the result of blood passing into the eye from the optic sheath. Among the eight cases in the present series some fundus change was noted in four. In three there was papilloedema only; in the other there was papilloedema and, in addition, retinal and vitreous haemorrhages. In Case iv, although the initial haemorrhage was fairly severe, there were no eye changes. It was possible to account for this at necropsy, when large clots were found round the aneurysm; these had prevented the entry of anything more than a small quantity of blood into the optic sheaths.

TREATMENT

Any unnecessary movement or effort on the part of the patient is to be avoided, as this will raise the blood pressure and so be likely to increase or restart the bleeding. Lumbar puncture is a ready method of reducing intracranial pressure, and it takes a prominent place in treatment. The value of the method has, however, been variously assessed. Some doubt the advisability of reducing the intracranial pressure, believing that it determines new or increased bleeding. Ingvar⁹ records one case in which he considers lumbar drainage was responsible for the patient's death within a few hours. On the other hand, Collier¹ has recently expressed the opinion that free and repeated drainage should be performed so long as symptoms of increased intracranial pressure exist. In intracranial haemorrhage death is caused by diminution, through increased pressure, of the blood supply to vital centres, and it is agreed that deepening coma is a clear indication for reduction of this pressure by lumbar puncture. The risk of aggravating the haemorrhage is then outweighed by that of fatal cerebral compression.

The question of whether or not lumbar puncture is to be employed will arise in one other phase of the disease—namely, the period characterized by symptoms of meningeal irritation, such as pains in the head and neck and mental changes. These symptoms will occur after recovery from the coma produced by a severe haemorrhage or may be present from the onset in a mild case without coma. Hall⁷ has sometimes observed them to subside rapidly without lumbar puncture, while Fordham⁴ found the effect of puncture beneficial in some but not in others. He concludes that it should not be repeated unless decided improvement is noted. In the present series of cases the lumbar puncture was undertaken several times for the relief of meningeal symptoms. It was frequently followed by improvement, and never by any immediately unfavourable effect. The cerebro-spinal fluid was slowly removed until the pressure was reduced to normal as judged by the rate of flow. It is better, however, to control the pressure with a manometer, as Ingvar recommends, so that the pressure may not be allowed to fall below 100 mm. Various other methods used in treatment are subsidiary and probably of small

importance. Intracranial pressure may be reduced by giving magnesium sulphate orally or per rectum. Substances designed to promote clotting may be given intravenously, and with the same object anti-meningococcal serum has been given intramuscularly.¹¹ Eskuchen² injected gelatin intrathecally with the object of encouraging coagulation of the blood; the result suggested that the method was risky.

SUMMARY

Eight cases of spontaneous subarachnoid haemorrhage are reported. Various grades of the disease, from the most severe to the mild, are illustrated. Two instances of the latter are recorded in which there is a slow oozing of blood, leading to headache, pyrexia, and symptoms of meningeal irritation. Coma does not occur, and a good recovery follows.

Examination of the cerebro-spinal fluid is the key to the diagnosis, and the fluid is nearly always uniformly tinted, due to the presence of blood. It may, however, be clear to the naked eye, yet red corpuscles can be discovered under the microscope. This was the finding in one case in which the diagnosis was proved at necropsy.

Intraocular changes are valuable in diagnosis, and were observed in half the cases. Clotting of the blood, so that it is prevented from entering the optic sheath, is one cause for their non-appearance.

Periodic headaches are often complained of for years, either before or after the rupture of a cerebral aneurysm, or both. This was so in five of the eight here recorded, one having the characters of migraine.

Treatment consists in absolute rest and in reduction of intracranial pressure when life is threatened and where symptoms of meningeal irritation are severe and persistent.

I am much indebted to those physicians whose names appear in the text for allowing me to publish case notes.

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THE RUBIN TEST AS A THERAPEUTIC AGENT

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As a therapeutic agent the Rubin gas inflation of the upper female genitals stands conspicuously alone. When confronted with a case of sterility due to occlusion of the Fallopian tubes the gynaecologist realizes how limited are the therapeutic agents at his disposal. Surgical intervention to restore patency has been uniformly unsuccessful in accomplishing the desired result. In the Rubin test, however, he has a powerful agent to overcome obstructive sterility. In over 500 consecutive consulting room cases of the gas test there was evidence of obstruction in only 35 per cent. In many of these the obstruction was only of a mild nature that gave way before the high pressure of the first test. In these the

pressure would frequently rise to 180 mm. or 200 mm. of mercury, and then suddenly fall to 80 or 90 mm., and never rise again. In a subsequent Rubin test the gas rarely rose above 120 or 130 mm. before patency was re-established.

There were thirty-three cases in which pregnancy followed the Rubin test, after periods of sterility varying from two to eighteen years. In most instances the pregnancy followed surprisingly quickly after the first successful patency test.

In all cases of sterility, of course, the routine examination of sperms, etc., was made. But in many instances where the sperm activity was impaired Rubin tests were done either to promote greater facility for conception or at the urgent request of the patient.

The greatest number of tests in a single patient was seven. Many cases had from three to five tests before complete patency was established. In many the patency is quickly and permanently established at the first test, but in others one or more tests with a pressure of from 200 to 240 mm. were required to effect a passage of the gas. Not infrequently pregnancy followed quickly upon an inconclusive and unsatisfactory test, where even under a pressure of 220 to 240 mm. there were no appreciable signs of the gas having gone through. The most reliable clinical sign of patency after the Rubin test performed upon a conscious patient is the characteristic shoulder pain occurring a few minutes after assuming the sitting posture.

My method consists in sitting the patient up immediately after the withdrawal of the intrauterine tube, and then asking her to tell if or when she feels anything unusual. It is thought prudent not to tell her what to expect. When not knowing the signs, she is not led to imagine the desideratum. Almost invariably the first sign of the development of the shoulder symptom is a subconscious movement of the hand to the opposite shoulder. This is a sign that the gas has reached the subdiaphragmatic area, and the pain is referred to the shoulder as in gall-bladder trouble. It is readily conceivable, however, that the amount of gas which passes through a very small aperture of a tubal stricture may be so slight as to get lost among the coils of intestine and therefore never reach the diaphragmatic area, and similarly the small leak through the Fallopian stricture may not be appreciable in the fall of the mercurial level, which is the second most constant sign of patency. Most striking among this class was a physician's wife, sterile for eighteen years. The Rubin test rose to a pressure of 240 mm. without any evidence that the carbon dioxide had gone through, but she became pregnant the next month, though no hope for such an outcome had been given her.

The most interesting type of case is that which permits gas to penetrate in small quantity at 240 mm. of mercury. Three months later gas penetrates at 200 mm., and at each seance the pressure required is progressively lower. Then pregnancy supervenes.

It has always been a question what can be the pathology of these occlusions that give way before gas pressure. By a process of exclusion one may state that it cannot be a tube filled with fluid and therefore occluded at both ends. By the lipiodol test one can see cases of obstruction at either the cornual or the fimbriated end. But clinically I am convinced that the great majority of those cases of obstruction that yield to pressure are strictures at the intramural section of the tube, and that most of these are due to a peritubular lymphangitis and cellulitis of a mild nature. In corroboration of this one finds a great number of the successful therapeutic Rubin tests are those that are done upon patients who have had an infected abortion and have become sterile after this. Many of

my cases were of this type, and they are those in which a successful therapeutic Rubin may be expected. In two such cases Rubin tests were done five and seven times respectively before pregnancy occurred. In the one, pregnancy did not occur until gas went through at 140 mm. at the seventh sitting, thereby registering a slow drop from 240 mm. In the other instance, five repeated tests at from 200 to 220 mm. had given negative results as to penetration, but in spite of that the patient became pregnant after the fifth unsuccessful test. Both these cases, like many others, followed incomplete abortion and digital evacuation of the uterus.

Singularly enough, though there was definite obstruction of the tubes in all thirty-three successful pregnancies following the therapeutic tests, in not one was there an ectopic gestation. One would be led to think that the greater motility of the sperm over that of the ovum, and its smaller size, would enable the sperm to traverse where an ovum could not. But definitely such is not the case.

Anaesthesia was required in only eleven of the cases for the Rubin test, owing either to constricted cervix or to extreme nervousness or fear. The symptoms and signs of a successful Rubin test are much more convincing and emphatic with the conscious than with the unconscious patient. In only one instance was there any unpleasant sequel to the consulting room application of the Rubin test with carbon dioxide gas and a carefully adjusted pressure and water gauge and mercurial manometer.

THE PROPERTIES OF HALIBUT-LIVER OIL

BY

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Within the last few months considerable interest has been shown in halibut-liver oil as a source of vitamin A and vitamin D for use in the treatment of malnutrition, and there is no doubt that the product is already proving of great value in the hands of the medical profession.

The liver of the halibut (*Hippoglossus hippoglossus linnaeus*) may show considerable variation in the amount of oil present, but of greater significance is the curiously wide variation in vitamin A value which is encountered. Lovern,¹ and Heilbron and others,² have drawn attention to these differences, for which, as yet, no satisfactory explanation has been advanced.

In examining the question of the origin of the vitamins in the liver of the cod, Drummond and Hilditch³ were led to suggest that although the normal food of this fish contains only very minute traces of both A and D, accumulation might take place and in time produce the oils of high value that are encountered. Interesting confirmation of this view has recently been put forward by Macpherson.⁴ He has shown from an examination of the liver oils of individual codfish that there is a general relation between the age of the fish and the reserves of A in the liver, which indicates that accumulation does occur.*

In addition to this gradual storage which tends to produce high vitamin oils in the older fish, there are variations caused by changes in the amount of oil present in the liver at different periods of the life of the fish.

Whether these views can be extended to cover the remarkable vitamin A values encountered in some halibut-liver oils remains to be determined. Meanwhile it is of interest to place on record the results of the examination of a number of authentic halibut-liver oils of known

* We are indebted to Dr. H. Thompson and Dr. Macpherson of the Fishery Research Station, Newfoundland, for the opportunity to read the account of this work before publication.