glycerol, by sulphur when this element is deficient, and by calcium salts, according to the laboratory findings and the nature of the case.

Summary

An abnormal condition of the serum is described which, when persistent, is nearly always associated with signs of pancreatic inflammation: this inflammation is generally ascending from the intestine, and is patchy in distribution. Glycosuria is rare. Insulin is ineffective. The altered blood state predisposes to oedema and to low-grade infections.

My thanks are due to Dr. Porter Phillips; to Professor Downs of Alberta, whose work gave us the key to our problems fifteen years ago; to my staff at Bethlem Royal Hospital, who have prepared the sections and photographs; and to all those who have helped by case notes and after-histories, and who are too numerous to mention individually in this article.

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NON-SUPPURATIVE INTRACRANIAL COMPLICATIONS OF OTITIS MEDIA*

BY

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It is with some diffidence that I present this paper before this Section, but I have been given to understand that an unbiased opinion on the quality of alien coal can be obtained in Newcastle.

The intracranial complications of otitis media may be classified as suppurative and non-suppurative. The pathology of the former is well established, for each stage in the process has been observed post mortem. The pathology of the non-suppurative complications is not so clear, for the operative findings are often inconclusive and necropsies are rare. These non-suppurative complications are of two kinds, one an encephalitic lesion which gives rise to both focal and general symptoms, and the other a derangement of the amount or of the circulation of the cerebrospinal fluid, resulting in the accumulation of the fluid and a rise in the general intracranial pressure.

The Encephalitic Lesion

The encephalitic lesion was postulated by Borries in 1921 and by Symonds in 1927 under the terms "otogenous encephalitis" and "non-purulent encephalitis" respectively. Borries held that the encephalitis was analogous to that which occurs in acute fevers, and that it ran its full course without suppuration. He stated that it was possible to identify the lesion at a post-mortem examination of the rare fatal case. Symonds suggested

that the encephalitis might be the initial stage in the formation of a cerebral abscess.

In general the diagnosis has been made only when recovery followed a negative exploration for cerebral abscess, "the symptoms of abscess without abscess" (Borries). In this condition the cerebrospinal fluid is normal or perhaps blood-stained.

When a patient with otitis media presents symptoms of a focal lesion of the brain, such as aphasia, hemiparesis, or hemiplegia, it is wise to make a diagnosis of an abscess and to act on that diagnosis. Non-purulent encephalitis is rare in comparison with the purulent type. If, however, an abscess be not found, recognition of the possibility of this condition may save further unnecessary exploration, and a decompression operation is indicated in some of these cases of encephalitis just as in some cases of abscess.

Derangements of the Cerebrospinal Fluid

These derangements are of two general types. In the first type an excessive amount of cerebrospinal fluid gives rise to the symptoms and signs of increased intracranial pressure. Symonds described this condition in 1931, and gave to it the name of "otitic hydrocephalus," using the word hydrocephalus as meaning simply an excess of fluid in the skull. By drawing attention to the existence of such cases Symonds rendered a signal service to otology and neurology. Nothing need be added to his description to make these cases recognizable. The outstanding symptoms are intermittent headache and papilloedema. In spite of a high degree of pressure the patient may look remarkably well. There are no localizing signs, a feature which serves to distinguish this condition from that of non-suppurative encephalitis. The fact of greatest importance is that the cerebrospinal fluid is normal and that there is no excess of protein or cells. As there is no obstruction in the pathway of the cerebrospinal fluid the excess of fluid may be withdrawn at any point in that pathway, and of course the easiest point for withdrawal is the lumbar sac. One or several lumbar punctures may be necessary before the amount of fluid remains within normal limits.

The second type of derangement is of the circulation of the cerebrospinal fluid rather than of its amount. At some point in the cerebrospinal fluid pathway an obstruction to the circulation of fluid occurs so that the fluid is held up proximal to the obstruction. If the obstruction be at the outlet from the ventricles an internal hydrocephalus results; if in the cisterns of the posterior fossa, one or more of these cisterns may become distended with retained cerebrospinal fluid. In either case the patient then presents the symptoms of increased intracranial pressure. These collections of fluid localized in the ventricles or in the cisterns of the posterior fossa demand direct removal.

There are therefore two derangements of the cerebrospinal fluid which may arise in the course of otitis media: (1) a general excess of cerebrospinal fluid in which lumbar puncture is safe and curative; (2) a localized collection of cerebrospinal fluid in which lumbar puncture may not be safe and is not curative.

Can these two conditions be distinguished clinically from each other? Cases of both types have symptoms of increased intracranial pressure, but papilloedema is much more common when the fluid is in general excess than when it is localized. Should papilloedema therefore be an indication for lumbar puncture?

* Read in the Section of Oto-rhino-laryngology at the Annual Meeting of the British Medical Association, Belfast, 1937.

So far as my experience goes it is not possible to make a definite clinical diagnosis between a general excess of cerebrospinal fluid and a localized collection of cerebrospinal fluid. Statistics and probabilities do not help in the individual case. The safest way to make the diagnosis, and incidentally to treat the patient, is to perform a ventricular puncture. If there is a general excess of fluid this will remove it as readily as a lumbar puncture; if there is a localized collection of fluid in the head the ventricular puncture will furnish some indication of its position and will not carry the risk of lumbar puncture.

The clinical picture associated both with the general excess of cerebrospinal fluid and with the localized collections of fluid is usually suggestive of an intracranial abscess, and an abscess must be excluded in every case. The routine just suggested is applicable when it is necessary either to confirm or to refute the diagnosis of an abscess. The cerebrospinal fluid obtained by ventricular puncture is immediately examined and its protein content and cell count noted. A perfectly normal fluid is suggestive but not indicative of a non-suppurative rather than a suppurative lesion. Incidentally the amount of fluid obtained indicates the size of the ventricle and affords a clue to the whereabouts of any local collection of purulent or non-purulent fluid.

Conclusions

The whole matter may be summarized thus: When symptoms and signs of increased intracranial pressure develop in the course of otitis media and clinical methods fail to establish a definite diagnosis, ventricular puncture is safer and more informative than lumbar puncture and should be used first. If a communicating hydrocephalus be found, lumbar puncture may then be used for treatment.

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Clinical Memoranda

Treatment of Graves's Disease with Pancreatic Extract

Thyrotoxicosis is defined as a condition affecting a previously healthy thyroid gland, the cause of which is obscure and originates probably outside the thyroid, but the main symptoms are the consequence of the production of a perverted secretion in combination with an excess of normal secretion (Joll). Many theories have been advanced as to the cause and origin outside the gland, and one naturally looks for a contributory pathological condition in one of the other endocrine glands—the thymus, adrenals, pituitary, parathyroid glandules, pancreas, and the lymphatic apparatus. Pathological changes do appear in the endocrine organs, but there is doubt if they are the cause or are directly due to the thyroid disease and merely develop with it.

One cannot, however, fail to notice a very close link between the pancreas and the thyroid in thyrotoxicosis. There may be a considerable disturbance of the digestive system with prominent symptoms such as diarrhoea and icterus; looseness of the stools as distinct from true diarrhoea is very common, and is due to the very large amount of undigested fat and meat fibres—surely a pancreatic insufficiency? Severe grades of thyrotoxicosis are

associated with increased appetite and thirst, and loss of weight and toxic goitre may make manifest a latent diabetes or convert a prediabetic condition into true diabetes. It has been shown that functional glycosuria clears up with thyroidectomy, and true diabetes may develop if the goitre is not operated on. Again, the blood sugar is high in thyrotoxic states and in conditions of deficient pancreatic activity. A diminished output of pancreatic diastase is found in the urine in toxic conditions of the thyroid. It is well established that the fat-splitting function of the pancreas may be deficient in Graves's disease, with a resulting increase of fat in the stools due to imperfect absorption, a large proportion being in the form of undigested fragments. None of the other endocrine glands show such constant changes as does the pancreas in thyroid hyperactivity.

There seems little doubt that there is deficiency of iodine absorption in Graves's disease, and this deficiency may arise, according to Marine, because there is a diminished amount of iodine in the diet or because the body for some reason requires an increased supply or because there is something which blocks tissue oxidation. The problem of Graves's disease may be solved by this simple theory, that it is through pancreatic insufficiency that the necessary amount of iodine is not absorbed from the food, for the pancreas has to do with the breaking down of carbohydrates, fats, and proteins.

As far back as 1920 I treated a case of what seemed to be a malignant pancreas with pancreatic extract; the diarrhoea, which was excessive and uncontrollable, quickly subsided and the patient recovered and rapidly put on weight. This led me in 1931 to prescribe pancreatin to a severe case of toxic goitre because of diarrhoea with very light-coloured stools, and it was my good fortune to note that the diarrhoea was controlled at once and that there was amelioration of the syndrome of symptoms, the huge goitre disappearing within a few weeks. In 1934, to help to control persistent looseness of the stools in another severe case of Graves's disease, I tried the efficacy of parenteral injections of vagotomine, a then newly discovered hormone isolated from the pancreas by Santenise. This experiment has been found successful in three instances.

In May, 1934, the *Lancet* published a letter with the heading "Pancreatic Insufficiency in Graves's Disease," outlining my successful treatment of exophthalmic goitre with pancreatic extract. It is interesting to note that the *British Medical Journal* epitomized an article of J. V. Kup (*Dtsch. med. Wschr.*, April 3, 1936, p. 538) entitled "Skin in Thyrotoxicosis Changes," in which it was stated that eczema due to exophthalmic goitre was cleared up with treatment by tablets containing the total extracts of the pancreas and that the manifestations of the thyrotoxicosis regressed markedly.

It is in what is now termed the primary toxic goitre that this treatment is so notably and uniformly successful, although one can see amelioration of the symptoms and some change occur in the gland after lengthy treatment in the secondary or toxic adenomatous goitres. Acute or fulminating cases of goitre may be met with in which an early fatal termination may be expected, where such grave symptoms occur as uncontrollable vomiting and diarrhoea (? pancreatic disease), but the common form has an insidious beginning, is chronic in its course, and interrupted with acute exacerbations. Many cases of incipient toxic goitre come before the general practitioner which, unless he is "goitre-minded," are labelled as neurasthenia, and these are the cases which would be rapidly cured and never develop into the chronic Graves's disease if recognized and treated with pancreatic extract. Any patient who exhibits fine tremors, complaints of palpitation, and has an increased pulse pressure, without necessarily having exophthalmos or an enlarged gland, should be tested with the impedance angle apparatus to clinch the diagnosis.

It may be a matter of criticism that the iodine used with the pancreatic extract in most of the cases successfully treated was the cause of the benefit accruing. Iodine medication in itself will not cure the disease, and if its administration is continued, especially in larger doses, definite increase in the syn-

J. S. YOUNG: TUMOURS OF BONE

FIG. 1.—Osteogenic sarcoma of tibia invading knee joint.

FIG. 2.—Osteolytic sarcoma of femur.

FIG. 3.—Ewing sarcoma of tibia. Positive radio-diagnostic test. (2750r).

FIG. 4.—The same case as in Fig. 3, four weeks later, showing extension of tumour into supra-condylar pouch during progress of irradiation.