the tumour, just as, in a partial gastrectomy, it is easier to anastomose the stomach to the jejunum before amputating the stomach.

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THE DIAGNOSIS AND TREATMENT OF INFANTILE MASTOIDITIS

BY

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In winter a children's hospital contains many cases of severe air-borne infection—influenza, bronchitis, pneumonia, etc. In summer food-borne infection—diarrhoea and vomiting—is more commonly seen. In both summer and winter many bottle-fed infants are admitted. With suitable treatment and feeding a majority of these cases recover without complication. Some patients, however, perhaps after a temporary improvement, begin to go downhill mysteriously, lose weight rapidly, and die. In such cases, although during life the physical signs usually associated with mastoiditis, such as discharge from the ear and swelling behind it, were absent, yet a post-mortem examination has frequently revealed the presence of a purulent mastoiditis on one or both sides. Thus investigation of the records of 146 recent consecutive necropsies revealed that mastoiditis undiagnosed in life had been present on one or both sides in no fewer than twenty-nine cases. It is clear, therefore, that unsuspected mastoiditis is a common and often fatal complication, developing insidiously during the course of the above diseases.

The frequency with which mastoiditis complicates the above diseases has not been sufficiently realized: the reason for its development is to a certain extent shrouded in mystery, and since the physical signs which point to its presence are often masked by those of the disease from which the child is suffering, some confusion exists with regard to the diagnosis.

In order to clarify the problem it is proposed to discuss it under the following headings, pointing out: (1) the extreme frequency of mastoiditis as a complication in the above diseases; (2) the method by which infection gains access to the mastoid antrum and the material which causes it in each disease; (3) the local and general physical signs by means of which diagnosis can be made with confidence; (4) the treatment which experience has shown to be effective; (5) certain nursing details which have been found useful in prevention and helpful in promoting spontaneous recovery.

Frequency

At the Royal Liverpool Children's Hospital during the last six months mastoiditis has been recognized as a complication in thirty-six cases of children suffering from one

or other of the above diseases. All were referred to the laryngologist by the courtesy of the physician or surgeon in charge, and in nearly all of them the classical physical signs usually associated with mastoiditis were absent.

Method of Infection

We must remember that the Eustachian tube is more horizontal in children than in adults, and that normally it opens with each act of deglutition. On account of this horizontal position any material in the post-nasal space finds its way through the Eustachian tube into the tympanum and thence to the mastoid antrum more easily than in adults—especially when the child is lying on his back while feeding. It is thus seen how easily infected mucus can enter the tympanum from the post-nasal space in air-borne disease, and how vomited material may do so in food-borne disease and milk in bottle-fed infants.

Diagnosis

We have seen that diagnosis is often obscured not only by the physical signs of the disease from which the child is suffering but also by the fact that those usually associated with mastoiditis are absent—for example, as a rule there is no discharge from the ear, and swelling behind it is never present at a stage when, in the interest of the child's life, treatment is imperative. Moreover, the child is too young to tell us that he has earache, and palpation over the mastoid process gives us no definite help. Nevertheless experience has shown that mastoiditis can be recognized in these children at an early stage by the presence of local physical signs, other than those usually associated with mastoiditis, in conjunction with considerations in regard to the child's general condition.

GENERAL CONSIDERATIONS

In the first place the child is suffering from an air-borne or food-borne infection or is a wasted bottle-fed infant. We have seen that in these illnesses mastoiditis is a common complication. If, therefore, such a child is not improving, mastoiditis is likely to be the cause and should always be suspected. Further, it may be that for the last two or three days an increase in the temperature has been noted. Perhaps the child has been crying out as if in pain. The nurse may have noticed that he has been putting his hand to his head or pulling at his ear or rolling his head on his pillow. Diarrhoea and vomiting may have increased or, if not present, have now appeared, leading to rapid loss of weight and dehydration.

LOCAL PHYSICAL SIGNS

A discharge from the ear is seldom present, but examination with the electric auriscope may reveal a pool of pus too small to appear outside. Often the tympanic membrane is pink, especially in the upper and posterior quadrant, or it may only show a loss of lustre or a wrinkled appearance like a piece of crushed tissue paper. Frequently nothing abnormal is seen.

There is, however, one physical sign which is constant—one that has not received the attention it deserves. It consists in the presence of a palpable gland or glands in the posterior triangle of the neck behind the sternomastoid muscle. The glands in this region are often easily palpable, but sometimes difficulty is experienced in detecting them, for they are small at first, but increase in size with the chronicity of the mastoid infection. It is therefore to be expected that at an early stage the glands are more difficult to find than at a later date. There are, of course, other conditions which produce enlargement of the glands in the posterior triangle of the neck, such as

sepsis in the area of skin the lymphatics of which drain into the glands. But of all the conditions causing enlargement, mastoiditis in its catarrhal or purulent stage is by far the commonest. In the event, therefore, of glands being felt in this situation, and having excluded other causes, mastoiditis should always be suspected.

When this suspicion is strengthened by the presence of one or other of the above local signs and by the fact that the child is suffering from any one of the above diseases, experience has shown that a diagnosis of mastoiditis can be made with almost absolute certainty. Having made the diagnosis it is not suggested that an immediate operation is necessary in every case, for it has been found that in some instances mastoiditis in its early stage subsides spontaneously. Immediate operation is necessary only in the case of a child whose general condition is not improving, and who is losing weight and becoming dehydrated. In such a child operation is urgently called for in the interest of his life.

Treatment

About fifteen years ago the appalling mortality among young children in whom the mastoid cells showed unsuspected disease at necropsy led to a determined effort to recognize the condition during life and to adopt treatment at an early stage in the disease in the hope of saving the lives of children who would otherwise die. At first paracentesis was tried in those in whom the tympanic membrane showed changes. This proved unsatisfactory, for although some cases improved for a time, yet most of these patients died, and purulent mastoiditis was found post mortem. Gradually more and more were subjected to mastoidectomy, with the result that many children who were expected to die made a spectacular recovery.

Both now and for several years past the diagnosis is and has been made in the way outlined above, and if the child is losing weight or going downhill an immediate exploration of the mastoid is advised and carried out. The operation is an extremely simple one, and can be completed in less than ten minutes. It consists in opening the mastoid antrum and any cells which may be present, and leaving the lower part of the wound open so that drainage may take place posteriorly. The typical condition found at operation in an early case consists in the presence of swollen polypoid mucous membrane filling the antrum and any cells which may be present. At a later stage the polypoid mucous membrane is seen to be bathed in muco-pus; later still, frank pus is found, with destruction of bone. Experience has shown that, in mastoiditis due to air-borne infection, pus and bone disease are more likely to be found than when it develops as a complication in food-borne infection or in wasted bottle-fed infants.

We have seen that the complication is often bilateral, and as most of the children are critically ill it is not always a safe risk to operate on both sides at the primary sitting. We must therefore decide by the physical signs on which side to operate first. The rule is to choose that side on which the posterior glands are the larger or that on which the tympanic membrane is the more abnormal—with one exception. In a bilateral case, if one ear is discharging and the other dry it has been found safer to choose the latter ear for the primary operation; for on the discharging side the mastoid cells are draining and on the dry side the infection is pent up.

Nursing Details

We have seen above how readily muco-pus, vomit, or milk can enter and infect the mastoid antrum while the child is lying on his back, and especially while being fed

in this position. It is suggested, therefore, that children suffering from air-borne infection, diarrhoea, and vomiting, or wasted bottle-fed infants, should never be fed while lying down, and that during the intervals of feeding they should be well propped up on pillows and constantly turned from side to side—and never be allowed to lie on their backs for any length of time. The routine adoption of these suggestions at the Royal Liverpool Children's Hospital has not only led to a definite decrease in the frequency of mastoiditis as a complication in the above diseases, but has also proved itself to be a potent factor in promoting spontaneous recovery in those cases as yet not ill enough to require operation.

An analysis of the case sheets of the thirty-six cases mentioned above brings out the following interesting facts.

Enlarged glands in the posterior triangle were present in every case. In seven cases the tympanic membrane appeared normal. In twenty-three cases the tympanic membrane was abnormal or pus was present in the meatus. In six cases there is no note as to the appearance of the tympanic membrane. Seven cases recovered spontaneously. Twenty-nine cases were operated on, either on one or both sides, mastoiditis in the catarrhal or the purulent stage being present in all. Eight of these patients died (27.5 per cent.). Twenty-one recovered (72.5 per cent.).

All the cases subjected to operation were critically ill, some apparently in the last stages of dehydration, which even intravenous salines had failed to improve. When this is realized a recovery rate of 72.5 per cent. must be considered eminently satisfactory, for, unless the complication is recognized and treated, death is almost certain.

Conclusions

That many children considered to have died from one or other of the above diseases do in reality succumb to unrecognized mastoiditis.

That this complication occurs with much greater frequency than is generally realized.

That diagnosis even at an early stage can be made with confidence.

That mastoidectomy will save the lives of about 70 per cent. of the children in whom the complication is present.

That young children should never be nursed or fed lying on their backs.

Summary

The frequency with which mastoiditis complicates other diseases in children is stressed.

The diagnosis and treatment of the condition are detailed.

Nursing precautions which lead to a decrease in the incidence of mastoiditis in child patients are given.

An analysis is made of the case sheets of a series of thirty-six such cases occurring at the Royal Liverpool Children's Hospital.

In *La Presse Médicale* for June 28, 1939 (p. 1031), Desmarest and Capitain discuss the value of testosterone treatment in menorrhagia, metrorrhagia, and menopausal disturbances. They describe a number of cases of metrorrhagia and menorrhagia in young women and in women at the menopause, and also certain cases of post-menopausal disturbances which they have treated with testosterone propionate with excellent results. In uterine haemorrhage they give testosterone alone, while in amenorrhoea they combine it with small doses of folliculin.