THE VACCINE TREATMENT OF PNEUMONIA IN CHILDHOOD.*

By John Mowbray.

There are several reasons, apart from the more obvious ones, why I should not bring forward a communication on the vaccine treatment of pneumonia in childhood, the most important being that I have not as yet dealt with sufficient cases on which to base convincing conclusions, nor have I had sufficient controls. This paper is, admittedly, being produced prematurely, and it is only a rash promise wrung from me at our October Meeting by our Cæsarean Secretary that has plucked it so untimely. I have no message for the Pediatric Club, nor for the world. I simply want you to be sympathetic witnesses of my travail.

I have become accustomed to seeing a case of tuberculous meningitis come into one of my beds, there to be diagnosed and to die. In my student days I had developed a stoeic calm when one of my teachers finished his clinical lecture on a nervous system case on the diagnostic note, but I cannot get accustomed to seeing death ensue in a case of pneumonia without the uncomfortable feeling that it might have been saved. There was no specific drug to employ. Intravenous mercurochrome, despite the difficulty of its administration and its risks of fatal nephritis and intestinal ulceration, was my stand-by for a time, but when it was borne in on me that a concentration capable of killing the micro-organisms must at the same time injure the leucocytes and the reticulo-endothelial system on which the patient was depending for protection, and that anyway the maximum concentration and amount I would risk would give me a concentration in the blood of only about 1 gramme in 75,000 c.c.s., whereas for external use as an antiseptic we are not content with less than a 2 per cent. solution, I really could not go on. That was the position when early last year in a more than usually conscientious review of the first volume of Treatment in General Practice (reprinted from the British Medical Journal) I came across the following in an article on pneumonia by Wynn of Birmingham.

"During the preconsolidation stage when the circulation through the lung is not yet impeded and toxæmia is slight, much can be done to control the infection by the timely use of a vaccine or serum. We should think in terms of immunity; a patient recovers from pneumonia by producing sufficient immune bodies.

"It is not possible to find out beforehand those who will succeed in this, and 20 per cent. to 30 per cent. fail utterly. By early specific treatment a reduction of the mortality to 5 per cent. is within the bounds of possibility.

"When the patient is seen within the first three days a vaccine or serum should be given. A vaccine has the great advantage of being immediately available. It must be an active one of known antigenic power, made as far as possible from young primary cultures. The one I use contains equal numbers of pneumococci, streptococci and B. influenzæ (P.S.I. vaccine). Whilst it is desirable that it should consist of the various strains, it is more important that it should be made from virulent cultures. For an adult the dose is 200 millions of each organism, that is,

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600 millions in all. Larger doses can be given at this stage, as the patient is not yet sensitised. Children should have proportionately smaller doses, but even at 12 months 20 millions of each should be given. The object is to stimulate the production of non-specific antibodies in adequate amount. The specific effect is not seen for some days. If the temperature does not fall after the first injection, this can be repeated every 24 hours until three doses have been administered. When such doses are injected on the first day of the illness, in the majority of cases the temperature falls rapidly during the next 24 hours, with a corresponding improvement in the general condition. With each day's delay such rapid defervescence is less easily obtained. When cases are not treated until after the third day the circulation through the affected part is interrupted and toxins are fixed in vital tissues; little, then, can be expected of specific treatment, whose aim is to prevent, not cure, toxic symptoms."

Now all this sounded far too good to be true, besides which it cut across all my preconceived ideas of vaccine therapy in acute conditions. No opportunity had been lost in my student days to drum into me the danger of that dreadful negative phase, and the thought of giving six hundred million living organisms with the initials P.S. and I just gave me cold shudders.

Had I been conscientious and read Wynn's article when it was first published in the *B.M.J.* in 1934, I daresay I should not have given it another thought, but immediately after I actually read it I came across a reprint of a lecture which he delivered to the Norfolk Branch of the B.M.A. in which he successfully overcame my objections. In this he pointed out that the phase of lowered immunity consequent on giving a vaccine occurs only in patients who are sensitised, whose cells are allergic. This stage of sensitisation depends on the presence of specific antibodies, and if these antibodies are absent there is no sensitisation and no reaction will occur with any reasonable amount of vaccine. This is clearly seen in a case of tuberculosis; 1 c.c. of tuberculin can safely be injected into a non-tuberculous and, therefore, unsensitised infant, whereas .0000001 c.c. may produce a reaction in an infected and therefore sensitised person. From the point of view of the treatment of acute infection it was unfortunate that the first experiences were with patients suffering from chronic infections, who were therefore sensitised and who easily reacted. It was assumed that the variations in the opsonic index found after the injection of a vaccine in chronic cases were likewise obtained in acute infections; but the chronic cases, unlike the acute, possessed specific antibodies, and so the initial doses of vaccine had to be small in such conditions as chronic bronchitis, arthritis, pyelitis, etc. In acute infections the specific antibodies are slowly produced and are present only after a certain interval has elapsed. Up to this point the patient is unsensitised and may safely be given an adequate dose of vaccine.

In pneumonia the curve of intoxication rises rapidly and then remains at a high level. Specific antibodies begin to appear only about the fourth or fifth day. Their curve rises slowly at first, then rapidly, and reaches the curve of toxemia about the seventh day, when in favourable cases a crisis will occur or lysis will commence. Our problem in treatment is to accelerate the formation and rise of this antibody curve so that it will rise pari passu with the toxemic curve. These antibodies, however, are strictly specific and injection