Follow-up

About half of these infants have been seen at varying intervals in the two years following their illnesses, and no severe pulmonary complications have been noted, although a higher proportion of them seem liable to recurrent wheezy bronchitis than do the general population at this age in the district. Plain radiographs have shown no evidence of permanent lung damage.

Discussion

This disease has been described adequately from both clinical and pathological points of view in a manner much more scientific and exact than that which we have attempted here, but rarely in literature readily available to the general practitioner, who is the person most likely to see the illness in its sporadic form and in its early stages. The feature which made the deepest impression on the hospital staff during this outbreak was the rapidity of advance of the infection in a few hours from what had appeared to be a common cold to what was obviously a critical illness. Equally remarkable was the speed of recovery once the crisis had passed, the low rate of relapse, and the absence of serious sequelae. No attempt has been made to find out if minor degrees of bronchiectasis are common, but we have formed the impression that this is improbable in view of the absence of moist sounds in the lungs of those babies whom we have followed up.

The treatment employed may stimulate criticism on the ground that penicillin and chlortetracycline should not be given together, but the recovery of many desperately ill infants in the earlier stages of the epidemic made us reluctant to change this combination of antibiotics. Oxygen gave much more relief than humidification of the atmosphere with steam, although both together might have been even more effective. Drugs such as adrenaline, ephedrine, and aminophylline produced no obvious beneficial effect. Small doses of chloral hydrate and "nepenthe" were of considerable value. No attempt was made to alter the viscosity of the bronchial secretions.

The absence of significant pyogenic organisms from culture of the sputum coughed up into the back of the throat, combined with the appearance of the lungs at necropsy, suggests that the infecting organism was a virus. It also seems significant that there was an epidemic of upper respiratory infection amongst the adult population at the time.

Despite the early discharge home of many of the incompletely recovered cases, it eventually became necessary to open an unused ward in another hospital to deal with the flow of admissions.

Similar cases have been seen each year in this area over the past six years since adequate records have been kept, and it is interesting to note that this disease, although present each winter in this area, assumed epidemic proportions in 1951, in 1953, and again in 1955. The results of the 1955 epidemic will be published at a later date.

It is interesting to speculate on the nature of this illness. A distinct impression has been obtained that it is far more common than the limited reports in the literature would suggest. We would like to advance a tentative theory that acute bronchiolitis is not distinguishable from bronchopneumonia in young babies, and that it may, in fact, be the form in which bronchopneumonia attacks them. The epidemic incidence may parallel the epidemic incidence of upper respiratory infections in the older members of the community.

Excluding staphylococcal pneumonia, it must be rare indeed that any other form of bronchopneumonia occurs in young babies. If the above theory is acceptable, it would suggest that acute bronchiolitis is synonymous with bronchopneumonia in the young infant.

The great importance of this illness in the young baby is that it starts as a common cold and advances so rapidly that the general practitioner may not appreciate its severity when he first sees the baby, especially as the rise of temperature may be small.

Oxygen and chemotherapeutic agents appear to be life-saving, and we feel it unlikely that without their help the average case would survive until the initial virus infection burned itself out.

Summary

An epidemic of acute bronchiolitis in infants living in an industrial area in the North of England is described.

The rapid onset and severity of the illness, and the lack of long-term complications, are discussed.

The importance of oxygen and chemotherapy is stressed.

A possible theory of aetiology is put forward.

We wish to thank the resident doctors and nursing staff of the Sunderland Children's Hospital for their excellent care of these ill babies. We wish also to thank the Radiological and Pathological Departments, including the Public Health Laboratories, for their help.

Medical Memoranda

A Danger from Flexometallic Endotracheal Tubes

A middle-aged obese woman was recently anaesthetized for a neurosurgical operation. As premedication she had pentobarbitone sodium, 3 gr. (0.2 g.), and atropine 1/100 gr. (0.65 mg.). Anaesthesia was induced with thiopentone, 0.3 g., and gallamine triethiodide, 60 mg. The cords were sprayed with less than 1 ml. of 10% cocaine and a No. 9 "latex" armoured tube was passed. The patient was positioned on the table on her left side and anaesthesia was maintained with nitrous oxide (5 litres/minute), oxygen (2 litres/minute), and trichlorethylene (less than 0.5%). The operation, which was one for cranioplasty, proceeded uneventfully until the skull was being closed, some two hours from the beginning of the anaesthesia. About this time the patient gave signs of obstruction. The chest began to heave and the movements of the reservoir bag were reduced. On listening at the end of the corrugated breathing-tube, sounds similar to those produced by obstruction were heard, although the air passages sounded quite dry. No cause for the obstruction could be found outside the tube, and so a gum-elastic catheter was passed down the tube with suction. After this had been introduced about 6 to 8 in. (15 to 20 cm.) down the tube, obstruction became complete and the situation was remedied only by the removal of the endotracheal tube. Fortunately the operation was practically completed by this time and it was not necessary to introduce another tube. The patient was returned to the ward at the end of the operation and made an uneventful recovery.

Examination of the endotracheal tube showed a large blister, practically 1½ in. (3.8 cm.) long, which had formed on the inside of the tube about 2 in. (5 cm.) from the proximal end. Over this blister, on the outside, the colour of the tube appeared to be lighter than elsewhere, and closer examination revealed a number of patches of similar lightness. Other tubes were examined, some of which had never been used, and these too were seen to have some light patches.

Two days later the tube which had been used for the operation was taken to be photographed, and it was surprising to find that the blister had almost disappeared.

Closer examination of the inside of the tube, however, revealed the remains of the original large blister and two smaller blisters.

Another section of the tube was half cut across at one of the light patches. Two layers of the tube were clearly discernible, one on each side of the metal reinforcement (see Fig.). These layers could be separated quite readily, and it was found that the inner layer would swell very con-

siderably if trichlorethylene were applied to it. The swelling continued until the entire lumen of the tube was obstructed. When fresh air was blown through the tube the process was shown to be reversible and the swelling almost entirely disappeared.

A small test was arranged to show this effect of trichlorethylene on a loosened inner surface of this endotracheal tube. Trichlorethylene was dripped on the cut end of such a tube at the rate of approximately one drip every five seconds. A cine-camera was arranged to take one picture every two seconds. When developed and projected this film gave a dramatic illustration of the gradual swelling of the inner lining of the tube until it was folded back on itself and so completely blocked the tube.

It should be emphasized that this alarming incident occurred in a tube which to casual examination appeared perfectly sound. Further, the process is reversible, and so a blister is unlikely to be detected by looking down any tube prior to use. However, the lighter areas which may be seen from the outside of the tube and are caused by air spaces between the two layers of the tube will warn the anaesthetist of what is a potentially dangerous tube. It is known that ether will cause rubber to swell in the same way as trichlorethylene, but to a less extent.

I understand that these latex flexometallic tubes are made by dipping the metal reinforcement repeatedly in rubber. Nevertheless, separation into layers does occur in practice, and is conclusively shown in the illustration.

The main manufacturers of endotracheal tubes are carrying out research to discover ways of preventing this separation into layers. One solution would appear to be to separate the coils of metal more widely than they are at present. This would allow the latex to unite firmly between each turn of wire. In the meantime firms who sell these tubes whom I have contacted inform me that the tubes are not displayed on the counter but are only brought out if specially requested by a customer, who is reminded of their dangers before the purchase is completed.

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Familial Idiopathic Thrombocytopenic Purpura

The familial or hereditary form of idiopathic thrombocytopenic purpura (I.T.P.) is rare. Quick (1942) doubted its existence, and cases reported usually have a history of bruising in other members of the family without proof of thrombocytopenia. Witts (1932) described a family in which thrombocytopenia without purpura occurred in one genera-

tion and I.T.P. in the succeeding one. In the family described here both purpura and thrombocytopenia occurred in two generations.

CASE REPORTS

Case 1.—A boy aged 5 developed purpura. The platelet count on admission to hospital was 6,000 per c.mm. The tourniquet test was positive; clotting-time was 4 minutes and bleeding-time more than 16 minutes. Bone marrow showed an increase in the number of megakaryocytes, and platelet budding was diminished. Blood loss required repeated transfusion. After several months of expectant treatment splenectomy was performed. Following the operation the platelet count rose, and it has remained between 140,000 and 200,000 per c.mm. The number of megakaryocytes in the bone marrow became less and platelet budding was increased. The tourniquet test was still positive five years after splenectomy.

Case 2.—The father of Case 1 provided fresh blood for the transfusion of his son. It was noticed that he bled freely and that he had ecchymoses on his arms and legs. He gave a history of a tendency to bruise easily since childhood. His platelet count was 74,000 per c.mm. but the bleeding-time was only 3½ minutes. The bone marrow showed an excess of megakaryocytes with reduced platelet budding.

Case 3.—A sister of Case 1 was seen when aged 7. She bruised easily, and the tourniquet test was positive. Her platelet count was 98,000 per c.mm. and the bleeding-time was two minutes. Marrow biopsy was not carried out.

Case 4.—The younger sister of Case 1 was seen when aged 4. She had no history of purpura, but the tourniquet test was weakly positive. The bleeding-time was three minutes, the platelet count 164,000 per c.mm., and the bone marrow normal.

The mother of these children was completely normal. Her platelet count was 235,000 per c.mm. Neither the children nor the parents showed any abnormality of the white cells. Their detailed blood grouping showed that there was no correlation between their genotypes and the incidence of thrombocytopenia. It has not been possible to examine the parents or brothers of the father (Case 2). They are said to be normal.

DISCUSSION

There is no doubt that I.T.P. is a syndrome rather than a clinical entity, and that it has a number of causes. The condition which occurred in this family must not be confused with the congenital thrombocytopenic purpura of the newborn, which is due to the transfer from the mother to the foetus of the anti-platelet factor demonstrated by Harrington *et al.* (1951) in the plasma of patients suffering from chronic I.T.P. The literature on this condition has been reviewed by Morris (1954). In the above family there was clearly no question of such a transfer, since the mother was the only completely normal member.

Stefanini and Dameshek (1953) suggest that the inherited abnormality is a defect in the platelets. They compare it with the abnormality of the red cells in acholuric jaundice and in Mediterranean and sickle-cell anaemias. In the cases described here there was no apparent morphological abnormality of the thrombocytes, but no attempt was made to demonstrate increased fragility or a shortened survival time. The positive tourniquet test in Case 4, in which there was a platelet count of 164,000 per c.mm., and in Case 1 following splenectomy, might be interpreted as evidence of an inherited abnormality of the capillaries.

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