carries the danger of producing vascular damage of the periarteritis nodosa type was borne out by the present case.

The oral administration on August 16 of a few grammes of sulphatriad followed by the alarming signs described in stage 3 was of almost experimental value in demonstrating the abnormal bodily response as seen in anaphylaxis. That this should have expressed itself clinically by fever, prompt reappearance of the rash, bronchial spasm, eosinophilic leucocytosis, periarteritis-nodosa-like skin lesions, and haematuria is in complete agreement with observations by Rich and many other workers. The way in which sulphonamides act has been clarified by Wedum (1942). He suggested that sulphonamides can attach themselves to plasma proteins and form antigens capable of sensitizing the body specifically. Such a combination of sulphonamides with human serum proteins had been effected in the laboratory (Wedum, 1942).

In recent years attempts have been made to find a common pathogenic basis for manifestations of drug hypersensitiveness and certain haemorrhagic phenomena occurring during or shortly after specific fevers (for example, purpura fulminans in scarlet fever). The search has led to the rediscovery of the role of the Sanarelli and Schwartzman phenomena in human pathology (Lewi, 1948, 1949; Boelter and Hatoff, 1949). Alechinsky (1939) has repeated Sanarelli and Schwartzman's experiments and demonstrated that the two phenomena are identical and not dependent on allergy or anaphylaxis. It is Lewi's merit to have introduced the conception of sanergy (San(arelli) and -ergy, to denote reaction) to describe an altered bodily reaction to certain drugs and bacterial toxins; the reaction is thought to be produced in a manner similar to that operating in the experiments on animals performed by Sanarelli in 1894 and by Schwartzman in 1927. It seems that the autonomic nervous system is the principal mediator in the Sanarelli-Schwartzman type of reaction, but the intimate mechanism of this mediation is not yet quite clear. The problem became more complex when it was realized that allergic sensitization may supervene on top of the Sanarelli-Schwartzman phenomenon.

In the above case the clinical manifestations described in stages 1 and 2 were undoubtedly due to allergic sensitization; but, in the light of Lewi's concept, it could be argued that the sulphonamide administered to the patient on August 16 acted as a precipitating sanergen, producing in a highly sensitized subject a sanergic reaction (the locally applied sulphonamide powder was the sensitizing sanergen), with such complications as toxic rash, bronchial asthma, and periarteritis nodosa. In the absence of histological verification of the latter, the existence of sanergic periarteritis nodosa is very problematical.

It is well, however, to bear in mind that in some patients receiving chemotherapy (antibiotics should be added) a state of sensitization can sometimes be established in which further treatment with the same or related compounds will result in a sanergic, as distinct from anaphylactic, reaction—that is, in essentially haemorrhagic lesions. These would be either of a general nature (Sanarelli), such as haemorrhagic purpura, visceral haemorrhagic lesions, vascular necrosis, nephritis, etc., or local in extent (Schwartzman), such as skin lesions at the site of application of the sensitizing sanergen. In other words, some patients during chemotherapy, when certain favourable factors are operating, can behave in the same manner as the suitably prepared rabbits in the Sanarelli-Schwartzman experiments. It is hoped that elucidation of these facts may lead to rational

treatment and especially to prevention of the secondary syndrome of chemotherapy.

Summary

An unusually severe case of sulphonamide hypersensitivity is reported, and its clinical manifestations are described under the name of the secondary syndrome of chemotherapy (Lewi, 1949). The pathogenic mechanism is discussed with reference to the theories of allergy and Lewi's sanergy.

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ANAESTHESIA FOR CARDIAC CATHETERIZATION IN CHILDREN

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The use of cardiac catheterization and angiocardiology in the investigation of children with congenital cardiac defects is increasing rapidly as its value becomes apparent.

It has been considered by us that children under the age of 5 and in all probability up to the age of 12, depending on their mental development and temperament, require an anaesthetic to allow the investigations to take place, and it is hoped that this article may be of value to anaesthetists when first confronted with this problem.

The investigation entails the passage of a catheter into a vein, usually an antecubital one, and thence into the right heart and the vessels arising therefrom, under x-ray control. Blood samples are taken for gas analysis and pressures are recorded at suitable points. If an angiogram is required the catheter is withdrawn until a few inches remain in the vein, when an adequate dose of contrast medium is injected and rapid serial radiographs are taken of the heart and great vessels. This may be done in the antero-posterior position, in either oblique position, or, where it is considered necessary, any two may be done consecutively. The whole investigation may last from 1½ to 2 hours.

In attempting to devise a safe yet simple technique of anaesthesia for these cases certain problems had to be overcome: (1) the use of an x-ray plant precludes the use of all explosive anaesthetic mixtures; (2) the technique of blood gas analysis necessitates the use of non-volatile agents; (3) the subject, usually cyanosed, is a poor-risk patient; (4) despite this, except in an emergency, pure oxygen should not be administered, as the extra oxygen dissolved in the plasma may render the gas analysis inaccurate; and (5) the injection of the contrast medium may shock the patient.

When these problems were first tackled rectal bromethol ("avertin") was used. It was unsatisfactory because even with a dose of 0.12 g. per kg. of body weight—the

maximum which it was thought safe to give in these cases—it had to be supplemented with intravenous thiopentone. Rectal paraldehyde was therefore substituted for bromethol, but it also had to be supplemented with thiopentone, and, in addition, since it is chiefly excreted by the lungs, it was felt that its volatility might affect the blood gas analysis.

It was now considered that if thiopentone was required as a supplement to basal narcosis it might well become the primary anaesthetic agent. Rectal basal narcosis was discarded and oral pentobarbitone sodium substituted; the technique now used is as follows.

Technique

The child is premedicated with atropine, 1/150 gr. (0.43 mg.), and pentobarbitone. It should be emphasized that the pentobarbitone should be prescribed on a basis of weight rather than age, for many of these patients are grossly underdeveloped (one child for investigation was aged 4½ years but weighed 16½ lb.—7.5 kg.). The formula employed in this series has been approximately 3/5 gr. per stone (6 mg. per kg.) body weight. Forty-five minutes later the child is taken to the x-ray theatre, where there is an anaesthetic trolley equipped with a laryngoscope, endotracheal tubes, and oxygen under pressure. If possible there should also be available some form of suction for use in an emergency.

The child is now anaesthetized with thiopentone 5%, given slowly enough to avoid respiratory depression. Procaine 1% or 2% is injected round the selected vein, serving the double purpose of supplementing the anaesthesia and diminishing the risk of venospasm, and the catheter is inserted in the usual way.

From now on anaesthesia is maintained by small divided doses of thiopentone through the catheter. Usually 1 ml. is sufficient at any time, and the indication for a further dose is recognized by some movement of the child's body.

A careful watch on the child's pulse, respiration, and general condition should be kept at all times, for if the investigation is difficult or unduly prolonged the anaesthetist should be responsible for its curtailment. In most cases the injection of the contrast medium for angiocardiology leaves the child comparatively undisturbed, but occasionally it is accompanied by a brief period of respiratory arrest and some degree of surgical shock. Should there be a severe reaction the investigation is stopped, but otherwise it seems to be perfectly safe to allow a second oblique angiocardigram to be taken if required, although it is the practice to wait for half an hour to allow the first dose of contrast medium to be excreted.

In a limited number of cases angiocardiology alone was performed, and consequently there was no objection to the use of a non-explosive volatile anaesthetic agent. On these occasions it was found that, with the same premedication, "trilene" and oxygen administered through a Boyle machine produced a safe, smooth, and completely satisfactory anaesthetic, which did not appear to produce any cardiac irregularity beyond that which might already be present.

Some 40 investigations have been carried out by the technique described above. The children have usually arrived in the x-ray theatre sleepy or asleep and with less cyanosis than normal, presumably due to a lowered basal metabolic rate and a reduction in physical activity. With one exception their behaviour under anaesthesia has been perfectly satisfactory, the exception being a child who was known before the operation to be subject to

attacks of spasmodic coughing with accompanying distress and increased cyanosis. An attack was precipitated by the injection of the contrast medium, but recovery was rapid when oxygen was administered under slight positive pressure. In no case has there been any tendency to vomit under anaesthesia or any other complication, and the investigations have as yet been free from any mortality.

Medical Memorandum

Mongolism in One of Twins

Mongolism is the most frequent growth disorder of children, affecting from two to three in every thousand births; the condition is therefore of considerable importance. The occurrence of mongolism in one of twins, however, has very rarely been reported in British literature, the last time being by Armstrong (1928), although according to Benda (1947) a total of over 80 cases had by then been reported in world literature. The case here recorded may therefore be of interest.

CASE REPORT

The twins were born on October 10, 1946, the boy weighing 6 lb. (2.72 kg.) and the girl 7 lb. (3.17 kg.). From birth it was obvious that the boy had all the typical features of the mongoloid. The children were born when the mother was aged 40, after a gap of 12 years from the birth of a normal baby girl. There had been three miscarriages in the intervening years. This case illustrates perfectly the thesis by Benda (1947) and others before him that mongolism usually occurs towards the menopause or after a period of infertility, during which there may be miscarriages.

Treatment.—Benda believes that mongolism is due to hypofunction of the pituitary, as previously suggested by Brousseau (1928) and others, and thinks that the best treatment is with anterior pituitary extract plus thyroid, which has been favourably reported upon by Timme and others. The present case was treated with thyroid extract plus vitamin B from birth until the age of 20 months (July 1, 1948), when he was also given "antuitrin growth" by injection. He seemed to improve immediately; the stools rapidly changed from small hard pellets to normal and he began to lose his lethargy. His weight, which was only 15 lb. 6 oz. (6.97 kg.), began to increase by 1 lb. (0.45 kg.) each fortnight for the first time. During a period of one month when the pituitary extract was unobtainable he lost weight and interest in food, slept more, the stools deteriorated, and lethargy returned.

When treatment was resumed, so did the improvement. The mongoloid appearance started changing so that he looked more normal. He took an interest in and played with his toys, he became possessive and jealous, his hair improved in lustre and texture, the flesh became firm, the skin stopped flaking, the nails improved, and the feet broadened. He started to say a few words.

With his spine becoming firm he could first sit up and then stand up with support on August 20. He could propel himself across the room by November 18, and pull himself upright.

The family moved in January, 1949, and did not keep up correspondence, so unfortunately I do not know his present condition.

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