other authors, indicated that such changes reach their maximum about the time when the attack ceases, and this conclusion seems to be supported by the findings of Haldane *et al.* It is also borne out by the results obtained in Case 3 of the present series.

Of the 5 cases of this series in which specimens taken at the end of the attack were examined, 1 showed a definitely raised and 2 a slightly raised calcium figure, while the other 2 were near the upper limit of the generally accepted normal range (9 to 11 mg.). In 2 the phosphorus was definitely low (below 2 mg.), 1 was only slightly higher (2.2 mg.), while the other 2 were within normal limits.

It is not surprising that uniform changes have not been found in all cases; such uniformity is rare in any condition. Moreover, failure to demonstrate changes from examination of one specimen taken at the end of the attack does not prove that these changes did not occur. It is probable that the time at which maximum changes do occur with reference to the tetanic attack is somewhat variable, and in any case the period during which these changes are marked is short. It is also likely that the duration, extent, and time of occurrence of the blood changes are related in some degree to the severity and duration of the attack, and these have varied considerably in our cases. Hence it is to be expected that specimens taken at a relatively fixed period of the attack should in a certain proportion of cases fail to demonstrate changes which do in fact occur. It can at least be said that the type of blood change which has been observed in certain of our cases corresponds to that found by other workers in hyperventilation tetany.

Hyperventilation tetany is of course due to an alkalosis resulting from excessive loss of CO₂ by overbreathing, and the treatment applied aims at making good this CO₂ deficit. It is impossible to make definite assertions regarding the effect of treatment in such a small series of cases, but we have the distinct impression that it shortened the attack and relieved the muscular spasm; the treatment applied to Case 4 seemed to be particularly effective. The observations made on the treatment of these cases therefore tend to support our views as to the real nature of the attacks.

There remain to be considered the reasons for hyperventilation in blood donors. It is well known that hyperventilation is a frequent response to nervousness, apprehension, fear, and pain, particularly in those of anxious or highly strung temperament, and the great majority of reported cases of hyperventilation tetany have occurred in persons of this type. It is not surprising that some donors should view the removal of their blood by a process of which they have little or no knowledge, and no previous experience, with nervousness and apprehension, and possibly some fear. A certain proportion of these will respond by overbreathing, and a few of them will develop tetany either because they are unduly susceptible to the effects of overbreathing or because the overbreathing is excessive. It would be expected, therefore, that attacks of tetany would be much more apt to occur in those making a first attendance at the transfusion centre than in others. This is seen in the present series, in which 6 of the 7 patients were giving blood for the first time, and nearly all admitted to some apprehension. It should be added that before bleeding takes place it is generally difficult to distinguish those who may be liable to an attack of tetany; for the overbreathing is in most cases far from obvious, and not at all easy to detect under the conditions usually obtaining at transfusion centres.

It has been suggested to us that another possible factor is the effect of adrenaline, since in all our cases a local anaesthetic (parasetic—Parke, Davis) containing adrenaline was used. The ability of adrenaline to increase the heart rate and depth of respiration, especially in those particularly susceptible to its action, might, it is thought, play some part in the development of the hyperventilation leading to the tetanic attacks.

Summary

Seven cases of tetany occurring in blood donors are described. The condition is believed to be a hyperventilation tetany.

The blood changes noted—namely, low inorganic phosphorus and high-normal or raised calcium—correspond to those found in other reported cases of spontaneous hyperventilation tetany.

Six out of the seven cases were in persons giving blood for the first time, and the principal factor concerned is believed to be overbreathing resulting from nervousness and apprehension.

The treatment recommended for the attacks is to supply air enriched with CO₂. This should be done from a special CO₂ supply, where available; otherwise the patient should be caused to rebreathe his own expired air by placing a paper bag over his nose and mouth.

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MENINGOCOCCAL SEPTICAEMIA

BY

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Two series of cases of chronic meningococcal septicaemia of moderate size have been reported by Stott and Copeman (1940) and Dickson, McKinnon, Magner, and McGillivray (1941), while several observers have subsequently published accounts of sporadic cases. In spite of this, however, the condition still appears to be regarded by most medical men as a rarity. That this is not so is shown by the fact that the cases recorded here (see table, p. 761) merely represent those seen in the wards of a military hospital from Sept., 1941, to March, 1942. All but one had been sent in under another diagnosis, but the blood cultures of 14 of the 15 cases were positive for the meningococcus, although not necessarily so at the first attempt.

Clinical Diagnosis and Treatment

Diagnosis is easy if the possibility of meeting with the condition is borne in mind. The onset is often sudden, with fever and, occasionally, sweating and a rigor. Severe pain in the muscles and joints, sometimes with effusion, is common, together with headache. Within a day or two the characteristic rash occurs—generally on the legs, often on the arms, and less frequently on the back and trunk. In some instances, however, this is so sparse that it may not be noticed even by the patient, who may therefore be unaware of its occurrence. In its commonest form it consists of pinkish papules, macules, and sometimes nodules, which may vary in size from a few millimetres to 3 cm. or more across. On pressure the colour fades, but a small haemorrhagic centre is often seen, whilst petechiae are frequently found. Successive crops appear in many cases, although occasionally only a few spots will occur singly and so may be missed. A somewhat characteristic feature of this rash is tenderness on pressure. If not treated with sulphapyridine or similar drugs the condition may last for months or even years, generally with remissions. The fever is usually of the intermittent type, rising to 104° to 105°. In no case in this series was the spleen palpable, although there was tenderness in that area in one instance. A curious feature of the disease was the absence of wasting, debility, or even a feeling of real illness throughout its course. It was chiefly of the muscle and joint pains and, when present, of sweating that the patients complained.

Sulphapyridine, 12 g. in the first 24 hours, will in most cases terminate the disease within this period, although dosage should be continued for at least a week after pyrexia has ceased. The patient then can convalesce rapidly and normally.

Comment

Meningitis was at no time epidemic in the areas from which these cases were derived. They did not appear to differ, however, from those reported by Stott and Copeman in 1940 as occurring in association with an epidemic of cerebrospinal meningitis. It is believed that meningococcal septicaemia is a comparatively common disease, although it is frequently misdiagnosed—generally as rheumatic fever or influenza, and as erythema nodosum when the rash is of the confluent type.

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Details of the Cases of Meningococcal Septicaemia reported on the Preceding Page

Case	Age	Onset	Initial Symptoms and Period	Tender Rash with Haemorrhagic Element	Headache	Muscle and Joint Pains	Sweating	Type of Temperature	Leucocytes	Original Diagnosis	Remarks
1	24	Gradual	Pains legs, swelling knee. Vomiting 3 days	+	0	+	0	Intermittent to 104°	12,000 P.65%, L.30%	Rheumatic fever	Throat swabs and sinus lavage—pneumococci but no meningococci. Effusion knee
2	32	„	Pains large joints. Off food. Swelling one ankle	+	0	+	+	Intermittent to 104°	17,000 P.85%, L.6% myelocytes 5%	P.U.O.	Nasopharyngeal swab—no meningococci
3	24	„	Chill—1 week. Pains legs; bluish lumps on shins, tender	+	0	+	+	None till rash, then intermittent to 100°	11,200 P.77%, L.16%	Subacute rheumatism and erythema nodosum	Nasopharyngeal swab negative. B.S.R. Westergren 28 mm. Never felt ill
4	28	„	Malaise 4 days. Papular rash	+	+	+	0	Irregular, rising to 100.5°	12,600 P.80%, L.25%	Varicella	Some discrete macules with small central vesicle. Few with haemorrhagic centres. All tender to pressure
5	27	„	Run down—overwork. Muscular stiffness legs. No rash first 4 days; then sudden onset, malaise and rash	+	0	+	+	Intermittent to 101° after admission	11,600	Acute rheumatism	Rash haemorrhagic throughout, but scanty. Fluid both knees
6	33	„	P.U.O. irregular 4 weeks. Fatigue. Occasional pain knees and ankles	+	+	+	0	Irregular, rising to 102°	11,200 P.80%, L.14%	Influenza	Rash painful (and tender) for first 2 days. Blood culture not +, but agglutinations strongly +
7	21	Sudden	Stiffness calves and forearms. Sweating. Then flitting muscular pains, disappearing for short periods	+	0	+	+	Intermittent to 102°	10,400 P.63%, L.34%	Rheumatic fever	Onset after sleeping 6 weeks on wet floor. B.S.R. 28 mm. Joint effusions
8	23	„	Vomiting, headache, pains all joints. Rash in 24 hrs. all over	+	+	+	+	Intermittent to 105°		Cerebrospinal meningitis	Drowsy subsequent to admission. L.P. twice normal at interval of 1 week
9	21	Gradual	Malaise, pains in wrist and ankles for 2 days. Some photophobia	+	+	+	0	Continued evening rise to 100°–101°	5,000 P.73%, L.22%	Meningococcal septicaemia	Nasopharyngeal swab almost pure growth meningococcus Type I. Blood culture also Type I
10	25	Within 48 hours	Stiffness legs. Gradually spread upper limbs. Onset pain sudden	+	0	+	+	Intermittent to 104°		Acute rheumatic fever	Pain in joints agonizing on movement. Could not be moved for 48 hrs. Effusion many joints. Rash appeared 4th day
11	27	Sudden	Malaise, painful lump right shin	+	+	+	+	Intermittent to 104°	18,000 P.84%, L.15%	Erythema nodosum	Rash scanty except on legs. Confluent, resembling erythema nodosum
12	32	„	Rigor; all joints ached. Sweating +	+	+	+	+	Intermittent, rising to 103.2°	7,000 P.67%	Rubella	Nasopharyngeal swabs negative
13	22	Gradual	Joint pains for 3 months with occasional malaise	+	0	+	0	?	11,000 P.68%, L.21%	Muscular rheumatism	Ambulatory throughout until blood culture was found positive. Rash very scanty
14	31	„	Joint pains and sweating. Erythema nodosum elbow	+	0	+	+	Irregular, rising to 102°	17,000 P.78%	Acute rheumatism	
15	32	Sudden	Headache, pains back and limbs	0	+	+	+	Remittent to 103°	12,000 P.70%, L.25%	Influenza	Nasopharyngeal swabs negative

Medical Memoranda

Treatment of Heat Pyrexia by Lumbar Puncture

The immediate and permanent response of the following case to ether anaesthesia and lumbar puncture as adjuvants to the usual cooling therapy was a source of great satisfaction to us and may be of interest to others.

CASE REPORT

The patient, an A.B. aged 41, employed as a mess-deck sweeper, last June complained of symptoms which were in our opinion attributable to heat exhaustion. At that time temperatures between decks were never under 110° F., and more commonly varied between 115° and 120° F. These of course refer to the living spaces, where meals were served and where men normally spent their off-duty time. Engine-room temperatures were much higher (140° F. being not uncommon in the cooler parts). The man was ordered a change of occupation on the upper deck, and for a few days was better, but eventually felt so "light-headed" that he was obliged to report sick again, and was put to bed for a "rest cure." Next morning his temperature (101° F.) was not considered unusual for cases of his type, which were common on board at that period. At 1 p.m., however, it had risen to 105° F. A sponge down with ice-cold water gave some relief, but in the neighbourhood of 4 p.m. his manner became strange, he was mentally confused, and when seen at that time he was actually unconscious, with a temperature of 109° F.

All the ice on board ship was temporarily commandeered (with the willing co-operation of the engineer commander and his staff), and something like 40 lb. of it was packed round the patient. A long piece of rubber sheeting was employed to convert

his bed into a bath of ice and iced water, which was continually being added to and siphoned off (using a Higginson syringe for the purpose) as the water ceased to be "iced." Nothing less was adequate, and in an hour his temperature came down to 105° F. After that the fall in temperature was more rapid: half an hour later it was 101° F., and orders were given to discontinue the ice bath. Owing to the pressure of work in the sick bay at that time, ten minutes passed before this was completed. By that time the patient had become collapsed and pulseless, and was still unconscious (temperature 97° F.).

In spite of the fact that the temperature in the sick bay was 102° F., it became necessary to apply blankets and hot-water bottles for a short while, till the radial pulse became palpable again. Convulsions were anticipated, but the suddenness of their onset, their severity, and the speed with which they developed were not. They began at 6.30 p.m., and within a few moments were as pronounced as those of tetanus. Opisthotonos, risus sardonius, and neck and back stiffness were severe. Fortunately a bottle of ether and a mask were in readiness, and lumbar puncture needles were in the sterilizer. All the above convulsions appeared during the short time the induction of ether anaesthesia takes, but they of course disappeared with the deepening of the anaesthesia. The lumbar puncture needle was then inserted. About 2 oz. of clear cerebrospinal fluid under tremendous pressure was gradually removed over a period of half an hour, until the pressure was normal. Nothing more was done. No further convulsions occurred, and the patient recovered from the anaesthesia but remained unconscious (temperature 101° F.). One pint of water injected slowly per rectum was retained, and a close watch was kept during the night on his pulse and temperature.

At 3 o'clock next morning the patient became slightly restless and his temperature rose to 103° F. A repetition of the ice bath on a smaller scale had the desired effect. He was conscious, though tired and drowsy, the following forenoon,