Evacuation to a general hospital was delayed for more than a fortnight, and the patient died nearly three weeks after this.

The holding of patients for at least ten days after laparotomy has made a vast difference to results, and by this time the issue is usually clear. Even then, however, evacuation by air or by slow stages is the method of choice.

Chest Wounds

These are not, as a rule, difficult to deal with in forward areas, the minimum possible being done after closure of open wounds of the pleura. In a series of more than 60 cases only one required operation for bleeding from an intercostal vessel producing a haemothorax. Repeated aspiration in this instance failed to prevent displacement of the apex beat to the fifth right interspace three inches from the midline. Surgical emphysema likewise has necessitated intervention only once in the same series.

Limb Injuries

Sixty to eighty per cent. of all wounds involve the limbs, and the lower more often than the upper. Immobilization of a standard type simplifies the problem in these cases. Illustrative and valuable examples are the Tobruk plaster for fractures of the femur and thoraco-brachial plaster for the humerus. Plaster cuffs for amputation stumps have also proved useful. Coincident injuries, such as a Pott's fracture with a fractured femur, can complicate the picture appreciably.

Of all fractures perhaps those of the upper third of the femur must be regarded as the most dangerous, associated in dispatch riders, who are the commonest victims, with head injuries which may also be grave. The value of radiographs in these as in all fractures in forward areas has too often been exaggerated, as immobilization and not realignment is the surgeon's task. Excision of the wound is of course required, and difficulty is often experienced in distinguishing bone fragments from foreign bodies. The errors, however, can easily be rectified when definitive treatment is carried out after evacuation.

Amputations, as already stated, are numerous, and primary suture is no more admissible here than in any other site. Blood transfusion in these cases is usually vital, and for double amputations imperative. One such case did well although operated on 15 hours after injury with massive destruction of one leg below the knee and gas gangrene in the other.

Gas gangrene has been encountered more than a dozen times in 500 cases, and the interval since wounding has twice been less than eight hours. One case oddly enough presented coincident maggot infestation, and the wound was (as usual in these cases) very clean. Excision of the affected muscle group proved effective. The diagnosis in the majority of cases, however, is made not from an inspection of the wound but from the patient's general appearance—the sallow, vivid look, incipient delirium, and restlessness being characteristic features. The presence of gas in the wound is unusual and has been noted only once. Anaerobic gangrene, in fact, might be a more descriptive and apposite term. It may even be fair to say that the presence of gas in gas gangrene, so-called, is as useful in establishing the diagnosis as skeletal secondaries in carcinoma of the breast.

Chemotherapy in these infections is an adjunct to and not a substitute for radical surgery. Buttock, thigh (lateral aspect), and calf wounds, for anatomical reasons, are those most apt to develop gas gangrene, and prophylactic serum for all of them may well have reduced the incidence of this complication. There again postponement of evacuation for some while after operation is of the greatest value. In these cases, as in large wounds with gross sepsis, secondary haemorrhage is the real danger of the convalescent period. When it occurs nothing but ligation of the main vessel involved is likely to be effective.

Burns

Routine treatment with sulphanilamide and petroleum jelly gauze after gentle but thorough cleansing with saline is still the method of choice, and it is the anaesthetist rather than the surgeon whose task is difficult. General agreement will probably be expressed with the danger of pentothal in extensive burns as in head injuries. Intravenous morphine has, in fact, proved much more satisfactory, and can be used with advantage for subsequent dressings at five-day intervals.

Conclusions

Evacuation controls the problems of surgery in forward areas.

The number rather than the nature of wounds may be the most important prognostic feature.

The all-in mortality of abdominal wounds is 50% or thereabouts.

Abdomino-thoracic wounds are not necessarily more serious than abdominal.

No patient should be evacuated until ten days after a laparotomy.

Radiographs of fractures in forward areas are unnecessary in nearly all cases.

"Anaerobic gangrene" is suggested as an alternative to "gas gangrene." The presence of gas is a late manifestation.

Intravenous morphine is the anaesthetic of choice in the treatment of burns.

Medical Memoranda

Severe Granulocytopenia from Sulphaguanidine

A recent M.R.C. Memorandum (1943a) reports that sulphaguanidine has shown little toxicity to date, although nausea, drug-rash, and fever have occasionally been noted. The occurrence of severe granulocytopenia in a young adolescent treated for Sonne dysentery with moderate doses of this drug is therefore of some importance.

CASE RECORD

A girl aged 15 who had complained of headache, vomiting, and diarrhoea since the previous day was admitted to an E.M.S. hospital with a pyrexia of 101.2° and tenderness over the course of the colon. Her general condition was good and the frequent watery stools contained no blood or noticeable excess of mucus. Desoxycholate cultures produced a heavy growth of *B. dysenteriae* Sonne.

Sulphaguanidine was begun on the third day of the illness, 1.5 g. being given three times daily in the first three days. By this time the temperature had become normal and the stool cultures negative, and the dose was reduced to 1 g. three times daily, which was continued for four days. Thus a total of 25.5 g. of sulphaguanidine was given in seven days.

Six days after the drug had been discontinued the stools became relaxed and the cultures again became positive. A second course of sulphaguanidine was begun eight days after the conclusion of the first, 1.5 g. being given four times daily. After only two doses the temperature, previously normal, rose to 100.2° and there was complaint of a feeling of lassitude and slight headache. The temperature showed morning remissions to normal, but the malaise persisted, and on the third day, when a total of 15 g. had been given, the second course of sulphaguanidine was stopped. On this day the total leucocyte count was 5,500 per c.mm., of which 64% were polymorphs. The following day the temperature showed no morning remission and the leucocytes had fallen to 4,100 per c.mm., of which 38% were polymorphs. A day later the pyrexia reached 103.2° and the leucocyte count was 2,000 per c.mm., of which only 10% were granulocytes.

Sodium pentnucleotide was given in 10-c.cm. doses three times daily for four days, and twenty-four hours after starting it the leucocyte count had improved to 4,000 per c.mm. Of these 38% were of the granulocyte series, 4% being myeloblasts, 16% myelocytes, and 18% polymorphs. Thenceforth there was gradual improvement, but six days elapsed before primitive white cells ceased to be present in fair numbers and before the temperature became normal. The red cells were not affected. There were no necrotic lesions and no petechiae.

COMMENT

Sulphaguanidine is used in the treatment of bacillary dysentery because of the local bacteriostatic action of the proportion of the total dose given which reaches the colon unabsorbed and is finally excreted in the faeces. Attention has centred on this action, and it requires to be emphasized that approximately two-thirds of the amount administered by mouth is absorbed before the ileo-caecal valve is reached (M.R.C. Memo., 1943b). That relatively low blood concentrations occur with this sulphonamide is due in far greater measure to rapid elimination in the urine than to poor absorption from the intestine (Firor and Poth, 1941). The possibility of agranulocytosis resulting from the administration of sulphaguanidine therefore merits attention, especially as the drug is often given to large groups of cases in epidemics, when regular checking of the granulocyte count may be impracticable.

That agranulocytosis is liable to occur during second courses of treatment has frequently been observed with other sulphonamides. In the above case the early onset of headache, lassitude, and slight pyrexia after the resumption of sulphaguanidine is suggestive of sensitization by the first course of the drug.

I wish to thank Dr. W. A. Bullough, County Medical Officer of Health, for permission to publish this report.

A. GRANT, M.D.

REFERENCES

- Firor, W. M., and Poth, E. J. (1941). *Ann. Surg.*, **114**, 663.
M.R.C. War Memo. No. 10 (1943a). *The Medical Use of Sulphonamides*, p. 39.
— (1943b). *Ibid.*, p. 9.

Megalocytic Anaemia in a Young Vegetarian

Trowell (*Lancet*, 1943, **1**, 43) of the Uganda Medical School reviewed the subject and literature of deficiency anaemias of malnutrition, with special reference to macrocytic anaemia. The present case is of interest in showing, although far from fully investigated, certain unusual features in a type of anaemia apparently uncommon in this country.

CLINICAL HISTORY

On Aug. 5, 1941, a lorry-driver, a single man aged 20, was referred to the department by Dr. J. Strachan of Leyland, for a blood count. In April, 1941, three of his teeth had been extracted because of soreness of the tongue and mouth. In May, tiredness, breathlessness, and loss of colour were first noticed; and these, the only symptoms, steadily increased. For 15 years he had been practically a vegetarian. For breakfast he had bread-and-butter with either salad of lettuce and tomato, or jam, treacle, or marmalade; and for lunch bread-and-butter, potatoes in gravy with peas or carrots, rice pudding; meat was taken at most as scraps in a weekly olla podrida. His tea was similar to the breakfast, with home-made cakes, biscuits, or fruit pies; and his supper consisted of bread-and-butter. The patient had never been fond of cheese, bacon, meat, eggs, or liver, and only took milk in tea, coffee, or cocoa at each meal. His parents, sister, and two brothers were all well and were not vegetarians; there was no family history of anaemia.

Examination.—Well-built and well nourished; marked pallor of mucosae; tachycardia; spleen impalpable, reflexes normal; tongue slightly smooth at the edges; onychia not marked. Blood: Hb, 35% (Haldane); red cells, 1,400,000 per c.mm.; C.I., 1.25; reticulocytes, 4.5%; mean diameter of red cells, 8.2 μ (diffraction method); mean corpuscular volume, 114 cu. μ . White cells, 10,600 per c.mm.; differential count, normal. Red cells showed variability of size, shape, and staining; but no nucleated or stippled forms were seen. Plasma bilirubin, 0.85 mg. per 100 c.cm.; urea, 35 mg. per 100 c.cm.; W.R., negative. The urine showed no excess of urobilin.

The uncommon diet was viewed with suspicion, but the patient was unwilling to come into hospital, and was treated in bed at home as a case of presumptive pernicious anaemia. Between Aug. 6 and 29 he received injections of anahaemin in doses of 6 c.cm., 4 c.cm., and 8 of 2 c.cm. (total, 26 c.cm.).

Progress.—On Sept. 2, 1941, a gruel test meal revealed histamine-fast achlorhydria. The blood count showed: Hb, 85%; red cells, 4,400,000; C.I., 0.9; mean cell diameter, 7.5 μ . From that date until July 4, 1942, the patient received an injection of 2 c.cm. of anahaemin fortnightly. Counts done in Dec., 1941, and in Feb., April, and June, 1942, showed haemoglobin never less than 95% and not fewer than 5,000,000 red cells per c.mm., with a mean diameter of not more than 6.9 μ . Since Aug., 1941, a normal amount of meat, bacon, and milk had been taken in the diet. In July, 1942, it was decided to stop the injections and watch for a relapse. On five occasions between Aug. 4, 1942, and Jan. 18, 1943, haemoglobin was not less than 100%, nor the red cells below 5 millions. On Jan. 22, 1943, a test meal of 50 c.cm. of 7% alcohol showed a spontaneous secretion of free hydrochloric acid (from 8 to 12 c.cm. N/10 NaOH per 100 c.cm. of juice in the first three samples, rising after subcutaneous injection of 1 mg. of histamine to from 50 to 60 c.cm.), and the diagnosis of pernicious anaemia was abandoned. Fragility of the red cells was found to be normal at this time. Regret that marrow films were not examined before and after starting liver treatment, and a more delicate therapeutic experiment planned, is tempered by the patient's pleasure at his quick return to full fitness, and the prospect of relief from lifelong treatment. On Nov. 2 the patient felt and looked very well. His haemoglobin and red cell diameter were normal; and his reticulocytes numbered less than 1%.

COMMENTS

Points of note are: (1) The patient's good state of nourishment, indicative of the selective "anaemia-producing" action of his defective diet. (2) The early histamine-fast achlorhydria, but with a normal test meal 5 months later: Trowell found free HCl "almost always present." (3) The rapid improvement of the anaemia following anahaemin in moderately large though not massive dosage.

I wish to thank Drs. Strachan and F. B. Smith for their co-operation and for permission to publish.

R. T. COOKE, M.D.ED.,

Assistant Pathologist,
Preston Royal Infirmary.

Reviews

DISEASES OF THE BONES

Medical Clinics on Bone Diseases. A Text and Atlas. By I. Snapper, M.D. (Pp. 225; illustrated. £3 7s. 6d.) London: H. K. Lewis and Co. 1943.

Twenty years ago editors of *Systems of Medicine* were apologetic in approaching a contributor to write the section on diseases of the bones, for they seemed such a disconnected collection of conditions. Now the position has changed completely. Recklinghausen's disease has been proved to be of endocrine origin, and this has reacted on our interpretation of bone lesions in long-standing renal insufficiency. Osteomalacia and rickets have vindicated their status as deficiency diseases. The relationship of leukaemia, multiple myelomata, and hyperthyroidism to the skeleton has proved to be closer than was supposed. Lipoid granulomatosis affecting the bones has been recognized as the cause of new syndromes. X rays and biochemistry have greatly helped in formulating these new points of view, as to a lesser extent has the technique of sternal puncture. All this has put the earlier observations of Paget, Bence-Jones, Davies-Colley, and von Recklinghausen into their proper perspective as part of a growing synthesis. To that synthesis the present volume makes a sumptuous contribution, with admirable clinical descriptions and discussions, a bibliography, and striking illustrations.

We have come to realize that, whereas a parathyroid adenoma may be the cause of a profound disturbance of skeletal structure, it is also true that hyperplasia of the parathyroids may be a secondary and compensatory effect, as maintained by Erdheim, in various diseases. Thus, in osteomalacia they enlarge to deal with the excess of calcium and phosphorus set free by the destruction of bone, while chronic renal failure, if accompanied by acidosis, as it often is, stimulates enlargement of these glands. This inter-relationship between the kidney and the parathyroids is further exemplified by the renal calculi composed of calcium salts which so often form in hyperparathyroidism. Indeed, latent hyperparathyroidism has been held to be responsible for between 0.5 and 2% of all renal calculi. The enlargement which may follow a complete biliary fistula is presumably to compensate for the consequent ill-absorption of the fat-soluble vitamin D. Fortunately the tendency to remove the parathyroids for the relief of osteo-arthritis or otosclerosis has passed.

Full justice is done to the pioneer work of J. P. Maxwell in China on the essential unity of osteomalacia and ante-natal and post-natal rickets. The way in which the social customs of that country lead to severe foetal and benign infantile rickets and to the prevalence of osteomalacia—a rare disease in Europe—is discussed in an interesting manner. Complicated syndromes may also arise by the superposition of avitaminosis on pre-existing bony disease. It has been recognized that in Paget's disease there is a notable increase in phosphatase, although the metabolism of calcium and phosphorus is normal, and the explanation seems to be that this augmentation occurs under any condition in which there is hyperfunction of the osteoblasts. It is indeed a non-specific sign. The treatment of Paget's disease by carefully controlled injections of parathormone, followed by ultra-violet rays, seems to hold out prospects in a hitherto incurable disease. Leontiasis ossea is regarded as a syndrome of the same order.

Lipoid granuloma may form islands of foam cells loaded with cholesterol esters in fibrous tissue, but when it attacks bone it has a predilection for the skull and pituitary from which the syndrome of Hand-Schüller-Christian disease results. In Gaucher's disease a special lipid—kerasin—is abundant in the bone marrow, so that sternal puncture has become an important diagnostic technique in its recognition. The concluding chapter on multiple myeloma indicates that some connexion exists between it and myeloid leukaemia, and that the