Lymphocytes, mainly of the small variety, made up the remainder. A hyperchromic type of anaemia affected the red blood cells, the colour index being 1.4. Haematologically, therefore, the signs were those of monocytic leukaemia. Reference to the literature, however, indicated that these facts alone were not conclusive evidence in favour of such a diagnosis. The question arose whether the brother had died not of monocytic leukaemia but of a myelogenous leukaemia, which had been in the monocytic phase at the time of his arrival in hospital (Kracke and Garver, 1937). The absence of a marked myeloid reaction was regarded as a strong point in the support of the former diagnosis.

The striking feature of the blood picture in Case II was the presence of a high percentage (92.6) of mononuclear cells, each of which, when stained by Leishman's method, consisted of a round, eccentrically placed nucleus, often containing nucleoli, and blue agranular cytoplasm; many were undergoing division. These cells were considered to be myeloblasts. Only 0.8% of the leucocytes were polymorphonuclear, and the remaining 6.5% were lymphocytes.

These findings, together with those in the bone marrow, clearly constituted a blood picture of myeloblastic leukaemia.

Conclusion

Two cases of very acute leukaemia, occurring in a brother and sister living in the same house, are reported. The sister's illness developed two years after her brother's death.

In the brother, a study of blood films strongly suggests the diagnosis of monocytic leukaemia, whereas the sister undoubtedly suffered from acute myeloblastic leukaemia.

I am very grateful to Prof. J. W. McNee for helpful advice and criticism in the preparation of this paper and for permission to publish the second case. To Dr. Forbes Walker, Ayr, I am indebted for the clinical details of the first case.

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SUPERFICIAL GANGRENE IN ADOLESCENT DIABETES

BY

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Gangrene in the young diabetic is a rare event. Joslin (1940), the greatest authority on clinical diabetes, describes it as an accompaniment of arteriosclerosis, therefore developing almost entirely in the arteriosclerotic era of life. Of the few cases recorded in young people, some are determined by rare vascular accidents, disease of the blood vessels, or overwhelming infection of devitalized tissue. Kiefer, Brigham, and Wheeler (1926) reported frank gangrene of the entire left foot due to infarction in a youth aged 19 who was in diabetic coma complicated by pneumonia. Gangrene of the nose in three children under 10 years of age was described by Bowers (1924). Carbuncle, essentially a gangrenous lesion, may be a grave complication of diabetes at any age.

Recently we have seen two cases with a pathology obviously differing from the above rarities and from the common gangrene of the extremities of elderly diabetics. With their description is included that of a third case almost meriting the bizarre title "dermatitis artefacta gangrenosa diabetica."

Case I

A boy aged 15 who had suffered from diabetes for three years was admitted to hospital on April 25, 1944, in coma. At an outpatient clinic on April 18 his diabetes had seemed to be well controlled by two doses of soluble insulin, with a noon blood sugar of 143 mg. per 100 c.cm., slight glycosuria, and no ketosis. Three days later an illness labelled "gastritis" had started with much vomiting. Insulin, at first reduced, had later been omitted, and coma had inevitably ensued.

No complication was found on clinical examination. The coma was profound, with air hunger, ketosis, and extreme dehydration.

The pulse rate was 140, the temperature 98.2°, and the respiration rate 30. The blood pressure, at first 90/60, later fell to 80/50. A specimen of urine could not be obtained for some hours, but then showed gross amounts of sugar and ketones, with a strong reaction to ferric chloride. The blood sugar attained the notably high level of 1,320 mg. per 100 c.cm. Despite his coma the boy was so intensely restless that the insertion of a cannula into the right internal saphenous vein with splinting of both legs offered the only chance of maintaining the necessary intravenous therapy over a long period. This seemed a better arrangement than splinting of the arms.

Although four-hourly attention to the back was scrupulously observed, a large area of gangrene, involving the upper part of the right buttock, suddenly appeared on the second day of splinting. The surrounding skin was red and indurated, and over the blackened skin of the gangrenous part small vesicles containing serous fluid arose. Separation at the edges was apparent by the third day, but a week later secondary infection had spread to the underlying fatty tissues and an abscess in the right buttock was evacuated. Culture of the pus produced *B. coli*. Consciousness was regained on the third day, and a complete recovery made from the coma. Fig. 1 shows the gangrene as it appeared on May 15.

FIG. 1.—Case I. Photograph of the gangrene on May 15, one day before separation of the slough and eighteen days from the onset.

Case II

A soldier aged 24 was transferred on June 2, 1942, from another hospital for stabilization after diabetic coma. He had noticed thirst and polyuria for six months, but had felt quite well until a carbuncle appeared on the back of his neck on May 20. At this time he was on manoeuvres, and diabetes was not diagnosed until his admission to hospital on May 30 in diabetic coma, which lasted for two days. The blood sugar was then 560 mg. per 100 c.cm., and dehydration, ketosis, and peripheral circulatory failure seem to have been pronounced. The coma had been treated in the usual way and the diabetes was well controlled.

Each knee showed an area of dry superficial gangrene on the anterior surface. Overlying the surface of the flexed knee each area was 4 in. long by 3 in. broad on the right and 2½ in. on the left, the outer border on the right being just lateral and on the left just internal to the midline of the knee. The shape and symmetry of these lesions, almost mirror images as they were, suggested that they were due to pressure of the bed-clothes with the knees flexed and the thighs in a position of slight abduction and external rotation. There was no effusion into the joints or adenitis. Separation was complete in four weeks, and in six weeks the areas were healed.

The patient was well on discharge after four months, but in the interval many embolic abscesses, including a deep staphylococcal abscess in the adductor muscles of the left upper thigh, required surgery.

Case III

A packing-case maker, aged 29, who had been diabetic for three years, was admitted on July 15, 1942. Mentally a little dull, he was a most unstable diabetic, and the bruise on his left thumb, well shown in the photograph (Fig. 2), attested to those insulin reactions, accompanied by diplopia, through which his erring hammer would miss the nail, held in his hand, and strike his thumb.

For the first of his three years of diabetes he had had great difficulty with his injections and had been warned not to inject too deeply. When asked to demonstrate his usual technique he produced to our horror, by the injection of 20 units of soluble insulin 40 units per c.cm. in strength, an intradermal wheal corresponding in size to the lesions shown in the photograph. These consisted

of small round patches of dry superficial gangrene in all stages from discoloration to separation of the slough and fibrosis of the underlying granulations.

Attempts to reproduce the lesions both in this man and in normal controls were unsuccessful. During this time his diabetes was well controlled. No more gangrene has appeared since his use of the correct method of injection, but his diabetes is very unstable,

Fig. 2.—Case III. "Dermatitis artefacta gangrenosa diabetica" of areas used for insulin injections; July 9, 1942.

hypoglycaemic symptoms being frequent despite noon blood sugars of the order of 400 mg. per 100 c.cm. on some of his visits to the clinic.

Discussion

From the first two of these cases it would appear that even in adolescents a comparatively slight degree of pressure during severe diabetic coma will produce a local ischaemia which proceeds to gangrene. Of the various pathological factors present—ketosis, hyperglycaemia, dehydration, and severe peripheral circulatory failure—the last may well be the most important. That arterial disease plays no part is well shown by the intense local inflammatory reaction and the rapid localization and separation of the slough. Indeed, the contrast between the tedious dry gangrene of the extremities in the elderly diabetic and the condition just described is striking.

This condition receives small mention in the literature. In Brier's (1934) description of a case of gangrene of the face and ear in an untreated diabetic farmer aged 24, he notes that superficial gangrene of the heels also appeared. At so young an age as 18 days a female infant, whose case is described by Lawrence and McCance (1931), developed typical gangrenous lesions of pressure-points associated with a severe but temporary diabetes. Similar lesions of pressure-points in a woman aged 40 who was in typical diabetic coma have been named "dermatitis gangrenosa" by Riven (1935).

In the third case intermittent trauma by the intradermal injection of insulin over a period of two years in a badly controlled diabetic produced small areas of dry gangrene at the site of some injections. Lawrence (1944) gives a warning of the effect of intradermal injections, but such a case must indeed be rare, and is worthy of record as a curiosity.

I wish to express my gratitude to Dr. A. C. D. Firth for his kindness and help in this study of his patients, to Sir Francis Fraser for permission to record their description, and to Dr. R. D. Lawrence for helpful criticism.

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Medical Memoranda

A Case of Petrositis

The following case is instructive, for it shows that the serious condition of suppurative petrositis, complicated by extradural abscess, may be treated by a conservative operation preserving the hearing.

CASE HISTORY

On March 1, 1944, a girl aged 9 was admitted to hospital with acute left-sided otitis media and mastoiditis. She had a past history of several attacks of bilateral otitis media successfully treated with sulphonamides. Myringotomy was performed on the same day and profuse discharge followed. Sulphonamide therapy was begun in full doses. On March 5 she complained of severe persistent left frontal and post-orbital headache, and on the following day a left external rectus palsy developed. Lumbar puncture revealed a C.S.F. with a lymphocyte count of 9 per c.mm., but otherwise normal. A diagnosis of mastoiditis and acute suppurative petrositis was made. A left cortical mastoidectomy was done on March 7, and a gallery of infected cells in the sino-petrosal angle was opened.

Although the general condition improved for a few days after the operation, the pulse rate remained high and the temperature did not settle. On March 15 she complained of: (1) severe left frontal headache, mainly in the distribution of the ophthalmic branch of the 5th nerve; (2) weakness when chewing on the left side (mandibular branch of 5th nerve); (3) deafness and giddiness. The deafness apparent a few days before now increased (8th nerve). The squint persisted (6th nerve), and there was some slight evidence of facial palsy (7th nerve). It was obvious that a lesion was present involving the courses of the 5th and 6th nerves. A small extradural abscess at the apex of the petrous temporal was diagnosed. Involvement of the 7th and 8th nerves was accounted for by diagnosis of acute petrositis and serous labyrinthitis.

Radiograph of Case.—A: Normal mastoid cells. B: Mastoid cells removed up to bony labyrinth. C: Track of absorbed bone. D: Site of abscess.

Operation (Mr. Magauran).—To preserve the hearing it was decided to approach the abscess along the superior surface of the petrous bone. This was done after removing the bone down to the bony labyrinth (lateral and posterior canals) and elevating the dura from this aspect of the bone. An extradural abscess containing a few cubic centimetres of pus was found after separating the dura for about 1½ in. Two thin rubber strips were used to drain the abscess, and 30% sulphacetamide injected into the cavity. The strips were removed three days later. The patient is now (April 15) well recovered. The wound is closing satisfactorily and hearing is nearly normal (whispering voice, 10 ft.).

Morbid Anatomy.—It was demonstrated at operation that the superior galleries of the petrosal cells were infected. Radiographs