SYPHILIS OF BONES*

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Syphilis of bones is one of those conditions which is generally regarded as being less common than it used to be; and certainly one can hardly doubt that, within the span of living memory, there has been a considerable decline in its incidence. Looking through the literature of the last 20 years or more, one is struck by the fact that there have been relatively few references to this condition, and that so many have thought it worth while to place on record one, or very few cases, which have shown no exceptional features.

INCIDENCE

The true incidence of bone involvement in the various stages of syphilis seems impossible to determine. If one goes far enough back to the days when diagnostic methods were considerably less accurate, there was an undoubted tendency to ascribe to syphilis many affections of bones and joints which would not now be accepted as syphilitic even if they were found in patients with syphilis. We may add to this the fact that syphilitic lesions of bones are often symptomless and therefore unsuspected unless revealed by the taking of routine radiographs. Modern treatment, too, may well prevent the development of radiological signs by the speed with which infection is brought under control.

To mention some of the few figures available, Wile and Senear (1916) found sixty cases of involvement of bones or joints among 165 patients with early syphilis (36 per cent.); Turner (1930), in Baltimore, found osseous lesions in 8.8 per cent. of 10,000 cases of late syphilis; Buchman and Lieberman (1941) found lesions of bones in 119 (5 per cent.) of 2,400 cases of syphilis in all stages in New York City; Speed and Boyd (1936) found that the diagnosis of syphilis of bones or joints was made in only

0.5 per cent. of cases admitted to a large orthopaedic clinic.

Our own experience at a large clinic for venereal diseases is that these cases are not to be seen every day or every week, but that they do turn up with reasonable regularity and constitute an interesting and important diagnostic problem.

DIAGNOSIS

More often than not we are in the position of having had the diagnosis made for us before the patient is referred, leaving us in a situation of no particular merit, but able to learn something from the difficulties which others have experienced in making the diagnosis. For this can be a very difficult diagnosis and the reasons for difficulty appear to be as follows:

- (1) The condition is less common than formerly.
- (2) The disease takes a chronic and insidious course which often attracts no attention.
- (3) Involvement of bones frequently gives rise to no symptoms, although in other cases symptoms, particularly pain, may be of a severity which would not suggest so chronic a disease.
- (4) Syphilis is still the great imitator, and syphilis of bone may resemble many other conditions some of which are far more common. The list of these conditions is formidable; some of the more obvious include the following:

Primary and metastatic carcinoma
Myeloma
Tuberculosis
Eosinophilic granuloma
Yaws
Leprosy
Paget's disease
Scurvy
Chronic pyogenic osteomyelitis
Primary osteogenic sarcoma
Ewing's tumour

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- (5) Last on the list of barriers to accurate diagnosis is an attitude which exists in some degree in almost every mind. It is an unreasoning judgment, a tendency to regard syphilis as a disgrace rather than a disease, and an instinctive feeling that it does not happen to nice people, and therefore not to patients with whom our colleagues have dealings.

It is in the radiological department that this diagnosis is now usually made, and it behoves the radiologist to maintain what has been called a "high index of suspicion".

STAGES OF SYPHILIS

The osseous lesions of syphilis may appear in all except the very earliest period of infection:

- (a) In the early stages of infection, namely, in or after the secondary stage, within the first 3 years of infection.
- (b) In the late stage, which may develop at any time from the end of the third year onwards.
- (c) In congenital syphilitics whose lesions may be early or late.

(a) **EARLY SYPHILIS.**—In the early stages of syphilis it is not very uncommon for patients to have pains in the long bones, usually boring in character and often worse at night, the so-called osteocopic pains. The pain may be confined to a single localized point and can be severe. There is seldom objective evidence of periostitis; microscopically there is thickening and infiltration of the periosteum with oedema and the changes of chronic low-grade inflammation. The radiographs show no changes. This is the standard description and this is what one expects to find. On the other hand there have been some reports in the literature of bony involvement in early syphilis producing radiographic changes. Mandelbaum and Saperstein (1936) described a case of acute syphilitic osteomyelitis of the skull and sternum occurring 8 weeks after blood transfusion in which the recipient was infected. Pian and Frazier (1940) reported a similar case. Wile and Welton (1940) described two cases, one with destructive lesions of the ribs and spine and one with similar lesions of the skull, both in the secondary stage of syphilis. Burrows (1937) described a case of atrophic syphilitic lesions of bone in the late secondary stage of syphilis resulting in pathological fracture of the humerus. Newman and Saunders (1938) described multiple osteolytic areas in the skull and in a number of the long bones, in a case of secondary syphilis. Squires and Weiner (1939) described a similar case and suggested that more such cases would come to light if the skull were always

x-rayed in cases of secondary syphilis. Reynolds and Wasserman (1942) reviewed the literature relating to destructive lesions of bones with radiological changes occurring in the early stages of syphilis, and found that fifteen such cases had been reported. They added fifteen additional cases from 10,000 cases observed at the Johns Hopkins Hospital during the 22 years from 1919 to 1940. Thompson, Leedham, and Hailey (1949) described two cases of osteomyelitis of the skull, each of which occurred during the secondary stage of the disease. In both cases other bones were also involved. Cox (1950) described the case of a patient with destructive lesions of the left frontal bone due to syphilitic osteitis occurring in the course of secondary syphilis.

We have no personal experience of early syphilitic disease of bone producing radiographic changes, but it is true to say that, in the days when secondary syphilis was a common condition, headache was a frequent symptom and pain in the long bones not uncommon. It is possible that had the bones affected been x-rayed as a routine, changes might have been found in some of these cases.

(b) **LATE SYPHILIS.**—The clinical and radiological appearance of the gummatous changes which affect bone are well known, but it is worth while briefly to review the common sequence of events before considering those cases which may be regarded as exceptional. The period at which gummata of bone are likely to become manifest is from 5 to 20 years after infection, but to this, as to almost all general statements regarding syphilis, there are many exceptions.

Gummata usually commence in the fibrous layer of the periosteum in response to the presence of blood-borne treponemata, which appear to be small in numbers. The cellular reaction which results is that of the gumma wherever it occurs, namely lymphocytic infiltration with small lymphocytes and plasma cells, some epithelioid cells, and occasional giant cells. Lymphocytic infiltration is particularly concentrated around the small blood vessels, the walls of which are involved in the inflammatory process. The intima responds with increase in the number of layers of lining cells, the results of so-called endarteritis obliterans, which in many instances causes obliteration of the lumen of the vessel. In consequence there is a diminution of blood supply to the centre of the lesion with necrosis of tissue. At the same time fibroblasts appear in large numbers in the area of inflammation, especially at the periphery of the lesion. Later the result is the formation of scar tissue with partial healing. Up to this point, the gummatous process is identical with that which occurs in soft tissue, but certain further changes,

which proceed concurrently, are determined by local circumstances. The gummatous inflammation may extend outwards beyond the periosteum to invade the subcutaneous tissue and skin or the submucous tissue and mucous membrane, if these structures are adjacent. The result may be swelling and subsequent ulceration on the free surface exposing underlying necrotic bone. Irrespective of this local spread to other tissues, the chronic inflammation in the fibrous layer of the periosteum provokes activity of the osteoblasts in the osteogenic layer, with the formation of new bone under the periosteum appearing on the surface of the cortex. Hence the rough irregular thickening of the cortex of the bones which is seen characteristically in the long bones, especially the tibia. The gummatous process extends into the cortex of the bone by way of the Haversian systems, causing erosion and destruction of the cortical bone. New bone formation from the periosteum occurs

promptly, and in many cases there is no radiographic evidence of bone destruction even though the gummatous process is active. The newly formed bone is dense and sclerotic so that the affected part of the shaft of the bone becomes ivory-like in appearance. The process may extend right through the cortex invading the medullary canal which, in neglected cases, may, in turn, become filled with new bone formation. The characteristic radiographic appearances are present in Figs 1 to 3, and in Fig. 4 (opposite).

It is clear that provided these lesions take the expected course that bone is not weakened but strengthened. A syphilitic long bone is a thick heavy strong bone, and bending of the bone is not to be anticipated. We often hear of sabre-shaped tibiae of which Figs 5 and 6 (opposite) are examples. It can be seen that the bone is not bent—the lines of force are unchanged. The appearance of bowing is present

FIG. 1.—Female aged 45.

1949: referred from ante-natal clinic. Wassermann reaction positive 32. No signs of syphilis. Treated in pregnancy. Healthy baby.

1951: attended again because of pregnancy. No signs. Wassermann reaction positive. Price's precipitation reaction positive 512. Penicillin 6 mega units.

1954: severe pain in right arm. Hb 61 per cent. Admitted to hospital. Second husband had positive S.T.S. Diagnosis gummatous osteoperiostitis of right humerus. Relapse or re-infection.

FIG. 2.—Female aged 31.

1948: tender swelling of right knee. Wassermann reaction positive; Price's precipitation reaction positive 16. On examination, tender, warm swelling on inner aspect of right leg below knee. No history of early syphilis. Husband sero-negative. Mother, two brothers, and one sister sero-negative. Diagnosis gummatous osteoperiostitis of right tibia. Responded well to penicillin and bismuth.

FIG. 3.—Male aged 57.

1939: syphilis treated with three or four injections.

1941, 1942, 1945, and 1946: gonorrhoea.

1946: urethral stricture.

1950: Wassermann reaction positive; Price's precipitation reaction positive 2. Treatment up to 1950, 23.75 g. arsenic and 16 g. bismuth.

1950: on examination thickening of left tibia. Diagnosis syphilitic osteoperiostitis.

clinically because the major effect of the process is on the middle third of the bone in its anterior aspect.

Even with long bones it is sometimes possible

to obtain a radiograph of syphilitic destruction of the cortex without visible evidence of periosteal reaction. Fig. 7 is an example of this. Presumably the condition is so recent that the new periosteal bone

FIG. 4.—Male aged 18.

1933: painful swelling on left shin following kick. Wassermann reaction positive; Kahn positive. Patchy choroiditis both retinae. No other stigmata of congenital syphilis. Diagnosis congenital syphilitic osteoperiostitis of both tibiae.

FIG. 5.—Male aged 71.

1954: noticed opacity in front of left eye. On examination bilateral choroido-retinitis, "bowing" of right tibia, and tissue paper scarring of right lower leg. Wassermann reaction positive; Price's precipitation reaction positive 1. Cerebrospinal fluid normal. Diagnosis syphilitic osteoperiostitis.

FIG. 6.—Male aged 26.

1946: painful swelling of both tibiae. Wassermann reaction positive; Price's precipitation reaction positive 80. On examination tenderness and swelling along subcutaneous surface of left tibia. Diagnosis syphilitic osteoperiostitis.

FIG. 7.—Female aged 44.

1943: haemoptysis. Wassermann reaction positive. Defaulted without treatment.

1948: tender lump to left of spine at level of tenth rib. Wassermann reaction positive; Kahn positive 10. On examination tender swelling to left of spine and swelling at lower end of left tibia. Diagnosis syphilitic osteitis of spine and osteoperiostitis of left tibia. (See also Fig. 17.)

is not yet calcified. In this case the diagnosis was evident on clinical grounds because involvement of the bone was extending from a typical subcutaneous gumma of the lower leg.

On the other hand, there are instances in which for some reason periosteal reaction just does not occur. Figs 8 and 9 show an example of this. There are multiple destructive lesions suggesting perhaps secondary carcinomatous deposits, but it should be noted also that the lesions are multilocular in character, which is the only point suggesting a gummatous process. Another radiograph from the same patient (Fig. 10) shows destructive lesions with slight periosteal reaction in another bone.

FIG. 8.—Female aged 48.

1950: severe pain in right arm and headaches. Anaemia for 5 years. Poor response to iron. On examination wasted and pale, movements of right arm limited by pain, liver palpable two finger breadths below costal margin. Hb 26 per cent., Wassermann reaction positive; Price's precipitation reaction positive 256. Responded well to treatment. Diagnosis syphilitic osteitis.

The merely destructive gummatous lesion in a long bone is unusual but not unique. Stewart (1938) stated that osseous involvement in young adults with acquired syphilis was usually atrophic in character, whereas in older patients who had had the disease for many years the manifestations were nearly always hypertrophic. This does not apply to the patient whose radiographs are shown in Figs 8 to 10, for she was a middle-aged woman. Ungerman, Vicary, and Eldridge (1938) described a case of osseous syphilis of the gummatous type involving one tibia in which the radiographs showed multiple destructive lesions in the cortex without periosteal

FIG. 9.—Same patient as Fig. 8, showing response to treatment.

FIG. 10.—Same patient as Fig. 8, showing periostitis.

or medullary changes. The lesions resembled those of malignant disease but disappeared after anti-syphilitic treatment. McGladdery (1950) reported from Singapore five cases of gummatous involvement of bones in young adults in which osteoporosis was the striking feature and was much greater than the new bone formation. In three cases one or both clavicles were involved, in one the left first metatarsal bone, and in the fifth the left tibia, fibula, and right femur. In this last case pathological fractures

occurred through extensive osteolytic lesions in the middle third of the right femur and the upper third of the left tibia and fibula. McGladdery had also seen a similar case with destructive gummatous lesions of tibia, talus, and calcaneum, closely resembling secondary carcinomatous deposits. In these cases, he said, biopsy was often inconclusive and blood tests were not always positive, so that amputation might even be considered in the mistaken belief that the lesion was a bone tumour.

We do not recall seeing an undoubted case of syphilitic inflammation of bone with negative serological tests for syphilis, and we assume that such a happening is very exceptional, especially in these days of highly sensitive standard tests and specific tests such as Nelson's treponemal immobilization test. But this estimate refers only to the work of first class laboratories, and not everywhere in Great Britain and certainly not everywhere in the world, is it possible to have a first class serological service. Then, too, even first class laboratories make mistakes sometimes. Certainly, in any case of doubt, the effect of antisiphilitic treatment should be tried.

The story of a pathological fracture through a gummatous lesion of a long bone is certainly an unusual one; but there have been other similar

reports in the literature. Hazen (1919) stated that fractures as a result of bone destruction should always arouse suspicion of syphilis. Weiner (1939) described a case of gummatous osteomyelitis of the right radius with pathological fracture. Olmstead (1948) described three cases of destructive syphilitic lesions of bones associated with pathological fractures among 252 cases of general paralysis; in two cases the mandible was involved and, in the third, the 3rd and 4th lumbar vertebrae.

In bones other than the long bones, and more particularly in the vault of the skull, the hard palate and the nasal septum, the lesions are apt to be destructive and the evidence of periosteal reaction may be slight. This is presumably because the periosteum of these bones is relatively deficient in power to produce new bone. In the skull we see the evidence of rounded areas of osteoporosis, often rather blurred in appearance, and, in cases of recent onset, with slight surrounding sclerosis or none. The variations in radiographic appearances are considerable. At its most developed the condition is called "worm-eaten" skull. Figs 11 and 12, and Figs 13 to 16 (overleaf) show examples of these changes. The large sequestra which appear centrally in Fig. 12 give evidence of secondary infection. With syphilis the sequestra in cancellous bone are of microscopic proportions.

FIG. 11.—Male aged 42.

1938: secondary syphilis. Treated with 22.3 g. arsenic and nine injections of bismuth.

1940: ulcers on left shin and around both elbows, which healed without treatment.

1949: pain in head. Developed tender lump on vertex in frontal region to right of midline. Wassermann reaction positive; Price's precipitation reaction positive 128 units. Cerebrospinal fluid cells 4 per cu. ml.; protein 20 mg. per cent.; Wassermann reaction positive; Lange 112221. X ray of skull showed irregular areas of bone destruction in right frontal bone. Responded satisfactorily to penicillin.

1951: no residual x-ray changes in skull. Diagnosis syphilitic osteitis of skull.

FIG. 12.—Female aged 62.

1944: "inflammation of face and legs.

1948: injured head and found to have large gummatous ulcers on frontal and parietal areas of scalp and forehead involving skull. Gross stigmata of congenital syphilis. Wassermann reaction positive; Price's precipitation reaction positive. Persistent secondary infection of ulcers with *B. proteus*. X rays of skull showed sclerosis and worm-eaten erosion of skull with sequestra due to secondary infection. Diagnosis syphilitic osteitis of skull.

FIG. 13.—Same patient as in Fig. 12, showing lateral view of skull.

FIG. 14.—Same patient as Fig. 12, photograph of gummatous lesions of scalp.

Fig. 17 gives one more example of what was probably a destructive syphilitic lesion in an unusual site, namely in the body of the 10th dorsal vertebra. It is interesting to note that Alexander and Schoch (1942) described a case of destructive lesions involving the upper five cervical vertebrae, with greatest destruction of the 4th, and extensive similar lesions of the left clavicle and numerous ribs. The condition was thought at first to be due to tuberculosis. The patient was found to have syphilis and antisyphilitic treatment relieved the intractable pain of the condition and produced healing.

FIG. 15.—Same patient as Fig. 8, x ray of skull.

FIG. 16.—Same patient as Fig. 8, showing skull after treatment.

FIG. 17.—Same patient as Fig. 7, showing lesion of body of D 10 and narrowing of disk space between D 10 and 11.

A third type of pathological change is described as occurring with gummatous lesions of bone, but this must be rare. Gumma formation occurs in the medullary cavity and is apt to erode the cortex from within. The radiographic appearance may simulate osteomyelitis of pyogenic origin.

(c) CONGENITAL SYPHILIS.—The bony changes found in this variety of the disease provide a big subject for study, and it is difficult to do justice to them in limited space. Just to recall the salient features, the characteristic lesion of the first 6 months of life is syphilitic osteochondritis. The changes which may be recognized radiographically are as follows:

- (1) Enlargement of epiphyseal ends of bones.
- (2) Broadening and irregularity of the epiphyseal lines.

FIG. 18.—Male aged 2 months. Pain in both tibiae. Bilateral tenderness at upper end of both tibiae and lower end of both radii. Wassermann reaction positive; Kahn test positive. Diagnosis congenital syphilitic osteochondritis.

- (3) Irregularity and sclerosis of the zones of provisional calcification ("saw-tooth" metaphysis).
- (4) Irregular areas of osteoporosis in the bones, particularly in the metaphysis.
- (5) Thin regular subperiosteal deposits of new bone ("periosteal cloaking").
- (6) Pathological fracture. Separation of epiphysis. Suppuration and destruction of a joint.

Figs 18 to 22, and Figs 23 and 24 (overleaf), are examples of congenital syphilis, showing many of these features.

FIG. 19.—Same patient as Fig. 18. X ray shows lesions in upper limbs and enlarged liver and spleen.

FIG. 20.—Healing osteochondritis of long bones of lower limbs. Note Wimberger's sign at upper ends of tibiae.

FIG. 21.—Male aged 6½ months. Blisters on hands, arms, and scalp. Thrombosed vein on right side of scalp. Baby thin and wasted with watery discharge from both nostrils. Liver palpable. Wassermann reaction positive; Price's precipitation reaction positive 512. Responded well to penicillin. Diagnosis congenital syphilitic osteochondritis.

FIG. 22.—Same patient as Fig. 21, showing osteochondritis.

FIG. 23.—Same patient as Fig. 21, showing syphilitic osteitis of skull.

FIG. 24.—Male aged 8 months.

1951: painful, immobile left arm. Snuffy since birth but had thrived well. Father Wassermann reaction negative; mother Wassermann reaction positive. On examination generalized lymphadenopathy. Liver and spleen both palpable. Bones tender to palpation especially left elbow. Wassermann reaction positive; Price's precipitation reaction positive 52.

Cerebrospinal fluid cells 75 per cu. ml.; protein 60 mg. per cent.; Wassermann reaction positive; Price's precipitation reaction positive 2. Satisfactory result after penicillin treatment. Diagnosis congenital syphilitic osteochondritis, periostitis, and enlarged liver and spleen.

FIG. 25.—Same patient as Fig. 24, showing early hydrocephalus.

FIG. 26.—Same patient as Fig. 24, showing syphilitic periostitis of bones of lower limbs with healing osteochondritis.

FIG. 27.—Case of bilateral syphilitic periostitis of tibiae with "onion-peel" periosteum.

McLean (1931) observed that, in almost every instance of congenital syphilis, lesions of the bones could be found by *x* ray during the first 3 months of life, and from the 6th month onwards tended to disappear, either spontaneously or as the result of anti-syphilitic treatment. Parmelee and Halpern (1935) found that 95 per cent. of 67 syphilitic infants had evidence of the disease detectable by *x* ray. The

osseous lesions were most evident during the 6th to the 12th week of life, and by the 6th month had become less frequent.

Nevertheless, in the second 6 months of life the evidence of periosteal reaction tends to become more intense. Successive layers of new bone are laid down under the periosteum ("onion peel periosteum"). Figs 25 to 27 and Fig. 28 (opposite) show these changes.

FIG. 28.—Bilateral syphilitic periostitis of tibiae and fibulae.

O'Reilly (1932) stated that syphilitic lesions of bones in early life were always bilateral. A single lesion was not syphilitic. It is dangerous to make dogmatic assertions about this disease, but there is probably an element of truth in that statement.

In the second year of life syphilitic dactylitis is said to be not uncommon, but it so happens that there has been no case in our series for a number of years. The condition is more common in the hands than in the feet, and the proximal phalanges are characteristically involved with the appearance of thickening of the bone with sclerosis of the cortex. It has been alleged, however, that the lesions of dactylitis are more common in the metacarpals and metatarsals than in the phalanges in the first year of life.

In late congenital syphilis, that is after the end of the second year of life, the lesions of bones are of the gummatous type and can seldom be distinguished from those which occur with the acquired form of the disease. At this stage bony involvement is much less common. Cole (1937), in 1,010 cases of late congenital syphilis, found only 7.2 per cent. with involvement of bones or joints. Figs 29 and 30 give an example of gummatous osteoperiostitis occurring in a congenital syphilitic, which is a case of particular interest. The gummatous changes have involved a non-united epiphysis and have faithfully reproduced the characteristic changes of osteochondritis.

FIG. 29.—Female aged 8.

1948: painless swelling in left calf. On examination painless thickening of upper part of left tibia. Wassermann reaction positive; Price's precipitation reaction positive 540. Parents not known. In care of foster mother for 6 months. Responded well to penicillin and bismuth.

1952: developed left interstitial keratitis.
Diagnosis subcutaneous gumma left lower leg. Gummatous osteoperiostitis and osteochondritis left upper tibia.

FIG. 30.—Same patient as Fig. 29. Note soft tissue swelling on left due to subcutaneous gumma.

The question of the place of radiology in the diagnosis of early congenital syphilis is one of special importance. Its chief value lies in its application to the apparently healthy infant with positive serological tests for syphilis, and the method is most valuable and accurate when used early. A customary routine is to *x* ray the long bones of infants born of syphilitic mothers in the first and sixth weeks of life. The method is, however, subject to error. Changes resembling those of syphilitic periostitis have been found on radiological examination of the long bones of non-syphilitic infants suffering from other diseases, and, even of infants who were apparently normal but growing rapidly. Changes resembling osteochondritis have been described as the result of treating the mothers with injections of bismuth before delivery, and others have been ascribed to erythroblastosis foetalis, familial haemolytic anaemia, congenital atresia of the bile ducts, and multiple birth injuries, and various infections have also been noted. Difficulty may also arise from the uncommon occurrence of signs of rickets in the long bones in the second or third month of life. Caffey's syndrome of "infantile cortical hyperostosis" is another potential source of error. Stokes, Beerman, and Ingraham (1944) recommended that only unequivocal multiple osteochondritis or periostitis should be accepted as diagnostic. Treatment should not be given because of doubtful or suggestive radiological signs. On the other hand, if there was undoubted evidence of osteochondritis associated with periostitis, and if this showed progression during the first 6 weeks of life, the findings might be accepted as diagnostic of syphilis. Shaffer and Courville (1951) *x* rayed, during the first week of life, the long bones of nearly all of their series of a hundred babies found to have positive serological tests of the cord blood. Five infants born of mothers who received penicillin late in pregnancy showed radiological changes of bones suggestive of syphilis, but in all these cases blood tests became negative without treatment. They suggested that these infants had acquired syphilis *in utero* but had been cured by the penicillin administered to the mothers.

The literature of the past 20 years contains various references to the value of dental radiographs in the diagnosis of congenital syphilis. According to Johnston, Anderson, and McAllenney (1941), in 80 per cent. of cases of congenital syphilis in which comparison of size of the unerupted molars was possible after *x* ray, it was found that the mandibular first molar was smaller than the mandibular second molar. Sarnat and Shaw (1943) laid particular stress on the importance of *x* rays of unerupted teeth in the diagnosis of congenital syphilis, and recommended

that *x* rays of these teeth should be a routine diagnostic procedure in addition to *x* rays of the long bones. Characteristic incisor teeth had been demonstrated radiologically as early as the second to the fourth year of life. Bradlaw (1953) stated that radiological diagnosis of the incisor deformity had been reported as early as the second year. Whereas the clinical appearances of affected teeth might vary, it could be shown by Grenz radiographs that the outstanding feature was a characteristic disturbance of the amelodentinal junction. In all these teeth there was a varying degree of irregularity of this junction beneath the first formed enamel, and various workers had described histological appearances showing inflammatory changes in and about the tooth germ. We have had no opportunity of confirming these radiological findings. In recent years our patients with congenital syphilis have all been too young to show evidence of dental stigmata, or beyond the age of eruption of the permanent teeth.

COMMENT

The fact that syphilis is now less common ought to make us more constantly alive to the fact that it still exists, and is even more deceptive in its chronicity and variability since it comes to our notice less frequently. In relation to late syphilis we should remind ourselves that in the years of and immediately after the second world war early syphilis was extremely prevalent, and past experience taught us that for every case of early syphilis which reached the light of diagnosis and treatment, at least one stayed underground and was completely missed. If this was true, we are now well into the period during which a considerable crop of gummatous lesions is to be anticipated. We should not neglect to remind our colleagues that infection of this kind does happen to nice people and may even happen to their own patients.

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DISCUSSION

DR. G. H. KNIGHT (*Birmingham*) thanked Mr. King for his brilliant review of a neglected subject. In making the diagnosis of bone syphilis he considered that a complaint of localized pain by a patient with syphilis should never be ignored until x-ray examination of the site had shown the bones to be normal. He suggested that the apparent destruction of the long bones that occurred in congenital syphilis was probably due to inflammatory change rather than to complete destruction; that this view was correct was suggested by the very rapid reconstruction of bone that followed treatment. He gave details, with illustrations, of the findings in a woman of 69 who had sustained pathological fractures of her arm and leg following extensive involvement by syphilitic osteitis.

DR. GEORGE CSOKA (*Cambridge*) showed two x-ray slides of the osteoperiostitis occurring in bejel. In both these cases symptoms had started in early childhood, but there was no evidence to suggest congenital infection. The fact that infection commonly takes place in the first few years of life seems to alter the appearances of the resultant bone lesions sufficiently to approximate to those of congenital rather than of acquired syphilis. The next x-ray slide showed the gross hyperplastic osteoperiostitis present in an acrobat who, at the age of 17 years, had been found to have congenital syphilis. Dr. Csonka then described the case of a woman aged 25, with tender areas over the spine, ribs, sternum, and acromion. X-ray slides showed the bone erosions present at these sites. Routine serological tests were positive and, as with the last case, the symptomatic relief produced by treatment was dramatic, pain having ceased by 24 hours after the first injection of penicillin; the patient's resistant normochromic and normocytic anaemia of 9 years' standing rapidly vanished and she later became pregnant after six sterile years of marriage.

DR. W. V. MACFARLANE (*Newcastle*) recalled the case of a male patient who, at his initial attendance in the Department of Venereology, Newcastle General Hospital, revealed complete destruction of the vertex, this permitting the patient's cap to rest upon infected, thickened meninges. The nature of the case was such that a full report was to be published (Macfarlane and Rannie, 1958).

He referred to evidence which suggested that Lord Darnley had developed caries of the skull following immediately upon what may well have been secondary syphilis. He had recently seen a middle-aged female patient who, following a cholecystectomy, developed pyrexia, which was treated with a penicillin injection. Within a few days, she complained of severe pain which was diagnosed by the family doctor as rheumatism in the right leg, but radiological investigation showed undoubted evidence of syphilitic periostitis. As the penicillin injection would appear to have acted as the trigger mechanism, he wondered if other clinicians had observed this phenomenon in any of their patients.

DR. R. R. WILLCOX (*London*) congratulated Mr. King on his erudite lecture. Mr. King had referred to the increase in the incidence of early syphilis after the second world war, but it was interesting that they had not yet seen any increase in the clinic incidence of late syphilis in the clinics. Why was this? In areas where endemic syphilis existed, the number of late lesions seen apparently increased with the incidence of early infectious lesions. Could it be that the expected rise in the incidence of late lesions in Great Britain had not occurred because there was less possibility of superinfection?

DR. G. L. M. MCELLIGOTT (*London*) thanked Mr. King for his most instructive paper. In reference to the term "sabre tibia", he had soldiered with cavalrymen when they had carried sabres; he thus preferred the term "sabre scabbard tibia" to describe the syphilitic lesion in which the anterior border of the tibia became curved and the posterior border remained straight.

DR. J. S. MCCANN (*Belfast*) referred to the point that serological tests for syphilis were usually positive in the presence of syphilitic bone disease. He wished to stress the importance of full clinical examination and cited the case of a woman reported as having only a "doubtful" Kahn test with a negative Wassermann reaction, but was found on examination to be suffering from congenital syphilis with back pain due to syphilitic osteoperiostitis. This patient also had neurosyphilis.

THE PRESIDENT, DR. S. M. LAIRD, said that all would agree with him in praising Mr. King's paper; in particular, he would like to comment on the very excellent

standard of the radiographic slides. He felt it was dangerous to generalize because there were so many problems and so many exceptions in the field of bone syphilis, and quick diagnosis might be very difficult. Late syphilis of bone had impressed him by the very long time it might take for symptomatic improvement to follow treatment. It was to be expected that the radiological picture might take a long time to revert to normal, and the therapeutic test might be a slow process. He referred to a case of a woman, treated 3 years earlier by irradiation for carcinoma of the cervix, who complained of pain in the hip at follow-up examination. A radiograph had shown four areas of necrosis of the ilium, with increased density, which were thought to be secondary deposits. However, a routine Wassermann reaction and Kahn test were positive. On therapeutic trial it took 2 months to obtain relief from pain after treatment and 6 months for improvement to show itself radiologically, but the patient's

general condition had improved very noticeably immediately after treatment. He referred to Mr. King's experience that serological tests for syphilis were always positive in a late affection of bone. In this connexion he cited the case of a man in the mid 40s with a history of migrainous headache dating back to early childhood. Routine x-ray examination of the skull showed marked osteoperiostitis, and the Wassermann reaction and Kahn test were positive. Treatment was given, and 10 weeks later the serological tests for syphilis were negative and remained so. This quick sero-reversal was a surprising thing, because in late bone syphilis the tests were usually slow to reverse. He stressed that bone change in the presence of a positive Wassermann reaction did not mean bone syphilis. In this connexion he recalled a patient with a neoplasm who was sero-positive. This field was a fascinating part of the study of syphilis, and it had been dealt with most admirably by Mr. King.