VERTEBRA PLANA (CALVÊ)

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Vertebra plana first became known as an entity in 1924 when Calvè described it at the meeting of the British Orthopaedic Association at Bologna. In the following year he published his case and one discovered by Brackett under the title “A localized affection of the spine suggesting osteochondritis of the vertebral body, with the clinical aspect of Pott’s disease.”

Sundt (1935) reviewed the world’s literature and found twenty-one reported cases, but some of these he considered were not true examples. Compere, Johnson and Coventry (1954) presented four cases of vertebra plana caused by eosinophilic granuloma. Compere added: “I would like to make it clear that we are not by any means suggesting that it (eosinophilic granuloma) is the only cause of vertebra plana, but it is the only one that we know about.”

The world’s literature has been searched by one of us (W. J. W.), and we have analysed this material in the hope of obtaining further information about the nature and cause of vertebra plana1–3. This search brought to light ten cases reported in the Japanese literature that have not been noted by other European authors.

It appears from our review of previous work that the radiographs in the case to be reported are unique, because it is the first time that a complete series of films has been obtained showing the remarkable speed with which the vertebra may collapse. Our serial films also show changes in the pedicles and in one transverse process which have received little attention in the literature: Bonomini (1937), Fawcitt (1940), Neyroud (1947) and Rocher (1934) are the only other authors to have reported such changes.

The progress of the disease in the body, pedicles and transverse process in this case is so like that seen in the Calvè-Legg-Perthes disease of the hip that we still feel that one cause of vertebra plana is aseptic necrosis.

CASE REPORT

A quarter-caste Maori girl aged three years was admitted to the Hutt Hospital in May 1953. Seven days before she had complained of pain in the back. Four days later, while getting up from the sitting position, she fell forward screaming and then doubled up. This attack lasted for five minutes and she was then quite at ease. The next morning she had a similar attack of pain, and the following day two more. These came on while she was walking about. On the day of admission she had a further attack lasting about ten minutes. Apart from these episodes she ran about and played normally.

An unusual feature of the history was that on the day of admission she had passed two stools consisting of bloody mucus. Her general practitioner noticed “red currant jelly” on the examining finger and sent her into hospital with suspected acute intussusception. There was no history of recent injury or infection, or of tuberculosis in the family.

On examination it was noted that she spent most of her time lying in bed and resented being moved. Now and then she seemed to have pain in her back, but she would get up and walk about the cot for short intervals. She would lie on her stomach or left side when resting. No other abnormality was found. Radiographs showed loss of the lumbar curve but no other abnormality (Fig. 1).

During the next few days the back pain seemed to be worse, and a week after her admission she was unwilling to walk at all. There was intense spasm of the posterior spinal muscles, and on attempted movement she screamed with pain. There was no swelling in the lumbar
Figure 1—Initial radiograph showing normal depth of the fifth lumbar vertebra. Figure 2—Eight days after first examination: partial collapse of fifth lumbar vertebra with increased depth of the disc spaces above and below it.

Figure 3—Fifteen days after first examination. The vertebral body has collapsed to a wafer. The disc spaces are deep. The end plates of vertebral body are intact. Figure 4—Condition at six weeks. Note that the pedicles are atrophic.
region and no definite tenderness. Further radiographs taken eight days after the first examination showed collapse of the body of the fifth lumbar vertebra, with increase in the depth of the adjacent spaces (Fig. 2). Re-examination another week later showed the body of the fifth lumbar vertebra now as a thin disc. The superior and inferior end plates appeared intact and there was a further increase in the depth of the disc spaces above and below it. There was some loss of bone substance in the pedicles (Fig. 3). Radiographs of the skull, thoracic spine, chest, pelvis and upper femoral and humeral shafts did not show any other lesion.

Investigations—Haemoglobin was 15 grammes per cent and the leucocyte count showed 9,300 per c/millimetre (neutrophils 67 per cent, lymphocytes 31 per cent, monocytes 1 per cent, eosinophils 1 per cent). The erythrocyte sedimentation rate was 29 millimetres/hour; Mantoux test was negative to 1:1,000. The Wassermann and Kahn reactions were negative.

Treatment and progress—The child was rested on a plaster bed, with immediate complete relief from pain. After six weeks she began to lean up on her elbow whenever she had the chance; so presumably all the pain had gone. Immobilisation was continued for nine months, after which she was allowed up in a spinal brace. Serial radiographs during this time showed evidence of gradual healing of the lesion, with renewed growth of the vertebral body (Figs. 4 to 6).

The child has been re-examined regularly and has remained free from pain. When she was last seen, in October 1958, the lumbar spine was rather flat but there was no suggestion of a gibbus. The spine was freely mobile in all directions. The last radiographs (1958) showed the body of the affected vertebra to be about half the normal depth (Fig. 6). The disc above was
of the same height as that between the fourth and fifth lumbar vertebrae, and that below was a little narrower. The antero-posterior diameter of the vertebral body was 40 millimetres, compared with 28 millimetres for the body of the adjacent vertebral body. Thus restitution to normal shape cannot be expected in this case.

**DISCUSSION**

The flattened body characteristic of the fully developed Calvé's disease is a radiological appearance that may have several causes. It has been believed, on good grounds, that osteochondritis was the commonest cause, but others that have been reported include Hand-Schüller-Christian disease, Hodgkin's disease, osteogenesis imperfecta, hyperparathyroidism, unidentified malignant disease, eosinophilic granuloma, and injury in tetanus.

In about a third of the cases there has been history of sudden onset; in the remainder the onset has been gradual. The speed of development is no help in diagnosis because the radiographic appearance is the same in each type. A few patients have shown a fusiform paravertebral shadow extending for an inch or two above and below the collapsed vertebra. The nature of this shadow remains uncertain; it is not regularly associated with any particular type of case. It appears early, it never calcifies and it persists for weeks.

The continuing uncertainty about the pathology in most cases of Calvé's disease is due to the infrequency of histological study of material from the affected vertebrae. Mezzari's (1938) report was of limited value because the study was made eighteen months after the

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**FIG. 7**

Diagrams showing the early changes. They correspond to radiographs in Figures 1 to 4.

**FIG. 8**

Diagrams showing changes in the alignment, shape and density of pedicles in early stages of the disease.

Hand-Schüller-Christian disease, Hodgkin's disease, osteogenesis imperfecta, hyperparathyroidism, unidentified malignant disease, eosinophilic granuloma, and injury in tetanus.
onset of the disease and it was already in a late healing stage. Mezzari concluded that the process was a malacia with aseptic necrosis.

Compere, Johnson and Coventry (1954) found that eosinophilic granuloma was the cause in four consecutive cases—a very suggestive observation. One may question whether biopsy is in the best interests of the patient, but it is the only way of settling the issue with any certainty, and if a few more cases can be investigated the same way the problem should be solved.

SUMMARY
1. A case of vertebra plana (Calvè) is described and serial radiographs throughout the course of the disease are presented.
2. The initial radiographs showed a vertebra of normal depth which collapsed to a thin disc in fifteen days. Since the symptoms had begun twelve days before the first examination the total time taken to reach this stage was twenty-seven days.
3. The literature has been reviewed for evidence of the underlying pathology of vertebra plana. In the case described biopsy of the affected vertebral body was not carried out, and thus the nature of the underlying change could not be determined.

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