SPONTANEOUS ANTERIOR FUSION OF VERTEBRAL BODIES

R. WEEDEN BUTLER, CAMBRIDGE, ENGLAND

Bony fusion of the anterior part of two vertebral bodies is occasionally noted in radiographs of the adult spine, and is usually interpreted as a congenital abnormality or the result of previous infection. It is the author's belief that it is more commonly a rare manifestation of Scheuermann's vertebral osteochondritis.

The essential lesion in vertebral osteochondritis is the escape of intervertebral disc tissues by herniation through the cartilage end-plate of the vertebral bodies into the underlying bone. These herniations may be small, when they are often multiple, or very large, in which case they are often single. The largest occur in the lumbar spine, where they take the form of a massive herniation of disc substance into the anterior part of the vertebral body through a crescentic subsidence in the cartilage plate just behind the anterior segment of the epiphysial rim (Butler 1955), and it might be thought remarkable that the consequent early and profound loss of disc space does not lead more often to fusion between the affected vertebral bodies.

Fusion between vertebral bodies after vertebral osteochondritis occurs occasionally as a late sequel, not generally being present before the sixth decade, and then only in the thoracic spine in patients in whom a severe kyphotic curve has followed anterior wedging of the vertebral bodies. This fusion takes place between the massive osteophytes which develop as a secondary manifestation (Figs. 1 and 2). Rarely, however, following vertebral osteochondritis,
fusion of the anterior parts of vertebral bodies is seen far earlier, in any part of the spine, and without dependence upon osteophyte formation (Fig. 3). The explanation of how and when such fusion had occurred has been obscure, but the observations reported below may provide an answer.

**Case 1** (Mr J. G. Taylor and Dr R. S. Thorpe's case)—A girl aged thirteen had complained of thoracic backache for two years before being seen. Examination showed kypholordosis and tight hamstrings. Radiographs showed wedging and early anterior fusion at T.10-11, and marked osteochondritis at L.3-4 (Figs. 4 and 5). All other investigations were negative. She used a plaster bed at night for two and a half years. Anterior bony fusion was complete at both levels within twenty months (Figs. 6 and 7).

**Case 2** (Dr J. P. Hughes's case)—A boy aged fourteen was treated for pneumonia in February 1966, and lateral radiographs showed mild Scheuermann's disease affecting T.9, 10 and 11 vertebrae. Eighteen months later bony fusion had occurred anteriorly between the bodies of T.9 and 10 (Figs. 8 and 9). The back was completely symptomless throughout.

**Case 3** (Mr J. G. Taylor and Dr R. S. Thorpe's case)—A woman aged twenty-seven complained of backache for two years. Radiographs suggested old Scheuermann's disease at T.10–11 with typical increase in antero-posterior diameter of the vertebral bodies. The erythrocyte sedimentation rate was normal. Twenty months later anterior bony fusion was complete. Further calcification was observed in the posterior part of the disc (Figs. 10 and 11). The patient was still complaining of backache.

**Case 4** (Mr C. M. Wilkinson's case)—A girl aged twelve had had backache for one month. Radiographs showed severe osteochondritis at T.9–10 and milder changes at T.7 and 8. All other investigations were negative. She was treated on a spinal frame. Two years later anterior bony fusion at T.9–10 was complete (Figs. 12 and 13).

**Case 5** (Mr R. G. Thomas's case)—A girl aged six complained of low back pain during convalescence from carditis. Radiographs showed osteochondritis at L.3, 4 and 5. She was treated by rest in bed for two months, with full functional recovery. Five years later anterior fusion appeared to be occurring at L.3–4 and at L.4–5. There was generalised calcification of the remains of the L.3–4 disc (Figs. 14 and 15). This patient was lost to follow-up because the family moved away from the district.

**DISCUSSION**

It is apparent that fusion of the anterior parts of the affected vertebral bodies may on rare occasions occur when the active stage of the osteochondritic process has recently ceased and the healing process, with the filling up of the intransosseous herniation with new bone, has begun. This fusion between the anterior parts of the vertebral bodies may leave the posterior part of the intervertebral spaces radiologically almost normal, though often somewhat narrowed. Anterior fusion between the vertebral bodies may be incomplete at this stage but becomes complete in the same way at some time in the next ten to fifteen years. Whether fusion occurs early or late, it is not unusual to see evidence of calcification in the remaining disc tissue.
Just as the original osteochondritic process may be completely symptomless, so this fusion may take place without discomfort or any other sign of disturbed mechanics. On the other hand, just as the earlier stages may be accompanied by backache and discomfort on lifting strains, so interbody fusion years later may be associated with a period of discomfort.
Such anterior fusion of the vertebral bodies, whether completed at the end of the active destruction phase or perhaps ten years after the initial stage, is rare. The patients described above were all investigated with the possibility of an infective lesion in mind and no evidence for this was found. With the knowledge that anterior vertebral fusion can follow osteochondritis
Case 4. Figure 12—Spine of woman aged 23 showing osteochondritis of lower thoracic spine, most marked at T.9–10. Figure 13—Two years later anterior bony fusion was complete at T.9–10.

Case 5. Figure 14—Osteochondritis at L.3, 4 and 5 in a girl aged 6. Figure 15—Five years later anterior bony fusion was probably occurring at both levels, with calcification in the remaining disc tissue.
it is suggested that this offers a logical explanation of such chance findings as are illustrated in Figures 16 and 17.

The marked kyphosis seen in Figure 16 may be the result of anterior fusion occurring in early youth, with persistent growth posteriorly accompanied by moulding of the anterior bony bar, as suggested by Knutsson (1949), who reported one such case and cited further references.

![Figure 16](image1.jpg)  ![Figure 17](image2.jpg)

**Fig. 16**—In this woman aged 70, anterior interbody fusion probably occurred in early life and led to marked wedge deformity from continued growth posteriorly. **Fig. 17**—Spine of woman aged 85 with multiple anterior interbody fusions in the thoracic spine.

It is notable that symptoms in his patient started at the age of five or six years, as in our Case 5, but nevertheless it is apparent from our patients that an early age of onset is not an essential prerequisite for anterior fusion to occur.

**SUMMARY**

1. Five patients are reported in whom osteochondritis is shown to have given rise to anterior intervertebral fusion.
2. It is suggested that anterior intervertebral fusion discovered in radiographs of adult spines may arise from osteochondritis rather than from a congenital abnormality or infection.

The author is very grateful to his colleagues enumerated in the text for providing him with notes and radiographs of their patients, and to Mr T. J. Fairbank for help in correlating the material.

**REFERENCES**


Vol. 53 B, No. 2, May 1971