HAEMANGIOMA OF A VERTEBRAL BODY TREATED BY LIGATION OF THE SEGMENTAL ARTERIES

Report of a Case


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Recent advances in arteriographic techniques have considerably widened the scope of the surgical treatment of arteriovenous malformations involving spinal vessels. Such lesions have been successfully treated by various neurosurgical methods (Houdart, Djindjian and Hurth 1966; Love, Svien, Baker and Layton 1966; Ommaya, Di Chiho and Doppman 1969).

The following case history is of interest in that a vascular malformation supplied by branches from the first lumbar arteries almost completely replaced the first lumbar vertebral body. Arteriography, used before operation to demonstrate the vessels contributing to the lesion, was of considerable value because it showed that if these vessels were ligated the blood supply to the spinal cord would not be impaired.

CASE REPORT

A twenty-nine-year-old Indian man gave a history of recurrent back pain for the previous eight years. At first his symptoms occurred only after strenuous manual work and were relieved by various forms of physiotherapy and by local injections of hydrocortisone. He had been seen before at other hospitals and on one occasion the provisional diagnosis of a haemangioma of the vertebral body had been made (Fig. 1). At that stage there was already evidence of erosion of the vertebral body.

The back pain became continuous and he developed girdle pain twelve months before his admission. On examination there was a thoraco-lumbar scoliosis convex to the left. There was marked tenderness on percussion over the spinous processes from the eleventh thoracic vertebra to the second lumbar vertebra. No neurological abnormality was detected. Radiologically, there was extensive erosion of the right side of the first lumbar vertebral body and the residual bone was sclerotic. The adjacent disc spaces were unaffected (Fig. 2). Haematological and serological investigations were normal apart from an unexplained transient eosinophilia of 32 per cent.

The atypical radiological appearances at this stage were difficult to interpret and the possibility that the lesion could be due to infection was considered. A scintiscan with the isotope Fluorine-18 showed no increase in the uptake of the isotope at the site of the lesion. Kemp, Johns, McAlister and Godlee (1973) considered that a negative uptake excluded the presence of infection in spinal lesions. This observation supported the original diagnosis of a vertebral haemangioma. Accordingly, the lesion was initially explored through a right thoracotomy. A large pulsatile soft-tissue mass was found arising from the first lumbar vertebral body. The ill-defined vascular tissue extended beneath the dome of the diaphragm on the right side, rendering isolation technically impossible; the incision was consequently closed.

Subsequently, selective arteriography was performed by a retrograde femoral approach. Each of the lower intercostal arteries and the upper lumbar arteries were individually catheterised and their distribution demonstrated by the injection of radio-opaque medium. By the use of this technique, it was clearly shown that the lesion received its major contribution
FIG. 1
Antero-posterior and lateral radiographs of the first lumbar vertebra showing trabecular irregularities and early collapse, two years before admission.

FIG. 2
Antero-posterior and lateral tomographs of the first lumbar vertebra, at the time of admission, showing extensive erosion of the vertebral body and sclerosis of the residual bone. There is considerable collapse of the affected body.
Figure 3—Selective arteriograph showing filling of malformation on injection of the first right lumbar artery. Figure 4—Selective arteriograph showing minor involvement of the vessels derived from the first left lumbar artery.

Figure 5—Composite tracing of the selective arteriographs to show the vessels contributing directly and indirectly to the lesion. Figure 6—Radiograph showing arteriograph following catheterisation of the right eleventh intercostal artery. The *arteria radicularis magna* of Adamkiewicz is clearly defined. It ascends the level of one vertebrae before forming a hair-pin bend to descend as the anterior spinal artery.
from the first right lumbar artery, to a lesser extent from the first left lumbar artery; in addition, minor communicating branches arose from the eleventh intercostals, the subcostals and the second lumbar arteries (Figs. 3 to 5). The artery of Adamkiewicz (arteria radicularis magna) was seen to arise from the eleventh right intercostal artery (Fig. 6), and no arterial supply to the lower thoracic or lumbar cord was demonstrated from any of the other vessels that were injected.

As a result of this investigation, it was possible to decide which vessels required ligation. Left-sided thoracotomy was accordingly undertaken and the abnormal arteries and the communicating vessels were indirectly ablated by ligating the eleventh left intercostal, the subcostals, the first lumbar and the common origin of the second lumbar arteries. Recovery from the operation was delayed by the development of a left haemorrhax which required aspiration. Six weeks later the patient was transferred to the Radiotherapy Unit, University College Hospital, for a course of radiotherapy to the body of the first lumbar vertebra. Using four portals, a total dose of 4,400 rads was administered over a period of three weeks. Subsequently, to stabilise the affected level, posterior spinal fusion was done from the twelfth thoracic to the second lumbar vertebra. After the operation, the patient remained in the plaster bed in which he had been immobilised during treatment, for a further six weeks, before being mobilised in a brace which was worn for nine months. He has remained symptomless and has returned to full activities including tennis. Radiographic examination at five months showed that there had been a slight increase in the degree of collapse of the affected vertebral body, but there was extensive new bone formation which had progressively consolidated, filling the defect. Twelve months after operation it was considered on the basis of clinical and radiological examination that the lesion was quiescent and stable (Fig. 7).

**DISCUSSION**

Intraosseous vascular malformations can generally be recognised by the appearance of coarse striations replacing the normal trabecular pattern (Murray and Jacobson 1971). In the
case described, however, the radiological appearance was atypical; although a provisional diagnosis was made the exact nature of the lesion was only confirmed at operation.

The introduction of selective radiological arteriography has enabled accurate assessment of vascular malformations of spinal vessels to be made (Houdart et al. 1966). In this patient it was possible to demonstrate, by catheterisation of the segmental vessels, that the abnormal arteries were mainly supplied from an anatomically normal right first lumbar artery.

Various therapeutic measures have been employed in an attempt to ablate such vascular anomalies. The simplest of these has been radiotherapy. Manning (1951) showed that the symptoms may be relieved by irradiation, although the radiological appearances remain unaltered. In his reported cases there were limited bone changes and there was no evidence of soft-tissue expansion. Embolisation of the feeding vessels of angiomatous malformations of the spinal cord has been attempted by injecting glass beads into the vessels after percutaneous catheterisation (Doppman, Di Chiros and Ommaya 1968). The technique can be employed only when the lesion is supplied by one or two main tributaries. Surgical isolation of vascular malformations has been effective when the lesion is small and easily defined (Ommaya et al. 1969). Ligation of segmental arteries to obtain indirect ablation of vascular malformations of spinal vessels has been reported to be effective by Post, Levitsky, Doppman, Di Chiros, Wirth and Ommaya (1971). Neurological complications may occur after ligation of aortic segmental branches, particularly in the lower thoracic region (Adams and van Geertruyden 1956). The anterior spinal artery, which supplies approximately two-thirds of the cross-sectional area of the spinal cord (Bolton 1939), arises as a confluence of paired vessels originating from the vertebral arteries. It passes caudally, along the midline, on the anterior surface of the cord. It usually receives its principal tributaries at the level of the third and fifth or sixth cervical, frequently at the level of the fourth thoracic and again in the lower thoracic or upper lumbar region. The anterior spinal artery diminishes in diameter in the regions between its tributaries, tending to be especially narrow in the lower thoracic area above the last major radicular feeding artery, so that the main supply to the cord in this region is from the arteria radicularis magna. Any surgical procedure which endangers the supply from this vessel may cause ischaemia and consequent paraplegia. This artery usually arises from one of the intercostal arteries below the level of the sixth thoracic or from one of the upper three lumbar arteries on the left side. It takes origin near an intervertebral foramen (Doppman et al. 1968). The artery sometimes ascends as high as the fifth or sixth thoracic vertebra and then makes a hairpin bend to descend as the anterior spinal artery (Doppman and Di Chiros 1968).

In our patient, because of the extensive nature of the lesion, ligation of the segmental vessels was considered to be the procedure of choice. Segmental arteriography showed that the arteria radicularis magna arose from the eleventh right intercostal artery (Fig. 6). It was decided that ligation of the left eleventh intercostal, the subcostals and the first two lumbar arteries could therefore be safely achieved. This procedure was followed by radiotherapy to the body of the affected vertebra. Posterior spinal fusion was then performed because it was considered that the spine was unstable. The result of the treatment was indicated by the progressive ossification of the lesion and the relief of symptoms.

**SUMMARY**

1. The case is described of a twenty-nine-year-old man with back pain due to an extensive vascular malformation replacing the major part of a vertebral body.
2. Treatment was by transthoracic ligation of the segmental vessels, with irradiation and spinal fusion later.
3. The importance of demonstrating the origin of the thoraco-lumbar supply to the anterior spinal artery is emphasised.
REFERENCES


