COMPLETE PROTRUSION OF A CALCIFIED NUCLEUS PULPOSUS IN THE THORACIC SPINE

Report of a Case

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The clinical and radiological diagnosis of rupture of the intervertebral disc and backward prolapse of the nucleus pulposus is commonplace in the lumbar region and is sometimes made in the cervical region also. Calcification of the nucleus pulposus is occasionally observed radiologically in the thoracic spine, but rarely in other vertebral regions. Prolapse of the nucleus is distinctly uncommon in the thoracic spine.

This case report is concerned with the demonstrable prolapse of a completely calcified nucleus in the lower thoracic spine—a rare occurrence. It is surprising that such a happening has not been observed and recognised more frequently.

Clinical and radiological features—

The patient was a married woman, aged forty-seven years. In September 1953 she first complained of a severe "stitch-like" pain in the region of the left lower costal margin and lower sternum. She described this pain as tingling and continuous, worsened by most movements, especially by flexion of the trunk. The pain was slightly relieved by aspirin-codeine tablets. Later, the pain tended to spread to the right lower costal margin, though it was never so severe there as on the left side. Her sleep was appreciably disturbed by the pain.

She first attended as an out-patient at St Mary’s Hospital a month after the onset. On examination, there was no spinal deformity but there was some rigidity of the back with spasm of the sacro-spinalis muscles. The normal thoracic curve was preserved. There were no demonstrable abnormal motor or sensory neurological signs in association with this girdle pain.

Radiological examination was carried out on the first day of her attendance. In the mid-thoracic spine there was slight anterior marginal osteophytic lipping affecting the bodies of the fifth to the eighth thoracic vertebrae. In the lower thoracic spine, between the bodies of the tenth and eleventh thoracic vertebrae,
a striking example of calcification of the nucleus pulposus was evident (Fig. 1). The uncorrected dimensions of the calcified nucleus were: antero-posterior, 21 millimetres; supero-inferior, 7 millimetres; transverse, 24 millimetres. Anteriorly, at the same level, there was some separate dense calcification, probably in the anterior margin of the annulus fibrosus. There was slight osteophytic lipping at the lower margin of the tenth and at the upper margin of the eleventh thoracic vertebrae. From before backwards, the measurements of the disc space were 5, 7, 8 and 5 millimetres.

The patient was admitted to hospital under the care of Mr Dickson Wright ten weeks after the onset. She was then in considerable pain. She was most comfortable when lying supine with a pillow supporting the lumbar curve. The physical examination showed no

![Figure 2](image1)

![Figure 3](image2)

**Fig. 2**—Lateral tomograph two months later. **Fig. 3**—Lateral radiograph on the following day. These show: 1) narrowing of the disc space between T10-11; 2) complete postero-inferior escape of the calcified nucleus pulposus which lies behind the body of T11; 3) slight forward displacement of the anterior marginal calcification of annulus fibrosus.

significant change from that already described. A week after her admission the severity of the pain was unaltered, but two days later the patient was much better and after a further week she was able to walk about the ward without much discomfort.

*Further radiological investigations*—Five days after the pain had begun to subside a tomographic examination was made with somewhat surprising findings (Fig. 2). Because of a misunderstanding, a "simple" spinal radiographic examination was not made immediately before tomography, but this oversight was remedied on the next day (Fig. 3). The following description applies to both these examinations. In comparison with the findings at the first examination two months before: 1) The whole of the calcified nucleus pulposus had been extruded posteriorly and was seen to lie behind the upper part of the body of the eleventh
thoracic vertebra and was probably intact (Figs. 2 and 3). 2) The intervertebral disc space had become appreciably narrowed and its dimensions were 4, 4, 5 and 4 millimetres from before backwards. The slightest remnants of calcification in the annulus near the normal site of the nucleus were just detectable. The anterior marginal calcification showed a slight forward protrusion. 3) The postero-superior margin of the body of the eleventh thoracic vertebra was defective, as if marginal avulsion had occurred when the complete disc rupture and nuclear total protrusion occurred (Fig. 4).

**Progress** - The patient’s condition had improved so markedly that Mr Dickson Wright decided that surgical intervention was not indicated and she was discharged.

Fig. 4
Antero-posterior radiograph taken on the same day as Figure 3, showing a defect in the supero-posterior margin of the body of T.11, seen immediately below the spinous process of T.10. The prolapsed nucleus is just visible superimposed on the spinous process of T.11.

The patient was seen again six months after the onset of symptoms and she no longer complained of lower thoracic pain. Further radiographs were taken which confirmed the marginal defect in the body of the eleventh thoracic vertebra, but this had not increased. The calcified nucleus remained in the same position.

**DISCUSSION**

The radiological appearances seen at the second examination (Figs. 2 to 4) would have been extremely difficult to interpret had the previous findings not been known. It is quite possible that a mixed osteolytic and osteosclerotic infective or neoplastic lesion affecting the
postero-superior part of the body of the eleventh thoracic vertebra would have been erroneously suspected.

It is interesting to consider at what time the complete nuclear prolapse occurred. Marked pain was present when the patient was first examined and it began to improve soon after her admission six weeks later, but the change towards improvement was not abrupt. Further, the pain had not had an abrupt onset initially nor was there any definite strain or injury of which the patient was conscious at any time. There is no means of telling whether the total nuclear prolapse occurred before or after the patient was confined to bed, but it must have taken place in the two months' interval between the first and second radiological examinations. It seems possible that the extrusion was a gradual process and was complete at the time of the second examination when definite amelioration was reported.

It is interesting to note that, whereas nuclear calcification is most often seen in the lower thoracic spine, proven intraspinal rupture of the disc is rare at this level; further, calcification is seldom found at the commonest sites of prolapse. In the present case we have a visible demonstration of a complete rupture and the prolapse of a calcified nucleus associated with relief of symptoms.

Calcification within the spinal canal is a rare finding. It has been described in meningioma by Duff Gray (1942). It could well be seen if, in spinal caries, a cold abscess with calcareous debris tracked into the spinal canal. This case report shows that a calcified nucleus which had prolapsed could also show intraspinal calcification.

The opinion is expressed in Schinz's Roentgen Diagnostics (1952) that calcification of the nucleus pulposus carries little or no clinical significance. However, in a recent paper, Logue (1952) wrote: "It would seem that nuclear calcification in the thoracic region is indicative of a degenerative change of such a nature as to render the disc liable to prolapse, but this change may also be present in other discs as yet uncalcified, and it may happen that prolapse occurs from one of the latter. In a person suffering from spinal cord compression in the thoracic region calcification of the nucleus pulposus is an important finding, and as a general guide it may be stated that if the segmental level of the lesion corresponds with a calcified nucleus then the diagnosis of a protruded disc is practically certain, and even when the segmental level does not correspond a herniation is still the most likely diagnosis."

In the case described here, there was radiological evidence of escape of the whole nucleus posteriorly: judging from the history, there was pressure on the nerve root which was possibly relieved when the total rupture occurred. A close inspection of the lateral radiographs and tomographs suggests that pressure on the cord would have been almost inevitable if it were not for the "avulsion" or "giving way" of the postero-superior margin of the body of the eleventh thoracic vertebra, so that the nucleus (which is probably almost intact) does not bulge markedly into the spinal canal behind the plane of the posterior margin of the body.

My thanks are due to Mr Dickson Wright for permission to report this case under his care.

REFERENCES

