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Thoracic Disc Herniations: Evolution in the Approach and Indications

F. Lesoin[1], M. Rousseaux[2], A. Autricque[1], Y. Reesaul[1], L. Villette[1], J. Clarisse[3], and M. Jomin[1]

[1] Service de Neurochirurgie B, [2] Service des Convalescents, and [3] Service de Neuroradiologie, Centre Hôspitalier Régional, Lille, France

Summary

Between 1960 and 1 June 1985, 21 patients were operated for thoracic disc herniations. The advent of new operative techniques (with transverso-arthropediculectomy) has brought about new indications in the management of such disorders. These new indications are important because such protrusions may be abruptly complicate by compression of blood vessels, which may produce abrupt and irreversible neurological deficit. The progress in the radiological examinations allows a more precise study of the topography and density of the hernia. Furthermore, the use of a surgical microscope and microsurgical techniques allow a surgical treatment without preoperative medullary angiography.

Keywords: Intravertebral disc displacement; spinal cord compression.

Numerous articles and editorials in the medical and surgical literature advocate that thoracic disc herniations have an insidious and subtle onset and poor operative prognosis[1, 5, 6, 11, 15, 17]. These facts may explain why such disorders were rarely approached surgically. The review of our twenty one observations shows that this attitude should be changed because a number of facts, such as new surgical techniques with few medullary risks and better radiological images showing the extent of mechanical compression of the spinal cord allows better management of such disorders.

Patients (Table 1)

Between 1960 and 1 June 1985, twenty one patients were operated for thoracic disc herniations, of which seven between 1960 and 1982, six between 1982 and 1984 and eigth between 1 January 1985 and 1 June 1985. Seventeen patients presented progressive radiculomedullar symptoms. The early symptoms consisted of sensory disorders in ten cases and in seven cases motor disorders. The mean interval between the first signs and the date of hospitalization was twenty six months. Four of the patients exhibited abrupt complications, two of which seem to be after a violent effort (these two became paraplegic). These four patients reported a medical history of unilateral or bilateral radicular pain which rapidly worsened; two of the four patients suffered from tempory pain which was improved within a few weeks and the other two presented an important paraplegia.

Before 1982 standard X-ray examinations showed in two cases a calcified disc and five other cases a narrowing of the disc. After the standard X-ray, a myelography and a medullary angiography were performed.

Since 1982, plain myelography has been replaced by myelography coupled by CT scan which provide more precise information prior to the operation (Figs. 1 and 2). This examination gives information concerning the extent of the spinal cord lesion produced by the protruded disc.

Medullary angiography has been abandoned since the use of new surgical techniques that allow the visualization of the spinal cord arteries.

Surgical Techniques (Fig. 3)

Between 1960 and 1982, seven patients were operated, three by laminectomy, two by an anterior with thoracotomy, and other two by a posterolateral approach (one by costotransversectomy and the other one by arthropediculectomy).

Since 1982, fourteen patients were operated by a posterolateral approach that comprises a transverso-arthropediculectomy. We now prefer this approach and give further details on this type of approach.

The patient is placed in the prone position on an ordinary operating table with thoracic and iliac supports. This approach is a long, posterior midline incision which enable the paravertebral muscles to be retracted without being cut. Tilting the operating table to the side enables resection to be started tangentially to the plane of the posterior arc of the ribs. Ablation first of the transverse apophyses is performed with a bone forceps and a rotary burr. It is followed by burring of the articular masses from midline to the outside. This enables the surgeon to gain control not only of the side of the dural sheath but, in particular, of the roots and the radiculomedullary arteries, these being progressively dissected under the operating microscope. The pedicles of two adjacent vertebrae are also abraded.

Table 1

Case, age	Clinical symptoms	Paraclinical examinations	Approach	Outcome
Case 1 52 years	spastic paraparesis	myelography: complete block T 9	laminectomy	post-operative aggravation
Case 2 52 years	spastic paraparesis	myelography: incomplete block T 10/T 11	laminectomy	progressive favourable outcome
Case 3 57 years	spastic paraparesis	myelography: incomplete block T 9/T 10	transthoracic approach	without sequellae favourable outcome
Case 4 49 years	spastic paraparesis	myelography: total block T 10	laminectomy	post-operative aggravation
Case 5 55 years	spastic paraparesis	myelography: incomplete block T 8/T 9	transthoracic approach	without sequellae
Case 6 33 years	spastic paraparesis	myelography and CT scan: T 6/T 7	postero-lateral approach	without sequellae
Case 7 52 years	spastic paraparesis	myelography and CT scan: incomplete block T 10/T 11	postero-lateral approach	without sequellae
Case 8 57 years	spastic paraparesis	myelography and CT scan: incomplete block T 9/T 10	postero-lateral approach	without sequellae after transiant aggravation
Case 9 61 years	spastic paraparesis	myelography: incomplete block T 11/T 12	postero-lateral approach	discreet spasticity
Case 10 30 years	transitory paraparesis	myelography and CT scan: incomplete block T 8/T 9	postero-lateral approach	without sequellae
Case 11 30 years	paraparesis	myelography and CT scan: incomplete block T 8/T 9	postero-lateral approach	without sequellae
Case 12 35 years	paraparesis	myelography and CT scan: incomplete block T 8/T 9	postero-lateral approach	without sequellae
Case 13 50 years	transitory paraparesis	myelography and CT scan: incomplete block T 8/T 9	postero-lateral approach	discreet spasticity
Case 14 54 years	paraparesis	myelography and CT scan: incomplete block T 9/T 10	postero-lateral approach	without sequellae
Case 15 53 years	radicular pain	myelography and CT scan: incomplete block T 4/T 5	postero-lateral approach	without sequellae
Case 16 27 years	spastic paraparesis	myelography and CT scan: in- complete block T 4/T 5 and T 8/T 9	postero-lateral approach	discreet spasticity
Case 17 46 years	radicular pain	myelography and CT scan: incomplete block T 9/T 10	postero-lateral approach	without sequellae
Case 18 43 years	transitory radicular pain	myelography and CT scan: incomplete block T 9/T 10	postero-lateral approach	without sequellae
Case 19 48 years	radicular	myelography and CT scan: incomplete block T 10/T 11	postero-lateral approach	without sequellae
Case 20 35 years	spastic paraparesis	myelography and CT scan: incomplete block T 8/T 9	postero-lateral approach	discreet spasticity
Case 21 28 years	transitory radicular pain	myelography and CT scan incomplete block T 9/T 10	postero-lateral approach	without sequellae

Fig. 1

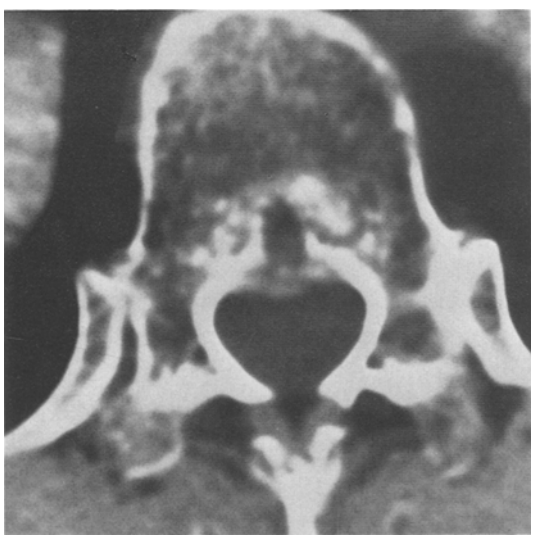

Fig. 2

This leads to the two vertebral bodies and to the disc. Osteotomy of the two bodies is then performed with a rotary burr passing between the two corresponding vasculoneural bundles. This minimum osteotomy enables the herniated disc to be collapsed into the freed space without manipulation of the dural sheath.

At the end of the operation, a laminectomy can be performed if an intradural fragment is suspected. Osteosynthesis is performed unilaterally using a short Harrington rod.

Results

Of the seventeen patients suffering from progressive compressive-irritative radicular syndrome, fifteen responded in a satisfactory manner to the surgical treatment.

Two patients operated by laminectomy were made worse. The two patients presenting with abrupt radicular symptoms were made asymptomatic by an operation using a transverso-arthropediculectomy technique. The two patients with abrupt paraplegia recovered, one without sequellae and the other one with spastic sequellae. In the patients operated using a transverso-arthropediculectomy technique an intercorporeal fusion was obtained (between four to six months) by the use of a short unilateral Harrington rod. In fact the first patient operated by this approach was temporarily made worse (the Harrington rod was not used); perhaps this complication may be explained by a collapse of the vertebral body.

Comments

Thoracic disc herniation was for a long time known to have a gradual and steady progression, but of interest is an observation of Julian[12] where he reported an abrupt progression of this type of hernia. He attributed this rapid progression to the compression of the Adamkiewicz artery, Lazorthes[13] showed that this artery is located between T 7 and T 8 in 15% of cases, between T 9 and T 12 in 75% of cases and between L 1 and L 2 in 10% of cases and usually on the left side.

In one of our observations, a medullary angiography showed such a mechanism, a calcified protruded disc compressing the anterior spinal artery. The major complication of thoracic disc herniation is vascular compression usually unforseen and giving rise to important neurological disorders with a picture of medullary transverse lesion. Even if a recovery is possible, the likelihood of a secondary ischaemia is important. These facts have lead to the extension of the indications for a surgical approach to patients suffering from radicular symptoms due to minimum discal protrusion. In fact, we think that there is no relationship between the volume of the hernia and gravity of the clinical picture. Furthermore, in the genesis of neurological signs there are two types of compressive effects, vascular and mechanical. The mechanical compression is more important when near a kyphosis that reduces the dorsal vertebral canal diameter.

Unforseen worsening of Neurological symptoms, caused by the above-mentioned mechanisms are indications for a surgical intervention.

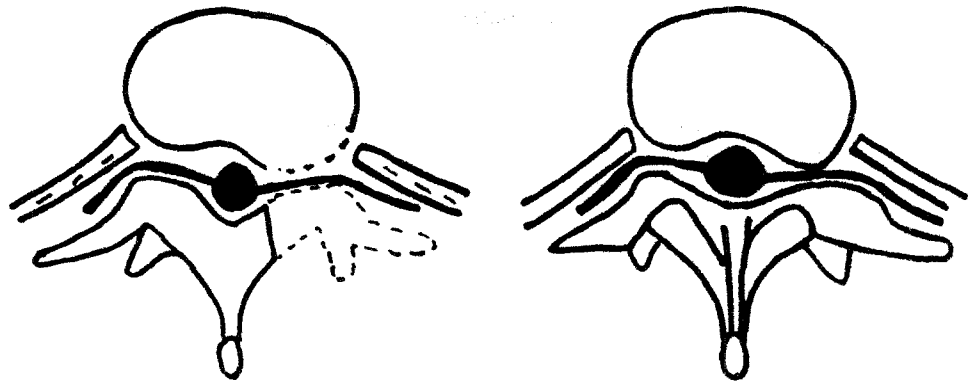

Fig. 3

New specialized techniques and myelotomography may reveal lateral discal herniation that were unnoticed or minimized by standard myelography. Myelography coupled with CT scan provided still further precision, although this technique is sometimes difficult to perform because of the normal curvature of vertebral column. Nevertheless, it provides important information concerning the volume, density and location of hernia; and if the protrusion is lateralized it gives clues as to the type of surgical approach. Medullary angiography is no longer used because it contains risks and has been virtually replaced by surgical techniques that allow the visualization of spinal cord arteries.

The operative indications have been extended because actually the postero-lateral approach using a transverso-arthropediculectomy technique for operating thoracic discal herniations entails low risks. For the majority of authors there is agreement that simple laminectomy should be abandoned because it is responsable for 50% of post-operative worsening[21].

We are not enthusiastic about the anterior approach, which we used twice, because it is a too major surgical procedure for disc pathology; and thoracocophrenolaparotomy is necessary when the herniation concerns a lower dorsal level. The posterolateral approaches appear to us to be superior, provided that they are tangential and leave the vasculoneural elements intact. The approaches involving costal resection require the sacrificing of the intercostal vasculoneural bundles. The more midline approaches with resection of the pedicles and the inner part of the articular surface do not appear to us to be sufficiently tangential, especially if the herniation is midline[3, 4, 10, 14]. The intermediate route by transverso-arthropediculectomy provides a tangential approach to the disc space by tilting the table to the side and retracting the paravertebral muscles laterally without cutting them; but above all by resecting the transverse apophyses. It enables the identification of the vasculoneural elements by the posterior opening of the intervertebral foramina early in the operation. The intercostal vasculo-neural bundles and the arteries that have a radiculo-medullary destination are dissected under the operating microscope. This control, which enables these elements to be left intact, is the first important point in this technique. The second point is osteotomy of the two vertebral bodies located above and below the herniated disc. This facilitates the handling and excision of the herniated disc without mobilizing the dural sheath and nerve roots. The disadvantage of a transverso-arthropediculectomy technique is the relative instability that is induced despite the support provided by the thorax. To prevent bending and subsequent deterioration through ischaemia, we use a short unilateral Harrington rod. This potential risk is also present in the various approaches recommended by other authors because they involve curetting of the disc with or without osteotomy of the vertebral bodies treated above and below[8, 16].

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Author's address: F. Lesoin, M.D., Service de Neurochirurgie B, Centre Hôspitalier Régional, F-59037 Lille Cedex, France.