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Percutaneous Injection of an Alcoholic Embolizing Emulsion as an Alternative Preoperative Embolization for Spine Tumor

J. Chiras, C. Cognard, M. Rose, C. Dessauge, N. Martin, L. Pierot, and P. F. Plouin

Summary: A hypervascular pheochromocytoma metastasis in the sixth cervical vertebra was embolized preoperatively by an intravertebral injection of an alcoholic embolizing emulsion, when transarterial embolization was considered too dangerous because of the possibility of inadvertent embolization of the intracerebral vertebrobasilar territory.

Index terms: Spine, metastatic neoplasms; Interventional materials, embolic agents

The value of embolization in the preoperative management of spinal tumors is well known (1–10). However, in some cases, this technique cannot be performed. For such circumstances, we describe a new method similar to percutaneous vertebroplasty (11–13).

Case Report

A 38-year-old man previously treated for a malignant pheochromocytoma presented with a left cervical radiculopathy. Plain films, computed tomography (CT) (Fig 1A), and magnetic resonance (MR) (Fig 1B) demonstrated a lytic lesion of the body of the sixth cervical vertebra with erosion of the posterior wall and involvement of the epidural space. A radionuclide study did not show any other metastatic site.

Preoperative angiography showed a tumoral blush of the body of the sixth cervical vertebra. The neovascularization arose exclusively from the right and left vertebral arteries (VA); unfortunately, the anatomy of the vertebral arteries was unusual. The right VA was thin and intracranially supplied only the right posterior inferior cerebellar artery, without supply to the basilar trunk. The left VA was dominant and supplied the basilar trunk. The anterior spinal artery for the cervical cord arose from the right VA below the origin of tumor vessels; very thin tumor vessels arose from the left VA (Fig 1C and 1D).

On the basis of these anatomical findings, transarterial embolization of left VA branches was considered dangerous and was not performed. The risk of the surgical removal

of pheochromocytoma metastases is very high because of hypervascularity and hemodynamic changes caused by the release of vanillylmandelic acid; therefore preoperative vascular obliteration is important.

A percutaneous embolization of the tumor was performed via right and left anterolateral routes, under neuroleptanalgesia and with hemodynamic monitoring to prevent acute hypertension. By these routes, 10-gauge needles were placed under fluoroscopic guidance in the body of C6 after pushing the vessels laterally as in the anterolateral approach to the cervical disk. The progressive embolization of the body was fluoroscopically controlled (lateral view) and stopped when the radiopaque Ethibloc arrived in close relation to the posterior wall of the vertebra. Three-and-one-half milliliters of Ethibloc (mixture manufactured by Ethicon and containing zein, sodium amidotrisoate tetrahydrate, oleum papaveris, and propyleneglycol ethanol) were necessary to fill the corpus of the sixth vertebra (Fig 2). This agent was used because of its necrotizing power and its plasticity. During the procedure, no local pain was observed, but the release of vanillylmandelic acid induced major hypertension, which was controlled by hypotensive drugs. A control angiogram was performed via bilateral retrograde brachial routes at the end of the procedure and demonstrated complete disappearance of neovascularity of the sixth cervical vertebra (Fig 3).

Surgical removal was performed 48 hours after the embolization without hemodynamic difficulties or significant blood loss (under 500 mL).

Discussion

Preoperative endovascular embolization of spinal tumors gives very good results in most instances (1–10). Nevertheless it can be difficult for technical reasons (2–8) and dangerous because of the close relationship between the blood supply of the tumor and the arteries of the spinal cord and the vertebrobasilar system (1, 3, 6, 8, 10).

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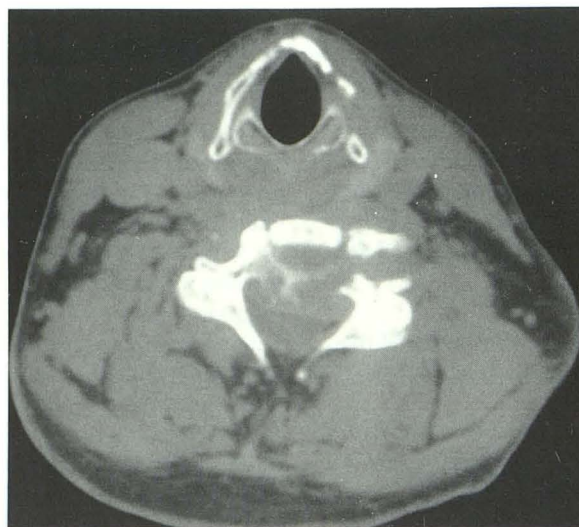
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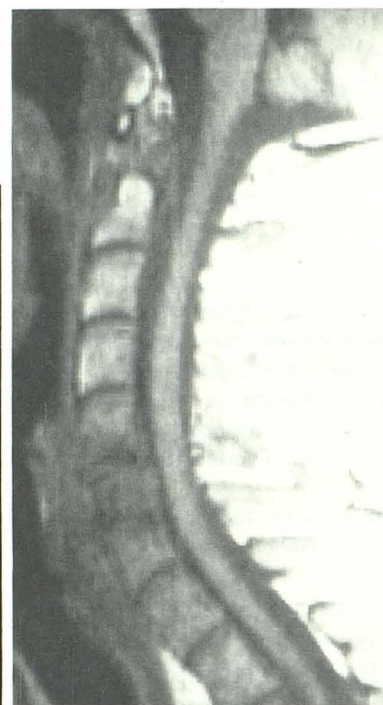
Fig. 1. A, CT scan after contrast injection. Osteolysis of the corpus of C6 with destruction of the posterior wall of the vertebra.

B, MR sagittal T1-weighted sequence. Hyposignal of the corpus of C6 and of the inferior part of C5 with epidural tumor responsible for cord compression.

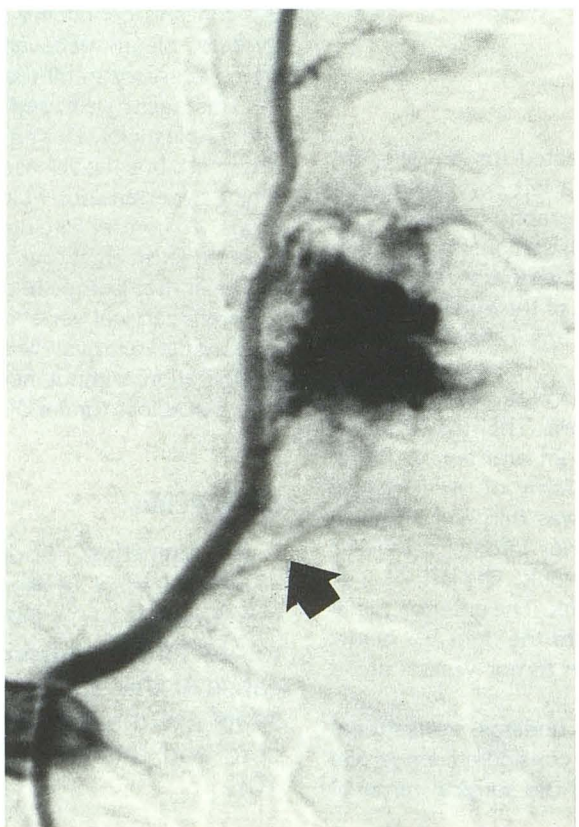
C, Right vertebral angiogram. The artery is hypoplastic and supports the spinal artery to the cervical cord (*arrow*). It feeds an intense tumoral blush involving in the corpus of C6 and the anteroinferior part of C5. *Left*, lateral view; *right*, anteroposterior view.



A



B



C

A common origin of anterior spinal arteries and tumor vessels is quite rare in the thoracic and lumbar areas. It was estimated at 17% in a previous report (3). However, it was very common

in the cervical spine (6). This can be explained by the blood supply of the cervical spine, which arises from the vertebral arteries up to C6 and from the cervical intercostal trunks below C6 (14).

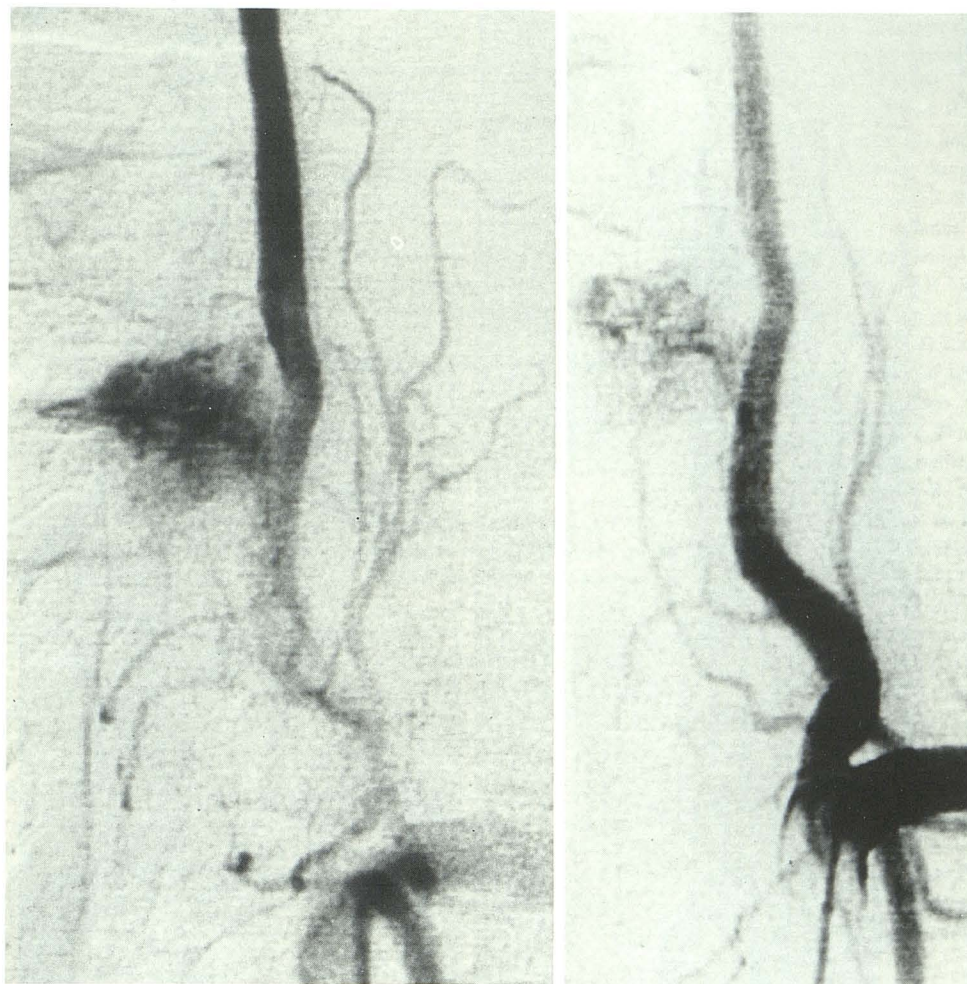


Fig. 1. *D*, Left vertebral angiogram. This artery is dominant and also feeds a tumoral blush of the corpus of C6.

D

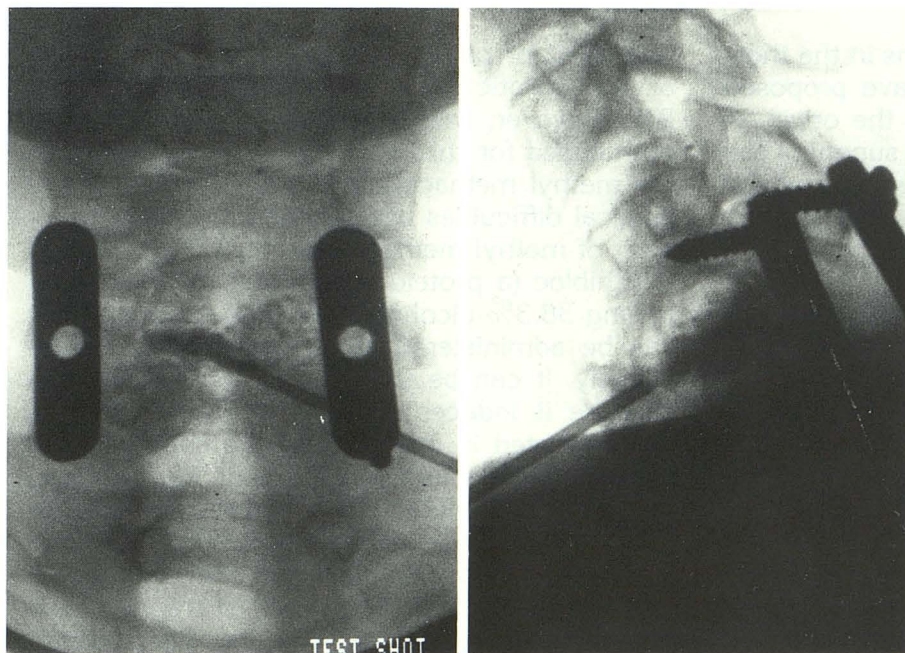
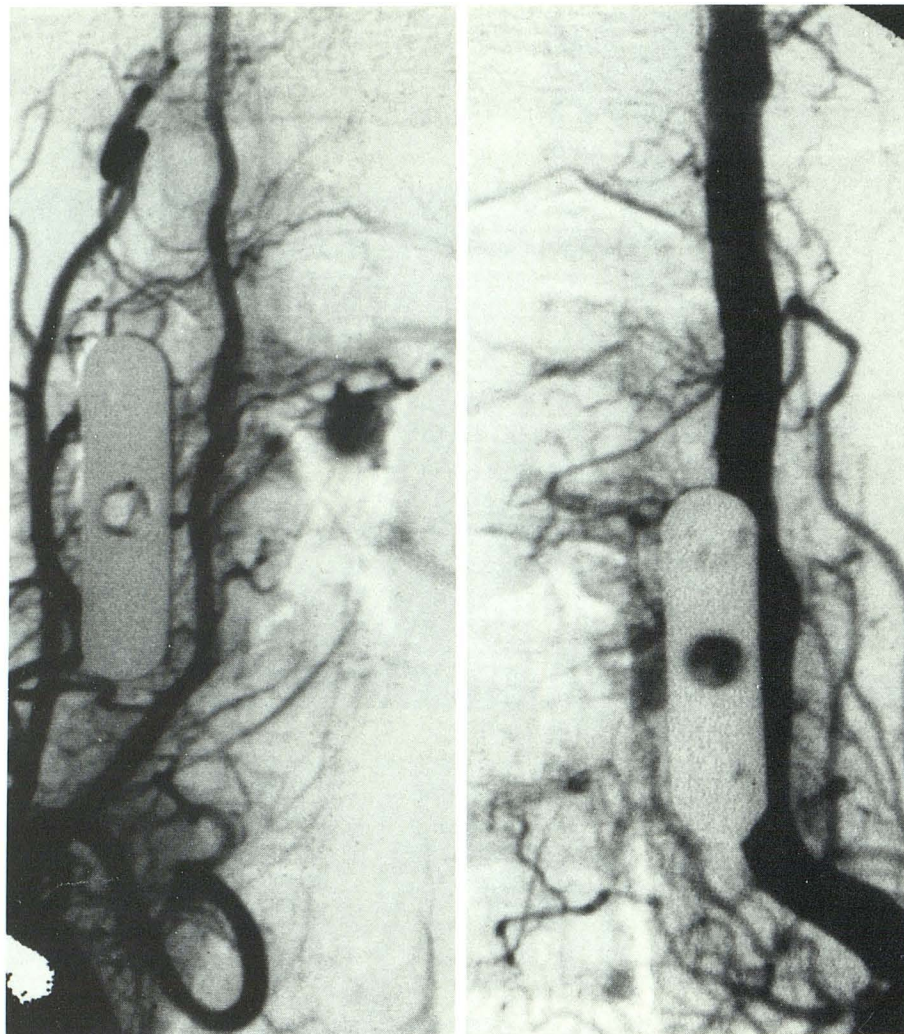


Fig. 2. Anterior percutaneous approach to the body of C6 with injection of Ethibloc. Note the opacification of the posterior part of the corpus.

Fig. 3. Control angiogram, right brachial (*left*) and left brachial (*right*). Complete disappearance of the tumoral blush of C6. Persistent tumoral blush of the anterior part of the corpus of C5.



To avoid neurologic complications in the thoracolumbar spine, some authors have proposed placing a tracker catheter beyond the origin of the spinal artery (15). However, the supply of the vertebral body also arises from the trunk of the intercostal artery (16), and such embolization could be incomplete and less helpful (3).

In the cervical spine, some authors have proposed embolization of tumor arteries in conjunction with temporary occlusion of the distal vertebral arteries (17). However, this technique has the risk of distal embolization to the basilar system when the balloon is deflated.

In the case reported, the asymmetric vertebral arteries and the origin of the spinal artery from the VA were a high-risk anatomic configuration for arterial embolization. Because the risk of surgical removal without embolization was also very high, we performed a percutaneous embolization of the lesion. Vertebroplasty with methyl methacrylate is a method previously described for the

treatment of painful hemangiomas, metastases, or osteoporotic fractures of the spine (11–13, 18–21). However, this technique could not be recommended for this case preoperatively because the methyl methacrylate is solid. This produces surgical difficulties because of the solid consistency of methyl methacrylate.

Ethibloc (a proteic radiopaque emulsion containing 38.3% alcohol) is an embolic agent that can be administered intra-arterially or percutaneously. It can be used for tumor embolization because it induces necrosis of the tumors, as demonstrated in our case by the complete disappearance of the tumoral blush. Furthermore, the material produces no technical difficulties for surgical removal because it stays soft. Therefore, such percutaneous embolization with a soft agent can be an efficient alternative to transvascular embolization when the arterial route is contraindicated because of risk to the spinal cord or brain stem.

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