Giant tumor cell. Preoperative tumor intraarterial embolization

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Patient: 25 years, male

Clinical History:

A 25-year-old male patient presented with back pain, lasting over the past two months. A clinical examination was done, which revealed that he had a limited range of motion in the spine. Imaging study showed the presence of a D8 geographic lytic lesion on the pedicle, with destruction of the internal cortex.

Imaging Findings:

We present the case of a 25-year-old man complaining of back pain, lasting over the past two months. A clinical examination was done, which revealed that he had a limited range of motion in the spine; the pain was reduced by rest. The neurological examination done, was found to be normal. The CT scan study (Fig. 1) revealed the presence of a D8 geographic lytic lesion with no ring sclerosis, centered on the pedicle, with destruction of the internal cortex. The patient underwent a needle biopsy and the diagnosis of giant cell tumor was confirmed by the histological examination of the specimen. The MRI study showed, in sagittal T1 image, marrow replacement with soft tissue mass and an extension to the superior pedicle (Fig. 2), and, in the axial-gradient echo T2 image, it showed a soft tissue mass of high-signal intensity arising from the pedicle and extending into the spinal canal and resulting in an extradural intraspinal mass effect to the medulla with marked left displacement (Fig. 3). Contrast enhancement fat suppression showed a homogeneous enhancement within the tumor, which spread to the adjacent vertebral posterior elements (Fig. 4). Due to the major risk of excessive intraoperative bleeding, it was decided that the intraarterial embolization of the tumor would be carried out two days before the surgical intervention. The embolization procedure was performed under local anesthesia via the femoral sheath to facilitate catheter exchange and with intravenous sedation. After a global thoracic aortography, selective catheterization of the segmental dorsal arteries (D5–D9) was performed with a Cobra 2 catheter. The feeding arteries of the tumor (D6, D7 and D8) were superselectively catheterized using a coaxial system (Tracker 18) for embolization with PVA particles of 150–200 mm diameter (Fig. 5). These particles were found to be suspended in 50 ml of non-ionic contrast medium, in a vial. A post-embolization angiogram showed a near, total occlusion of the feeding artery and patency of the normal branches (Fig. 6). A gadolinium-enhanced MRI study done, 24 h later demonstrated hypoenhanced areas corresponding to necrotic areas within the central portion of the tumor, although the mass effect to the spinal cord and the radicular compression had not changed significantly (Fig. 7). The patient was operated on with the vertebral resection of D8 and the posterior elements of D7, and the tumor was totally removed. The estimated blood loss during the surgical procedure was 200 cc. After a follow-up done 18 months later, the patient was found to be
Giant cell tumor (GCT) is a relatively common skeletal tumor, accounting for 4%–9.5% of all primary osseous neoplasms. It is a locally aggressive tumor, consisting of a vascularized network of spindleshaped stromal cells surrounding multinucleated giant cells. The most common specific location of occurrence of the GCT is around the knee (50%–65% of cases). The single most common site is the distal femur (20%–30% of cases) followed by the proximal tibia (20%–25%). In the thoracic spine, this tumor is infrequent and usually affects the vertebral body. MR images provide more information on both the tumor location and extension than do CT or plain films. The GCT usually has a low to intermediate signal on T1-wi and a predominantly high signal on T2-wi (1). The case that we present involves the dorsal posterior elements with destruction of the pedicle, extending to the adjacent vertebral bodies. There is a higher recurrence rate for tumors that involve the posterior elements in comparison with lesions residing only in the anterior elements (2). GCT is a hypervascularized lesion and the surgery in patients with hyper vascular tumors is frequently complicated by excessive intraoperative blood loss. A preoperative tumor embolization procedure facilitates surgical resection primarily by reducing intraoperative bleeding, ensuring an unimpeded view of the surgical field and making complete tumor resection more likely (3,4). The estimation of intraoperative hemorrhage showed a median value of 5000 ml in patients affected with hypervascular spinal tumors and it was recommended to reduce bleeding complications by adopting a preoperative embolization procedure (5). In this case, we decided to embolize the distal vessels. During the embolization procedure, the occlusion of smaller tumor vessels by means of small-particles is very important; most frequently, polyvinyl alcohol (PVA) is used to occlude the tumor vessels. The effect of proximal embolization with coils alone is moderated and it is not sufficient to ensure a safe operation of hypervascular lesions. The reason is an early revascularization of the tumor occurs through intersegmental collaterals. In these cases, a careful interpretation of high-quality spinal angiograms, superselective catheterization and flow control during embolization is very important to avoid neurological complications. The radiculomedullary and radiculopial arteries are a part of anterior or posterior spinal cord circulation, and therefore must be identified; and embolization of such segments should be avoided. Small-sized particles with diameters less than 150 mm should not be used as they may cause blockage of the arterial input to the spinal cord at the level where collateral supply is either inadequate or does not exist (6). In conclusion, preoperative embolization of these tumors with medium sized particles is an effective tool to reduce intraoperative blood loss and it helps to increase technical feasibility and safety of the surgical procedure.

**Differential Diagnosis List:** Giant cell tumor.

**Final Diagnosis:** Giant cell tumor.
**Description:** A CT scan showing a D8 geographic lytic lesion on the pedicle with destruction of the internal cortex. **Origin:**
**Figure 2**

**Description:** A sagittal T1 image, showing marrow displacement with tissue mass. **Origin:**
Description: An axial-gradient echo T2 image, showing a soft tissue mass of high-signal intensity arising from the pedicle and extending into the spinal canal. Origin:
Figure 4

Description: An MR image showing a homogeneous enhancement within the tumor, spreading to the adjacent vertebral posterior elements. Origin:
Description: An image showing the selective catheterization of segmental D8 artery. Origin:
Description: An image showing the total occlusion of the feeding artery. Origin:
Figure 7

Description: An MR image showing hypoenhanced areas corresponding to necrosis. Origin: