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BACKGROUND: Although percutaneous endoscopic technique has been routinely used in the treatment of disk herniation, there are few reports on its application in the management of intraspinal tumors. We present a case report of lumbar epidural angiolipoma that was totally removed by percutaneous endoscopic technique.

CASE DESCRIPTION: A 63-year-old man presented with a 4-month history of progressively worsening low back pain. No abnormal neurologic finding was noted on physical examination, and magnetic resonance imaging demonstrated a dorsally located L2-3 epidural lesion, suggestive of a noninfiltrating angiolipoma. During the operation, an 8-mm skin incision was made, and a dilator was bluntly inserted toward the interlaminar space, followed by insertion of a working cannula onto the ligamentum flavum and placement of the endoscope. The interlaminar space was enlarged by resection of part of the lower rim of the right L2 vertebral laminae, and the right side of the interlaminar ligamentum flavum was removed to expose the tumor. The tumor was totally removed piecemeal under endoscopic guidance, and pathologic examination confirmed the diagnosis of angiolipoma.

CONCLUSIONS: This report supports the application of percutaneous endoscopic technique in the surgical resection of noninfiltrating extradural lumbar angiolipoma.

INTRODUCTION

Percutaneous endoscopic technique has been widely adopted in surgeries for disk herniation and spinal stenosis. A recent case report showed the successful application of transforaminal endoscopic surgery for biopsy and partial removal of a ventrally located epidural thoracic malignant tumor. We report a case of a dorsally located lumbar epidural angiolipoma that was totally resected via an interlaminar approach with a percutaneous spinal endoscopic procedure.

CASE REPORT

History and Examination
A 63-year-old man with progressively worsening low back pain for 4 months was admitted to our hospital. Physical examination showed no numbness of lower limbs, abnormalities in superficial and deep sensations, or muscle weakness.

Imaging Studies
Preoperative magnetic resonance imaging demonstrated a dorsally located L2-3 epidural mass suggestive of a benign tumor (Figure 1A). In view of the slow-growing nature of the tumor, the patient chose to undergo minimally invasive percutaneous endoscopic surgery. Follow-up magnetic resonance imaging performed 6 months later showed no sign of tumor recurrence (Figure 1B), and postoperative computed tomography volume-rendering technique reconstruction of the spinal column showed minimal impact of the operation on the bony structures (Figure 1F). The scar that resulted from the operation measured approximately 4 mm in length (Figure 1G).

Operation
A percutaneous spinal endoscope was used for the resection of this dorsally located epidural tumor. After administration of general anesthesia, the patient was placed in prone position with all pressure points padded. According to the skin projection of the lesion, a longitudinal 8-mm incision, 20 mm to the right of midline, was first made at the L2-3 level. A 6.9-mm diameter dilator was bluntly inserted through the skin incision toward the interlaminar space, which was followed by insertion of a 7.9-mm diameter working cannula onto the ligamentum flavum, and...
finally the dilator was removed for the placement of a rigid spinal endoscope (SPINENDOS GmbH, Munich, Germany; all endoscopic instruments, including dilator and working cannula, were also from SPINENDOS GmbH). The accuracy in positioning of the endoscope was confirmed by intraoperative C-arm x-ray. The operation was performed under endoscopic visual control and continuous saline irrigation. The endoscopic irrigation system comprised a washing tunnel and outlet tunnel, and the local irrigation pressure was set between 15 and 20 cm H2O or temporarily increased to 40–50 cm H2O by closing the outlet tunnel for hemostasis. The lower rim of the right L2 vertebral laminae was partially removed by a long-stem drill to enlarge the interlaminar space, and then the right ligamentum flavum was removed by micropunches to expose the tumor. The tumor was red and white in color and approximately 1.0 × 1.5 × 2.5 cm in size. Because there were clear borders between the tumor and dura mater and nerve root, the tumor was totally removed piecemeal (Figure 1C–E). Bleeding was controlled by closing the exit of the irrigation system to increase local pressure, by application of gelatin sponge, or simply by waiting for spontaneous formation of blood clots. Finally, the working cannula was removed, and the skin wound was closed by
sutures. Blood loss was estimated to be only approximately 10 mL, and the operation time was 128 minutes.

Follow-Up
The patient was able to walk 1 day after surgery, and his symptoms had disappeared when he was discharged 2 days after surgery. There was no relapse of the patient’s symptoms at 1-year follow-up examination.

DISCUSSION
Routine surgical management of intraspinal tumors involves open surgery via a posterior approach, such as laminectomy, unilateral hemilaminectomy, and minimally invasive interlaminar approach. Inspired by the clear visualization of the lesion during our previous endoscopic operations for lumbar disk herniation and the availability of different shapes of endoscopic forceps, we cautiously attempted to manage intraspinal tumors with a spinal endoscopic approach. Moreover, the well-encapsulated angiolipoma in our case was poorly vascularized. Therefore, endoscopic dissection of the angiolipoma by direct grasper was not likely to cause severe bleeding or excessive retraction of dura mater and nerve roots. The risks of cerebrospinal fluid leak and dura mater tear were also minimized by confinement of the surgical manipulations within the extradural fatty tissues and avoidance of sharp dissection of the tumor. To the best of our knowledge, this is the first reported case of total removal of a lumbar epidural angiolipoma with a percutaneous spinal endoscopic procedure.

Hijikata was the first to report performing percutaneous lumbar disk surgery in the early 1970s, and endoscopes were first introduced as an alternative to open surgery for visualization of the intervertebral space in the early 1980s. A fully endoscopic transforaminal operation was then developed from simple endoscopic investigations, and endoscopic interlaminar approaches were first reported in the 1990s. DeAntoni et al. reported successful lumbar discectomy via a translaminar approach with standard arthroscopic instrumentation. Since then, endoscopic treatments of various spinal nonneoplastic lesions (e.g., disk herniation, spinal stenosis, infections, and tethering of spinal cord) have been attempted through this minimally invasive interlaminar or transforaminal corridor. Ruetten et al. showed excellent outcomes with a fully endoscopic operation for lumbar disk herniation via an interlaminar and lateral transforaminal approach. Percutaneous endoscopic surgery differs from endoscope-assisted microsurgery, as the former does not rely on a microscope, and all procedures are performed through the endoscopic working cannula. The operative field in endoscopic surgery is maintained clear by continuous water irrigation, and the water pressure is set at a level that can effectively prevent oozing from paravertebral venous plexus. Until now, only a few studies have reported the successful resection of spinal neoplasms or similar lesions by using a percutaneous endoscope. In 1998, Frank first reported successful treatment of L4-S1 epidural lipomatosis with an endoscopic technique. However, a bilateral L5-S1 laminotomy was required before the fat tissues were removed with an endoscopic aspirator. Similarly, in the report by Sairyo et al., endoscopic excision of L3-4 epidural lipomatosis was achieved after a right-side laminotomy and removal of the ligamentum flavum on both sides. More recently, the first biopsy of a neoplastic lesion, a ventrally located epidural thoracic malignant tumor, was achieved by transfemoral endoscopic surgery.

In the present case, we managed to access and totally resect the epidural angiolipoma by even less removal of vertebral laminae and ligamentum flavum, and thus better preservation of spinal mobility and stability can be expected. The invasiveness of a percutaneous endoscopic procedure is comparable to, if not less than, a dorsal translaminar microsurgical approach. The patient would experience little pain because of the small skin incision and could recover faster because of the minimal impact on spinal stability by the operation.

There are still several obstacles that might hinder the application of percutaneous endoscopic surgery in the management of intraspinal tumors. First, the surgical manipulations and hemo-stasis are limited in the “coaxial technique” with the endoscope and the instrument placed in the small working tube. For example, isolation of the tumor from surrounding tissues would be difficult through a single endoscopic working cannula and by a single endoscopic forceps if the tumor is large. Moreover, the endoscopic visual field would be easily blurred when the tumor has rich vascularity. Finally, when intraoperative findings suggest malignancy, the neoplasm adheres tightly to the dura mater, or there are high risks of dural tear, conversion of endoscopic surgery to an open procedure should be considered.

CONCLUSIONS
The success of percutaneous endoscopic surgery for the treatment of a lumbar epidural angiolipoma in the present report suggests that certain intraspinal tumors (i.e., extradural and noninfiltrative) could be safely removed with a percutaneous endoscopic procedure. The major benefits of this technique include minimal invasiveness (e.g., small skin incision and minimal bone removal) and magnified operative field to allow for safe surgical manipulations. With development of better endoscopic instruments, it is possible that this percutaneous endoscopic technique might be applied in the surgical management of other types of intraspinal tumors.

REFERENCES


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