

Cervical Neurinoma Encasing Vertebral Artery: a case report and review of the literature

Afsoun Seddighi, Amir Saied Seddighi, Maryam Sadegh Azar, Amir Hossein Zohreh Vand

Functional Neurosurgery Research Center, Shohada Tajrish Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

ABSTRACT

Our case was a 48-year-old man with cervical pain radiating to the upper limbs. Imaging showed an intradural tumor with extradural component encasing the vertebral artery. The tumor diagnosed as a neurinoma and had been removed surgically. The post operation magnetic resonance imaging showed that the tumor was completely removed and the vertebral artery was intact at the entire length. The goal of surgery of neurinoma is a total removal of the tumor, however if the vertebral artery is completely encasing by the tumor, it is advisable to remove the tumor to the level that the vertebral intactness is saved.

Keywords: Neurinoma; Cervical; Vertebral artery

ICNSJ 2014; 1 (2):65-68

www.journals.sbmu.ac.ir/neuroscience

Correspondence to: Amir Saied Seddighi, MD; Functional Neurosurgery Research Center, Shohada Tajrish Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran; E-mail: a_seddighi@sbmu.ac.ir; Tel: +98(912)2151591

Received: July, 24, 2014

Accepted: October, 19, 2014

INTRODUCTION

Cranial neurinomas are benign and relatively slow growing tumors, but growing in unusual sites can cause several clinical manifestations by compressing surrounded neurovascular structures¹. About 25%-40% of the schwannomas are in the head and neck region². Extradural component of this tumor is located in the mediastinum or pre vertebral areas, and the exspatiation of this component make neurinoma as one of most common tumors causing medullary compression at the cervical level³. Extradural and extra spinal extension occurs in about 15% of this tumors⁴. Complete removal of these tumors can cause a series of problems in nerve root preservation and saving the stability of the spine and the vertebral artery and can lead to fatal outcomes⁵. Preoperative vertebral angiography should be performed to identify the compromising of the vertebral artery by a cervical neurinoma⁶. The resection of the tumor can be done by a posterior, anterolateral, anterior approach based on the location, size and the involved area⁴. Mainly the posterior surgical approach to cervical cord tumors is preferred, with favorable post-operative results⁷.

Recurrences of these tumors after total removal are rare².

CASE PRESENTATION

A 48-year-old male was admitted to the hospital with pain over the neck, left shoulder and arm. Neurological examination revealed left-sided spastic hemiparesis, more pronounced distally hypoesthesia below C2 dermatome and hyperactive deep tendon reflexes. T1-weighted Magnetic resonance imaging (MRI) of the cervical spine showed a hypointense mass measuring 1.5x2x2.5 cm and occupying the left neural foramen and left half of the spinal canal. The lesion had a prominent hyperintense center with a hypointense periphery on T2-weighted images. There was a marked contrast enhancement of the periphery of the lesion following gadolinium injection (Figure 1).

Intradural component of the mass was showed compression on the left side of the spinal cord while the extradural component was close to the vertebral artery. Cranial diffusion perfusion MRI performed to depict cerebral vascularization and collateral circulation was normal (Figure 2).



Figure 1. MRI of the cervical spine of our patient showing C2 Neurinoma.

Vertebral MR angiography was performed to determine the course of the vertebral artery and to plan the surgical procedure (Figure 3).

The patient was operated via a post exposure with cervical laminectomy. The tumor was considered as a

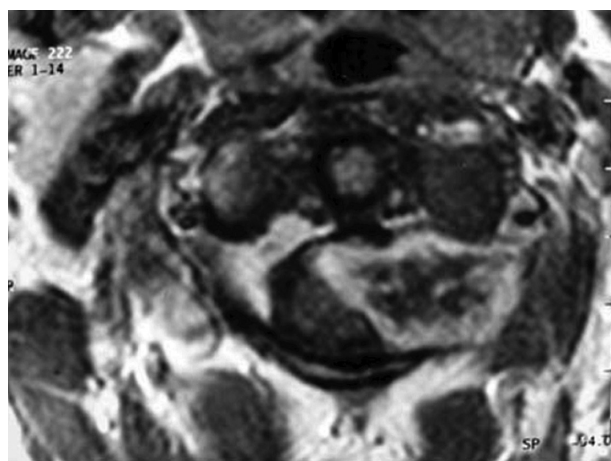


Figure 2. Axial T1 weighted MRI which shows left sided neurinoma.

neurofibroma, there were possibilities of spinal cord compression by the intradural component and adhesions of the extradural component to the vertebral artery and venous structures around it (Figure 4).

Majority of the nerve fibers are entrapped within tumoral tissue in dumbbell neurofibroma cases, as in our case. It is impossible to remove the tumor without sacrificing the nerve root and aggressive surgery that may result in severe neurological deficits. Partial resection in dumbbell neurofibroma cases is safer but there is always the risk for recurrence and reoperation may be more hazardous. Since we predicted the encasement of the vertebral artery, we asked a vascular surgeon to collaborate.

To remove the parts of the tumor that were attached to the vertebral artery proximal, ligation was performed and after complete resection of the tumor, vertebral

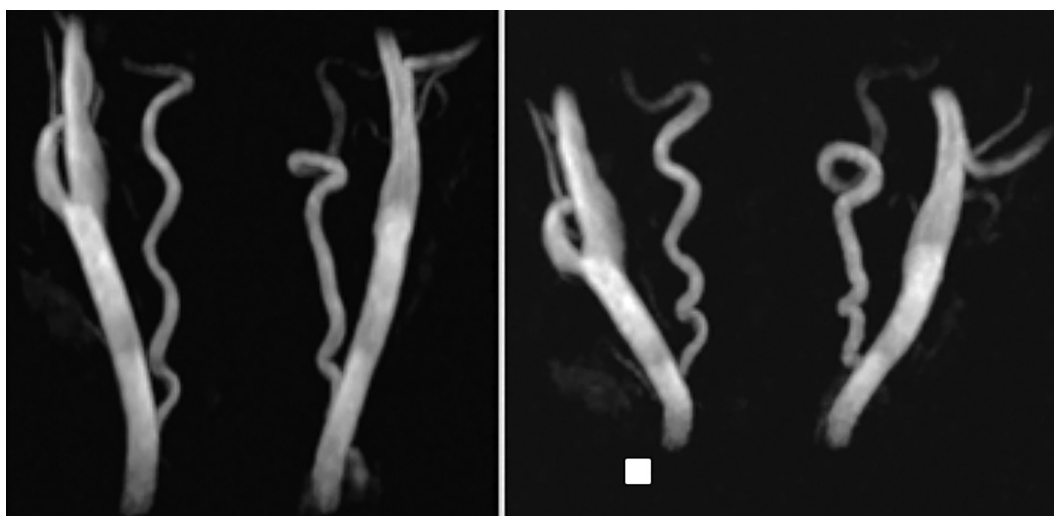


Figure 3. Preoperative MR angiography which shows patent vertebral arteries.

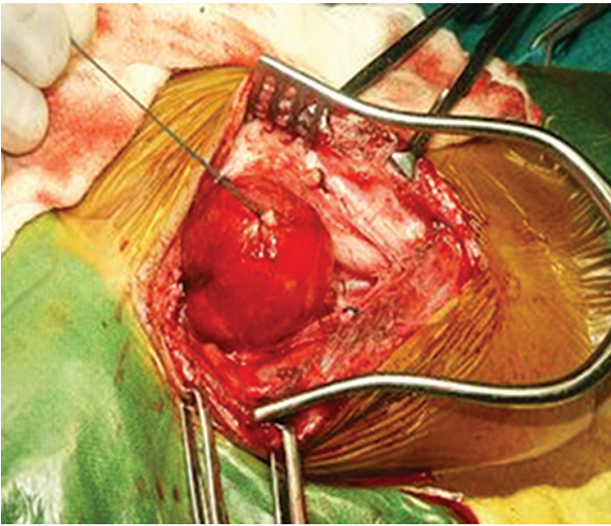


Figure 4. Intraoperative view shows the gross tumor bulk.

artery reconstruction was done. Post operation MRI and angiography was performed for follow up of the patient showed no visible damage to the artery (Figure 5, Figure 6). There was no recurrence of the symptoms at one year follow up.

DISCUSSION

Dumbbell- shaped neurinomas constitute 6% of all spinal tumors. In the cervical region 71% of the tumors are dumbbell shaped. Mainly the spinal neurinomas are intradural benign tumors, with a slow growth and an occurrence of 43.3% to 58.3% in the cervical region³. The extradural and intradural expansion of this tumor can lead to compressions of the spinal cord and the close vascular systems that make the preoperative imaging

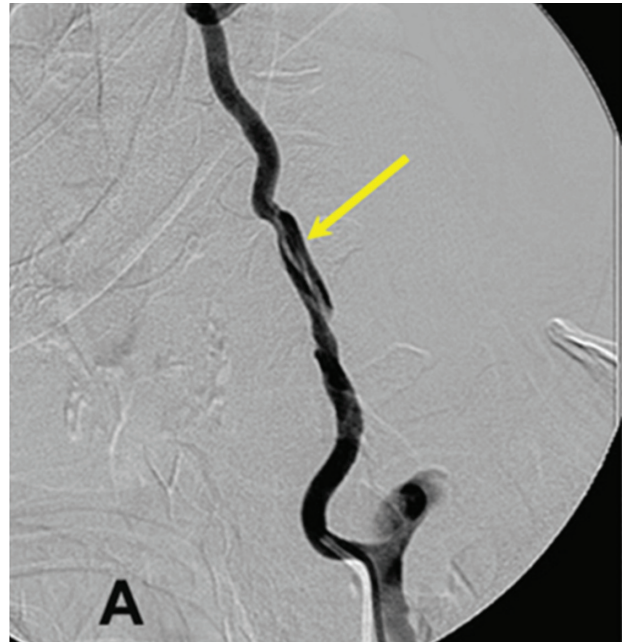


Figure 6. Post-operative angiography showed a complete preservation of the vertebral artery.

evaluation of the tumor advisable to distinguish the location and origin of the tumor⁸. A total removal of the tumor without any complication can be challenging due to the location combined with the close anatomical relation of the tumor to important vascular and nervous structures. Partial resection in dumbbell neurofibromatosis safer but the risk for recurrence and the need of reoperation may be more hazardous. A total resection usually had a good long-term outcome with low recurrence risk. Although the involvement of the vertebral artery from both sides make the resection of tumor complicated. The resection

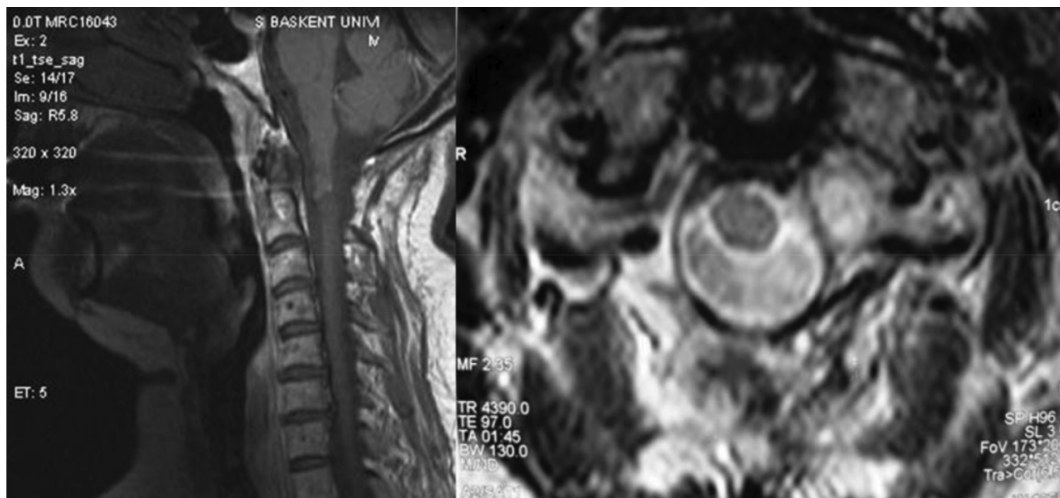


Figure 5. Post-operative MRI with contrast shows complete tumor removal.

of the tumor can be done by a posterior, anterolateral, anterior approach based on the location, size and the involved area⁴.

The anterior or anterolateral approach has several advantages like safe separation of the tumor from the vertebral artery due to the direct visualization of the vertebral artery. It also had a low risk of injuring the spinal cord by removing of the extra spinal canal tumors⁹.

Overall, the posterior approach for cervical cord tumors is preferred. This approach is useful in intraspinal canal tumors, but the extraspinal canal tumors are relatively inaccessible by this approach³. In the literatures the modified posterior approach had showed the advantages to be a less invasive method to the cervical vertebrae and due to that, the occurrence of postoperative instability and angular deformity, and long postoperative immobilization had been reduced⁷. However an angiography is needed to identify the diameter and involvement of the vertebral artery before the operation, to avoid complication due to the ligation of the vertebral artery if it is necessary. In such cases the diameter of the ligated vertebral artery should not be larger than the not involved one¹⁰. The approaching method should be chosen by including all the important factors such as location, size and the involved of the area by the tumor, to prevent further surgical interventions. To avoid incomplete resection or the involvement of nerve or vascular systems by the removing of the tumor, consulting should be done before and at the time of surgery.

CONCLUSION

The most significant feature of dumbbell neurofibromas is the adhesion of the tumor to the environment by enlarging the foramen and projecting outward from the spinal canal. The goal of surgery is total removal of the tumor. Although a variety of surgical approaches for these lesions is available, most cervical spine dumbbell tumors can be effectively managed with a single-stage posterior exposure with partial laminectomy and unilateral facetectomy. However, in selected cases partial removal

of the tumor with adequate spinal cord decompression can be preferred to prevent vertebral artery injury.

Conflict of interest statement

None of the authors has any potential conflict of interest.

REFERENCE

1. Kalavakonda C, Sekhar LN, Jones RV, Rehaman AB. Intermittent vertebral artery compression caused by C1-root schwannoma: case report. *Neurol Res.* 2000;22 (7) :679-84.
2. Kim SH, Kim NH, Kim KR, Lee JH, Choi HS. Schwannoma in head and neck: preoperative imaging study and intracapsular enucleation for functional nerve preservation. *Yonsei Med J.* 2010;51 (6) :938-42.
3. Iwasaki Y, Hida K, Koyanagi I, Yoshimoto T, Abe H. Anterior Approach for Dumbbell Type Cervical Neurinoma. *neural med chir (Tokyo).* 1999;39:835-840.
4. Radulović D, Ivanović S, Misović M. Surgical management of cervical neurinomas with extraspinal extension. *Acta Chir Jugosl.* 2004;51 (4) :81-5.
5. Oruçkaptan HH, Gürçay O. Combined posterior and posterolateral one-stage removal of a giant cervical dumbbell schwannoma. *Pediatr Neurosurg.* 1999;30 (2) :102-7.
6. Avman N, Ozaki E, Erdogan A. Vertebral arteriography and microsurgery in the management of dumbbell cervical neurinomas. *Surg Neurol.* 1975;4:327-329.
7. Uede T, Kurokawa Y, Wanibuchi M, Ze PH, Ohtaki M, Hashi K. Surgical approach for cervical dumbbell type neurinoma: posterior approach by partial hemilaminectomy with preservation of a facet joint. *No Shinkei Geka.* 1996;24 (7) :675-9.
8. Righini CA, Motto E, Faure C, Karkas A, Lefournier V, Reyt E. [Schwannomas of the neck. About 3 cases, and literature review]. *Rev Laryngol Otol Rhinol (Bord).* 2007;128 (1-2) :109-15.
9. Sen C, Eisenberg M, Casden AM, Sundaresan N, Catalano PJ. Management of the vertebral artery in excision of extradural tumors of the cervical spine. *Neurosurgery.* 1995;36 (1) :106-15; discussion 115-6.
10. Hoshino Y, Kurokawa T, Nakamura K, Seichi A, Mamada T, Saita K, et al. A report on the safety of unilateral vertebral artery ligation during cervical spine surgery. *Spine (Phila Pa 1976).* 1996;21 (12) :1454-7.