



ORIGINAL ARTICLE

Anterior intradural tumors of spine in children: endoscopy guided resection with neurophysiological monitoring by posterior approach

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Abstract

Introduction: Anterior intradural tumor of the spine is a challenge to the surgeon, especially in children. The use of the endoscope in intradural spinal tumors surgery is still poorly described. The association between spinal endoscopy and neurophysiological monitoring allows better tumor visualization and lower risk of retraction of the spinal cord, decreasing the neurological risk.

Methods: The authors described the posterior approach to tumor resection. The medical records from two cases were described.

Results: In the first case one dermoid tumor anterior to spinal cord was completely resected after endoscopy help. The second patient had one anterior tumor and the endoscopy was used to help gross total resection.

Conclusion: Microsurgery assisted by endoscopy is a safe and effective method to control resection of intradural tumors, and associated with neurophysiological monitoring becomes a secure method of approach this type of tumor in children.

Keywords: Endoscopy, spine, tumor, neurophysiological monitoring

Introduction

Anterior intradural tumor of the spine is a challenge to the surgeon, especially in children. The need for tumor removal is limited by the position of the spinal cord and the risk of neurological deficit development by retraction during surgery. The performance of anterior approach of the spine is more difficult in children than adults and there is risk of vertebral instability due to the extension of bone resection. The posterior surgical approach may limit the complete removal of the tumor and pieces may remain in the primary site due to incomplete visualization.

The use of the endoscope in intradural spinal tumors surgery is still poorly described. The association between spinal endoscopy and neurophysiological monitoring allows better tumor visualization and lower risk of retraction of the spinal cord, decreasing the neurological risk.

In this study the authors described the experience gained from the posterior approach for two extramedullary intradural lesions with the aid of endoscopy in children. Report the technique and results of the association between surgery for video-assisted tumor resection and neurophysiological monitoring as an auxiliary method for resection of intradural spinal tumors.

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Material and Methods

The review of the medical records and surgical data from two children with previous intradural tumors spinal cord was performed. The surgical technique used in both cases began with subsequent osteoplastic laminectomy of the affected levels with lateral extension, removing small part of the facet joint on the side of greatest tumor expansion. After opening the dura mater paramedian, began resection of the tumor and laterally above. The endoscope lens 30° was used to perform the inspection the anterior space and complementation resection of the tumor. The surgeries were performed under neurophysiological monitoring, somatosensory evoked potential using and potential engines, wave M and D. After resection of the previous lesion visualized by endoscope, the dura mater was closed and the replacement of the bone was performed with titanium miniplates.

Case 1.

Child 12 years old, with hemivertebra and secondary scoliosis. Had normal neurological function, but with progression of coronal deviation of the spine. It was submitted to radiological investigation by MRI which demonstrated the presence of an expanding lesion prior to spinal cord compression spinal cord (Figure 1). Performed neurophysiological preoperative exam that demonstrated integrity of somatosensory and motor responses. It was indicated common posterior approach for the resection of the lesion and intradural spine stabilization for the treatment of scoliosis. Laminotomy of two levels with partial lateral extension was made. After opening the duramater it was found that the lesion was covered by the cord (Figure 2). It was made the release of the dentate ligaments and then began tumor resection. Characteristics of the lesion were compatible with dermoid tumor. During surgery, it was seen only part of the lesion through the surgical microscope. Using the endoscope lens 30° was possible to visualize the lesion and its complete resection without tumor remnants (Figure 2). At the end of the lesion remove inspection by endoscope also showed small fragment anterior to spinal cord and this tumor was removed by the other side. Probably without endoscopy view this lesion could be missed. The neurophysiological monitoring remained unchanged and it was important to prevent further spinal cord retraction. The patient has recovered from surgery without clinical complications and neurological function preserved with total tumor resection (Figure 3).

Case 2.

Patient 14-year-old female presenting with cutaneous stigmata cafe au lait spots and diagnosed with neurofibromatosis type I. He presented progressive picture of spastic paraparesis with difficulty in walking and partial deficit level T2. The MRI image showed

expansive lesion prior to cord compression. In the image in T1 contrast there was a contrast of intense enhanced, suggestive of meningioma (Figure 3). He underwent surgery with laminectomy and opening the dura mater paramedian. Made tumor resection with assisted endoscopic view. After the initial resection was performed inspection and observed tumor contralateral part of the initial approach. Made tumor resection from the other side. Throughout the resection was done neurophysiological monitoring that was uneventful. The intraoperative bleeding was less than 300ml.

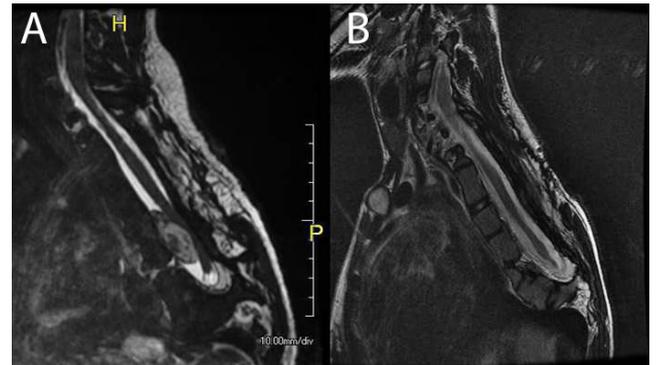


Figure 1. A – Preoperative MRI on sagittal view showing the tumor anterior to spinal cord. B -Postoperative MRI showing complete tumor resection

Discussion

Resection of anterior lesions of the spinal cord is a challenge to the neurosurgeon. Extradural lesions have an advantage over the intradural injuries by not having to open the duramater, thus facilitating the construction of a room for maneuver and removal of the tumor without spinal traction. The intradural surgery has a space constraint for the manipulation of the tumor in relation to epidural tumors. The wide bone resection of the tumor extends the vision capability, but can cause spinal and need for fixation of the spine in children for the treatment of progressive deformity instability. Furthermore, subsequent to previous approaches intradural tumors when applied myelopathy may cause a greater spacing marrow. The not adequate visualization of the tumor may allow tumor remnants remain and new growth occurs so the injury. Using the endoscope with neurophysiological monitoring allows an assessment of any remaining tumor accurately and neurological safety.

The current literature describes only few experiences with the use of intradural endoscope. One of the first description of the us endoscopes to myelotomy was written by Yamakawa in 1992 [1]. The authors described in myelotomy, draining veins of arteriovenous malformations and nerve roots of the cauda equina could be clearly seen by flexible fiberscope [1].

Chern and colleagues described the use of the endoscope for various intradural pathologies in

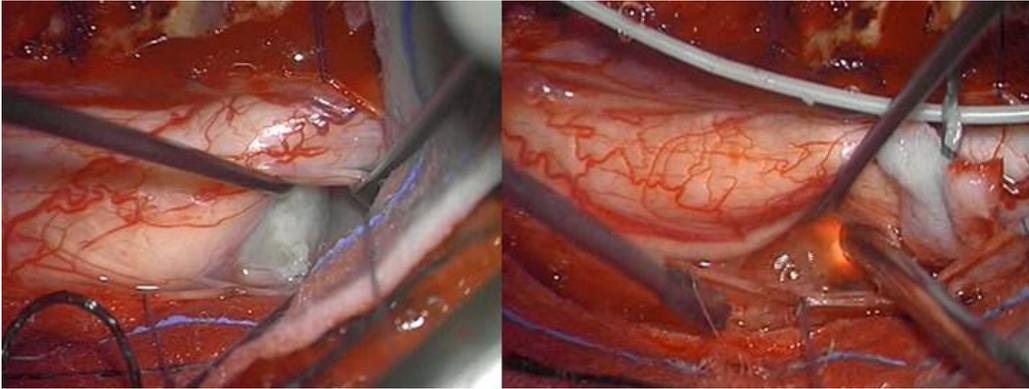


Figure 1. Surgical view from the microscope. The tumor was completely covered by spinal cord. With endoscopy helping it was possible to complete the resection.

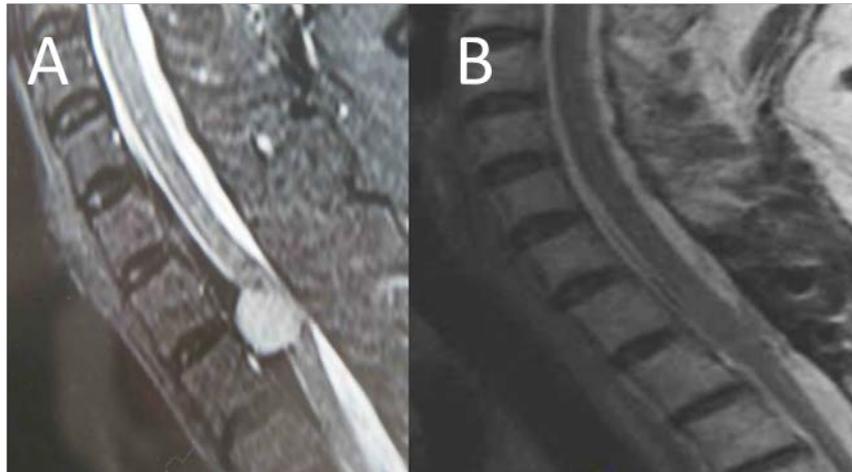


Figure 2. A - Patient with spinal cord compression due to one anterior tumor. B - Postoperative MRI from case 2. Complete tumor resection.

children [2]. The authors described one case of spinal cord tumor, one of holocord syringomyelia, one arachnoid cyst and one case of split malformation. In all cases the endoscope was used to see better the cavities in the spinal cord or subarachnoid space [2]. Barami and colleagues described the surgery for resection of intradural tumors using the endoscope [3]. The report showed that the patients had a good outcome and that bone approach may be less extensive when using the video [3].

Probably the most common indication in the literature is arachnoiditis [4, 5]. Mathews wrote about the use of endoscopy to see arachnoiditis in the subarachnoid space [5].

Our experience described in these two cases observed that the endoscope has been an important tool in view of possible tumor remaining and helped to complete resection of the lesion. The use of favored the neurophysiological monitoring neurological safety of the surgical procedure, preventing it had a larger displacement of the cord and both children showed no additional deficit after surgery. The endoscope primarily favored the tumor visualization in these cases and facilitated the search for tumor remnants. The children were 12 and 14 years age at time of surgery and it was possible decrease bone resection

during surgery, avoiding postoperative spinal deformity. Both lesions were located anterior from spinal cord (Figure), which would require an anterior or anterolateral approach. The bleeding was less than 300 ml in two cases, this value could be bigger if there was need of bone resection and spinal fusion. There were no neurological deficits after surgery. Control exams after surgery showed the complete resection of the lesions.

Microsurgery assisted by endoscopy is a safe and effective method to control the extension of resection of intradural tumors, and associated with neurophysiological monitoring becomes a secure method of approach to this type of tumor.

The review of the medical records and surgical data from two children with previous intradural tumors spinal cord was performed. The surgical technique used in both cases began with subsequent osteoplastic laminotomy of the affected levels with lateral extension, removing small part of the facet joint on the side of greatest tumor expansion. After opening the dura mater paramedian, began resection of the tumor and laterally above. The endoscope lens 30° (Minop Auesculap) was used to perform the above inspection cord and complementation resection. The surgeries were performed under neurophysiological

monitoring, somatosensory evoked potential using and potential engines, wave M and D. After resection of proven injury to the previous display by endoscope, was made closing the dura mater and the replacement of the fixation with blades removed the same with miniplates of titanium.

Conclusion

Microsurgery assisted by endoscopy is a safe and effective method to control resection of intradural tumors, and associated with neurophysiological monitoring becomes a secure method of approach this type of tumor in children.

Conflict of interest

The authors declare that they have no conflict of interest related to this article.

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