

SURGERY OF VENTRAL INTRADURAL MIDLINE CERVICAL SPINAL PATHOLOGIES VIA ANTERIOR CERVICAL APPROACH: OUR EXPERIENCE

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A VENTRALIS INTRADURALIS NYAKIGERINC-PATOLÓGIÁK SEBÉSZI ELTÁVOLÍTÁSA ELÜLSŐ NYAKI FELTÁRÁSON KERESZTÜL: SAJÁT TAPASZTALATOK

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Introduction – The surgical removal of the cervical intradural pathologies located ventrally carries a high risk. According to the anatomical situation and the increasing experience with anterior cervical approach and corpectomy revealed the reality to remove the ventral midline pathologies this way. The anterior approach which require corpectomy preferable to cervical intradural lesions located ventrally at the midline. In the literature have described anterior approach for intradural cervical lesions in very limited cases.

Case – The authors present five cases of intradural ventral cervical spinal pathologies, where removal was done via anterior cervical approach with corpectomy. Two of the cases were intradural meningeomas, one intramedullary cavernoma, one ventral arachnoid cyst and one malignant neurogenic tumour. The approach was described elsewhere. The corpectomy gave a relatively wide window to explore the pathologies and under operative microscope the local control of removal was fairly well. After the total removal of tumours and cavernoma, and fenestration of arachnoid cyst to the subarachnoid space watertight dural closure was made and the cervical spine was stabilized with autolog iliac bone graft, plate and screws. The recovery of the patients was well and there were no postoperative complications.

Conclusions – The anterior cervical approach with corpectomy seems to be a real and safe way to explore and remove the cervical ventral midline pathologies. Postoperative MRI has a great value in early control after the surgery and for follow up the patients.

Keywords: anterior approach, corpectomy, ventral intradural tumor, intramedullary, cavernoma, tumor

Bevezetés – A ventralis intraduralis nyakigerinc-patológiák sebészi eltávolítása a nagy kockázatú beavatkozások közé tartozik. Az elmúlt évtizedekben az elülső nyakigerinc-feltárásokkal és a corpectomiával szerzett tapasztalatok lehetővé tették, hogy a gerincszakon ventralisan elhelyezkedő patológiás elváltozásokat ezen úton el lehessen távolítani. Az elülső nyaki feltárás corpectomiával kombinálva elsősorban azon nyaki intraduralis elváltozások eltávolítására használható, ahol a laesio ventralisan a középvonalban helyezkedik el.

Esetismertetés – A szerzők öt esetben végeztek elülső nyaki feltáráson keresztül intraduralis ventralis nyakigerinc-patológia-eltávolítást. Eseteik között két meningeoma, egy intramedullaris cavernoma, egy ventralis arachnoidalis cysta és egy intramedullaris malignus neurogén tumor szerepelt. A corpuseltávolítás viszonylag széles műtési területet biztosított a patológiás elváltozások mikroszkóp alatti eltávolításához. A cavernoma és a tumorok eltávolítása, valamint az arachnoidalis cysta fenestrációját követően teljes durazárást végeztek, majd a gerincet saját csípőcsont, lemez és csavarok segítségével stabilizálták. A betegek a beavatkozást jól tűrték, posztoperatív szövödményt nem tapasztaltak.

Következtetés – Az elülső nyakigerinc-feltárás corpectomiával kombinálva biztonságos eljárás a középvonalban elhelyezkedő, intraduralis, ventralis nyakigerinc-patológiák eléréséhez és eltávolításához.

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Kulcsszavak: elülső nyaki feltárás, corpectomia, ventralis intraduralis tumor, intramedullaris, cavernoma, tumor

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The surgical removal of the cervical intradural pathologies located ventrally at the midline carries a high risk. The standard surgical approach to the dorsal or dorsolateral intradural extramedullary or intramedullary spinal pathologies has been the posterior approach after laminectomy or laminoplasty. Theoretically the dorsal myelotomy is suitable for removal centrally located intramedullary lesions and may cause a serious damage in the normal spinal cord tissue when the pathologies located ventrally. The posterolateral approach useful to visualize the ipsilateral anterior surface of the spinal cord¹. The anterior approach with corpectomy² is a real and suitable opportunity to visualize the midline anterior surface and both sides of the anterior spinal artery. In the literature have described anterior approach for ventral thoracic intramedullary lesions³, cervical intradural extramedullary⁴ and intramedullary⁵ lesions in very limited cases.

In the present report we describe our experience with the removal of ventral intradural midline cervical spinal pathologies via anterior cervical approach with corpectomy.

Material and method

PATIENT POPULATION

Between 1997–2000 five patients with ventral intradural pathologies were treated at National Institute of Neurosurgery, Budapest. **Table 1** summarizes the clinical data in this series of cases. Out of five patients two had histologically proved intradural meningiomas [Case 1 and Case 3 (**Figures 1, 2, 3**)], one had malignant neurogenic intramedullary tumor (grade IV) (Case 5), one intramedullary cavernoma (Case 2), and another had space occupying ventral arachnoid cyst (Case 4). Of the five patients three were male and two female. The mean age of the males was 32.3 years (range 22–53) and of the females 59.5 years (range 49–70). The location of the pathologies were seen at the level of C₃, C₅, C₆, C₇ corpus. All patient was controlled clinically and radiologically with plain cervical spine radiographs obtained six weeks, three months, six months, one year post-surgery. The patient wore soft collar for six weeks post-surgery.

Table 1. Summary of clinical data of five patients with cervical intradural ventral midline pathologies.

| Case | Age (years)/sex | Time of operation | Preoperative signs & symptoms | Location | Histology | Postoperative signs & symptoms |
|------|-----------------|-------------------|---|---|----------------------------|---|
| 1. | 49/female | 10.02.1998 | neck pain, brachialgia, both upper extremities numbness, left sided upper extremity decreased superficial sensation | C ₃ intradural extra-medullary | meningioma | improved, no focal signs |
| 2. | 22/male | 21.08.1997 | right lower extremity numbness, left upper extremity weakness, both shoulders pain and numbness, left distal mild upper extremity paresis, left hyperreflexia, right lower extremity hypaesthesia | C ₆ intra-medullary | cavernoma | unchanged, no new focal signs |
| 3. | 70/female | 14.08.1997 | left upper and right lower extremities numbness, left upper and both lower extremities weakness, gait disturbance, left upper extremity dominant tetraparesis, C ₆ –Th ₁ left sided hypaesthesia | C ₅ intradural extra-medullary | meningioma | motor function improved, no weakness |
| 4. | 22/male | 27.03.2000 | right dominant back pain, right upper extremity numbness, no focal signs | C ₆ intradural | arachnoid cyst | improved, no new focal signs |
| 5. | 53/male | 19.05.2000 | cervical and back pain, lower extremities weakness and numbness, both lower extremities paresthesia, slight paraparesis, left lower extremity hyperreflexia, Babinski sign, from Th ₁₀ distally hypaesthesia | C ₇ intra-medullary drop mets | malignant neurogenic tumor | worsened, severe paraparesis, urinary disturbance |

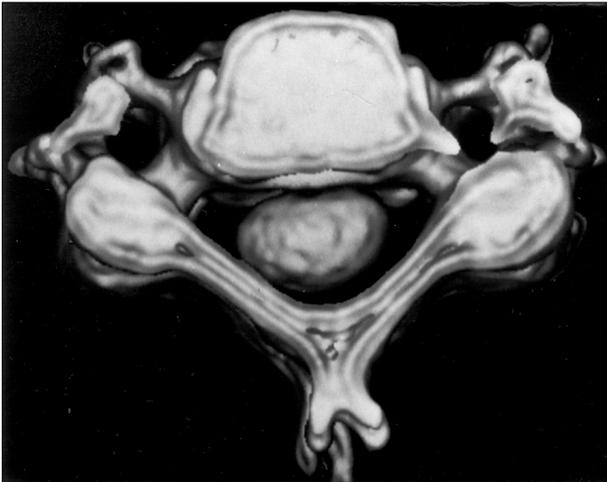


Figure 1. *Computerized tomography reconstruction scan showing the calcified ventromedially located meningeoma at the level of C₅.*

DIAGNOSTIC EVALUATION

All patients were evaluated with magnetic resonance imaging (MRI) pre- and postoperatively. Preoperative radiological evaluation of patients consisted of plain cervical radiography and most of the cases computer tomography (CT). Postoperative evaluation consisted of

CT and plain films to control the bony structures and the correct position of plate and screws after corpectomy and ventrofixation.

OPERATIVE TREATMENT

The patient was placed in supine position. Right sided skin incision was performed to explore the cervical vertebral bodies. The level of the pathology was confirmed by intraoperative radiography. The anterior longitudinal ligament was incised, and the necessary discectomies were performed. We made corpectomy by high speed drill under operative microscope. The posterior longitudinal ligament was removed and the dura mater were opened. After the removal of the tumours and cavernoma and fenestration of arachnoid cyst to the subarachnoid space we made watertight dural closure with 5.0 nylon stitches and fibrin glue. An appropriate length of tricortical iliac bone graft was inserted and plate (Caspar plates – Aesculap, Tuttlingen, Germany) and bicortical screws was positioned under the control of fluoroscopy. Lumbar drainage was used in two cases.

Results

We carried out macroscopically totally removal of tumours, cavernoma and fenestration of ventral arach-



Figure 2. *Contrast-enhanced sagittal T1-weighted magnetic resonance imaging scans showing the cervical intradural meningeoma at the level of C₅ A before the surgery and B after the surgery.*

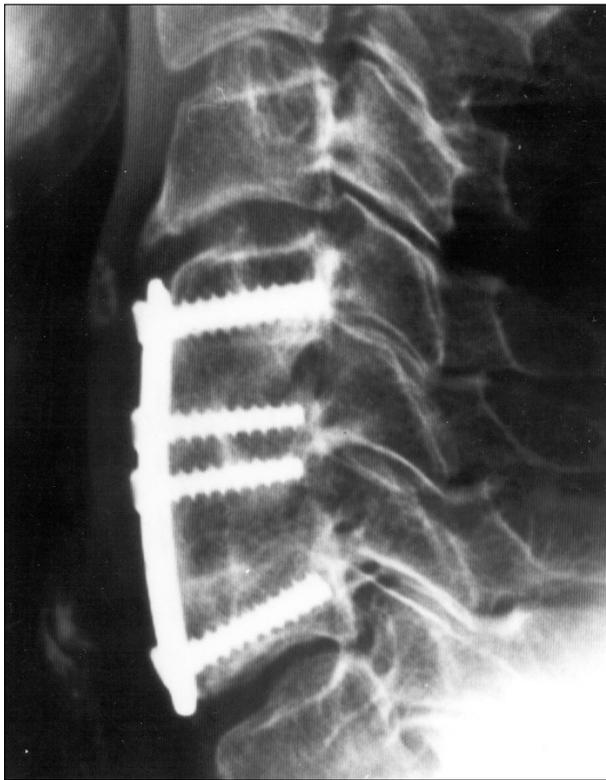


Figure 3. Lateral cervical radiographs revealing a C₅ corpectomy and C₄₋₆ fusion with autolog iliac bone graft and plate two years later.

noid cyst to the subarachnoid space. The postoperative radiological pictures showed no residual tumour, cavernoma and collapse of the arachnoid cyst, and correct position of the bone graft and plate and screws.

Three patients' neurological symptoms improved after the surgery (Cases 1, 3, 4), one unchanged (Case 2) and one patient's neurological condition became worse due to removal of exophytic intramedullary malignant neurogenic tumour (Case 5). There were no postoperative complications, wound infections, meningitis, liquorrhoea etc.

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Discussion

The surgical removal of the cervical intradural pathologies located ventrally at the midline is a surgical challenge and carries a high risk. The standard posterior surgical approach through laminectomy or laminotomy is suitable and commonly used to the dorsal or dorsolateral intradural extramedullary lesions and intramedullary pathologies not far beneath the dorsal surface of the spinal cord. This procedure has not been suitable to remove ventral intradural extramedullary, or ventrally or ventrolaterally located intramedullary lesions without extremely risk of spinal cord damage.

The posterolateral approach is suitable to remove ventrally located small extramedullary or intramedullary lesions, but the anterior spinal artery is the ventromedial limit of the exposure and not suitable for lesions that occupy both sides of ventral cord. Bilateral posterolateral approach might be use in whom the lesion extends both sides of anterior spinal artery, but should be only considered if the anterior approach impossible option because of the stabilization of the spinal coloumn¹.

The anterior approach which require corpectomy preferable to cervical intradural lesions located ventrally at the midline. This approach provides direct visualization of the ventral surface of the spinal cord on both sides of the anterior spinal artery. The corpectomy gave a relatively wide window to explore the pathologies. The exposure was deep, but under operative microscope the local control of removal was fairly well.

The recovery of the patients was well, only one patient neurological condition worsened with intramedullary malignant tumour with drop mets. There were no postoperative complications, wound infections, meningitis, liquorrhoea etc. We did not used lumbar drainage routinely.

Postoperative MRI has a great value in early control after the surgery and for follow up the patients. Postoperative CT and plain cervical radiography was done in all cases to reveal the bony structures after the operation, and the position of plate and screws.

According to our experience the anterior cervical approach with corpectomy has an important role to explore and remove the cervical ventral midline or ventrolateral pathologies. The procedure is safe and gives wide window to cervical ventral surface.