

Excision of an anterior intradural arachnoid cyst of the cervical spine through central corpectomy approach

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Abstract Anterior cervical intradural arachnoid cyst is a rare entity which has been mostly approached posteriorly, commonly resulting in incomplete resection. Incomplete resection is associated with recurrence; hence, we describe the anterior central corpectomy approach with complete neurologic recovery in a twenty year old with an anterior cervical intradural arachnoid cyst in front of the third and fourth cervical vertebra, who had presented with spastic quadriparesis.

Keywords Corpectomy · Anterior · Arachnoid cyst

Introduction

Intradural extramedullary arachnoid cysts (Type III meningeal cysts) [1] are rare entities, found mostly in the thoracic spine in a posterior location [2, 3]. Anterior cervical intradural arachnoid cysts are extremely infrequent with only 26 cases reported in the English literature till 2013 [4–8]. Most of these cases have been treated by a posterior approach by laminectomy and cyst fenestration, with only four previous reports of anterior cervical approach, corpectomy, and excision of the lesion. A 20-year old with an anterior cervical intradural arachnoid cyst in the C3/4 level with spastic quadriparesis was operated through central corpectomy approach to full neurologic recovery; consequently the surgical steps and the pros and cons of the various approaches are discussed here.

Case report

A 20-year-old right handed gentleman presented with complaints of pain at the nape of the neck for a year and progressive spastic quadriparesis of one month duration, with intact sphincters and no obvious history of trauma. Neck movements were moderately restricted in all directions and pain and temperature sensation was decreased markedly below the neck; however, joint position and vibration sensation were preserved. Power was MRC grade 2/5 in all limbs; deep tendon reflexes were brisk with presence of ankle clonus and up going planters. Magnetic resonance (MR) imaging of the cervical spine showed a well defined, non-enhancing intradural extramedullary cystic lesion at C3/C4 level with spinal cord compression posteriorly, suggestive of arachnoid cyst (Fig. 1). In view of severely compromised cord, awake fiber-optic bronchoscopic intubation was done, as any undue cord manipulation could make the patient quadriplegic. The neck was adequately extended for upper cervical exposure, position of the lesion confirmed by C-arm; and then the patient was put to sleep. A right transverse skin-crease incision was given, Platysma undermined, anterior border of Sternocleidomastoid muscle mobilized to expose the anterior body of C3 down to C5 and the C3–C4 disk space confirmed radiologically. The Cloward retractor was hinged below the mobilized medial edges of the Longus Colli muscle bilaterally to safely retract the esophagus and trachea medially and the carotid sheath laterally. Cloward drill (13.5 mm) was centered on the C3–C4 disk space to drill down to the posterior cortical plates of the adjacent C3 and C4 vertebral body and the gutter widened on both sides using high speed air drill. Finally, 1-mm angled Kerrison rongeur, under the microscope, was used to take down the posterior cortical plate leaving a few millimeters

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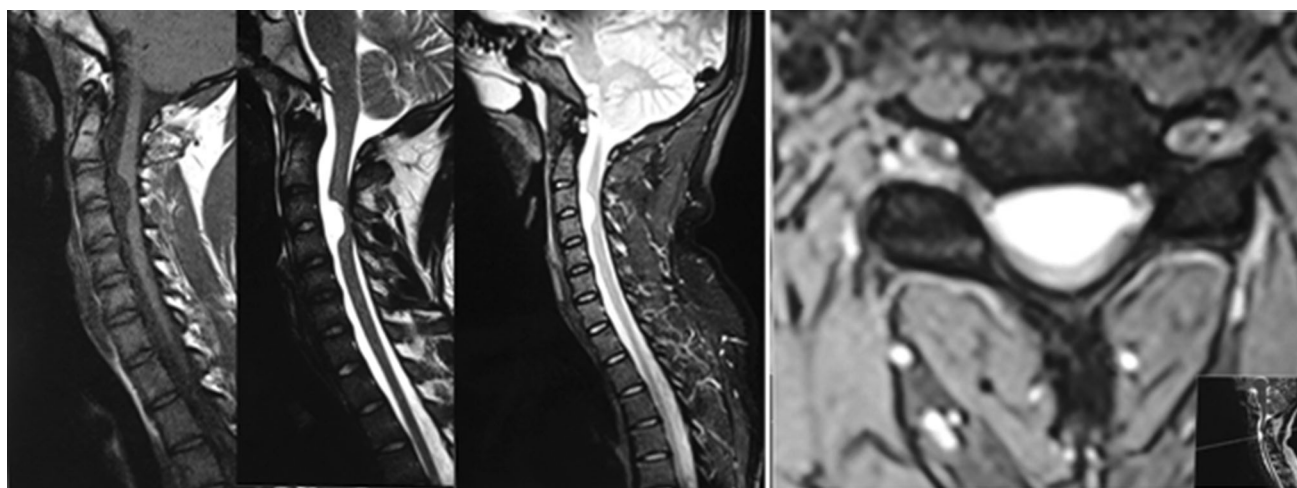
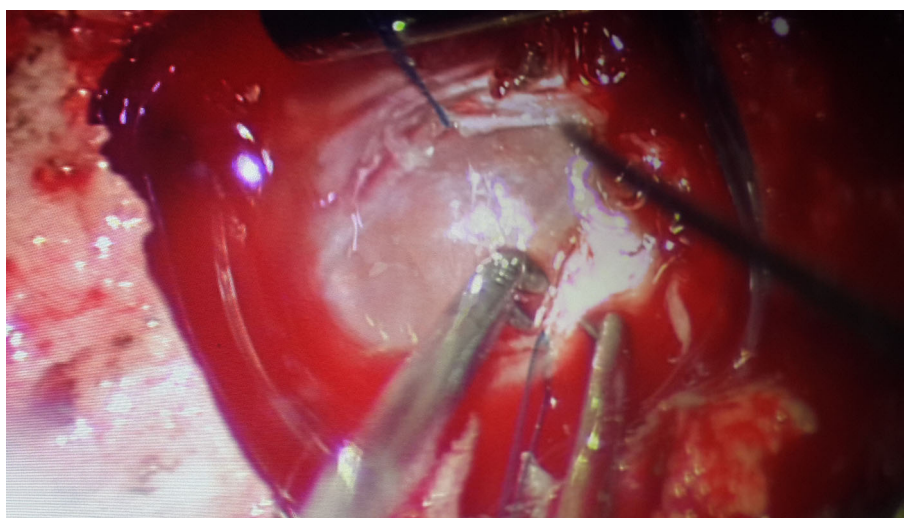


Fig. 1 T1W, T2W, and STIR sagittal and axial T2W MR images of the C3–4 anterior intradural arachnoid cyst compressing the spinal cord posteriorly

Fig. 2 Tense arachnoid cyst clearly visible after taking stay sutures on the duramater and the posterior longitudinal ligament



circumferential posterior cortical plate cliff, to avoid posterior slippage of the planned autologous tri-cortical iliac crest bone graft which was later harvested. The posterior longitudinal ligament and dura were opened longitudinally and held back with stay sutures. The thin-walled, tense cyst was adequately exposed and when aspirated yielded clear CSF (Fig. 2). The collapsed cyst wall was then mobilized dividing intervening fibrous strands adhering it with the arachnoid and most of the cyst was excised leaving part of the cyst wall densely adherent to the cord along midline to avoid inadvertent injury to the anterior spinal artery. watertight primary dural closure with continuous 7–0 Polypropylene suture was done under the microscope. Autologous iliac crest bone graft of required dimension as measured by vernier calipers was harvested, further accurately trimmed with high speed drill; and countersunk in position under manual neck traction. Plates and screws

were used to further fix the graft in place as well as to prevent anterior graft displacement. The wound was then closed over a suction drain and the neck immobilized on a Philadelphia collar. In the immediate post-operative period, neurology worsened temporarily but he made steady progress then after and was walking with support by the fourth post-operative day. Post-operative MRI revealed complete resolution of the arachnoid cyst (Fig. 3) and at 6-month follow-up, the myelopathic symptoms had completely recovered.

Discussion

Spinal intradural arachnoid cysts are mostly present in the thoracic region (80%) and rarely in the cervical (15%) and lumbar (5%) regions; 20% of which are located anterior to



Fig. 3 Post-operative sagittal T1W MR image showing complete resolution of the arachnoid cyst

the spinal cord [9]. They are mostly congenital and occur due to sequestration of an enclosed chamber in the loose mesenchymal tissue around the neural tube, “perimedullary mesh”, which normally differentiates into pia and arachnoid mater [10, 11]. Less frequently, they can also be acquired following trauma or meningitis secondary to subarachnoid haemorrhage, subarachnoid adhesions,

contrast media, anesthetic agents, spinal surgery [12], and tumors [13]. In our patient, there was no history of previous trauma or meningitis.

Neck pain is a symptom mostly overlooked and gradually progressive myelopathy is the most common presenting complaint [3]. Our patient delayed surgery for a week and became progressively quadriparetic.

It is generally agreed that successful treatment of the spinal arachnoid cyst requires total excision, which is unlikely with a posterior approach when the cyst is anteriorly placed; [2, 8] and there have been recurrences after incomplete resection [14]. Muhammedrezai reports successful treatment of an anterior cervical arachnoid cyst in a 29-year old via C7 corpectomy, following unsuccessful treatment by a posterior approach [15]. In our patient, as the anterior spinal arachnoid cyst was in the C3–4 level, posterior approach would endanger the cervical cord as well as the C3 and C4 nerve roots, both of which are essential for normal respiratory function, hence an anterior approach was opted for. The senior author had operated on a 6-year-old child with an anterior cervical neurenteric cyst in 1994, which happens to be one of the earliest reported cases of this surgical approach [16].

Conventionally, the cervical arachnoid cysts have been surgically treated by a posterior laminectomy and cyst excision or fenestration; [8] however, when the cyst is located anteriorly, a posterior approach is not sufficient for adequate exposure of the cyst. Retraction of an already compromised cord can be detrimental when a complete cyst excision is attempted posteriorly, with likely injury to the exiting nerve roots as well. Kazan et al. have thoroughly reviewed eight cases in the literature and presented two of their cases located intradurally in the anterior cervical treated via the posterior approach, with complete resection possible in only one of the cases [8]. No doubt,

Table 1 Cervical arachnoid cyst treated via anterior approach

Author	Year	Age/sex	Symptom	Location	Surgery	Outcome	Remark
Banczerowski et al. [18]	2003	22/M	Neck pain, Rt upper monoparesis	C6–C7	Corpectomy and cyst excision	Improved	One of 5 cases of intradural cervical pathology
Muhammedrezai et al. [15]	2008	29/M	Progressive paraparesis	C7	Corpectomy and cyst excision	Improved	Initial failed treatment by posterior approach
Srinivasan et al. [19]	2009	51/M	Neck pain, right upper limb weakness	C2–C3	Partial C2 median corpectomy	Improved	Post-op MRI-residual arachnoid cyst
Engelhardt et al. [20]	2015	18/M	Cervical pain, diffuse paresthesia, and weakness of both arms	C2–C5	C4–5 and C5–6 dissection C5 corpectomy and excision	Improved	Presented after minor RTA
Present case	2015	20/M	Neck pain, progressive spastic paraparesis	C3–C4	Partial C3–4 central corpectomy and excision	Improved	

the optimal surgical intervention should be safe and less invasive; it should also provide an adequate surgical window for complete resection of the cyst. Anterior cervical approach is safely and commonly practiced for degenerative cervical disk diseases, and provides adequate visualization of lesions directly anterior to the spinal cord.

Hence, even though various posterior approaches [17] as laminotomy, laminectomy, cyst fenestration, cystopleural, and cystoperitoneal shunt, repeated aspiration have been suggested, the best treatment modality for a anteriorly placed cervical arachnoid cyst, in view of possible recurrence is and anterior approach to the cyst and total excision of the cyst, when possible; the safety and efficacy of which have been reported by four surgeons before us in the world literature (Table 1).

Compliance with ethical standards

Conflict of interest None.

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