Clinical Analysis and Surgical Outcomes of 15 Cases of Cauda Equina Tumors

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Abstract

Objective: To evaluate the clinical results of gross total resection of cauda equina tumors.

Patients and Methods: Between June 2007 and October 2011, 9 males and 6 females (mean age 37) diagnosed with intradural tumor in the region of the cauda equina were surgically treated at Suez Canal University Hospital. The neurological and functional states of each patient were evaluated according to the modified McCormick scale. Magnetic resonance imaging was used in diagnosis and follow-up.

Results: The most common symptoms presented were pain (in 93.3%); weakness presented by 2 patients (13.3%), and incontinence by 1 patient (6.6%). Gross total resection (achieved in 13 patients = 86%) through a posterior approach. Surgical resection of these tumors led to significant alleviation of pre-operative symptoms.

Conclusions: Cauda equina tumors generally carry a favorable prognosis: Most of these tumors are benign, and the aim of treatment is to restore function and prevent recurrences. The determining factors for optimal clinical results after surgery are a gross total resection of the tumor and good neurological condition before the operation.

Key Words: Cauda equina – Tumors – Ependymoma – Schwannoma.

Introduction

TUMORS of cauda equina are uncommon and consist mainly of schwannoma, myxopapillary ependymomas, neurofibromas, and less commonly meningiomas, [1-4] dermoids, epidermoids, paragangliomas, high grade gliomas and hemangioblastomas [5,6,7]. A High proportion of tumors in this region are benign [5]. They have been considered to cause a progressive neurological deficit by compression and infiltration into the surrounding neural tissues such as cauda equina nerves. In addition, they have been recognized as neoplasm that is amenable to complete surgical resection with acceptable morbidity and mortality and a low incidence of recurrence. However, some cases associated with surgical morbidity have been reported [8]. The functional results after microsurgical resection of cauda equina tumors are directly related to the preoperative neurological status. The emphasis of this paper is on the clinical presentation, indications, radiological and surgery-related findings and outcome of the tumors of this region.

Material and Methods

A total of 15 adult patients (9 male and 6 female) with cauda equina tumors were surgically treated in Suez Canal University Hospital in the neurosurgery department between June 2007 and October 2011. The mean patient age was 37 years (range 19 to 68 years).

The neurological function of each patient was evaluated with a modified McCormick classification (Table 1) [3,9,10]. Patient functional assessments were done in the preoperative stage, the early postoperative stage, the postoperative 6th month and regularly every year.

Table (1): Modified McCormick Classification [3,9,10].

<table>
<thead>
<tr>
<th>Grade</th>
<th>Summary</th>
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<tbody>
<tr>
<td>1</td>
<td>Neurologically normal, normal ambulation and activity, minimal dysethesia</td>
</tr>
<tr>
<td>2</td>
<td>Mild motor and sensory deficit, independent function and ambulation maintained</td>
</tr>
<tr>
<td>3</td>
<td>Moderate sensorimotor deficit, restriction of function, independent with external aid</td>
</tr>
<tr>
<td>4</td>
<td>Severe sensorimotor deficit, restricted function, dependent</td>
</tr>
<tr>
<td>5</td>
<td>Paraplegia and quadriplegia, even/flickering movement</td>
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Magnetic resonance image (MRI) was utilized in the radiological diagnosis of patients. MRI evaluation was also used in the postoperative stage. MRI examinations were repeated in the early postoperative stage and six months postoperatively, and then for yearly follow-up evaluations.

Informed consent should be obtained from patient. A realistic image of the results should be presented, and the expectations of the patient should be addressed. Neurological deficits may not improve, and a risk of worsening exists, including pain, paralysis, paresthesia, bowel or bladder problems, and sexual dysfunction.

Surgical treatments applied all used a posterior midline approach. A laminectomy is performed over the appropriate lumbar region. For delicate debulking of the tumor, an operating microscope and microsurgical instruments are used. Ultrasonic aspirators can be used; however, concern exists about disrupting certain types of tumors because of possible seeding at distant sites. The dura is closed in the usual watertight manner. If indicated, an epidural drain may be left in place. Concerns exist regarding infection or tracking spinal fluid along a drain.

Typically, ambulation is recommended after bed rest for approximately 1-3 days. Attention should be given to the development of any neurological complications. In addition, resumption of normal bowel and bladder function should be monitored carefully.

Results

A total of 15 adult patients (9 male and 6 female) with cauda equina tumors were surgically treated in Suez Canal University Hospital in the neurosurgery department between June 2007 and October 2011. The mean patient age was 37 years (range 19 to 68 years).
At the time of diagnosis, the most common symptoms presented were pain (in 14 patients = 93.3%), weakness was presented by 2 patients (13.3%), and incontinence by 1 patient (6.6%). Most tumors were limited to the filum terminale, although one also involved the conus medullaris and two clearly arose from a caudal nerve root. All were entirely intradural.

All 15 patients underwent surgical exploration with an attempted gross total resection (achieved in 13 patients = 86%) through a posterior approach. Marked adhesions halted further resection in 2 patients with questionable tumor margins. The histological diagnoses were as follows:

- Ependymoma in 5 (33%) cases.
- Schwannoma in 5 (33%) cases.
- Epidermoid cyst in 2 (13.4%) cases.
- Metastasis in 2 (13.4%) cases.
- Hemangioblastoma in 1 (6.7%) case.

Each patient had an MRI immediately after surgery, approximately 6 months post-operatively, and then annually. Radiation therapy was employed as a surgical adjunct in 2 patients (13.3%) because of possible residual tumor. All patients were followed-up postoperatively for an average of 20.6 months (range 6 months to 4 years). All patients are surviving to date. Surgical resection of these tumors led to significant alleviation of pre-operative symptoms. Pain was improved in all of the 14 patients suffered from preoperatively, with complete disappearance in 12 patients. Motor deficit improved in the 2 patients suffered from preoperatively, but not completely. Incontinence was not improved. Two cases of postoperative superficial skin infection were found and controlled by broad spectrum antibiotics. Three cases of CSF leakage were encountered post operatively and controlled by lumbar intrathecal CSF drain. No cases of postoperative neurological deterioration, postoperative hematoma, or instability after laminectomy.

**Discussion**

Tumors of the cauda equina are rare lesions, and a large clinical series with long follow-up has not been reported before in the neurosurgical literature. Primary tumors of the cauda equina are ependymoma, schwannoma, neurofibroma, meningioma, lipoma, metastatic tumors, epidermoid and dermoid tumors. The most frequent primary intradural tumors of the cauda equina are schwannomas (44%) and ependymomas (34%); the incidence of these histotypes was similar in our group to other series. Ependymoma of the cauda equina have almost exclusively myxopapillary histology [5,6,11,12,13].

Intradural tumors of the cauda equina usually present during the 4th and 5th decade of life (mean 39.7 years), with male predominance (M/F ratio; 1.4:1), except lipomas which mainly affect young patients (1st to 2nd decade of life; mean 16 years).

There is no correlation between the histological type of tumor and the duration of preoperative history. Consequently, a long preoperative history
seems to be caused by difficulties in early diagnosis. From reviewing the clinical histories and neurological findings in our patients it becomes apparent that these lesions are quite insidious in the early stage, especially when pain is the only symptom.

In our series, pain was the first symptom in 93% of cases and was intermittent in the early phase and progressive later. The type of pain was different among the various patients. Pain in remembrance is a useful aspect for differential diagnosis with other non-neoplastic diseases, particularly with lumbar disc herniation and spondylolisthesis [1,2,7,8,14]. It is worthy of note that cauda equina tumors rarely present with acute pain due to subarachnoidal bleeding or with alterations in CSF resorption and intracranial pressure [15-17].

Neuroradiological investigation is necessary during the early phase to formulate a differential diagnosis, especially when painful symptoms do not respond to conservative treatment. Of the neuroradiological investigations employed in our cases, MRI with gadolinium proved superior to CT with contrast enhancement.

Treatment of cauda equina tumors is surgical. When surgically feasible, gross total removal should be the goal of surgery. When subtotal resection is necessary or when local invasion leaves a question as to completeness of tumor removal, irradiation seems mandatory although far from guaranteeing prevention of recurrence. Biopsy alone is undesirable [2,3,15-17].

Long-term outcome varied according to the extent of preoperative deficit, the extents of removal and, particularly, the histotype of the tumor. Patients with less severe preoperative deficit more frequently showed improvement at follow-up. This finding confirms that early detection enhances the chance on reversibility of neurological disturbances whereas, at a later stage, more extensive disturbances will be diagnostic but imply a worse prognosis.

Conclusions:

Cauda equina tumors generally carry a favorable prognosis: Most of these tumors are benign, and the aim of treatment is to restore function and prevent recurrences. The determining factors for optimal clinical results after surgery are a gross total resection of the tumor and good neurological condition before the operation. In order to achieve good functional results, it is very important to have early diagnosis and to perform an early surgical operation before permanent neural injury.

References