Microsurgery for Intradural Spinal Tumors

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About half of all spinal tumors are intradural. Due to their location and close proximity with the delicate neural structures, surgical removal requires great expertise and delicacy. Intramedullary tumors can hardly be removed without the help of the operating microscope and other microsurgical techniques. During a period of 18 months, 12 intradural tumors were operated upon in the Department of Neurosurgery, Aziz Fatimah Trust Hospital, Faisalabad. Out of the seven-extramedullary tumors, 4 were neurofibromas, 2 were arachnoid cysts and one was a meningioma. The five intramedullary lesions depicted a great histological variety; one ependymoma, one neurenteric cyst, one dermoid, one lipoma and one was reported as fibrous tissue. All neurofibromas were removed totally, while both arachnoid cysts were decapitated. Removal was total in three of the intramedullary lesions and sub-total in two. Ten patients (83.3%) improved after surgery. One patient (8.3%) remained at the same neurological status while one patient (8.3%) with a very large intramedullary ependymoma had a mild deterioration in motor power. We conclude that complete removal of most intradural tumors is possible without increasing the neurological deficit.

Key Words:

Spinal tumors are a common cause of neurological deficit. Victor Horsley deserves a great credit for his successful pioneering operation on an intradural spinal tumor as early as 1887[1]. Now with improved diagnostic facilities like the MRI, CT scan and Myelography, the diagnosis of spinal tumors has become very easy. Less than two decades ago complete removal of intramedullary astrocytomas was considered to be impossible[2]. Now with the availability of the operating microscope, surgical lasers, bipolar coagulation, etc. most intramedullary lesions can be removed without increasing the neurological deficit.

The goal of operation in intradural tumors is complete removal. There is no role of radiotherapy in the treatment of benign tumours[1]. In the case of ependymomas, radiation therapy should only be considered as a surgical adjunct where gross total resection has not been achieved[3]. In low grade astrocytomas, a repeat operation is preferred to radiotherapy if recurrence occurs. In malignant astrocytomas of the spinal cord, which have a horrible prognosis, radiotherapy is frequently recommended as a palliative therapy[4].

So, the mainstay of effective treatment lies in radical and total excision of the tumors. There seem to be no real viable alternatives to operative treatment.

Patients and Methodology

During a period of 18 months (July, 1997 to December, 1998), 12 intradural spinal tumors were operated upon in the Department of Neurosurgery, Aziz Fatimah Trust Hospital, Faisalabad. An operating microscope and a set of micro-instruments were available in the operation theatre. Expensive aids like surgical lasers, ultrasonic surgical aspirator and per-operative ultrasonography were not available. We have tried to show that in even in small set-ups like ours, in developing countries, total removal of intramedullary lesions is often possible.

A complete neurological follow-up of all patients was done. The post operative neurological status was divided into five groups:

1. Complete recovery.
2. Good recovery.
3. Fair recovery.
4. No recovery.
5. Deterioration.

Results

The anatomical location and the histology of the 12 intradural tumors was as follows:

Extramedullary:	7
Neurofibromas	4
Meningiomas	1
Arachnoid cysts	2
Intramedullary:	5
Ependymoma	1
Neurenteric cyst	1
Lipoma	1
Dermoid	1
Fibrous Tissue	1
Total	12

Post-op Neurological Status:

As long term follow-up was not available (and some patients were still improving gradually when this report was compiled), the neurological status at the time of the last examination was counted. The post operative recovery/ status was as follows:

1. Complete recovery	4
2. Good recovery	2
3. Fair recovery	4
4. No recovery	1
5. Deterioration.	1

One patient with post tuberculous multiple arachnoid cysts in the dorsal region did not improve after surgery. One patient with a very large intramedullary ependymoma in the cervical region deteriorated slightly in the post operative period but started improving again in ten days. The initial deterioration may have been due to the cord oedema.

Radiotherapy was not given in any case. In the short follow-up ranging from 3 to 18 months no recurrence of symptoms or tumor was reported.

Excision

All the neurofibromas were removed completely. Both the arachnoid cysts were decapitated. The patient of arachnoid cyst who improved was symptom free after one year follow-up. Out of the five intramedullary tumors, the lipoma and the "fibrous tissue" were removed sub-totally, while the other three tumors were removed completely.

Conclusion

Most neurological centres in developing countries cannot afford expensive equipment like the surgical lasers, ultrasonic surgical aspirators, per-operative ultrasonography and evoked potential measuring devices as described by Simeone[1]. We feel that the operating microscope is the most important tool of micro-neurosurgery and even in small set-ups like ours, good results can be achieved by operation. Surgery for intradural tumors using micro surgical techniques is safe and rewarding.

Discussion

In this study, five tumors (41.6%) were intramedullary while seven (58.3%) were extramedullary. In a large study from Pakistan in which 87 intradural tumors were studied during a period of four years, only 15 (17.2%) were intramedullary[5]. Another strong contrast in our series is the absence of common intramedullary tumors. There was only one ependymoma and no astrocytoma. On the other hand, we found some extremely rare tumors; one purely intramedullary neurenteric cyst and one dermoid. Intramedullary neurenteric cysts are a rarity and there are only a few sporadic case reports in the literature[6,7]. To the best of our knowledge, only seven intramedullary neurenteric cysts of the cervical region have hitherto been reported in the world literature. Intradural dermoid cysts are also very rare and account for only 1% of intradural spinal tumours[8] and intramedullary dermoid tumors are unusual[9]. Our case of dermoid tumor was purely intramedullary and extended from the 11th dorsal vertebra to the 2nd lumber.

In our study three of the five intramedullary tumors were removed completely. In a study from China, reporting 58 consecutive operations for intramedullary tumors of the cervical region, 50 (86.2%) tumors were totally resected, seven had a subtotal resection and removal was partial in one[10]. In our study, both the cervical intramedullary tumors were excised completely. Slightly older series claim less total removals. Cooper and Epstein in 1985 reported 29 intramedullary tumors. A complete removal was attained in 14 patients[11]. In another large series, 81 patients were operated upon for intramedullary spinal cord tumors over a span of 12 years (1975-1986) and a total tumor removal was accomplished in 81% of the cases with ependymoma and total or subtotal removal was achieved in 50% of the cases with astrocytoma. At long term follow-up study, fair or good functional results were observed in 19 out of 41 cases of ependymoma (46%) and in 3 cases out of 10 of astrocytoma (30%)[12]. Stein has reported post operative deterioration in only 7 out of 31 intramedullary tumors (22.5%)[13]. In our study, only one patient (8.3%) deteriorated transiently as a result of surgery.

Radiotherapy was not advised to any patient as total removal was achieved in all those cases where a residual tumor would have warranted radiation therapy.

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