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Management of Intramedullary Spinal Cord Tumors with 26 Cases in the Department of Neurosurgery of Ibn Sina University Hospital—Rabat

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Abstract

Intramedullary spinal cord tumors are relatively rare neoplasms of all Central Nervous System (CNS) tumors. Their treatment and prognosis are largely dependent on tumor histology and patient functionality. The introduction and breakthroughs of microsurgical techniques have made surgery the mainstay of treatment for intramedullary tumors. We performed a retrospective analysis of 26 cases of primitive intramedullary spinal cord tumors treated between 2013 and 2019 at the Neurosurgery Department of Ibn SINA University Hospital of Rabat. In our patient's population, the sex ratio was 1.75 showing with a predominance of male over female patients. The median age was 26 years old. The clinical symptomatology is dominated by a slow medullar compression. Spinal magnetic resonance imaging (MRI) was performed for all the patients and led to the positive diagnosis in all cases with a radio-histological correlation in 54.4% of the cases. The treatment was surgical in all cases by laminectomy in posterior access. This surgery has allowed a complete tumoral resection. Histological examination of the tumor was done for all patients and led to diagnosis confirmation in all cases. Understanding intramedullary spinal tumor is imperative to design proper management and obtain optimal patient outcomes. In addition, a meticulous operative technique and the use of surgical adjuncts are essential to accomplish proper tumor removal, diminish the risk of recurrence, and preserve neurologic functions.

Subject Areas

Clinical Trials, Neurology

Keywords

Intramedullary Spinal Cord Tumor, Complete Removal, Microsurgical Technique

1. Introduction

Intramedullary spinal cord tumors are rare primary spine neoplasms of the CNS. It accounts for 2% - 5% of CNS neoplasms in adults and it remains a clinical challenge due to potential delay in diagnosis and limited therapeutic options [1] [2].

The most common types are Ependymomas, Astroctyomas, Hemangioblastoma [2]. These lesions have their own hallmark characteristics; however, they remain both radiographically and clinically difficult to distinguish from one another. The Surgical resection remains the mainstay of treatment of this tumor.

The purpose of this work is to assess the service experience in terms of care of this pathology, and to compare our results with those of the literature.

2. Material and Methods

This is a Retrospective analysis of 26 cases of Primitive Intramedullary Spinal Cord Tumors treated between 2013 and 2019 at the Neurosurgery Department of Ibn SINA University Hospital of Rabat.

Different parameters were used from the medical records from our neurosurgery department. A pre-established operating sheet produced for this purpose enabled the collection of epidemiological, clinical, para-clinical, therapeutic and evolutionary data. These parameters are then collected and analyzed.

3. Results

During 7 years, we admitted 26 cases of intramedullary spinal cord tumors to our department.

3.1. Age Repartition

The age distribution of our cases varies from 18 to 74 years.

3.2. Sex Ratio

In our series, we had 10 female and 16 male (**Figure 1**).

3.3. Consultation Deadline

It is defined by the time elapsed between the first clinical sign and the diagnosis. It varied between 4 months and 6 years, with an average of 21 months.

3.4. Clinical Exam

We find 24 cases (92.30%) of Motor disorder, 19 cases (73.07%) of sensitive

disorder, 11 cases of radicular pain (42.3%) and 10 cases of sphincter disorder (38.46%). We resumed this clinical finding into FRANKEL rating (Table 1).

3.5. Imaging Finding

T1 and T2-weighted MRI with gadolinium enhancement is the imaging modality of choice for suspected Intramedullary Spinal Cord Tumor.

We had 11 cases of cervical localization (42.30%), 05 cases of cervico dorsal tumors, 06 cases of dorsal tumors (23.07%) and only 4 cases of Lumbar tumors (15.38%).

MRI finding was useful to characterize some tumors (Figures 2-5).

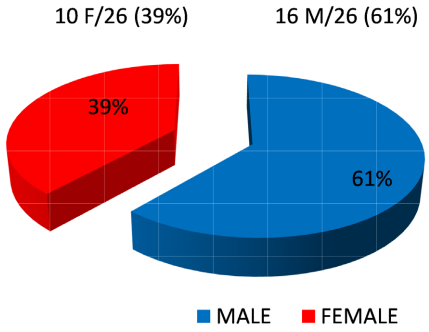

Figure 1. Sex ratio.

Table 1. Neurological status according to the FRANKEL rating.

FRANKEL	NUMBER OF CASES	PERCENTAGE
A: complete motor an sensory loss	5	19.23%
B: complete motor loss, incomplete sensory loss	9	34.61%
C: incomplete motor loss without practical use	7	26.92%
D: incomplete motor loss, able to ambulate with or without walking aids	3	11.53%
E: free of neurological symptoms	2	7.69%

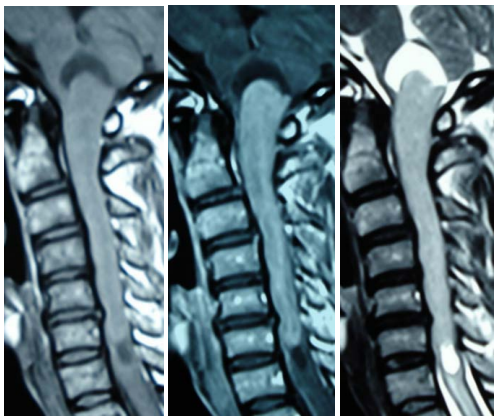

Figure 2. Ependymome (WHO grade II).

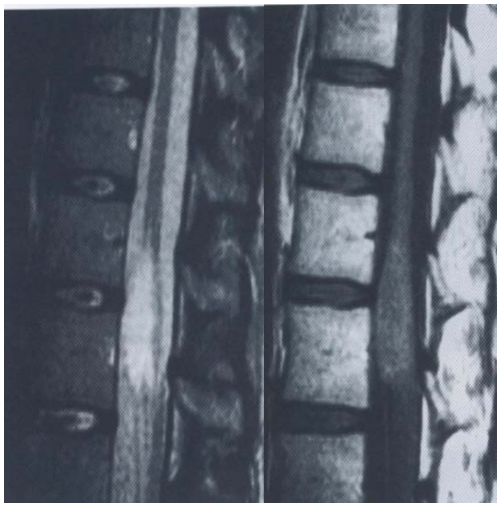

Figure 3. MRI of grade II conus astrocytoma.

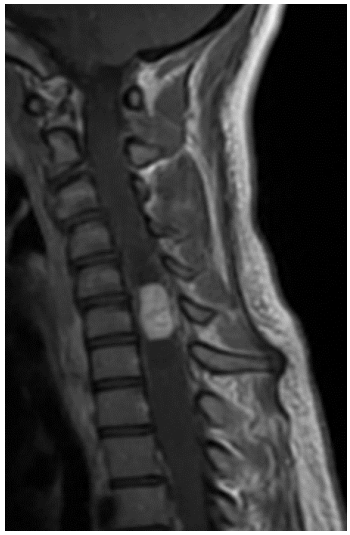

Figure 4. Spinal cord hemangioblastoma.

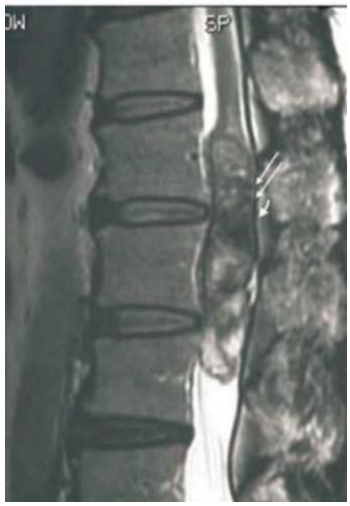

Figure 5. Spinal epidermoid cysts.

3.6. Surgery

The objectives of the surgery were to perform decompression by laminectomy, to do a complete resection as possible and to confirm the diagnosis by taking a sample for histological studies.

The surgical approach of intramedullary tumors was performed under an operative microscope in all cases (100%), and tumor resection was complete in 15 cases (57.69%) and incomplete in 10 cases (38.46%)

Some microscopic operative image of our spinal cord tumors (Figure 6, Figure 7).

3.7. Anatomopatholog

The histologic study was essential to confirm the diagnosis of intramedullary tumors.

We note in our series a predominance of astrocytomas, representing 38.46% of cases (Table 2).

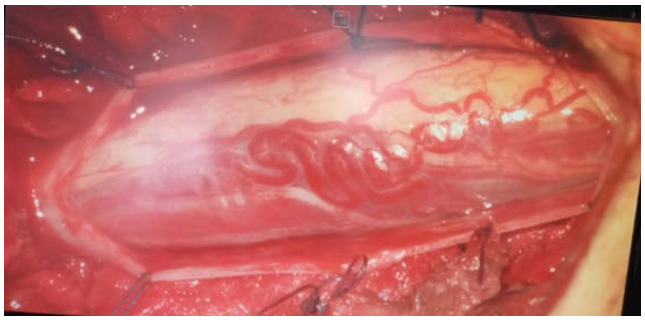

Figure 6. Spinal cord hemangioblastoma.

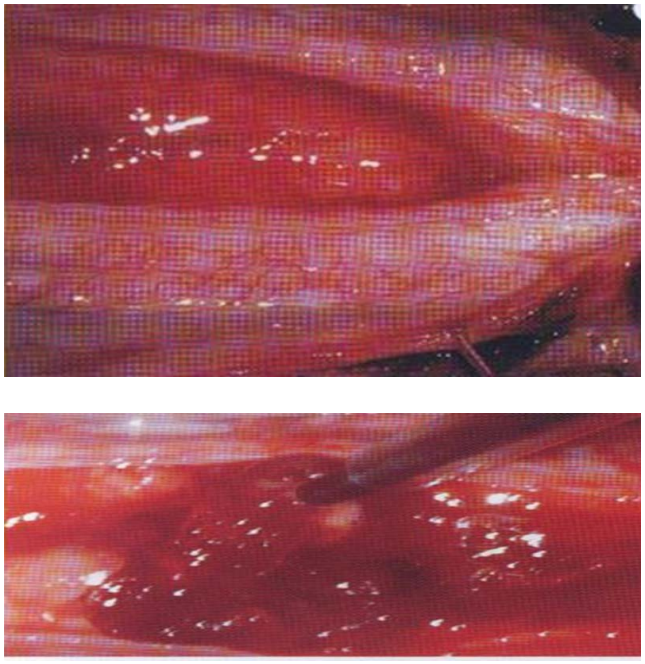

Figure 7. Surgical resection of grade II ependymoma.

Table 2. Distribution of histological diagnoses.

TUMOR TYPE	NUMBER OF CASES	PERCENTAGE
Astrocytoma	10	38.46%
Ependymoma	8	30.76%
Hemagioblastoma	2	7.69%
Dermoid cyct	3	11.53%
Epidermoid cyst	2	7.69%
Oligodendroglioma	1	3.84%

3.8. Evolution

In our series, there were no cases of death and by comparing the neurological states in the immediate pre and postoperative period, we noted Improvement in 15 cases (57.69%), worsening in 6 cases (23.07%), and a steady state in 5 cases (19.23%).

The postoperative consequences were simple, except for one case of meningitis on 6st day postoperative, which has progressed well under antibiotic treatment.

4. Discussion

4.1. Epidemiology

The average age of discovery of intramedullary spinal cord tumors in the literature varies between 28 and 44 years, with a maximum frequency noted in the third decade of life (Table 3).

Most of the series report a slight predominance of the occurrence of intramedullary spinal cord tumors in male sex.

The time taken to diagnose intramedullary tumors varies from one series to another, in the CHANDY series [6], this time varied from 3 weeks to 15 years, in our series this diagnostic timeframe varied from 4 months to 6 years with a 21-month average (Table 4).

For each tumor considered, the duration of development differs according to the grade histological.

According to the literature, hemangiomas have an average duration of evolution before the diagnosis of a year and a half.

4.2. Clinical Finding

Spinal pain was only revealing in 42.3% of cases in our series, while in the literature we find higher percentages. In our series, motor disorders are reported in almost all cases (92.3%) (Table 5). On the other hand, sphincter dysfunctions tend to appear late in the course of the disease, and are initially limited to incontinence or urinary retention. In our series, they were revealing in 38.46% of cases. In the FADI series [7], these disorders were initial in 35%.

Table 3. Distribution according to the mean age of onset in the literature.

Series	Number of cases	Average age
KELLY [3]	183	38.8
DAVID [4]	62	28.5
OLIVER [5]	27	41
OUR SERIE	26	36.43

Table 4. Time to progression of intramedullary tumors in the literature/our series.

Series	Number of cases	Diagnostic delay (months)
KELLY	183	36.5
DAVID	62	36
CHANDY [6]	68	31.2
OUR SERIE	26	21

Table 5. Comparison of the clinical results of our series with the literature.

	SPINAL PAIN	MOTOR DISORDER	SENTIF DISORDER	SPHINCTER DYSFONCTION
KELLY	122/183 67%	158/183 86.6%	79/183 43%	61/183 33%
FADI [7]	17/26 65%	18/26 69%	15/26 57.69%	9/26 35%
OLIVER	23/27 85%	20/27 76%	14/27 51.85%	3/27 11%
OUR SERIE	11/26 42.3%	24/26 92.30%	19/26 73.07%	10/26 38.46%

These data are consistent with the results of our series, where the cervical was the most affected 42.30%, then the thoracic level (23.07%) (**Table 6**).

4.3. Surgery

The difficulty lies in the fact that only a radical excision can prevent recurrence, we must then find the right compromise between a maximum excision with minimal functional risk.

In our series, complete tumor resection (macroscopically) was performed in 15 patients (57.69%) and incomplete in 10 patients (38.46%) (**Table 7**).

Adjuvant radiotherapy is advocated when resection is contraindicated or if the tumor is high grade. The role of radiotherapy is controversial, however. Some studies suggest a positive outcome whilst others suggest no benefit [8]. In addition, several side effects are associated with radiotherapy such as radiation myelopathy and spinal deformities [9]. Chemotherapy also seems to have limited role and is generally used only when resection and adjuvant radiotherapy were unsuccessful.

Table 6. Topographic distribution of intramedullary tumors.

	CERVICAL	CERVICO DORSAL	DORSAL	LUMBAR
SUN [8]	30/56 53.57%		9/56 16.07%	17/56 30.35%
BERHOUMA [9]	20/45 44.44%	5/45 11.11%	15/45 33.33%	5/45 11.11%
OUR SERIE	11/26 cases 42.30%	5/26 cases 19.23%	6/26 cases 23.7%	4/26 cases 15.38%

Table 7. Extent of surgical excision in the literature.

	COMPLETE RESECTION	INCOMPLETE RESECTION	BIOPSIE
SUN	**33/56 cases 58%**	**20/56 cases 35%**	**3 cases 7%**
BERHOUMA	**31/45 69%**	**11/45 24.4%**	**3/45 6.6%**
SANDALCIOGLU [10]	**65/78 83.3%**	**9/78 11.5%**	**4/78 5%**
OUR SERIE	15/26 cases 57.69%	10/26 cases 38.46%	1 case 3.84%

4.4. Histological Results

The majority of authors report that the degree of tumor excision depends mainly to the type and histological grade of the tumor. In most of the published series, we note the predominance of ependymomas [10].

In our series, astrocytomas accounted for 38.46% of cases, against 30.76% of ependymoma.

The ependymoma is most often well defined and with patience, we can discover the cleavage plane that will allow the tumor to be removed as completely as possible.

The complete excision of an infiltrating tumor such as astrocytoma, has been greatly facilitated by the use of the ultrasonic scalpel CAVITRON.

4.5. Recurrence

For ependymomas, recurrence after complete resection is rare, with a rate not exceeding 5%, but they can manifest after several years. In most series, the operative mortality rate is zero [9] [10] [11], this is also the case in our series.

Regular MRI is recommended every 1 - 2 years, and any possible recurrence will be best dealt with a new surgical resection.

Since astrocytomas are infiltrating lesions, their removal often leaves persistent tumor cells, which explains the high rate of local recurrence.

So, the total resection allow a good clinical improvement, and prevent long-term recurrence and decrease the morbidity, even if sometimes a subtotal resec-

tion with radiotherapy may preserve a stable neurological status, and good local control of the lesions.

4.6. Prognosis

The factors positively influencing the prognosis are early Diagnosis and rapid management with a good preoperative neurological status, and rate tumor width/ Medullary width <0.80.

Low histological grade of the tumor is also essential prognosis factors with an extent radical surgery.

5. Conclusion

Understanding intramedullary spinal tumor is imperative to design proper management and obtain optimal patient outcomes. In addition, a meticulous operative technique and the use of surgical adjuncts are essential to accomplish proper tumor removal, in order to diminish the risk of recurrence, and preserve neurologic functions.

Conflicts of Interest

The authors declare no conflicts of interest.

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