Epidemiological Characterization of Patients with Spinal Tumors in Alagoas, Brazil

Perfil Epidemiológico de Pacientes com Tumores da Coluna Vertebral em Alagoas, Brasil

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ABSTRACT

Introduction: Spinal tumors can be primary (5% of cases), originating from the organ itself, or secondary (95% of cases), by metastasis from another anatomical site. Objective: To demonstrate the epidemiological data of patients with spinal tumor in Alagoas, Brazil, regarding gender, age, topography, and histology of the spinal lesion. Methods: Retrospective study conducted at the neurosurgical hospital of reference in the state of Alagoas. Results: Twenty-one patients were included, 57.1% male. The mean age was 51.9 ± 16.2 years. As for race, 76.2% were brown. As for the topography, the majority occurred at the thoracic level (66.6%). The highest level occurred at C5, and the lowest injury occurred at S2. The median number of simultaneously affected vertebrae in a patient was 2 (1-3). Various types of lesions were found after pathological analysis, and in neoplastic findings metastases prevailed (19%). Conclusion: Some data found are in agreement with the literature, such as sex and age, although variables such as race, histological type and vertebral level of the lesion showed a difference. The lack of Brazilian studies on these variables should also be highlighted, given their importance for guiding efficient health measures and knowing the population to be treated.

Keywords: Spinal cord neoplasms; Neurosurgery; Epidemiology

RESUMO

Introdução: Os tumores da coluna vertebral podem ser primários (5% dos casos), originários do próprio órgão, ou secundários (95% dos casos), por metástase de outro sítio anatômico. Objetivo: Caracterizar os dados epidemiológicos dos pacientes com tumor de coluna vertebral em Alagoas, Brasil, quanto ao sexo, idade, topografia e histologia da lesão vertebral. Métodos: Estudo retrospectivo realizado em um hospital de referência em neurocirurgia do estado de Alagoas. Resultados: Foram incluídos 21 pacientes, sendo 57,1% do sexo masculino. A média de idade foi de 51,9 ± 16,2 anos. Quanto à raça, 76,2% eram pardos. Quanto à topografia, a maioria ocorreu no nível torácico (66,6%). O nível mais alto ocorreu em C5, e a menor lesão ocorreu em S2. A mediana do número de vértebras afetadas simultaneamente num doente foi de 2 (1-3). Após análise anatomopatológica foram encontrados vários tipos de lesões, sendo que dos achados neoplásicos prevaleceram as metástases (19%). Conclusão: Alguns dados encontrados estão de acordo com a literatura, como sexo e idade, porém variáveis como raça, tipo histológico e nível vertebral da lesão apresentaram diferença. Ressalta-se ainda a carência de estudos brasileiros sobre essas variáveis, dada a sua importância para nortear medidas de saúde eficientes e conhecer a população a ser tratada.

Palavras-chave: Neoplasias da medula espinhal; Neurocirurgia; Epidemiologia

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INTRODUCTION

Spinal tumors can be primary, originating in the organ itself, or secondary, by metastasis from another anatomical site. Primary tumors are rare, with a frequency of less than 5% of cases of spinal tumors. Most patients with a primary tumor are diagnosed incidentally or by evaluation of nonspecific axial pain. Because of this variety in presentation, Enneking staging divides these tumors into 3 stages: B1, B2, and B3. B1 as asymptomatic, B2 as slow growing, and B3 as more aggressive growing, which will require more specific treatments.

Spinal metastases, on the other hand, are much more frequent than tumors in situ and its main sources are adenocarcinomas of the lung, breast, and prostate. This dissemination occurs by the hematogenous route, especially through Batson’s plexus, or by the lymphatic route, where after implanting themselves in the bone tissue, they lead to osteolytic lesions, which cause the clinical presentation of deformity. The main symptom is back pain, present in 80 to 90% of patients, followed by motor dysfunction, affecting 35 to 75% of cases.

Furthermore, spinal tumors are also classified as intramedullary, extramedullary-intradural and extradural. The intramedullary tumors originate from the nerve cells themselves, such as ependymomas and astrocytomas, being rare, about 5% of the cases. The extramedullary-intradural occurs between the spinal cord and the dura mater, with a frequency of 40%, with meningiomas and schwannomas as examples. Finally, extradural tumors, which occur outside the dura mater, are the most frequent (55% of cases).

In general, the diagnosis occurs from the suspicion of the clinical presentation, followed by tests such as radiography, which can identify about 80% of cases of benign tumors and 40% in metastases. However, other more sensitive exams can be used, such as CT scan, which is the best method to identify the limits of the lesions, MRI, scintigraphy, or even biopsy.

Treatment usually varies depending on the patient’s condition and staging. In general, for some benign tumors, such as hemangiomas, expectant management can be used. However, in general, surgeries with curative potential are performed, although neoadjuvant and adjuvant therapy can be associated to obtain better results depending on the staging. Moreover, in metastases, treatment is usually more palliative, with methods such as corticotherapy, radiotherapy, or more invasive forms, such as surgical resection of the lesion.

In view of the clinical and epidemiological importance of spinal tumors, the objective of this study is to describe the epidemiological data of patients with spinal tumors in Alagoas, Brazil, in relation to sex, age, topography, and histology of the lesion in the spine.

METHODS

This is an observational, descriptive, and retrospective study conducted at the neurosurgical hospital of reference in the state of Alagoas (Hospital Universitário Professor Alberto Antunes da Universidade Federal de Alagoas - UFAL).

Data was collected from medical records of patients undergoing spinal biopsy for suspected neoplasm from December 2014 to December 2019. Variables such as age, sex and race, levels of spine involvement, and histological type were evaluated. There was no sex or age restriction.

From the categorical variables, absolute and percentage frequencies were obtained. For continuous variables, the means and standard deviation were obtained in case of normal distribution, or the median and percentiles in case of non-normal distribution.

RESULTS

Twenty-one patients were included, of whom 12 (57.1%) were male and 9, female (42.8%). The age of the patients ranged from 17 to 76 years, with a mean of 51.9 years (Standard Deviation: 16.2 years and median of 54 years (interquartile range (IIQ) = 41-64 years), and when divided into groups, the age group 60-69 years was the most frequent (33.3%), as seen in Table 1. Regarding race, 16 (76.2%) were brown, 3 (14.2%) were white, 1 (4.7%) was black, and 1 (4.7%) was not identified.
In relation to the topography of the vertebral lesion (Figure 1 and Table 2), the majority occurred at the thoracic level with 14 cases (66.66%), followed by the lumbar level with 8 cases (38.09%), and finally cervical and sacral level where both presented only 2 cases each (9.52%). The highest level occurred at C5, and the lowest lesion occurred at S2.

The number of simultaneously affected vertebrae in a patient (Table 2) ranged from 1 to 14, with a median of 2 (interquartile range IQ= 1-3). It is also noteworthy that 19.04% of the cases presented lesions at multiple levels, i.e., not restricted to only one level of the spine (cervical, thoracic, lumbar or sacral). One case had an extensive lesion from C5 to T11, and in another case there were 2 non-continuous lesions (lesion from T2-T6 and from L5 to S2 simultaneously). Also, in most cases (61.9%) there were less than 3 simultaneous lesions.

Moreover, there were several types of lesions found after pathological analysis (Figure 2), so that of the neoplastic findings, metastases prevailed (19%), among these there were bone metastases, from Hodgkin's lymphoma or from the thyroid gland. In second place of the most common neoplastic findings were adenocarcinoma and schwannoma (9.5%).

**Table 1.** Distribution of spine tumors by age group intervals.

<table>
<thead>
<tr>
<th>Age Grouping</th>
<th>Frequency = n (rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>1 (4.76%)</td>
</tr>
<tr>
<td>20-29</td>
<td>1 (4.76%)</td>
</tr>
<tr>
<td>30-39</td>
<td>2 (9.52%)</td>
</tr>
<tr>
<td>40-49</td>
<td>5 (23.8%)</td>
</tr>
<tr>
<td>50-59</td>
<td>3 (14.28%)</td>
</tr>
<tr>
<td>60-69</td>
<td>7 (33.33%)</td>
</tr>
<tr>
<td>≥70</td>
<td>2 (9.52%)</td>
</tr>
</tbody>
</table>

**Table 2.** Distribution of the vertebrae affected.

<table>
<thead>
<tr>
<th>Vertebral Level</th>
<th>&lt;3 Vertebrae</th>
<th>≥3 Vertebrae</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical</td>
<td>1 (4.76%)</td>
<td>0 (0%)</td>
<td>1 (4.76%)</td>
</tr>
<tr>
<td>Thoracic</td>
<td>7 (33.33%)</td>
<td>4 (19.04%)</td>
<td>11 (52.38%)</td>
</tr>
<tr>
<td>Lumbar</td>
<td>3 (14.28%)</td>
<td>2 (9.52%)</td>
<td>5 (23.8%)</td>
</tr>
<tr>
<td>Sacral</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Multiple level lesions</td>
<td>2 (9.52%)</td>
<td>2 (9.52%)</td>
<td>4 (19.04%)</td>
</tr>
<tr>
<td>Total</td>
<td>13 (61.9%)</td>
<td>8 (38.09%)</td>
<td>21 (100%)</td>
</tr>
</tbody>
</table>

n (rate).
DISCUSSION

In general, in the present study the proportion between men and women was similar, with a small male predominance. However, such a result according to the literature is quite variable. According to Sohn et al., the rate of malignant spinal tumors in men was significantly higher than in women (p=0.013)\textsuperscript{14}.

A study by Wang et al.\textsuperscript{15} with 1196 patients with spinal metastasis showed a male-to-female ratio of 1.5:1, but the difference in the proportion of the incidence of this neoplasm in men compared to women only became statistically significant after the age of 60 years. They also found that the age of onset in women was 2 years less than in men.

The slight predominance of males found in our study can be justified by the low number of patients, besides the fact that they are the sex with the highest prevalence of lung cancer, as well as having prostate cancer, neoplasms that are sources of metastasis to the spine\textsuperscript{16}.

The age at diagnosis in the present study (51.9 years) showed little variation when compared to the literature. A study by Pamplona et al. showed a mean age of 54.3 years. In general, the literature showed an average between 58.6 to 64.8 years in cases of spine metastasis, while for primary spine tumors, the range occurs between 65 and 74 years or in children between 10 and 16 years\textsuperscript{16}.

However, due to the rarity and underreporting of primary tumors, such information tends to vary, for example, a study conducted by Zhou et al.\textsuperscript{18} of 1209 cases of primary tumors, in which patients had a mean age of 39.3 ± 16.8 years\textsuperscript{17,18}.

Moreover, when analyzing the patients diagnosed with spine tumor by age group, in the present study, the group of 60 to 69 years prevailed (33.3%), in agreement with Wang et al.\textsuperscript{15}, which demonstrated a predominance in the 60 to 64 years range in patients with spine metastases conflicting, however, with other studies, such as that of Sohn et al.\textsuperscript{14}, which prevailed the 50 to 59 years range also in metastasis conditions.

Furthermore, in the present study, there was a predominance of the mixed race, which contrasts with papers such as by Dibas et al.\textsuperscript{19} who reported for example predominance of Caucasians in spinal meningioma. Studies by Cachia et al.\textsuperscript{20} of spinal ependymomas revealed racial disparity, with the white to black ratio being equal to 1.73. The finding of the present study can be explained by the smaller sample size, as well as the fact that Brazil is a country with a strongly miscegenated population, which warrant results that are different from works in other countries. There is also a lack of studies on the racial relationship with predisposition to this type of tumor.

In the topography of the tumor, thoracic level lesions predominated (66.6%). However, according to the literature, the lumbar level is usually the most affected in metastases. Nevertheless, Valesin et al.\textsuperscript{21} in their epidemiological study of spinal metastases showed a predominance of the thoracic level (45%). Other studies showed a predominance of multiple lesions (36.1%), followed later by thoracic lesions (26.4%)\textsuperscript{15,16,18,21}.

As for the number of vertebrae involved in the tumor lesions, in this study, there were from 1 to 14 vertebrae involved, with 38.1% of the cases presenting 3 or more vertebrae. Other studies have shown values of 1 to 4 vertebrae, with 17.4% of cases with more than 3 vertebrae involved or cases in which 38.9% had 3 or more lesions\textsuperscript{15,16}.

Our cases predominated metastases over primary tumors, as in accordance with the literature. Because many primary lesions are asymptomatic and thus not reported, their incidence is not fully known, although hemangiomas and enostoses are reported to have an incidence of about 11 to 14%, while on the other hand metastases to the spine are present in up to 70% of cancer patients\textsuperscript{1}.

In spinal metastases, it is known that the most frequent primary tumor of origin is breast cancer, with reports of the frequency of this neoplasm in 32.7% of patients with metastases. However, according to Wang et al.\textsuperscript{15} data the lung cancer was the most common, presented in 36.5% of patients with spinal metastasis, followed by cancer of unknown origin\textsuperscript{15,21,22}. This finding can be explained both by the proximity of the lung to the spine, and by the vascular drainage system between such structures. Moreover, the complex inflammatory interaction of tumor cells, with osteoclasts and cytokines such as IL-6, IL-1, TGF-beta, and RANK/RANKL may explain the bone predisposition to metastasis\textsuperscript{23}.
Regarding primary tumors, there is no consensus on the most common histological type. In the present study, schwannoma was the most frequent, however, in Zhou et al., in a 20-year retrospective study in China, 64.5% of cases were benign, with hemangioma (28.1%) being the most common benign tumor, followed by large cell tumor, while chordoma was the most common malignant tumor (9.8%). While, Momin et al. 21 in a retrospective study in the USA from 2000 to 2017 demonstrated ependymoma as the most frequent 10,23,24.

CONCLUSION

Some data found are in agreement with the literature, such as sex and age, although variables such as race, histological type and vertebral level of the lesion showed a difference. This finding must take into consideration the small sample size of the present study. To date, this is the first study from Alagoas that analyzed the profile of patients with spinal tumors. The lack of Brazilian studies on these variables should also be emphasized, given their importance for guiding efficient health measures and to know about the population to be treated.

REFERENCES


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