

Research Article

Epidemiology of Metastatic Lesions and Aggressive Benign Lesions Affecting the Spine: Experience in a Single Hospital of the City of São Paulo

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Abstract

Background: In the musculoskeletal system, the spine is the most frequently site affected by metastatic lesions, presenting the highest rate of symptoms caused by them; the thoracic and lumbar segments are the most often affected. The predominant symptom is axial pain, present in 80 to 90%.

Objective: Assess the incidence of metastatic lesions in the spine, diagnosis and staging.

Methods: Patients with metastatic lesions in the spine, in single or double sites, and who could be subjected to surgical treatment were included in this study. Sixty-seven patients, from an orthopedics outpatient clinic, were evaluated from July 2014 to July 2016. The variables analyzed were: gender, age, tumor site, number of lesions, neurological status, tumor type and the presence of fractures.

Results: 34 men and 33 women were included with mean age of 53 years. The most affected site was the lumbar spine, with a predominance of L2, followed by L1 and L3. The primary tumor showing secondary implants in the column was breast cancer followed by prostate cancer. Forty-five patients had previous vertebral fracture. In assessing neurological changes, we found alterations in 18 patients and only 01 A Frankel.

Conclusion: All patients treated for primary tumors which have axial spinal pain or fracture, must be studied and should perform imaging exams of the entire spine, whereas 40-50% of metastatic distant lesions affect the spine.

Keywords: Epidemiology; Metastasis; Outcomes; Spine

Introduction

The diagnosis and treatment of spine lesions considerably evolved in recent years. The therapeutic possibilities, often surgical, have contributed to improving the quality and, sometimes, to extending patients' lives. Due to the increase in extended life deriving from oncological treatment, the rate of lesions observed in the spine increased exponentially. The treatment of these lesions is not a consensus in the world literature. In the musculoskeletal system, the spine is the most frequently site affected by metastatic lesions, presenting the highest rate of symptoms caused by them [1]; the thoracic and lumbar segments are the most often affected [2]. The predominant symptom is axial pain, present in 80 to 90% of the cases [3,4], showing controversies regarding the best approach to these pathologies. This work aims to statistically assess the incidence of the lesions affecting the spine, preferential sites, stages, age and gender, within a

certain period in a tertiary hospital that is considered a reference in oncological treatment.

Methods

This transversal study was realized in the Hospital Santa Marcelina – Itaquera, in the orthopedics and traumatology clinic, from July 2014 to July 2016. Were included patients with tumoral lesion in the spine who were submitted to surgical treatment, with known or not primary site. A biopsy was realized in all patients. Patients with compatible conditions were staged with: Computerized Tomography (CT) of the thorax, abdomen and pelvis and Magnetic Resonance (RM) of the segment affected; bone scintigraphy; laboratory exams including: hemogram, kidney and liver function, phosphatase, PSA in men and protein electrophoresis. The inclusion criteria were: patients with single or double lesions in the spine, who had clinical conditions to undergo surgery; our criteria were based on Karnofsky Index [5] and the smallest value accepted was 40. The tumoral stage was evaluated by the Enneking criteria [6]. Data were presented as mean (standard deviation) or n (%). In the statistical analysis, chi-square, t-student, exact test and Mann Whitney tests were used.

Result

Sixty-seven patients were included in the study, 34 males and 33 females. The sample characteristics were presented in (Table 1).

	Sample n=67
Gender (female/male)	33/34
Age	53,45 (15,66)
Karnofsky	64,48 (15,50)
Enneking	
SIA	4(5.97)
SHIA	7(10.45)
SHHA	5(7.46)
SIB	17(25.37)
SIIB	34(50.75)

Table 1: Sample characteristics.

The mean age was 53 years, varying between 13 and 88 years; with a 15.7 standard deviation. Being 33 females and 34 males, no significant difference was found for gender ($p = 0.903$). No statistically significant difference was found comparing the mean age between gender using the t-Student test ($p = 0.397$) (Figure 1).

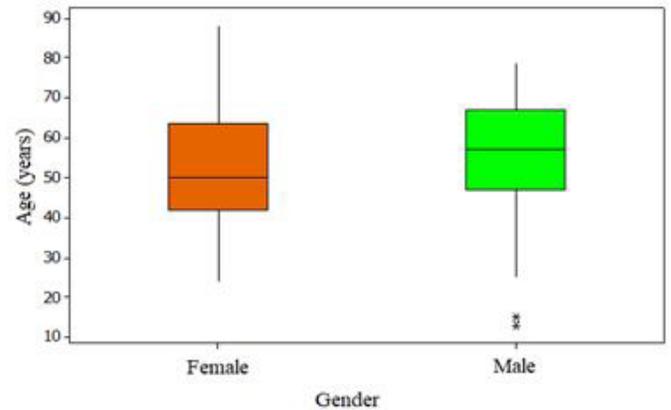


Figure 1: Relation between age and gender.

There were sites in the spine with a significantly higher proportion of lesions than others ($p < 0.001$). Looking for which proportions can be considered significantly larger, were found:

- L2 and L3 were significantly higher than the proportions of the other sites from T10 and T12 ($p = 0.026$ and $p = 0.045$ respectively).
- L1 was significantly higher than the proportions of sites C7, Sacrum, T11 / L2, T5, T6 / L3 and T8 ($p = 0.017$).
- From site L5, all proportions did not show significant differences (Figure 2).

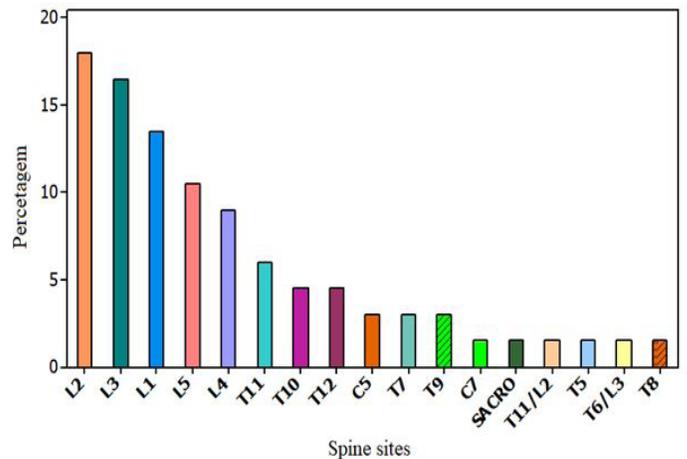


Figure 2: Most affected spine sites.

The number of patients that presented previous fracture were significantly high - 45 patients. The patients without fracture were assessed by the Kostuik criteria [6,7] to assess the risk of a fracture to occur. The neurological assessment realized with Frankel scale criteria [8] and differences with statistical relevance was found ($p < 0.001$). Frankel E was the majority ($p < 0.001$). No statistical difference was found among the other presentations, including patients with Frankel C and D ($p = 0.192$).

Regarding stage, assessed according to Enneking: [6] type SIIB was the most incidents ($p = 0.011$); type SIB is the second most incidents at the moment of diagnosis ($p = 0.003$) and for type SIIA, none of the proportions show significant differences (Table 1). No significant difference was found for the age distribution between those presenting or not a fracture ($p = 0.466$). No significant difference was found in proportions among those with a previous fracture for the different types of tumor ($p = 0.695$). Comparing the presence of fracture and the Enneking classification, more previous fractures were found in the SIB type than in the others ($p < 0.001$). The mean survival of the patients assessed was 14 months, varying from 0 to 24 and with a standard deviation of 8.3.

In addition to the tumors that only affect one gender (Breast, Prostate and Uterus) for the other tumors were found significant differences in proportions in:

- Colon - significantly higher proportion of males ($p = 0.001$).
- Kidneys - significantly higher proportion of males ($p = 0.008$).
- Lung - significantly higher proportion of males ($p = 0.002$) (Table 2).

	N (%)
Breast	23 (34.3)
Prostate	11 (16.4)
Colon	7 (10.4)
Lung	6 (9)
Thyroid	3 (4.5)
Uterus	3 (4.5)
kidney	5 (7.5)
Bone sarcoma	1 (1.5)
Lymphoma	2 (3)
Myeloma	1 (1.5)
GCT	2 (3)
Leukemia	1 (1.5)
Non-identified	2 (3)
Total	67 (100)

Table 2: Other tumors.

Breast tumor, albeit rarely, may affect the male gender, however, this was not observed in any of our patients. The assessment of the tumor and age ratio is described in (Figure 3).

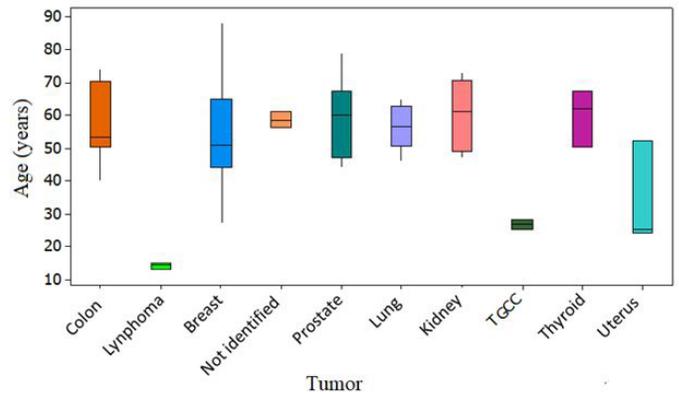


Figure 3: Relation between tumors and age.

Discussion

Reported a higher incidence of women [10], which was not observed in our study. However, the breast tumor as the main lesion presented in their study, similar to what was found in our study; they also reported a predominance of the lumbar spine tumor, a fact that we also found in our study. Pain was also the main symptom reported in both studies. According to them, the stage precedes any more aggressive behavior. [11] evaluated the surgical procedure in patients with pathological fractures and observed that this intervention should be performed whenever possible, as they verified that the evolution of the implants improved the patients' quality of life after surgery with pain reduction. They emphasized that treatment for metastases should not interfere with the treatment of the main conditions. A fact observed by Defino was the predominance of secondary lesions, especially breasts, followed by prostatic metastases. [12] evaluated only the metastatic lesions of the breast tumors, observing a high incidence of metastasis, not only in the spine, but also in the appendicular skeleton. They report the diffuse involvement of the skeleton that characterizes the aggressiveness of these tumors and how easy it is for them to develop metastases in the musculoskeletal system.

[13] conducted a study comparing the outcome of surgery with radiotherapy. When analyzing this work, we observed a different incidence from that observed, with predominance of pulmonary metastases, followed by breast metastases, a fact that we did not observe. We checked some common data, such as the most affected level. The authors present two cases with two vertebrae being affected, something that we also observed and whose treatment is not different. Falavigna also found a high rate of neurological changes, unlike our study. [14] performed a review, in which they report the importance of metastatic oncology in the spine due to the large increase in the number of patients presenting this pathology; they also emphasize the importance of

the multidisciplinary approach so that this is a complex and still little clarified condition. Treatments with new devices, such as kyphoplasty and thermal ablation, were not included in our study due to the economic constraints inherent in the Brazilian public health system. Boriani also informs that the goal of his treatment is to mitigate, providing improvements in the quality of life of patients.

Although not performing an epidemiological study [15] emphasizes the importance of the stage and diagnosis before a surgical procedure, since the behavior and the primary site are the ones that should define the procedure. He also says that kidney metastases should be more aggressively addressed because they do not respond to radiotherapy and that radio or hormone-sensitive tumors may need a more conservative approach with good clinical outcomes. In a review [16] points out the importance of the stage; he analyzes that, depending on the site affected, the treatment can be changed and especially the approach, corroborating our view that the diagnosis and the prior evaluation are necessary for a specific therapy. In our study, however, the approach was similar for thoracolumbar tumors.

Evaluating the epidemiology and anatomical position [17] analyzed the anatomical position of the tumor lesions and, based on their classification, we analyzed only epidural lesions; intradural lesions were not part of our study. Based on this classification [18] published a review on the diagnosis of lesions, which largely uses magnetic resonance to better evaluate the images and allow the design of a better procedure. Biermann [19] analyzes the cause of pain in patients and corroborates hypothesis, in which the main causes of pain are invasion and tumor instability [20,21]. The authors also perform a clinical evaluation of the patients before the surgery, especially in relation to their clinical conditions, since the authors report the difficulty in evaluating the extension of the patient's life, both by the surgeon of the spine and by the clinical oncologist, emphasizing the need for surgery at the time of diagnosis and improvement of the conditions of the patient in question.

Conclusion

We conclude that primary breast, lung and prostate lesions require routine spinal investigation. Advances in adjuvant treatments have contributed to a longer life expectancy for patients with aggressive tumor pathologies. This has increased the incidence of metastatic lesions that, among other places, also affect the spine. Any patient undergoing oncology treatment with axial symptoms should receive special attention, including clinical and radiological spinal investigation, especially if fractures with low energy trauma are detected.

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