

# Surgical Approach of Cauda Equina Syndrome Secondary to L5 Lumbar Solitary Bone Plasmacytoma with Partial Resection and Lumbopelvic Fixation

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## Abstract

The solitary bone plasmacytoma is an uncommon cause of chronic lumbar pain. It belongs to a tumor group of plasmatic cells that usually disturbs the axial skeleton and can progress to multiple myeloma. The treatment of choice is radiotherapy; however, surgical management can also be done. Regardless of the no reliable data and little evidence, it is clear that the intervention is based on the classification systems of Enneking and Weinstein–Boriani–Biagini. This article will show a 66-year-old female patient with lumbar pain of 1 month with B symptoms. A solitary bone plasmacytoma diagnosis was made with pathology confirmation. A surgical procedure with improvement of symptoms was achieved, with 2 years of follow-up without relapse.

## Keywords

- ▶ plasmacytoma
- ▶ lumbopelvic fixation
- ▶ spinal tumors

## Introduction

Lumbar pain is the fourth most common symptom of spine diseases in outpatient context.<sup>1</sup> It affects up to 80% of adults throughout their life. It can be of neoplastic etiology, which is the solitary bone plasmacytoma.<sup>2</sup> Here is presented a case of confirmed solitary bone plasmacytoma in L5 lumbar vertebra, with the respective presentation and treatment.

## Case Description

A 66-year-old female patient was brought to the emergency room because of a 5-year evolution of symptoms of lumbar pain that worsened over the last month with limitation for walking, without response to oral painkillers and neuromodulators. Also, during the last week, the patient presented with saddle anesthesia, asymmetric flaccid paraparesis, and involvement of sphincter control. The patient did not present previous history of trauma.

On neurologic examination, she presented with pain at the lumbar region, left lower extremity one-fifth in L5 and S1 paresis, right lower extremity two-fifth in L5 and S1 paresis, bilateral Achilles' tendon areflexia, loss of sphincter tone, and saddle anesthesia.

A spine computed axial tomography (CT) was performed which showed an osteolytic lesion in vertebral body, pedicles, and laminae of L5, with invasion of spinal canal at this level. Magnetic resonance of lumbosacral spine revealed infiltration of L5 vertebral body with a 95% stenosis of the spinal canal (▶ Fig. 1).

Afterward, complementary examinations were performed which included flow cytometry for light lambda (λ)-free chains, which reported above-mentioned reference values, and a myelogram without abnormalities. Laboratory results revealed normocytic anemia (hemoglobin 9.7 mg/dL), hypoalbuminemia (2.56 mg/dL), normal renal function, serum immunoglobulins (Ig): IgA 311.4 mg/dL, IgG 1631.5

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mg/dL, and IgM 111.1 mg/dL; negative Bence Jones protein; and normal flow cytometry of bone marrow with plasmatic cells of 0.23%.

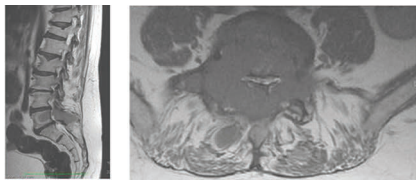
As the first step in diagnosis analysis, classification tools were used: Enneking classification was grade I, which meant that the pathology had low probability of metastasis (lower than 15%), intracapsular lesion without metastasis: G1T1M0. With regard to Weinstein–Boriani–Biagini classification, it suggested that tumoral resection should be from zone 3 to zone 10 with arthrodesis of L2–L4 and iliac bone (►Fig. 2); given the spinal canal invasion, canal decompression was also considered with laminectomy from L5 to S1 (►Fig. 3).

Surgical pathology evidenced fibrinoid and connective tissue with trabeculae bone of L5 arc infiltrated by plasmatic cells with eosinophilic cytoplasm with eccentric nucleus.

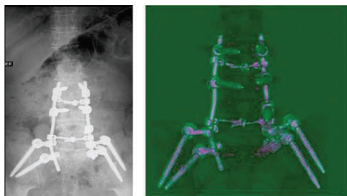
After surgery recuperation, the patient was given a total of six radiotherapy sessions, divided once a week, with significant clinical improvement. Nowadays, 2 years later, with follow-up every 6 months, it has neither shown malignancy relapse nor motor or sensitive alterations.

## Discussion

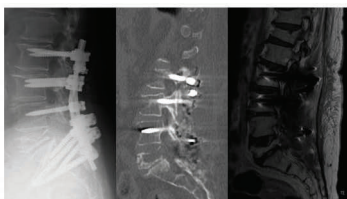
The solitary bone plasmacytoma is defined as a solitary mass of plasmatic neoplastic cells.<sup>3</sup> Two different classifications exist that vary according to the general compromise. When axial skeleton is involved, it is called solitary bone



**Fig. 1** It shows an infiltration of vertebral body of L5 vertebra by soft tissue and significant stenosis on spinal canal.



**Fig. 2** Radiography and 3D reconstruction tomography in which the arthrodesis L2–L4 and iliac bone material position by posterior approach can be seen.



**Fig. 3** Computed tomography scan and magnetic resonance in which laminectomy and decompression postoperative changes in the spinal canal and partial resection of the tumor can be seen.

plasmacytoma, and if it does not compromise the axial skeleton, it is extramedullary plasmacytoma, usually with gastrointestinal and respiratory involvement.<sup>4</sup>

Some patients present with a solitary bone lesion, while others advance to multiple myeloma (MM); is important to make this differentiation at diagnosis, because from it depends the treatment chosen. The progression to MM can be fast, as Yang et al point in a case report in which a patient presented progression to MM, 2 months after a solitary bone plasmacytoma diagnosis was made.<sup>3</sup> Opportune diagnosis is very important because plasmacytoma involves only 1 to 5% of plasmatic cells neoplasia,<sup>5</sup> besides it has good prognosis and survival rates to 10 years compared to those with MM.<sup>3</sup> The solitary bone plasmacytoma represents a 10-year survival rate up to 85% patients<sup>6</sup>; however, 50% can progress to a MM variant, with worse prognosis.<sup>7</sup>

The diagnosis work-up should include a complete anamnesis, physical examination, laboratory studies, tumor histopathology confirmation, protein electrophoresis, and evaluation for the presence of Bence Jones protein (Ig light chains in urine).<sup>5</sup>

In solitary bone plasmacytoma, the symptoms depend on the localization of the lesion and could be from lumbar pain with radicular signs to sphincter compromise. Medullar compression and cauda equina syndrome are indicatives for radiotherapy or surgery management. The cauda equina syndrome is an uncommon presentation of solitary bone plasmacytoma.<sup>8</sup>

Within the diagnostic work-up that has to be done is a biopsy of bone marrow, and it should report < 10% of plasmatic cells without other organ involvement,<sup>9</sup> as well as the tumor biopsy with infiltration of plasmatic cells.<sup>10</sup> There exist diagnosis criteria given by Durie and Salmon, which are important to expose the following:

1. One bone area destroyed by clonal plasmatic cells (IgG being the most common).
2. Bone marrow without clonal findings.
3. No other bone or organ compromised (no other findings in radiography and gammagraphy).
4. No anemia, hypercalcemia, or renal injury by Ig light chain.
5. Absence or low level of Ig light chains in urine (Bence Jones protein).

Moreover, Kevin Harrington categorized the tumor disease according to extension and margin resection, as given below:

- I, II, III are considered in-compartment.
- IV–V are out-compartment, with findings of vertebral collapse and neurologic symptoms.

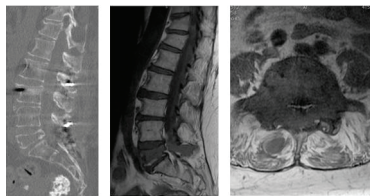
Imaging studies like CT and magnetic resonance are helpful in evaluation of the bone compromise: unique, multiple, or bone marrow dissemination. CT shows lytic lesions, compressive fractures (►Fig. 4a), polycystic lesions, or bone sclerosis; the last one is very uncommon (3%).<sup>3</sup> In the magnetic resonance, the bone marrow findings are described as hypointense or isointense in T1 (compared with muscle) (►Fig. 4b), hyperintense in T2 and short-tau inversion

recovery (STIR), and variable contrast enhancement.<sup>5</sup> Commonly, the posterior structures are involved as the nearby soft tissue and more severe presentation with epidural compression giving the sign of the *draped curtain* (►Fig. 4c).

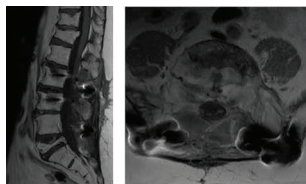
This patient presented with all the Durie and Salmon's criteria, without MM progression. By other side, the surgical stratification system of Weinstein–Boriani–Biagini is used for determine the surgical approach, while the Enneking system describes the local extension of the tumor and prognosis of the patient.<sup>11,12</sup> These two classifications were used to focus in this case and to determine the most appropriate surgical management.

The whole treatment for plasmacytoma includes radiotherapy, chemotherapy, and surgery. The gold standard management is radiotherapy because it is a radio-sensible pathology, with local control of 80%. However, sometimes, surgical procedure is needed for spinal stabilization or neurologic brisk progression associated with direct compression,<sup>5</sup> such as in this exposed case that was taken to surgical and radiotherapy treatment, in which the follow-up every 6 months to 2 years showed neurologic improvement and tumor control (►Fig. 5).

The chemotherapy is considered as an adjuvant treatment in tumor of 5 cm of diameter or greater and, moreover, can delay the MM progression.<sup>5</sup> The surgery is not the first management of choice; however, it is an important therapeutic choice in difficult pain control, instability, or neurologic signs or deficits.<sup>13</sup>



**Fig. 4** (a) Sagittal CT scan that shows a lytic bone lesion in L5 with compression fracture associated. (b) Sagittal MRI T1 sequence shows vertebral body lesions hypointense to isointense compared with muscle. (c) Axial MRI T1 sequence shows posterior structure, paraspinous soft tissue, and epidural (draped curtain sign) tumor infiltration. CT, computed tomography; MRI, magnetic resonance imaging.



**Fig. 5** Sagittal and axial MRI T1 sequence of 2 years after surgical and radiotherapy management. It shows spinal canal decompression, post-radiotherapy soft tissue changes, and complete disease control. MRI, magnetic resonance imaging.

The most common neurologic complications in the spine are radicular pain, loss of motor function, and tremors, given by nerve compression or direct vertebral extension of the plasmacytoma or, most commonly, by pathologic compression fracture with foramina stenosis.<sup>8</sup>

## Conclusion

The solitary bone plasmacytoma has an excellent response to no-invasive treatment with radiotherapy and chemotherapy. Nevertheless, in some particularly cases it is vital to consider surgery as an important management because, in spite of an uncommon presentation, it can present neurologic damage that if not treated immediately can cause irreversible injury. The surgery looks to achieve a local control of the complication, but no total resection since the postoperative radiotherapy can reach total control and response of the illness.

## Conflict of Interest

None.

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