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Solitary Plasmacytoma of the Thracic Vertebra Presenting with Sudden Paraplegia and Back Pain: A Pathologic Case Report

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Abstract Solitary plasmacytoma (SPC) accounts for 5% of plasma cell neoplasm. SPC of the spine is relatively rare, and SPC presenting with sudden paraplegia is very rare. A 53 year-old woman was admitted to our hospital complaining of sudden severe paraplegia and back pain. Emergency MRI revealed a tumor of the thoracic vertebra no. 10 (Th10). Pressure fracture of the Th10 was also recognized. The tumor was not osteolytic and invasion was recognized around the Th10. The tumor directly compressed the spinal cord. An excision of the tumor was performed under the clinical diagnosis of metastatic carcinoma. Pathologtically, the tumor consisted of plasmacytoid atypical cells with hyperchromatic nuclei. Histochemically, the tumor cells showed pyroninophilia. Immunohistochemically, the tumor cells were positive for λ-light chain, but negative for cytokeratin, epithelial mermbrane antigen, vimentin, CD45, CD20, CD45RO, κ-light chain, α-heavy chain, λ-heavy chain, μ-heavy chain, δ-heavy chain, ε-heavy chain, IgA, IgG, IgM, synaptophysin, chromogranin, S100 protein, desmin, α-smooth muscle antigen, myoglobin, and p53 protein. The Ki-67 labeling was 73%. The author diagnosed the tumor as SPC with λ-light chain disease. After the diagnosis, whole body CT and MRI revealed no other tumors. Blood and serum test revealed no significant changes; no M-protein was recognized. However, voided urine test revealed λ-light chain protein. The patient underwent fixation operation of TH10, and received radiation (50 Gray) and chemotherapy. No recurrence or transformation into myeloma occurred at the present time 25 months after the first manifestation. The present study indicated that pathological examination is an only clue to the diagnosis of SPC of the vertebra bone.

Keywords Plasmacytoma · Vertebra · Bone · Immunohistology · Histopathology

Introduction

Plasma cell neoplasms are classified into plasma cell myeloma, plasmacytoma, immunoglobulin deposition diseases, osteoclastic myeloma (POEMS syndrome), and heavy chain diseases [1]. Plasmacytoma is clonal proliferative disorder of neoplastic plasm cells and is biologically malignant [1]. Plamacytoma is a rare lesion, and account for 5% of plama cell neoplasms [1]. Plasmacytoma is further classified into solitary plasmacytoma (SPC) of bone and extramedullary plasmacytoma. The former involves vertebrae, ribs, skull, femur, clavicule, pelvis, scapula, and other bones. SPC may be accompanied with M-protein, amyloidosis, heavy chain diseases, and light chain disease.

SPC of the vertebra is a rare condition. Several studies of SPC of the vertebra have been reported [2–9]. The diagnosis of SPC of the vertebra finally depends on pathological diagnosis. SPC of the vertebra with the first presentation of neurological symptom is rare, and that with the first manifestation of severe paraplegia and back pain is very rare.

Here. the author reports the case of SPC of the vertebra manifesting sudden paraplegia and back pain, with an special emphasis on histopathologic findings. The diagnosis of SPC was made by pathological and immunohistochemical examinations.

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Case Report

A 53 year-old woman presented with severe sudden paraplegia and back pain, and consulted to a private hospital, where she was pointed out a vertebra abnormal shadow in thoracic vertebra no. 10 (Th10) by MRI. She was admitted to the orthopedics division of our hospital. The Th10 shadow was diagnosed as a metastatic carcinoma by the orthopedists and radiologists. The tumor was not osteolytic and involved the Th10 and surrounding tissues. The tumor compressed the spinal cord. Compression fracture was also recognized. An excision of the tumor was performed.

Pathologically, the tumor showed a marked hypercellularity. The tumor was consisted of plasmacytoid atypical cells with hyperchromatic nuclei and eccentrically-located nuclei (Fig. 1). Cytoplasmic halo-like structures were recognized in some areas. Histochemically, the tumor cells showed pyroninophilia (Fig. 2).

The author performed an immunohistochemical study was perormed, with the use of Dako Envision method (Dako, Glostrup, Denmark), as described previously [10, 11]. The antibodies used were as follows: pancytokeratin (AE 1/3, Dako), pancytokeratin (CAM5.2, Beckton-Dickinson, CA, USA), epithelial membrane antigen (E29, Dako), CD45 (LCA, Dako), CD20 (L26, Dako), CD45RO (UCHL-1, Dako), κ-chain (polyclonal, Dako), λ-chain (polyclonal, Dako), μ-heavy chain (polyclonal, Dako), δ-heavy chain (polyclonal, Dako), ε-heavy chain (polyclonal, Dako), IgG (polyclonal, Dako), IgM (polyclonal, Dako), IgA (polyclonal, Dako), CD68 (KP-1, Dako), vimentin (Vim, Dako), synaptophysin (polyclonal Dako), chromogranin (DAK-A3, Dako), S100 protein (polyclonal, Dako), desmin (D33, Dako), α-smooth muscle antigen (1A4, Dako), myoglobin (polyclonal. Dako), p53 protein (DO7, Dako), and Ki-67 antigen (MIB-I, Dako). Immunohistochemically, the tumor cells were positive for λ-light chain (Fig. 3), but negative for cytokeratin, epithelial mermbrane antigen, vimentin, CD45, CD20, CD45RO, κ-light chain, α-heavy chain, λ-heavy chain, μ-heavy chain, δ-heavy chain, ε-heavy chain, IgA, IgG, IgM, synaptophysin, chromogranin, S100 protein, desmin, α-smooth muscle antigen, myoglobin, and p53 protein. The Ki-67 labeling was 73%. The author diagnosed the tumor as SPC with λ-light chain disease. After the diagnosis, whole body CT and MRI revealed no other tumors. Blood and serum test revealed no significant changes; no M-protein was recognized. However, voided urine test revealed Bence-Jones protein composed only of λ-light chain protein. The patient underwent orthopedic fixation operation of Th10, and was treated by radiation (50 Gray) and chemotherapy. No recurrence or transformation

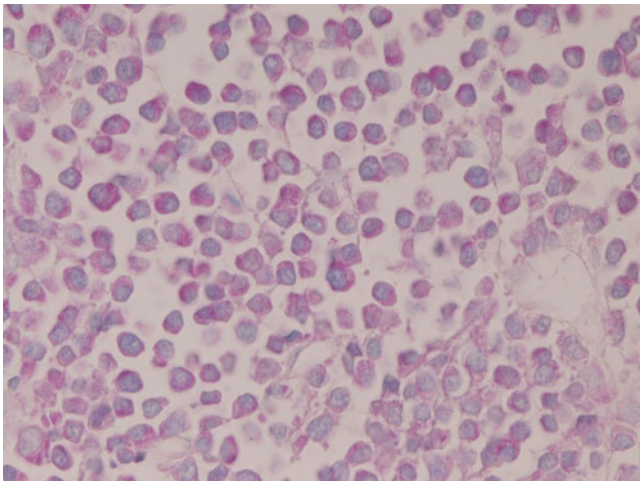

Fig. 2 The tumor cells show pyroninophilia. Methyl Green Pyronine stain, ×200

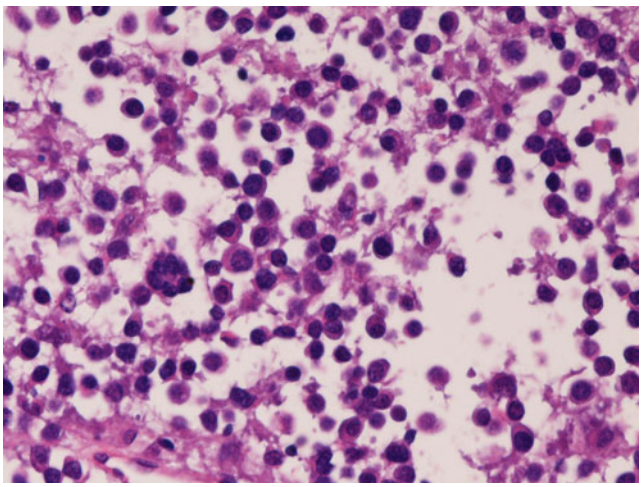

Fig. 1 The tumor cells have plasmacytoid features and cellular atypia. HE, ×200

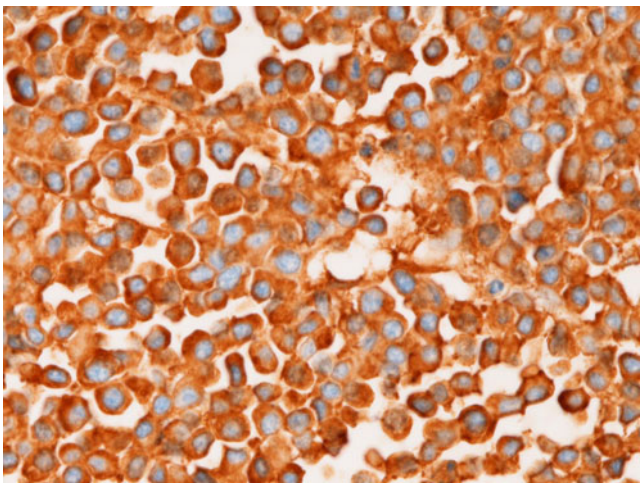

Fig. 3 The tumor cells are strongly positive for λ-light chain. Immunostaining, ×200

into multiple myeloma occurred at the present time 25 months after the first manifestation. No, the patient is strictly follow-up.

Discussion

The SPC of the vertebra is very rare [1–9]. In our hospital, only two cases of SPC were present in the last 15 years. One is brain SPC, and another is the present case. Dava et al. [9] reported that among the 71 biopsies of the vertebral lesions, only three (4%) was SPC.

The final diagnosis of SPC depends on pathological diagnosis. However, there have been few studies of SPC of the vertebral bone. In the present case, the Th10 lesion was clinically diagnosed as metastatic carcinoma. The excision specimens showed hypercellular tumor resembling plasma cells. Because there are many plasmacytoid carcinomas in the body, the author investigated the lesion histochemically and immunohistochemically. Pyroninophilia employed in the present case indicates abundant RNA and protein expressions, being consistent with plasma cell neoplasm. The tumor cells showed cellular atypia and Ki-67 labeling was very high (73%), indicating that the tumor is malignant. Immunohistochemically, tumor cells were positive for λ-light chain, but negative for other antigens examined. The negative cytokeratins and epithelial membrane antigen indicates that the tumor is not plasmacytoid carcinoma. The negative stromal antigens such as smooth muscle antigen and S100 protein denied the possibility of plasmacytoid sarcomas. The negative neuroendocrine antigens such as chromogranin and synaptophysin suggest that the tumor is not neuroendocrine carcinoma. Taken together, these findings indicate that the tumor is SPC of the vertebra. Because the present study had no other lesions, the present study was not multiple myeloma.

Plasma cell neoplasms may produce various immunoglobulins-related proteins, and produces several associated disorders such as amyloidosis, M-proteinemia, urine Bence-Jones protein, heavy chain disease, and light chain disease [1]. In the present case, the author succeeded in the determination of the secreted materials. Namely, the immunohistochemical study revealed positive λ-light chain but negative κ-light chain, α-heavy chain, λ-heavy chain, μ-heavy chain, δ-heavy chain, ε-heavy chain, IgA, IgG and IgM. The data indicates that the secreted protein from the present SPC was only λ-light chain. That is, the paraneoplastic syndrome of the present study was λ-light chain disease. In fact, later immunochemical examination of the voided urine revealed Bence-Jones protein consisting only of λ-light chain. In most of SPC, no serum M-protein and urine Bence-Jones protein is absent [1]. However, if present, they are low level or disappear later [1].

Clinically, the SPC of the vertebra may present with symptom of back pain and mild neurologic disturbance [2, 4, 8]. The present case manifested as sudden severe paraplegia and back pain. Such severe manifestation appears rare. Bacci et al. [2] reported that paraplegia was present in 3/15 cases in vertebral SPC. Approximately 50% of SPC progress into multiple myeloma [3, 12]. The treatment was tumor resection and chemoradiation [5–7]. Radiation significantly improves patients's survival [7]. The 5-year survival of SPC is 60–75% [5, 6], and 10-year survival is 45% [5]. The local recurrence occurs in about 10% of cases [5]. In the present case, operation and chemoradiation were performed, and the patient was now free from tumor 25 months after the first presentation. The patient should be strictly follow-up.

The present case indicated that pathological examination is an only clue to the diagnosis of solitary plasmacytoma of the vertebra bone.

Conflict of interest None.

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