

Sarcomatoid plasma cell tumour: a rare entity

Sarah Ruane
Christian Seghetti
Jonathan Shanks
Adrienne Flanagan

Abstract

Sarcomatoid plasma cell tumours are rare entities, and often present histopathologists with great diagnostic difficulty as they can exhibit a wide range of morphological and immunohistochemical profiles. Herein we present a case report of a 76-year-old man, with an enlarging knee mass, in whom an open biopsy showed solid sheets of pleomorphic cells with plasmacytoid, epithelioid and spindled morphology. Cytokeratin, melanocytic and mesenchymal markers were negative, so a provisional diagnosis of undifferentiated pleomorphic sarcoma (UPS), grade 3 was suggested. However, upon tertiary review of the CD138, there was focal weak positivity, triggering further haematological work up, including immunoglobulin heavy chain gene analysis which ultimately detected a heavy chain gene rearrangement. Thus, a diagnosis of a sarcomatoid plasma cell tumour was made. This case demonstrates the importance having plasma cell tumours within histopathologist's differential diagnoses when posed with a sarcomatoid tumour. It also highlights the need for judicious interpretation of IHC, and the use of a wide panel of IHC to ensure that correct histopathological diagnoses are made.

Keywords CD138; plasma cell tumour; plasmacytoma; sarcomatoid tumour; undifferentiated tumour

Case report

We present a case of a 76-year-old man with a 6 month history of a growing mass (106 mm in greatest dimension) in the anterior aspect of the left knee, involving the patellar tendon and Hoffa's fat pad displaying a lobulated outline.

The patient underwent a needle biopsy that revealed a largely necrotic tumour that was difficult to classify. An open biopsy was then performed and showed a tumour comprising solid sheets and short fascicles of pleomorphic cells with epithelioid,

Sarah Ruane *MBChB ST4 Histopathology Registrar, Manchester University Foundation Trust, UK. Conflicts of interest: none declared.*

Christian Seghetti *MD Visiting Fellow, Histopathology, Royal National Orthopaedic Hospital NHS Trust, Stanmore, UK. Conflicts of interest: none declared.*

Jonathan Shanks *BSc MBChB MD FRCPath Consultant Histopathologist, Manchester University Foundation Trust, UK. Conflicts of interest: none declared.*

Adrienne Flanagan *MB BCh BAO FRCPath PhD Consultant Histopathologist, Royal National Orthopaedic Hospital NHS Trust, Stanmore, UK. Conflicts of interest: none declared.*

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plasmacytoid and spindled morphology set in a fibrous stroma with focal myxoid change and extensive necrosis (Figure 1). Immunohistochemistry showed absence of MNF116, SMA, desmin, S100 and Melan A expression and small foci with weak immunoreactivity for CD138 (Figure 2).

Although an undifferentiated pleomorphic sarcoma (UPS) grade 3 was considered the most likely diagnosis, the case was sent for a hematopathology second opinion. Additional immunohistochemistry showed that tumour cells were immunoreactive for BLIMP1 and demonstrated patchy positivity for CD45, CD56, MUM1 and EMA. AE1/AE3, CD30 and EBER were negative. Light chain IHC was considered to be non-contributory.

Immunoglobulin Heavy Chain gene analysis detected a rearrangement involving the heavy chain gene, favouring a haematological malignancy.

Discussion

Extramedullary plasma cell tumours are rare, comprising 1–2% of plasma cell neoplasms.¹ The majority are easily diagnosed due to their recognizable plasma cell morphology² however, when poorly differentiated, these neoplasms can pose a significant diagnostic challenge for pathologists. Although there was patchy

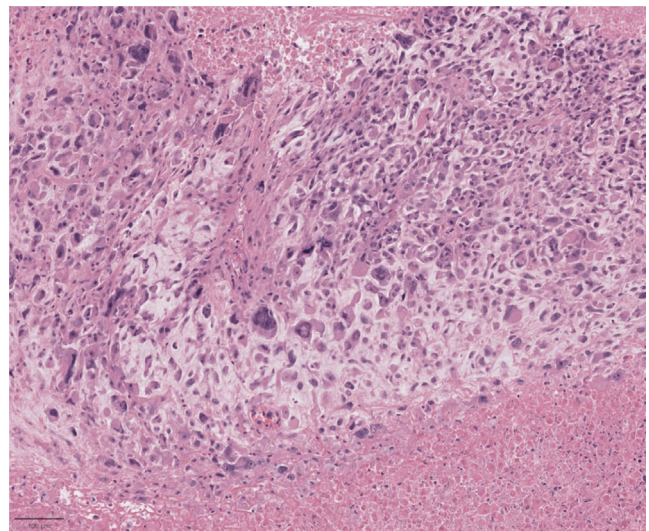


Figure 1 Highly necrotic pleomorphic lesion with spindle to epithelioid morphology. H&E 10×.

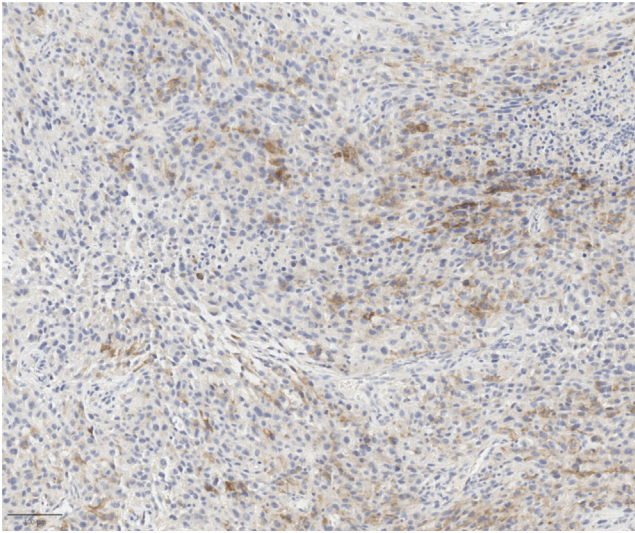


Figure 2 Patchy and weak CD138 positivity. 10×.

and largely weak CD138 immunoreactivity observed in the sample, it was considered that this could have represented a reactive population of plasma cells.

As well as being mistaken for high-grade carcinomas, melanomas and sarcomas,³ the literature also reports that they can be mistaken for lymphomas, leukaemias and germ cell tumours.² Plasma cell tumours also exhibit numerous architectural and cytological variations, from polymorphous to pleomorphic, further adding to their histomorphological complexity.²

Patients can present with a variety of symptoms ranging from general fatigue and weakness⁴ to bone pain and pathological fractures.⁵ They most commonly occur in the head and neck region,¹ with a propensity for the oral cavity and upper airways.⁶

Plasma cell tumours present as a clonal plasma cell count of >10% in peripheral blood/bone marrow biopsy or plasmacytomas. Plasmacytomas can be extramedullary or intraosseous and may precede the later development of myeloma in some cases. The presence or absence of clinical symptoms (The ‘CRAB’

group: hypercalcaemia, deranged renal function, anaemia and bone disease), further characterize the disease, distinguishing multiple myeloma from precursor, less aggressive forms such as either monoclonal gammopathy of undetermined significance (MGUS) or smoldering multiple myeloma (SMM).⁷ Other investigations that can support the diagnosis include flow cytometry, bone marrow biopsy and a skeletal survey.

Biopsies of suspected plasma cell tumours undergo histopathological interpretation with ancillary immunohistochemical and molecular analysis to obtain a correct diagnosis, guide treatment and facilitate patient prognostication.

Classically, plasma cell tumours have the histopathological appearance of diffuse monomorphic cells, with ‘clock face’ morphology with abundant, slightly basophilic, cytoplasm with a paranuclear hof.¹ In well differentiated neoplasms, it can be difficult to distinguish normal from reactive plasma cells, with such cells described as exhibiting ‘Marshalko’ morphology. Other characteristic findings of plasma cell tumour include intracytoplasmic protein globules and intranuclear inclusions referred to as Russell and Dutcher bodies, respectively.^{2,7} However, the cytological appearance can exhibit varied degrees of atypia, and the Bartl et al.⁸ grading system can be used to reflect this (see Table 1),¹ with lower grade tumours exhibiting classical plasma cytology, and high-grade tumours showing little resemblance to their cell of origin.

Sarcomatoid variants of plasma cell tumours are extremely rare, with relatively few described in the literature.^{1,3–5,9–11} Architecturally these neoplasms have a storiform pattern and stromal fibrosis with a perivascular distribution.^{3,4,9} Cytologically they are composed of spindled cells with pleomorphic nuclei and variable amounts of cytoplasm. They can also contain bizarre tumour giant cells and atypical mitoses.^{1,5}

A broad but targeted immunohistochemical (IHC) panel is required to avoid an erroneous diagnosis in plasma cell tumours. Incorrect diagnosis of a sarcomatoid carcinoma is a potential pitfall if cytokeratin and EMA positivity is observed in the context of a negative CD45 (Table 2). Analysis of multiple plasma cells markers is required as sole use of CD138 can be misleading, as it

Histological classification of plasma cell tumours, adapted from Bartl et al.⁹

	Grade 1			Grade 2		Grade 3
Type	Marschalko	Small	Cleaved	Polymorphous	Asynchronous	Plasmablastic
Cells	21 µm sized	13 µm sized	Variable	Giant cells present	Asynchronous maturation of nucleus and cytoplasm	Predominantly plasmablasts
Nuclei	Eccentric	Small and round	Notched with intranuclear inclusions	Multinuclearity	Large eccentric	Large
Cytoplasm	Basophilic and abundant	Small basophilic rim	Low volume	Inclusions and Russell bodies	Basophilic and abundant	Moderate rim of basophilic
Nucleoli	Few	Rare		Prominent and centrally located	Prominent	Large immunoblastic like
Growth pattern	Interstitial	Interstitial	Packed	No predominant pattern	No predominant pattern	Complete replacement
Other features	Mitoses observed	Rare mitoses		Coarse fibrosis	Mitoses found	

Table 1

Immunohistochemical results typically seen in plasma cell tumours. Data from Wong² and Banerjee et al.³

Positive	Variable positivity	Negative
CD38	EMA	CD45 (LCA)
CD138	Cytokeratins	CD20
MUM1	CD10	S100
CD56	CD31	
CD19	CD43	
CD79a	Cyclin D1	
K/L light chains	UCHL1 (CD45RO)	

Table 2

can also be positive in carcinoma. To avoid the potential misdiagnosis of sarcoma, inclusion of mesenchymal markers such as smooth muscle actin (SMA), desmin and myogenin is essential, and their interpretation considered within the context of all other findings (as SMA expression can be found in some carcinomas). As with all high-grade lesions, inclusion of a melanocytic marker such as SOX10 will ensure that a poorly differentiated melanoma is not overlooked, although poorly differentiated melanoma may lose wide-spread immunoreactivity of SOX10.

Notably, there is an increasing role for molecular testing in such lesions. Alongside a supportive diagnostic role, molecular analysis can also provide more personalized prognostication, with the literature reporting that deletion of chromosome 13 and hypodiploidy being associated with a worse outcome.^{3,9}

Treatment for plasma cell tumours is dependent on individuals, anatomical site of occurrence and stage of disease. However, radiotherapy is often the treatment of choice, with chemotherapy and surgery also viable options for patient management.

In conclusion, when presented with an undifferentiated high-grade neoplasm, it is essential to consider plasma cell tumours in the differential diagnosis as the treatment is significantly different to that of lymphomas, carcinomas, sarcomas and melanomas. We recommend in the absence of any pertinent history or clinico-radiological findings, a broad but targeted first line IHC panel comprising at least two cytokeratin markers (AE1/AE3, CK5/6), a haematological marker (CD45), two melanocytic markers (SOX10 MelanA), two plasma cell markers (CD138, MUM1), two vascular markers (CD31, ERG) and two mesenchymal markers (SMA, desmin), and \pm germ cell markers (OCT3/4, AFP). This approach ensures that a wide range of neoplasms are considered and should avoid or at least significantly reduce any erroneous diagnoses being made. ◆

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Self-assessment questions

1. Which of the following IHC markers are negative for a plasma cell tumour?

- A) S100
- B) CK7
- C) EMA
- D) CD31

Answer: A. Cytokeratins, EMA and CD31 can be positive in plasma cell tumours.

2. Which is NOT a typically seen feature in plasma cell tumours?

- A) Russell bodies
- B) Dutcher bodies
- C) Civatte bodies
- D) Clock face nuclei

Answer: C. Civatte bodies are pink globules that are characteristically seen in lichen planus.

3. Which investigations can be helpful alongside IHC in obtaining a diagnosis of a plasma cell tumour?

- A) MRI
- B) Flow cytometry
- C) Urine electrophoresis
- D) All of the above

Answer: D. All of the above have a role alongside the histopathology in reaching a diagnosis of a plasma cell tumour. Clinico-radiological correlation is essential in such cases.

4. Which plasma cell feature would NOT be in keeping with a low-grade plasma cell tumour?

- A) An interstitial growth pattern
- B) Small sized cells

- C) Predominantly plasmablastic cells
- D) Interstitial growth pattern

Answer: C. A large plasmablastic population is more indicative of a grade 3 plasma cell tumour.

5. What are the differential diagnoses for sarcomatoid plasma cell tumours?

- A) Sarcomatoid carcinomas, anaplastic lymphoma.
- B) Sarcomatoid carcinomas, melanoma, germ cell tumours.
- C) Sarcomatoid carcinomas, anaplastic lymphoma, melanoma.
- D) Sarcomatoid carcinomas, lymphomas, melanoma, germ cell tumours, sarcomas.

Answer: D. It is important to consider a wide range of differential diagnoses when posed with any high-grade poorly or undifferentiated neoplasm to reduce the risk of an erroneous diagnosis is not made.