**Secondary plasma cell leukaemia (PCL) with plasmablastic morphology**

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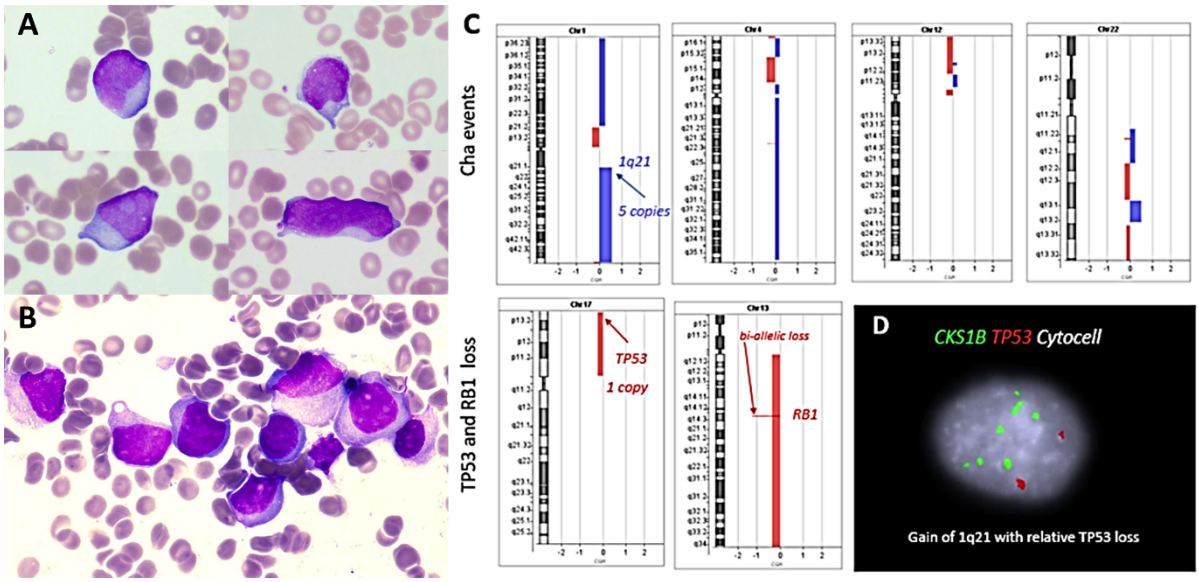


**Figure 1**. (A) Peripheral blood film (Wright-Giemsa x100 objective) showed blastoid cells. (B) Bone marrow aspirate at the second relapse (May-Grünwald-Giemsa stain x100 objective) showed heavy infiltration by plasmablasts. (C) Molecular karyotyping of whole bone marrow sample (blue colour bars indicate copy number gain, red colour bars indicate copy number loss) showed hyperdiploid type complex genome with chromoanagenesis (cha) events in chromosomes 1, 4, 12 and 22 as well as loss at *TP53* and *RB1* gene regions. (D) Fluorescence in situ hybridization (FISH) analysis of CD138(+) cells (x100 objective, DAPI staining) showed *CKS1B* (1q21) amplification of more than five copies.

A 71-year-old female was diagnosed with IgA lambda myeloma. She presented with femoral plasmacytoma, IgA paraprotein 5g/L, lambda light chain 2833 mg/L and widespread lytic lesions on

PET/CT. Bone marrow biopsy was not performed due to the patient's preference. She was treated with femoral fixation, followed by bortezomib, cyclophosphamide and dexamethasone for one year to partial response with normal light chain level and undetectable paraprotein. She relapsed two months after stopping chemotherapy with T10 cord compression, causing right leg weakness. Light chains were normal, and paraprotein was undetectable. She was treated with palliative radiotherapy, carfilzomib, lenalidomide and dexamethasone. Nine months later, at the second relapse, she presented reduced mobility with light chain 232 mg/L and no paraprotein. MRI of the whole spine showed T11-12 cord compression. She was treated with palliative radiotherapy with planned B-cell maturation antigen (BCMA) targeted clinical trial after radiotherapy. She then developed progressive cytopenia. An automated full blood count showed haemoglobin 78 g/L, neutrophil $2.5x10^9$/L and platelet $10x10^9$/L. The peripheral blood film (Figure 1A) showed 5% blastoid cells. By flow cytometry, they were positive for CD56 and CD38 and negative for CD117, CD33, CD14, CD19, CD20, CD3, CD2, CD5, cytoplasmic myeloperoxidase (cMPO), cytoplasmic terminal deoxynucleotidyl transferase (cTdT), indicative of plasma cell leukaemia. Bone marrow aspirate (Figure 1B) showed 60% plasmablasts (large cells with basophilic cytoplasm, fine chromatin pattern, high nuclear-cytoplasmic ratio, very little perinuclear hof) and reduced trilineage haematopoiesis. By flow cytometry, there were 43% CD45wk cells. They were positive for CD33, CD56, CD19wk, CD10wk, and negative for CD34, CD117, CD20, cMPO, cTdT, indicative of plasma cells. Molecular karyotyping (Agilent) identified a complex female genome (Figure 1C). Target CD138-cell FISH (Cytocell) showed *CKS1B* (1q21) amplification (Figure 1D) and *IGH::FGFR3* fusion. Next generation sequencing (Archer Pan-Heme panel, IDT) detected *TP53* p.Arg175His [Variant allele frequency (VAF) 53%], *KRAS* p.Gly12Asp (VAF 30%), *USB1* p.Ser177Ter (VAF 11%) and *TP53* p.Tyr163Cys (VAF 7%) variants. Bone marrow trephine showed 70-80% infiltration by abnormal cells. They were positive for CD138, CD56 and lambda light chain restricted. There was no excess of myeloblast on CD34 or CD117 stain. The patient was diagnosed with plasmablastic progression of myeloma and secondary PCL with plasmablastic morphology. She was not fit for further treatment and sadly passed away two weeks later.

PCL is a rare and aggressive form of plasma cell dyscrasia. The International Myeloma Working Group (IMWG) revised the PCL diagnostic criterion from ≥ 20% circulating plasma cells to ≥ 5% in 2021 [1]. 30-40% of PCLs are secondary PCLs [1]. Secondary PCL patients have a poor prognosis with a median overall survival of less than six months [2]. Secondary PCL with plasmablastic morphology is very rare. Morphologically, it mimics acute leukaemia. In patients with a history of cytotoxic treatment, the differential diagnosis includes myeloid neoplasm post-cytotoxic treatment. Plasmablastic morphology is an independent poor prognostic factor [3]. It is essential to recognize this subtype and explore a novel treatment approach. Here, we reported a case of secondary PCL with plasmablastic morphology, complex cytogenetics and high-risk mutations, who had a fast progressive disease and a very poor prognosis.

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## Informed consent

For this type of study informed consent is not required.

**Consent for publication**

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