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Case Report

Two Monoclonal Bands in Gamma Region onSerum Protein Electrophoresis; a Case Report

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Abstract: Serum protein electrophoresis (SPE) is a useful technique to separate various serum proteins based on their electrical charges and molecular weight. Normally gamma region is characterized by a polyclonal broad band. In Plasma cell dyscrasia we find single monoclonal prominent band. Two distinct bands in this region are quite rare. Here we present such an interesting case. .

Key words: Serum protein electrophoresis, SPE, Multiple myeloma, monoclonal gammopathy, bi-clonal gammopathy, di-clonal gammopathy

Introduction

Serum protein electrophoresis (SPE) is a separation technique based on the movement of charged particles because of an external electric field. Commonly used supporting media are cellulose acetate and polyacrylamide. Proteins are most often stained with Ponceau S after electrophoresis on cellulose acetate and quantified by Densitometry[1].

Most of the diseases like multiple myeloma, liver disorders, acute & chronic inflammatory conditions, nephrotic syndrome and autoimmune disorders are reflected in distinctive electrophoretic patterns. The most important use of SPE is for the detection of monoclonal paraproteins. Reflecting the extreme diversity of a normal antibody repertoire, normal immunoglobulins are extremely heterogeneous and spread out as an ill-defined smear throughout the gamma and beta region.

In contrast, the immunoglobulin proteins produced by an abnormal monoclonal proliferation of plasma cells are homogeneous in their physicochemical & electrophoretic properties and form sharp, tall, & narrow-based peaks on Densitometric tracing[2].

Case Report

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A 53 year old male reported to Armed Forces Institute of Pathology with complaints of backache for 3 months and epistaxis for 10 days. His hemoglobin was 6.4 g/dl and peripheral picture showed bicytopenia. Red blood cells morphology showed anisocytosis and rouloux formation. Biochemical profile revealed serum urea -16.4 mmol/l, serum creatinine - 502 umol/l and serum B2 - microglobulin 15.0 mg/l (reference value 1.0-2.8 mg/l).

He was managed with non steroidal anti-inflammatory drugs, hematinics and 2 pint of red cell concentrates. His bone marrow examination revealed depressed erythropoisis, myelopoisis& diffuse infiltration by abnormal plasma cells and it was reported as plasmacytosis. Serum total proteins were 108 g/l. SPE showed two monoclonal bands in gamma region (Fig 1).

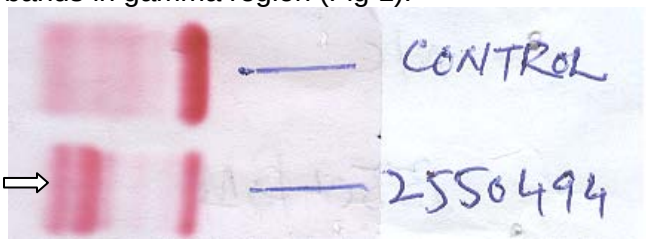

Fig 1.Two distinct monoclonal bands in gamma region (arrow)SPE) on cellulose acetate membrane

Concentration of one monoclonal band in gamma region was 13 g/l and that of monoclonal band in fast gamma region was 41 g/l by Densitometry.

Serum immunoelectrophoresis confirmed the presence of IgA Lambda in gamma region.

Discussion

Multiple myeloma is a malignant neoplasm of a single clone of plasma cells which produce narrow-based peak in monoclonal grammopathies.[3]Whereas chronic antigenic stimulation leads to a polyclonal plasma cell response and therefore no discrete, sharp bands are noted, and the densitometric tracing shows a broad-based peak in the gamma region. [1] It is extremely important to distinguish monoclonal grammopathy from a polyclonal pattern.[4]

Multiple myeloma can be diagnosed precisely through lots of evaluation technique including the confirmation of the presence of increased clonal myeloma cells in bone marrow accompanied by monoclonal protein, cytopenia, bone diseases and renal disturbance. However, there still exists a difficulity during diagnostic process. Among them, common problems are confirmation or identification of minimal or 'masked' monoclonal proteins in several conditions (e.g. myeloma following polyclonal hypergammaglobulinemic conditions), the differential diagnosis between multiple myeloma, Waldenströmmacroglobulinemia, monoclonal grammopathy of undetermined significance (MGUS), tumors in refractory phase (eg. extramedullary plasmacytoma or transition to lympho-proliferative disorders), and the interpretation of new M-component or oligo-clonal protein band in some periods after stem cell transplantation for myeloma.[5]

To diagnose a band seen on SPE definitely as M component, confirmation by immunofixation is usually necessary. IgA tends to migrate in the fast gamma region, between C3 and the origin; IgG, in contrast, is more likely to be found in the slow gamma region and tends to remain in the area immediately surrounding the origin.[3]

About 4 % of patients with a grammopathy have 2 monoclonal bands, mostly they have MGUS, 1/3rd have multiple myeloma, macroglobulinemia or other malignant lympho-proliferative disorders.[6] Kyle RA has reported that multiple myeloma accounts for 1% of all malignancies and about 10 % of hematologic malignancies in United States and it occurs in all races and geographical locations.[7]Goni F et al had reported two electrophoretically homogeneous immunoglobulins were detected in the serum of a patient with multiple myeloma.[8]

Shegemi H reported a case in 1986 about a patient who died of pneumonia due to pancytopenia, his Immunoelectrophoresis showed two M-components (IgG kappa, IgA lambda) in serum. His autopsy report revealed showed massive infiltration of myeloma cells which were positive for lambda light chain in bone marrow, suggesting a development of myeloma from a diclonal gammopathy.[9]

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