Pleural Effusion in a Patient with Multiple Myeloma

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CASE

A 62-year-old woman presenting with dyspnea on exertion was admitted to our hospital. Her medical history included type 2 diabetes and light chain multiple myeloma (MM) diagnosed 3 years ago.

The results of a basic biochemical examination performed 2 weeks earlier were normal. Serum protein electrophoresis revealed hypoproteinemia (65 g/L; reference interval, 68–73 g/L), associated with decreased γ globulins (4 g/L; reference interval, 9–15 g/L) but without a detectable paraprotein band. An assay for serum free light chain showed decreased κ light chains (0.5 mg/L; reference interval, 3.3–19.4 mg/L) and λ light chains (<0.3 mg/L; reference interval, 5.7–26.3 mg/L); the κ/λ ratio could not be accurately determined because of the low concentration of λ light chains. An examination of a bone marrow aspirate taken 3 months earlier showed dystrophic plasma cells accounting for 50% of the nucleated cells.

On admission, laboratory tests revealed normal values for hemoglobin (142 g/L; reference interval, 130–180 g/L), white blood cells (6.7 X 10^9/L; reference interval, 4–10 X 10^9/L), platelets (211 X 10^9/L; reference interval, 150–400 X 10^9/L), and creatinine [38 μmol/L (0.4 mg/dL); reference interval, 45–90 μmol/L (0.5–1.0 mg/dL)], but the tests also revealed mild hypocalcemia [2.14 mmol/L (8.6 mg/dL); reference interval, 2.20–2.60 mmol/L (8.8–10.4 mg/dL)].

A chest radiograph and spiral thoracic computed tomography showed a large right-sided pleural effusion.

A sample of the pleural fluid had a total protein concentration of 38 g/L and a white blood cell count of 20.5 X 10^9/L, with 100% lymphoid cells. The results of bacterial and mycobacterial cultures were negative. Protein electrophoresis evaluations of serum, urine, and the pleural effusion were performed in our laboratory with the Hydrasys® electrophoresis system (Sebia). The serum protein electrophoresis results confirmed the hypoproteinemia (total serum protein, 51 g/L), which was associated with a markedly decreased γ-globulin concentration (2 g/L). There was no detectable paraprotein band (Fig. 1A). The urine electrophoresis results showed proteinuria (713 mg/24 h; reference

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interval, <150 mg/24 h) associated with 2 bands that migrated in SDS-PAGE at the positions of free light chains (data not shown). Standard electrophoresis analysis of the unconcentrated pleural effusion showed a discrete band migrating at a position between the β and γ globulins. This band corresponded to the presence of residual fibrinogen (*1*), because it disappeared after reptilase treatment (Fig. 1B).

Reference

1. Qiu LL, Levinson SS, Keeling KL, Elin RJ. Convenient and effective method for removing fibrinogen from serum specimens before protein electrophoresis.
Clin Chem 2003;49:868–72.

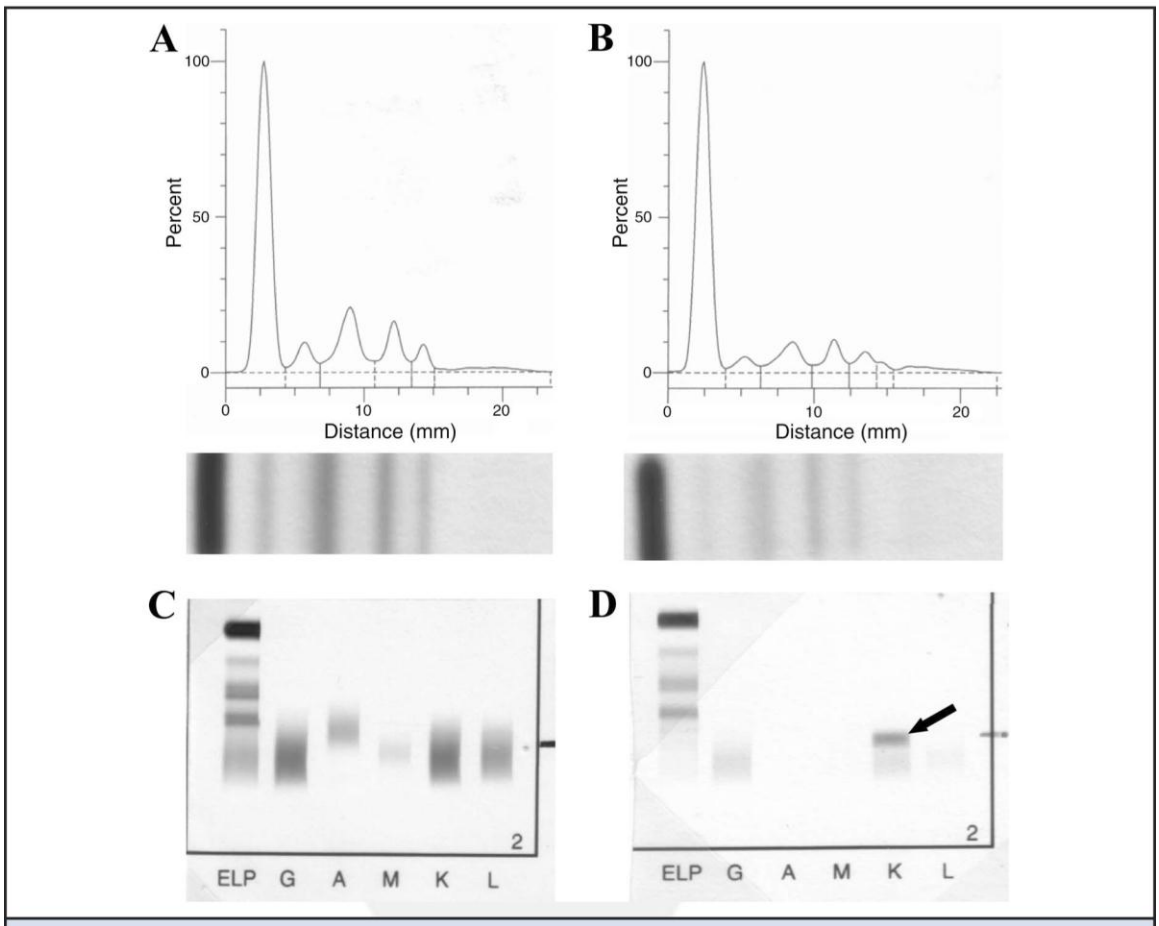

Fig. 1. Biochemical examination of serum and pleural fluid.

Protein electrophoresis of serum (A) and pleural fluid after reptilase treatment (B) showed an important decrease in γ globulins. The serum immunofixation electrophoresis results (C) were normal, whereas immunofixation electrophoresis of the pleural fluid (D) showed a paraprotein band (arrow).

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Questions to Consider
• What is the differential diagnosis of a myelomatous pleural effusion in MM?
• Should laboratory testing of pleural fluid in patients with myeloma include immunofixation electrophoresis?
• Must measurement of pleural fluid for free light chains be considered in this patient?

Final Publication and Comments

The final published version with discussion and comments from the experts will appear in the April 2012 issue of *Clinical Chemistry*. To view the case and comments online, go to http://www.clinchem.org/content/vol58/issue4 and follow the link to the Clinical Case Study and Commentaries.

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