

CASE REPORT

A Polymerized Kappa Light Chain Multiple Myeloma

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SUMMARY

Background: We report a case of a multiple myeloma with light polymerized kappa chains, a phenomenon rarely described.

Methods: Capillary electrophoresis of serum proteins (Capillarys 2 Flex Piercing Sebia[®]) revealed the presence of two migrant monoclonal peaks in the gamma globulin area and identified by immunosubtraction (IS) as light chain (LC) κ . These results suggest either the presence of a LC κ monoclonal IgD or IgE or the presence of a bi-clonal gammopathy or finally a LC κ polymerization. Serum immunofixation (IF) was carried out, after serum depolymerization with beta mercaptoethanol (BME), using as antiserum anti IgD, anti IgE and anti LC κ total and free LC κ . Capillary electrophoresis and IS were also repeated after serum treatment with BME.

Results: The depolymerization of our patient's serum showed the transformation of the two serum peaks into a single peak at the level of the κ light chains on both capillary electrophoresis and immunotyping techniques (IF and IS).

Conclusions: Polymerization of kappa light chains is a rare phenomenon which can cause difficulty in the interpretation of the serum protein electrophoresis and immunotyping.

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KEY WORDS

multiple myeloma, light chains, polymerization of kappa

INTRODUCTION

Light chain multiple myeloma (LCMM) is a hemopathy, characterized by bone marrow invasion with tumor plasma cells and blood secretion of an immunoglobulin free light chain (FLC) [1], and which represents 10% to 15% of multiple myeloma (MM) [2].

We report a case of a multiple myeloma with polymerized FLC kappa (κ), a rarely reported phenomenon.

CASE REPORT

A 68-year-old patient was admitted in the nephrology department for hypercalcemia with renal failure. She

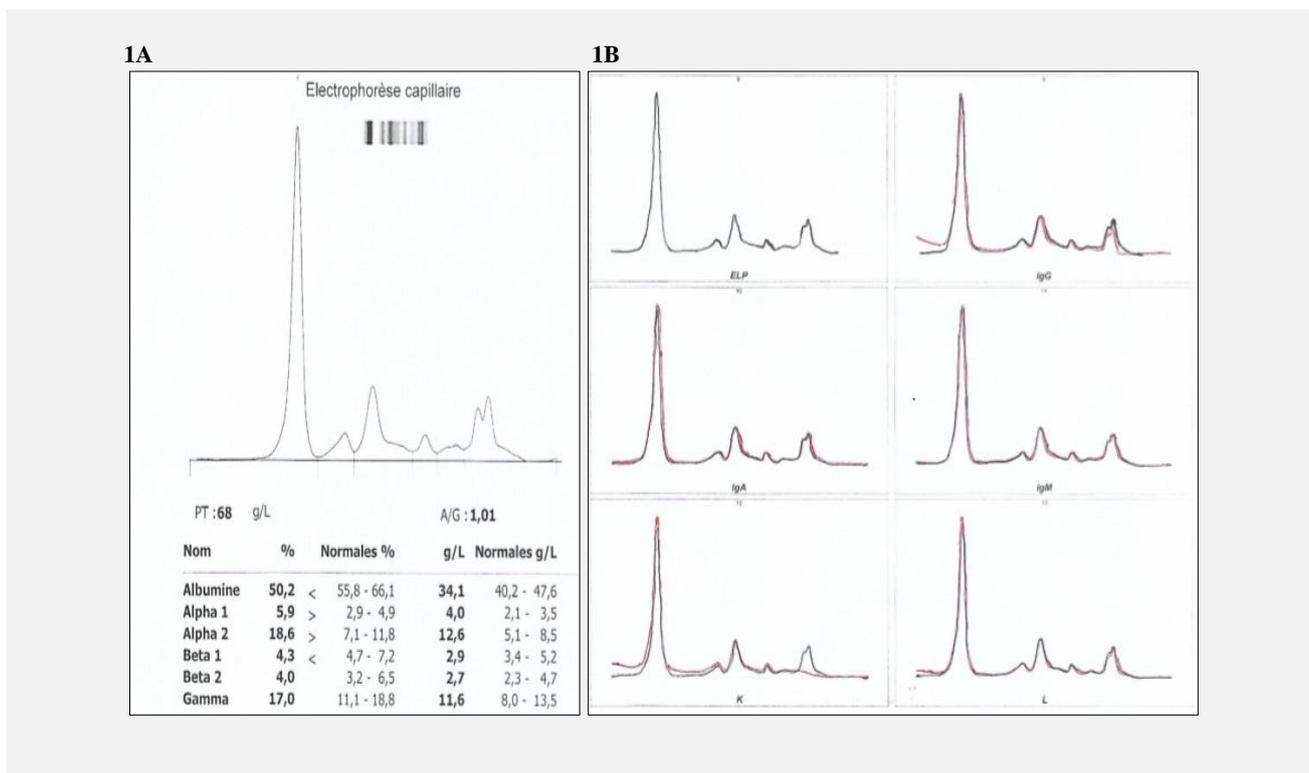


Figure 1A. Electrophoresis of serum proteins before depolymerization.

Figure 1B. Immunofixation before depolymerization.

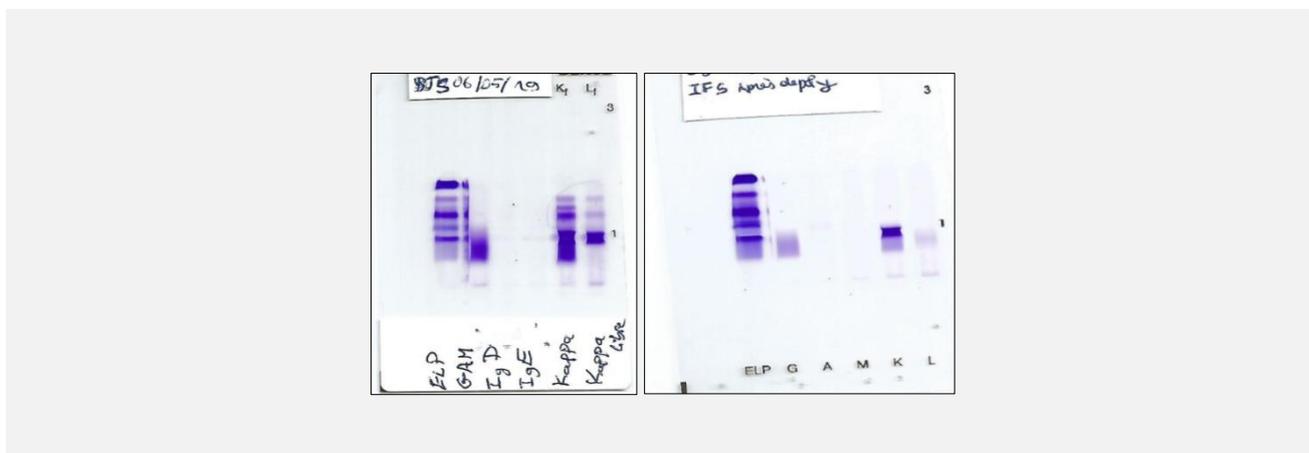


Figure 2. Serum immunofixation after depolymerisation.

has a history of high blood pressure that was not followed. Symptoms started 3 weeks ago with nausea, vomiting, epigastralgia, and intermittent urinary burns, all evolving on a context of apyrexia and anorexia. The physical examination found poorly colored conjunctiva with redness in the right eye without palpable lymphadenopathy. However, tibias pressure was pain-

full without inflammatory signs towards the joints. The skull x-ray showed characteristic lytic lesions also known as Pepperpot Skull. The biological assessment revealed a normochromic, normocytic, and are generative anemia at 10.2 g/dL, a renal failure with a Glomerular Filtration Rate estimated at 5 mL/min/1.73m² by MDRDs, a proteinuria at 0.45

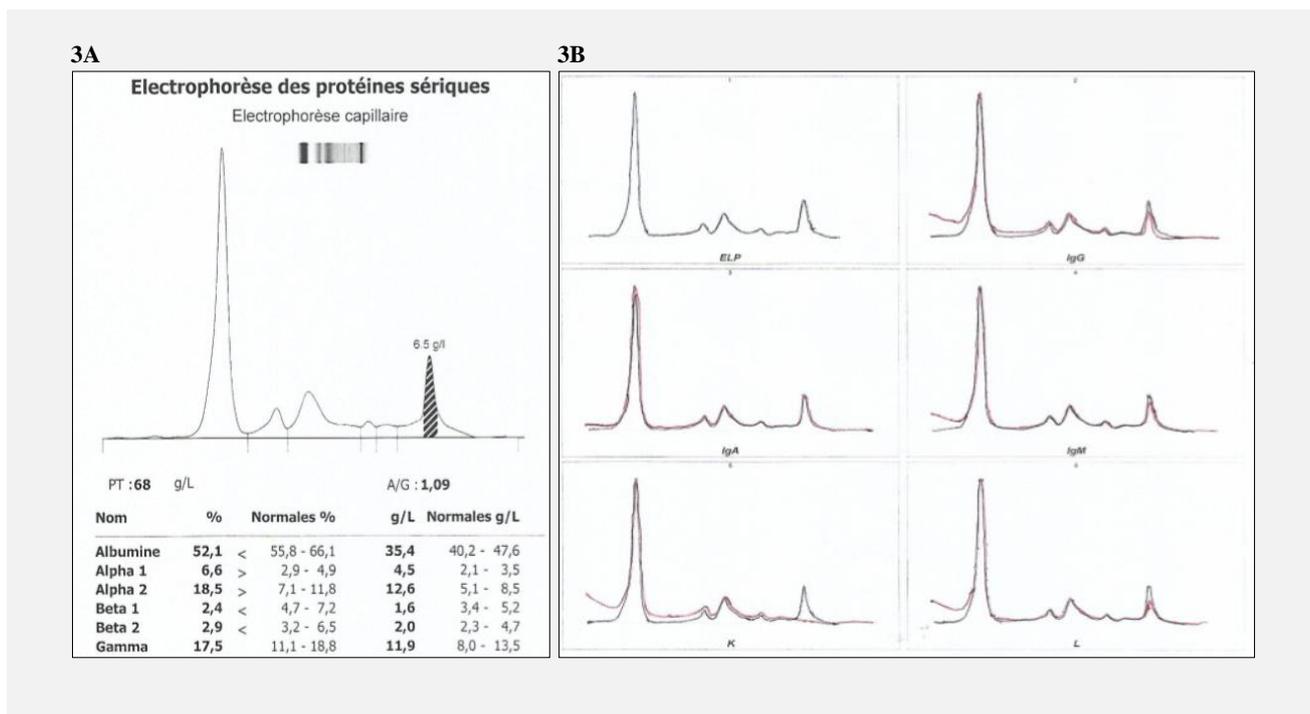


Figure 3A. Electrophoresis of serum proteins after depolymerisation.
Figure 3B. Immunofixation after depolymerisation.

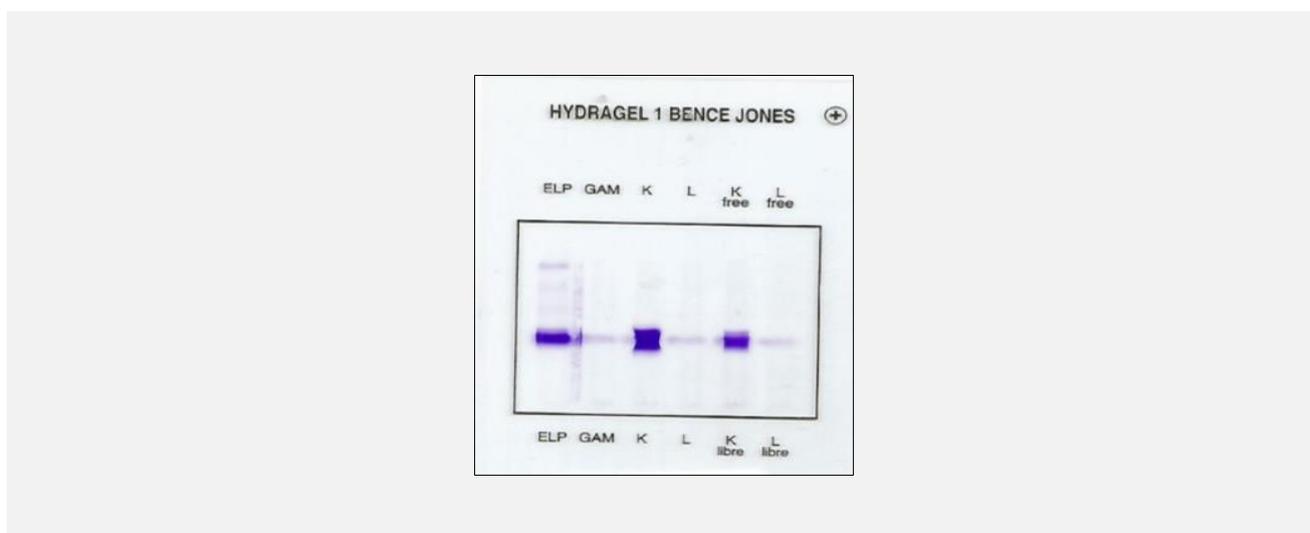


Figure 4. Urinary immunofixation.

g/L (with a Proteinuria Creatininuria Ratio at 3,516 mg/g) and hypercalcemia at 154 mg/L.

Capillary electrophoresis of serum proteins (Capillars 2 Flex Piercing Sebia®) revealed the presence of two migrant monoclonal peaks in the gamma globulin area (Figure 1A) and identified by immunofixation (IS)

as light chain (LC) κ (Figure 1B). These results suggest either the presence of a LCκ monoclonal IgD or IgE or the presence of a biclonal gammopathy or finally a LCκ polymerization.

Serum immunofixation (IF) was carried out, after serum depolymerization with beta mercaptoethanol (BME),

using as antiserum anti IgD, anti IgE, anti LC κ total and FLC κ (Figure 2).

Capillary electrophoresis and IS were also repeated after serum treatment with BME and showed a single peak at the level of the light kappa antichain track (Figure 3A/3B).

The search for κ monoclonal FLC in the urine was positive (Hydrasys 2 Scan FocusingSebia®) (Figure 4).

The myelogram showed a marrow invaded at 74% by dystrophic plasma cells with immature forms.

The diagnosis retained in this case was symptomatic multiple myeloma with light kappa chain.

DISCUSSION

Our patient is admitted in a context of end-stage renal disease with the presence in the urine of monoclonal FLC kappa in high concentration. In fact, the monoclonal FLC synthesized in excess are filtered by the glomerulus and are found in the urine in large quantities, the threshold of metabolization of the proximal convoluted tubule being exceeded. This mechanism is often responsible for the formation of waxy cylinders composed of polymerized LC and Tamm-Horsfall proteins, responsible for renal toxicity [1]. Furthermore, the depolymerization of our patient's serum showed the transformation of the two serum peaks into a single peak at the level of the κ light chains on both capillary electrophoresis and immunotyping techniques (IF and IS) as well.

In normal serum, FLC κ are present in the form of monomers and dimers. These dimers consist of two monomers united in 50% of the cases by disulfide bridges and in 50% of the cases by weak bonds. Few molecules are in the form of tetramers. As for the serum FLC λ of normal serum, only a third of the molecules are in the form of monomers, the remaining two-thirds being in the form of dimers of which 80% result from covalent bonds between the monomers [3].

Generally, in MM κ the degree of polymerization does not exceed 5 and can reach more than 20 in that at FLC λ . However, this polymerization phenomenon is patient-dependent and is independent of the concentration of LC involved [4]. The serum treatment with BME when the presence of polymerized immunoglobulins is suspected, allows breaking the disulfide bridges of the polymerized chains and obtaining a monomeric molecule with homogeneous electrophoretic migration [5].

CONCLUSION

Polymerization of kappa light chains is a rare phenomenon which can cause difficulty in the interpretation of the serum protein electrophoresis and immunotyping.

Declaration of Interest:

The authors declare no conflict of interest.

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