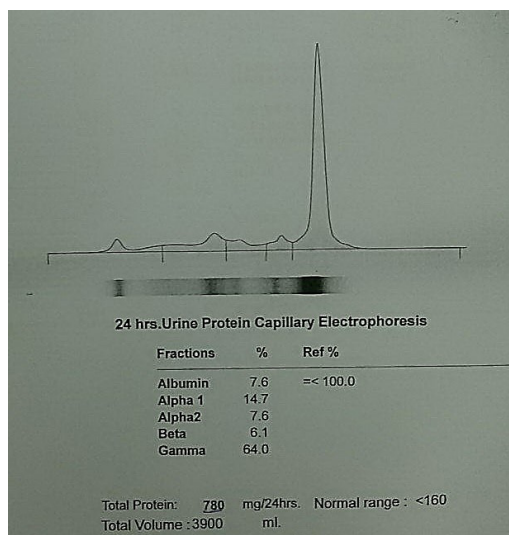
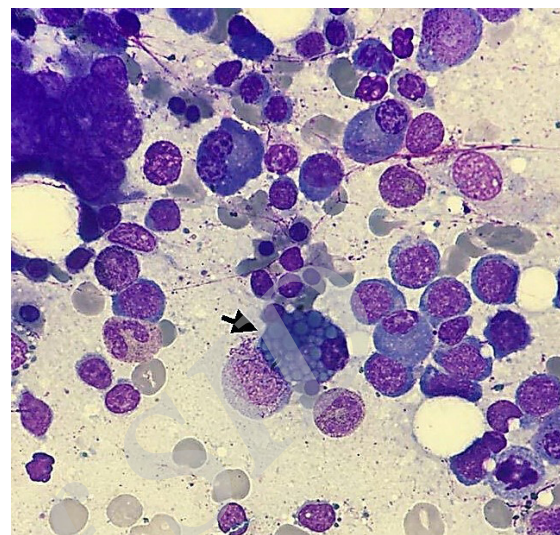


Photoclinic**Figure 1.** Urine Protein Electrophoresis of the Patient.**Figure 2.** Bone Marrow Aspiration Smear of the Patient. (Wright staining $\times 100$).

A 55-year-old previously healthy man was admitted with a diagnosis of pneumonia, and successfully managed with intravenous antibiotics. On admission day, laboratory evaluations were noted: white blood cell (WBC), 12500/ μL , hemoglobin (Hgb), 8.3 g/dL, platelet (PLT), 164000/ μL , C-reactive protein (CRP), 33 mg/L, erythrocyte sedimentation rate (ESR), 110 mm/h, and calcium serum (Ca), 12.9 mg/dL. Despite the improvement of signs and symptoms, ESR, Hgb and Ca levels were 118 mm/h, 8.1 g/dL, and 13 mg/dL

respectively. Because of persistent anemia, hypercalcemia, and elevated ESR, the patient underwent serum and urine protein electrophoresis and immunotyping (Figure 1). Serum B2 microglobulin was 4.3 IU/mL. Bone marrow aspiration (Figure 2) and biopsy were performed. Metastatic cells of a primary lung cancer were found scattered to alveoli, epicardium, pericardial sac, lymph nodes, and pulmonary interstitium (“carcinomatous lymphangitis”). There was neither remarkable pericardial or pleural effusion, nor evident thromboembolism.

**What is your diagnosis?
See the next page for your diagnosis.**

Received: June 21, 2017, Accepted: July 5, 2017, ePublished: May 1, 2018

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■ Photoclinic Diagnosis

Mott cells in a multiple myeloma

Presence of IgG type kappa monoclonal component in serum and urine protein immunotyping, and 20% plasma cell bone marrow on flow cytometry, were consistent with plasma cell myeloma. Therefore the patient was referred to a hematology oncology center.

Bone marrow aspiration revealed plasma cells containing eosinophilic, large, homogeneous grape like accumulation of immunoglobulin called Russell body (RB). These cells which are also known as Mott cells (indicated by the arrow in Figure 2) can be found in multiple situations from malignancies to reactive lesions such as multiple myelomas, autoimmune disorders, monoclonal gammopathies, leukemia, chronic infections, gastric carcinoma, Wiskott–Aldrich syndrome, von Recklinghausen's neurofibromatosis, and Barrett's esophagitis.^{1,2}

Although William Russell and F. W. Mott described these cells in 1890 and 1901 respectively, RB is still used in different morphologic features. While some pathologists refer a large globular inclusion dislocating the nucleus as an RB, others mention it when multiple intracytoplasmic accumulations are present.³

Normally, plasma cell ribosomes produce immunoglobulins which are then delivered to Golgi apparatus, and wrapped into secondary vesicles for secretion out of the cell. It seems that in sustained immune stimulations and hypergammaglobulinemia states like chronic infections or neoplasms, somatic hypermutation of immunoglobulin genes might lead to immunoglobulin synthesis, degradation, and secretion system imbalance, and formation of Russell bodies'. In addition, inadequate transportation of proteins which precipitate within dilated rough endoplasmic reticulum (ER), could play a role in this morphological manifestation.^{4,5}

Mott cells could be realized by some special stains like periodic acid-Schiff (PAS) and May-

Greenwald Giemsa (MGG), as well as expression of immunohistochemistry markers such as B220, CD5, CD43, and CD11b. Pale blue inclusions and cherry red RBs in Mott cells have been described. Other similar PAS positive pale-bluish intracytoplasmic inclusions, Dutcher bodies, should be interpreted carefully since they are

known as pseudo-inclusions according to the WHO classification 2008, and intranuclear appearance has been developed by invagination into the nucleus or laying on it.⁴

Finally, while coexisting light chain diseases, cardiac involvement, advanced stages, anemia, hypercalcemia, and high serum myeloma protein levels are associated with shorter overall survival, the presence of Mott cells does not alter the prognosis of multiple myeloma.^{6,7} The standard first-line treatment for patients ineligible for autologous stem cell transplantation (ASCT) is melphalan and prednisone (MP), with thalidomide (MPT) or bortezomib (VMP).⁸

Authors' Contribution

Data collection: RM; Writing primary draft and manuscript, critical revision: AA.

Conflict of Interest Disclosures

The authors have no conflicts of interest.

Ethical Statement

The ethical committee of Tehran University of Medical Sciences declared ethical approval for the current study.

Acknowledgments

We thank the patient for his cooperation.

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