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RESEARCH ARTICLE

Study of serum protein electrophoresis in suspected cases of Multiple Myeloma.

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Abstract

INTRODUCTION

Multiple Myeloma (M.M) is a neoplasm of B cell lineage which is characterized by excessive proliferation of abnormal plasma cells. These abnormal plasma cells secrete abnormal immunoglobulin that produces a condition called monoclonal gammopathy, which can be detected by the presence of M protein in serum and urine electrophoresis[1]. Serum protein electrophoresis (SPEP) should be done to evaluate the general manifestations like malaise, weakness, chronic bone pain and anaemia, to detect the monoclonal gammopathy and to know the quantity of the M protein in these patients so that we can differentiate between multiple myeloma and the other causes of monoclonal gammopathy.[2]

SPEP is a simple lab technique where the serum is applied on a support medium and exposed to an electric current. The pattern of serum protein electrophoresis results depends on the fractions of two major types of protein: albumin and globulins. Albumin is the major protein component of serum. Globulins comprise a much smaller fraction of the total serum protein content. The subsets of these proteins and their relative quantity are the primary focus of the interpretation of serum protein electrophoresis. Albumin, the largest peak, lies closest to the positive electrode. The next five components (globulins) are labelled alpha1, alpha2, beta1, beta2, and gamma. The M protein or the M component is readily detected as a sharp symmetric spike (M spike) with an α2, β, or a γ mobility while performing the electrophoresis of serum. Multiple myeloma is the most common cause of paraproteinaemia.[3,4]

The purpose of this study is to assess the diagnostic significance of serum protein electrophoresis to detect and to quantify a monoclonal gammopathy by doing SPEP in suspected cases of multiple myeloma

Material and methods :

In present study, total 100 cases were studied during the period of 2 years from September 2012 to September 2014 in the department of pathology M.P shah medical collage Jamnagar. Present study was carried from suspected cases of multiple myeloma patients without prior definitive diagnosis of their diseases were included in the study.
SPEP was performed on Genio electrophoresis machine on cellulose acetate strips by using a readymade buffer (pH 8.6) and Ponceau S as staining reagent. The levels off all the reagents and positions of the strip and blotting paper were checked. 30 µ of serum sample loaded in sample area . After 1 hour 15 minutes, reports were analysed .
The clinical history and the bone marrow biopsy reports were correlated in the M band positive cases to differentiate M.M from the other conditions.

Results and observation :

In present study 100 cases were studied in clinically suspected cases of multiple myeloma whose serum samples were received in the department of pathology for serum protein electrophoresis during the period from sep2012 to sep 2014. There were 68% males and 32 % females. The male to female ratio was 2.1:1. Among the 100 cases, 11cases (11%) were found to have monoclonal gammopathy (the positive M band could be seen in SPEP).The male to female ratio was 2.1:1. A majority of the male patients belonged to the age group of 50 to 59 years, whereas a majority of the female cases were in the range of 60 to 69 years. Among these cases, 10(90.9%) had the M band in the gamma (γ) region and 1 cases (9.1%) had it in the beta (β) globin region. There was no M band in the α region.

The mean concentration of the M protein in the γ region was 6.4 g/dl, with a range of 3.8 to 9.4 g /dl and in the β region, it was 2.9 g/dl. The normal SPEP pattern [Fig-1] and The M spike in the γ region has been depicted on the cellulose acetate strip and in the graph form in monoclonal gammopathy cases in the [Fig-2] and M spike in the β region in the [Fig - 3]

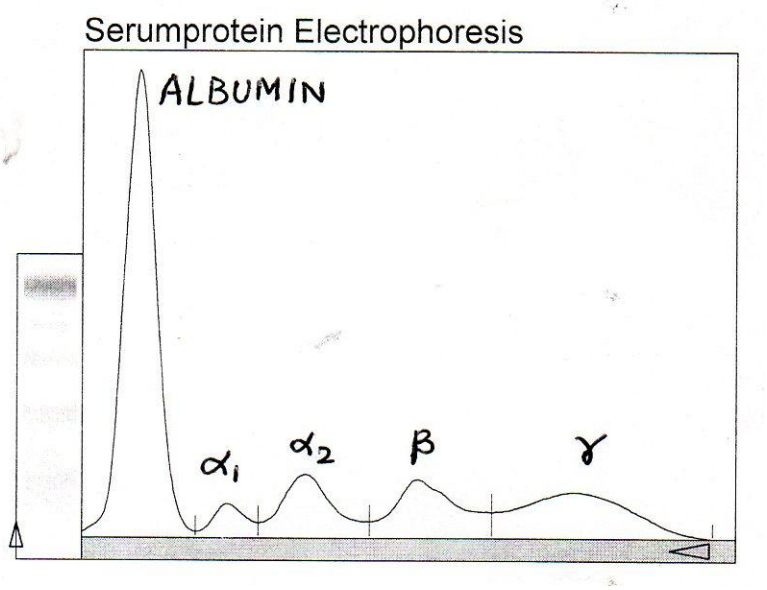


Fig:1 normal pattern of serum protein electrophoresis.

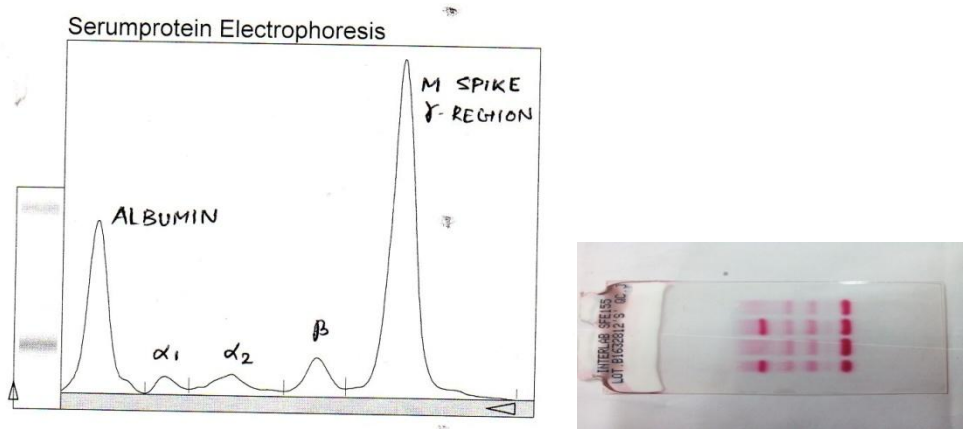


Fig: 2 above graph and strip showing M spike in gamma region in Monoclonal gammopathy cases

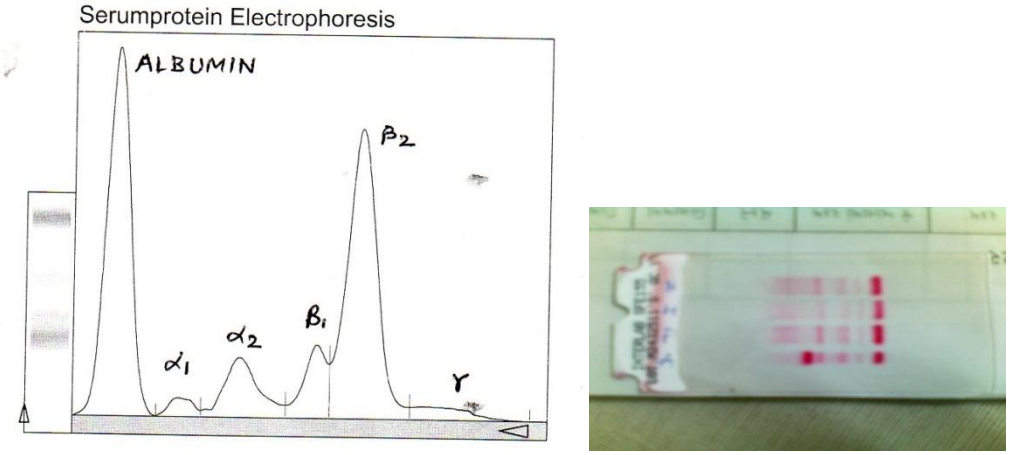
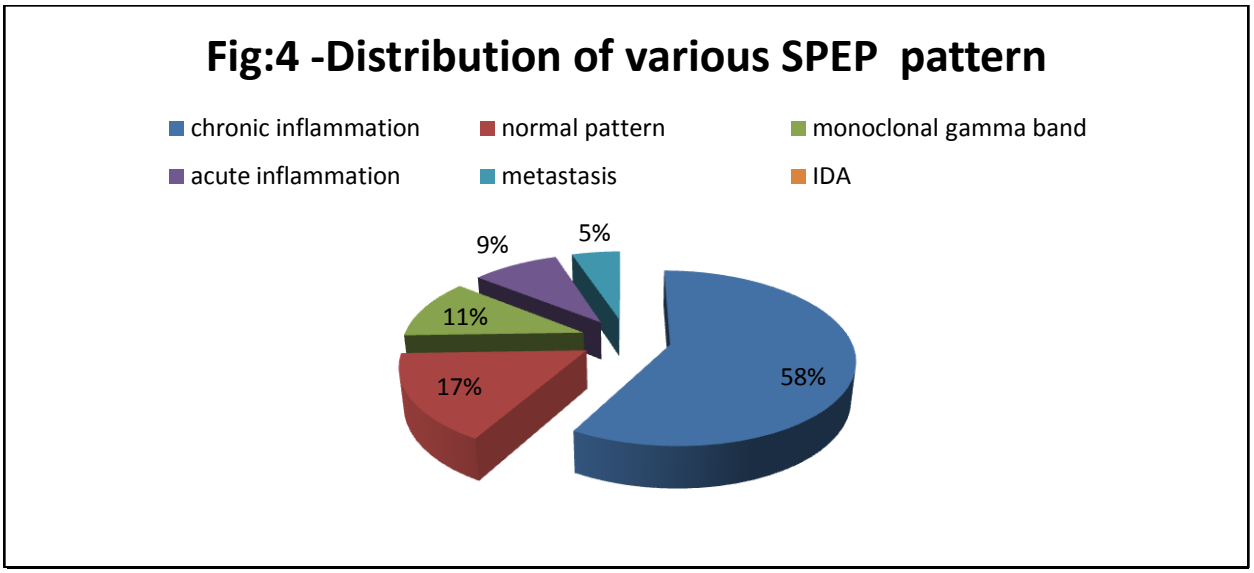


Fig:3 above graph and strip shows M spike in beta region in monoclonal gammapathy case.

The bone marrow biopsy results of the M band positive cases were collected. After correlating the monoclonal gammopathy with the bone marrow biopsy and the clinical features, All 11 cases (11%) were diagnosed to have multiple myeloma The percentage of the myeloma cells in the bone marrow was variable and it ranged from 19 % to 80% in the cases of multiple myeloma.

Along with paraproteinaemia, the other SPEP patterns which were found in our study were the chronic inflammation pattern, acute inflammation, metastasis , iron deficiency anaemia and the normal pattern which is shown in [Fig-4] by a pie chart.



Discussion :

Advent of serum protein electrophoresis has greatly enhanced diagnostic accuracy in different disease processes. Electrophoresis has proved to be very useful in subfractioning different types of proteins. Although an absolute indication in gammopathies, it has turned out to be a very useful diagnostic tool. Its main significance is in the diagnosis and monitoring of monoclonal or polyclonal gammopathies. SPEP can be used as a screening test in the initial evaluation for numerous clinical conditions. [5]

In our study, out of the 100 suspected cases of multiple myeloma, 11 % (11) cases were found to have monoclonal gammopathy or paraproteinaemia, whereas as Tripathi S[2] found 10.6% (16)cases . MD Dilawer et al[6] reported 9.2% [14] samples, Col. Chopra et al[7], found 24.4% samples to be positive for the M protein by SPEP and Vijayashree N[8] reported 4.8% samples to have paraproteinaemia in their studies .

Among the 11 M band positive cases there were M spike in the gamma region in 10 cases(90.9%) and in beta region in 1 sample(9.1%) .Tripathi S[2] reported 14 (87.5%) cases in gamma region and 2 cases(12.5%) in the beta region. G S Chopra et al[7] reported that, 84.8% of the cases had an M band in the gamma (γ) region and that 15.2% cases had an M spike in the beta (β) globin region . In our study, the male to female ratio was 2.1:1 the sex ratio were 1.7:1 in Tripathi S[2] , 1.2:1 in Col GS Copra[7] et al.

All the 11 cases satisfied the diagnostic criteria of multiple myeloma. And could not detect the immunoglobulin isotype due to a lack of IF

Conclusion:

Elderly male complaining of bone pain and with anaemia should be further investigated. SPEP is an easy to perform laboratory test which can be used for the detection and the quantification of monoclonal gammopathy. Compared to total serum protein and different fraction like albumin & globulin estimated by bio-chemistry, serum protein electrophoresis at a same time shows quantitative analysis of serum protein fractions like albumin, alpha-1, alpha-2, beta, gamma globulin and their graphical representation of pattern shows own diagnostic significance.

Reference:

1. Abdalla IA, Tabbara IA. Nonsecretory multiple myeloma. *South Med J*. 2002;95(7).

2. Tripathy S. The Role of Serum Protein Electrophoresis in the Detection of Multiple Myeloma. Journal of Clinical and Diagnostic Research. 2012 November, Vol-6(9): 1458-1461.

3. Vavricka SR, Burri E, Beglinger C, Degen L. Serum protein electrophoresis: An underused but very useful test. Digestion 2009;79: 203-10 .

4. Bottini, Verginia P. Laboratory tests for the evaluation of the monoclonal component. *Rev. Bras. Hematol. Hemoter*. 2007, 29 (1): 23-26.

5. O'Connell TX, Horita TJ, Kasravi B. Understanding and interpreting serum protein electrophoresis. *Am Fam Physician*. 2005 Jan 1;(1): 105-12.

6. Dilawar M, liaz A, Hafeez A, Akbar N, Khan FA, et al. The pattern of serum protein electrophoresis in various diseases. *Pak J Pathol*. 2005;16(1):22-27.

7. Chopra GS, Gupta PK, Mishra DK. The evaluation of suspected monoclonal gammopathies: the experience in a tertiary care hospital. *MJAFI* 2006; 62:134-37.

8. Vijayashree N .The serum protein electrophoresis pattern in the chronically ill patients in a tertiary care hospital. Ind J Clin Biochem. 2009; 24,supp-, P 204.