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Bradshaws Test: A Surreal Test For Multiple Myeloma

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ABSTRACT

Multiple myeloma is characterized by neoplastic proliferation of a single clone ofplasma cells in bone marrow.In asymptomatic patient, multiple myeloma is most likely to be identified through laboratory abnormalities such as hypercalcemia, anemia or proteinuria. Patients may present with non specific symptoms such as nausea, vomiting, malaise, weakness, recurrent infections or Weight loss. Symptoms of bone disease (for example pain from fracture or plasmacytoma, spinal cord compression, peripheral neuropathy or hyperviscosity (for example dyspnoea, transient is chemical attack, retinal haemorrhage, deep venous thrombosis can occur). Anemia is present in nearly all patients with multiple myeloma at some point in the disease[1] .

Herein I present a case of 48 year old female patient who presented with complaints of low back ache for the past 2 months.

Biochemical investigation revealed normocytic normochromic anemia, hyperglobulinemia, raised ESR. Bradshaws test was done and it turned out positive. On electrophoresis, diagnosis of Multiple myeloma was obtained.

Key words: Multiple myeloma, Electrophoresis, Bradshaw test**.**

1. 1. INTRODUCTION

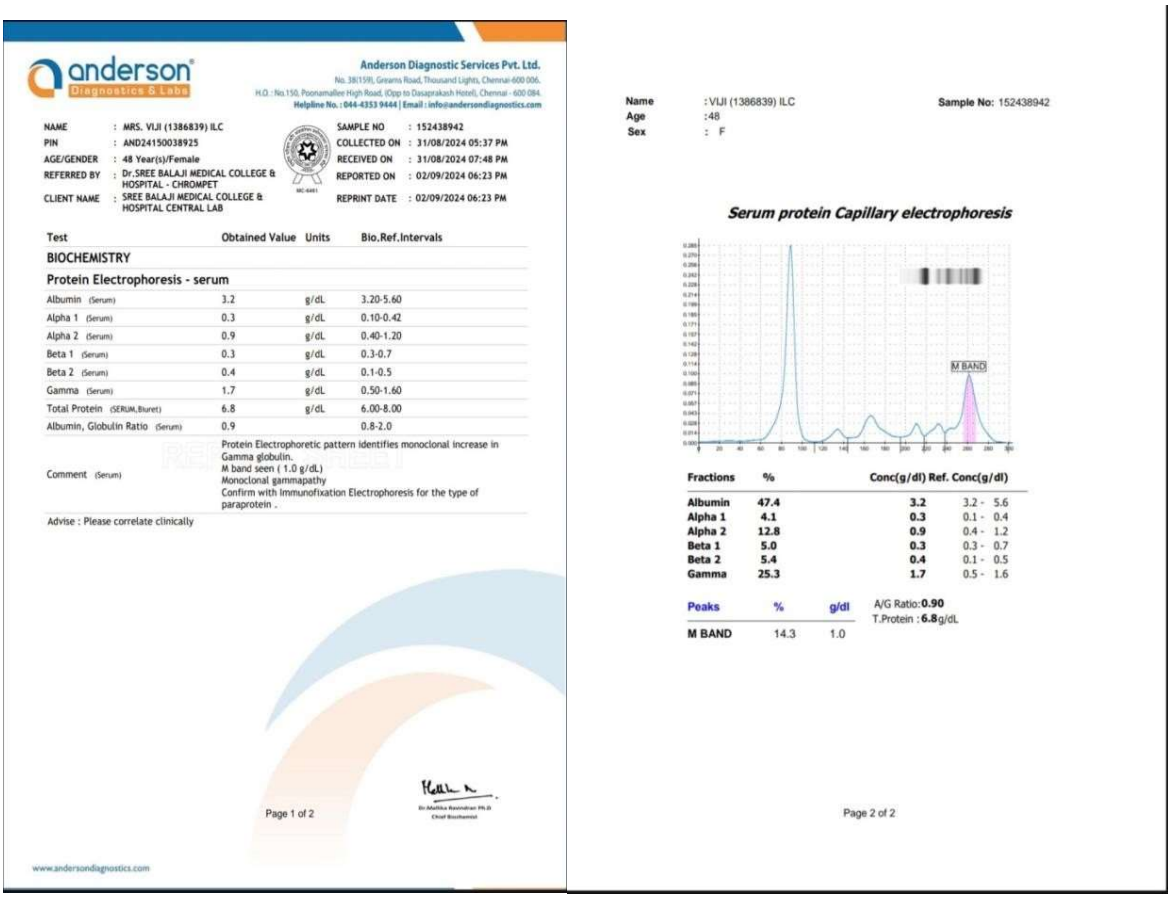
Multiple myeloma is a hematological malignancy of plasma cells. It is a neoplasticplasma cell disorder characterized by clonal proliferation of plasma cells in the bone marrow and presence of monoclonal protein in the blood and urine. The cause of myeloma is not known.Worldwide, it accounts for 1% of all malignancies, 10-13% of all haematological malignancies and 1% of all cancer deaths every year. In India, having been reported with incidence anywhere between 0.3 to 0.9 and 0.4 to 1.3 per 1,00,000 in females and males respectively[2], affecting 0.7/1,00,000 population. Bone pain isthe most common symptom in myeloma, affecting nearly 70% of patient.

Diagnosis of myeloma requires marrow plasmacytosis (>10%) a serum urine Mcomponent .

2. LABORATORY FINDINGS

SAMPLE AND TEST DESCRIPTION	OBTAINEDVALUE	UNITS	BIO.REFERENCE
Whole blood Hemoglobin	8.6	g/dl	12.0-15.0
Whole blood total WBC count	5.63	x10*9/L	4.0-10.0
EDTA ESR	>140	mm/hr	0-20
Serum CRP	1.2	mg/dl	<0.5
Serum Urea	14.59	mg/dl	12.84-42.8
Serum Creatinine	1.03	mg/dl	0.6-1.1
Serum Potassium	3.79	mEq/l	3.5-5.1
Serum Sodium	141.4	mEq/l	136-145
Serum alkaline phosphatase	155.46	IU/L	42-98
Serum Ionised Calcium	1.22	mmol/L	1.15-1.29
Serum Phosphorous	4.11	mg/dl	2.5-4.8
PTH	15.10	pg/ml	12.0-88.0
Serum Vitamin D	28.99	ng/dl	30-100
Serum A/G ratio	0.81	-	1.2:1-2:1
Serum albumin	3.23	g/dl	3.35-5.2
Serum Globulin	4.22	g/dl	2.5-3.5
Serum Beta 2 Microglobulin	5.76	mg/dl	1.5-3
Urine Albumin		Positive	

Electrophoresis of serum was performed simultaneously and showed prominent M band(monoclonal band between beta and gamma). This due to monoclonal origin of immunoglobulins.



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NAME : MRS. VIJI (1386839) ILC
PIN : AND24150038925
AGE/GENDER : 48 Year(s)/Female
REFERRED BY : Dr.SREE BALAJI MEDICAL COLLEGE & HOSPITAL - CHROMPET
CLIENT NAME : SREE BALAJI MEDICAL COLLEGE & HOSPITAL CENTRAL LAB

SAMPLE NO : 152438942
COLLECTED ON : 31/08/2024 05:37 PM
RECEIVED ON : 31/08/2024 07:48 PM
REPORTED ON : 02/09/2024 06:23 PM
REPRINT DATE : 02/09/2024 06:23 PM

Test	Obtained Value	Units	Bio.Ref.Intervals
BIOCHEMISTRY			
Protein Electrophoresis - serum			
Albumin (Serum)	3.2	g/dL	3.20-5.60
Alpha 1 (Serum)	0.3	g/dL	0.10-0.42
Alpha 2 (Serum)	0.9	g/dL	0.40-1.20
Beta 1 (Serum)	0.3	g/dL	0.3-0.7
Beta 2 (Serum)	0.4	g/dL	0.1-0.5
Gamma (Serum)	1.7	g/dL	0.50-1.60
Total Protein (SERUM,Biuret)	6.8	g/dL	6.00-8.00
Albumin, Globulin Ratio (Serum)	0.9		0.8-2.0
Comment (Serum)	Protein Electrophoretic pattern identifies monoclonal increase in Gamma globulin. M band seen (1.0 g/dL) Monoclonal gammapathy Confirm with Immunofixation Electrophoresis for the type of paraprotein .		

Advise : Please correlate clinically

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Name :VIJI (1386839) ILC
Age :48
Sex : F
Sample No: 152438942

Serum protein Capillary electrophoresis

Fractions	%	Conc(g/dl)	Ref. Conc(g/dl)
Albumin	47.4	3.2	3.2 - 5.6
Alpha 1	4.1	0.3	0.1 - 0.4
Alpha 2	12.8	0.9	0.4 - 1.2
Beta 1	5.0	0.3	0.3 - 0.7
Beta 2	5.4	0.4	0.1 - 0.5
Gamma	25.3	1.7	0.5 - 1.6

Peaks	%	g/dl
M BAND	14.3	1.0

A/G Ratio:**0.90**
T.Protein :**6.8**g/dL

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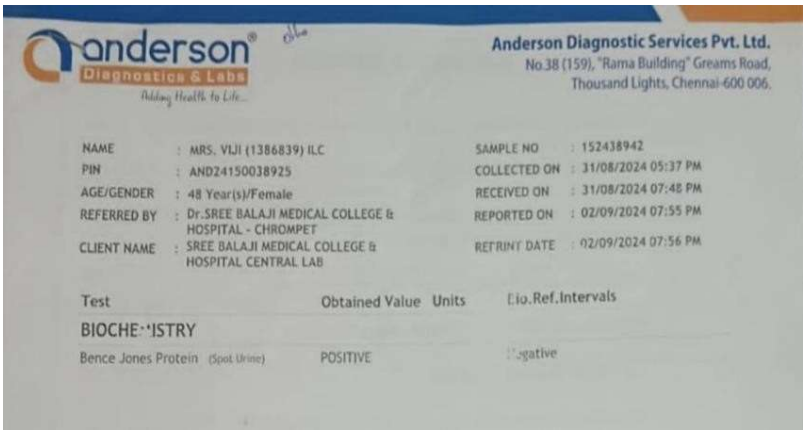
BRADSHAW TEST was used to confirm proteinuria mainly globulin. It was performed by layering clear, filtered urine on concentrated hydrochloric acid so as to foam two unmixed layers formation of a precipitate of protein at the urine acid interface showed positive for globulin.

Bence Jones Protein is a quantitative test which was performed and showedpositive.



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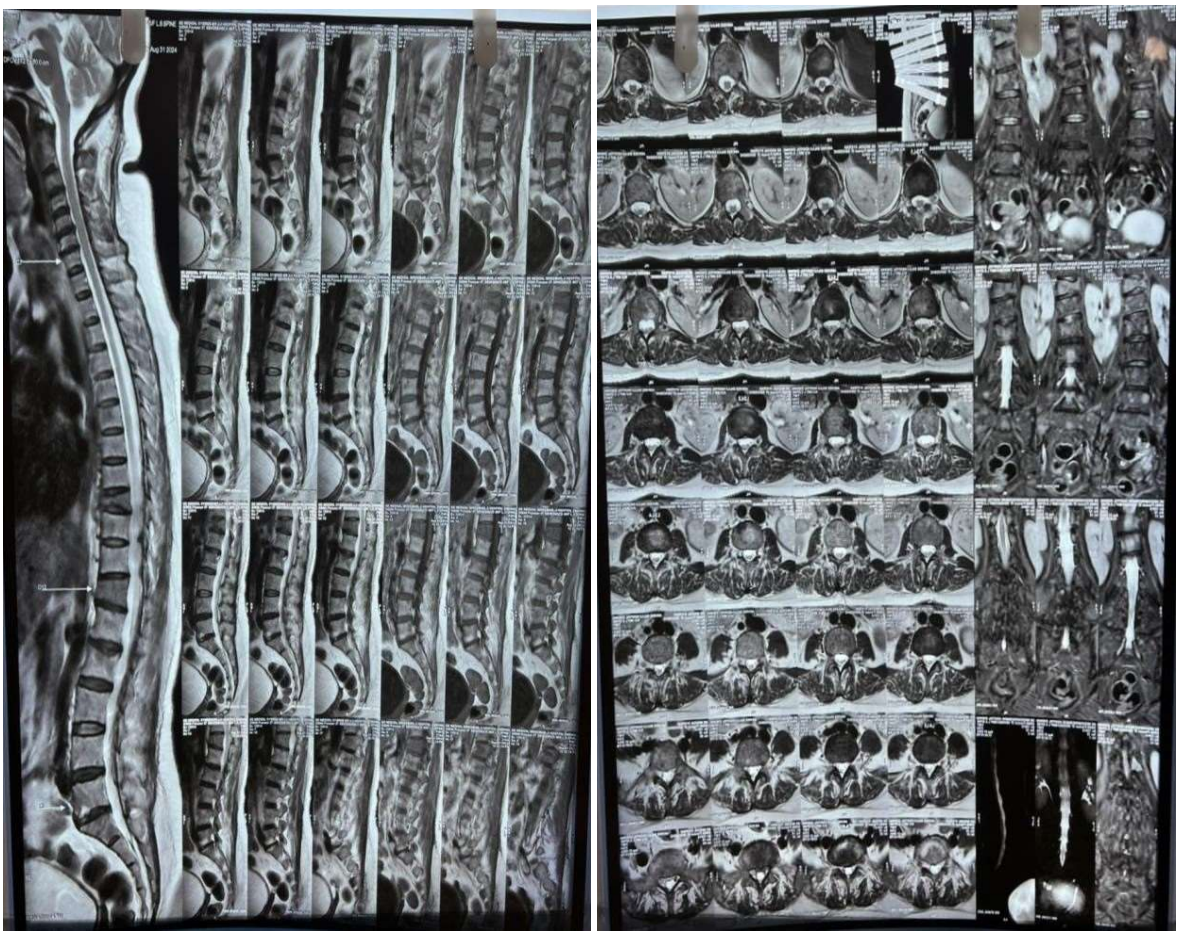
Thousand Lights, Chennai-600 006.

NAME	: MRS. VIJI (1386839) ILC	SAMPLE NO	: 152438942
PIN	: AND24150038925	COLLECTED ON	: 31/08/2024 05:37 PM
AGE/GENDER	: 48 Year(s)/Female	RECEIVED ON	: 31/08/2024 07:48 PM
REFERRED BY	: Dr.SREE BALAJI MEDICAL COLLEGE & HOSPITAL - CHROMPET	REPORTED ON	: 02/09/2024 07:55 PM
CLIENT NAME	: SREE BALAJI MEDICAL COLLEGE & HOSPITAL CENTRAL LAB	RETRINT DATE	: 02/09/2024 07:56 PM

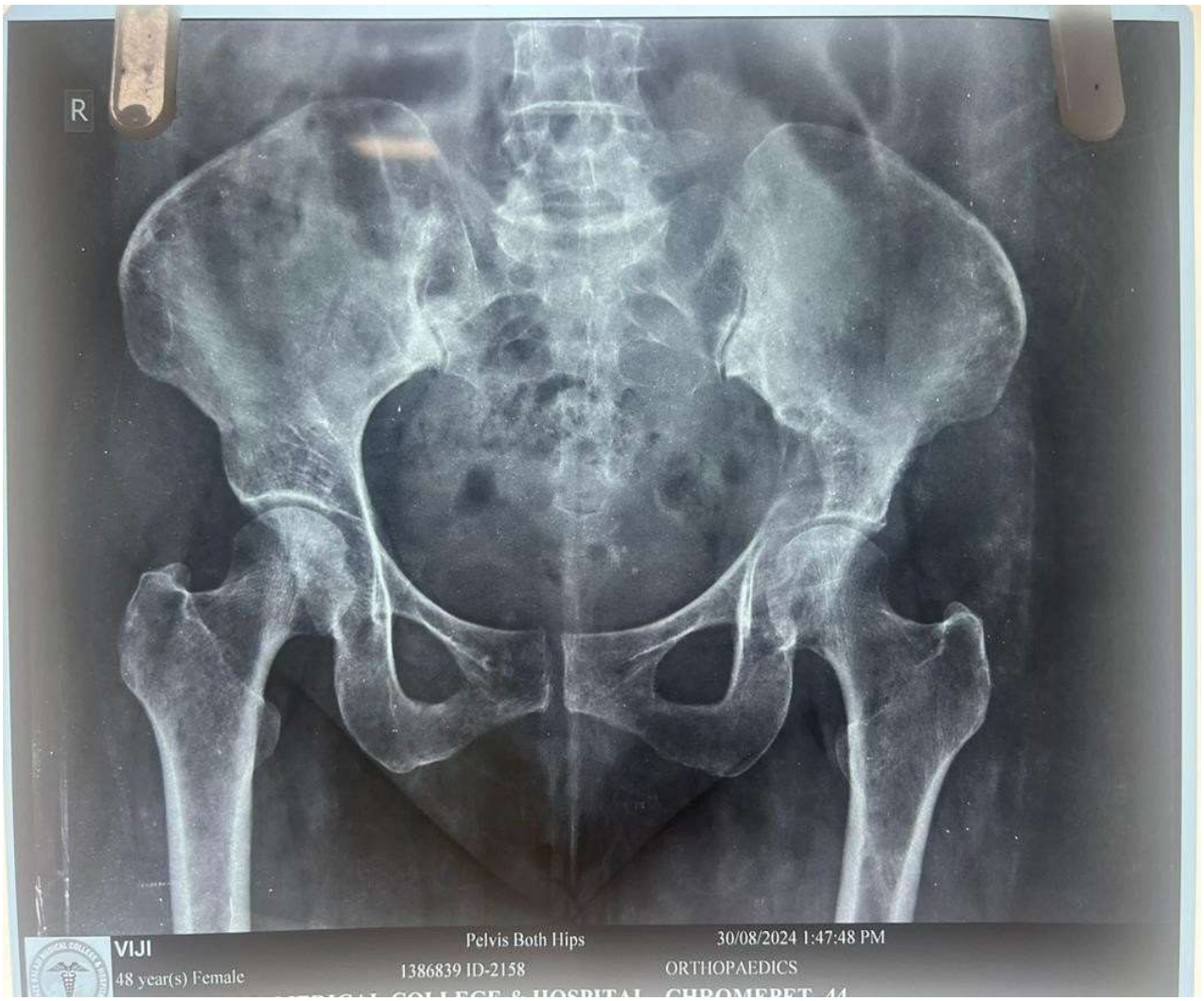
Test	Obtained Value	Units	Bio.Ref.Intervals
BIOCHEMISTRY			
Bence Jones Protein (Spot Urine)	POSITIVE		Negative

MRI shows

- Mild dorsal disc bulge atL1-L2 level causing mild ventral thecal sacindentation.
- Mild dorsal disc bulge with possible posterior annular tear at L2-L3 level,causing mild ventral thecal sac indentation.
- Mild dorsal disc bulge at L4-L5 level causing mild ventral thecal sacindentation with bilateral neural foraminal narrowing.
- Diffuse disc bulge with possible anterior annular tear at L5-S1 level causingventral thecal sac indentation with bilateral lateral recess and neural foraminal narrowing.



X RAY shows few ill-defined and relatively well defined lytic lesions noted involving the left acetabular roof of right pelvic bone.

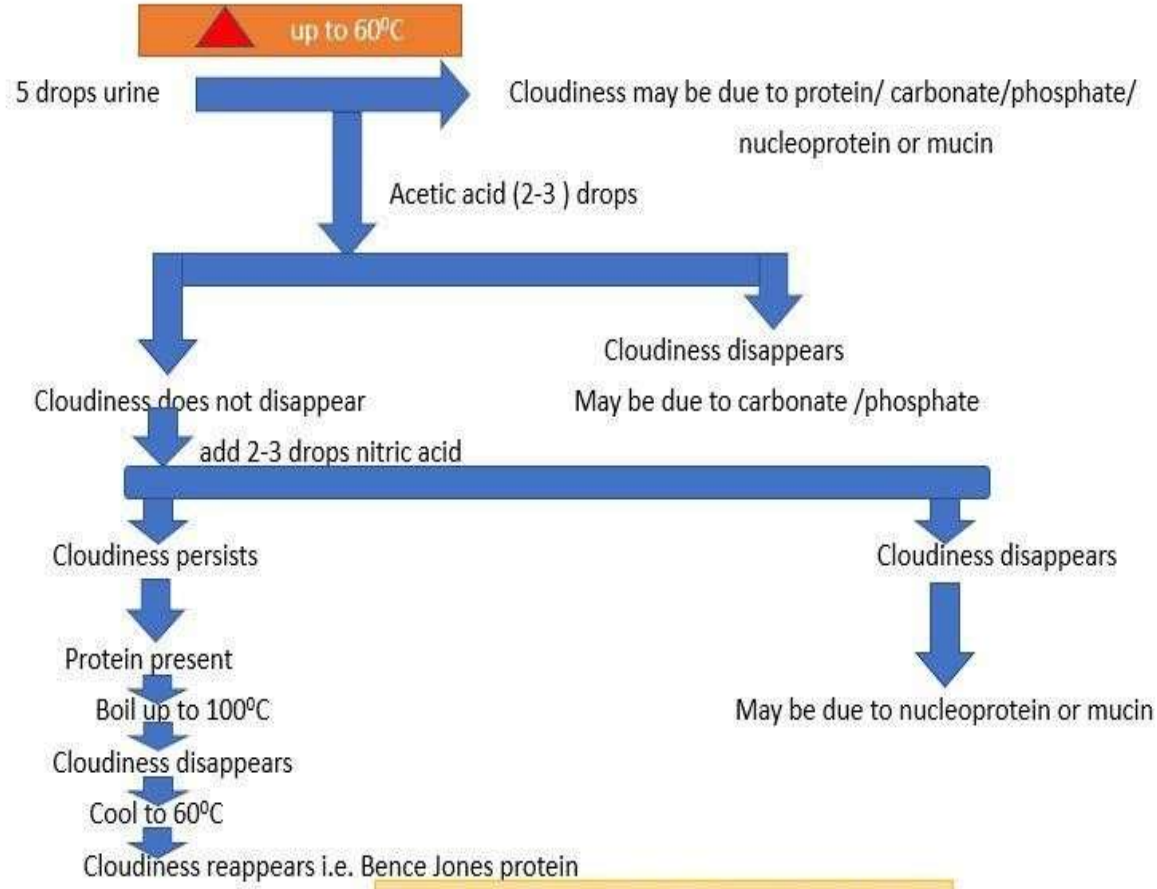


3. DISCUSSION

The early Diagnosis of Multiple myeloma depends on detection of abnormalities of globulin synthesis.

Hendry Bence-Jones described it in 1848. This phenomenon is seen in about 20% cases of multiple myeloma (plasmacytoma), the light chains of immunoglobulins are produced abnormally. Being smaller molecular weight, they are excreted in urine. These are called Bence jones proteins (monoclonal light chains produced by plasmacytomas).

Due to asynchronous production of H and L chains or due to deletion of portions of L chains, so that they cannot combine with H chains. The Bence Jones Protein have special property of precipitation when heated between 45 degree celsius and 60 degree celsius; but re-dissolving at higher than 80 degree celsius and lower than 45 degree celsius. It is also detected by immunoprecipitation[3].



Flow chart of Bence Jones (BJ) protein estimation

4

Atleast 60% of patients with classical myeloma have Bence Jones Protein in their urine. More importantly, 20% of patients with multiple myeloma produce only Bence Jones Proteins without heavy chains. More specifically, changes in the urinary light chain excretion level can assess response to therapy. Direct positive effects on the treatment of multiple myeloma are defined as a reduction to 50% or less of the pre-treatment value of urinary M-protein. In patients with Waldenstrom macroglobulinemia and amyloidosis, Bence Jones Protein can be crucial in the diagnosis. The presence of light chain ladders in samples is a complicating phenomenon. Polyclonal light chains, usually kappa, can produce a characteristic banding pattern after electrophoresis and immunofixation electrophoresis. These light chain ladders are not Bence Jones proteins but commonly appear in the urine samples of elderly patients suffering from tubular proteinuria due to inflammatory disease. Moreover, Bence Jones proteins can sometimes co-migrate with the bands in these ladders. These ladders must be carefully examined to ensure no concomitant accompanying Bence Jones Proteins[5].

Hence Screening test with Bence Jones Protien may be misleading BRADSHAWS test has been found to be unsurpassed as screening test.

Serum biochemical parameters which serve as a sign for multiple myeloma are:

- Peripheral smear shows normocytic normochromic anemia, it is a resultof bone

marrow failure due to infiltration of bone marrow by malignant plasma cells[6].

- Decreased albumin levels (3.23mg/dl) can be connotative of advanced disease such as Multiple Myeloma.
- Lymphoproliferative disorders manifest with high serum Beta 2 microglobulin(5.76mg/dl) and is considered one of the most useful prognostic factor in patients with multiple myeloma.
- Untreated myeloma may progress to damage bones resulting in a elevation in serum calcium levels(1.32mmol/L) due to osteoclastic resorption potentially leading to fractures[6].
- Elevated ESR (140mm/hr) which is indicative of presence of monoclonalprotein.
- CRP is a sensitive marker for inflammatory disease, (CRP-1.2mg/dl) it is increased in response to myeloma-derived cytokines, activated myeloma cells to promote osteoclastogenesis and bone destruction.
- Serum alkaline phosphatase (155.46 IU/L) could be used as a discriminating marker in presence of bone lesions.

The above quantitative and qualitative assessment of bone marrow plasma cell disease is a crucial step in diagnosis of Multiple Myeloma.

CONCLUSION

Bradshaws Test can be considered the screening test for multiple myeloma having showed sensitivity of 47.4%, specificity 91.3% with positive and negative practice values of 50% and 90.4% respectively[7]. It is easy to conduct and cost effective which can be conducted in any clinical laboratory. The diversity of clinical and biological manifestations makes Multiple Myeloma a multidisciplinary condition, which implies a close collaboration between biologists and clinicians for better management.

In this case, Bence Jones Protein turned out to be faintly positive and inconclusive. On addition to that Bradshaw test was carried out and was positive with a remarkable layer of precipitate. This conjecture was then proven when the sample was sent for serum electrophoresis which was conclusive of Multiple Myeloma. Bradshaw test has helped us in early Diagnosis and treatment of this case. Hence, Bradshaw test can be considered as an unwavering investigation for Multiple Myeloma.

REFERENCES:

1. *THOMAS C. MICHELS, MD, MPH, is a residency faculty physician at Madigan Army Medical Center Family Medicine Residency, Tacoma, Wash.* https://www.aafp.org/pubs/afp/issues/2017/0315/p373.html#clinical-presentation-and-evaluation
2. *Department of Pathology, University College of Medical Sciences and Guru Teg Bahadur Hospi*tal, delhi,india https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5844606/
3. *DM VASUDEVAN, SREEKUMARI S, KANNAN VIDYANTHAN Textbook of biochemistry for medical students 10TH EDITION*
4. *https://universe84a.com/bence-jones-protein-estimation/*
5. *NEERAJ RAMAKRISHNAN; ISHWARLAL JIALAL https://www.ncbi.nlm.nih.gov/books/NBK541035/*
6. *Biochemical profile of multiple myeloma about 50 cases ELGHOUAT GHITA, NAKHIL RAJA, RAISSI ABDERRAHIM, CHELLAK SALIHA and BOUKHIRA ABDERRAHIM*

7. *G.SHULMAN, K.STEVENS, D.B.BERNARD, T.H.BOTHWELL, W.R.BEZWODA, S.R.LYNCH Multiple myeloma clinical, biochemical and immunochemical aspects*