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An Interesting Case of Chronic Obstructive Pulmonary Disease with Primary Polycythemia JAK2 V617F Mutation

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Abstract: ***This particular case emphasizes the importance of investigation and significance of not excluding a primary cause in chronic obstructive pulmonary disease with erythrocytosis. A 63 - year - old male, presenting a complaint of dyspnea, was subsequently diagnosed with COPD clinically and confirmed by spirometry. Erythrocytosis was also incidentally noted. The patient had no signs of polycythemia or hepatosplenomegaly. As a result, the erythrocytosis was first attributed to being caused by hypoxia secondary to COPD. However, the JAK2 V617F gene mutation was detected, which led to the diagnosis of polycythemia vera. Although the erythrocytosis was initially attributed to the underlying pulmonary disease, investigations proved it to be primary in origin.***

Keywords: Polycythemia Vera, Polycythemia, Mutation, Chronic Obstructive Pulmonary Disease, Case

1. Introduction

Polycythemia which is defined as increase in hemoglobin concentration above normal can be classified into absolute polycythemia or relative polycythemia. Absolute polycythemia is further be divided into polycythemia vera (PV, primary polycythemia) associated with JAK mutation and secondary polycythemia associated with EPO secretion secondary to hypoxia. This is a case a polycythemia vera JAK2 positive patient with COPD.

Diagnosis of Polycythemia Vera is based on WHO criteria a composite assessment of clinical and laboratory features, including *JAK2* mutation status and serum erythropoietin (EPO) level. The presence of a *JAK2* mutation and a subnormal serum EPO level confirms the diagnosis of PV Secondary polycythemia can be attributed to chronic obstructive pulmonary disease (COPD) in response to chronic hypoxia. Prevalence of JAK 2 mutation in COPD patient is not known.

2. Case Report

Virendra Singh 63 years old male presented to SRN Hospital emergency with complain of dyspnea on exertion since 4 months aggravated 15 days back. The patient had a history of smoking a round 20 bidis per day for past 20 years. Now reduced to 2 to 3 bidis per day for past 3 months. On examination the look was plethoric. vesicular sounds reduced over all auscultatory areas. Rhonchi present over all lung fields. Rest systemic examination within normal limit.

Several investigations were carried out including a chest X - ray which showed hyperinflated lung field with tubular heart and flat diaphragm. Spirometry revealed a non - reversible, obstructive picture with a forced expiratory volume in one second (FEV1) of 64%, a FEV1/FVC of 58, and a post bronchodilator responsiveness FEV1 of 9% (100 mL). Full blood count (FBC) result showed hemoglobin 18.2g/dL, white cell count (WCC) 4 thousand/mm and platelets 31000/mm; therefore, he was noted to be polycythemia.

Date	: 28-Aug-2023	Reg/Ref: -- / 20230828-127269	Collected At : [Main Centre]
Name	: **MR. VIRENDRA SINGH**	Age/Sex	: 63 Yrs./Male
Ref.By	: **Dr. Manoj Mathur MD.**	Specimen	: Collected in lab.

BONE MARROW EXAMINATION
REF. NO.- BM-198/23

REPORT :

Bone marrow aspirate is mildly hypercellular.
M : E ratio is 2 : 1.
Myeloid series of cells are normal in number and morphology.
Erythroid series of cells are normal in number and show normoblastic maturation.
Lymphocytes and plasma cells are normal in number and maturity.
Megakaryocytes are normal in number and show pleomorphic forms and increase in nuclear cytoplasmic ratio.
No abnormal cells, haemoparasites, increase in blasts or metastatic deposits are identified.
Bone marrow Iron is 2+.
Marrow cell count :
P 28, L 18, E 02, M 01, B 01, Band forms 19, Metamyelocytes 14, Myelocytes 16, Plasma cell 01%.

INFERENCE :

Bone marrow aspirate shows normoblastic erythroid hyperplasia.
Peripheral blood and marrow findings are suggestive of a chronic myeloproliferative neoplasm likely Polycythaemia vera.
Suggested study of JAK/2 mutation.

20/29 , Panna Lal Road , Near Raj Nursing Home , Allahabad-211002

Name	: **Mr. VIRENDRA SINGH**		Billing Date	:	29/08/2023 16:23:12
Age	: 63 Yrs		Sample Collected on	:	29/08/2023 16:25:38
Sex	: Male		Sample Received on	:	29/08/2023 16:27:50
P. ID No.	: P1204100015741		Report Released on	:	31/08/2023 19:43:24
Accession No	: **120423017600**		Barcode No.	:	1201052805
Referring Doctor	: MANOJ MATHUR				
Referred By	:		Ref no.	:	

Report Status - Final

Test Name	Result	Biological Ref. Interval	Unit

MOLECULAR DIAGNOSTICS

JAK2 V617F Mutation Detection
Sample: Bone Marrow EDTA
Method: Real Time PCR

***JAK2* Exon 14 Mutation Analysis (Qualitative)**

Specimen type: EDTA P BM
Methodology: Real Time PCR
Reference Sequence: NC_000009.12

Gene/ Exon	Mutation Status	Variant Effect
JAK2/ Exon 14	V617F Mutation Detected	Pathogenic/ Activating

Result & Interpretation:
V617F mutation was observed in exon 14 of *JAK2* gene in the specimen provided.
Presence of the mutation strongly supports a diagnosis of PV. Correlation with clinical and other hematological parameters is advised for confirmation

3. Discussion

The diagnosis of PV is strongly associated with the presence of the JAK2 V617F somatic mutation. Around 80% polycythemia patient have JAK2 V617 mutation. COPD and other hypoxic states are associated with elevated EPO levels causing secondary polycythemia. Here we report a case of a patient of COPD with polycythemia having JAK 2 mutation presented in exacerbation. The patient was treated with therapy specific for primary polycythemia - Hydroxy urea 500 mg BD, Aspirin 75 OD and other supportive measures for exacerbated COPD after which the patient improved.

4. Conclusion

Here we stress upon the importance of identifying the occurrence of primary polycythemia vera with JAK 2 mutation in patient with underlying lung disease like COPD which can have polycythemia due to elevated EPO level secondary to hypoxia. As both the conditions have entirely different management and prognosis.

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