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# Homocysteinemia in a Case Presenting with Right Ventricular Dysfunction and Deep Vein Thrombosis

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**Abstract:** ***Elevated levels of homocysteine in the blood is known as homocysteinemia. Homocystinuria, an inborn error of metabolism is a rare disorder. It usually presents with ectopia lentis, stroke, mental retardation, anaemia and skeletal abnormalities. 31-year-old man presented with marfanoid features, right ventricular dysfunction, DVT in left lower limb. Other systems were normal. Investigations revealed of very high Methionine (Homocystinemia) probably due to cystathionine β synthase deficiency.***

**Keywords:** Homocystinuria, Thrombosis, Marfanoid features

## 1. Introduction

Elevated levels of homocysteine in the blood is known as homocysteinemia. It is an inborn error of methionine metabolism. It is an autosomal recessive disorder due to cystathionine β synthase deficiency [1]. It can also manifest due to cobalamin deficiency and homocysteine excreted in urine which is known as homocystinuria. A normal blood level varies between 5-15 µmol/L. There is a consistent relation between homocysteine level and thrombosis [2]. We present a non-smoker, alcoholic young man diagnosed with homocysteinemia with deep vein thrombosis (DVT) of left lower limb, mild pulmonary embolism (PE), and right ventricular (RV) dysfunction with normal vitamin B12 and folate levels.

## 2. Case Study

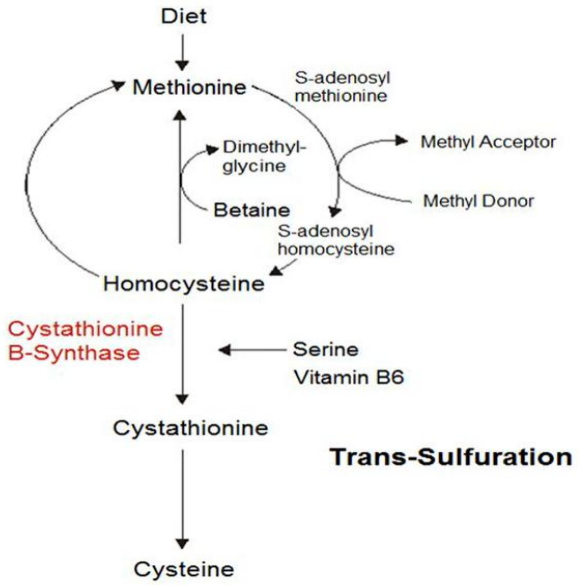
31-year-old, unmarried, previously healthy man presented to the emergency department with complaints of giddiness, breathlessness and an episode of fainting with no loss of consciousness. Not a known case of diabetic or hypertension. Known case of alcoholic and non-smoker. No history of fever. On examination patient was conscious, oriented, no anaemia, icterus present.
BP: 100/70 mmHg
PR :99/min
RR:28/min
SpO2: 97%

Patient was shifted to ICCU and investigations were done. Blood investigations are as follows:

| Investigations | Observed value | Reference level |
|---|---|---|
| Serum Methionine | 73.4 | 5-15 µmol/L |
| Prothrombin time | 37.2 | 12-14 sec |
| INR | 3.13 | <1.1 |
| Serum CPK | 248 | 26-174 U/L |
| Serum CK- MB | 38 | 5-25 U/L |
| Serum Bilirubin total | 4.8 | 0.3-1mg/dl |
| Serum Bilirubin direct | 1.2 | 0-0.2 mg/dl |
| Serum Bilirubin indirect | 3.6 | 0.2-0.8 mg/dl |
| SGOT | 165 | 13-39 U/L |
| SGPT | 95 | 7-41 U/L |
| Pulmonary angiogram | Bilateral pulmonary artery thrombosis in both ascending and descending pulmonary arteries with dilated main pulmonary artery and mild pleural effusion. | |
| ECHO | dilated right and left atrium with RV dysfunction. | |
| Venous doppler | non compressible DVT in left lower limb. | |

## 3. Discussion

Homocystinuria is the second most prevalent curable aminoacidopathy next to phenylketonuria. There are two ways of removal of the intermediate metabolite of methionine catabolism known as homocysteine. Cystathionine β synthase is an enzyme that uses B6 as a cofactor to irreversibly catalyze the conversion of Homocysteine. This process is known as transsulfuration process.The second method involves the remethylation of methionine using either methionine synthase or methylenetetrahydrofolate reductase.




Classification of hyperhomocysteinemiai) moderate risk 15 - 30µmol/L ii) intermediate risk 30-100 µmol/L iii) severe >100µmol/L [4].

Homocysteinemia affects several organs namely central nervous system, eye, skeletal, and vascular system. These patients are often normal at birth. Ocular manifestations include lens subluxation, which results in severe myopia and iridiodonesis. Skeletal abnormalities in homocystinuria are similar to Marfan syndrome.Central nervous system involvement includes progressive mental retardation, seizure, dystonia, behavioural and personality disorder, and stroke due to thromboembolic syndromes.

There are various studies that shows increased risk of thromboembolism in homocysteinemia [5, 6]. Homocysteinemia leads to endothelial dysfunction and thrombosis by increased generation of thrombin. A patient with homocysteinemia needs to be closely monitored because there is a significant chance that thromboembolic episodes.In our case the patients had DVT of left lower limb and also cardiovascular complications. Demethylation of dietary methionine results in the formation of homocysteine, a sulfur containing amino acid [7]. Because folate is necessary for the remethylation of homocysteine to methionine, people with folate deficiency typically have higher blood homocysteine levels.

Hyperhomocysteinemia was revealed to be a risk factor for thrombosis in people under the age of 40 by Falcon et al. in a case-control study [8]. While supplementation of vitamins B6, B9, or B12 lower homocysteine levels, they had no effect on the risk of heart disease, stroke, or death [9].Principle in the treatment of homocysteinemia is to correct the biochemical abnormalities by controlling the homocysteine level thereby to prevent complications. As it is a genetic disorder frequent monitoring and lifelong treatment is necessary [10].

## 4. Conclusions

Homocysteinemia is a rare autosomal disease. The patient can be given methionine-restricted diet and treated with high dose of oral pyridoxine. Duration if treatment is lifelong. The patient should be followed up at regular intervals for clinical evaluation, response to treatment and also to detect clinical complication.

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