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A Rare case of neonatal Carnitine palmitoyltransferase II deficiency at Tertiary care centre

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Carnitine Palmitoyltransferase-II (CPT-II) deficiency is a disorder of mitochondrial fatty acid oxidation. Carnitine palmitoyltansferase -II deficiency can be detected by tandem mass spectrometry. Clinical manifestations characteristically involve hepatic, skeletal and cardiac muscle. The most common presentation is acute episode of life threatening coma, hepatic encephalopathy and hypoglycemia induced by a period of fasting resulting from defective hepatic ketogenesis. Treatment is to ensure frequent feeding to prevent hypoglycemia and carnitine supplementation.

Introduction:

Mitochondrial beta oxidation of fatty acids is an essential energy producing pathway and its defect is seen in Inborn errors of metabolism. The prevalence is 1-9 per 100,000. It is essential during periods of reduced calorie intake caused by any gastrointestinal illness or increased energy expenditure during febrile illness. Under these conditions, body starts using fat instead of carbohydrate as its major fuel. Carnitine Palmitoyltransferase-II deficiency can be diagnosed by tandem mass spectrometry. Clinical manifestations characteristically involve hepatic, skeletal and cardiac muscle. The most common presentation is acute episode of life threatening coma, hepatic encephalopathy and hypoglycemia induced by a period of fasting resulting from defective hepatic ketogenesis. We present a case of 25 days old female neonate admitted with lethargy, refusal to feed ,convulsions and respiratory distress. Carnitine deficiency was not thought of until the patient was investigated thoroughly. This case report highlights the importance of newborn screening to rule out fatty acid oxidation defects as early detection of these defects dramatically changes the health and development outcomes.

CASE REPORT:

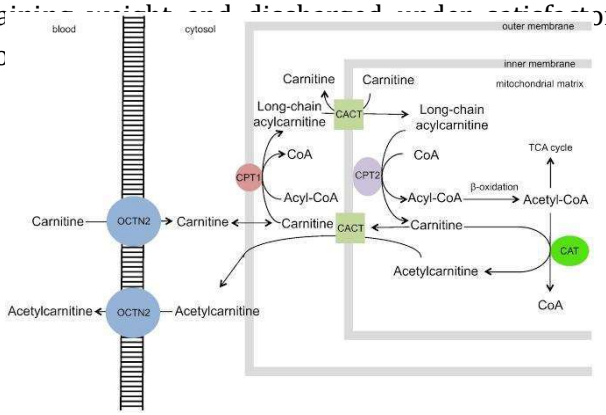
Written informed consent was obtained from the parents of the patient regarding participation in study as well as use of obtained medical data for scientific research and publication.

A 25 days old newborn presented with lethargy, refusal to feed, irritability and respiratory distress. Baby was born via normal delivery at a gestational age of 38 weeks 2 days with a birth weight of 2540 gms. She is the third child of non-consanguineous marriage. There was no significant birth history and family history. At presentation, his vitals were Heart rat 120/min, respiratory rate 58/min, temperature 101. F, blood pressure of 90/50 mm Hg and sPO2 82 % off O2. On examination, baby was tachypneic with reduced air entry on left side and put on non invasive ventilation with PEEP of 5 cm H20, and FiO2 of 70%. Baby had no facial dysmorphism, hepatomegaly of 5 cm below right subcostal margin and tip of spleen was palpable, activity and tone were depressed. With the above symptoms, initial diagnosis suspected was of Sepsis, Galactosemia or Glycogen storage disorder.

Haemogram showed Haemoglobin of 8.3 g/dl, total leucocyte count of 13000 cells/mm3. Neutrophils 70%, lymphocytes 28%, monocytes 2%, platelet counts of 45000 cells/mm3and peripheral blood smear normocytic normochromic, normal coagulation profile. Blood urea 26 mg/dl, S.creatinine 0.6 mg/dl, low random blood sugar 25mg/dl. Total serum bilirubin 5.3 mg/dl, direct serum bilirubin 3.1 mg/dl, raised aspartate transaminase 345 IU/L and alanine transaminase 154 IU/L. Blood culture and urine culture were

suggestive of no growth. In view of thrombocytopenia baby was given 3 units of platelets guided by clinical and lab improvements. 2D Echo was normal and USG revealed hepatosplenomegaly.

Serum and Urinary ketones were sent which were negative, suggesting non ketotic hypoglycemia. Liquid chromatography mass spectrometry for Plasmaacylcarnitine profile showed low levels of free carnitine , elevated levels of free fatty acids namely, C16 and C18, thereby leading to diagnosis of CPT-II deficiency. In view of low RBS, dextrose bolus injection was given and GIR of 8mg/kg/min started and increased to 10mg/kg/min. After recovery, baby was shifted to full feeds and syrup L-carnitine started at 100 mg/kg/day in two divided doses. Baby was gaining weight and discharged under satisfactory cc



DISCUSSION: Carnitine palmitoyltransferase – II deficiency (CPT-II) is a disorder of mitochondrial fatty acid oxidation. [2] There are three forms of CPT-II deficiency – neonatal form, infantile hepatocardiomuscular form and myopathic form.[5] Carnitine palmitoyl transferase-II deficiency can be detected by tandem mass spectrometry. CPT-II deficiency is one of the most common defects of LCFA metabolism.[1] CPT-II catalyses formation of LCFA acyl co-A species in mitochondria, allowing further oxidation and energy generation by other LCFA oxidation enzymes, including very low acyl coA dehydrogenase (VLCAD).Patients with CPT-II deficiency show elevated blood levels of long chain acylcarnitine species, especially palmitoyl-carnitine (C16) and oleoyl-carnitine. (C18)

Signs and symptoms of CPT-II deficiency typically appear during infancy or early childhood and can include severe brain dysfunction(encephalopathy), a weakened and enlarged heart (cardiomyopathy) , confusion, vomiting, muscle weakness and low blood sugar (hypoglycemia) often associated with hepatomegaly, elevated transaminases levels, pericardial effusion. Infants mostly present with hypoglycemia and lethargy. [5-6] In neonates with carnitine palmitoyltransferase deficiency diagnosis is n[illegible] [3-4-7



TEST NAME	RESULTS (micromol/L)	BIO REF. INTERVAL
Free Carnitine (C0)	20.00	25.00-50.00 micromol/L
Palmitoylcarnitine (C16)	0.51	<0.45 micromol/L
Octadecanoylcarnitine (C18)	0.11	0.02-011 micromol/L
Octanoylcarnitine (C8)	0.04	0.08-0.41 micromol/L
Decanoylcarnitine (C10)	0.03	0.04-0.44 micromol/L

CONCLUSION: This is a rare case of Carnitine palmitoyltransferase-II deficiency presented with lethargy, refusal to feed, irritability and respiratory distress. Mass spectrometry for Plasmaacylcarnitine profile was done that revealed low levels of free carnitine. Frequent feeding was ensured to prevent hypoglycemia and carnitine supplementation was

started. Parents were advised regular followup for adequate weight gain and development.

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