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Vitamin B12 Encephalopathy- A Case Series

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Here we report 3 cases of vitamin B12 encephalopathy who presented with seizure and neurodevelopmental delay. They were later diagnosed as a case of severe vit B12 deficiency and successfully treated with IM vit B12 resulting in good neurological outcome almost towards normal.

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Vitamin B12 Encephalopathy- A Case Series

Sunil Kumar Agarwalla [α] & Nasreen Ali [σ]

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One of our case was presented with INFANTILE SPASM which being a rare form of seizure in a case of B12 encephalopathy.

Any child presented with encephalopathy with knuckle hyperpigmentation without any prior history of fever,loose stool,vomiting one has to do Complete blood count,comment on peripheral smear & serum B12 to rule out B12 deficiency. We want to emphasize that early diagnosis & prompt treatment can alter the disease process.

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I. Case Report

In 1st case -A 19 month old female baby admitted to paediatric department of MKCG medical college with complains of hyperpigmentation of skin for 4 months, unable to stand with support for 3 months and sudden flexion of neck, arms and thighs multiple times for 2 months. The child was born out of non-consanguinous marriage by normal vaginal delivery, the child has been continuing breast feed till now along with mixed diet from family pot. The family being vegetarian. The child was apparently normal till 15 months of age and had attained all milestones appropriate for age till 15 months of life, following which she gradually lost the ability to stand with support and sit by herself. There was no associated fever, headache and vomiting. On examination, the child was irritable. There was intermittent flexor spasm (infantile spasm) multiple times a day and there was hyperpigmentation of skin over toungue, knuckles, knee and thighs (Figure 1,2 and 3). There were no signs of meningitis, reflexes were brisk and B/L plantar was flexor.CSF study was done to rule out meningitis, which came out to be normal.CBC showed severe anaemia and MCV was 94 fL (Figure 4). Because of macrocytic anaemia, knuckle pigmentation and neurological signs with a history of vegetarian diet,a provisional diagnosis of vitamin B12 deficiency was made. It was confirmed by doing serum B12 level, which came to be very low (<100pg/ml) (Figure 5).EEG came out to be normal. The patient was treated with IM neurobion injections daily for 7 days followed by weekly dose for 7 weeks. To control infantile spasm IV valproate started and after 72 hours oral clonazepam was added as seizure persisted. The patients cognition improved by day 3.The infantile spasm came under control from 6th day onwards and from day 8 it seized completely. The patient was successfully discharged after regaining all the developmental milestones appropriate for age (figure 6).

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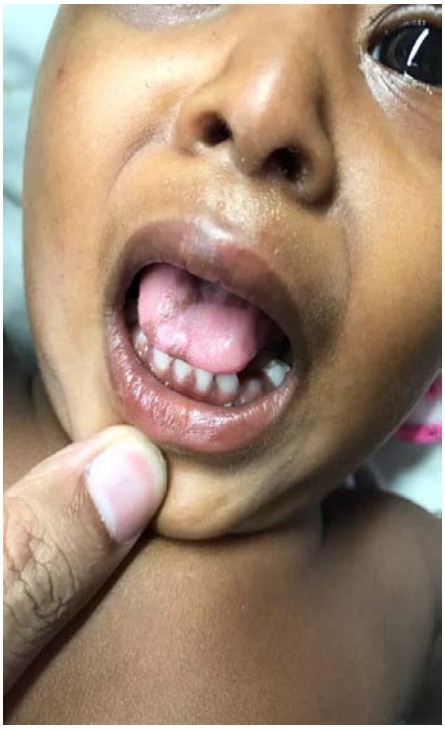


Figure 1, 2, 3: Showing pigmentation of lower limbs, hand and tongue

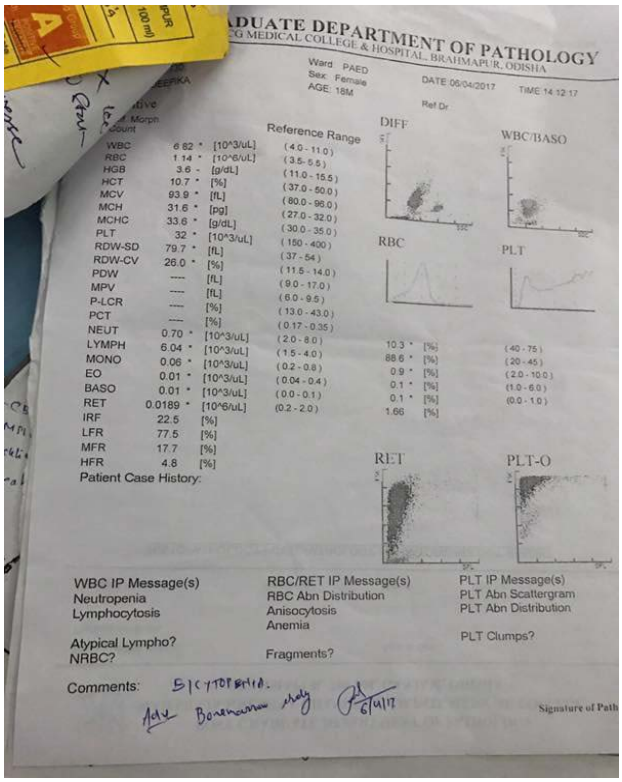
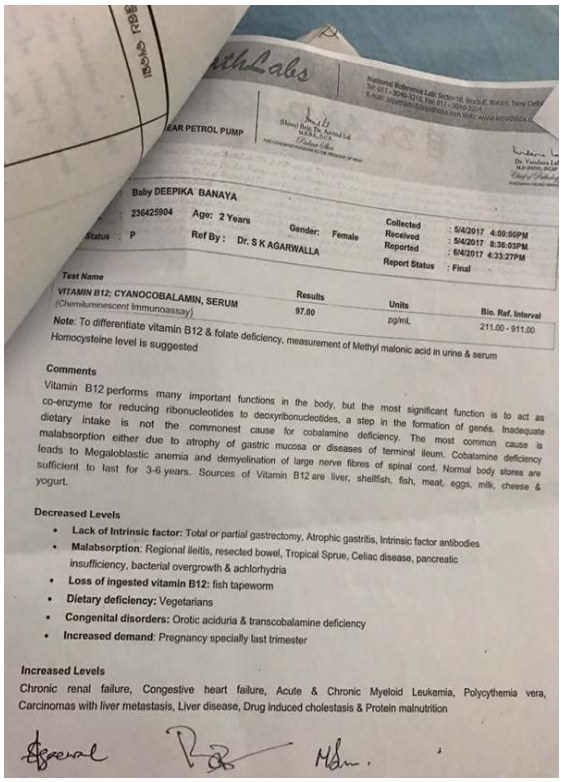


Figure 4: Showing CBC (low Hb and high MCV) Figure 6 showing happy child with ability to sit on its own



Baby DEEPIKA BANAYA
236425904 Age: 2 Years Gender: Female
Status : P Ref By : Dr. S K AGARWALLA
Collected : 5/4/2017 4:09:00PM
Received : 5/4/2017 8:36:03PM
Reported : 6/4/2017 4:33:27PM
Report Status : Final

Test Name	Results	Units	Bio. Ref. Interval
VITAMIN B12; CYANOCOBALAMIN, SERUM (Chemiluminescent Immunoassay)	97.00	pg/mL	211.00 - 911.00

Note: To differentiate vitamin B12 & folate deficiency, measurement of Methyl malonic acid in urine & serum Homocysteine level is suggested

Comments

Vitamin B12 performs many important functions in the body, but the most significant function is to act as co-enzyme for reducing ribonucleotides to deoxyribonucleotides, a step in the formation of genés. Inadequate dietary intake is not the commonest cause for cobalamine deficiency. The most common cause is malabsorption either due to atrophy of gastric mucosa or diseases of terminal ileum. Cobalamine deficiency leads to Megaloblastic anemia and demyelination of large nerve fibres of spinal cord. Normal body stores are sufficient to last for 3-6 years. Sources of Vitamin B12 are liver, shellfish, fish, meat, eggs, milk, cheese & yogurt.

Decreased Levels

- **Lack of Intrinsic factor:** Total or partial gastrectomy, Atrophic gastritis, Intrinsic factor antibodies
- **Malabsorption**: Regional ileitis, resected bowel, Tropical Sprue, Celiac disease, pancreatic insufficiency, bacterial overgrowth & achlorhydria
- **Loss of ingested vitamin B12:** fish tapeworm
- **Dietary deficiency:** Vegetarians
- **Congenital disorders:** Orotic aciduria & transcobalamine deficiency
- **Increased demand**: Pregnancy specially last trimester

Increased Levels

Chronic renal failure, Congestive heart failure, Acute & Chronic Myeloid Leukemia, Polycythemia vera, Carcinomas with liver metastasis, Liver disease, Drug induced cholestasis & Protein malnutrition

Figure 5: Showing serum B12 level

In 2nd case- A 5 yrs. old male child, product of non consanguineous marriage presented with unable to walk, stand, sit, speak with abnormal body movements and altered sensorium for last 15 days.(fig.1) There was no history of fever, convulsion, loosestool and vomiting, respiratory difficulty.There was also no history of birth asphyxia and child is neuro developmentally normal. No similar episodes in past or no sibling in the family having similar problem. On examination child was in altered sensorium, vitals was stable, anthropometric measurement was normal for the age. On head to toe examination child having knuckle and periungual hyperpigmentation of both limbs (fig.2, 3), angular stomatitis with sparse hypo pigmented brittle hair, somepallor, no cyanosis, clubbing, icterus, edema or lymphadenopathy. On CNS examination no cranial nerve deficit, hypotonia of both upper and lower limbs, power of both limbs was diminished (3/5). All superficial reflexes are normal except planter extensor, B/L Knee jerk was exaggerated and ankle jerk was diminished. Other systemic examination was within normal limits. On investigation complete blood count suggestive of megaloblastic anemia. Hb-6.7 gm%, MCV-110.8 fl. Serum electrolytes, urea, creatinine, liver function test was normal. Serum vitB12 was estimated and it was very low (73 pg/ml). CECT brain was also normal. After giving 2 wks. of daily vit B12(1mg IM) and folic acid, neurological and general well-being improved (fig 4,5).Repeat vit B12 level was 512pg/ml. Child discharged with im vit B12 wkly for 8 wk. then monthly once for 6 month alongwith folate therapy .The child was advised for monthly check up.

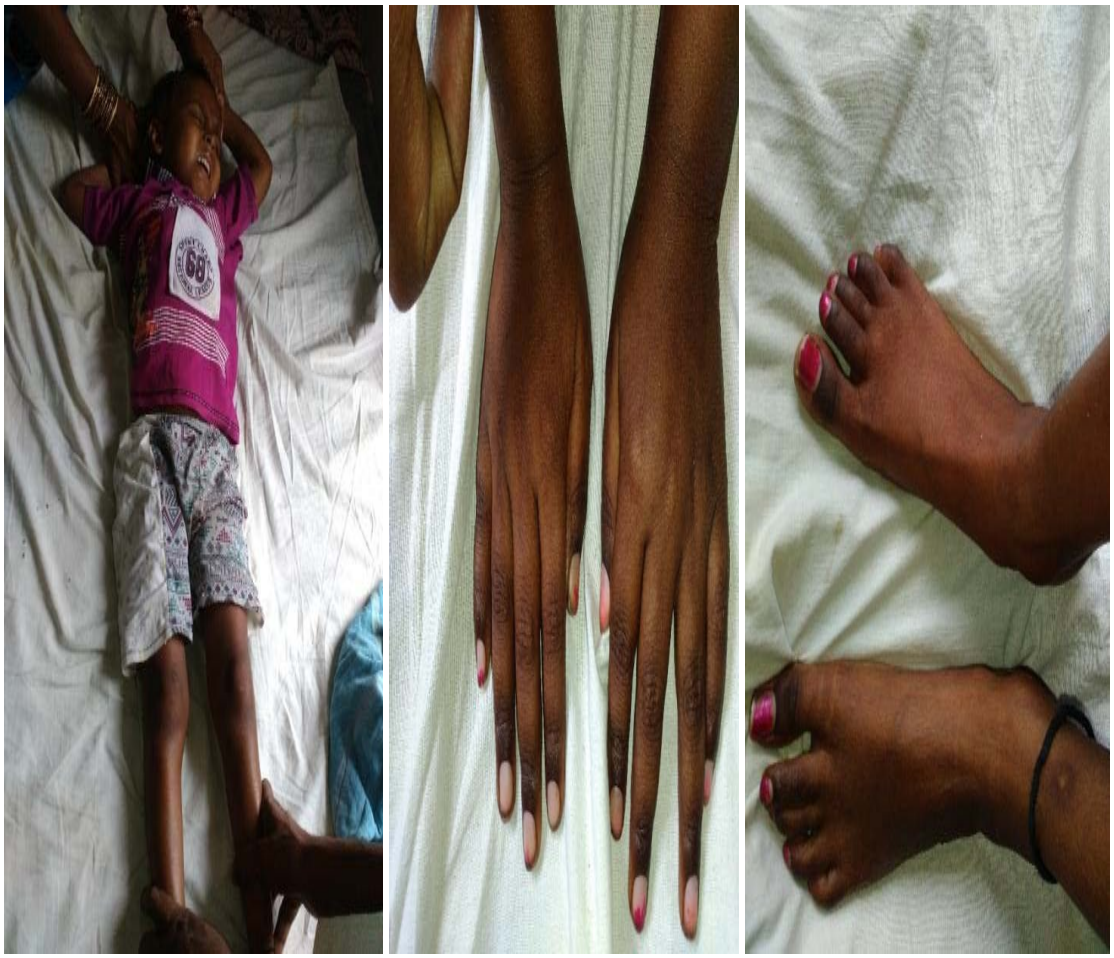


Fig. 1: Showing altered sensorium Fig. 2 & 3 Showing knuckle and periungual hyperpigmentation of both

Figure 4 & 5: Showing improved wellbeing

In the 3rd case-A 11 months female baby born out of non consanguineous marriage by normal vaginal delivery was admitted with complains of fever since last 6 days and fast breathing since last 2 days.On examination the child was febrile and pale ,respiratory rate was 52/min with chest indrawing.There were B/L conducted sounds in the chest with creps.The liver was enlarged 6cm below the coastal margin and spleen was just palpable.There was history of blood transfusion.Hence a provisional diagnosis of pneumonia with congenital heamolytic anaemia was made.On further inquiring about the history,it was found that the baby was apparently normal till 5 months of age,then she developed respiratory tract infection for which she was admitted in hospital for 4 days.Since then the baby had repeated respiratory tract infections.By 8 months of age there were regression of developmental milestones like ability to sit and neck control.There was one episode of generalized tonic clonic seizure. The child has been continuing breast feed till now along with mixed diet from family pot. The mother being vegetarian. There was hyperpigmentation of skin over palm, knuckles, knee and thighs (Figure 1,2 and 3). There were no signs of meningitis, reflexes were brisk and B/L plantar was flexor.CSF study was done to rule out meningitis, which came out to be normal.CBC showed severe anaemia and MCV was 96.5 fL (Figure 4). Because of macrocytic anaemia, knuckle pigmentation and neurological signs with a history of vegetarian diet,a provisional diagnosis of vitamin B12 deficiency was made. It was confirmed by doing serum B12 level, which came to be low(145 pg/ml) (Figure 5). The patient was treated with IM neurobion injections daily for 7 days followed by weekly dose for 7 weeks. The patient was successfully discharged after regaining all the developmental milestones appropriate for age.

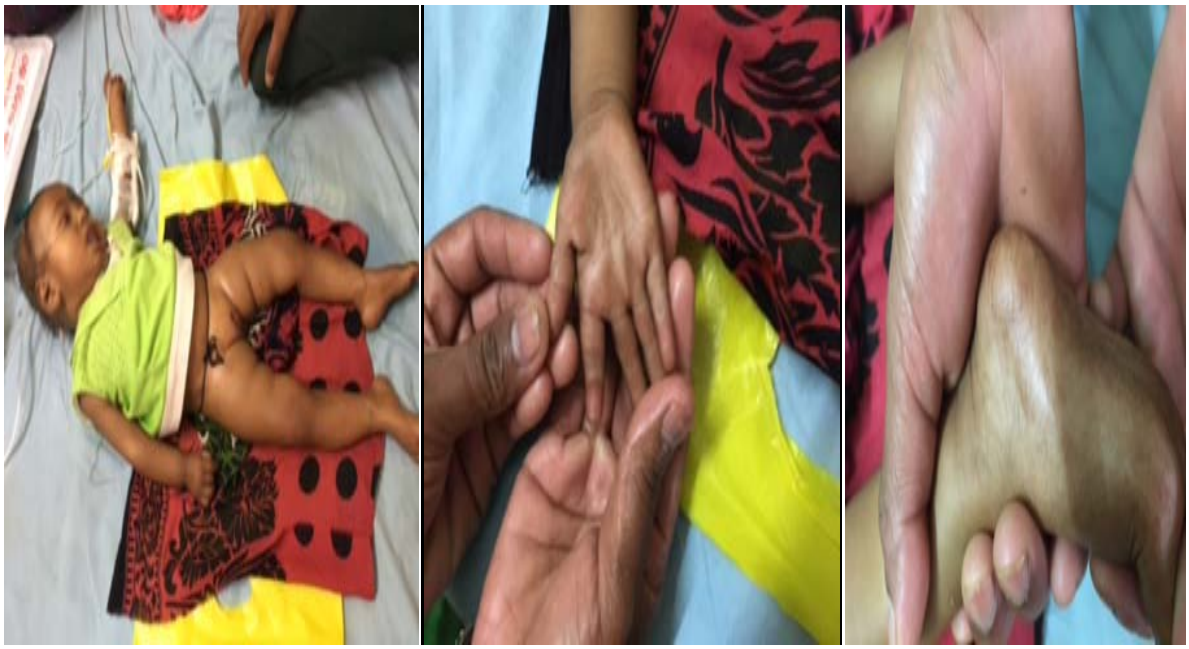


Figure 1, 2 & 3: Hyperpigmentation of skin over palm, knuckles, knee and thighs

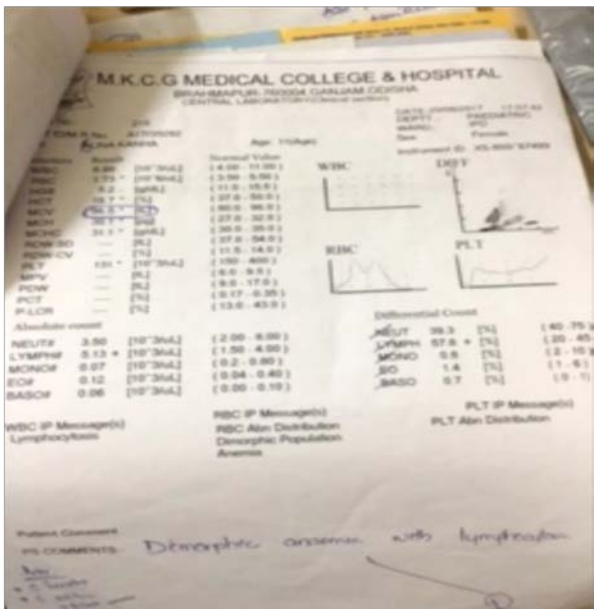


Figure 4: Showing high MCV

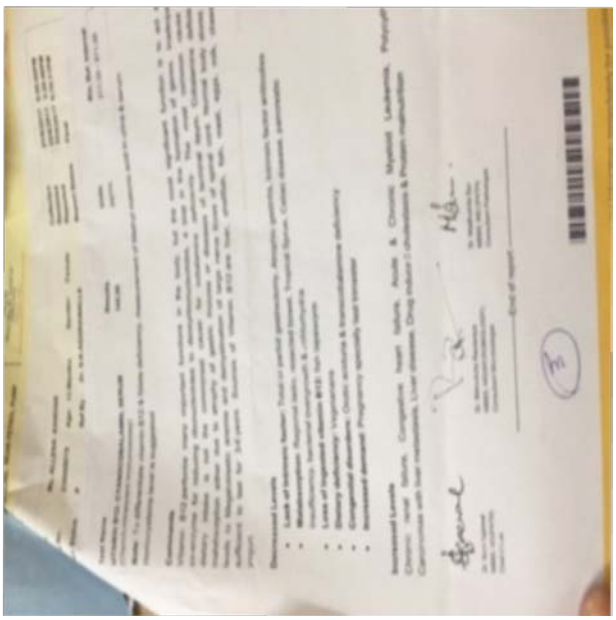


Figure 5: Showing low serum B12

II. Discussion

Vit B12 is also known as cyanocobalamine. it is essential for functioning of brain, spinal cord, peripheral or cranial nerves, and blood cell production. In 1877, Gardner and osler coined the term pernicious anaemia to describe a patient with progressive arm numbness with difficulty in buttoning and using tools.[1]Deficiency produces dementia, peripheral neuropathy, subacute combined degeneration of the spinal cord, nutritional amblyopia (visual loss) and cognitive dysfunction[2]. Vitamin B12 deficiency can lead to serious sequelae in developing children as reported by Honzik et a[3]. The prevalence of vitamin B12 is difficult to asertain because of its etiology and different assays[4]. It is an easily treated disorder that often goes undiagnosed in infant and children, placing them at high risk for permanent brain injury. Vitamin B12 defici-ency occurs in infants born to mother·s with vitamin B12 deficiency due to any cause like vegetarianism, autoimmune pernicious anaemia, celiac disease, H.Pyloric infection, Crohn·s disease, gastric bypass, partial ilectomy,eating disorders, use of PPI etc. Children presents with non specific manifestation such as developmental delay, irritability, weakness, failure to thrive, abnormal pigmentation, hypotonia and hepatosplenomegaly.

Vitamin B12 has a role in DNA synthesis, delayed DNA synthesis in rapidly growing hematopoietic cells may result in macrocytic anaemia. The neurological manifestation of cobalamin deficiency is may be due to homocysteine toxicity deposits in brain and infants may be predisposed due to incompletely formed blood brain barrier[5].

Most of the initial data regarding vitamin B12 deficiency in infancy are from case studies of infants exclusively breast fed by mothers on vegetarian diet. This case reiterates the association between infantile spasm and vitamin B12 deficiency. Infantile spasm are a unique form of seizure disorder as their occurrenceis mosltly limited to infancy and they are refractory to conventional anticonvulsant drugs. In India, a hospital population radioassay study with a cut off of 200 pg/ml found a vitamin B12 deficiency in 0.88% of patients with boder line values in 3.8%[5].Infants born to vitamin B12 replete mothers have stores of vitamin B12 that are adequate to sustain them for first several months post partum hence vitamin B12 rarely occurs before 4 months of age[6]. The neurological complex, defined as myelosis funicularis, consists of the following symptoms:

1. Impaired perception of deep touch, pressure and vibration, loss of sense of touch, very annoying and persistent paresthesias
2. Ataxia of dorsal chord type
3. Decrease or loss of deep muscle-tendon reflexes
4. Pathological reflexes-Babinski, Rossolimo and others, also severe paresis.

III. Conclusion

Encephalopathy due to vit B12 deficiency is very rare in children but any child presented with encephalopathy with knuckle hyperpigmentation without any prior history fever, loose stool,vomiting one has to do CBC, PS and serum B12 level to rule out B12 deficiency.Management with vit B12 supplementation and folic acid is mainstay of therapy. 90% patients have improvement in symptoms and rest 10% have residual moderate to severe disability following early treatment[7]. Hence early diagnosis and treatment is required.

Contributors

Dr. Sunil Kumar Agarwalla-revising it critically for important intellectual content.

Dr. Nasreen Ali-conception, design and drafting.

Conflict of Interest

There was no conflict of interest and no funds received.

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