Connate Myxedema- An Inadequate Thyroid Hormone Production in Newborn Infants

Ruchitha Reddy Akkati1* and Surender Kagitapu2

1Department of Clinical Pharmacy, Vaagdevi College of Pharmacy, Warangal 506002, Telangana, India.
2Department of Pediatrics, Mahatma Gandhi Memorial Hospital, Warangal 506002, Telangana, India.

Authors’ contributions

This work was carried out in collaboration between both authors. Author RRA designed the study, performed the statistical analysis, wrote the protocol, wrote the first draft of the manuscript and managed the literature searches. Author SK managed the analyses of the study. Both authors read and approved the final manuscript.

ABSTRACT

Connate myxedema is also known as congenital hypothyroidism is an inborn endocrine disorder, affects 1 in every 3000 to 4000 infants. Numerous genetic defects are related with perpetual congenital hypothyroidism (CH). Ambient atmosphere, iatrogenic and immunologic factors are known to cause transient congenital hypothyroidism, which resolves within first few months of life. Molecular defects of thyroid oxidase system which is composed of at least two proteins may be involved in pathogenesis of lasting transient congenital hypothyroidism in infants with faults in iodide organification, for which the oxidase system is needed. Congenital hypothyroidism is predominantly sporadic but up to 2% of thyroid dysgenesis is inherited and congenital hypothyroidism due to organification faults is often recessively inherited. Levothyroxine is the drug of choice. An infant of 10 months old was presented with hoarseness while crying and noisy breathing. I had reported a case in which patient was diagnosed with congenital hypothyroidism and is being treated with levothyroxine.
1. BACKGROUND

Congenital hypothyroidism is an innate endocrine disorder, affects 1 in every 3000 to 4000 newborns. Numerous genetic defects are kindred with permanent congenital hypothyroidism. Environmental, induced and immunologic factors are known to prompt transient congenital hypothyroidism, which settles within first few months of life. Molecular defects of thyroid oxidase system which is made of at least two proteins may be incriminated in pathogenesis of persistent transient congenital hypothyroidism in newborns with defects in iodide organification, for which the oxidase system is essential. Biallelic deactivating mutations in the thyro oxidase 2 gene results in upset of thyroid hormone synthesis and related with severe and persistent congenital hypothyroidism. Monoallelic mutations are correlated with milder, transient hypothyroidism caused by inadequate thyroidal production of hydrogen peroxide. It averts the synthesis of adequate quantities of thyroid hormones to encounter the large demand for thyroid hormones at the inception of life [1]. In spite of the fact that the current experimental writing on the neurocognitive impacts of clinical hypothyroidism is very simple, clearly every individual analyzed as having this issue ought to be suggested for exhaustive neuropsychological assessment in perspective on the risk for intellectual dreariness [2]. Previous studies reported the cases of 3 infants with congenital hypothyroidism detected with the use of their newborn screening program, with evidence supporting that excess maternal iodine ingestion (12.5 mg/d) as the etiology [3]. According to a study, rising incidence of CH in Massachusetts is confined to mild and delayed cases. Findings suggest that this rise is attributable to enhanced detection rather than an absolute increase in numbers [4]. Screening in the first days of life seems to be the most important step in the approach to CH and replacement of related deficient hormones, thus preventing consequences that cannot be remedied. Hence, optimizing the sensitivity of the screening test has great importance especially for the high risk group of neonates [5]. Earlier results suggest that more than one cause is responsible for the rise in the increasing CH incidence, with lowering of the screening TSH cutoff and an increased survival rate of a growing number of preterm babies both playing an important role [6]. According to earlier studies, beginning dose of 50 µg/day (12-17 µg/kg every day) for raised serum T4 and free T4 focuses to target run by 3 days and standardized TSH by about fourteen days of treatment. "Target run" of 10 to 18 µg/dl for T4 and 2 to 5.0 ng/dl for free T4 during the initial 2 weeks of L-thyroxine treatment. After 2 weeks of treatment the levels decreased to 10-16 µg/dl for T4 and 1.6-2.2 ng/dl for free T4 [7].

2. CASE PRESENTATION

An infant of 10 months old was admitted to hospital with chief complaints of hoarseness while crying since 3 months which is increasing day by day, noisy breathing since 2 months and no growth in weight of infant. Patient had a coarse facial feature as shown in Fig. 1 underneath. The weight of child at the time of birth was 3.2 kgs. The patient mother is a known case of hypothyroidism since 2 years and was on medication (THYROXINE). Thyroid profile of patient is as follows: Triiodothyronine: 0.34 ng/ml (Normal range: 1.0-2.60 ng/ml),Total thyroxine: 0.6 mcg/100 ml (Normal range: 6-14 mcg/100 ml), Thyroid Stimulating Hormone: >100 µU/ml (Normal range: 0.7-6.4 µU/ml).Complete blood picture report is as following: Hemoglobin: 8.4 Gms%, RBC: 3.2 M/cmm, Haematocrit (P.C.V): 25 vol%, Reticulocyte count: 0.1%. Thyroid profile of patient revealed the increased levels of thyroid stimulating hormone and decreased levels of thyroxine and triiodothyronine. Impression of complete blood picture is Normocytic Hypochromic Anemia. Patient was diagnosed with cretinism. Currently the patient is being treated with Levothyroxine 50 mcg/day.

Fig. 1. Coarse facial feature in patient

3. DISCUSSION

Congenital hypothyroidism is an ordinary neonatal metabolic disorder and consequences in neurodevelopment disability and infertility if
untreated. Congenital hypothyroidism is occasional but up to 2% of thyroid dysgenesis is inherited and congenital hypothyroidism due to organification defaults is often recessively hereditary. The candidate genes interconnected with this genetic disorder form 2 main groups: one generating thyroid gland dysgenesis and other generating dyshormogenesis. Genes correlated with thyroid gland dysgenesis encompass those engendering non-syndromic congenital hypothyroidism (TSH receptor) and those generating syndromic congenital hypothyroidism (TITF-1, TITF-2, PAX-8 and G5α). Genes associated with dyshormogenesis comprise sodium iodide symporter, thyroid peroxidase, pendrin, thyroglobulin and most latterly, thyro oxidase 2. Modern evidence proposes that third group of congenital hypothyroidism conditions are interconnected with defects in iodothyronine transporter, MCT8, where hypothyroidism is associated with neurologic shortfall [8]. Autosomal dominant transmission of mutations of NKX2-1 may lead to congenital hypothyroidism, neonatal respiratory distress at term and persistent neurologic manifestations such as dysarthria, choreoathetosis and ataxia in families with pretentious subjects in several generations [9]. The clinical manifestations are tenuous or not present at birth. This is due to trans-placental transit of few maternal thyroid hormones, while many newborns have some thyroid production of their own. Symptoms involve hoarse cry, neonatal hyperbilirubinemia, constipation for more than 3 weeks and lethargy. The most familiar signs are cold or mottled skin, umbilical hernia and macroglossia. Persistent jaundice and poor feeding are most noticeable clinical features. The diagnosis must be established by finding an increased serum thyroid stimulating hormone and thyroxine or free thyroxine level. Serum thyroid stimulating hormone and free thyroxine should be monitored for every 1-2 months in the first 6 months of life and for every 3-4 months subsequently. Levothyroxine is the drug of choice; the endorsed starting dose is 10-15 mcg/kg/day. Here in this case the patient is being treated with Levothyroxine 50 mcg/day which is appropriate to the patient’s condition.

4. CONCLUSION

Levothyroxine is the drug of choice; the recommended starting dose is 10-15 mcg/kg/day. Here in this case the patient is being treated with Levothyroxine 50 mcg/day which is appropriate to the patient’s condition.

CONSENT

Written informed consent was obtained from the parents of infant for the publication of this case report and escorting images.

ETHICAL APPROVAL

As per international standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Jose C. Hennie B, Marlies JE, Paul AS, Frank B, Jan JM, Thomas V, RisStalpers C. Inactivating mutations in the gene for thyroid oxidase 2 (THOX2) and congenital hypothyroidism. New England Journal of Medicine. 2002;347(2):95-102.
2. Anthony T. Neurocognitive aspects of hypothyroidism. Arch Intern Med. 1988;158(13):1413-18.
3. Kara J, Bruce A, Elizabeth N, David S, David S, Lewis E, Stephen H. Congenital hypothyroidism caused by excess prenatal maternal iodine ingestion. The Journal of Pediatrics. 2012;161(4):760-62.
4. Marvin L, Ho-Wen H, Inderneel S, Massachusetts Pediatric Endocrine Work Group. The increased incidence of congenital hypothyroidism: Fact or fancy? Clinical Endocrinology. 2011;75(6):806-10.
5. Mahin H, Silva H, Arman A, Mojtaba K, Pooyan K, Negar N. Screening of congenital hypothyroidism in preterm, low birth weight and very low birth weight neonates: A systematic review. Pediatrics & Neonatology. 2018;59(1):3-14.
6. Olivieri A, Fazzini C, Medda E. The Italian Study Group for Congenital Hypothyroidism. Multiple factors influencing the incidence of congenital hypothyroidism detected by neonatal screening. Horm Res Paediatr. 2015;83(2): 86-93.

7. Karin A, Scott H, Leanne Rein RN, David S, Richard M, Michael S, Jerald C, Stephen H. Initial treatment dose of L-thyroxine in congenital hypothyroidism. The Journal of Pediatrics. 2002;141(6): 786-92.

8. Park SM, Chatterjee VKK. Genetics of congenital hypothyroidism. Journal of Medical Genetics. 2005;42(5):379-89.

9. Daniel A, Iris G, Becky T, Mena S. Autosomal dominant transmission of congenital hypothyroidism, neonatal respiratory distress, and ataxia caused by a mutation of NKX2-1. The Journal of Pediatrics. 2004;145(2):190-93.

10. Maynika V, Stephen H. Congenital hypothyroidism. Orphanet Journal of Rare Diseases. 2010;5(1):17.

11. Samir N. Respiratory manifestations in infants with hypothyroidism. Archives of Disease in Childhood. 1962;37(196):603-05.

12. Frances B. Hypothyroidism in childhood. British Medical Journal. 1951;1(4716): 1169-76.

© 2019 Akkati and Kagitapu; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/50255