Case Report

Congenital Diaphragmatic Hernia and Maternal Hypothyroidism: A Case Report

Manisha Behal1*, Rajeev Vinayak2

1Associate Professor, Dept. of Obstetrics & Gynaecology, 2Associate Professor, Dept. of Pediatrics, MMU Medical College & Hospital, Kumarhatti, Solan, Himachal Pradesh

*Corresponding Author:
Email: manishabehal30@gmail.com

Abstract
Congenital Diaphragmatic hernia is a rare entity with incidence of 1:2000-3000 live births and causes are still largely unknown. This case hints about possible relationship with maternal hypothyroidism which needs further research to confirm/refute.

Key words: Congenital diaphragmatic hernia, Hypothyroidism, Newborn

Introduction
Congenital diaphragmatic hernia (CDH) has an incidence of 1: 2000–3000 live births1,2,3,4,5 and accounts for 8% of all major congenital anomalies. The left-sided Bochdalek hernia occurs in approximately 85% of cases which have a mortality of 45–50%. Associated anomalies are present in 10-50% of patients with CDH; these anomalies confer a twofold relative risk of mortality when compared with patients with isolated CDH.6,7 The etiopathogenesis of CDH in humans is unknown but in animal models several teratogenic processes including exposure to chemicals have been found to induce CDH.8,9. This case is presented as mother had high raised levels of TSH and there is resemblance of Herbicide Nitrofen (which cause CDH in experimental models) to thyroid hormone.

Case Report
A 30 year old female, an unbooked case was admitted on 09/04/2016 in Obstetrics and Gynecology department of our institute for safe confinement. She was of 39 weeks 5 days gestational age on admission (G3P2L2A0). She had previous two normal live children born by vaginal delivery at Civil hospital, Solan, 7 and 4 years back. Present pregnancy ANC checkups were done regularly at District hospital, Solan. She was a known case of hypothyroidism since December 2015 but was not on any medications. No h/o any other drug intake except iron/folic acid and calcium supplementation. Antenatal US done on 08/04/2016 at regional hospital Solan was normal. T3/T4/TSH done on 10/04/2016 were 0.49 ng/ml, 3.12 mcg/dl and 177.5 microIU/ml respectively. TSH done on 08/04/2016 was 170.3microIU/ml. Lipid profile showed raised TG-320.2mg/dl, Total Cholesterol 344mg/dl and LDL 232 mg/dl. HIV, HBsAg, VDRL and Anti HCV were all negative/Non-reactive. Blood group was AB Rh positive. USG done in our institution on 12/04/2016 showed Heart displaced to right side, Fetal stomach bubble located on right side with Liver placed almost in midline, likely suggestive of left side Diaphragmatic Hernia (Fig. 1).

She delivered by normal vaginal delivery on 12/04/2016 1:57 PM, a live female child. Baby had inadequate respiratory efforts after birth and was immediately intubated and given Bag and tube ventilation. Baby was shifted to NICU and patient put on Pressure limited ventilator support (Fig. 2). Baby was of 2.7 kg weight and showed no external major/minor malformations. Anthropometry was normal. X ray chest was done within ½ hr after birth (Fig. 3). It showed Intestinal loops in left hemi thorax with heart and trachea shifted to right. Right side lung was collapsed. No air was seen in abdomen. NG tube tip was seen in right side of chest. Diagnosis of Congenital diaphragmatic Hernia most probably Bochdalek type was made. Umbilical vein catheterization was done and baby put on ionotropes and supportive treatment. VBG done showed Ph-Low, PCO2 74mmHg, PO2 33mmHg on FiO2 100%. Hb 11.3gm%, Platelets- 2.52 lacs/mm3, RFT and LFT were normal. Blood gp- A Rh positive. To rule out other associated congenital anomalies USG Abdomen, Spine and ECHO were done which were normal. Patient was seen by Pediatric surgeon who advised surgery after stabilization of baby. Baby expired on 12/04/2016 at 11:30 PM even after adequate ventilator and supportive management.

Some important points which arise in this case are
1. Whether Raised TSH is a co- incidental finding or is associated with CDH?
2. Was such a severe presentation and Rapid progression was correlated to Raised TSH in mother or it was due to large size hernia of Intestine, Stomach and Liver only.
Congenital Diaphragmatic Hernia and Maternal Hypothyroidism: A Case Report

Fig. 1:

Fig. 2:
Discussion

The most commonly used teratogenic model for CDH is the nitrofen model. Nitrofen is a Protophlorohydrin inhibiting herbicide of the diphenyl ether class. The teratogenic effect of nitrofen is exerted mainly during the critical period of organogenesis. There have been various studies that suggest that Nitrofen may interact with embryonic nuclear receptors for thyroid hormone. The configuration of Nitrofen is very similar to that of triiodothyronine (T3) and thyroxine (T4) which are necessary for normal fetal lung development. Maternal hypothyroidism has been associated with an increased risk of many birth defects in newborns, but information on it being a causative agent in CDH is not confirmed. When it was used in rats experimentally it interfered with the lung development causing lung hypoplasia and various anatomical malformations including diaphragmatic hernias. This hypothesis links pulmonary hypoplasia and CDH with thyroid hormone status of mother while she is pregnant. Only 60-90% of exposed rat pups demonstrated CDH suggesting a “dual-hit” hypothesis, in which one insult affects the lungs and second insult affects the diaphragm development causing CDH. Other studies show direct delivery of the nitrofen compound (and not active metabolites) into the fetus through the maternal–fetal circulation, indicating direct effects of nitrofen on fetal diaphragm and lung development. Recent studies have stated that nitrofen alters the retinoic acid pathway and so thyroid hormones doesn’t play a part as a causative agent in CDH. Nitrofen may also cause epigenetic defects, as miR-200b expression is seen to be decreased in nitrofen caused hypoplasia of lungs. Nitrofen and other teratogenic chemicals used on experimental animals inhibit retinal dehydrogenase-2 (RALDH-2), an enzyme necessary for the production of retinoic acid, thus causing vitamin A deficiency which contributes to pathogenesis of CDH.

Further studies are needed to confirm or refute these hypothesis and this makes our case an interesting one.

References

