

Prenatal diagnosis of multiple fetal anomalies in naphthalene-addicted pregnant women: a case report

F.K. Boynukalin¹, C. Baykal²

¹Anatolia Women's Health and Infertility Clinic, Ankara

²Florence Nightingale Hospital, Dept. of Obstetrics & Gynecology, Istanbul (Turkey)

Summary

Background: Naphthalene is one of the abused inhalants. It has been associated with acute and chronic health problems. To the authors' knowledge, prenatal exposure to naphthalene has never been discussed in humans. **Case:** The authors discuss a case of naphthalene-addicted pregnant women with multiple fetal anomalies. At 15 weeks gestation, ultrasound screening demonstrated multiple fetal anomalies: anencephaly, scoliosis, diffuse subcutaneous edema, flexion contracture of lower extremities, and hypoplastic left ventricle. Four weeks later obstetrical ultrasonography revealed that there was no fetal cardiac activity. The patient had a medical abortion. **Conclusion:** A stronger knowledge basis regarding naphthalene-related fetal anomaly is required to ensure accurate direct link, however the probability of naphthalene-related fetal anomaly must be considered.

Key words: Naphthalene abuse; Multiple fetal anomalies; Pregnancy.

Introduction

Inhalant abuse is a significant problem, especially in adolescents [1]. The most commonly abused inhalants are chemical products that are available, accessible, inexpensive, and legally obtained. Naphthalene, one of the abused inhalants, is an aromatic hydrocarbon and it is metabolized to naphthol and naphthoquinone by the liver and these metabolites are excreted in the urine [2,3]. Hepatic injury and hemolytic anemia are the most common toxicities. Renal insufficiency, cataract formation, methemoglobinemia, aplastic anemia, and cardiac dysrhythmias are other less frequent related toxicities related to naphthalene abuse. Central nerve system toxicities, such as slurred speech, ataxia, and coma can also occur. Peripheral neuropathy has also been reported [4].

In Turkey, naphthalene is a popular fumigant insecticide commonly used to protect wool garments from bite damage. It is also the major component of glue, spray paints, nail polish remover, room fresheners, and gasoline.

To the authors' knowledge, prenatal exposure to naphthalene has never been discussed in humans. They present a case of a naphthalene-addicted pregnant women with multiple fetal anomalies.

Case Report

A 19-year-old, gravida 1 woman was admitted to the present clinic for antenatal care. Gestational age was seven weeks and two days according to last menstrual period. Ultrasound revealed fetal cardiac activity and crown rump length (CRL) of the fetus measured as seven weeks and four days. There was no pathologic sign in the

physical examination of the pregnant woman. Her husband declared that she had a history of substance abuse including naphthalene by inhalation and had had rehabilitation for this problem. She stated that she had not been using naphthalene for two months. The authors recommended the patient psychiatric support during the pregnancy period, but refused to see a specialist and also treatment. The antenatal laboratory data showed that complete blood count, blood electrolytes, and hepatic and renal function tests were normal. Antenatal care visits were also planned but the patient was not fully cooperative. Eight weeks later -at 15 weeks- she was admitted to the present clinic with nausea and vomiting. Physical examination was normal, but the authors recorded that she had lost eight kg in that time period. She refused to answer the questions regarding naphthalene inhalation. The authors re-evaluated the laboratory tests including, complete blood count, blood electrolyte, hepatic, renal, and thyroid function tests. All of them were normal.

A detailed ultrasonographic evaluation of the fetus was performed and multiple fetal anomalies were detected. Anencephaly (Figure 1) and scoliosis in vertebral spine were diagnosed. Diffuse subcutaneous edema was also present (Figure 2). Lower extremities of the fetus were in flexion contracture. Fetal echocardiography demonstrated hypoplastic left ventricle and pleural effusion.

The patient and family were informed regarding lethal fetal anomalies and counseled regarding the option of termination and again they recommended psychiatric support. They did not, however, accept both.

Four weeks later obstetrical ultrasonography revealed that there was no fetal cardiac activity. The patient had a medical abortion in a nearby county hospital.

After termination of pregnancy, the prenatal diagnosis of multiple anomalies were confirmed by autopsy, with the identification of prenatal sonographic findings.

Discussion

The clinical literature regarding prenatal organic solvent exposure is limited. The most popular abused inhalants is toluene [5] and most of the studies assessing

Revised manuscript accepted for publication April 18, 2013



Figure 1. — Anencephaly is illustrated.



Figure 2. — Diffuse subcutaneous edema is shown.

perinatal organic solvent exposure are about toluene. There are some cases also reporting toluene-related embryopathy [6-8]. Perinatal death related to very high levels of maternal solvent exposure, typical of abuse, has also been reported and there are reports that surviving neonates show evidence of morphological teratogenicity. Prematurity or growth retardation, microcephaly with severe facial dysmorphology (deep-set eyes, small face, low-set ears, micrognathia), and spatulate fingertips and small fingernails are the anomalies that had been reported in affected infants [9]. Follow-up evaluations of the toluene-exposed children up to three years of age revealed developmental delays, language impairment, hyperactivity, cerebellar dysfunction, and postnatal growth retardation.

Naphthalene has rarely been abused. Most of the reports of toxicity are acute and accidental. To the authors' knowledge, this is the first case regarding perinatal toxicity. Because of several confounding factors, it is difficult to establish a direct link between abuse of naphthalene and fetal anomaly. Many inhalant abusers can use various products since they have problems with accessibility. Concomitant abuse of other drugs and alcohol is common and can also be another confounding factor. Changes in solvent formulations, impurity within solvents, and most importantly, genetic predisposition and preexisting medical conditions, are also confusing. There is no study that evaluates high-dose prenatal exposure to naphthalene in animal models. The presented patient has no other risk factor for fetal anomaly, such as diabetes mellitus, advanced maternal age, infection, alcohol abuse, and family history.

In summary, a stronger knowledge base regarding naphthalene-related fetal anomaly is needed to ensure accurate direct link, but the probability of naphthalene-related fetal anomaly must be considered.

References

- [1] Kurtzman T.L., Otsuka K.N., Wahl R.A.: "Inhalant abuse by adolescents". *J. Adolesc. Health*, 2001, 28, 170.
- [2] Linden C.H.: "Volatile substances of abuse". *Emerg. Med. Clin. North Am.*, 1990, 8, 559.
- [3] Siegel E., Wason S.: "Mothball toxicity". *Pediatr. Clin. North Am.*, 1986, 33, 369.
- [4] Weintraub E., Gandhi D., Robinson C.: "Medical complications due to mothball abuse". *South Med. J.*, 2000, 93, 427.
- [5] Lorenc J.D.: "Inhalant abuse in the pediatric population: a persistent challenge". *Curr. Opin. Pediatr.*, 2003, 15, 204.
- [6] Pearson M.A., Hoyme H.E., Seaver L.H., Rimsza M.E.: "Toluene embryopathy: delineation of the phenotype and comparison with fetal alcohol syndrome". *Pediatrics*, 1994, 93, 211.
- [7] Till C., Koren G., Rovet J.F.: "Prenatal exposure to organic solvents and child neurobehavioral performance". *Neurotoxicol. Teratol.*, 2001, 23, 235.
- [8] Arnold G.L., Kirby R.S., Langendoerfer S., Wilkins-Haug L.: "Toluene embryopathy: clinical delineation and developmental follow-up". *Pediatrics*, 1994, 93, 216.
- [9] Wilkins-Haug L., Gabow P.A.: "Toluene abuse during pregnancy, obstetric complications and perinatal outcomes". *Obstet. Gynecol.*, 1991, 77, 504.

Address reprint requests to:
F.K. BOYNUKALIN, M.D.
1. Cadde 109/2 - Bahçelievler
06500 Ankara (Turkey)
e-mail: drkubraboybukalin@yahoo.com.tr