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MYELOMENINGOCOELE IN DIZYGOTIC TWINS

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ABSTRACT

Background: Periconceptional use of folic acid can reduce a woman's risk of having a baby with a neural-tube defect and other congenital abnormalities.

Method: Case reports of babies OO both males, who were delivered at term by emergency caesarean section by a 21 year old woman. At birth, both twins had neural tube defects, bilateral talipes equinovarusdeformity, bladder and bowel dysfunction. Twin one in addition had hydrocephalus and a ventriculoseptal heart defect (VSD).

Conclusion: We advocate comprehensive neural tube defect (NTD) surveillance, a folic acidsupplementation program for high-risk women who have had a NTD-affected pregnancy and a national folic acid education campaign for all women of reproductive age preconceptionally.

Key Words: Folic acid, congenital heart disease, neural tube defect, multiple births. *(Accepted 13 May 2008)*

INTRODUCTION

Neural tube defects (NTD) are the second commonest birth defect after congenital heart defects.[1] It results from failure of closure of the embryonic neural tube during the first 4 weeks of gestation. It has been linked to folic acid deficiency. Commonest types are myelomeningocele, anencephaly and encephalocoele. The neurologic, motor, and sensory deficits usually encountered is dependent on the anatomic level of the defect and include lower limb paralysis and sensory loss, bladder and bowel dysfunction, cognitive dysfunction, varying degrees of talipes and hydrocephalus. NTDs as with other congenital abnormalities occur with a greater frequency in twin gestations,[2-5] however, NTD affecting both fetuses (i.e. concordance) in a fraternal twin gestation is very rare. To the best of our knowledge, myelomeningocoele affecting both dizygotic twins has not been previously reported in Nigeria.

Case Report

Babies OO both males were delivered at term by emergency caesarean section for prolonged obstructed labour by a 21 year old woman in a private clinic. The pregnancy was supervised from 4 months of gestation in the same clinic at which time the mother started taking routine antenatal drugs including folic acid. The neural tube defect and the multiple gestations were detected by ultrasound at 7months. There was no previous history of maternal illness, exposure to irradiation or drug/herbal intake during pregnancy, and no history of congenital anomalies in the family. This was her second pregnancy, the first pregnancy having ended in a spontaneous abortion at 7wks of gestation (2 months before the index pregnancy). The parents are not related, do not live near factories, and do not smoke. The father vulcanizes tyres and is a social drinker. The mother is a petty trader, but had worked as an apprentice in a chemist shop and does not take alcoholic beverage. Both had primary level of education. Table I and Figures 1, 2 and 3 show the findings on physical examination of twins OO. Twin one had a cystic swelling between the eleventh thoracic vertebra and the third sacral segment measuring 12cm x10cm with an ulcerated granulating surface. Twin two had a similar but smaller cystic swelling between the third lumbar vertebra and the second sacral segment and measuring 8cm x 5cm. Twin one in addition had a grade 3 pansystolic murmur of a ventriculo-septal defect which was confirmed by echocardiography.The defects which were both ruptured and infected were managed with daily dressing and broad spectrum antibiotics. Both babies developed neonatal jaundice on the 3rd day of life and were managed conservatively with phototherapy. They were reviewed by the neurosurgeons who considered the first twin not to be suitable for surgery due to multiple congenital abnormalities. The 2nd twin was prepared for surgery, but due to financial constraints, the parents took both of them home against medical advice. Laboratory results of the mother four days post partum showed haemoglobin concentration of 8.4gm, mean corpuscular volume of 63fL, and hypersegmented neutrophils with metamyelocytes and band forms on blood film. The serum/red blood cell folate assay as well as marrow aspiration could not be done for the mother as they were not available in our institution.

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Figure 1: **Twin One with Myelomeningocoele.**

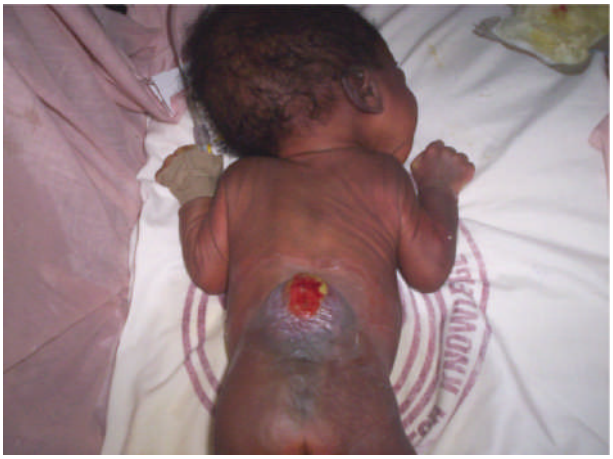


Figure 2: **Shows Twin 1 with Hydrocephalus and Sun Setting Eyes.**

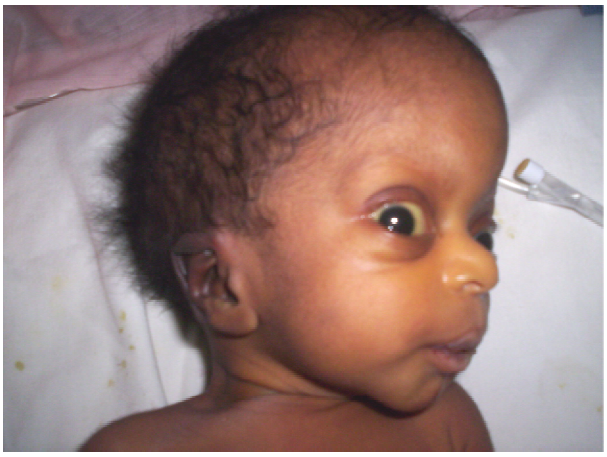
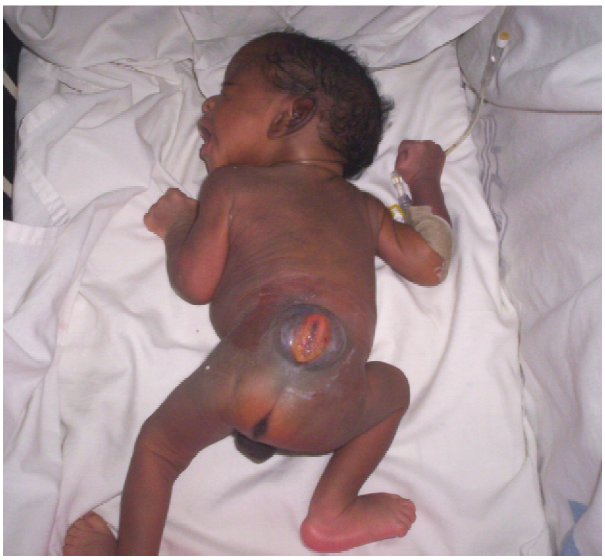


Figure 3: **Twin Two with Myelomeningocoele**



DISCUSSION

The causes of neural tube defects are unknown but are thought to be multifactorial because they are caused by a combination of multiple genes and multiple environmental factors.[6] Association with single gene defects and genetic syndromes,[1,6] enhanced recurrence risk among siblings[1,6] and a higher frequency in twins than singletons [2-5] indicate the presence of a strong genetic contribution to the etiology of NTD. There is some evidence to suggest that the process of twinning itself may be associated with higher risk for NTD.[2-5,7,8] It is thought that in the process of twinning, developmental disruptions occur which cause susceptibility to environmental agents.[5] Even though NTDs seem to be common in twin gestation, due to its multifactorial inheritance pattern, concordance is relatively low with only one co-twin affected. [4,9-11] Only very few studies have demonstrated concordance in the development of NTDs in twins.[2,7,8,12,13] Budhiraja et al[13] reported NTD in dizygotic twins, whereas Ertunc et al[2] reported concordant occipital encephalocoele in monoamniotic twins. Kallen et al [7] reported that twins concordant for NTD were mainly found when the defect occurred as part of a syndrome, and only in like-sexed pairs. Even among the neural tube defects, incidence of myelomeningocele is less in twins compared to anencephaly or encephalocoeles, [4,12] and identical twins are concordant for the trait significantly more often than non identical twins. So it is a rare occurrence to find dizygotic twins concordant for NTD. Babies OO were same-sex dizygotic twins as they had different placentae. Women who had a short interval between the end of the previous pregnancy and the current pregnancy had an increased incidence of NTD.[1] This may be true of the mother of babies OO who became pregnant with the twins soon after a spontaneous abortion. Canfield et al[14] documented an association between neural tube defect and previous spontaneous abortions. In California birth defect registry, NTD were more likely to follow previous completed term pregnancy and short intervals between pregnancy.[15] The reason why short intervals between pregnancies predisposes to NTD is not known, but it may be linked to micronutrient deficiencies.Folic acid deficiency has been aetiologically linked to neural tube defect.[16] Controlled trials have shown that periconceptional folic acid supplementation reduces both the recurrence and occurrence of NTDs.[17-20] These discoveries led to mandated folic acid food fortification in several countries. The influence of folate nutritional status on various pregnancy outcomes has long been recognized. Various pregnancy complications including spontaneous abortion, still birth, prematurity, low birth weight have been associated with folate deficiency.[21,22]

Folic acid deficiency has also been associated with other malformations like orofacial clefts (OFCs) and congenital heart defects.[23-25] Observational studies in general support an association between maternal use of multivitamins containing folic acid and a reduction in the occurrence of congenital heart defects and orofacial clefts.[26] Although the mother took folic acid, this was however commenced from the 2nd trimester, a time that neurulation would have been completed and folic acid supplementation would be of no use in the prevention of the neural tube defect. The ventriculoseptal defect in twin 1 like the neural tube defect could have also resulted from folic acid deficiency. Diagnosis of folate deficiency is through assay of folate in the red blood cells or serum. Whereas a low serum folate indicates drop in folate intake over the preceding few days, red cell folate reflects folate turnover over the preceding 2-3 months and thus is a better indicator of tissue folate status. Hematologic indices are also helpful and show macrocytosis and multilobed neutrophils. Co-existing microcytic anemia from iron deficiency for instance, can however prevent macrocytosis and thus mask the megaloblastic anemia.[27] Even when masked by a severe microcytic anemia, however, a megaloblastic anemia will usually show hypersegmented neutrophils in the blood and metamyelocytes and band forms. This was the case from the laboratory results of the mother who showed both features of iron deficiency anemia (microcytosis) as well as features suggesting folic acid deficiency megaloblastic anemia (hypersegmented neutrophils). The mother's low socio-economic status coupled with another pregnancy soon after termination of the first pregnancy and the twin gestation could have drawn on the available reserve of folic acid stores, thus producing a deficiency state. As it is not customary in our setting to examine the abortuses for abnormalities, it is difficult to determine whether the aborted foetus had any congenital abnormality that was incompatible with life.

CONCLUSION

In pregnancy, even mild folate deficiency especially in multiple gestation is associated with congenital abnormalities most notably defects in neural tube closure and congenital heart disease in the foetus. Lack of serum assay of folate in the mother and paucity of African/Nigerian literature on NTDs in twins are important limitations in this report. We recommend a folic acid supplementation program for all women of reproductive age preconceptionally as an essential way for the primary prevention of these serious and disabling birth defects.

REFERENCES

1. **Bianchi DW, Crombleholme TM, D'Alton ME**(eds). Central nervous system: myelomeningocoele. In Fetology: Diagnosis and management of the fetal patient 1st ed 2000. McGraw-Hill Professional 260-278.

2. **Ertunc D, Tok EC, Kaplanoglu M, Polat A, Aras N, Evruke C**. Concordant occipital encephalocoele in monoamniotic twins. J Perinat Med. 2005;33(4):357-359.

3. **Garabedian BH, Fraser FC**. A familial association between twinning and upper-neural tube defects. Am J Hum Genet. 1994 ;55(5):1050-1053.

4. **Windham GC, Bjerkedal T, Sever LE**. The association of twinning and neural tube defects: studies in Los Angeles, California, and Norway. Acta Genet Med Gemellol (Roma). 1982;31(3-4):165-172.

5. **Windham GC, Sever LE**. Neural tube defects among twin births. Am J Hum Genet. 1982;34(6):988-998.

6. **Kolaski K.** Myelomeningocoele. Www.emedicine.com/pmr/topic83.htm.

7. **Kallen B, Cocchi G, Knudsen LB, Castilla EE, Robert E, Daltveit AK, Lancaster PL, Mastroiacovo P.** International study of sex ratio and twinning of neural tube defects.Teratology. 1994;50(5):322-331.

8. **Hansen LM, Donnenfeld AE**. Concordant anencephaly in monoamniotic twins and an analysis of maternal serum markers. Prenat Diagn. 1997;17(5):471-473.

9. **Ben-Ami I, Vaknin Z, Reish O, Sherman D, Herman A, Maymon R.** Is there an increased rate of anencephaly in twins? Prenat Diagn. 2005;25(11):1007-1010.

10. **Lim KI, Dy C, Pugash D, Williams KP**. Monoamniotic twins discordant for anencephaly managed conservatively with good outcomes: two case reports and a review of the literature. Ultrasound Obstet Gynecol. 2005;26(2):188-193.

11. **Kriplani A, Banerjee N, Takkar D**.Etiology and management of monoamniotic twin discordant for anencephaly. Acta Genet Med Gemellol (Roma). 1998;47(1):51-55.

12. **Das G, Aggarwal A, Faridi MM.** Dizygotic twins with myelomeningocoele. Indian J Pediatr. 2003;70(3):265-267.

13. **Budhiraja S, Dahiya P, Ghei M, Gathwala G**. Neural tube defect in dizygotic twins. Pediatr Surg Int 2002;18:211-212.

14. **Canfield MA, Annegers JF, Brender JD, Cooper SP, Greenberg F**. Hispanic origin and NTD in Houston/Harris county Texas II. Risk factors. Am J Epidemiol 1996;143:12-24.

15. **Todoroff K, Shaw CM.** Prior spontaneous abortion, prior elective termination, interpregnancy interval and risk of neural tube defect. Am J Epidemiol 2000;151:505-511.

16. **Smithells RW, Sheppard S, Schorah CJ et al**. Possible prevention of neural tube defect by periconceptional vitamin supplementation. Lancet 1980;16:339-340.

17. **Stevenson RE, Allen WD, Pai GS.** Decline in prevalence of NTD in a high-risk region of the United States. Paediatrics 2000;106:677-683.

18. **Smithells RW, Nevin NC, Seller MJ et a**l. Further experience of vitamin supplementation for the prevention of NTD reccurrences. Lancet 1983;1:1027-1031.

19. **The MRC Vitamin Study Research Group.** Prevention of neural tube defect: result of the Medical Research Council Vitamin Study. Lancet 1991; 338: 131-137.

20. **Werler MM, Shapiro S, Mitchell AA.** Periconceptional folic acid exposure and risk of occurent neural tube defect. JAMA 1993;269:1257-1261.

21. **George L, Mills JL, Johansson ALV, Nordmark A, Olander B, Granath F, Cnattingius S**. Plasma Folate Levels and Risk of Spontaneous Abortion. *JAMA* 2002;288:1867-1873.

22. **Nelen WLDM, Blom HJ, Steegers EAP, Den Heijer M, Thomas CMG, Eskes TKAB**. Homocysteine and folate levels as risk factors for recurrent early pregnancy loss. Obstet Gynecol 2000;95:519524.

23. **Shaw GM, O'Malley CD, Wasserman CR, Tolarova MM, Lammer EJ.** Maternal periconceptional use of multivitamins and reduced risk for conotruncal heart defects and limb deficiencies among offspring. Am J Med Genet. 1995;59(4): 536-545.

24. **Botto LD, Khoury MJ , Mulinare J, Erickson JD.** Periconceptional Multivitamin Use and the Occurrence of Conotruncal Heart Defects: Results From a Population-based, Case-Control Study. Pediatrics 1996;98(5):911-917.

25. **Czeizel AE**. Reduction of urinary tract and cardiovascular defects by periconceptional multivitamin supplementation. Am J Med Genet. 1996 ;62(2): 179-183.

26. **Bailey LB, Berry RJ**. Folic acid supplementation and the occurrence of congenital heart defects, orofacial clefts, multiple births, and miscarriage. Am J Clin Nutri, 2005;81(5):1213S-1217S.

27. **Spivak JL**. Masked megaloblastic anemia. Arch Intern Med 1982;142(12):2111-4.