SMALL AND LARGE HEADS DETECTED IN PALESTINIAN NEWBORNS

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INTRODUCTION

The incidence of major CNS malformations detected in the neonatal period was calculated on the last consecutive 33969 hospital deliveries and was published in the Bulletin 2003. In this short article we present few notes about the incidence of small and large heads and the possible inversion of their rates in the future.

Hydrocephaly is a heterogeneous entity. In this study we considered the diagnosis when the head circumference was enlarged with the presence of ventricular dilatation or with abnormally enlarged ventricles even if the head circumference was not enlarged yet. If no other intracranial malformation like **Dandy walker or absent corpus callosum** or other extra CNS malformation was found the hydrocephalus was classified as **isolated**. Cases of hydrocephaly associated with NTD were not considered under hydrocephaly as all cases of acquired hydrocephalus due to intracranial hemorrhage or congenital toxoplasmosis. **Colpocephaly** was considered when the volume of the frontal horns was nearly normal and there was major dilatation of the occipital horns without absence or evident hypoplasia of corpus callosum and in the absence of NTD or Arnold Chiari malformation.
Hydranencephaly is a condition of uncertain origin characterized by an intact skull and absence of cerebral hemisphere.
Holoprosencephaly is a malformation in which the prosencephalon has failed to undergo segmentation and cleavage into paired symmetric cerebral hemispheres.
Microcephaly was considered in this series when the head circumference was at least 3 standard deviations below the mean for gestational age.
Malformations associating CNS anomalies with chromosomal aberration were considered with chromosomal aberrations.

DIAGNOSIS

Diagnosis of cases was based on antenatal clinical and ultrasonic findings (on admission for delivery or during regular antenatal care), clinical examination at birth, during the first week of life till discharge from the neonatal unit (in some cases up to eight weeks), postnatal brain ultrasound examinations, brain axial computerized tomography and plain roentgenograms. The family authorized autopsy in few cases. In cases of hydrocephaly and microcephaly, mother and baby serum were tested for evidence of toxoplasmosis and cytomegalovirus. Metabolic workup and chromosomal studies were done upon clinical indications.

RESULTS

The general characteristics of the studied series were given in a precedent article, Table I resume major results.

TABLE I

	N	M NB	CNS M	% CNS /TM	% CNS-M/T
TB	33969	812	309	38	0.91
SB	730	156	104	67	14
LB	33269	656	205	31	0.62
ND	828	306	151	49	18.2
PND	1558	462	255	55	16.7

N:number, MNB: Malformed newborn, CNSM: Central nervous system malformed newborn, CNS/tM: Percentage of newborns with CNS malformation from total newborns with major malformation, CNS-M/T: Percentage of newborns with CNS malformations to total newborns.

CNS MALFORMATIONS

A-General overview of CNS anomalies

During the period of the study 812 (23/1000) products of delivery with major malformations in all systems were registered. These malformations represent 38% of all malformations (major and minor) registered in the same period. Among the major malformations 309 cases were severe malformations of the CNS diagnosed antenatally or in the first week of life. General distribution of CNS anomalies is shown in Table II. The total incidence was 9.1 per 1000 births for all CNS malformations considered in the study. Neural tube defects represented the major part, 57% of CNS malformations. Male to female ratio was 1:1.3 in this group. Hydrocephaly was associated with myelomeningocele and encephalocele in 65% of cases. Results demonstrated that a newborn with NTD was encountered every 193 deliveries with equal figures for anencephaly and myelomeningocele. Cases of spina bifida occulta were not included in this study as major malformation.

TABLE II: General Distribution of CNS anomalies

MALFORMATION	M	F	TX	SB	ND	M/1000 DEL	M/N DEL
NTD	77	99	176	62	100	5.18	193
Hydrocephaly	64	48	112	42	44	3.297	303
Craniostenosis	3	4	7	0	0	0.206	4853
Microcephaly	4	6	10	0	3	0.294	3397
Hydranencephaly	1	1	2	0	2	0.058	16985
Caudal Regression	0	2	2	0	2	0.058	16985
T CNS	149	160	309	104	151	9.096	110
T Malformed newborns	449	363	812	156	306	23.90	41.8
% of CNS/all malformed NB			38.05	66.66	49.34		

M:Male, F:Female, TX: Total, SB: Stillborn, ND: Neonatal Deaths, M/1000DEL: number of malformed newborn per 1000 deliveries, M/NL: One malformed baby for number of deliveries.

B-Hydrocephaly

Hydrocephaly is the major single malformation. One newborn with hydrocephaly was encountered in every 300 deliveries without considering cases associated with neural tube defects. Male to female ratio was 1.3:1 in the whole group and 1.1:1 in the isolated hydrocephaly group. Hydrocephaly was considered isolated when no other significant malformation or other significant structural brain anomaly was noticed except ventricular dilatation. One case of hydrocephaly due to congenital toxoplasmosis was diagnosed during the period of the study. Cases of hydrocephaly associated with other significant malformation or having a particular brain structural anomaly were considered in a distinct subgroup. Extended families of isolated cases of hydrocephaly are still under investigation for the presence of recurrence, NTD, and other malformations.

Two of the cases of Colpocephaly, an abnormal enlargement of occipital horn of the lateral ventricle also described as persistence of fetal configuration of the lateral ventricle, were brother and sister, who had been followed for 6 and 8 years; they had moderate speech delay. Corpus callosum was present but reported as thin in these cases. Colpocephaly has been described in twins (1) and agenesis of corpus callosum was the most common malformation associated with this anomaly (2).

TABLE III: Hydrocephaly cases group

MALFORMATION	M	F	TX	SB	ND	M/1000DEL	M/N DEL
Hydrocephaly-Isolated	**44**	**39**	**83**	**36**	**36**	**2.443**	**409**
Hydrocephaly +	**20**	**9**	**29**	**6**	**8**	**0.854**	**1171**
Colpocephaly	2	2	4	0	0	0.117	8492
Dandy Walker	5	1	6	1	3	0.176	5662
Absent C. Callosum	2	1	3	0	0	0.088	11323
Klipple- Trenaunay	1	0	1	0	0		
Cleft lip palate	1	0	1	0	1		
Cleft lip	1	2	3	2	0		
Cardiac	2	0	2	0	0		
Warburg	0	1	1	0	1		
TEF+ ambiguous genitalia	1	0	1	1	0		
TEF+ imperforate anus	1	0	1	0	1		
Others	4	2	6	2	2		
Hydrocephaly-total	**64**	**48**	**112**	**42**	**44**	**3.297**	**303**
T CNS	**149**	**160**	**309**	**104**	**151**	**9.096**	**110**

M:Male, F:Female, TX: Total, SB: Stillborn, ND: Neonatal Deaths, M/1000DEL: number of malformed newborn per 1000 deliveries, M/NL: One malformed baby for number of deliveries.

C-Microcephaly

Three of the severe cases of microcephaly reported were associated with esophageal atresia. Parents were first degree cousins in 2 cases. One of the cases was operated at birth and survived for six months without increasing her head circumference. Brain CT showed small lateral ventricles and smooth cortex with atrophic frontal lobes. Autopsy was refused. The other 2 died soon after birth. Up to our knowledge this association of microcephaly and esophageal atresia , without other major malformations was not reported as an autosomal recessive entity. A familial syndromic esophageal atresia with microcephaly and other malformation , MODED (3) or Feingold syndrome (4) was finally mapped to the chromosome 2 (5). The total number of microcephaly cases was 1/12 of the total number of hydrocephalus.

Table IV: Microcephaly

MALFORMATION	M	F	TX	SB	ND	M/1000 DEL	M/N DEL
Microcephaly	**4**	**6**	**10**	**0**	**3**	**0.294**	**3397**
-Isolated	1	5	6	0	0	0.176	5662
-Cleft palate	1	0	1	0	1		
-TEF	1	2	3	0	2		
T CNS	149	160	309	104	151	9.096	110

M:Male, F:Female, TX: Total, SB: Stillborn, ND: Neonatal Deaths, M/1000DEL: number of malformed newborn per 1000 deliveries, M/NL: One malformed baby for number of deliveries.

DISCUSSION

The limitations of this study were discussed in the previous issue of the Bulletin. Since we have collected these data and analyzed them the situation has changed. The introduction of the fetal sonography in the community and the facility of detection of hydrocephalus have certainly reduced the number of newborns with hydrocephalus and the relative number of microcephalic newborns has increased as their detection is more difficult and late to induce abortion. It is worthy to mention that, while the study was done, there was no formal law or established social practice for termination of malformed fetuses and medical practice in this field is still without consensus in the community. The situation has changed since and a lot of Moslem scholars accepted the idea of medical abortion before 18 weeks of gestation. Analysis of future results will certainly enlighten us on the effect of this practice.

Ethnic variations of CNS malformations were widely reported, but it is still difficult, at times, to separate ethnic and geographic variations from that due to differences in reporting systems (6). The different methodology of calculation of rates between different studies, inclusion of still births, ascertainment of cases, and the laps of time between them must be taken into consideration when comparing results.

The incidence of hydrocephaly in this study, although not including cases associated with NTD, is one of the highest reported in the word literature (7, 8, 9).

This study done at an early stage of development of modern obstetrics and fetal medicine in our community constitute a tool to compare and analyze future changes.

REFERENCES

1-Nigro MA, Wishnow R, Maher L. Colpocephaly in identical twins. Brain Dev 1991; 13(3):187-9.

2-Noorani PA, Bodensteiner JB, Barnes PD. Colpocephaly: frequency and associated findings. J Child Neurol. 1988; 3, (2):100-4.

3-Frydman M, Katz M, Cabot SG et al. MODED: Microcephaly-oculo-digito-esophageal-duodenal syndrome. Am J Med Genet.1997;71(3):251-7.

4-Courtens W, Levi S, Verbelen F et al. Feingold syndrome: report of a new family and review. Am J Med Genet. 1997;73(1):55-60.

5-Cell J, van Beusekom E, Hennekam RC et al. Familial syndromic esophageal atresia maps to 2p23-p24. Am J Hum Genet. 2000;66(2):436-44.

6-Myrianthopolos NC. Epidemiology of central nervous system malformations in Handbook of Clinical Neurology ,volume 6(50):49-68, NC Myrianthopolos,editor. Elsevier Science Publisher Amsterdam 1987.

7-Stevenson AC, Johnston HA, Stewart MIP, Golding DR. Congenital malformations. A report of a study of series of consecutive births in 24 centers. Bull WHO 34, 1966 (suppl) 1-127.

8-Dignan P ST J, Warkany J. Congenital malformations:hydrocephaly. In J.Wortis(ed), Mental retardation and Developmental disabilities, An Annual review, Vol.VI New York, Brunner and Mazel 1974:44-83.

9-Halliday J, Chow CW, Wallace D, Danks DM. X linked hydrocephalus: a survey of 20 years period in Victoria, Australia. J Med Genet 1986;23:23-31.