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Epidemiology of congenital abnormalities in West Africa: Results of a descriptive study in teaching hospitals in Abidjan: Cote d'Ivoire

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ABSTRACT

Background: Congenital abnormalities constitute one of the major causes of infant mortality, particularly in developing countries. The aim of this study was to describe the epidemiology of congenital anomalies in Cote d'Ivoire. **Materials and Methods:** It was a multicentric study of three academic hospitals and the Heart Institute of Abidjan over 10 years. The epidemiologic Data concerned the Parturients, the annual frequency of congenital abnormalities. Distribution of the congenital abnormalities according to the organs, overall mortality and lethality of congenital abnormalities were evaluated. **Results:** Over 10 years, 1.632 newborns with 1.725 congenital anomalies were recorded. Frequency was 172.5 congenital anomalies *per annum*. Parturients were less than 35 years in 33% of cases, multigravida in 20%, multiparous in 18% and had a low socio economic status in 96% of cases. Prenatal diagnosis of congenital anomalies was performed in 1.5%. Congenital anomalies were orthopedic in 34%, neurological in 17%, gastrointestinal in 15%, facial in 11.5%, parietal in 13%, urogenital in 9% and cardiac in 0.5% of cases. The overall mortality rate of congenital anomalies was 52% and gastroschisis was the most lethal disease with 100% mortality. **Conclusion:** This descriptive study reveals the low socio economic status of Parturients with congenital anomalies and their poor prenatal diagnosis. These factors explain the very high mortality of congenital anomalies due to a delay management in our country in which medical expenses were borne by parents and where technical platforms remain obsoletes for good resuscitation and neonatal surgery.

Key words: Congenital abnormalities, epidemiology, mortality, newborn

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INTRODUCTION

Congenital anomalies (CAs) are a major cause of child and neonatal mortality, particularly in developing countries. Earlier studies in India indicated that congenital malformations affected 2.5% of infants and accounted for 10-15% neonatal deaths and 8-18% of perinatal mortality.[1] In the United States, CAs are the leading cause of infant mortality,[2] and they represent 1% of infant mortality in Canada and Ireland.[3,4] In developing countries, CAs are responsible for high infant mortality with various risk factors.[5-7]

The reduction of infant mortality due to CAs in Western countries has gone through various stages, of which the main one has been the establishment of epidemiological surveillance networks of congenital diseases. Reducing mortality due to CAs is also related to the improvement of diagnosis (including prenatal and early postnatal diagnosis), appropriate medical and surgical management of newborns with CAs.

Most developed countries have Congenital Anomalies Registry,[1-3] and epidemiological surveillance of malformations with potential teratogenic environmental agents.[2,3] In developing countries, especially in African sub-Saharan French-speaking countries, such registries are non-existent. The reported incidence and mortality rates associated with Cas remained speculatively high, with very little information on other epidemiological data. Previous studies conducted in Cote d'Ivoire were monocentric, of short duration and did not take into account epidemiological data of pregnancies.[6,7] Thus, the true incidence and outcome of CAs in newborns remains unknown in our setting.

The aim of this study was to document the epidemiological characteristics and outcome of CAs, with the objective to create a database that would help

the establishment of a register of congenital anomalies in our country.

MATERIALS AND METHODS

We conducted a cross-sectional study of CAs in all newborns aged 0-28 days admitted for congenital anomalies from January 2000 to December 2010, in the Departments of Paediatric Surgery of three Academic Hospitals, in the Heart Institute and in the main Department of Neonatology of Abidjan. Data were collected from consultation, from the hospitalisation registers and the medical records of newborns.

Epidemiological data studied in the Parturient were: The age, the socio-economic status, gestity, parity. The quality of follow-up during pregnancy was evaluated by prenatal assessment (toxoplasmosis serology, rubella serology), the number of prenatal consultations, and the number of prenatal ultrasounds. We compared the frequencies of congenital anomalies in mothers under 35 years and those in the parturient over 35 years.

Epidemiological data of newborns involved the term of pregnancy, mode of delivery, and anthropometric data. We studied the frequency of birth defects according to the siblings.

We calculated the annual frequency of congenital anomalies, the proportion of prenatal diagnoses and assessed the distribution of congenital anomalies according to the organs.

We assessed overall mortality and calculated the lethality of each CA.

The data processing was performed using Microsoft Excel spreadsheet 2007, (Microsoft Corporation One Microsoft Way Redmond, WA 98052-6399 USA) and the statistical analysis with Epi Info 6.0 software (CDC, Atlanta, GA, USA). Chi-square test was used to determine the relation between congenital abnormalities and maternal age; α-risk was set at 5%.

RESULTS

There were 1.632 newborns with 1.725 congenital abnormalities; the sex ratio was 1.49 and 1% of sexual ambiguity. The annual frequency of CAs was 172.5 per year in the university hospital facilities, and the prevalence of 1 case/10,000 live births in Abidjan according to figures from the National Statistics Institute (NSI) over the study period.

Maternal age was observed in 34% of parturient, 95% CI = (31-38). The average age of mothers (years) was 27 ± 9, the gestity and parity were described in Tables 1 and 2. More than half of the mothers were housewives, 25% worked in the informal sector, students and employees represented less than 1%.

PreNatal Consultations (PNC) began in the first quarter of pregnancy in 81% of cases, second quarter in 13 % and third quarter 6 % of cases. The prenatal assessment was performed in 79% of cases [Table 3].

Deliveries were full-term in 97% of cases, premature and post-term in 2.5% and 0.5% of cases, respectively. Majority (56%) of deliveries were carried out in a hospital while in 44% deliveries were at home. Delivery by Caesarean section was performed in 52 % of cases

Table 1: Distribution of the congenital defect according the maternal age

Maternel age	Populations (n = 515)	Percentage
18-25	315	61
25-35	145	28
>35	55	11

Maternal age has been studied in 515 parturients. There is no significant difference between congenital anomalies in women over 35 and in those below 35 years $P > 0.05$

Table 2: Distribution of the parturients data: Gestate and parity

Number of geatate or parity	Gestate		Parity	
	Populations (n = 380)	Percentage	Populations (n = 380)	Percentage
1	87	23	113	30
2-3	155	41	141	37
4-5	96	25	85	22
>6	42	11	41	11

The gravidity and parity have been studied in 380 parturientes. We noted a multi-gestity and a multi-parity higher than 6 in 11% of cases

Table 3: The assessment parameters of the pregnancies follow-up of children born with a malformation: The number of prenatal consultations and the number of antenatal ultrasounds per pregnancy

Numbers of prenatal consultations	Populations (n = 628)	Percentage
0-3	286	46
4-6	202	32
>6	140	22
Numbers of antenatal ultrasounds	Populations (n = 349)	Percentage
0-3	345	99
>3	4	1

The number of prenatal consultations per pregnancy was specified in 42% of cases, the number of antenatal ultrasounds was specified in 23% of cases

and by vaginal route in 48 % of cases. Newborns had a normal weight in 29% of cases [Table 4].

Congenital anomalies occurred in the first child of the siblings in 22%, in the second child of the siblings in 20%, in the third child in 17%; in 41% CAs occurred after the third child among the siblings.

The prenatal diagnosis of congenital anomalies was made in 1.5 % of cases, in 79.5% the diagnosis was made at birth and in 19 % at the post-natal period.

Congenital anomalies, in order of frequency, were orthopaedic (34%), neurological (17%), digestive (15%), facial (11.5%), parietal (13%), urogenital (9%), and cardiac (0.5%). The anomalies were isolated in 83% of cases and multiple in 17%.

Curable congenital anomalies were treated in 51% of cases. The overall mortality rate of congenital abnormalities was 52%. Mortality was more important in the first week of life with 65% of cases. The most lethal congenital anomalies were, gastroschisis 100% of deaths, neonatal occlusions 52%, oesophageal atresia 50% of deaths [Table 5].

Table 4: Distribution of the anthropometric data of newborns bearing congenital abnormalities

Anthropometric parameters	Limits	Numbers	Percentage
Birth weight (g)	<3000	658	71
	>3000	272	29
Birth size (cm)	>52	33	4.5
	<52	706	95.5
Cranial circumference (cm)	<33	603	81
	>33	144	19

Table 5: Distribution of lethality of each congenital anomaly

Congenital anomalies	Total	Lethality (%)
Heart defects		
Interventricular communication	03	—
Interauricular communication	03	33
Tetralogy of Fallot	01	—
Pulmonairy stenosis	01	100
Digestive malformations		
Anorectal malformation	171	13.5
Neonatal occlusion	38	52
Esophageal atresia	10	50
Hirschsprung disease	03	—
Diaphragmatic Hernia	01	—
Parietal defects		
Omphalocele	176	15.5
Laparoschisis	17	100
Prune Belly Syndrome	02	—
Neurologic malformations		
Myelomeningocele	206	10
Meningocele	37	5.5
Encephalocele	30	17
Anencephaly	13	100
Urogenital malformations		
Posterior urethral valves	45	7
Hypospadias	44	—
Cryptorchidism	30	7
Bladder exstrophy	18	—
Genital ambiguity	11	—
Megaureter	05	—
Ureteropelvic junction obstruction	05	—
Craniofacial defects		
Cleft lip and palate	96	1
Cleft lip	72	—
Facial dysmorphism	30	6
Limbs malformations		
Club foot	250	1
Flat foot	59	—
Polydactyly	39	2.5
Recurvatum genu	64	1.5

DISCUSSION

Congenital anomalies are relatively common in health centres and university hospitals in Abidjan, with an average frequency of 172.5 Cas/year. This annual frequency is probably underestimated. Newborns with birth defects dying at home are often not stated and hence not taken into account in our study. Also because of cultural considerations in our area, other malformed newborns were subjected to infanticide.

Several risk factors are outlined in congenital anomalies, maternal age is described as a risk factor after 35 years age.[2,3]

In our study, the number of mothers below 35years old was very high, but there is no significant difference between the proportion of congenital anomalies born to mothers below 35 and those born in mothers over 35 years [Table 1].

The risk of congenital anomalies after the age of 35 is not supported by all studies.[8-12]

However, some defects like, Down syndrome and congenital heart disease have a high prevalence after 35 years.[2,3] A recent study in India, showed that the proportions of congenital anomalies according to the parturient age were variable, but there is no significant difference.[13] We noted a significant multigestity and multiparity in Parturients. Eleven percent of Parturients were over 6 gestity [Table 2]. We did not assess their association with the congenital anomalies, but a study in India showed that the multi gestity was a risk factor for congenital anomalies.[13]

Three-quarters of Parturients in our study, had a low socio-economic stratum. Variation in neonatal mortality according to socioeconomic strata has been reported even when there is equitable good medical service.[2,10]

Despite their low socioeconomic strata, three-quarters of pregnancies were well followed-up, either parturient has had at least three prenatal consultations and 3 obstetric ultrasounds [Table 3]. In contrast, the percentage of prenatal diagnosis of congenital anomalies (1.5%) remains low compared with the number of ultrasounds. With the problem of competence for congenital anomalies prenatal diagnosis, obstetric ultrasounds are often performed by obstetricians or radiologists who do not always have the expertise in foetal echo-morphology. The value of prenatal ultrasounds in the diagnosis of congenital anomalies is well established.[11,13,14]

Prenatal diagnosis of congenital anomalies in our country, could help for deliveries in hospitals for an early management of curable conditions. Deliveries were carried out at home in 44% and postnatal diagnosis was made in 79.5%. Almost the newborns had a normal birth weight [Table 4].

The congenital anomalies identified dominated by orthopaedic, neurological, digestive, facial and parietal anomalies. An earlier report from Southwest Nigeria confirms this distribution.[15]

Myelomeningocele and meningocele were the most common neurological anomalies [Table 5]. These are serious conditions that cause neurological and orthopaedic sequelae incapacitating, then children will remain dependent on their families for the rest of their lives. Neurological abnormalities are associated with more compromise of cognitive as well as motor function.[16] When the law allows it, these serious conditions are subject to medical termination of pregnancy.[17]

The overall mortality is still high due to the significant lethality of the parietal anomalies (100% of deaths in gastroschisis) and lethality of digestive anomalies (52% of deaths in neonatal occlusions). Their diagnosis is late, usually in the 1st week of life. Thus, attempts feed oesophageal atresia unrecognised at birth lead to severe pneumonia causing post-operative death.

The mortality of congenital anomalies in developing countries remains high.[18-23] In our department, significant lethality of digestive diseases is due to inadequate technical platform for resuscitation and neonatal anaesthesia. So far, the treatment of gastroschisis remains inconceivable without an adapted nutritional therapy.

In the United States, according to the National Vital Statistic System report, the mortality rate in 2003, raised to 6.84/1000 live births, with a significant neonatal mortality in the 1st week of life despite the importance of prenatal care.[1] Earlier perinatal deaths are associated with the presence of other structural defects or chromosomal abnormalities.[24]

CONCLUSION

Congenital abnormalities exist and are relatively significant in our hospitals. Their prenatal diagnosis remains marginal. They are dominated by orthopaedic abnormalities. Their mortality remains high. Mortality is burdened by a more significant lethality of visceral congenital diseases. The high lethality of digestive disorders is due to the late postnatal diagnosis and to the absence of adapted therapeutic means such as the neonatal resuscitation and nutritional therapies. Our findings may help to set up an epidemiological database for the establishment of a register of congenital abnormalities in Cote d'Ivoire.

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