THE INCIDENCE OF CONGENITAL CLEFTS OF THE LIP AND PALATE*

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I have frequently been asked how often congenital clefts of the lip and palate occur, and have never been able to give a definite answer. The object of this paper is to determine as definitely as may be the incidence of these clefts. It is based on a study of the cases of congenital clefts of the lip and palate which have occurred up to March 1, 1924, in 24,158 deliveries in the Obstetrical Service of the Johns Hopkins Hospital † and in 3927 deliveries in the Hospital for the Women of Maryland.

A review of the literature shows that Fröebelius, in 1865, published a report based on the number of congenital clefts of the lip and palate found among 180,000 children admitted to the St. Petersburg Foundling Hospital between the years 1833 and 1863.

He estimated that these clefts occurred once in 2400 births and his figures have been generally accepted and constantly quoted. For a number of reasons, to be mentioned later, it is obvious that congenital clefts would occur more frequently in 180,000 total births than in the same number of admissions to any institution. Nothing further has been written on the subject.

One cannot determine the incidence of congenital clefts of the lip and palate from the records of any surgical clinic, as many children with these malformations die before they are presented for operation or admission; many of the simpler cases are operated on at home; and a considerable number are never brought for operation.

The number of these cases applying for operation at the larger surgical clinics varies according to the increase in the population of the district from which that clinic draws; according to the reputation of that particular clinic for success with these cases; according to the knowledge of the public at large that much can be done for the relief of these deformities and the consequent willingness of parents to bring children for operation.

It is possible that the frequency of occurrence of congenital clefts of the lip and palate may vary in different parts of the world. This may even be true in different sections of our own country and also there may be a difference in rural and urban communities. This seems to be indicated by the statistics compiled from the draft records of the defects found in the first 2,500,000

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men examined for the United States Army in the world war, which show that in Vermont, at one extreme, the ratio of the occurrence of congenital clefts of the lip and palate per 1000 men examined was 1.55, while at the other end of the list stood Arkansas with a ratio of .16 per 1000. These statistics also showed that the incidence was highest per 1000 in the agricultural sections of the northern states.

As these figures are based entirely on the examination of men of military age no definite conclusion can be drawn from them as to the frequency of occurrence of congenital clefts, as those in females, those dying in infancy of malnutrition or following operation, and those operated on successfully are not included.

As far as I have been able to ascertain no mention is made of congenital clefts of the lip and palate in the official birth records now in use in this country or abroad, and in consequence accurate information cannot be obtained for the whole country or even for individual states, until uniform birth statistics are required which will cover this point.

It has been said that the frequency of occurrence of the types of congenital clefts may change and this was noted by Bruns, who quotes Langenbeck as saying in 1828: "In the past eight years the simple harelip has become a rare occurrence and the cleft palate a frequent phenomenon." He also quotes Walter in 1834, who says "double and complicated harelips occur at present more frequently than simple harelip, and much more frequently than thirty years ago." Bruns in 1873 confirms this idea from his own statistics. These observations may or may not be of value as the differences might have been caused by the fact that only the more difficult cases were brought into these particular surgical clinics.

In this study our interest is solely in the number of congenital clefts of the lip and palate which came to delivery, and not in those which are found so frequently in pathological embryos aborted in the early months of gestation.

For convenience and for purposes of comparison, I have separated the cases studied into three series.

SERIES A. The negro cases from the obstetrical service of the Johns Hopkins Hospital.

SERIES B. The white cases from the same clinic.

SERIES C. The white cases from the obstetrical service of the Hospital for the Women of Maryland.

SERIES A. NEGRO CASES FROM THE OBSTETRICAL DEPARTMENT, JOHNS HOPKINS HOSPITAL

Number of congenital clefts of the lip and palate in 12,520 deliveries—7. *Nationality of mothers*—United States, 7. *Ages of mothers.* Youngest, 21; oldest, 36; average, 26. *Health of mothers.* Good, 6; excessive vomiting (early months), 1. *Mentality of mothers.* Usual ward type. *Ages, health and mentality of fathers.* No routine note. *Social status.* Ordinary ward type.

Primipara, 2; *multipara,* 5. Both of the primipara were 21 years old. Of the multipara, one child was the third of a 24-year-old mother; one was the fourth of a 26-year-old mother; one was the fourth of a 30-year-old mother; one was the fifth of a 30-year-old mother and one was the tenth of a 36-year-old mother.

Sex of child. Male, 3; female 4. *Year of birth*—1899, 1; 1902, 1; 1906, 1; 1907, 1; 1915, 1; 1920, 1; 1922, 1. *Legitimate,* 6; *illegitimate,* 1. *Presentation*—L.O.A., 3; R.O.P., 3; R.O.A., 1.

Delivery. At term, 5. Spontaneous, 4; version, 1. Premature, 2. Both spontaneous. Seven and one-half months macerated fœtus, 1; 8½ months child, died immediately after birth. *Weight at birth.* Heaviest, 3317 gms.; lightest, 2268 gms.; average, 2648 gms. *Length at birth.* Longest, 53 cm.; shortest, 42 cm.; average, 47.7 cm.

Malformation.‡ *Alveolar cleft lip,* 2 cases. In one female child, there was a right unilateral complete cleft of lip with notching of the alveolar process on right side. Palate intact. In one male child, there was a bilateral complete cleft of the lip with notching of the alveolar process on both sides. Palate intact.

Alveolar cleft lip and palate, 4 cases. In two males and two females, there were bilateral complete clefts of the lip, alveolar process and palate.

Alveolar cleft palate, 1 case. In a female child, there was a unilateral (side not given) complete cleft of the alveolar process and palate. Lip intact.

Associated anomalies, 3 cases.

In one girl, there was clubbing of feet and hands with polydactylism. (Died fortieth day.) In one girl, there was malformation of the mandible and enlarged thymus. In one boy, there was rudimentary hand and forearm and ankylosed elbow. (7½ months' fœtus; still-born.)

Mortality, 5 cases. One 7½ months macerated male fœtus, placenta luetic; one 8½ months female child, died after a few gasps, typically luetic, placenta negative; one female child still-born at term, placenta luetic; one male child died third day (mother had condylomata and the placenta was luetic); one female child died fortieth day of inanition. Three of these were typically syphilitic in appearance, although the Wassermann reaction was negative for the mother in 1; for the mother and father in 1; and for the mother, father and cord in 1.

SERIES B. WHITE CASES FROM THE OBSTETRICAL DEPARTMENT, JOHNS HOPKINS HOSPITAL

Number of congenital clefts of the lip and palate in 11,638 deliveries—13. *Nationality of mothers*—Bohemian, 1; Irish, 1; Roumania, 1; Russian, 2; United States, 8. *Ages of mothers.* Youngest, 17; oldest, 38; average, 25½. *Health of mothers.* Good, 10; excessive vomiting (in early months), 1; health poor, 1; tuberculosis of lungs, 1. *Mentality of mothers.* Ordinary ward type, 12; feeble-minded, 1. *Ages, health and mentality of fathers.* No routine note. *Social status.* That of ordinary ward patient.

Primipara, 7; *multipara,* 6. The ages of the primipara were 17, 19, 20, 22, 24, 26 and 33 years and 4 of the 7 children were illegitimate. Of the multipara, one child was the second of a 20-year-old mother; one was the second of a 23-year-old mother; one was

‡ In this paper the classification of Davis and Ritchie will be used. Group 1. *Prealveolar* (process) *cleft.* (Lip cleft; alveolar process normal.)

Cleft of the palate may be associated with this group.

Group II. *Postalveolar* (process) *cleft.* (Palate cleft; alveolar process normal.)

Cleft of the lip may be associated with this group.

Group III. *Alveolar* (process) *cleft.* (Cleft follows incisor sutures.)

Clefts of the lip and palate are usually associated in this group.

the second of a 25-year-old mother; one was the third of a 35-year-old mother; one was the third of a 38-year-old mother and one was the sixth of a 30-year-old mother. One of these children was illegitimate.

Sex of child. Male, 10; female, 3. *Year of birth,* 1905, 2; 1907, 1; 1909, 1; 1911, 2; 1915, 2; 1916, 1; 1919, 2; 1921, 2.

Legitimate, 8; *illegitimate,* 5. *Presentation*—L.O.A., 7; L.O.T., 1; R.O.A., 4; R.O.P., 1. *Delivery* At term, 12 Spontaneous, 9; mid-forceps, 2; low forceps, 1. Premature, 1. Spontaneous, 8 months. *Weight at birth.* Heaviest, 3954 gms.; lightest, 2085 gms.; average, 3250 gms. *Length at birth.* Longest, 52 cm.; shortest, 46 cm.; average, 49 cm.

Malformations. Prealveolar cleft, 5 cases. In one of these, a girl, the cleft was complete; in four boys, the clefts were incomplete. All were unilateral. The cleft was on the left side in two boys and one girl; the side was not given in two boys.

Alveolar cleft lip, 1 case. In a boy, there was a bilateral complete cleft of the lip with notching of the alveolar process on the left side.

Alveolar cleft lip and palate, 4 cases. In one, a girl, there was a bilateral complete cleft of the lip, alveolar process and palate. In three, all boys, there were unilateral clefts, one right and two left, of the lip, alveolar process and palate. Two of these were complete and one was incomplete.

Prealveolar and postalveolar cleft, 1 case. In this case, a boy, there was a unilateral left incomplete cleft of the lip with complete cleft of the hard and soft palate, the alveolar process being intact.

Postalveolar cleft, 2 cases. In both cases, a boy and a girl, there were complete clefts of the soft palate, the alveolar process and lip being intact.

Associated anomalies, 2 cases. In one boy, there was a stricture of the ureter and hydronephrosis. (Died 5th day.) In one girl, there were bilateral club feet and polydactylism of the right hand. (Died 1st day.)

Mortality, 6 cases. One girl died on the 1st day, one hour after birth. (Bilateral club feet, polydactylism.) One boy died on the 5th day. (Stricture of the ureter and hydronephrosis.) One boy died on the 21st day. (Bronchopneumonia, post-operative.) One boy died on the 24th day. (Bronchopneumonia and inanition). One boy died on the 35th day. (Inanition.) One girl died when 8 months old. Cause not given. In none of these cases was syphilis suspected or demonstrated.

SERIES C. WHITE CASES FROM THE OBSTETRICAL DEPARTMENT OF THE HOSPITAL FOR THE WOMEN OF MARYLAND

Number of congenital clefts of lip and palate in 3927 deliveries, 4. *Nationality of mothers*—United States, 4. *Ages of mothers.* Youngest, 27; oldest, 28; average, 27½ years. *Health of mothers.* Good, 3; nasal sinusitis, off and on during pregnancy, 1. *Mentality of mothers.* High grade. *Social status of mothers.* High grade. *Ages of fathers.* Youngest, 26; oldest, 55; average, 37¾. In one instance, the father was 28 years older than the mother and in another 15 years older. In one instance, the mother was 1 year older than the father and in one instance, the ages of the parents were equal. *Health of fathers.* Good, 4. *Social and mental status of fathers.* High grade, 4.

Primipara, 4. *Sex of child.* Male, 4. *Year of birth.* 1918, 2; 1919, 1; 1922, 1. *Legitimate,* 4. *Presentation.* L.O.A., 4. *Delivery.* At term, 4. Spontaneous, 3; low forceps, 1. *Weight at birth.* Highest, 3615 gms.; lowest, 3153 gms.; average, 3322 gms. *Length at birth.* Not noted.

Malformations. Alveolar cleft lip and palate, 3 cases. In two boys, there were bilateral complete clefts of lip, alveolar process and palate. In one boy, there was a unilateral left, complete cleft of lip, alveolar process and palate.

Postaveolar cleft, 1 case. In a boy, there was a cleft of the posterior third of hard palate and all of soft palate, the lip and alveolar process being intact.

Associated anomalies, 1. In this case, a boy, there was unilateral club foot on the right side (cleft on left side), and slightly bifid nose.

Mortality, 0. All of these cases were operated on and lived. The youngest being now 2 years old. Syphilis was not suspected or demonstrated in any of these cases.

GENERAL SUMMARY OF THE ENTIRE SERIES

Number of congenital clefts of the lip and palate in 28,085 deliveries—24. *Nationality of mothers*—19 were natives of the United States; 1 was a Bohemian; 1 was Irish; 1 was Roumanian and 2 were Russians. Color. White, 17; black, 7.

Ages of the mothers. Second decade, 2; 17 and 19 years. Third decade, 15; one each, 22, 23, 25 and 28 years; two each, 20, 21, 24 and 26 years; three each, 27 years. Fourth decade, 7; one each, 33, 35, 36 and 38 years; three each, 30 years. The average age of the mothers of Series A was 26 years; in Series B was 25½ years; in Series C was 27½ years, with a general average of 26⅓ years.

Health of the mothers. In the negro series, it is probable from the appearance of the child and placenta that four mothers were syphilitic, although all tests were negative. All of these reported themselves in excellent health. One of the white mothers complained of "poor health" at the time of conception and another of tuberculosis of the lungs. Two mothers, one white and one colored, reported excessive vomiting during the first 2½ months of pregnancy. Otherwise, the health of the mothers was excellent.

Mentality of mothers. High grade, 4; ward type, 19; feeble-minded, 1. *Health of fathers.* This was noted in only 3 cases in the Johns Hopkins Hospital series and all of these were in good health. In the 4 cases in Series C, the health of the fathers was excellent. *Mentality of fathers.* High grade, 4; ward type in those mentioned, 3. *Primipara,* 13; *multipara,* 11. *Sex of child.* White, male, 14; female, 3. Negro, male, 3; female, 4. Total, male, 17; female, 7.

Years of birth. 1899, 1 case; 1902, 1 case; 1905, 2 cases; 1906, 1 case; 1907, 2 cases; 1909, 1 case; 1911, 2 cases; 1915, 3 cases; 1916, 1 case; 1918, 2 cases; 1919, 3 cases; 1920, 1 case; 1921, 2 cases; 1922, 2 cases. *Legitimate.* White, 12; negro, 6. Total, 18. *Illegitimate.* white, 5; negro, 1. Total, 6.

Presentation. L.O.A., 14; L.O.T., 1; R.O.A., 4; R.O.P., 4; not given, 1.

Delivery. In 21, delivery was at term; in 3, the birth was premature. The labor was spontaneous in 19 cases; 13 white and 6 colored. Mid-forceps and low forceps were used in 2 cases each, all being whites. There was 1 version in a negro woman with a contracted pelvis. Of the 3 premature births, one was white, 8 months; and two were colored, 7½ and 8½ months. *Weight at birth.* White, highest, 3954 gms.; lowest, 2085 gms.; average, 3263 gms. Colored, highest, 3317 gms.; lowest, 2268 gms.; average, 2648 gms. *Length at birth.* White, longest, 52 cm.; shortest, 46 cm.; average, 49 cm. Colored, longest, 53 cm.; shortest, 42 cm.; average, 47.7 cm.

Malformations.—Prealveolar cleft (cleft of the lip alone). The lip alone was cleft in 5 cases, all being in white children and all unilateral. One was complete (the cleft extending into the nostril) and 4 were incomplete. In 3, 2 males and 1 female, the clefts were on the left side, and in 2 male children, the side was not noted.

Alveolar cleft lip (cleft of the lip with notching of the alveolar process), 3 cases. In one negro girl, the cleft was unilateral complete with cleft and notch on the right side. In one negro boy, the cleft was bilateral complete with notching of both sides. In one white boy, the cleft was bilateral complete with notching of the alveolar process on the left side.

Alveolar cleft lip and palate (cleft of the lip with cleft of the alveolar process, hard

and soft palate), 11 cases. Seven were bilateral complete clefts, 4 of these being colored, 2 boys and 2 girls; 3 white, 1 girl and 2 boys. Three were unilateral complete clefts, all being in white male children, one being right and two left. One was a left unilateral incomplete cleft of the lip with complete cleft of the alveolar process and palate in a white boy.

Prealveolar and postalveolar cleft (cleft of the lip and palate, the alveolar process being intact), 1 case. In a white boy, there was an incomplete left-sided cleft of the lip with complete cleft of the hard and soft palate.

Alveolar cleft palate (cleft of the alveolar process and palate, the lip being intact), 1 case. There was cleft of the alveolar process and palate in one negro girl. The side was not given.

Postalveolar cleft (cleft of the palate alone), 3 cases. There was cleft of the posterior third of the hard and soft palate in 1 boy, and of the soft palate in two cases, one boy and 1 girl, all being white.

Associated anomalies. In 6 cases, there were other congenital anomalies, associated with lip and palate clefts. Three of these were in white children. One, a boy, had a stricture of the ureter and hydronephrosis and died on the 24th day; one girl with bilateral club feet and polydachtylism of the right hand, died on the first day; one boy, who had a slightly bifid nose and a club foot on the right side (the cleft being on the left side) still survives. Three were in negro children; one of these, a girl, had clubbing of the feet and hands and polydactylism of feet and hands, died on the 40th day; one girl had enlarged thymus and malformation of the mandible, was still-born at term; one boy, a 7½ months macerated fœtus, had a rudimentary hand and forearm and ankylosed elbow.

Mortality. Within 8 months, 11 died out of the 24 cases. One was a macerated 7½ months negro male fœtus; one was a 8½ months negro girl, who died after a few gasps; one negro girl was still-born at term; one white girl died the first day, one hour after birth; one negro boy died the third day, luetic; one white boy died the fifth day, stricture of the ureter and hydronephrosis; one white boy died the twenty-first day, post-operative bronchopneumonia; one white boy died the twenty-fourth day, inanition and bronchopneumonia; one white boy died the thirty-fifth day, inanition; one negro girl died the forty-second day, inanition; one white girl died when 8 months old, cause not given.

COMMENTS

Five out of twenty-four of the mothers were of foreign birth, but this appears to have no significance. There is nothing noteworthy in the ages of the mothers. Bad health of the mother or father, or both, at time of conception and of the mother during the early months of pregnancy has been considered a possible cause for these malformations, as has also been excessive vomiting during the first two and one-half months of pregnancy, and these facts should be borne in mind. There was excessive vomiting during the first and second months in three instances. One mother had pulmonary tuberculosis at time of conception. Another had "poor health" at time of conception.

It has been claimed that syphilis is the definite factor in causing these malformations, and there was probably syphilis in 4 cases, all of these being in Series A. From this number (4 out of 7 cases) of apparently syphilitic children with congenital clefts of the lip and palate, it might be inferred that syphilis played a definite part in the etiology, at least in the negro group.

We must bear in mind, however, that the majority of syphilitic children, both black and white, are born without this malformation. In Series B and C, no case of syphilis is recorded and this seems to refute the idea, at any rate for the white group.

Low-grade mentality of the parents has also been suggested as a possible cause of congenital clefts of the lip and palate. In the cases studied, only one mother is listed as feeble-minded. The mentality of the others was sufficiently normal to excite no comment.

The difference in the ages of the parents has also been considered a possible etiological factor. In one instance, the mother (feeble minded) was twenty years old, and the father (the girl's own father) was fifty-three years old, a difference of thirty-three years. In another instance, the father was fifty-five and the mother twenty-seven; and in another there was fifteen years difference. These were the most marked instances of difference in the ages of the parents in this series.

Maternal impressions were not recorded on the majority of the histories, and although interesting they are of no particular importance as etiological factors.

Although no notes were found in the family histories of the occurrence of similar congenital clefts, heredity undoubtedly plays an important part in the occurrence of these clefts of the lip and palate. The percentage given by different authors varies between 15 per cent. and 20 per cent. In my own cases, I have noted about 19 per cent. with a family history of congenital clefts.

It has been said that these congenital malformations occur more frequently in illegitimate than in legitimate children. In this series, 18, or 75 per cent., were legitimate and 6, or 25 per cent., were illegitimate; all of these were in Series A and B. Inasmuch as one-fourth of the children were illegitimate, notice must be taken of this fact; but I question the importance of illegitimacy as an etiological factor.

Doubt has been expressed by those who seldom see negro patients as to whether congenital clefts of the lip and palate ever occur in this race. From case reports elsewhere and from the number reported in Series A, we can conclude that the occurrence is not infrequent, but that it is not so common as in the white race.

The question of social status and environment is of considerable interest. The majority of the patients in the Johns Hopkins Hospital Series A and B, were of the public ward and out-patient service type. Those from the Hospital for the Women of Maryland, Series C, were of the private ward class. It has been generally accepted that a greater proportionate number of these malformations occur among the children of individuals of the lower and more ignorant classes, whose nutrition and hygienic surroundings are poor, than among those whose environment is all that could be desired and whose mental attainments are of higher degree.

In 12,520 deliveries of negro women in Series A, 7 congenital clefts of the lip and palate were found, or 1 in 1788+. In 11,638 deliveries of white women in Series B, 13 congenital clefts were found, or 1 in 895+. In 3927 deliveries of white women in Series C, 4 congenital clefts were found, or 1 in 981+. Taking the white series together, we find in 15,565 deliveries, 17 clefts, or 1 in 915+; combining all the series, in 28,085 deliveries, there were 24 clefts, or 1 in 1170.

In other words, in series A, where all conditions were most unfavorable, congenital clefts of the lip and palate occurred comparatively much less often than in series B and C. It may be that these clefts occur less frequently in the negro race than in the white, irrespective of environment, etc., but if this consideration is left out, these figures seem to upset the theory as to social status and environment. A comparison of series B and C show that clefts occur in the white public ward cases (1-895+) more frequently than in the private ward cases (1–981+), but the comparative difference is not great when we take into consideration the vast contrast between the environment and social status of these groups.

We find that 13 out of 24, or 54+ per cent., of the entire series were first children. Eleven white mothers were primipara as compared with 2 negro mothers, which shows that the proportion of congenital malformations of the lip and palate were greater in white primipara than in negro primipara. On the other hand, there was a greater proportion of negro multipara, 5 out of 7, as compared with the white multipara, 6 out of 17.

Haug in 1904 collected from the literature 2352 cases of congenital clefts operated on in various surgical clinics and found that 64.3 per cent. were males and 35.7 per cent. were females. In this series there were 7 females, or 29.17 per cent., and 17 males, or 70.83 per cent. In other words, these clefts occur much more frequently in male than in female children.

The first delivery in the out-patient Obstetrical Service of the Johns Hopkins Hospital was on January 1, 1895, and the first congenital cleft occurring on this service was on July 14, 1899, or four and one-half years later. The first delivery in the Obstetrical Ward of the Johns Hopkins Hospital was on August 17, 1896, and the first congenital cleft on this service occurred on July 22, 1902, or about six years later.

Nothing abnormal was noted during pregnancy, in the type of presentation and in the course of labor in this series. Delivery was at term in 87 per cent. of the cases.

The average weight of a full term normal white infant at birth is 3250 gms. The average weight in this series is 3263 gms., which is approximately normal. The average weight of a full term normal negro infant at birth is 3104.8 gms. The average weight of this series is 2648 gms., which is considerably less than normal.

The average length of a full term white normal infant at birth is 49.64 cm.

The average length of this series of infants is 49 cm., which is normal. The average length of a full term normal negro infant is 48.75 cm. The average length of this series is 47.7 cm., which is slightly shorter than normal.

From these figures, it can be said that the average weight and length of a full term white child with a congenital cleft of the lip and palate in this series of cases is equal to that of the normal white child at birth. In only one of the negro cases did the birth weight reach normal for this race. This may be accounted for by the state of health of the mothers, 4 out of 7 being probably syphilitic. Less favorable hygienic surroundings and possible malnutrition during pregnancy may also have had some effect on the weight of the children of the negro series.

The lip was cleft in 20 cases, 83+ per cent. of the series. In 5 of these, 25 per cent., the lip alone was cleft. In 15, or 75 per cent., there were in addition clefts of either the alveolar process or palate or both. In other words, clefts of the lip complicated with clefts of the bony structure were found three times as often as simple clefts.

The palate alone was cleft in 3 cases, 12.5 per cent., and the alveolar process and palate in one case, 4+ per cent. of the series. Therefore, clefts of the palate alone occurred less often (12.5 per cent.) than simple lip clefts (20.8 per cent.).

A comparison of the most severe types of clefts shows the following: *Alveolar cleft lip and palate* (cleft of the lip, alveolar process and palate) occurred 4 times in 7 cases in Series A; 4 times in 13 cases in Series B and 3 times in 4 cases in Series C. Of these in Series A, all were bilateral complete, in Series B, one was bilateral and in Series C, 2 were bilateral.

It is noteworthy that in Series A, 57 per cent. were in the bilateral group; in Series C, 50 per cent. were in this group, while in Series B, only 7+ per cent. were bilateral. Thus we find that the negro series showed the highest percentage of the bilateral type of cleft with the private ward, Series C, a close second.

Of the unilateral type in this same group, there were 3 cases in Series B and one in Series C, and if we consider these in connection with the bilateral group, we find in Series A, 5 per cent.; Series B, 30+ per cent.; and in Series C, 75 per cent. In other words, in the series with the highest mentality and most favorable surroundings, the comparative number of severe cases was greatest.

In the twenty cases with cleft of the lip, 2, or 10 per cent., were on the right side; 8, or 40 per cent., were on the left; 8, or 40 per cent., were bilateral and in 2, or 10 per cent., the side was not stated. This would make the occurrence of the clefts on the left side four times as frequent as on the right, and in this series the bilateral clefts occurred in the same proportion, which seems unusually large.

The record of 11 deaths out of 24 cases (11 out of 20, or 55 per cent., in

Series A and B) is interesting, as it shows the mortality to be extremely high, even in the hospital where every facility is at hand for proper handling and care. It stands to reason that outside where facilities are frequently lacking, the mortality must be at least as high and is very probably higher. Syphilis, inanition and bronchopneumonia have been the principal causes of death.

A follow-up of the cases in Series B showed that one each was living 15, 13, 3 and 2½ years after leaving the hospital. In Series C, one each was living 6, 5½, 5 and 2 years after discharge. In Series A, none could be located.

It is interesting to compare the frequency of occurrence of congenital clefts of the lip and palate with other congenital malformations and this was possible in Series A and B.

In 24,158 deliveries in the Johns Hopkins Obstetrical Service, the following congenital defects, in addition to the 20 cases of cleft of the lip and palate, were found: Amnion adhesions, glaucoma, muscle defect, absence of œsophagus, situs transversus and diaphragmatic hernia, one each; intrauterine amputation, cystic kidney, anencephalus, two each, or one in 12,079; skeleton defect, teratoma, three each, or one in 8052+; anus imperforate, hemicephalus, tracheo-œsophageal fistula, four each, or one in 6039+; hernia, except umbilical, defects of intestines, six each, or one in 4026+; defects of digits, defects of the external ear, eight each, or 1 in 3019+; webbed fingers, nine, or one in 2684; hypospadias, nævus, eleven each, or one in 2196; acrania, 14, or one in 1725+; tongue tie, 19, or one in 1271+; hydrocephalus, 20, or one in 1207+; spina bifida, 21 or one in 1150, and club foot, 26, or one in 929+; multiple digits, 134, or one in 180+; umbilical hernia, 390, or one in 61+.

The above makes a total of 713, *i.e.*, one congenital defect (other than cleft lip and palate) in every 33+ children delivered. This seems to be an extremely high percentage of defects, although the greater number were not of serious nature. We find that only spina bifida, club foot, multiple digits and umbilical hernia occurred more frequently than congenital clefts of the lip and palate.

CONCLUSIONS

The incidence of congenital clefts of the lip and palate cannot be determined from a study of the admissions of these cases to surgical clinics or to institutions. Likewise, accurate data cannot be obtained on this point from the examination of male adults of draft age.

Definite conclusions cannot be drawn as to the relative importance of the various possible etiological factors, although in the negro series syphilis must be considered. Nothing unusual was noted during the course of pregnancy, labor and delivery, and the presentations were normal.

In 28,085 deliveries, 24 clefts of the lip and palate were found.

Congenital clefts of the lip and palate occur in the negro race (in this series, 7 in 12,520 deliveries), but with less frequency than in the white (in this series 17 in 15,565 deliveries).

Environment and social status are apparently of little importance, as in the negro series, where conditions were most unfavorable, clefts occurred much less frequently (1–1788+) than in either white series. However, in the public ward white series, clefts occurred more frequently (1–895+) than in the private ward series (1–981+). The incidence in all the series together was 1 in 1170+; in the two white series 1 in 915. These figures show a frequency of occurrence much greater than that estimated by Fröebelius.

More than half the clefts were in first children.

The percentage of males was 70+, of females 29+ per cent.

Clefts of the lip on the left side and bilateral clefts were found equally often, each occurring four times as often as right-sided clefts.

The lip was cleft in 83+ per cent. of the cases. Of these in 25 per cent., the lip alone was cleft; in 75 per cent. there were, in addition, clefts of either the alveolar process or palate or both. The palate alone was cleft in 12.5 per cent. of the cases and the alveolar process and palate in 4+ per cent.

In Series C, with the highest mentality and with the most favorable surroundings, the relative number of alveolar cleft lips and palates, the most severe type of cleft, was greater than in the other white series, 75 per cent. as against 30+ per cent. This group of clefts occurred in 57 per cent. of the negro series.

The average weight and length of a full-term white child with congenital cleft of the lip and palate is equal to that of the normal child at birth. The average weight of the negro child with congenital cleft of the lip and palate is considerably less than that of the normal negro child at birth and the average length is slightly less.

Associated anomalies occurred in 25 per cent. of the cases. This is a much larger percentage than we ordinarily find in cases admitted for operation. The mortality during the first few months is extremely high, 11, or 45+ per cent., of the entire series. Syphilis, inanition and bronchopneumonia were the principal causes of death, although in addition five of these cases had associated anomalies.

Children, with congenital clefts, who live past the first year, apparently have a reasonably good chance of surviving.

The occurrence of congenital defects, other than those of the lip and palate, in the Johns Hopkins cases is astonishingly high, one in every 33+ deliveries.

I realize that the number of cases studied in this series is too small to allow accurate conclusions to be drawn. However, certain information has been gained which is of considerable interest and value, and which sheds light on the incidence of congenital clefts of the lip and palate, at least in this locality.

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