Open chemical combustions resulting in a local increased incidence of orofacial clefts

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Introduction

In the mid and late 1960's Koppe, et al serendipitously found the number of infants born with orofacial clefts in the Zeeburg area of Amsterdam, The Netherlands, to be far too high in relation to a maternity clinic elsewhere in the city (*1*). At the time little was known over the dioxin emissions from the nearby incinerator.

The company which operated the incinerator from 1961 to 1969, was allocated the "Diemerzeedijk" terrain in 1961. Operation commenced shortly thereafter. By 1963 it was already apparant that a tremendous demand existed for such an incinerator, and major multinational companies exploited the opportunity in order to dispose of chemical wastes. The incineration company promptly began importing waste chemicals for combustion, from countries such as Germany and Cechoslovakia, and even from as far as Finland. By 1964 innumerable complaints regarding the extreme smells and air pollution had already been received. This led to municipal stipulations in the incineration processes: combustion was only permitted while the wind was blowing from the south west, thereby blowing the pollution out over the IJssel Lake, and "protecting" the surrounding urban areas. From 1965 a scanty registration of the quantities of combusted materials was kept.

The quantities of incinerated chemical wastes for the years 1961 up to and including 1964 are unknown. The figures for the years 1965 up to and including 1968 are recorded respectively as 4235 tons, 8574 tons, 9061 tons and 11789 tons per year, although these figures have been shown to be up to 70% understated. The quantities incinerated in the first half of 1969 are also unknown although it is assumed that they were considerably less than the previous 4 years. From the second half of 1969 until 1972 approximately 2 500 tons of waste were incinerated per year. The incineration activities ceased during the spring of 1973 (*2*).

Method

It was decided to test the clinical observation by way of a retrospective observational epidemiological study. The trend of the incidence of orofacial clefts for the period 1960 up to and including 1969 in a maternity clinic, Zeeburg, in an exposed area of the city was compared with that of a clinic, Wilhelmina Gasthuis, in an unexposed area of the same city.
All the pregnancies at a maternity clinic in Zeeburg, Amsterdam, The Netherlands, situated nearby the waste incinerator mentioned above were reviewed from the medical log books. Each pregnancy was sufficiently documented. The number of orofacial clefts was noted. In order to exclude syndromal clefts, other abnormalities were also noted, as were specifics such as gender. These data were then related to the total number of births, live and stillborn.
The same procedure was performed for another maternity clinic, Wilhelmina Gasthuis, also situated in Amsterdam, The Netherlands, yet in the west of the city, about 12 km away from the waste incinerator (the wind in The Netherlands is mostly from the south-west).

Results

As can be viewed in table 1, from a total of 8803 births in Zeeburg, in the period 1 January 1960 up to and including 31 December 1969, 22 babies had a non-syndromal orofacial cleft. Thus an average incidence of 2,5 per 1000 births. In 1963, 973 infants were born in Zeeburg, of which 5 with an orofacial cleft, producing an incidence of 5,1 per 1000 births. In Zeeburg in 1964, 990 infants were born, of which no less than 7 with an orofacial cleft - an incidence of 7,1 per 1000 births. In the years 1963 and 1964, 3 and 2 respectively of the cases of orofacial clefts were of cleft palatum molle (soft palate).
In the maternity clinic Wilhelmina Gasthuis a total of 21078 infants were born from 1 January 1960 up to and including 31 December 1969, including 25 with a non-syndromal orofacial cleft (table 2). Therefore the average incidence of palatoschisis over the ten year period was 1.2 per 1000 births. In 1963 the incidence was 1.0, with 2 of 2100 babies born with a non-syndromal orofacial cleft. In 1964, 2187 infants were born, of which 5 had an orofacial cleft, producing an incidence of 2.3. At no time during the ten years from 1960 up to and including 1969 did the incidence of infants born with an orofacial cleft rise beyond 3.0 per 1000 births (figure 1).

Conclusion

In summary, the results indicate a strong association between the open incineration of dioxin and dioxin-related chemicals, and the increased incidence of orofacial clefts in Zeeburg, Amsterdam, The Netherlands, in the years 1960 up to and including 1969.

Bibliography

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2. DOW GRM. *Nader Onderzoek Brandplaats Diemerzeedijk.* Opdracht 3930 GRM 33. Amsterdam:Dienst Openbare Werken Bureau Grondmechanica, **1987**.

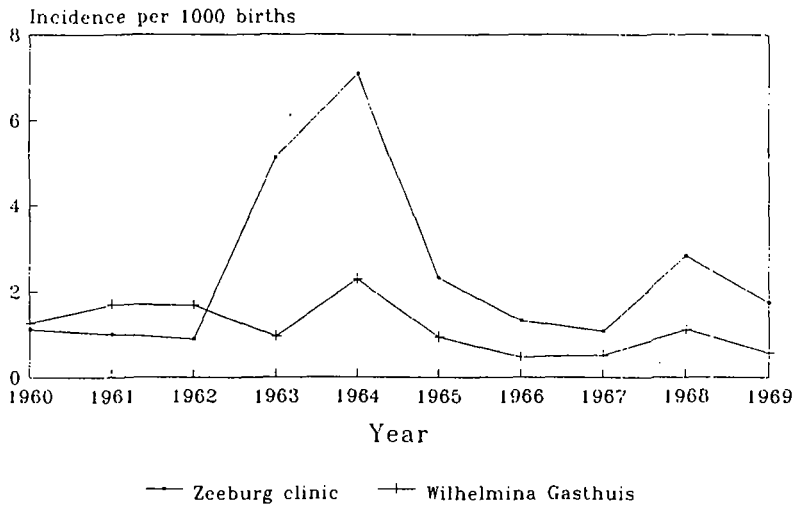
Year	Total no. of births	CLP	CPS	Syndrom-atic cleft	Total no. of clefts	Remarks
1960	894	1	-		1	Sister also had an orofacial cleft
1961	996	1	-	-	1	Sister also had an orofacial cleft
1962	1119	1	-	-	1	
1963	973	2	3	-	5	
1964	990	5	2	-	7	
1965	860	2	-	-	2	
1966	758	1	-	-	1	
1967	929	-	1	2	3	
1968	711	1	1	-	2	
1969	573	-	1	-	1	
Total	8803	14	8	2	24	

Table 1:The incidence of orofacial clefts at the Zeeburg maternity clinic for the years 1960 up to and including 1969. CLP = cleft lip with or without cleft palate, CPS = cleft palatum molle (soft palate).

Year	Total no. of births	CLP	CPS	Syndrom-atic cleft	Total no. of clefts	Remarks
1960	2364	3	-	1	4	
1961	2353	4	-	3	7	1 CLP is sibling of an epilepsy patient
1962	2381	3	1	-	4	
1963	2100	2	-	1	3	
1964	2187	4	1	-	5	
1965	2129	2	-	-	2	
1966	2095	-	1	1	2	
1967	1947	-	1	1	2	
1968	1804	2	-	-	2	
1969	1718	1	-	3	4	
Total	21078	21	4	10	35	

Table 2: The incidence of orofacial clefts at the Wilhelmina Gasthuis maternity clinic for the years 1960 up to and including 1969. CLP = cleft lip with or without cleft palate, CPS = cleft palatum molle (soft palate).

Figure 1:



The incidence per 1000 births of non-syndromal orofacial clefts 1960-1969.