

Leukemia in Twins

World-wide review of clinical cases

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We undertook an extensive review of world-wide clinical reports of leukemia in twins. Our survey was a careful one; exclusions are inevitable, but, if so, are inadvertent, except for undocumented "personal communication" cases. These have sometimes been included in large reviews of either leukemia or leukemia in twins. Also excluded are cases mentioned only tangentially in reports of cancer in large population groups, if no clinical details were given. In some instances, we were able to adapt available clinical information to our tables.

Leukemia appears to occur at four periods in the lives of twins: (1) the perinatal-congenital period; (2) early childhood; (3) late childhood; and (4) adulthood. Those cases occurring around the time of birth and the first year of life are combined under the title: Perinatal-Congenital. In Tab. I, Early Childhood extends from about 2 to 7 years, and Late Childhood from 7 through 12 years. All other cases have been considered as Adult. Two cases occurring in teenagers have been placed in this group in accordance with clinical practice. We have compiled 62 cases of leukemia in twins from clinical reports from the world publications in the following categories: Perinatal-Congenital, 15; Early Childhood, 26; Late Childhood, 9; Adulthood, 12. Comparative clinical details of all these cases will be published in a subsequent report.

Except for those instances about which writers admitted that the diagnosis of zygosity was in question, most reported clinical cases occurred in MZ twins. There were 39 cases of leukemia in MZ twins, 13 cases in DZ twins and 10 cases in whom zygosity was in doubt.

Among 39 sets of twins with a reasonably assured diagnosis of monozygosity, there were 21 instances of concordance for leukemia and 18 instances of discordance. When grouped according to the stages of life, concordance-discordance ratios were 10 : 1 in the perinatal-congenital period and 6 : 6 in early childhood. Discordance became more prevalent in the late childhood where the ratio was 1 : 5; this pattern was continued in adulthood with a concordance-discordance ratio of 4 : 6. When DZ twins were examined, the ratios were 1 : 1 in the perinatal-congenital period, 3 : 5 in early childhood, and 0 : 1 and 0 : 2 in late childhood and adulthood respectively.

Tab. I. Age distribution of clinical reports of leukemia in world literature

Stage of life	Total N. of cases	MZ*		DZ*		Sex ratio (♂ : ♀)**
		Concord.	Discord.	Concord.	Discord.	
Perinatal-Congenital	15	10	1	1	1	5 : 9; 1 set ♂♀
Early Childhood	26	6	6	3	5	15 : 6; 1 set not stated 4 sets ♂♀
Late Childhood	9	1	5	—	1	4 : 4; 1 set ♂♀
Adulthood	12	4	6	—	2	8 : 3; 1 set ♂♀

* 10 cases of doubtful zygosity excluded.

** Including all cases.

The twin sets were: 32 ♂♂, 22 ♀♀ and 7 ♂♀. In one case the sex was not stated.

We hesitate to draw conclusions from these compilations. Cases of concordance of any neoplasm in twins are reported more frequently than are discordant cases. Because unreported cases may exist, a source of error becomes constant.

On rare occasions, pregnant women with leukemia bear children in whom clinical leukemia subsequently develops. Gausch (1954) suggested this happened in two of his twin cases; however, details were not given. Cramblett et al (1958) reported the first well documented instance. The infant was nine months old at the time that acute lymphatic leukemia developed. Although the maternal diagnosis was not made until the eighth postpartum day, signs and symptoms of acute leukemia were exhibited during the seventh month of pregnancy.

Bernard et al (1964), reported the occurrence of acute lymphoblastic leukemia in an infant five months of age, whose mother had the same condition at the time of birth. They pointed out the remarkable similarities between their case and that of Cramblett.

That both partners of a pair of twins, either MZ or DZ, can become ill with leukemia within days or months of each other appears more than coincidental. With the exception of the extremely rare instances in which the mother had leukemia, it is difficult to ascertain exactly when the leukemic process became active in twins or when they were first exposed to any leukemogenic factor.

Wolman (1962) has reiterated that vessel-to-vessel anastomoses in the placentas of MZ twins allow for intrauterine blood exchanges between the fetuses. He postulated a free exchange of any leukemogenic agent or abnormal leukocytes between the infants. To our knowledge, Wolman (1962) and MacMahon and Levy (1964) were the first to suggest that in addition to the possibility of chromosomal defects and common environmental factors, conjoined intrauterine circulations may be important in the transmission of the disease from one twin to another. We believe that this line of thinking is reasonable and probably should be pursued further. It may explain the overwhelming concordance noted in the perinatal-congenital period.

References

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