

Increased Cancer Incidence Following 15 Years after Cardiac Catheterization in Infants under 1 Year between 1980 and 1998 in a Single Center

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Objectives:

Cardiac catheterization is associated with a significant radiation exposure in the pediatric patient population, bearing an excess risk of cancer development. In this study we aimed to assess the risk of cancer in a cohort of children who underwent cardiac catheterization in our institution in the first year of life.

Methods:

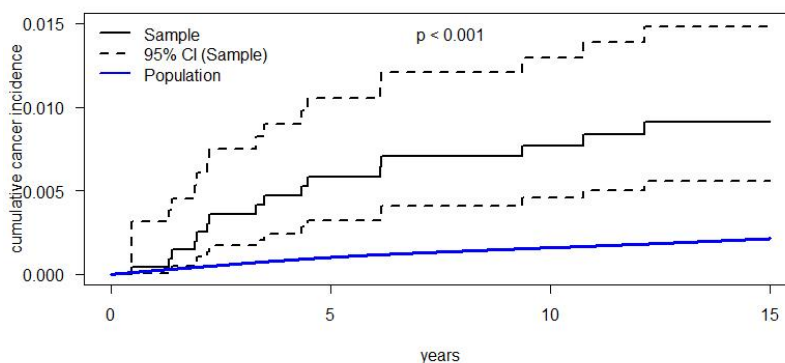
In our retrospective study we included 2770 infants, of whom 7.8% had trisomy 21, without known malignant disease, who underwent cardiac catheterization in our institution at the age of less than one year between the 1st of January 1980 and the 31st December 1998. In this cohort, newly diagnosed cancer, occurring in the first 15 years of life was detected through record linkage to the German Childhood Cancer Registry (GCCR). Cancer risk was assessed and compared to the GCCR incidence rates for the general German population of children less than 15 years calculating the standardized incidence ratio (SIR). Subgroup analysis was performed for patients with trisomy 21, comparing cancer incidence with data from the Danish Cytogenic Register for trisomy 21.

Effective radiation doses were calculated by Monte Carlo (MC) simulations for each tumor patient and for 60 randomly selected patients out of the whole cohort who did not develop cancer. MC simulations were performed after adjustment for patients' weight and length on the basis of registered dose area products.

Results:

A total of 24472.5 person years were analyzed. Sixteen patients developed malignant tumors until the age of 15 without predominance of a specific cancer type. The number of expected cancer cases until the age of 15 is 3.64 (SIR) = 4.4, 95%-CI: 2.5-7.2, $p < 0.001$ (see Figure). The proportion of patients with trisomy 21 was higher among patients with cancer (4/16 = 25%) than in the studied cohort (7.8%, $p = 0.034$). All 4 patients had leukaemia or myelodysplastic syndrome.

Median effective radiation dose in 15 patients with cancer was higher (65.1 mSv, range: 0.8-242.3 mSv) than in controls, although statistically not significant (28.5 mSv, range: 0.0-750.0, $p > 0.1$).



Conclusions:

Cardiac catheterization in the first year of life between 1980 and 1998 was associated with a significantly increased cancer risk.