

Oral presentation

Review of cumulative diagnostic radiation exposure during childhood in patients with spina bifida

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Background

Diagnostic imaging using ionizing radiation is a crucial tool in the management of patients with spina bifida, starting almost directly from birth. During childhood, a patient with spina bifida will have multiple CT scans of the head, Voiding cysto-urethrograms, and X-rays of the limbs and spine. Hence, the patient with spina bifida will have a much greater exposure to radiation than the average person throughout their lifetime. For a child, the radiation exposure to their immature and developing body can have significant consequences. Experts such as the International Commission on Radiation Protection have described a risk of cancer due to imaging studies that increases with increasing radiation dose. This study describes the magnitude of the exposure to diagnostic radiation in children with spina bifida. Understanding this should help the clinician caring for children with spina bifida to be prudent with the ordering of radiologic studies. It will also help clinicians caring for children and adults with spina bifida to be cognisant that their patients have a significant risk factor for the development of malignancies, especially those known to be related to radiation exposure such as leukaemia and lymphoma. They then can provide timely screening for early detection for these conditions.

Materials and methods

The spina bifida program at Children's Hospital of Los Angeles cares for well over 600 patients. Out of the portion of the clinic population that is presently 18 years old or older, 30 were chosen randomly as subjects for the

study. Inclusion criteria were that they had myelomeningocele and hydrocephalus, and had been receiving their care at CHLA since at least one year of age. Exclusion criteria included any other significant chronic illness not related to myelomeningocele and hydrocephalus, e.g. cystic fibrosis, cancer, congenital heart disease, chronic lung disease etc. The radiologic records for each of the 30 subjects were reviewed and the total number of imaging studies involving ionizing radiation was noted. Using standard values for the amount of radiation involved in each study, each recorded study was converted into a radiation dose, e.g. one CT of the head equals a dose of 4 mSv of radiation. Then the total radiation dose for a patient's childhood was determined by adding up all of the individual doses. The total dose per patient was then averaged among the 30 subjects, determining the average total dose of ionizing radiation during childhood for a patient with myelomeningocele and Hydrocephalus.

Results

Children with myelomeningocele and Hydrocephalus are exposed to significantly high amounts of ionizing diagnostic radiation, averaging about 50 mSv over 18 years.

Conclusion

Children with myelomeningocele and hydrocephalus are exposed to large amounts of radiation as part of their medical care and management. Ionizing radiation has been identified as a risk factor for the development of cancer. Children are especially vulnerable due to increased sensitivity of growing tissues, possible long latency

period, and smaller cross-sectional areas are exposed. Clinicians should be aware of the magnitude of radiation exposure during childhood for their patients with spina bifida so that they can exercise prudence in ordering studies and screen for possible malignancies.

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