

Repeated Dental X-Rays Without Neck Shielding Predispose to Thyroid Cancer

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SUMMARY • • • • • • • • •

Background

Exposure to ionizing radiation at a young age is a wellestablished risk factor for thyroid cancer. Currently, diagnostic x-ray procedures are a leading source of exposure to ionizing radiation in the United States. The purpose of this study was to determine the risk of thyroid cancer in relation to various diagnostic radiation procedures.

Methods

The US Radiologic Technologists Study is a nationwide prospective cohort study of 146,022 radiologic technologists. It includes extensive data on self-reported personal medical histories of diagnostic imaging procedures collected at baseline in 1982 before the development of thyroid cancer. The present investigation focused on 75,494 technologists who responded to the first questionnaire and to additional questionnaires in 1994-1998 and 2003-2005. The diagnostic x-ray procedures that potentially involve radiation exposure to the thyroid gland included x-rays of the skull, cervical spine, head and neck, chest, and thoracic and lumbar spine; dental x-rays; mammograms; barium swallow examinations; angiograms; and upper gastrointestinal tract series. The estimated radiation dose to the thyroid from a full-mouth dental x-ray examination is estimated at 0.7 mGy, from a panoramic dental x-ray examination 0.4 mGy, and from a bitewing x-ray examination <0.1 mGy.

The investigators adjusted for the estimated occupational radiation exposure to the thyroid gland. They estimated the risk of thyroid cancer related to each of the 11 radiologic diagnostic procedures by using multivariate Cox proportional-hazards models.

Results

There were 75,243 noncases (controls) and 251 thyroid cancer cases, of which 187 were papillary. The mean age at study entry was 38 years, and all subjects were older than age 22 at entry into the study. Cases were more likely to be female, nonsmokers, and obese.

Dental x-rays were associated with an increased risk of all types of thyroid cancer (hazard ratio [HR], 1.13 per 10 radiographs; 95% CI, 1.01 to 1.26) and with the subgroup of papillary thyroid cancer (PTC) (HR, 1.18 per 10 radiographs; 95% CI, 1.04 to 1.33). The increase in thyroid cancer risk from dental x-rays was associated with exposure before 1970, but there was no evidence that the increased risk was associated with childhood or adolescent exposure. No other diagnostic radiation exposure was associated with an increased risk of thyroid cancer. An increased number and frequency of dental x-ray examinations was associated with an increased risk of thyroid cancer, including PTC. In addition, radiotherapy to the head was associated with a 2.7-fold increased risk of thyroid cancer (HR, 2.74; 95% CI, 1.52 to 4.95).

Conclusions

Repeated dental x-ray examinations before 1970 increased the risk for thyroid cancer.

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ANALYSIS AND COMMENTARY • • • • •

This carefully performed epidemiologic case-control study by a group with considerable experience in this area is very convincing because the subjects, radio-logic technologists, were very sophisticated with regard to radiation exposure. It is interesting that procedures—such as chest CT, which gives 15.5 mGy to the thyroid, and cervical spine x-rays, which give 4.0 mGy—were not associated with the risk of thyroid cancer. The explanation is probably that these procedures were not done repeatedly or were not done when the subjects were young. A case-control study in Kuwait with a much smaller control group also concluded that dental x-ray examinations increased the risk of thyroid cancer with an odds ratio of 2.1 (95% CI, 1.3 to 3.1) (1). A Swedish case-control series

of women with PTC also reported that more than 10 dental x-ray examinations increased the odds ratio to 3.5 (95% CI, 1.6 to 7.6) (2).

My dentist for over 20 years (the daughter of an endocrinologist) has used a lead apron with a thyroid shield when she takes my dental x-rays. The current recommendation by the American Dental Association stresses the need for shielding of the thyroid during dental x-ray examinations (3). Last year, the American Thyroid Association made a comprehensive recommendation about shielding during dental x-rays (http://thyroid.org/american-thyroid-association-ata-issues-policy-statement-on-minimizing-radia-tion-exposure-from-medical-dental-diagnostics). Take heed and advise your patients about this preventive measure.

References

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