

18. Screening for Thyroid Cancer

RECOMMENDATION

Routine screening for thyroid cancer using neck palpation or ultrasonography is not recommended for asymptomatic children or adults. There is insufficient evidence to recommend for or against screening persons with a history of external head and neck irradiation in infancy or childhood, but recommendations for such screening may be made on other grounds (see *Clinical Intervention*).

Burden of Suffering

Thyroid cancer accounts for an estimated 14,000 new cancer cases and more than 1,000 deaths in the U.S. each year.¹ The annual incidence is about 4/100,000 population.² Women account for 77% of new cases and 61% of deaths.¹ Current overall 5-year survival with treatment is 95% in whites and 90% in blacks,¹ but is much lower with some histologic types (e.g., medullary, anaplastic).³⁻⁵ Among those at substantially increased risk for thyroid cancer are persons exposed to external upper body (especially head and neck) irradiation during infancy or childhood, and individuals with a family history of thyroid cancer or multiple endocrine neoplasia type 2 (MEN 2) syndrome.⁶⁻¹⁰ The risk of radiation-induced thyroid nodularity and cancer increases with radiation dose and decreases with increasing age at which irradiation occurred.⁷⁻¹² In several large cohort studies, the absolute excess risk of thyroid cancer associated with low-dose irradiation given before 18 years of age ranged from 0.3 to 12.5/10,000 person-years per Gy (Gy = radiation dose).⁸⁻¹⁰ Medullary thyroid cancer, which comprises about 10% of all thyroid malignancies, is inherited in one fourth of cases as part of the autosomal dominant MEN 2 syndrome.^{6,13}

Accuracy of Screening Tests

Common screening tests for thyroid cancer include neck palpation and ultrasonography to detect nodules. Screening for medullary thyroid cancer as part of the autosomal dominant syndrome MEN 2 is performed at specialized centers^{13a} rather than by primary care providers and will not be considered further in this chapter. Diagnostic procedures such as scintigraphy and fine-needle aspiration with cytology are generally reserved for persons with evidence of nodular disease or goiter.

The accuracy of neck palpation as a screening test varies with the examiner's technical skill and the size of the mass.¹⁴ Among asymptomatic persons, palpation had a reported sensitivity of 38% for any thyroid disease (compared to examination at surgery for hyperparathyroidism), and 4 of 6 thyroid tumors were missed by palpation.¹⁵ Compared to ultrasonographic examination, the sensitivity of neck palpation for detection of solitary thyroid nodules was only 15%, although no nodules were malignant.¹⁶ Of 821 patients with no history of thyroid abnormalities and without clinically palpable nodules at autopsy, 100 had solitary nodules on macroscopic inspection of serially sectioned glands, and 17 had primary thyroid cancer.¹⁷ Direct palpation of the excised thyroid gland at autopsy had a sensitivity for solitary nodules of only 24% compared to macroscopic inspection. These studies suggest a negative examination does not appreciably decrease the probability of thyroid nodules or cancer.

Neck palpation for thyroid nodularity has a high specificity in asymptomatic persons (93–100%), but routine palpation for thyroid nodules as a screening test to detect thyroid cancer generates many false-positive results because only a small proportion of nodular thyroid glands are neoplastic.^{14,17,18} Periodic screening by palpation of almost 77,000 Japanese women detected thyroid cancer in 0.14%; the likelihood of thyroid cancer in the presence of a palpable thyroid abnormality was 6%.¹⁸ A similarly high false-positive rate has been reported when ultrasonography is used as a screening test for thyroid abnormalities. In Finnish studies, ultrasound screening of 354 asymptomatic persons detected 56 solitary nodules, but none was malignant on biopsy.^{16,19} Those falsely identified as positive by screening tests must undergo the inconvenience, expense, and anxiety of needless additional testing, including invasive tests such as biopsy, to rule out cancer.

Persons exposed to upper body irradiation in childhood have a higher prevalence of thyroid cancer, but also have a higher prevalence of thyroid nodularity.^{8–11} It is unclear what effect a history of irradiation has on the likelihood of thyroid cancer in the presence of palpable thyroid nodularity. Periodic screening by neck palpation of 1,500 patients with a history of thyroid irradiation detected carcinoma in 1%.²⁰ The likelihood of thyroid cancer given detection of any nodular disease was only 3%, but the likelihood of malignancy among patients with nodular disease that was suspicious for cancer (e.g., solitary nodules) was not reported. Only 17% of the patients with nodularity actually underwent surgery, of whom 20% had thyroid cancer.

Effectiveness of Early Detection

The benefits of early detection of thyroid cancer in the general population are not well defined. For all histologic types, 5-year survival is significantly

better with earlier stage at diagnosis.³ A cohort study of mass screening found a significantly higher 7-year cumulative survival rate in patients whose cancer was detected by screening (98%) when compared with those presenting with symptoms (90%).¹⁸ Cancers detected by screening were significantly more likely to have a favorable histology, however, and both lead-time and length biases are likely in this study. There have been no controlled trials demonstrating that asymptomatic persons detected by screening have a better outcome than those who present with clinical symptoms or signs. In addition, not all cancers detected through screening are likely to present clinically during the patient's lifetime. In autopsy studies in the U.S., the prevalence of occult thyroid carcinoma in adults ranges from 2–13%;^{17,21,22} in contrast, the annual incidence of thyroid carcinoma is only about 4/100,000 population.²

Recommendations of Other Groups

The American Cancer Society recommends screening for thyroid cancer by palpation every 3 years in persons aged 21–40 years and annually in those more than 40 years old.²³ The American Academy of Family Physicians recommends palpation for thyroid nodules in adults with a history of upper body irradiation;²⁴ this recommendation is currently under review. The Canadian Task Force on the Periodic Health Examination concluded that there was poor evidence for either inclusion or exclusion of screening for thyroid cancer in the periodic health examination.²⁵

Discussion

Given the lack of evidence that early detection of thyroid cancer by screening improves outcome, the high prevalence and uncertain clinical significance of occult thyroid carcinoma, the poor sensitivity of neck palpation in the detection of thyroid nodules, the fact that most positive screening tests would be false-positives, and the invasive nature of diagnostic tests (e.g., biopsy) likely to follow a positive screening test, routine screening for thyroid cancer cannot be recommended at this time. For persons irradiated in childhood, the greater likelihood of having both thyroid nodules and malignancy means that the yield from screening is likely to be higher. The clinical benefits of such screening have not been established, however.

CLINICAL INTERVENTION

Screening asymptomatic adults or children for thyroid cancer using either neck palpation or ultrasonography is not recommended (“D” recommendation). Although there is insufficient evidence to recommend for or against such screening in asymptomatic persons with a history of external

upper body (primarily head and neck) irradiation in infancy or childhood, recommendations for periodic palpation of the thyroid gland in such persons may be made on other grounds, including patient preference or anxiety regarding their increased risk of cancer (“C” recommendation).

The draft update of this chapter was prepared for the U.S. Preventive Services Task Force by Carolyn DiGuseppi, MD, MPH.

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