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Modern Diagnostic Approachкetreatment of Thyroid Cancer

Mamedov U. S., Khodjaeva D. I.

Bukhara State Medical Institute

Abstract: To date, mandatory diagnostic procedures for suspected thyroid cancer are an ultrasound examination of the thyroid gland and a fine-needle aspiration biopsy of the tumor, if necessary performed under ultrasound control (TAB6UZI). The diagnosis is established on the basis of the clinical picture, ultrasonographic symptoms and cytological examination data.

Keywords: thyroid cancer, classification, clinical course, diagnosis, prognosis.

INTRODUCTION

The problem of thyroid cancer diagnosis has not lost its relevance, despite the widespread use of more and more advanced diagnostic equipment. In particular, among patients with thyroid cancer who are operated on for nodules in non-oncological settings, the correct preoperative diagnosis is established only in 54-61-%of cases, which leads to deliberately non-radical operations [5, 6]. The main causes of diagnostic errors in this category of patients are, first of all, the lack of oncological alertness of doctors and their lack of familiarity with the initial forms of thyroid cancer. A significant role is also played by the peculiarity of this disease, which does not have pathognomonic symptoms in the early stages, as well as a frequent combination with the accompanying pathology of the thyroid gland (thyroiditis, goiter). The clinical picture, course, and prognosis of thyroid cancer are critically determined by the differentiation and cellular origin of the tumor. According to the degree of differentiation, it is customary to distinguish differentiated, moderately differentiated and undifferentiated thyroid cancer.

Differentiated cancer differentiated thyroid cancer refers to papillary and follicular carcinomas that are characterized by a slow course and a favorable prognosis. Papillary adenocarcinoma is the most commonhistopathological type and accounts for 50-60% of-all thyroid cancers. In women, this tumor occurs three times more often than in men. Macroscopically, papillary adenocarcinoma is a partially encapsulated or uncapsulated node with cystic cavities, villous inner surface, areas of fibrosis and calcifications, which are detected in half of patients. The node cavity is often filled with brown liquid contents. The tumor is characterized by low functional activity, slow development and is limited to the thyroid gland for a long time. For papillary adenocarcino, lymphogenic metastasis is typical, which does not depend much on the size of the primary tumor. By the time of surgery, metastases in the cervical lymph nodes are detected in approximately 35% of patients. Hematogenous metastasis of papillary thyroid is relatively rare, with the lungs being the preferred site of metastasis. The 5-year survival rate for papillary adenocarcinoma reaches 92-96-% [1, 6]. Follicular adenocarcinoma is the second most common among all thyroid carcinomas and is observed in 10-20% of patients, among whom women make up the vast majority. The tumor is a well-defined dense node of pinkish-red color, often containing calcifications. Intragastric dissemination is rare. In some cases, follicular carcinoma shows functional activity. The frequency of lymphogenic metastasis is2-10%, hematogenic metastases are observed in 20% of cases, and bone damage is typical. The tumor is characterized by slow development and a favorable prognosis. The 5-year survival rate is 80%, and 70-75-% of patients live more than 10 years [1, 6].

Main part

Moderately differentiated cancer Medullary carcinoma. The specific weight of medullary thyroid carcinomas does not exceed 8-13-%. The ratio of women to men amongthose affected is 1.3:1. Macroscopically, the tumor looks like a dense бугиbuggy node that has no clear boundaries and often infiltrates both lobes of the gland. Calcifications are detected in 25% of patients. A characteristic feature of medullary thyroid is its ability to producecalcitonin and a number of other biologically active substances, such as prostaglandins, serotonin, melanin, cancer-embryo antigen, prolactin, somatostatin, and others. Such hormonal activity explains a number of unusual clinical manifestations of this disease, among which the first place should be given to persistent diarrhea, observed in about a third of patients. The cause of diarrhea in medullary thyroid cancer is hyperproduction of prostaglandins. The level of calcitonin, which normally does not exceed 10mg / l, specific and sensitive diagnostic marker of medullary thyroid carcinomазы, as well as an indicator of disease recurrence [4]. Lymphogenic metastases in medullary thyroid cancer occur in 40-55-% of cases, and hematogenicmetastases occur in 22-24-% of patients. Typical is the defeat of bones, adrenal glands. The tumor is characterized by a moderate growth rate and haseта worse prognosis compared to differentiated thyroid

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cancer. The 5-year survival rate is50-58% [1, 6]. There are sporadic and familial variants of medullary thyroid cancer. Often there is a combination of medullary thyroid cancer with other endocrine tumors, the so-called multiple endocrine neoplasia type II syndrome (MENG II syndrome). MENG IIa syndrome (Sipple syndrome Sipple) includes medullary thyroid cancer, pheochromocytosis, and parathyroid adenomas. MEN IIb syndrome includes medullary carcinoma of the thyroid gland, combined with multiple lesions of the nervous system (neurinomas of the tongue, lips, eyelids, and oral mucosa). Patients with MENG IIb syndrome often have a characteristic "marfan-like " appearance: kyphosis, elongated face, thick lips, and flattened ears. Undifferentiated or a plastic cancer accounts for 4-15% of all thyroid carcinomas. Its frequency is the same in men and women. Macroscopically, the tumor looks like an infiltrate of several-кconfluent nodes, which has no clear boundaries. Micro metastases in the opposite lobe of the gland are noted in 95% of cases. There is a "false-inflammatory" form of undifferentiated cancer with fever, local skin hyperemia, and leukocytosis. By the time of diagnosis, regional metastases are detected in half of the patients, and four patients have distant metastases. Undifferentiated breast cancer is functionally inactive, characterized by a rapid and severe clinical course with a median survival of 5-6 months. [1, 6]. Squamous cell carcinoma originates from the embryonic cell elements of the thyroid-lingual duct and occurs in less than1-3% of patients with thyroid cancer. Observed by more often in the elderly with equal frequency among men and women. By the time the tumor is detected, it usually occupies the entire gland, growing into neighboring structures. Squamous cell carcinoma is characterized by early and extensive metastasis, severe clinical course, and poor prognosis. The classification of thyroid cancer and the grouping by 2-4 am, adopted by the International Cancer Union [8], are presented in Table. 1 and 2. It is noteworthy that differentiated thyroid cancer is the onlytumor disease in the TNM classification, in the prediction of which age is an independent stratifying variable, the predictive power of which exceeds that for the T, N and M categories. It should also be noted that squamous cell carcinoma of the thyroid gland is not groupedby stage. From a practical point of view, such clinical forms of thyroid cancer as early and latent cancers are of great importance, since their diagnosis causes significant difficulties. Early breast cancer includes macroscopically defined cancers less than 1 cm and micro-carcinomas without metastases (T1N0M0). Hidden (occult) Thyroid cancer is a clinically undetectable primary tumor, the first manifestation of which is metastases in regional lymph nodes or distant metastases (T0N1M0, T0N1M1, T0N0M1) [5]. Clinical diagnosis of thyroid cancer Complaints and anamnesis. Most patients in the initial stages of thyroid cancer do not complain. Often, patients pay attention to the deformity of the neck, sometimes noting that the shirt collar has become narrower, there is a feeling of "lump in the throat", some difficulty in swallowing food. In differentiated cancers, these symptoms develop slowly and мocan last for years. With undifferentiated cancer, patients note the appearance of a painful fast-growing tumor, discomfort and a feeling of compression in the neck, early appear and increase with the presence of invasion of the trachea, esophagus, neck vessels, recurrent nerves (shortness of breath, dysphagia, changes in the timbre of the voice, hoarseness). Objective examination. Palpation is available for tumors larger than 0.8-1 cm located in the anterior or anterolateral parts of the thyroid gland. In papillary cancer, the tumor may have a softelastic consistency due to the cystic bands of the tei. In follicular carcinomas, the tumor has a denser, sometimes heterogeneous consistency. In the initial stages, especially when developing from a pre-existing goiter, the carcinoma may retain fairly distinct boundaries, which are blurred as the capsule of the tumor node germinates. In medullary and undifferentiated cancers, a dense lumpy infiltrate without clear borders is palpated. Tumors confined to the thyroidзgland move with it when swallowed. As it grows into the surrounding tissues, the mobility of swallowing decreases. On palpation, a number of patients have enlarged lymph nodes of the jugular group (along sternocleidomastoid muscle), less often - in the lateral and carotid triangles of the neck. Submandibular lymph nodes are not regional for the thyroid gland and almost never heale in the tumor process. Metastases of differentiated thyroid gland to the lymph nodes of the neck have the appearance of smooth nodes of dense or tightly elastic consistency, and are not accompanied by pain or neurological disorders. Slow-growing conglomerates of lymph nodes always have a clear border, are not soldered together, do not form infiltrates, do not grow into the surrounding tissues and skin. Metastases of undifferentiated cancer are characterized by the presence of an infiltrate consisting of metastatic nodes fused together and often with the primary tumor, sprouting through the skin, muscles, adjacent organs and structures, which is manifested by the corresponding symptoms. The presence of a rapidly progressing infiltrate, accompanied by hyperemia of the skin, symptoms of intoxication, fever and leukocytosis, can create a false impression of the inflammatory nature of the process. Functional research. The development of a tumor process in the unaltered thyroid gland usually does not cause drastic changes in thyroid homeostasis. In some patients with papillary thyroid cancer, a moderate increase in the level of thyroid-stimulating hormone (TSH) is noted. In medullary cancer, there was a slight increase in the levels of triiodothyronine (T3) and thyroxine (T4), a decrease in the level of thyroglobulin (TG), and a sharp increase in the concentration of thyrocalcitonin (over 200 pg/ml). Thyroglobulin (TG) is a unique iodine-containing protein involved in the synthesis of thyroid hormones and produced by thyroid cellsin the follicle lumen. Normally, only a small part of TG enters the blood, where its concentration ranges from 0 to 50 mcg/l. With breast cancer, approximately a third of patients have a noticeable leak DVt blood flow. However, due to the lack of a discrimination threshold for primary differential diagnosis, this cancer marker is not used. An increase in the level of

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TG in patients undergoing radical- surgery for differentiated forms of thyroid cancer is a sign of disease progression, which is used to monitor this category of patients [21].Modern imaging methods in the diagnosis of thyroid cancer-Radioisotope scintigraphy. The method is based on differences in the absorption of radionuclides in the tumor and healthy thyroid tissues. The most widely used isotopes are 123J, 131J, and 99mTc, which are selectively absorbed by functioning thyroid tissue. "Cold "zones that do not accumulate radio nuclide are observed in 59% of cases of thyroid cancer [6], 11.5% of" hot " nodes in adults are malignant [24]. Theнminimal visualization size is 1 cm, and the tumor is detected in 37% of cases at a 1.5 cm diameter [6]. Despite the fact that the sensitivity and specificity of scintigraphy as a method for diagnosing primarythyroid tumors is relatively low, this study is widely used to detect left after non-radical operations no thyroid, and to detect relapses and metastases. Ultrasound examination. Currently, ultrasound examination (US) occupies a leading place as an independent method of primarydiagnosis of thyroid diseases. The method is non-invasive, does not create a radiation load, has a high resolution, allowing you to visualize formations with dimensions of 1-2 mm. Ultrasound makes it possible to assess the size, structure and contours of the tumornode, determine the presence of a rim and dorsal echo amplification, and examine blood flow (ultrasound Dopplerography). The hypoechoic node structure in thyroid cancer is observed in 60-70% of cases,isoechoic-in15-25%, the proportion of hyperechoic nodes does not exceed 22-4%. [17], a mixed node structure is observed in5-10% of cases of thyroid cancer. Unevenness of the node contour is typical for 58% of cases of thyroid cancer, and weak contour delineation is typical for 62% [20]. Microcalcinatesare detected in 36% of malignant tumors [25]. Hypervascularization and increased blood flow during Dopplerography are detected in 80% of carcinomas [11]. In general, the sensitivity of ultrasound in the diagnosis of breast cancer is 80-92%, the specificity is 5092%, and the accuracy is 80-90-% [11]. As a method for detecting metastatic lymph node involvement, ultrasound cignificantly exceeds palpation, computer tomography, and magnetic resonance imaging in terms of resolution, sensitivity, and accuracy [3, 23].

Computed tomography. Standard spiral computed tomography (CT) is significantly inferior in resolution to ultrasound for detectingsmall thyroid carcinomas [23]. Currently, multi-spiral computed tomographs with significantly higher resolution are increasingly used, and the possibilities of using them for the diagnosis of thyroid cancer are being studied. At the same time, CT can provide valuable information about primary and metastatic tumor nodes located retrotracheal, retrosternal, and along the course of neurovascular bundles [2]. CTcriteria for metastatic lymph node involvement are: the minimum axial diameter exceeding 9 mm, the approximate shape of the node to spherical, the presence of central necrosis of the node [7]. Figure7-8 shows images illustrating the CT picture of thyroid cancer.

Magnetic resonance imaging. Despite the fact that the possibilities of magnetic resonance imaging (MRI) for detecting nodular formations in thethyroid gland are approaching ultrasound, today, due to the complexity and high cost, this study is not widely used. In cases where the process is not limited to the thyroid gland, MRI can assess the retro tracheal and retrosternal distribution of the process and identify clinically undetectable metastases in the cervical and mediastinal lymph nodes [13]. Positron 6-emission tomography (PET) is a modern and promising imaging technique that provides unique information about the metabolism and perfusion of normal and pathologically altered tissues at the cellular and molecular level. To date, the effectiveness of using PET in thyroid cancer has not been proven. Positron emission tomography combined with CT (PET/CT) is used to diagnose recurrence and metastasis of thyroid cancer in radically operated patients in the absence of radioisotope accumulation. PET / CT has a high sensitivity of 85% and specificity of 95% [19, 26].

Classical methods of X-ray examination Radiography, tomography. Despite the rapid progress of state-of-the-art imaging technologies, in some cases valuable clinical information can be obtained using traditionalX-ray methods. Figure 9 shows an overview chest X-ray of a patient with a typical pictureof damage to both lungs and mediastinal lymph nodes by papillary thyroid metastases. Figure 10 shows a tomogram of the upper mediastinum, which clearly shows the contours of the tumor node, the trachea shifted to the right, and large foci of calcification in the tumor. Follicular thyroid carcinomas are characterized by the development of osteolyticbonemetastases, which can be detected by standard radiographic examination.

Conclusion

Evaluating the diagnostic capabilities and accessibility of the methods discussed in this review, it can be concluded that currently, ultrasound examination of the thyroid gland and fine-needle aspiration biopsy of the tumor, if necessary performed under ultrasound control (TAB ultrasound), are mandatory diagnostic procedures for suspected thyroid cancer. The diagnosis is established on the basis of the clinical picture, ultrasonographic symptoms and cytological examination data. Clarification of the degree of spread of the tumor process (staging) is carried out using various imaging methods that allow detecting lymphogenic and hematogenic metastases. Mandatory mi studies are X-ray of the lungs and ultrasound of the cervical lymph nodes with a puncture biopsy if their metastatic lesion is suspected. Detailed examinations, such as CT and MRI, are performed according to indications and, first of all, for the purpose of optimal

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planning of surgical treatment. In complex cases, the final stage of diagnosis is urgent intraoperative cytological and histological examination of the drug. The standard of diagnosis of recurrent thyroid cancer in patients undergoing radical surgery for differentiated carcinomas is the study of serum thyroglobulin levels. In medullary cancer, calcitonin is an indicator of progressionкальцитонин. An increase in the level of these markers is an indication for the search for foci of recurrent or metastatic growth using thyroid-stimulating radionuclide scintigraphy. If the scintigraphy result is negative, PET (PET/CT) is indicated, which allows us to identify non-isotope-accumulating foci.

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