3D NLS-DIAGNOSTICS
OF NASOPHARYNX CANCER

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Problems in modern diagnostics of nasopharynx cancer (NPC) are pressing in the present time, it is proven by the fact that in 70% – 80% of patients treatment starts only at III-IV stages of disease, when average period of patients medical examination is 7 months before final diagnosis is identified.

Reasons of late diagnostics of nasopharynx cancer are: prolonged asymptomatic disease course, anatomico-topographic peculiarities of nasopharynx structure, imperfection of traditional widely used diagnostic techniques, difficulties in interpretation of tumorous and non-tumorous pathology visual pictures, low oncological vigilance of general therapists.

For the last decades NLS-diagnostic methods became widely spread in combined examination of patients; they demonstrate great diagnostic value at various diseases of digestive tract and respiratory organs. 3D NLS-graphy of upper respiratory tracts as diagnostic technique was developed last of all – its development was started by the Institute of Practical Psychophysics in 2006. In the future this examination method may be widely used in diagnostics of various nasopharynx pathologies and differential diagnostics of tumors of various geneses.

3D NLS-graphy allows therapists to visualize primary tumor, evaluate it spreading to pharynx walls, identify form of growth and detect genesis and character of neoplasm on the basis of resonance-entropy analysis (REA). Introduction of 3D NLS-graphy of upper respiratory tract into practical oncology made possible to develop and fulfill practical application of virtual microscopic researches with REA at the same time with routine histological examination. It extends significantly potentials of NLS-diagnostics, has an advantage over existing morphological methods of examination and allows to increase accuracy of diagnostics.

Nasopharynx neoplasms are characterized by variety of morphological forms, differing in their clinical course, histogenesis, applied methods of treatment and prognosis.

NPC is a combined group of tumors and there are many various morphological classifications with variety of used terms for it. Nowadays the most convenient in practical meaning is considered to be Micheau classification:

1. Non-differentiated cancer of nasopharyngeal type (variants: Schminke, Regaud, spindle-cell).
2. Epidermoid cancer (highly-, moderately- and low-differentiated ones).
3. Adenocarcinoma.
5. Malignant mucoepidermoid tumor.
6. Others.

MATERIAL AND METHODS OF STUDY

3D NLS-graphy was applied as examination method for the first time in the Institute of Practical Psychophysics in 2006. Since that time we accumulated great experience in diagnostics of various pathologies of upper respiratory tracts. The Institute developed NLS-graphic semiotics, created spectral etalons of nasopharynx neoplasms of various geneses, developed differential diagnostic criteria of malignant tumors, benign neoplasms and non-tumorous pathology on the basis of wave spectrum.

Indications for NLS-graphy fulfillment are symptoms related to tumor development in nasopharynx, which may be divided into nasal, auricular and neurological depending on localization.

Shortness of nasal breathing happens at tumor localization in nasopharynx. Increasing shortness of nasal breathing is accompanied by mucopurulent and purulent discharge with blood admixtures from nasal cavity. Number
of complains for shortness of nasal breathing depends on exophytic component of tumor that closes openings and on additional inflammations. If surface is ulcerated periodically appearing bleeding can be detected; it becomes dangerous at angiofibroma.

If tumor is localized at side wall in front of auditory tube orifice, Trotter’s symptom complex may be developed: hearing impairment at affected side of head, neuralgia and anaesthesia of trigeminal nerve third branch’s branchlet and unilateral limitation of soft palate mobility. If tumor is localized near auditory tube orifice leading positions are taken by hearing impairment, tinnitus aurium, stuffiness in ear.

Neurological symptoms appear if tumor spreads to surrounding tissues. Most frequently neurological disorders develop if tumor spreads into skull base, posterior and side walls of nasopharynx, at the same time symptoms of almost all pairs of cerebral nerves affection are detected: develops paralysis of abducent nerve, facial nerve, appear immobility of one half of larynx, aglutition, disorders of sensitiveness, taste and tongue declination.

Above mentioned disorders develop at continuous presence of tumor. At initial stage of nasopharynx tumor development symptoms of diseases are missing, and the first clinical presentation of NPC is appearance of enlarged lymph nodes at neck in 50% of cases. This fact evidences that NPC is characterized by early regional metastatic disease. Size of primary tumor does not correlate with presence of regional metastatic disease. Even at small and superficial invasions of primary tumor, one can detect multiple metastases both from affection side and crossed and bilateral ones, which often localized in deep group of jugular lymph nodes. Large-sized metastases cause pain sensation and Gorner’s symptom complex is developed, characterized by constriction of palpebral fissure, pupil and eyeball retraction.

Examination of nasopharynx was carried out with modern devices «Metatron»-4025 developed by the Institute of Practical Psychophysics together with American company «Clinic Tech Inc».

Taking into consideration that in 50% of NPC study cases there are indistinct changes, it is necessary to carry out additional REA of pathological tissue area.

The IPP has examined 376 patients suffering from various tumorous and non-tumorous nasopharynx pathologies in the last 4 years. The most widely spread group of pathologies are malignant epithelial affections. NPC was diagnosed in 40.7% of tumorous pathology cases.

Growth forms at NPC are divided into endophytic, exophytic and combined forms, with ulceration or without ulceration of surface. Endophytic form of cancer usually looks like smooth slightly rising over surface infiltrate at NLS-picture, it looks like roundish moderately hyperchromic area (4-5 point at Fleindler’s scale). Ulceration of surface at endophytic form of cancer may be superficial and occupy up to few millimeters before it affects one or two walls and looks at NLS-picture like apparent hyperchromic area (in some cases of 5, but mainly of 6 points on Fleindler’s scale). The most frequent form of cancer is localized on superior or side wall and is characteristic for non-differentiated cancer of nasopharyngeal type. The most difficult for differential diagnostics is endophytic form of cancer without ulceration, when it is presented only by small and slightly rising infiltrate. Such picture is quite infrequent and sometime it is very difficult to diagnose tumor even according to REA results. In our experience we had 6 cases when primary data did not allow to judge about cancer presence and only wave research of affected cells genome by high-frequency (40 GHz) devices allowed us to detect NPC.
As a rule patients suffering from endophytic form of cancer have no complaints related to nasopharynx. The first and main symptom in such patients is enlarged neck lymph nodes. In 23 patients with cancer metastases to neck lymph nodes, primary tumor in nasopharynx was detected only by NLS-graphic examination of lymph nodes and REA of lymphoid tissue.

Exophytic form of NPC growth is represented by one or few intermixed nodes, moderately hyperchromic (4-5 points on Flendler’s scale). Exophytic form of growth one can detect ulceration with apparent necrosis of surface in form of sharply hyperchromic areas (as a rule – 6 points on Flendler’s scale).

Exophytic growing tumors usually come from fornix, fill nasopharynx cavity, going down to soft palate and constrict nasopharynx opening. These researches with 3D NLS-graphy may show posterior and anterior pole of tumor. At extended processes tumor may obturate choana and spread to nasal cavity.

NPC of combined form in majority of cases localizes on fornix of posterior wall. Tumor is represented by infiltration with ulceration and tuberous enlargement at edges. With the background of tumor, necrosis of various intensities may be detected. At NLS-picture it is visualized as neoplasm with uneven edges of 4-5 points at peripheral areas and 6 points in central area of necrosis. Usually few walls of nasopharynx are involved into process during combined form of growth, therefore area of tumor affection is much larger in comparison with other forms of growth.

Consistency of tumor at NPC is tight-elastic. Instrumental palpation reveals rigidity in comparison with normal condition of mucous tunic. Tumor with ulceration is easily damaged and bleeds.

According to our studies, NPC on the basis of mirror examination can be detected only in 32% of cases. Tumor suspicion based on otorhinolaryngological and digital examination was detected in 13.5% of cases. The main difficulty for diagnostics is tumors located on side walls of nasopharynx and in its anterior area and endophytic form of cancer growth.

3D NLS-research of nasopharynx detected presence of tumor in 82% of cases when cancer was diagnosed. As a rule differential diagnostics of cancer is carried out by ultramicroscanning with REA by comparing of tumor spectrum with etalon processes of various histological forms of neoplasms. Roentgenological method, like computed tomography, may be used in order to specify spreading of tumor process and involvement extent of bone structures.

First of all differential diagnostics of NPC is carried out at malignant neoplasms of hemopoietic nature, in which prevail lymphosarcomas – the second most frequent of nasopharynx cancers (40.1%), which often localizes in gland of neck at affection of pharynx ring. At the first stages of tumor development differential diagnostics is carried out between lymphosarcoma and tonsils lymphoid tissue hyperplasia. Main role in this monitoring plays spectral similarity with one or another etalon process at REA.

It should be noted that at lymphosarcoma with nasopharynx tonsils affection, in 90% of cases there are no complaints indicating pathology in this area. Main symptom of the disease is occurrence of enlarged lymph nodes, not only in neck area, but of other peripheral also. Peculiarity of lymphosarcoma spreading in lymphoepithelial ring of pharynx is simultaneous affection of few tonsils.

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The third of most frequent of nasopharynx affections is soft tissues tumors; neoplasms of myogenous genesis hold first place among them. Rhabdomyosarcoma is located on pharyngeal surface of soft palate and at the border of fornix and posterior wall of nasopharynx. Tumor have the appearance of exophytic mass, represented in form of one node or large-tuberosous neoplasm with smooth surface. Ulcerations of mucous tunic are not detected. NLS-picture visualizes it as homogeneous moderately hyperchromic neoplasm (4-5 points on Fleidler’s scale). Most likely tumor develops in childhood or preadult age. Development of exophytic component leads to appearance of complaints for shortness of nasal breathing.

Juvenile angiofibroma is the most frequently diagnosed among benign neoplasms. Tumor comes out of nasopharynx fornix and has the appearance of exophytic mass with smooth surface. Its chromogeneity is moderate and different at various areas. Typical sign of angiofibroma is increased hyperchromeity (5-6 point) of vascular wall at NLS-scanning. If tumor is large it fills all nasopharynx opening; surface ulceration may be detected. Clinical picture of angiofibroma is characterized by shortness of nasal breathing, periodically appearing of bleeding (sometimes quite voluminous) and invasive growth.

Other nasopharynx tumors, in general of non-epithelial nature, have similar NLS-graphic picture and differ in density, localization in nasopharynx and can be detected in single cases.

Value of NLS-graphy is not only in feature of picture 3D-analysis, but in carrying out of high quality REA at ultramicroscopic areas of tumor without traumatic biopsy.

Together with study of nasopharynx pathology NLS-picture we started to develop resonance-wave aspects of diagnostics due to uninvestigated nature of this issue and difficulties of morphological differential diagnostics, especially of low-grade differentiated squamous cell carcinoma, low-grade differentiated cancer of nasopharyngeal type and lympho-proliferative diseases. At the same time it should be noted that it is wave spectrum character of low-grade differentiated cancer of nasopharyngeal type and tonsils that is more close to blast variants of lymphomas, and in some case only ultramicroscopic resonance-genetic analysis, and sometimes process generalization with hematopoietic system organs affection, give a possibility to carry out differentiated diagnostics.

Study of tumor cells cytomorphological peculiarities, character of their positioning, degree of differentiation and direction made possible to single out variants of wave spectrums, reflecting characteristics of histological structure of tumor various types.

Moderate-grade and high-grade differentiated squamous cell carcinoma which, was detected in 11% of our study cases, had typical spectral picture, just like cystoadenoid carcinoma (1.6%) and practically did not cause difficulties in interpretation of resonance-entropy analysis results.

Low-grade differentiated squamous cell carcinoma (67%) almost in all cases of monitoring causes certain difficulties in precise diagnosing and is one of hardly identified variants for resonance analysis. Resonance-wave picture of low-grade differentiated nasopharynx cancer is quite specific and allows therapist to diagnose not only form of tumor, but also to identify its organo-specificity by metastasis study without primarily detected nidus.

Results of carried out studies has proven high sensitivity of REA and detecting of low-grade differentiated cancer of nasopharyngeal type (78.3%), which allows us...
to recommend study continuation of NPC resonance-wave peculiarities with low grade of cells differentiation in order to find more precise identification.

RESULTS AND DISCUSSION

The outcome of the Institute’s staff long term practical experience is abovementioned aspects of NPC diagnostics. Using of modern diagnostic equipment for 3D NLS-graphy of nasopharynx with feature of target topological ultramicroscopy with REA and resonance-wave genetic examination significantly increased detection rate of cancer and allowed us to develop differential-diagnostic etalons of wave spectrums of various neoplasms and non-tumorous pathology.

In potentials comparison of various diagnostic methods for detection of widely spread tumor pathology – NPC, positive conclusion on cancer presence was acquired: at otorhinolaryngological examination – in 32.5% of cases, at roentgenography – in 41% of cases, at 3D NLS-graphy – in 86.8 cases of study. Tumor was not detected on the basis of visual pictures of mirror examination – in 38.7% of cases, of NLS-graphic method – in 13.2% of cases. Acquired data clearly demonstrates high information value of 3D NLS-graphy.