



CLINICAL CASE OF PLEOMORPHIC ADENOMA OF PAROTID GLAND MANAGED BY NEW ALGORITHM

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ABSTRACT

Pleomorphic adenoma (PA) remains the most common benign tumor of the parotid gland, accounting for approximately 60-70% of all parotid neoplasms and representing 3-6% of all head and neck tumors. Despite its benign classification, pleomorphic adenoma presents a significant clinical challenge due to its variable histopathological composition and potential for malignant transformation, which occurs in 1.9-15% of cases over time.

Introduction. According to several authors the frequency of diagnostic errors in patients with neoplasms of the salivary glands remains high. Clinical examination of patients with this pathology should be complemented by the results of cytological examination, since none of the methods makes it possible to accurately diagnose. Recently, a new area of in-depth digital image analysis has been actively developing – radiomics, the concept of which was proposed in 2012 and includes high-performance extraction, analysis and interpretation of quantitative features from medical images. Textural image analysis is a part of radiomics and provides an objective quantitative assessment of tumor heterogeneity by distributing and correlating pixel levels or gray voxels in an image. Given the non-invasiveness of the radiomic method, textural image analysis can be presented as a "virtual biopsy" [1, 2]. The purpose of radiomics and textural analysis is to build a standardized predictive model for determining clinical outcomes with selected features. The main diagnostic task of radiomics in oncology is to accurately distinguish between benign and malignant tumors using non-invasive diagnostic methods.

The aim of the study is to analyze the effectiveness of a new algorithm for PSG neoplasms management.

Materials and Methods. We analyzed the data of 124 patients with PSG neoplasms who received inpatient treatment at the Department of Adult Maxillofacial Surgery at the Tashkent State Dental Institute Clinic in the period 2022-2024 in order to identify specific signs, which were further compared with the results of a pathomorphological study.

The LIFEx program (versions for ultrasound, CT, and MRI image analysis) is used for textural image analysis. The choice of this program was due to its free access, intuitive and simple user interface for operation, regular improvement of the program by developers and the release of updates with new functionality and the elimination of minor flaws, as well as the lack

of requirements for powerful computer computing abilities. LIFEx participates in the Biomarker Imaging Standardization Initiative (BISI). The protocol for the textural analysis of ultrasound, CT, and MRI images included five sequential actions: pre-processing, segmentation of the neoplasm (delineation of areas of interest or ROI), extraction of textural features, feature selection, and development of a predictive classification model. In total, data from 38 ultrasound examinations, 62 MSCT and 97 MRI were processed.

The principles of evidence-based medicine are used in the organization and conduct of research. The statistical analysis was performed using the OriginPro 8.6 program (OriginLab Corporation, USA).

Clinical Case Description. Patient N.D., 38 years old, complaining of a painless swelling in the right parotid-masticatory region. The skin above the swelling is unchanged, it gathers into a fold. On palpation, the formation is mobile, dense, and the surface is bumpy. Ultrasound of the right PSG revealed the formation of reduced echogenicity, with a moderately heterogeneous echostructure and uneven but clear contours. The capsule is well visualized. Single vascular structures of small diameter with low-velocity blood flow along the periphery were found in the CDM mode. An oval-shaped, lobular structure with clear contours was found on the MRI slices in the superficial lobe of the PSG. The capsule can be traced along the entire perimeter of the neoplasm. The ADC value is 1.62×10^{-3} mm²/sec. Segmentation and digital processing of T2-weighted MRI images of the area of interest from various projections were performed, as well as 3D reconstruction of the neoplasm using 3D Slicer software. Textural analysis of the images revealed a benign neoplasm (5x4 cm) in the projection of the superficial lobe of the PSG. The case was analyzed using a new management algorithm. The neoplasm was removed along with the capsule (formation in the section of white color, soft consistency). Pathohistological examination confirmed the primary clinical diagnosis – pleomorphic adenoma of the PSG.

Conclusion. Thus, textural analysis of ultrasound, CBCT and MRI data is an important component in the diagnosis of parotid salivary gland neoplasms, which provides valuable additional quantitative information about the structural features of tissues and reveals the most specific signs of each nosological form. The radiomic analysis program requires further improvement to increase sensitivity and specificity. The developed therapeutic and diagnostic algorithm for the management of patients with PSG neoplasms has demonstrated high efficiency and accuracy by significantly reducing the risk of diagnostic errors, subsequently leading to the choice of the wrong method of surgical treatment, relapses and repeated interventions.

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