

Morphological changes in cervical cancer

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Abstract: Cervical cancer is a prevalent malignancy among women worldwide. Morphological changes play a key role in its diagnosis and prognosis. Pre-cancerous lesions, such as cervical intraepithelial neoplasia (CIN 1–3), show progressive epithelial atypia, increased nuclear-to-cytoplasmic ratio, mitotic activity, and loss of polarity. Invasive carcinoma is characterized by disruption of the basement membrane, stromal invasion, desmoplasia, angiogenesis, and inflammatory infiltration. Squamous cell carcinoma and adenocarcinoma are the most common histological subtypes, each with distinct cellular and architectural features. Understanding these morphological patterns is essential for early detection, treatment planning, and prognostic assessment.

Keywords: cervical cancer, cervical intraepithelial neoplasia, histopathology, morphological changes, squamous cell carcinoma, adenocarcinoma, stromal invasion, epithelial atypia.

Introduction

Cervical cancer remains a major global health problem and one of the leading causes of cancer-related morbidity and mortality among women, particularly in developing countries. Persistent infection with high-risk human papillomavirus (HPV) is recognized as the primary etiological factor, initiating a cascade of

cellular and molecular alterations that drive neoplastic transformation.

Understanding the morphological changes associated with cervical cancer is critical for accurate diagnosis, staging, and management of the disease.

Histopathological examination provides essential insights into the progression from pre-cancerous lesions, such as cervical intraepithelial neoplasia (CIN), to invasive carcinoma. CIN lesions are graded based on the degree of epithelial atypia and involvement, while invasive tumors are characterized by stromal invasion, desmoplastic reaction, angiogenesis, and inflammatory infiltration. Squamous cell carcinoma and adenocarcinoma are the most common histological subtypes, each exhibiting distinct cytological and architectural features. Detailed knowledge of these morphological patterns is essential for early detection, prognostic evaluation, and therapeutic decision-making in cervical cancer.

Materials and Methods

This descriptive study analyzed cervical tissue from 20 CIN cases (grades 1–3), 20 invasive carcinoma cases (squamous cell carcinoma and adenocarcinoma), and 10 normal controls. Samples were collected with ethical approval and fixed in 10% formalin, embedded in paraffin, and sectioned at 4–5 μm .

Histological evaluation used hematoxylin and eosin (H&E) for general morphology, Masson's trichrome for stromal fibrosis, and PAS staining for basement membrane and mucin assessment. Morphological parameters included epithelial atypia, nuclear-cytoplasmic ratio, mitotic activity, polarity loss, stromal invasion, fibrosis, angiogenesis, and inflammatory infiltration. CIN lesions were graded 1–3, and invasive tumors classified by histological subtype. Descriptive statistics summarized the findings.

Results:

Normal Cervical Tissue

Histological analysis of normal cervical specimens revealed well-organized stratified squamous epithelium on the ectocervix and simple columnar epithelium in the endocervical canal. The stroma was composed of fibroconnective tissue with normal vasculature and minimal inflammatory infiltration. Basement membranes were intact, and no cellular atypia was observed.

Cervical Intraepithelial Neoplasia (CIN)

CIN 1 (mild dysplasia): Atypical basal cells were confined to the lower third of the epithelium, with slight nuclear enlargement and occasional mitotic figures. Cellular polarity was preserved.

CIN 2 (moderate dysplasia): Atypical cells involved the lower two-thirds of the epithelium. Increased nuclear pleomorphism, higher mitotic activity, and mild stromal inflammation were noted.

CIN 3 (severe dysplasia / carcinoma in situ): Full-thickness epithelial atypia was observed, with loss of stratification and polarity, frequent mitoses throughout the epithelium, and intact basement membrane. Stromal reaction was minimal.

Invasive Cervical Carcinoma

Squamous Cell Carcinoma: Irregular nests and sheets of atypical squamous cells infiltrated the stroma. Keratin pearls were seen in keratinizing subtypes. Marked nuclear pleomorphism, high mitotic index, desmoplastic stroma, and lymphocytic infiltration were prominent.

Adenocarcinoma: Malignant glandular structures displayed irregular architecture, hyperchromatic elongated nuclei, and mucinous cytoplasm. Stromal invasion, desmoplastic reaction, and increased vascularization were evident.

Stromal and Vascular Changes

Fibrosis, angiogenesis, and peritumoral inflammatory infiltration were more pronounced in invasive lesions compared to CIN, correlating with tumor depth and histological subtype.

Conclusion

Morphological analysis of cervical tissue provides essential insights into the progression from pre-cancerous lesions to invasive cervical carcinoma. CIN lesions demonstrate graded epithelial atypia, loss of polarity, and increased mitotic activity, whereas invasive carcinomas exhibit basement membrane disruption, stromal invasion, desmoplastic reaction, angiogenesis, and pronounced inflammatory infiltration. Squamous cell carcinoma and adenocarcinoma display distinct histological features that are critical for accurate diagnosis and treatment planning. Understanding these morphological patterns is fundamental for early detection, prognostic evaluation, and effective therapeutic strategies. Integration of histopathological assessment with clinical and molecular data can improve patient management and outcomes in cervical cancer.

References:

1. Histology of cervical intraepithelial neoplasia and the role of biomarkers // Sci. Dir. (обзор). – 2011.
2. Diagnosis of cervical intraepithelial neoplasia and invasive cervical carcinoma by biopsy under colposcopy // PubMed. – 2022.
3. Review on histopathological features of cervical cancer and CIN // Asian Pac. J. Cancer Care. – 2025. – Vol. 10. – P. 1–10.
4. *Cytology and histology of endocervical glandular lesions: a review with emphasis on recent developments* // Pathology. – 2025. – Vol. 57, №7. DOI: 10.1016/j.pathol.2025.08.001.

5. Azizova, F. K., Madaminova, G. I., Azizova, P. K., Tursunmetov, I. R., & Sobirova, D. R. (2022). Morphofunctional Features of the Formation of the Testicular Generative Function in the Female Rats' Offspring with Experimental Hypothyroidism. *NeuroQuantology*, 20(6), 3471-3476.