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Quantitative nuclear image analysis of two types of endometrial adenocarcinoma

KEYWORDS: Endometrial Neoplasms; Adenocarcinoma; Carcinoma, Endometrioid; Kariometry; Image Cytometry

ABSTRACT

Endometrial adenocarcinoma of endometrioid type is estrogen related, well differentiated, less invasive carcinoma with a favorable prognosis. Endometrial adenocarcinoma of non-endometrioid type is usually not associated with estrogen stimulation or hyperplasia, readily invades the myometrium and vascular spaces, and carries a high mortality rate. The aim of this study is nuclear image analysis of endometrial adenocarcinoma of endometrioid type and adenocarcinoma of non-endometrioid type. Female patients with endometrial adenocarcinoma were retrieved and randomly selected from the files of the Institute of Pathology, University of Niš. 104 cases were diagnosed as adenocarcinoma of endometrioid type and 20 cases were adenocarcinoma of non-endometrioid type. Paraffin embedded histologic sections, stained with hematoxylin and eosin from endometrial adenocarcinoma was analyzed by image analyzer Lucia M 3.51 ab (Nikon, Tokyo, Japan) using objective x40. Seven nuclear variables were estimated: nuclear area, equivalent diameter, and volume of equivalent sphere, perimeter, mean chord, circularity, and integrated optical density. In comparison with adenocarcinoma of non-endometrioid type, endometrial adenocarcinoma of endometrioid type is characterized by significantly smaller nuclei (p<0,05) with significantly lower integrated optical density (p<0,0001). Nuclear shape is irrelevant for differentiation of these adenocarcinomas. Our findings showed that dimensional nuclear parameters and integrated optical density could be used to make distinction between endometrial adenocarcinoma of endometrioid type and adenocarcinoma of non-endometrioid type.

INTRODUCTION

Endometrial adenocarcinoma of endometrioid type is estrogen related, well differentiated, less invasive carcinoma with a favorable prognosis (1-5). On the other hand, endometrial adenocarcinoma of non-endometrioid type is usually not associated with estrogen stimulation or hyperplasia, readily invades the myometrium and vascular spaces, and carries a high mortality rate (4,6,8-10). Morphologic differentiation of endometrial adenocarcinoma of endometrioid type from adenocarcinoma of non-endometrioid type is not always easy, and it has significant prognostic and therapeutic implications. The aim of this study is nuclear image analysis of endometrial adenocarcinoma of endometrioid type and adenocarcinoma of non-endometrioid type.

MATERIAL AND METHODS

Female patients with endometrial adenocarcinoma were retrieved and randomly selected from the files of the Institute of Pathology, University of Niš. 104 cases were diagnosed as adenocarcinoma of endometrioid type and 20 cases were adenocarcinoma of non-endometrioid type (12 serous adenocarcinomas and 8 clear cell adenocarcinomas).

Paraffin embedded histologic sections, stained with hematoxylin and eosin from endometrial adenocarcinoma, were analyzed by image analyzer Lucia M 3.51 ab (Nikon, Tokyo, Japan) using objective x40. The binary images were manually edited. Seven nuclear variables were estimated: nuclear area, equivalent diameter, volume of equivalent sphere, perimeter, mean chord, circularity, and integrated optical density. In each case, a hundred nuclei were measured. The statistical significance of difference was obtained by Student's t-test.

RESULTS AND DISCUSSION

There is a statistically significant difference between endometrial adenocarcinoma of endometrioid type and adenocarcinoma of non-endometrioid type for all quantified nuclear parameters except for circularity ($p>0,05$). In comparison with adenocarcinoma of non-endometrioid type, endometrial adenocarcinoma of endometrioid type is characterized by significantly smaller nuclei ($p<0,05$) with significantly lower integrated optical density ($p<0,0001$). Nuclear shape is irrelevant for differentiation of these adenocarcinomas.

Numerous investigators have confirmed the importance of distinguishing endometrial adenocarcinoma of endometrioid type from adenocarcinoma of non-endometrioid type (4,5,7,9,11). The distinction between endometrial adenocarcinoma of endometrioid type and adenocarcinoma of non-endometrioid type sometimes represents diagnostic problem in routine histopathology. For this reason, more quantitative approaches to the classification of these adenocarcinomas would be desirable. Image analysis permits pathologists to obtain quantitative measurements on histological preparations, so that visual impressions can be augmented by quantitative morphometry (12). By quantitative nuclear image analysis, the morphology of the nucleus is described by number of mathematical parameters. In order to obtained additional differentiating criteria for these two types of endometrial adenocarcinoma, in present study, we estimated seven quantitative nuclear image futures. We identified significant differences with regard to nuclear size and integrated optical density.

CONCLUSIONS

Our findings showed that dimensional nuclear parameters and integrated optical density could be used to make distinction between endometrial adenocarcinoma of endometrioid type and adenocarcinoma of non-endometrioid type.

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