



Proceedings

SY01.02 | Image Analysis I

Morphometric Analysis In Benign, Atypical And Invasive Breast Lesions And Its Correlation With Histological Diagnosis, Tumour Grading And Her2 Overexpression

R. Gahlaut*¹, B. Arora²

¹Addenbrookes Hospital, Cambridge University Hospitals NHS Foundation Trusts, Histopathology, Cambridge, United Kingdom,

²Postgraduate Institute of Medical sciences, Histopathology, Rohtak, India

Introduction/ Background

Computer image analysis has become an important tool in the pathology laboratory for quantitative morphometric analysis, which has several advantages over conventional visual assessment: Objectivity, reproducibility and the ability to detect changes not immediately apparent to naked eyes. The nuclear and cytoplasmic alterations during the development of various breast lesions are the cornerstone for typing and grading of these lesions, including carcinomas. The current study was aimed at analyzing the morphometric parameters like mean nuclear area, mean cytoplasmic area, nuclear:cytoplasmic ratio in various breast lesions including benign, atypical and malignant cases, with and without lymph node metastasis.

Aims

The purpose of this study was to compare the morphometric parameters of various breast lesions on formalin fixed paraffin embedded (FFPE) tissue sections with conventional histological diagnosis, tumour grading and HER2 overexpression.

Methods

A total of 100 cases were selectively obtained from archival paraffin blocks. 75 cases were of breast tissues from wide local excision/mastectomy or excision biopsy specimens along with 25 cases of positive lymph nodes with metastatic deposits from infiltrating ductal carcinoma. FFPE sections were stained with conventional methods of haematoxylin and eosin (H&E) and examined for histological diagnosis. The sections with representative breast lesions were stained immunohistochemically to determine HER2 status. Morphometric analysis was performed on H&E sections.

Results

The current study showed that 'p' value was highly significant ($p < 0.001$) for nuclear area and N:C ratio among different categories. The cytoplasmic area was found significant ($p < 0.001$) in discrimination of benign from malignant lesions but not atypical from malignant lesions, indicating that cytoplasmic area alone is not a very reliable parameter.

Conclusion: The morphometric evaluation of breast lesions has proved to be a useful technique in tumour pathology and a valuable adjunct to histomorphology in rapid and accurate diagnosis of different breast lesions. As nuclear changes precede morphological changes, nuclear morphometry can prove beneficial in diagnosing the malignant changes, both at the earliest and with accuracy.

In our study we found that mean nuclear diameter and N:C ratio were higher in grade III tumors than grade I and grade II tumours. The difference was statistically significant. The malignant lesions with strong HER2 expression (3+) had higher mean nuclear area as compare to HER2 negative/ borderline (2+) tumours. Thus, the correlation between histological diagnosis, tumour grading and morphometric nuclear parameters, in



combination with HER2 overexpression, can improve the evaluation of the patient's prognosis, and possibly predict response to therapy.

Computer assisted nuclear morphometry can also be used in objective grading and standardizing grading performance between different laboratories. Hence nuclear morphometrical analysis will bring a factor of objectivity and help in quantification of the nuclear atypia and limit the subjective variability in grading of breast cancers.

Category	No. of cases	Morphometric parameters			HER2 expression		
		NA(μm^2) Mean \pm S.D	CA(μm^2) Mean \pm S.D	N:C ratio Mean \pm S.D	Negative (Score -0, 1)	Borderline (Score -2)	Positive (Score -3)
Benign lesions	15	25.85 \pm 3.62	82.20 \pm 11.51	0.31 \pm 0.04	15	0	0
Atypical lesions	10	49.62 \pm 9.30	135.95 \pm 19.48	0.36 \pm 0.03	9	1	0
Breast tissue of infiltrating ductal carcinoma without lymph node metastasis	25	52.89 \pm 9.65	120.59 \pm 22.00	0.44 \pm 0.06	17	5	3
Breast tissue of infiltrating ductal carcinoma with lymph node metastasis	25	55.69 \pm 8.78	105.25 \pm 16.59	0.53 \pm 0.09	16	7	2
Lymph node with metastatic deposits from infiltrating ductal carcinoma	25	56.22 \pm 9.66	106.25 \pm 18.25	0.52 \pm 0.07	19	5	1

Figure 1.

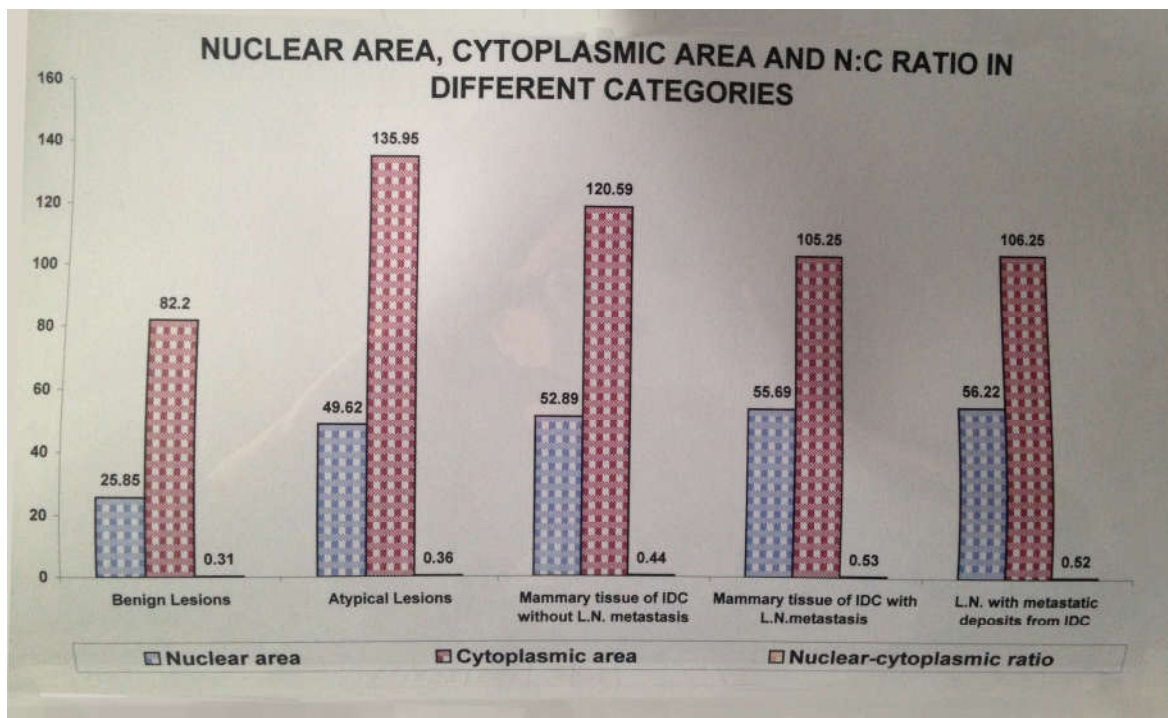


Figure 2.

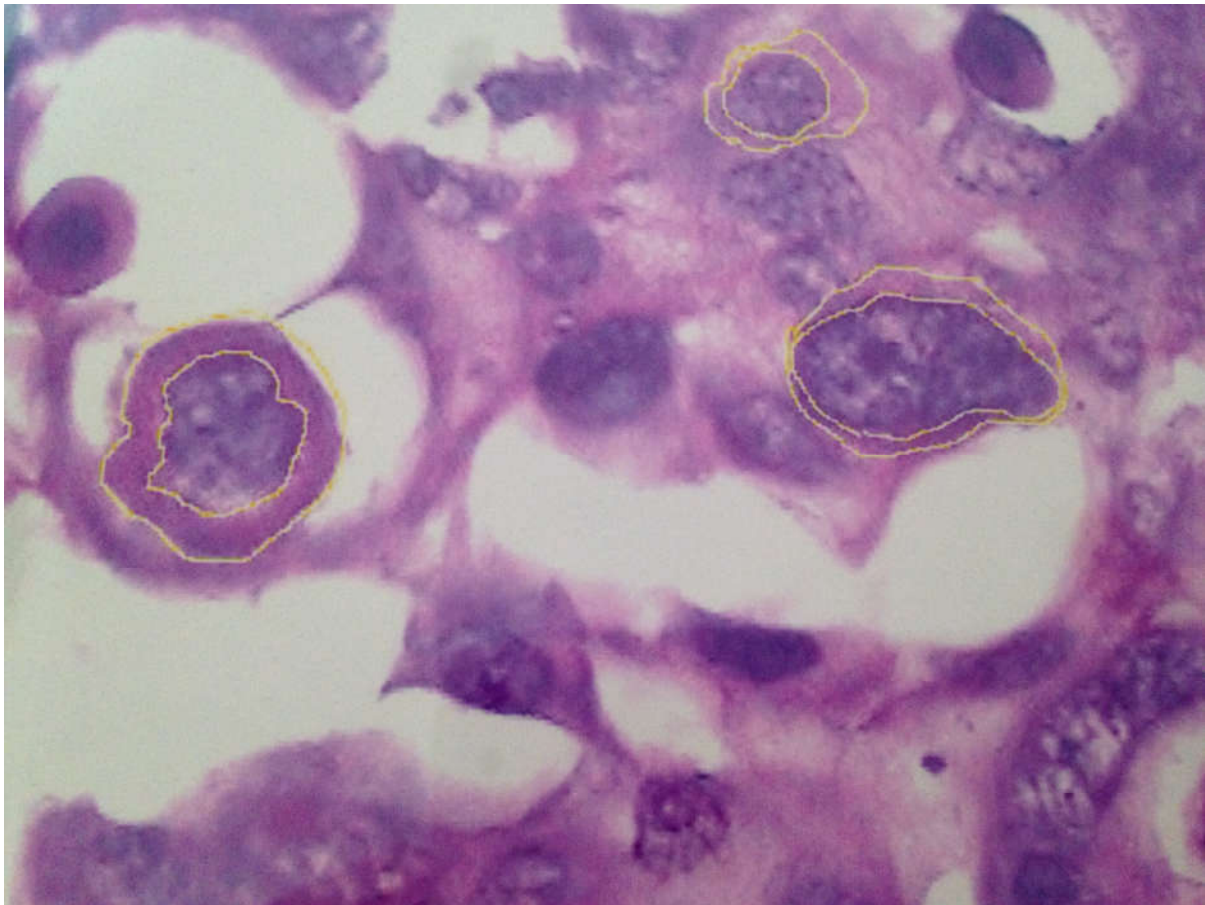


Figure 3.