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Morphologic criteria for the diagnosis of prostatic adenocarcinoma in needle biopsy specimens

KEYWORDS: Prostatic Neoplasms; Adenocarcinoma; Biopsy, Needle; Diagnosis

ABSTRACT

The diagnosis of prostatic adenocarcinoma in needle core biopsy specimens is based on multiple diagnostic criteria and supportive features. There is little information on the frequency with which diagnostic and supportive features of prostate cancer occur within benign glands. In evaluating the few atypical acini in question, the pathologist has to critically evaluate all features that are useful in the diagnosis of carcinoma. Since an obvious infiltrative pattern is often lacking in such foci, there is greater reliance on other diagnostic and supportive features.

INTRODUCTION

The diagnosis of prostatic adenocarcinoma is complex and is based on a constellation of histologic observations. The 3 major histologic criteria are infiltrative growth pattern, presence of macronucleoli, and absence of a basal cell layer. Several diagnostic criteria and supportive clues are absolutely specific. Some of those may be present in or mimic by benign glands and nonneoplastic small acinar proliferations. The diagnosis of prostate cancer is even more difficult if a very limited amount of tissue is available for evaluation. The current clinical strategy of performing biopsies in patients with elevated serum prostate-specific antigen without abnormal digital rectal examination, the finding of small foci of cancer has become more frequent. There is little information on the frequency with which diagnostic and supportive features of prostate cancer occur within benign glands (1).

DIAGNOSTIC CRITERIA

a) Nuclear changes. The presence of prominent nucleoli was advocated as diagnostic criterion of prostate cancer by Totten et al. in 1953. Nucleolar prominence has been variably defined as nucleolar size greater than 1μm, greater than 1,6μm, or even greater than 3μm. Nucleolar enlargement in secretory cells is now generally accepted as a cardinal diagnostic feature of prostatic adenocarcinoma. Iczkowski and Epstein did not find prominent nucleoli in 24% of consultation material. Some unusual variants of prostate cancer (e.g., xanthomatous carcinoma) are also known to be characterized by bland nuclear features without prominent nucleoli. Also this features can be seen in 25% of benign cases, but this finding was generally very focal. Most of these prominent nucleoli were in areas of inflammation, basal cell hyperplasia, atrophy, or Paneth cell-like change. In addition to nucleolar prominence, multiple nucleoli and nucleolar margination have also been suggested as diagnostic criteria for prostate cancer. Multiple nucleoli are never found in benign glands. A relatively important criteria of malignancy in prostate cancer is the presence of nucleomegaly (1,2).

b) Intraluminal contents.Prostatic crystalloids are intraluminal, eosinophilic, refractile structures of varying size and shape, which are closely associated with prostate cancer. Crystalloids can be found in 40,6% of adenocarcinomas in needle biopsies. With the notable exception of atypical adenomatous hyperplasia or adenosis, crystalloids are rare in benign glands. The association of crystalloids with atypical adenomatous hyperplasia is well documented, with a reported frequency of up to 40% (1,3-5).

The presence of intraluminal acidic mucin has been advocated as useful supportive evidence in the diagnosis of prostate adenocarcinoma. Many studies described positive Alcian blue staining in adenocarcinoma and rarity of such staining in benign glands. However, acidic mucin has been demonstrated by histochemistry in a high proportion of atypical adenomatous hyperplasia (54-63%) and in sclerosing adenosis, basal cell hyperplasia, and mucinous metaplasia of benign prostatic glands. Blue- tinged material to be a very useful criteria for the diagnosis of prostate cancer in needle biopsies since it is specific (100%) and relatively sensitive (52%) (5,6).

The presence of intraluminal, amorphous, eosinophilic material in malignant prostatic glands has been recognized in recent years. This has been found in 53% to 100% of cancer and only occasionally in benign glands. This material is often found in relation to crystalloids, and it has been suggested that it may be the precursor to crystalloids. It is uncertain whether these are true secretins or are a manifestation of individual cell necrosis (1,4,7).

c) Perineural invasion. The presence of glands in a perineural location used to be considered to a diagnosis of malignancy. Circumferential growth or intraneural invasion should be regarded as pathognomonic of cancer. The frequency of perineural invasion is about 20% in needle biopsies with cancer (1,7).

d) Malignant glands in adipose tissue. The presence of suspect glands within adipose tissue is practically diagnostic of extraprostatic extension of prostatic adenocarcinoma. However, this feature is rarely found in needle biopsies (1,7).

e) Cytoplasmic features. Cytoplasmic features in malignancy vary from clear to amphophilic to eosinophilic. This is very useful features in differentiation between benign and atypical / cancerous glands (1,7).

f) Retraction of malignant glands. Some authors have observed retraction clefting around malignant glands of prostate cancer. The mechanism of clefting in malignant glands is unknown, but may be related to an abnormality in the basement membrane or overexpression of collagenases and other enzymes required for invasion (1).

g) Collagenous micronodules. Collagenous micronodules are another relatively recently described histologic observation in prostate cancer. These microscopic nodular aggregates of paucicellular eosinophilic fibrillar stroma are a specific, but infrequent, diagnostic clue in prostatic adenocarcinoma. Collagenous micronodules are absence in benign glands. This morphological change is associated with mucin-secreting neoplastic glands (1,8).

CONCLUSION

Since not all diagnostic or supportive features of cancer are evident in any single case of cancer, particularly in needle biopsy specimens in which sampling

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is limited. These morphological findings are helpful in the assessment of small foci of atypical glands being considered for cancer.

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