Summary

1. A preliminary report is submitted on the aspiration biopsy of the prostatic gland.

2. A technique of prostatic biopsy is described, being relatively free of complications and readily accepted by patients as an office procedure for routine screening for carcinoma of the prostate.

3. A modification of the Giemsa staining technique is performed so as to evidence pathognomic elements within the interior of the nucleus, specifically in the altered nucleolus.

Materials and methods

The illustrations No. 1 and No. 2 are amplified in the following text.

The instrument we have devised and modified (No. 1) is patterned after the Franzen equipment (14) and can be described as an introducer consisting of a tube held by the small ring to the index finger. Through this tube passes a 22-gauge needle approximately 9 3/4 inches long. The entire assembly is placed over the gloved hand and the index finger is covered by a finger-cot to minimize contamination while being introduced into the rectum (No. 2). The nodule previously palpated is again found and the needle is inserted through the rectal wall into the suspected lesion. With a syringe attached, aspiration is carried out by creating a vacuum and the needle being moved to and fro through the introducer to sufficiently disturb the tissue being aspirated. The aspirate consists of a drop of blood which is immediately expressed onto a clean slide and
very delicately spread with the flat surface of a second slide, care being taken to not carry the tissue beyond the end of the slide being made. The slides are then allowed to air dry only until the gloss or sheen has disappeared from the smear, then fixed with a few drops of absolute alcohol. The staining procedure, which has been modified over a
period of time, began with the May-Gruenwald Giemsa method. The procedure presently employed and described in the following text is a modification by Ansmann (1). It is simple, efficient and economical and requires only four steps; the smear is stained with Giemsa, differentiated with an alcoholic solution of eosin, then cleared.

Cell types found in aspirates:

R.B.C. – Since the aspirate almost always consists of a drop of blood, red blood cells are found in abundance, staining light pink and are of no significance.
A normal sprinkling of leukocytes may be found. Only when present in exceptionally large numbers, do they indicate an acute or a chronic prostatitis. Their staining reaction is similar to that of a Wright’s stain.

Histiocytes – These cells are occasionally found in smears containing neoplastic tissue and should not be confused with the latter. They are large and grotesque in appearance, staining green to pink and are particularly abundant in acute prostatitis.

Fibromuscular stroma – Spindle-shaped cells staining blue to pink, depending upon the muscular elements present. They are usually quite abundant in cases of prostatic sclerosis.

Basal cells (prostatic) – Basal cells are occasionally found in prostatic smears. These cells usually display nuclei that are generally smaller than those of normal prostatic cells. They stain dark blue by the methylene blue component of Giemsa. They may have a very small nucleolus and irregular cytoplasm, staining slight basophilic.

Cells from the Seminal Vesicle – These cells are occasionally found and present a homogenous dark staining large nucleus with an eosinophilic cytoplasm usually containing green-staining lipochrome (15). When large numbers of these cells are found in aspirates, they are usually accompanied by spermatozoa staining blue-green. The cytoplasm is vacuolated and the nuclei vary considerably in size.

Prostatic cells (normal) – These cells have a typical honeycomb appearance (24) heavily laden with DNA and usually no nucleolus can be seen (16). All of the nuclei are uniform in size and spacing, most frequently arranged in a single sheet or layer of cells. Their staining reaction varies from a dark purple to rose, depending upon the amount of differentiation taking place during the staining procedure.

Prostatic cells (malignant) – The malignant cells are characterized by compressed large swollen nuclei (19) containing a pale nuclear sap produced by the relative loss of DNA. Clumping of the chromatin granules at the periphery of the nucleus produces a slight halo effect. On close inspection of the nucleus, the most striking feature is the constant appearance of multiple and pleomorphic nucleoli, staining dark purple.

Discussion

Cellular morphology of malignancy is generally described as immature degenerating cells characterized by a large swollen nucleus, vacuolization, chromatin clumping and a recognizable disparity in the cytoplasmic-nuclear ratio (19, 21, 25). In addition to the above description, the more definitive studies revealed the nucleolus to be the most prominent feature of the malignant cell (2, 4, 5, 7, 8, 10, 12, 13, 26, 29, 30). Occasionally, multiplicity and pleomorphism are present with the average nucleo-nuclear ratio altered in many carcinomas (11). The work of MacCarty (20), Totten (30), Ferreira (11), and Bernhard (5) has convinced us that more emphasis should be placed on the interior of the nucleus to determine malignancy.

Criteria utilized in this study and characteristics of malignant prostatic cells are categorically enumerated as follows:
1. Definite increase in nuclear size with an altered cytoplasmic-nuclear ratio.
2. Pale staining of the nuclear sap due to relative decrease of DNA.
3. Multiple or pleomorphic nucleoli.

In addition to implementing the diagnosis of prostatic cancer as a primary disease entity, its use can be extended to determine metastasis in the area of the prostatic urethra (4, 31), following total prostatectomy, or in the area of the capsule, following subtotal prostatectomy, should such follow-up examination present necessity of further evaluation.
The occurrence of carcinoma following subtotal prostatectomy has been reported as high as 10–15% (31). Perhaps some could be salvaged if more vigilance was exerted and appropriate and productive examination undertaken. Also, this method is applicable to assay the efficiency of estrogen therapy (26) in patients so committed.

Our smears often yield clumps of prostatic cells which possess malignant criteria and squamous metaplasia enmeshed in adipose tissue, indicating the necessity to evaluate further immediate therapy rather than to wait until more definitive and devastating evidence of metastasis has occurred.

The aspiration technique of obtaining tissue was chosen because it is felt that 80% of the total prostate gland can be reached and is accessible for biopsy by this method. It can safely be used as an office procedure. Also by this method, an abundance of cellular material can be obtained and has the added advantage of being relatively atraumatic and without significant complications (3, 10).

A survey of the literature written by various urologists regarding diagnosis and treatment of carcinoma of the prostate gland supports the fact that none of the authors has denied that early recognition while the disease is still confined to the gland determined greatly the success or failure of the treatment (12). It is therefore felt important that a simple, dependable method can be found for the early detection of this disease, one which all physicians could use, a method which would be comparable to the pap smear for female cervical cancers, in reducing the 10-year mortality statistics.

Results

During the year 1967, we completed 209 primary aspiration biopsies as a routine procedure, part of a urological survey of lower urinary tract problems.

From our aspiration smears, we have rendered 23 positive diagnoses of prostatic carcinoma, 15 of which have been proven by tissue examination following prostatic surgery. Six cases were inoperable, and because of the poor general condition of the patients, large-caliber needle biopsy was not undertaken. One case in which a retropubic prostatectomy was performed, appeared to be a primary tumor of the seminal vesicle with prostatic invasion.

The authors feel that this did not in any way affect the validity of the procedure since the malignancy was present and detected while still operable. Thus far, two false positive reports have been rendered, but only Silverman needle biopsies have been performed to validate the smear diagnosis.

The age range of our patients was from 16 to 94 with all the latent carcinomas being managed by total transurethral resection (28). Total retropubic prostatectomy was carried out in two cases, one of these was the previously mentioned carcinoma of the seminal vesicle. Also in our series, four cases of acute prostatitis and one case of chronic prostatitis were diagnosed.

A preliminary report of 209 patients, screened for prostatic carcinoma via fine needle aspiration biopsy is submitted.

23 positive diagnoses were rendered; 15 of which were proven by histological examination of surgical specimens, 6 cases were unconfirmed and 2 false-positive reports were made.

The biopsy method carried out in this manner is recommended as an office procedure, and many of the above cases were so performed.

A modified method of Giemsa staining technique is also described. Generally accepted criteria of cellular morphology in the diagnosis of prostatic cancer have been utilized.

The following photomicrographs were presented from Case # 67–6290.
Aspiration Smears

Numbers 1, 2, 3 and 4 aspiration Smears, illustrate cellular material from which the diagnosis of prostatic carcinoma was established, utilizing the criteria outlined in the discussion.

Tissue Section

Numbers 5 and 6 tissue section, stained with H & E, serve to substantiate the diagnosis of prostatic carcinoma.

Literature

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