contrary, there have been many unsolicited expressions of appreciation, by mothers and relatives, of the nursing care given in the homes. Lying-in ward sisters have, without exception, welcomed the contact with their colleagues working in the field and are enthusiastic in their encouragement of follow-up care. The enthusiasm of those undertaking the follow-up nursing care is no less than that of the ward sisters.

While it has been relatively easy to gauge the reactions of the nurses, it has been less easy to gauge those of the family doctor. Two instances have occurred of general practitioners objecting to the special visits of the nurse or health visitor. A number have spoken of the value of her help, and, as was to be anticipated, there have been isolated occasions when the nurse's advice has been modified or reversed at the time of the doctor's visit. It need hardly be stated that the medical attendant is looked to for decisions relating alike to treatment of the child or mother. There have been other occasions when the visiting nurse has been instrumental in securing for a baby timely medical advice not thought to be necessary by the parents. On a number of occasions the nurse has been able to secure urgent help necessary to offset in part at least the indirect effects of poverty and slum conditions.

The few misgivings of which we have heard appear to have arisen from suspicions concerning motives rather than from doubts about the working practicability of the arrangements. The arrangements have only one motive —the discharge home, with the minimum of delay, of small babies who are in hospital as a result of illness or of the circumstances of birth. It is implicit in the arrangements that when the family doctor assumes clinical responsibility for these babies he should be enabled to share in the indispensable benefits, known to his hospital colleagues, of having the assistance of a nurse skilled in the observation and in the general management of the small or ailing infant aged only a few weeks. Success is dependent upon careful selection of infants; the skill, knowledge, and personality of those providing the infant-nursing care; and co-operation between the family doctor, the local health services, and maternity hospitals. If this co-operation can be firmly secured the task of hospitals will be lightened, the place of child care in the home will be emphasized, and a further contribution—no matter how small—will have been made to improved prospects of total health in infancy and childhood.

We are indebted for generous co-operation to Sisters G. E. Capewell, A. M. Kelly, M. Pattullo, M. McMackin, and A. H. G. Whitehill, of the Leeds Maternity Hospital; to Miss D. Humphrey, supervisor of midwives, and Sisters D. Booth and B. Chapman, of the City of Leeds Health Department; and to Miss A. Carey, superintendent of health visitors, and the health visitors of the West Riding County Council.

At a meeting of the North of England Section of the Society of Public Analysts in April, Mr. J. G. Sherratt compared the methylene-blue grading test and the plate counts of ice-cream. He said that comparison of the results of the methylene-blue grading test for 1,400 samples of ice-cream from various sources was made with the results of plate counts at 37° C. and 20° C. and the coliform population of the samples. It was concluded that a Grade 1 indication may be accepted with confidence, that about 80% of samples falling into Grade 2 were bacteriologically satisfactory, and that the presumption that samples falling into Grades 3 and 4 are unsatisfactory must be adopted only with considerable reserve.

# CARCINOMA OF THE PROSTATE

## A COMPARISON OF METHODS OF DIAGNOSIS

BY

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The difficulty of making a conclusive differential diagnosis between malignant involvement and inflammatory changes in the prostate gland raises the question of the reliability of the various methods of investigation. The importance of this differential diagnosis becomes all the more evident when it is realized that cancer of the prostate is said to be the commonest carcinoma in the male over the age of 60 years (Hey, 1948). In 1921 the death rate from this disease was 4.18 per 100,000 of the male population, and it had risen in 1930 to 7.55 (Hoffman, 1934). The Registrar-General's Review for 1948 records double the number of deaths from this disease in 1948 than in 1928 (Registrar-General, 1948).

There is a wide divergence of opinion regarding the effect on the expectation of life from the introduction of hormone therapy in a patient with cancer of the prostate; nevertheless it is generally agreed that, whether conservative or radical surgical treatment is to be undertaken, only by early diagnosis can the best results be obtained.

In order to review the reliability of the commoner methods of diagnosis a series of 62 cases (see Table) in

*Cases (62) Suspected of Cancer of Prostate on Rectal Examination*

| | Non-malignant (28) | | | Malignant (34) | | |
|---|---|---|---|---|---|---|
| | No. Examined | Normal | Inconclusive Evidence | No. Examined | Definite Evidence of Malignancy | Inconclusive Evidence |
| Cystoscopy .. .. | 28* | 15 | 9 | 30 | 14 | 16 |
| Radiological examination | 28 | 28 | Osteitis deformans 2 | 34 | Secondaries of bone 15 | 19 |
| Serum acid phosphatase .. .. | 28 | 25 | 3 | 34 | 9 | 25 |
| Test for malignant cells in prostatic secretion or in urine | 28 | 28 | 0 | 32 | 19 | 13 |
| Needle biopsy .. | 19 | 19 | 0 | 21 | 17 | 4 |
| Perurethral biopsy . | 19 | 19 | 0 | 21 | 17 | 4 |

* Four of these patients had carcinoma of the bladder.

which there were strong clinical grounds for suspecting malignant changes in the prostate were investigated and the results compared. Of these cases only 34 had cancer of the prostate.

### Rectal Examination

This had elicited one or more of the following alterations in the gland suggestive of malignant change: (1) increased induration in a part or the whole of the gland; (2) irregularity in the contour of one or both lobes; (3) obliteration of the notch between the seminal vesicles; (4) induration along the lateral ligaments and lymphatics of the gland, especially at the upper pole and the seminal vesicles; (5) loss of the lateral sulcus; (6) increased fixation of the gland on bimanual palpation; (7) the membranous urethra broadened, indurated, ill-defined, and more fixed.

Of the 62 cases 34 were proved to be carcinomatous; of these latter, induration of a part or the whole of the

gland was present in 31, increased fixation in 34, and induration of the lateral ligaments in 22. Of the 28 non-malignant prostatic cases, induration was present in 27, decreased mobility in 24, and extraglandular induration in 11.

### Cystoscopic Examination

Although cystoscopic investigation is considered inadvisable by some urologists (Macalpine, 1949) for fear of disseminating malignant cells, it may provide valuable information, especially regarding lesions primarily of the bladder or urethra but involving the prostate; while the changes in the gland may be evident by the gritty resistance offered to the passage of the cystoscope, the more obvious fixation of the gland, easier identification of induration in the gland by palpation over the instrument, irregularity of the internal urinary meatus, puckering of the mucosa at the apex of the trigone, and the presence of nodules on the floor of the bladder in advanced cases. Of the 30 cases of cancer of the prostate which were cystoscoped, 14 showed a picture strongly suggestive of malignancy, while in 16 the bladder appeared normal. Of the non-malignant cases, 9 showed irregularity or oedema of the bladder floor, 15 were normal, and 4 had carcinoma of the bladder.

### Radiological Examination

This is done to exclude any condition of the prostate or bladder which might cause induration and fixation of the gland and also to detect metastases in the bone, which would denote the late stage of the disease. Of the 34 cases of cancer of the prostate 15 showed secondaries in the bones. The commonest sites were the rami of the pubis and ischium, then the ilium and sacrum, and lastly the lumbar spine. There were two cases of osteitis deformans, which were confirmed by the high level of the alkaline serum phosphatase.

### Serum Acid Phosphatase Estimation

Estimation of the serum acid phosphatase has become a routine procedure since phosphatase was shown to be present in large amounts in carcinomatous prostatic tissue and in its metastases, and that in such cases the serum acid phosphatase might be considerably raised (Gutman and Gutman, 1940). It is generally agreed that readings above 4 K.A. units are suggestive of carcinoma of the prostate, while above 10 K.A. units they are diagnostic (Huggins and Hodges, 1941). The converse, however, does not hold good, for it is usually stated that in only 40% to 50% of cases of cancer of the prostate is the phosphatase level raised above normal. In the present series the serum acid phosphatase was raised in 9 cases to above 4 K.A. units, and in 4 of these it was over 10 K.A. units. Of the 15 cases with secondary deposits in bone 6 showed readings above normal limits.

### Malignant Cells in Prostatic Secretion

The identification of malignant cells in prostatic secretion and in urine as a means of diagnosing cancer of the prostate has been a source of interest for many years. In 1931 Mulholland recorded the presence of clumps of epithelial cells with large acidophilic nuclei in 77% of cases of carcinoma of the prostate. Herbut and Lubin (1947), adapting the technique evolved by Papanicolaou in staining vaginal smears for uterine carcinoma cells and applying it to prostatic secretion, were able to identify the epithelial cells from various parts of the normal lower urinary tract, benign conditions of the prostate, and carcinoma of the prostate gland. The recognition of these cells depends not only on their arrangement in sheets or clumps or as single cells, on the cell outline, on the size of the cells, and on the position and staining of the nuclei, but also on the characteristic colour imparted to the malignant cells by this method of staining. Those authors were able to make a cytological diagnosis of carcinoma in 17 out of 100 patients; 10 of these cases were confirmed histologically and 6 were considered to be reasonably certain on clinical grounds. In a later paper Herbut (1949) reports that neoplastic cells were found in 54 out of 66 cases of known cancer of the prostate. Albers, McDonald, and Thompson (1949), using haematoxylin-eosin staining, found 3 cases of carcinoma of the prostate among 100 patients with a supposedly benign enlargement of the prostate and 13 positive smears in 24 known cases of carcinoma of the gland.

The main objection to this diagnostic method is that prostatic massage might cause a dissemination of cancer cells: this risk is regarded by its advocates as very slight and to be justified by earlier diagnosis. It has been suggested that prostatic secretion may be obtained from the urethra immediately after defaecation, the bladder having previously emptied; while Chute and Williams (1948) report that, by centrifuging the early morning specimen of urine, malignant cells were found in 10 out of 24 cases of known carcinoma of the prostate.

In the present series of 34 cases of cancer of the prostate, malignant cells were identified in 19. In 5 of these cases the finding of malignant cells was the first definite evidence of malignancy. None of the non-malignant cases showed cells suggestive of malignancy, but 13 had numerous pus cells, denoting a chronic imflammatory condition of the gland. The presence of pus cells, however, does not necessarily indicate a benign condition of the prostate, as they were present in 7 of the malignant cases.

### Prostatic Biopsy

Conclusive evidence of the malignancy of the prostate gland can be obtained only by histological examination of tissue removed from the suspected area. Such tissue is obtained by a biopsy needle (Figs. 1 and 2) by per-urethral resection, or by excision through the bladder or perineum.

*Needle Biopsy.*—The advantage of this method is that it causes the least amount of discomfort to the patient and of disturbance to the urinary tract, while tissue can be removed from any part of the gland. But the amount of tissue may be small, and considerable experience in sectioning and interpretation is required. The best-known needles are Lowsley's biopsy instrument, Silvermann's needle, and the harpoon types of needle. In 1944 Roth and Turkel modified (Fig. 2) the latter's bone-marrow biopsy needle by increasing its length, and they showed that by inserting this needle in the midline of the perineum, midway between the anus and the bulb of the urethra, it could be directed to any suspected nodule or lobe of the prostate by the left index finger in the rectum. That finger is then hooked over the upper border of the prostate and the gland compressed on to the trephine, which is passed up the needle. By rapid rotation of the trephine a column of tissue over a millimetre in diameter and of the desired length can be removed, and its removal may be facilitated by suction from a syringe exerted through the lumen of the trephine. Haemorrhage is controlled by pressure with the index finger at the point at which the trephine enters the gland or by a

diathermy electrode passed up the needle. This type of needle was found to be the most effective in obtaining adequate pieces of tissue from the prostate gland.

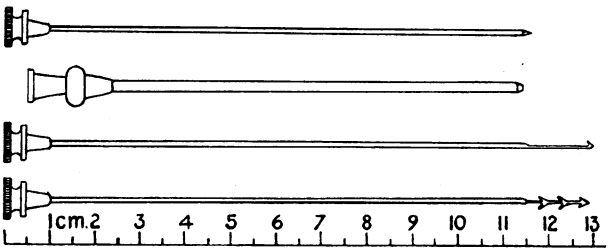


FIG. 1.—Needles designed to combine the tissue-holding action of the harpoon needle with the cutting action of the trephine. The pointed obturator, when in place within the trephine, allows the latter to be inserted through the mid-point of the perineum down to the prostatic capsule. The obturator is removed and the harpoon-like stylet is passed down the trephine into the suspected tissue. By slightly withdrawing the harpoon the tissue is compressed on to the edge of the trephine, which by a rotary cutting action removes a bigger piece of tissue than if the tissue was not compressed. (Made by Messrs. C. Thackray.)

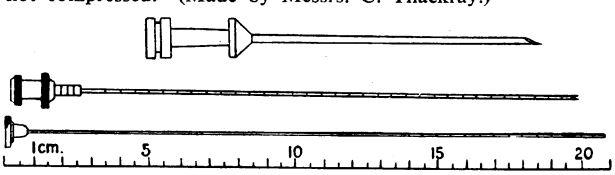


FIG. 2.—The elongated Turkel needle with its obturator in place. The trephine is next to the needle; its length compared with that of the needle and its toothed cutting end are shown. Below is the stylet with which the column of tissue is pushed out of the trephine. (Made by Down Bros. and Mayer & Phelps.)

*Perurethral Biopsy.*—Perurethral resection of the prostate gland by McCarthy's electrotome or Thompson's punch has the advantage of excising large pieces of tissue while at the same time removing bladder-neck obstruction. But biopsy then becomes a major surgical procedure, especially if the tissue under suspicion is situated at the periphery of the gland or in the posterior lobe, which, again, is regarded as the commonest site for early carcinoma of the prostate. The results from perurethral biopsy and Turkel's needle correspond closely. Perurethral resection was carried out in 21 of the 34 malignant cases, and in each instance a needle biopsy preceded the resection; in 17 cases the perurethral fragments showed a carcinoma of the prostate, while in 2 the needle biopsy revealed carcinomatous areas which perurethral section had failed to show. In 2 cases the tissue removed by the needle presented no sign of malignancy when it was evident in the perurethral sections. This discrepancy was mainly due to the fact that a recently sharpened trephine is essential, and this is practicable only if two or more trephines are available—a condition that obtained only during the latter part of the investigation.

## Discussion

Carcinoma of the prostate shows an increasing incidence greater than can be accounted for by the ageing of the population. The gradual onset of symptoms is responsible for the spread of the malignant process beyond the prostatic tissue in 90% to 95% (Barringer, 1935) of cases before diagnosis is made, and the interval between the onset of symptoms and diagnosis has been estimated at 25 months (Wear and Schoenenberger, 1948).

Many authorities believe that hormone therapy has extended life only 18 to 21 months in the majority of cases, while others claim that a large percentage reach the 5-year survival period. It is generally agreed that from 10% to 20% of patients fail to respond to oestrogen, while of those who do react a number rapidly become resistant to hormone therapy. But, whether medical or surgical treatment be adopted, the results will largely depend on how early the diagnosis has been made.

Clinical diagnosis depending on rectal examination has been claimed to be reliable in up to 88% of cases, but in the present series of 62 clinically suspected cases only 34 were proved to be carcinomatous.

Cystocopic examination, although considered inadvisable by some urologists, may be of help in determining the extent of the disease, the induration of the gland, and its fixation, and is especially valuable in excluding diseases of the bladder and urethra which by involving the prostate may simulate carcinoma; four such cases were discovered in this series.

Radiological examination is a routine procedure to exclude those lesions of the bladder and prostate which may cause induration and fixation of the gland and thus simulate a malignant involvement. Secondary deposits in the bones of the pelvis and spine indicate the late stage of the disease. Bony metastases were present in 15 of the malignant cases.

The level of the serum acid phosphatase is a valuable diagnostic measure. It is accepted that readings above the normal limits of 4.0 K.A. units are strongly suggestive of malignancy and are diagnostic when raised above 10 K.A. units; but they are raised in less than 50% of cases of carcinoma of the prostate. In this series they were raised in 9 of the 34 malignant cases.

The identification of malignant cells in the prostatic secretion obtained either by prostatic massage from the urethra immediately following defaecation or by centrifuging the early morning specimen of urine is valuable confirmatory evidence. The reliability of this test is reported as being 84% after massage and 54% in urine. In the present series a positive diagnosis was made in 19 of the 34 cases of carcinoma of the prostate.

The only conclusive evidence of malignant involvement of the gland is by microscopical examination of biopsy tissue removed from the suspected area of the prostate. The most efficient biopsy needle was found to be Turkel's. Perurethral resection provides larger pieces of gland for section and at the same time removes bladder-neck obstruction, but it may be difficult to remove tissue from the periphery of the gland or from the posterior lobe. The results of these two methods of biopsy correspond very closely.

I wish to thank Dr. R. Thomson for his assistance and advice regarding the histology and the identification of malignant cells in the prostatic secretion.

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