

BIOPSY BY NEEDLE PUNCTURE AND ASPIRATION

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THIS paper is a presentation of technical procedures employed and results attained by securing tissue from suspected neoplasms for histological examination by needle puncture and aspiration.

The use of some form of trocar or needle to obtain tissue from the living subject is not a new procedure. The Mixer punch, a blunt-tipped trocar sharpened with the bevel on the inside, was devised by S. J. Mixer some twenty-five to thirty years ago and has been quite generally employed to obtain specimens of brain tissue. We have been unable to find any published record of its description. Ward,¹ in 1912, suggested needle puncture and aspiration of lymph nodes in the study of lymphoblastomas, and Guthrie,² in 1921, reported his observations on the aspiration of nodes in Hodgkin's disease. Goeller,³ in 1920, devised a trocar with a spiral cutting tip for securing tissue from the prostate. Forkner,⁴ in 1927, presented a method by which he obtains a small amount of tissue by the use of a dental broach inserted through an 18-gauge needle, and summarized the results of study of material so obtained by supravital staining.

The Mixer punch, Goeller needle, and the dental broach of Forkner are admirable devices for the purpose intended, but since biopsy by needle puncture is only occasionally indicated, these instruments will commonly be found unavailable. Although the Goeller needle has been employed at Memorial Hospital since its invention, we find, that unless it is made quite heavy, it is too delicate an instrument to keep in repair, and, in any case, it undoubtedly causes more trauma than the method which we present below.

Since 1926, we have employed aspiration with an ordinary 18-gauge needle attached to a Record syringe. This apparatus is always available in any clinic, hospital or office and therefore has the advantage of permitting impromptu and immediate use. We also believe that, with the proper technic and coöperation between the surgeon and pathologist, it is the puncture method most universally applicable. The observations here presented do not include the study of cancer cells from pleural or ascitic fluids, which has already been published⁵ by one of us (E).

Indications and Advantages.—The indications for biopsy by needle puncture and aspiration are tumor masses which lie below the surface of normal tissue where surgical exposure is deemed contraindicated for any reason.

The common contraindications to biopsy by surgical exposure may be enumerated as follows: The danger of local or general dissemination of the disease or fungation of tumor tissue through the operative wound, the inter-

ference with subsequent therapeutic surgical procedures, the surgical risk (including hæmorrhage and infection) in obtaining specimens from certain deep-seated masses, and the lack of justification for any procedure involving physical or mental discomfort or expense to the patient, where the information to be gained may be of doubtful value to the patient or of academic interest only.

Biopsy by needle puncture and aspiration has, we believe, none of the above-mentioned disadvantages. The danger of local or general dissemination through the minute break in the tumor capsule produced by an 18-gauge needle is comparatively slight. The procedure has not in our experience

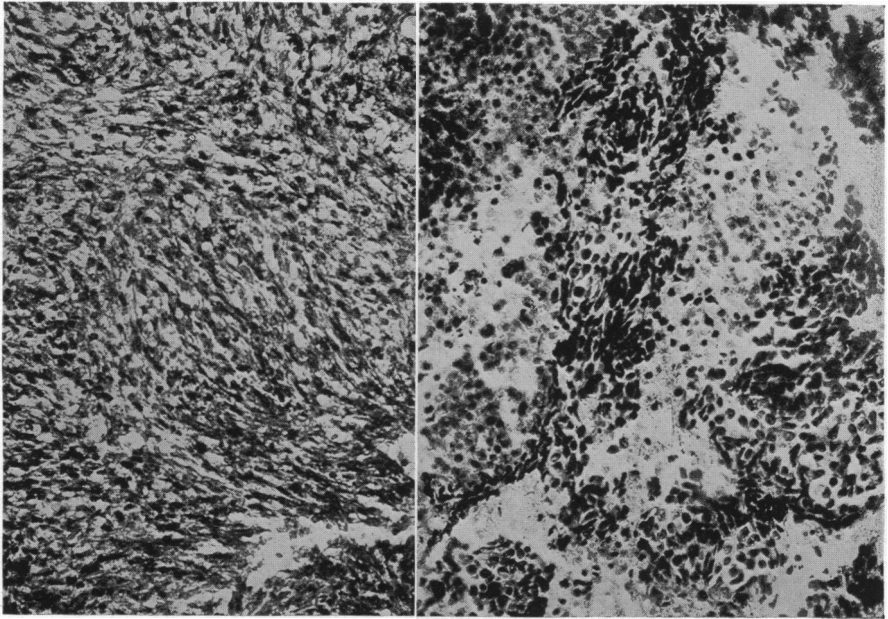


FIG. 1.—Spindle-cell sarcoma of cheek. Paraffin section of aspirated material (Case 1).

FIG. 2.—Carcinoma of lung. Smear of aspirated material (Case 3).

caused sufficient trauma to modify the clinical setting for any subsequent treatment and the surgical risk is negligible, if sterile precautions are observed. We have not considered aspiration of abdominal tumors advisable, but we have several times successfully obtained diagnostic material from masses within the lung, without any untoward symptom either immediate or late.

In a clinic wholly devoted to the treatment of neoplastic diseases, we have several times obtained unsuspected pus or other fluid leading to the diagnosis of a benign lesion.

The procedure is accepted without question by the patient as it does not necessitate hospitalization, elaborate preparation, great discomfort, or more than a few minutes of time. It therefore makes possible histological diagnoses, otherwise either unobtainable or of necessity deferred.

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Technic.—The special paraphernalia required is an ordinary 18-gauge needle five to ten centimetres in length (which should be new and sharp) and a twenty cubic centimetre Record syringe. For the preservation of the specimen, glass slides and a specimen bottle with 10 per cent. formalin are needed.

The skin at the site of the intended puncture is painted with iodine and a small area of skin infiltrated with 1 per cent. novocaine. With a bistoury pointed scalpel (No. 11 Bard Parker blade) a stab wound is made through the skin with the instrument held at right angles to the skin surface. This puncture of the skin facilitates insertion of the needle. An 18-gauge needle

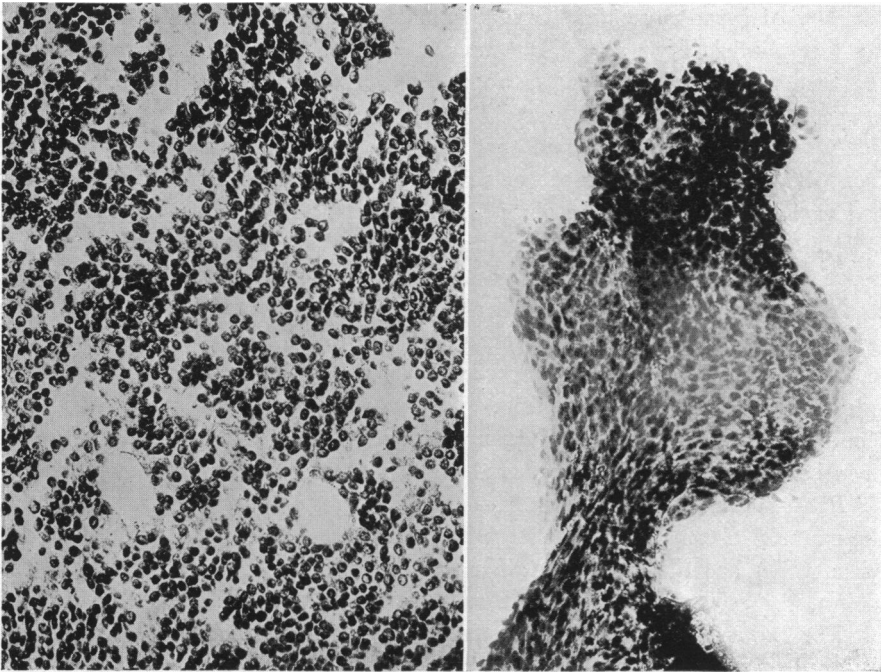


FIG. 3.—Endothelial myeloma of heel. Paraffin section of aspirated material (Case 4).

FIG. 4.—Carcinoma of lung. Smear of aspirated material (Case 8).

attached to a tightly fitting Record syringe is then inserted and advanced slowly through the superficial tissues until the point is felt to enter the suspected neoplastic mass. Guided by palpation with the disengaged hand, it is striking how readily a difference in consistence of the tissues can be felt as the needle enters a mass of neoplasm. When the point of the needle is felt to enter the tumor, the piston of the syringe is partly withdrawn so as to produce a vacuum and the needle slowly advanced one to three centimetres farther, depending on the anatomy and size of the tumor. Maintaining the vacuum, the needle is then withdrawn to the same distance and advanced again. This manipulation may be repeated two or three times at the discretion of the operator, *care being taken to maintain the vacuum when*

the needle is advanced or partly withdrawn. Aspiration with the needle at rest is not sufficient to draw tissue into the needle in most cases. By advancing the needle and aspirating simultaneously, a plug of tissue is both forced and drawn into the needle. Maintaining suction during partial withdrawal detaches the plug of tissue already within the needle. We have found this detail to be very essential. Before the needle is completely withdrawn from the tissue, the piston must be slowly released until the pressure in the needle is equalized, or better still, the syringe detached and the needle withdrawn separately, otherwise the aspirated material will be suddenly drawn and splashed over the interior of the syringe, making its collection difficult. While the needle is being advanced and withdrawn under negative pressure, a small quantity of blood mixed with fragments of tissue may enter the syringe, or a solid cylindrical mass of tissue may appear. In other cases, especially in the firmer masses, the syringe apparently remains empty, but after withdrawal, the needle is usually found to contain a plug of tissue.

After complete withdrawal of the apparatus, the syringe is detached from the needle, filled with air, attached and the contents of the needle slowly and carefully expelled on a glass slide. A small fragment of tissue should be left on the slide for smearing, and the remainder placed in the specimen bottle for fixation and staining by regular methods. If the needle is empty, small masses of tissue can almost always be found mixed with blood in the syringe, and these should, if necessary, be very carefully searched for. One or two of these small masses can readily be fished out upon a glass slide for smearing and immediate staining. In any case where the syringe contains blood or any tissue, formalin from the specimen bottle is poured into the open barrel of the syringe, agitated and returned to the specimen bottle.

Preparation of the Specimen.—In the average case, we have examined the material obtained by two methods: The shorter (a technic devised by one of us [E]) has the advantage of a reading in six to eight minutes and the longer, the advantage of a fixed and cleared preparation.

The Immediate Method.—The fresh tissue fragment on the glass slide is smeared by very firm flat pressure by another glass slide drawn once across. The smeared slide is fixed by heating gently over a gas flame until warm and dry, and is then prepared according to the following technic:

1. Alcohol (95 per cent.)—one minute.
2. Water—one minute.
3. Hæmatoxylin—one minute.
4. Water—one minute.
5. Eosin—one minute.
6. Alcohol (95 per cent.)—one-half minute.
7. Carbol-xylol—one-half minute.
8. Mount with Canada Balsam and cover glass.

Longer Method.—The remainder of the specimen is treated as any small biopsy, being carried through the stages of alcohol fixation and embedding in paraffin, great care being taken to collect and mass every minute particle

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of tissue, since a positive diagnosis may often be obtained from the smallest fragment. Absolutely fresh 52°-56° C. paraffin should be used for embedding, and all particles massed together on the block and cooled immediately on ice. Every section cut from the block should be examined for fear that in dealing with such small particles, one might lose the opportunity of making a positive diagnosis. We usually cut six to eight sections and place them on a single slide. These are carefully examined and further sections cut if the first are negative and more material remains on the block.

In case a reading is desired earlier than by our routine laboratory technic, we use the following method of preparation which requires about three hours.

The quick paraffin method :

1. Formalin 10 per cent.—ten minutes.
2. Alcohol 95 per cent.—two changes, ten minutes each.
3. Xylol—two changes, one-half hour each.
4. Paraffin 54° C.—two changes, one-half hour each. (First three steps in incubator 37° C.)
5. Cut and stain.

Interpretation of the Histological Preparation.—The interpretation of the smear, if it is to be of value, requires first of all the experience of a pathologist fully familiar with the field of neoplastic diseases. He must be cognizant of the probable types of tumors peculiar to the region under consideration. He must be aware of the pitfalls introduced into his interpretation by the possible inclusion of crushed normal tissue into his aspiration. He must familiarize himself with the differences in size and relation between the shrunken, fixed tumor cell of the paraffin section and the crushed, loosened, rapidly-fixed tumor cells of aspirated material. He must be associated with a clinician whose clinical interpretation of the facts of the case is accurate and reliable, and he must be capable of intelligently utilizing what may be called his pathological imagination. By the exercise of great care in preparation of both the smear and residue specimen, accurate diagnoses may be made from aspirated material. (Fig. 1.)

The information gleaned from the direct smear is usually sufficient to distinguish between an inflammatory process with leucocytes and lymphocytes predominating, and a malignant tumor with its atypical cells occurring singly or in groups. The paraffin section of the material enables one to classify and often grade the malignant process. Material from lymph nodes, particularly those invaded by epidermoid or squamous carcinoma, often shows liquefied or necrotic material with shadows of epithelial cells, singly or in groups. Careful search of the slide, however, may reveal just one small group of viable cells upon which a definite diagnosis may be made. This type of material often suggests pus, but pus cells are seldom found in the smear, although it may contain many flocculi and shreds of epithelium.

Various types of cells are encountered in the smears: leucocytes, lymphocytes, plasma cells, or swollen endothelial cells which may readily be confused with tumor cells. We search particularly for groups of cells, atypi-

cal in size and shape with definite hyperchromatic nuclei, as it is upon these that the most positive diagnosis of malignant disease can be made. Too much reliance should not be placed upon the direct smear unless one finds a definite group of atypical cells. Any other information should be considered suggestive only, until the paraffin section is secured which can be done in three hours if necessary. In the paraffin section, overlapping of cells and false arrangements are obviated, permitting more accurate classification and grading.

We have been able, however, to make correct diagnoses, as between benign and malignant lesions, in practically all cases and to check the diagnoses in about 60 per cent. of cases by paraffin sections on biopsies obtained by usual methods at a later date during the course of the disease. The smeared preparation should first be examined in its wet state following hæmatoxylin which permits deeper staining if necessary. If the smeared material appears too thick, gentle pressure with another slide may alter the arrangement of packed cells, and afford a better opportunity for staining and clearing. Lymphoid tissue must be left a little longer in alcohol for fixation which enables the cells to take the stain more readily.

When endeavoring to interpret a given smear or section of aspirated material, one must consider the source from which the specimen was obtained. The type of histological structure through which the needle has passed in securing the specimen must be kept in mind. Any structure foreign to this locality encountered in the smear must be carefully noted. Thus if a specimen aspirated from a lymph node in which one would expect lymphocytes or possibly some swollen endothelial cells to predominate, contains instead many epithelial cells, single or grouped, atypical and hyperchromatic, one must admit the probable invasion of this node by an epithelial tumor. If there is central necrosis and liquefaction of a lymph node, the aspirated material contains many loose cells, some necrotic and poorly staining, yet the shadowy outlines of these foreign cells should lead one to search the field for clearer and more typical cells upon which to make a diagnosis. These foci are usually found.

Results of the Method.—During our earlier experience, we were able to secure tissue by aspiration in about 80 per cent. of the cases attempted, the failures usually being in the harder fibrous tumors. With more experience and by more careful attention to the technic of aspiration, we practically always secure tissue. Where tissue was obtained, we have been able to distinguish between its malignant and benign nature in all cases and as our pathological staff becomes more familiar with the examination of tissue smears and fixed aspirated material, we are more often able to definitely classify the tumor process.

In Table I are listed sixty-five cases of neoplastic disease in which the diagnosis has been made by this method. In about 60 per cent. of the cases in this series the aspiration diagnoses have been checked and confirmed by histological sections obtained and prepared in the usual manner. We have

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TABLE I

Case No.	Clinical diagnosis	Site of aspiration	Histological diagnosis of aspirated material
1.	Tumor of cheek	Primary tumor through cheek	Spindle-cell sarcoma*
2.	Mediastinal tumor perforating sternum	Through skin over sternum	Solid cellular malignant tumor without definite epithelial character resembling lymphosarcoma or thymic tumor
3.	Tumor of lung	Lung tumor through posterior chest wall	Epidermoid carcinoma
4.	Tumor of heel	Heel	Endothelial myeloma
5.	Tumor of cheek	Cheek	Small-celled alveolar carcinoma,* salivary gland type
6.	Carcinoma (?) antrum	Antrum through cheek	Glandular carcinoma,* adenoma malignum
7.	Carcinoma (?) antrum	Antrum through cheek	Malignant epithelial tumor, probably transitional cell carcinoma*
8.	Tumor of lung	Lung tumor through posterior chest wall	Epidermoid carcinoma
9.	Carcinoma of tongue	Questionable metastatic neck node	Squamous carcinoma*
10.	Carcinoma (?) of thyroid or larynx	Tumor at anterior base of neck	Epidermoid carcinoma, probably from larynx
11.	Carcinoma (?) of thyroid or larynx	Tumor at anterior base of neck	Epidermoid carcinoma
12.	Sarcoma (?) of mandible	Primary tumor through alveolus	Chondrosarcoma*
13.	Adenoid cystic epithelioma of scalp	Metastasis in ilium at sacro - iliac joint	Adenoid cystic epithelioma*
14.	Post-operative tumor of sub-maxillary gland	Recurrence in sub-maxillary region	Adenoma malignum*
15.	Tumor of breast	Breast tumor	Loose malignant epithelial tumor,* no definite structure apparent
16.	Tumor of breast	Breast tumor	Alveolar carcinoma*
17.	Tumor of breast	Breast tumor	Malignant epithelial tumor consistent with breast carcinoma*
18.	Tumor of breast	Breast tumor	Malignant epithelial tumor consistent with breast carcinoma*
19.	Carcinoma (?) of larynx	Neck node	Squamous carcinoma
20.	Tumor of breast	Breast tumor	Malignant epithelial tumor consistent with breast carcinoma*
21.	Carcinoma (?) of sigmoid	Subcutaneous metastasis of chest wall	Adenocarcinoma*

* Indicates that the aspiration diagnosis was confirmed by paraffin section on larger biopsy obtained by the usual methods.

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TABLE I—*Continued*

Case No.	Clinical diagnosis	Site of aspiration	Histological diagnosis of aspirated material
22.	Tumor of neck	Neck mass	Hodgkin's disease
23.	Cystic tumor of jaw	Jaw tumor	Malignant epithelial tumor*
24.	Carcinoma (?) of larynx	Neck node	Squamous carcinoma
25.	Tumor of neck	Neck mass	Squamous carcinoma
26.	Carcinoma of tongue	Questionable neck node	Squamous carcinoma*
27.	Carcinoma (?) of antrum	Antrum through cheek	Squamous carcinoma*
28.	Tumor of neck	Neck node	Epidermoid carcinoma*
29.	Tumor of soft palate	Soft palate	Mixed tumor, salivary gland type*
30.	Carcinoma of floor of mouth	Submental node	Epidermoid carcinoma*
31.	Carcinoma of tongue	Neck node	Epidermoid carcinoma*
32.	Cervical adenopathy	Neck node	Transitional-cell carcinoma
33.	Carcinoma of tongue	Neck node	Epidermoid carcinoma*
34.	Carcinoma (?) of tonsil	Neck node	Malignant tumor, either a lymphoepithelioma or lymphosarcoma
35.	Cervical adenopathy	Neck node	Malignant tumor
36.	Carcinoma of cheek	Neck node	Epidermoid carcinoma*
37.	Cervical adenopathy	Neck node	Anaplastic epidermoid carcinoma
38.	Sarcoma (?) of humerus	Tumor of humerus	Osteogenic sarcoma*
39.	Carcinoma of thyroid	Neck node	Clusters of tumor cells
40.	Carcinoma of face	Mass over parotid gland	Squamous carcinoma*
41.	Carcinoma of oesophagus	Neck node	Degenerative squamous carcinoma*
42.	Carcinoma of parotid gland	Neck node	Squamous carcinoma*
43.	Carcinoma of tongue	Neck node	Epidermoid carcinoma*
44.	Sarcoma (?) of scapula	Tumor of scapula	Primary bone tumor with giant cells of type found in benign giant-cell tumor, though this is not sufficient to exclude malignant bone tumor
45.	Carcinoma (?) of submaxillary salivary gland	Submaxillary tumor	Tumor cells present, probably epidermoid carcinoma. (Later pathology after removal, mixed tumor, salivary gland type)

* Indicates that the aspiration diagnosis was confirmed by paraffin section on larger biopsy obtained by the usual methods.

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TABLE I—*Continued*

Case No.	Clinical diagnosis	Site of aspiration	Histological diagnosis of aspirated material
46.	Epulis (?)	Tumor of alveolus	Giant-cell epulis*
47.	Carcinoma of tongue	Neck node	Liquefied squamous carcinoma*
48.	Carcinoma (?) of thyroid	Neck mass	Numerous large spindle tumor cells, some with mitoses. Probably large spindle-cell thyroid carcinoma
49.	Transitional cell carcinoma of tonsil	Mass in scalp	Tumor cells present—type not determined.* (Specimen from tonsil—transitional-cell carcinoma)
50.	Lympho-epithelioma of tonsil	Diffuse swelling of forearm	Very cellular epithelial tumor, suggesting transitional-cell carcinoma*
51.	Lymphosarcoma (?) of neck	Neck node	Cellular epidermoid carcinoma
52.	Carcinoma (?) of antrum	Antrum through anterior wall	Schneiderian carcinoma*
53.	Cervical adenopathy	Neck mass	Squamous carcinoma
54.	Sarcoma (?) of humerus	Tumor of arm	Spindle-cell sarcoma, probably osteogenic
55.	Carcinoma (?) of prostate	Prostate through perineum	Carcinoma
56.	Carcinoma (?) of thyroid	Thyroid tumor	Malignant tumor, type undetermined
57.	Carcinoma of soft palate	Neck node	Transitional-cell carcinoma*
58.	Carcinoma of tongue	Neck node	Squamous carcinoma
59.	Carcinoma of floor of mouth	Neck node	Epidermoid carcinoma*
60.	Tumor of anterior chest wall	Chest wall tumor	Tumor cells in sheets are spindle and polyhedral, would consider carcinoma—possible thymic, thyroid or bronchogenic
61.	Tumor of thigh or femur	Thigh	Multinucleated tumor giant cells. Sarcomatous tumor probably neurogenic or myogenic
62.	Tumor of pelvis	Pelvic tumor	Masses of atypical cartilage cells—either chondroma or chondrosarcoma
63.	Cervical adenopathy	Neck node	Solid sheets of large lymphoid cells, consistent with reticulum-cell lymphosarcoma
64.	Tumor of breast	Breast tumor	Large number of spindle and polyhedral cells with atypical mitoses—sarcoma
65.	Tumor of thigh	Thigh tumor	Spindle-cell sarcoma—neurogenic

kept no definite record of the instances in which normal tissue, pus, or other fluid has led to an eventual diagnosis of a benign lesion. Obviously the

* Indicates that the aspiration diagnosis was confirmed by paraffin section on larger biopsy obtained by the usual methods.

aspiration of normal tissue may not be considered alone as conclusive evidence of a benign process.

The actual value of this method of biopsy in selected cases depends upon the fact that diagnoses can be made without loss of time and in instances where there are definite contraindications or obstacles to securing tissue by any other method. If in any case tissue can readily and safely be secured in larger amounts by any other procedure, there is no advantage in aspiration. An analysis of the cases in Table I will illustrate indications and advantages of the method in our series.

Nodes of the Neck.—In almost half of the cases in our series, the aspiration was done on neck nodes or masses. The indications and value of this

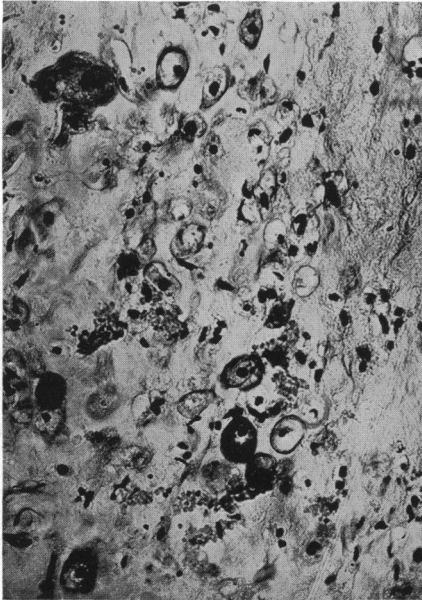


FIG. 5.—Chondrosarcoma of mandible. Smear of aspirated material (Case 12).

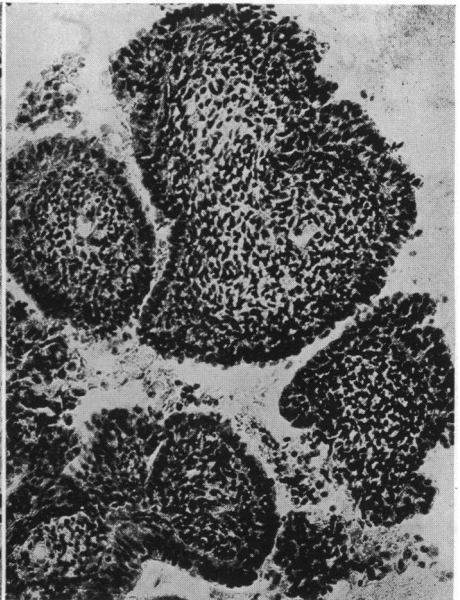


FIG. 6.—Adenoma malignum of metastatic neck node. Paraffin section of aspirated material (Case 14).

method of biopsy in neck nodes is illustrated by the citation of a few of these cases.

In Cases 22 and 25 there were firm solid masses in the neck without any other definite clinical or laboratory evidence of a primary or constitutional disease. Aspiration quickly established the diagnoses as Hodgkin's disease and squamous carcinoma respectively.

Cases 10 and 11 presented indurated fixed masses at the anterior base of the neck with moderate dyspnoea. Laryngeal examinations showed infiltration and pressure on the larynx, but no ulceration. The diagnosis lay between carcinoma of the thyroid and carcinoma of the larynx. Aspiration of the neck mass revealed squamous carcinoma in each case, establishing the larynx as the original site of the disease.

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Cases 19 and 24 presented typical clinical pictures of moderately advanced carcinoma of the larynx. Biopsies taken, twice in each case, from ulcerating and granular tissue within the larynx, showed simply granulation tissue. Neck nodes in each case were aspirated and squamous carcinoma found, establishing the diagnosis for a prognosis and for completion of the records. In Case 2 a diagnosis of a malignant process was obtained for record.

In Cases 9 and 26 the diagnoses had been made by biopsies from the primary lesions, but in subsequently developing neck nodes, the question of their metastatic or benign nature arose in determining treatment. In each of these cases, aspiration definitely settled their metastatic character and

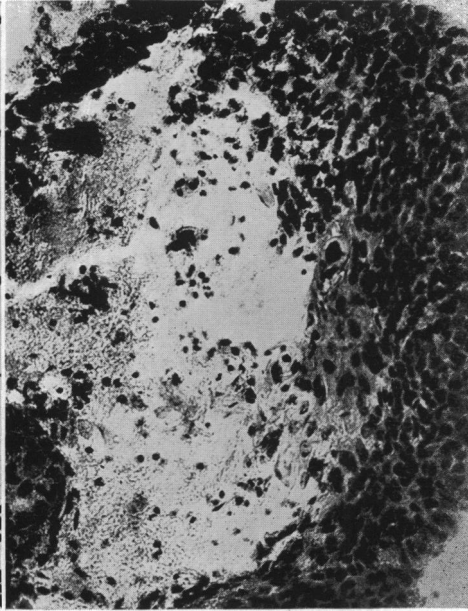
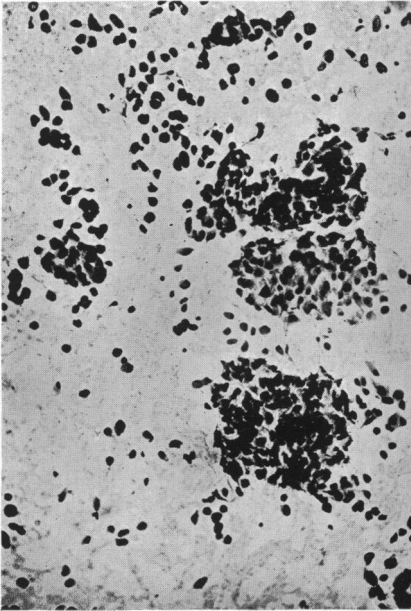


FIG. 7.—Carcinoma of breast. Smear of aspirated material (Case 15).

FIG. 8.—Epidermoid carcinoma of metastatic neck node. Smear of aspirated material (Case 24).

appropriate measures were taken. Case 14 came to Memorial Hospital with a local recurrence about eight months after operative removal of a sub-maxillary mass. We were unable to secure a pathological report from the operating surgeon, but aspiration showed adenoma malignum.

Intra-Oral Tumors.—In Cases 1, 23, 29, and 46 there were non-ulcerating tumors of the cheek and jaw in which incision carried with it the danger of fungation of the tumor. By aspiration we were able to diagnose them as spindle-cell sarcoma, parotid tumor, mixed tumor of salivary gland type, and epulis, respectively.

Tumors of the Antrum.—Unless the disease has perforated the hard palate or into the nasal cavity, biopsy must usually await antrotomy. In Cases 6, 7, 27, and 52 aspiration was done through the cheek and partly

eroded bone of the anterior antral wall. A diagnosis of carcinoma was made in each case without waiting for operation.

Tumors of the Lung.—In Cases 3 and 8, X-rays showed a mass within the parenchyma of the upper lobe of the lung. Bronchoscopic examinations were negative and offered no opportunity for biopsy. After a careful study of stereo-röntgenograms, a needle was inserted through the chest wall and material aspirated upon which a diagnosis of carcinoma was made.

Tumors of the Breast.—In Cases 15, 16, 17, 18, and 20 there was a real question in the mind of the surgeon as to whether he was dealing with benign or malignant tumors. This question might eventually have been decided during treatment at operation, but we believe that it has been of definite value, both to the patient and surgeon, to have an immediate definite diagnosis in order to plan and expedite both irradiation and possible surgery. In Case 64, there was a large non-ulcerating tumor of the breast in which aspiration made possible the rather rare diagnosis of sarcoma.

The danger of favoring metastases by the manipulation of aspiration in breast tumors is, of course, to be seriously considered but, where the diagnosis is much in doubt, it is ordinarily settled by surgical exposure and frozen section which would undoubtedly be a far greater factor in dissemination than simple puncture and aspiration.

Sarcoma of Bone.—In Cases 12, 38, 44, 54, and 62 diagnoses of various types of bone sarcoma were made from aspirated material. In two of these cases, the diagnoses were checked later by histological section of post-operative material and found correct. The danger of fungation of bone sarcoma through the operative incision is wholly eliminated by aspiration and it seems to us that the chances of general dissemination are slight. Coley⁶ admits the hazards of surgical biopsy, but insists that it should be done in all cases of suspected giant-cell tumors of bone, in which conservative therapeutic measures (radiation or curettage) are to be used. He arrives at these conclusions after an analysis of thirty cases of supposed giant-cell tumors in which there was an error of 25 per cent. in röntgenray diagnoses in various clinics. His views are opposed by those who maintain that the dangers of surgical biopsy outweigh the advantages, should the case be one of malignant bone tumor rather than a benign giant-cell type. It seems to us that both sides of the question might be answered by an aspiration diagnosis.

Miscellaneous Tumors.—In Cases 2, 4, 5, 21, 28, 32, 34, and 45, the nature of various tumors, primary or metastatic, was determined without danger of fungation through an incision. In this group the wide range of usefulness of aspiration in the study of malignant disease is again illustrated. Quite often the knowledge of an individual case must remain incomplete because further investigation would cause unjustifiable suffering or other unfavorable consequences. In certain instances these investigations may not benefit the patient, but may be of great interest in the general study of the disease.

The importance of histological diagnosis in the treatment of neoplastic

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disease needs no emphasis. In some clinics it is mandatory before treatment by radiation. Biopsy by surgical exposure is too often extremely ill-advised when casually performed by a surgeon who contemplates no further treatment, and it should be severely condemned when done in this manner without careful consideration and definite purpose.

Biopsy by aspiration has, we feel, few, if any, disadvantages to the patient from the surgical standpoint. The interpretation of the histological picture (especially of the smears) requires both an experienced and sympathetic pathologist. Undoubtedly, larger specimens uniformly fixed and stained offer more satisfactory material upon which to render a definite opinion, but such a preparation can too often be obtained only at considerable disadvantage to the patient or too late to be of any particular value in outlining treatment. A post-mortem diagnosis never benefits the one most concerned, the donor of the specimen.

We do not advocate this method of biopsy in any case where larger specimens of tissue can be readily and safely secured by any other method. The chief disadvantage of biopsy by aspiration is that one diameter of the specimen is very small—the same as the bore of the needle. In such a small specimen the characteristic cell arrangement may be difficult to determine as, for instance, in glandular carcinoma. In a smeared specimen it is usually lost entirely. While the lack of definite cell arrangement in smears or very small fragments often prevents accurate classification of the lesion, one is still able to definitely determine whether such tissue is malignant or benign. The accurate classification of tissue specimens is quite often impossible with frozen sections and when one considers the difficulty experienced with frozen sections, often too thick or poorly stained, and compares the necessary time and equipment required for that method with the rapidity and ease of preparation of smears from aspirated material, it might well become the method of choice when fortified by paraffin section of a portion of the same material.

We are indebted to Doctor Ewing and Doctor Stewart for many helpful suggestions and for the interpretation of the histological findings.

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