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VOLUME ONE

1 Introduction

Historical perspective

Surgical pathology has come a long way since the time that Velpeau, famous professor of clinical surgery at the Paris Faculty, stated in his work on diseases of the breast published in 1853: "The intervention of the microscope is not at all necessary to decide whether such and such a tumor, which has been removed, is or is not of cancerous nature."* In the 1870's, Carl Ruge and his associate Johann Veit, of the University of Berlin, introduced the surgical biopsy as an essential diagnostic tool. Despite the inevitable controversies that followed, Friedrich von Esmarch, professor of surgery at Kiel and a leading military surgeon, presented forceful arguments at the German Surgical Congress of 1889 on the need to establish a microscopic diagnosis before operating in suspected cases of malignant tumors requiring extensive mutilating procedures. Shortly thereafter, the freezing microtome was introduced, and the frozen section procedure hastened the acceptance of this recommendation. In this country, the specialty of surgical pathology was conceived and developed by surgeons and gynecologists. It is said that William S. Halsted was the first American surgeon to create a division of surgical pathology in his department. Joseph Colt Bloodgood is credited as being the first full-fledged American surgical pathologist.[10]

*From Velpeau AALM: Traité des maladies du sein et de la region mammaire. Paris, 1853. Translated into English by Henry M: A treatise on the diseases of the breast and mammary region. London, 1856, pp. 479-480.

Surgical pathology and the pathologist

The department of pathology in large medical centers should have a division of surgical pathology closely affiliated with the clinical and surgical departments. Surgical pathology implies surgery, but actually the surgical pathologist is closely affiliated with many branches of medicine. This includes all the surgical specialties, internal medicine, dermatology, neurology, diagnostic radiology, radiation therapy, and medical oncology. Although the study of radiology deals with shadows and the study of pathology with substance, the correlation of those shadows with the gross substance strengthens the diagnostic skill of the radiologists, explains errors in radiologic interpretation, and instills humility rather than dogmatism. The radiotherapist and medical oncologist, too, can learn much from the study of surgical pathology, particularly the correlation between sensitivity to therapy and microscopic tumor types and the effects of therapy on normal tissue. Furthermore, explanations for the success or failure of therapy may become apparent by the study of surgical specimens.

The surgical pathologist has the unique opportunity of bridging the gap between the beginning of disease and its end stages, and he should take advantage of this circumstance. He can do this only after a solid foundation of study at the autopsy table, where the ravages of cancer, tuberculosis, ulcerative colitis, and other diseases are all too clear. With this background, he can then correlate the initial stages of disease seen in specimens from living patients in the surgical pathology laboratory. With this objective in mind, the student may make many fundamental contributions to knowledge. With the integration of clinical findings, pathologic anatomy is still a living science.

By the very nature of the material submitted to him, the surgical pathologist makes mistakes. He sees the earliest subtle and sometimes bewildering changes in Hodgkin's disease. He may not recognize that the minimal granulomatous response in a lymph node is really a peripheral manifestation of histoplasmosis. The surgical pathologist must continue

to haunt the postmortem table, for there his diagnoses are confirmed or his errors are made painfully clear. The necessity of follow-up on the patient in whom the diagnosis is not certain is mandatory. Time is often a better diagnostician.

The surgical pathologist not only must know his own field thoroughly, but he also must have a rich background in clinical medicine. He needs to understand the clinicians' needs and respond to them accordingly. He must be in a position to advise the clinicians about the biopsy or the excised material he receives. It is not sufficient for him to say whether a lesion is benign or malignant. He must be able to tell the surgeon the extent of the disease, the adequacy of the excision, and other pertinent information. He should also be able to comment on whether additional therapy may be necessary and give information on the prognosis of the disease. He should communicate with clinicians constantly, informally and through interdepartmental conferences. The ever-increasing complexity of medicine has led to the unavoidable development of subspecialization within surgical pathology. There is no question that in some cases clinicians are best served by surgical pathologists who have special expertise in certain areas and fully understand the clinical implications of their pathologic findings. Hematopathology, nephropathology, neuropathology, and dermatopathology are prime examples of such subspecialties.

Surgical pathology and the nonpathologist

By its very nature, surgical pathology depends heavily on the input of clinicians and surgeons who are fully aware of the potentials and limitations of the specialty. They should know that a microscopic diagnosis is a subjective evaluation that only acquires full meaning when the pathologist is fully cognizant of the essential clinical data, operative findings, and type of operation. The requisition slip for pathologic study should ideally be completed by a physician familiar with the case (Fig. 1); too often the task is delegated to a medical student, a nurse, or the surgery resident who was requested to perform the biopsy. A conversation between the surgeon and the pathologist the evening before a contemplated frozen section may facilitate matters for both the next morning.

One of the best ways for a clinician to acquire a feeling of what the specialty is and how it can be best used is for him to have a full-time rotation in surgical pathology during his residency years. Ideally, this rotation should be of six months' duration; if this is not feasible, a minimum of two to three months should be required. We have found this practice invaluable in establishing a mutually beneficial rapport between surgeons and pathologists.

The surgeon we choose to operate has not only technical dexterity (a fairly common commodity), but also, more important, good judgment and a personal concern for his patient's welfare. The surgeon with a prepared mind and a clear concept of the pathology of disease invariably is the one with good judgment. Without this background of knowledge, he will not recognize specific pathologic alterations at operation nor will he have a clear concept of the limitations of his knowledge, and therefore he will not know when to call the pathologist to help him. Without this basic knowledge, he may improve his technical ability but never his judgment. One might say that with him his ignorance is refined rather than his knowledge broadened.

It is unfortunate that in some specialized areas of pathology (especially gynecology, dermatology, and gastrointestinal pathology), a conflict still persists in some quarters as to who should be interpreting the microscopic slides and in which department the laboratory should be located. Many are the reasons why it is unadvisable for clinicians to become their own pathologists and charge the patients on both accounts. An objective evaluation of the slide is compromised because of the conscious or unconscious tendency that we all have to agree with ourselves. Since the situation created is one of self-referral, there is an economic incentive to perform more, rather than fewer, microscopic examinations. The situation is comparable to the practice of radiology by nonradiologists, where it has been shown that the nonradiologist physician who owns an x-ray machine uses an average of twice as many x-ray examinations as do colleagues who refer patients to radiologists.[4]

There is a fundamental unity to the morphologic patterns of disease in the human body that can be appreciated only by being familiar with those patterns as they occur in different organ systems. Only by understanding the pathology of disease as a whole can the manifestation of that disease in a given organ be fully

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UNIVERSITY OF MINNESOTA HOSPITALS
SURGICAL PATHOLOGY TISSUES
PATHOLOGY NO. [redacted]

BIRTHDATE	AGE	SEX	DATE PREPARED
08/09/07	71	M	6/11/79

ORDERED BY [redacted] M.D. STATION 41

[redacted]

PATIENT IDENTIFICATION PLATE

X		DESCRIPTION	X		DESCRIPTION
X	0988-6	GROSS + MICRO		1370-6	REVIEW OUTSIDE SLIDES (from)
	0987-8	GROSS ONLY			
X	0383-0	FROZEN SECTION		1585-9	TISSUE BACT. SAMPLING
	1372-2	FROZENS, ADDITIONAL		1594-1	ENZYME HISTOCHEMISTRY
	1598-2	ELECTRON MICROSCOPY		1595-8	IMMUNOPATHOLOGY, BASIC
	1584-2	DEMINERALIZATION		1596-6	IMMUNOPATHOLOGY, EXTRA
	1582-6	SPECIMEN PHOTOGRAPH		1597-4	IMMUNOPATHOLOGY, PHOTO
	1583-4	SPECIMEN ROENTGENOGRAM		1601-4	BIOCHEM. ANALYSIS I
	1586-7	SPECIAL DISSECTION		1602-2	BIOCHEM. ANALYSIS II
X	1371-4	TISSUES, ADDITIONAL		1604-8	BIOCHEM. ANALYSIS III
	1638-6	SPECIAL STAIN I		1600-6	TISSUE CULTURE EXAM
	1591-7	SPECIAL STAIN II		1587-5	SMEAR EXAMINATION
	1592-5	SPECIAL STAIN III		1639-4 N/C	OUTSIDE CONSULTATION

FOR OB/GYN CASES

MENSES: Onset ____ ys; Comes q ____ days;
Lasts ____ days; Character ____
LAST MENSES (date) ____ P.M.P. (date) ____
Gravida ____ Para ____ Aborta ____
Hormone Therapy ____

CLINICAL HISTORY (INCLUDING ANY PREVIOUS SPECIMEN AND THERAPY, CURRENT PHYSICAL AND RADIOGRAPHIC FINDINGS):
71 y/o ♂ 3 mos of SOB & HEMOPTYSIS ♂ 26 LB wt ↓. SMOKED FOR MANY YEARS UNTIL 20 YRS AGO. NOW WITH MASS IN UPPER (R) HILUM AND IN (R) PARATRACHEAL AREA ON CXR.
FOR MEDIASTINOSCOPY TODAY ♂ POSS. BRONCHOSCOPY FOR TISSUE DX & EVAL FOR ? RESECTABILITY.

LABORATORY FINDINGS: ABG's - 7.55 36 56 UNR alk phos; PFT's: OBSTRUCTIVE DISEASE (MILD) (MODERATE)
pH. CO_2 O_2

CLINICAL DIAGNOSIS: OAT CELL CA (R) LUNG

POSTOPERATIVE DIAGNOSIS:

OPERATIVE FINDINGS AND PROCEDURE: MEDIASTINOSCOPY AND BIOPSY

SPECIMENS
(1) MEDIASTINAL NODE.

[redacted] 134-03-26-8 BD: 8-07 AGE: 71 (8-9-07)
C79-1752 Spu-Neg C79-1753 Spu-Inadeq for cytologic exam
JH79-3191 Rmainstem bronch bx-Clusters of atyp cells present c/w ca;Carina-Tiss insuff for dx.
PREVIOUS MATERIAL

F 26, NOV 78

WHITE - LAB COPY, YELLOW - BUSINESS OFFICE PINK - DUPLICATE COPY GREEN - STENO COPY BLUE - SPECIMEN COPY

Fig. 1 Properly completed requisition slip for surgical pathology evaluation. Upon receipt of the material in the laboratory, it is given an accession number, and information on any previous pathologic studies on the same patient is attached to the slip.

comprehended. This is the main reason why a clinician cannot hope to deal adequately with some small branch of surgical pathology. Disease does not cooperate with him by remaining neatly confined to an anatomic system.

It is encouraging to see that the trend in the United States (where, paradoxically, this problem has been more acute) is decidedly toward a restitution to the pathology departments of what logically belongs to them. Medicine has become too complex to be handled with the approach of the Renaissance man. The days in which the gynecologist examined the patient, looked at the x-ray films, performed the surgery, examined the surgical specimen microscopically, and administered radiation therapy are over. As far as pathology is concerned, the process is likely to be accelerated by the economic factors that are playing an increasingly important role in shaping the practice of medicine. Modern surgical pathology can no longer be performed in a laboratory equipped with a tissue processor, a paraffin oven, a set of reagents, and a microscope. It requires facilities for electron microscopy, enzyme histochemistry, immunohistochemistry, tissue culture, and other sophisticated techniques. To have these expensive and complicated facilities duplicated within each of the major clinical and surgical departments of a medical center is financially absurd, a fact that has not escaped the attention of hospital administrators and third-party payers. An additional reason why the pathologist interpreting microscopic slides should not belong to a clinical department is that only by remaining independent can he have the unbiased approach necessary for the performance of his functions. He should be in a position to discuss freely with the clinician the indications for the performance of a biopsy, a frozen section, or a surgical procedure. Tissue committees and the important quality control function that they fulfill depend largely on the pathologist's prerogative, free of any interference, to present facts and question procedures.

At this point, it is only fair to mention that many of the problems alluded to are of our own making. One of the main reasons why clinicians began to act as pathologists and set up pathology minilaboratories in their own departments was because many departments of pathology were unable or unwilling to provide the services that clinicians rightfully demanded. In the past, the diagnosis of tissue removed from a living patient often was delegated to a resident, and reports emanating from the department of pathology not only were delayed, but also often indicated only whether the tissue was benign or malignant. These circumstances sometimes forced clinicians to direct some branch of surgical pathology. Under these conditions, the clinician's diagnoses and recommendations were better than those of the experienced, disinterested pathologist. Although it is mandatory for the clinician to have some knowledge of surgical pathology, it is difficult, if not impossible, to be both a competent clinician and a skillful pathologist. Nor is it rational for the surgical pathologist to believe himself capable of doing radical mastectomies as a sideline. There are exceptional persons who are not trained pathologists but who have made fundamental contributions to pathology in their respective fields of interest. However, the most profitable arrangement is to have an experienced pathologist with a clinical background working with clinicians interested in pathology.

Surgical pathology report

The delivery of a specimen in the surgical pathology laboratory initiates a complex series of events that culminates in the issuance of the final report. A flow chart describing the mechanism for handling the surgical pathology cases in our laboratory at the University of Minnesota Hospitals is shown in Fig. 2.

The surgical pathology report is an important medical document that should describe, as thoroughly and concisely as possible, all the relevant gross and microscopic features of a case but should also interpret their significance for the clinician. It should be prompt, accurate, and brief. The pathologist should avoid unnecessary histologic jargon that is of no consequence to the case and concentrate on the aspects that bear a relation to therapy and prognosis. To quote Richard Reed: "A competent [pathologist] is not simply a storage site for microscopic verbiage. It is not enough to be able to recite by rote the microscopic findings once the clinical diagnosis is established. The ability to offer clinical differential diagnoses from the interpretation of microscopic findings is the mark of the mature [surgical] pathologist. In addition, he may record data that are prognostically significant or offer suggestions for pertinent clinical tests. The ability to recognize cytologic and histologic features

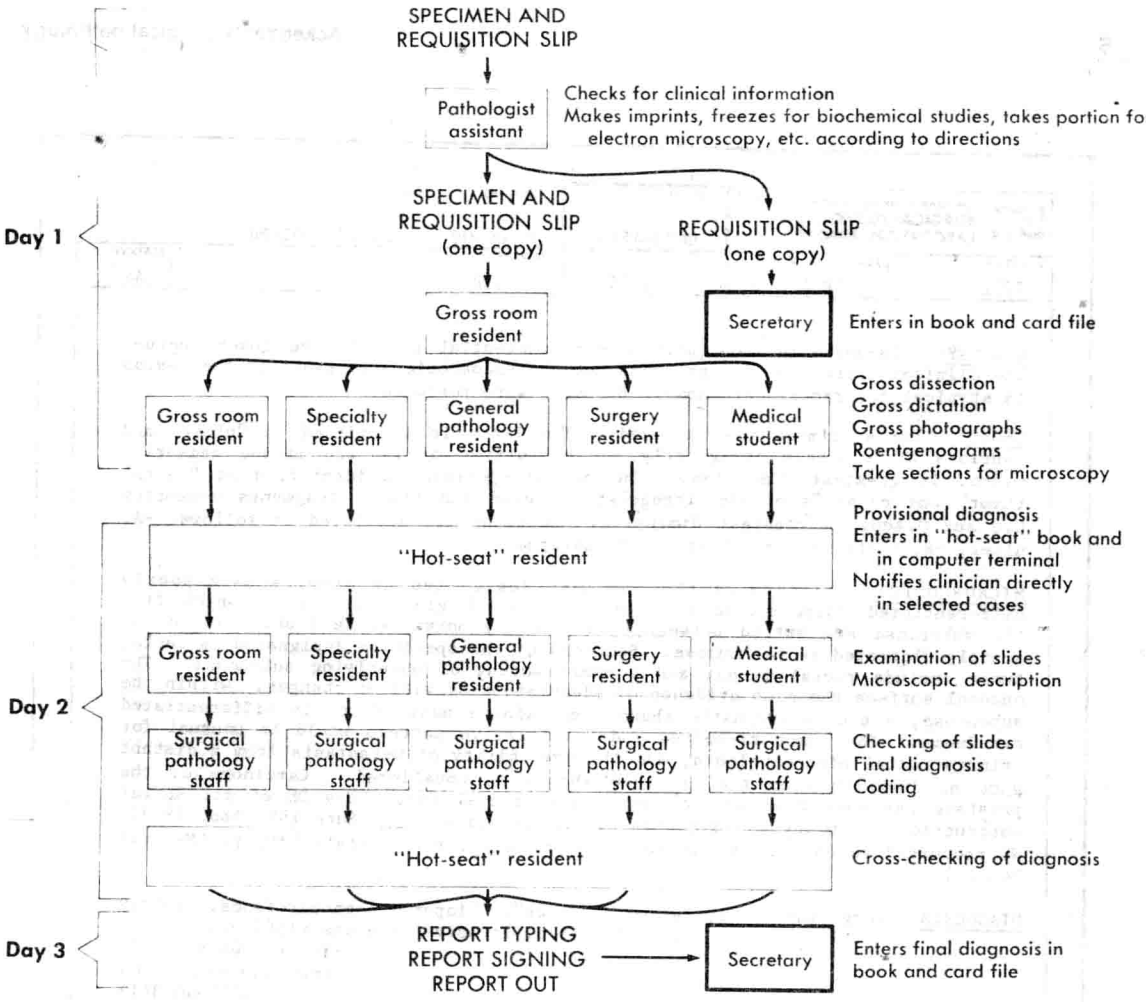

Fig. 2 Surgical pathology flow chart. Flow of activities from the time a specimen is received in the surgical pathology laboratory to the time the final report is issued.

is simply a beginning. The ability to integrate microscopic findings into a meaningful interpretation is the distinguishing characteristic of a pathologist and is the art of pathology."*

The usual surgical pathology report is comprised of four major parts (Fig. 3). The first, designated as "History," contains the essential clinical data known to the pathologist at the time he dictates a description of the gross specimen(s), such as sex and age of the patient, symptoms, operative findings, and type of operation. If a frozen section had been performed, the information regarding the organ biopsied, the diagnosis given, and the names of the pathologist(s) who performed the procedure should be included as part of the history. This portion of the report also should list previous biopsies on the same patient, if any had been taken. We insist on having a "History" section in all of our reports, no matter how brief, because it gives the reader of the report, whether a clinician or another pathologist, an immediate orientation as to nature of the problem that led to that particular operation in the context of the whole disease.

The second part of the report, known as

*From Reed RJ: New concepts in surgical pathology of the skin. New York, 1976, John Wiley & Sons, Inc. (Wiley Series in surgical pathology, Hartmann W, ed).

UNIVERSITY OF MINNESOTA HOSPITALS
SURGICAL PATHOLOGY LABORATORY REPORT

SURG. PATH. NO.	HOSP. NO.	NAME
UH79-4848	000-00-00	JONES, JOSEPH

BIRTHDATE	AGE	SEX	DATE	SURGEON	STATION
7/01	78	M	6/1/79	SMITH	44

HISTORY: 78-year-old male with a circumferential mass in the lower rectum. The clinical impression is carcinoma but the endoscopic appearance of the lesion is atypical for rectal carcinoma. Biopsies were performed.

GROSS: Two specimens are received. The first is identified as "ulcer" and consists of a single irregularly shaped portion of red-tan tissue measuring 0.5cm. in greatest dimension. The second specimen is identified as "rectal tumor" and consists of two irregularly shaped tan tissue fragments measuring 0.6 and 0.4cm. in greatest dimension. Sections are submitted as follows: -A, ulcer; -B, rectal tumor. (Jar 0) (Maizel)phm

MICROSCOPIC: Sections of the specimen designated as ulcer show a poorly differentiated adenocarcinoma composed of small glands and nests which fill the submucosa and extend between cytologically unremarkable glands within the acutely ulcerated rectal mucosa. Sections of the specimens designated as rectal tumor include rectal mucosa and a small amount of underlying submucosa. The mucosal surface shows no evidence of adenomatous of villous changes. Within the submucosa, a single lymphatic channel contains a nest of poorly differentiated carcinoma. The tumor histology and infiltrative pattern would be unusual for primary rectal adenocarcinoma, and the possibility of metastasis from a distant site or invasion from the prostate should be considered. Carcinoma of the prostate can rarely present as an annular rectal tumor (Fry DE et al: Rectal obstruction secondary to carcinoma of the prostate. Ann Surg 189: 488, 1979). We recommend serum acid phosphatase determination and prostate biopsy. (Maizel/Foucar)

DIAGNOSIS: Large intestine, rectum, ("ulcer"), biopsy - Adenocarcinoma, poorly differentiated, invasive (see description).
6700-8016(7700s-8143)(1)
- Acute ulceration.
6700-4003(1)

Large intestine, rectum ("rectal tumor"), biopsy - Adenocarcinoma, poorly differentiated (lymphatic spread).
6700-8016(7700s-8143)(1)

cef/phm
6/12 6/12
rfa29

E Foucar

C. ELLIOTT FOUCAR, M.D.

OTHER PATH. NOS.	TUMOR REGIST. NO.	T.R. OPTIONAL NOS.	SPECIMEN IN	REPORT OUT
☐ AND OTHERS	7700s-8143		6/1/79	6/3/79

16709, JULY 78 PAGE ____ CHECK IF CONTINUED → ☐

MEDICAL RECORDS

Fig. 3 Example of a surgical pathology final report.

"Gross," contains the gross description of the specimen(s). This should be precise and thorough, because once the gross specimen is discarded, this description remains as the only document by which the gross features of the case can be evaluated. It should indicate how the various specimens were identified (or unidentified) by the surgeon and whether they were received fresh or fixed, intact or open. The specimens should be described in a logical sequential fashion, with a clear description of gross abnormalities and their location. Lengthy anatomic descriptions of normal structures should be avoided. Size, color, and location of all lesions should be recorded. The metric system is to be used for all measurements. It is advisable to give specific dimensions and descriptions rather than to provide comparisons with oranges, apples, grapes, etc. The weight of the whole specimen, and sometimes the weight of the individual organs or lesions in a specimen, should be recorded whenever possible. It is important to be accurate, factual, and noncommittal in the gross description, avoiding subjective interpretations as much as possible. Azzopardi[1a] rightly commented that the contents of a mammary cyst are better described as amber, brownish, greenish, opaque, or white rather than "blood-stained," "pus," or "milky" because the reason for the color of a secretion is often unknown. This sensible advice should be applied to other lesions as well. We prefer to identify the various sections taken by using letters of the English alphabet sequentially (rather than the first letter of the specimen or some other code), and we list this identification at the end of the gross description rather than after each specimen. The "gross" portion of the report is concluded by noting whether or not all of the tissue was submitted for microscopic examination and by including the name of the pathologist who performed the gross examination.

The third part of the report is the "Microscopic." This should be short and to the point. The surgeon usually is not too interested in whether the nucleoli are acidophilic, basophilic, or amphophilic but rather what that means, if anything; if another pathologist is keen on this point, he probably will like to examine the slide himself. We incorporate our diagnostic interpretation, differential diagnosis, and other relevant comments (such as prognostic considerations, selected references, etc., when indicated) to the microscopic portion of the report. Others prefer to separate these from the purely morphologic description and place them in a section designated "Comments."

The fourth and most important part of the report is the "Diagnosis." Each specimen received should have a separate diagnosis or diagnoses. Our practice is to divide each diagnosis into two parts, separated by a dash. The first lists the organ, specific site in that organ, and operation; the second gives the morphologic diagnosis (example: Bone, femur, biopsy —Osteosarcoma). This is useful for coding purposes and, again, it provides the reader with all the essential information on that particular specimen in a single entry. The SNOMED code follows. Copies of the pathology report are sent to medical records, the treating physician, station, or clinic, and the tumor registry; of the two copies that remain in the laboratory, one is used for coding purposes and the other is filed and eventually bound.

It is medically and legally important that the diagnoses and comments made by the pathologist on a given case be documented as clearly as possible in a written form in the clinical chart through the pathology report. This should be done because sometimes there is a remarkable discrepancy between the diagnostic considerations given verbally by the pathologist to the clinician and the paraphrasing of these considerations by the clinician in the chart. Each remark of importance given verbally should be incorporated into the final pathology report. At the time of a frozen section, the diagnosis given verbally to the surgeon should be transcribed in an appropriate form and a copy of such form incorporated immediately into the chart (Fig. 4). Another copy should remain in the laboratory and filed with the frozen section slides. If the frozen sections are performed by several individuals on a rotation basis, it is important for a senior pathologist to review the material periodically to ensure that the quality of the sections and the agreement between the frozen section diagnosis and the final diagnosis remain at an acceptable level. These periodic reviews are useful also in pointing out patterns of use and misuse of the procedure by the various departments and their individual members.

When an urgent decision needs to be made on the basis of a pathologic finding, the clinician should not have to wait for that information to reach him via the routine typewritten report.

UNIVERSITY OF MINNESOTA HOSPITALS
SURGICAL PATHOLOGY FROZEN SECTION

HOSP NUMB 1036499-0
NAME Doe, Jane

DOCTOR	DATE	SURG PATH NUMBER
Bard Parker	6-7-79	R79-4893

HISTORY:

52 year old female who developed diabetes one year ago and presents now with history of 80 lb weight loss and recent onset of malabsorption syndrome

OPERATION AND SURGICAL FINDINGS:

Exploratory Laparotomy

FROZEN SECTION DIAGNOSIS:

	SITE OF BIOPSY	DIAGNOSIS	BY
1	Pancreas, needle bx:	Chronic pancreatitis, no tumor seen	
2	Pancreas, needle bx:	adenocarcinoma	
3	Lymph node, peripancreatic tissue:	metastatic adenocarcinoma	DRK JPH
5			
6			
7			
8			

FROZEN SECTION REVIEW: (FOR LABORATORY USE ONLY)

DX SAME AS PERMANENT	☑
DX DIFFERENT FROM PERMANENT	☐
DX DEFERRED ON F.S.	☐
INDICATION	Yes, definite –
CHECKED BY	JR 6/20/79

17095, JUN 77 (P-8808)

WHITE-MEDICAL RECORDS YELLOW-LABORATORY

Fig. 4 Form used in the surgical pathology laboratory for frozen sections: One copy is incorporated in the chart at the time of the procedure.

SURGICAL PATHOLOGY DIAGNOSIS REPORT 20:00 5 JUN 1979

	PATIENT NAME	PATIENT ID	CASE NUM.	SEX	BIRTH	COLLECTION
1.	[redacted]	[redacted]	[redacted]	M	8/ 1/1908	6/ 5/1979
	TOPOGRAPHY = 56	SOFT TISSUE,BIOPSY				
	PRELIMINARY DIAGNOSIS = B5	CARCINOMA,METASTATIC				
2.	[redacted]	[redacted]	[redacted]	M	6/ 7/1930	6/ 2/1979
	TOPOGRAPHY = 59	SPLEEN				
	PRELIMINARY DIAGNOSIS = E4	HYPERPLASIA,LYMPHOID				
3.	[redacted]	[redacted]	[redacted]	M	1/ 7/1896	6/ 4/1979
	TOPOGRAPHY = 31	LYMPH NODE				
	PRELIMINARY DIAGNOSIS = G1	INFLAMMATION,GRANULOMATOUS				
	A8	CALL SURGICAL PATHOLOGY				
	L4	SPECIAL STAINS PENDING				
4.	[redacted]	[redacted]	[redacted]	F	0/ 0/ 0	6/ 4/1979
	TOPOGRAPHY = 81	VULVA,BIOPSY				
	PRELIMINARY DIAGNOSIS = E9	INFLAMMATION,CHRONIC				
	E1	GLANULATION TISSUE				
5.	[redacted]	[redacted]	[redacted]	F	9/ 7/1903	6/ 4/1979
	TOPOGRAPHY = 55	SKIN,EXCISION				
	PRELIMINARY DIAGNOSIS = G5	KERATOSIS,SEBORRHEIC				
	TOPOGRAPHY = 57	SOFT TISSUE,EXCISION				
	PRELIMINARY DIAGNOSIS = A1	ABSCESS				
6.	[redacted]	[redacted]	[redacted]	M	5/29/1956	6/ 4/1979
	TOPOGRAPHY = 57	SOFT TISSUE,EXCISION				
	PRELIMINARY DIAGNOSIS = E5	HERNIA SAC				
7.	[redacted]	[redacted]	[redacted]	F	2/11/1950	6/ 4/1979
	TOPOGRAPHY = 10	BREAST,BIOPSY				
	PRELIMINARY DIAGNOSIS = A9	CARCINOMA,ADENOCARCINOMA				
8.	[redacted]	[redacted]	[redacted]	M	6/27/1945	6/ 4/1979
	TOPOGRAPHY = 61	STOMACH,BIOPSY				
	PRELIMINARY DIAGNOSIS = E9	INFLAMMATION,CHRONIC				
9.	[redacted]	[redacted]	[redacted]	F	7/16/1921	6/ 4/1979
	TOPOGRAPHY = 61	STOMACH,BIOPSY				
	PRELIMINARY DIAGNOSIS = E9	INFLAMMATION,CHRONIC				
	D1	EDEMA				
10.	[redacted]	[redacted]	[redacted]	F	11/23/1935	6/ 4/1979
	TOPOGRAPHY = 28A	LIVER, BIOPSY,J18				
	PRELIMINARY DIAGNOSIS = P6	HEP. DEG. -MILD				
11.	[redacted]	[redacted]	[redacted]	F	10/ 6/1959	6/ 4/1979
	TOPOGRAPHY = 48	PITUITARY				
	PRELIMINARY DIAGNOSIS = E9	INFLAMMATION,CHRONIC				
	D5	FIBROSIS				
12.	[redacted]	[redacted]	[redacted]	M	11/28/1964	6/ 4/1979
	TOPOGRAPHY = 36	NASAL CAVITY				
	PRELIMINARY DIAGNOSIS = J7	POLYP,INFLAMMATORY				
13.	[redacted]	[redacted]	[redacted]	M	1/22/1908	6/ 2/1979
	TOPOGRAPHY = 28	LIVER,BIOPSY				
	PRELIMINARY DIAGNOSIS = E8	INFLAMMATION,ACUTE & CHRONIC				
	D5	FIBROSIS				

Fig. 5 Computer print-out of basic surgical pathology report available to stations and clinics a few minutes after the pathologist has examined the slides.

Computer print-outs, available to stations and clinics minutes after the pathologist has examined the slides and has fed the basic information into a terminal located in the laboratory, are being increasingly used; we have found them very effective in shortening the communication gap (Fig. 5). However, no technologic advance can replace the time-honored practice of two medical specialists discussing together, immediately after the facts are known, how to best treat a patient.

Perhaps it should be stated again that a crucial aspect of the work of the surgical pathologist is the timing of his work. Whether this is counted in minutes, as in a frozen section procedure, or in hours or days, as in a routinely processed specimen, it is essential to keep it at a minimum. The pathologist spending minutes enraptured in the examination of a frozen section and sharing his excitement with his colleagues should remember that there is somebody else who is spending those same minutes under somewhat different circumstances and in a different frame of mind. The same applies to the surgical pathologist who is earnestly attempting to subclassify an obviously benign sweat gland tumor into one of the innumerable subcategories that have been described. This is a laudable academic exercise, and one that actually may have clinical implications. It would be advisable for him, though, also to think in practical terms; before this process is completed and an authoritative final diagnosis is made, he may well call the clinician (who in turn may call the patient) and simply inform him that the lesion is a benign sweat gland tumor (or a benign adnexal tumor, for that matter), that no further surgery is necessary, that in all likelihood the patient is cured, and that additional studies to classify the lesion precisely are in progress.

Slide review and consultation

A very fortunate aspect of pathology (although some may regard it as a curse) is the fact that the material on which the diagnosis is made—i.e., the microscopic slide—is of a permanent nature and can be evaluated by different observers or by the same observer at different times. This feature should be utilized by the pathologist at a maximum. All slides and paraffin blocks should be stored indefinitely. Whenever a specimen is received in the laboratory, the files should be searched for previous material on the same patient. If such material is present and is conceivably related to the present illness, the slides and the report should be reviewed. It is mandatory for the pathologist to review the outside slides of a patient who is referred to his institution with a microscopic diagnosis made elsewhere before therapy is begun. Whether the slides are requested by the clinician or the pathology department is immaterial, but eventually they should be examined by the pathologist and a formal report should be issued, a copy of which should be sent to the referring pathologist. Pathologists should not object to this practice, which is not instituted because their diagnosis is questioned but rather to ensure uniformity of diagnosis and nomenclature in a given institution, to allow comparisons with subsequent material in the same patient, and to be able to present this material at interdepartment conferences. Whenever possible, the slides should remain in the institution that requested them, because the need for review or comparison may arise later. I have never understood the insistence of some pathologists that the slides be returned to them in view of the fact that they have a paraffin block from which fifty or more identical sections can easily be obtained, especially in view of the relatively low cost of the procedure. If only one slide shows the diagnostic area, or if the specimen is a cytologic preparation, that is a different matter. The form that we use when slides are requested by another institution is illustrated in Fig. 6; this is accompanied by a copy of our pathology report and duplicates of all the pertinent slides.

Consultation of difficult and controversial cases among pathologists has become an increasingly popular practice. When done for the right reasons and in the proper fashion, it is a healthy practice that benefits the referring pathologist, the consultant, and the patient. In order to obtain maximum benefit from this procedure, some basic rules need to be observed.[11] It is important for the referring pathologist to review the clinical history carefully (he should have done that anyway to begin with) and provide all the pertinent information to the consultant, together with a description of the gross findings, *all* the relevant slides, and his interpretation of the lesion. If the need for special stains is anticipated, he should include a set of unstained slides or a paraffin block. Hopefully, he will inform the consultant of any subsequent developments on the case, especially those that have a bearing on the

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Division of Surgical Pathology
Department of Laboratory Medicine and Pathology
Box 76, Mayo Memorial Building
Minneapolis, Minnesota 55455
(612) 373-8760

Date_____

Chief, Department of Pathology

REFERRAL OF PATHOLOGY MATERIAL

Requested by _____

From the Dept. of _____

Pt. name _____

Our Path. No.	No. of slides	Blocks	Other Material

Enclosed are copies of our Pathology report(s).

☐ You are welcome to retain the slide(s)

☐ Return the slides(s). Reason:_____

_____

Please, send us a copy of your Pathology report to the above address.

cc _____

_____

_____

HEALTH SCIENCES

Fig. 6 Form that accompanies the slides and pathology report when this material is requested by another institution.

diagnosis and evolution; he may do so spontaneously or when so requested by the consultant. The consultant should be as expeditious and careful with these cases as he is with his own material. The medical and legal implications of his diagnoses are of no less importance than those made in his own institution. He also should keep in mind that the case does not become his property just because he was asked to express an opinion on it.

Limitations of histologic diagnosis

It is just as important for the surgical pathologist to know the limitations of his specialty as it is for him to be aware of its strength and potential contributions. This fact has been expressed in a most perceptive and amusing way by Dr. Oscar N. Rambo in an article entitled "The limitations of histologic diagnosis." Excerpts from this essay follow.

"Pathologists are physicians and human beings. They have as great a capacity for error and susceptibility to subjective distractions as other practitioners of the art of medicine. Because of certain nineteenth century dogmas and because the teaching of pathology used to be relegated primarily to the long-forgotten preclinical phase, pathologists traditionally have been regarded to be more scientific than many of their colleagues. A mystic perversion of this assumption prevails among those clinicians who believe that the pathologist, given only a piece of a patient's tissue, has all of the other ingredients necessary to produce a statement of absolute truth at the end of his report. More dangerous to mankind is a pathologist with the same concept."

. . .

"Incomplete communication between the clinician and pathologist may make diagnosis difficult or impossible. To perform intelligently, a consultant must know all the facts that have any bearing on the case. To render a diagnosis from an inherently puzzling bit of tissue with only vague knowledge of its source and no concept of the clinical problem is as foolhardy as to undertake an appendectomy on the basis of hearsay evidence that the patient has a pain in his belly.

"As an off-duty exercise, pathologists frequently like to play games with slides as 'pure unknowns.' Sometimes with their brains and microscopes they can give a remarkably accurate reconstruction of the disease process, pronounce the exact diagnosis and flush with pride at the awed applause of those gathered around the optical altar. And sometimes they can be absolutely wrong. Showmanship has no place in life and death diagnosis. . . ."

. . .

"Much of the effort expended in carefully executing a diagnostic biopsy procedure is wasted if the pathologist is regarded as a technician rather than a consultant. In many instances, the physician who will have to interpret the slide can offer valuable advice about the clinical nature of a lesion and where best to sample it if he is [invited] to examine the patient before or during surgery. With historical background, physical findings and precise orientation of anatomic relationships, the [pathologist] can block the tissue in the plane that will give the most meaningful sections."

. . .

"Most physicians are taught that the best biopsy is a cleanly excised, uncrushed wedge that includes a junction between normal and neoplastic tissue. The edge of an ulcerating squamous carcinoma may be indistinguishable from pseudoepitheliomatous hyperplasia; the junction between colonic mucosa and a well differentiated exophytic carcinoma may be sharp, dramatic and unmistakable, but if the biopsy is inadequate in depth or breadth, the pathologist is obliged to append a note stating that he cannot determine *from the tissue submitted* whether the process is a cancer or a polyp. The normal margin must not be obtained at the expense of representative tumor. Worst of all are expanding soft tissue neoplasms. Junction biopsies may include only a pseudocapsule that can be hard, typically 'fish flesh' and grossly more malignant in character than the tumor beneath. Such a barrier found in the retroperitoneum or deep muscle groups of an extremity may achieve a thickness of one centimeter or more."

. . .

". . . While it may not always be technically feasible to obtain bigger, better, or multiple biopsies, there are many occasions in which the advantages of a significant increase in the sample of tumor outweigh the risk to the patient. Adequate volume of tissue permits a choice of fixatives, histochemical studies, bioassay or tissue culture. In some instances, one of the specialized examinations may break a morphologic deadlock."

"Before a biopsy specimen is delivered to the laboratory, it may be so damaged that the slides prepared from it are worthless. In place of a diagnosis the pathologist must write, 'Tissue unsatisfactory for interpretation.' A more serious consequence of damage is failure to recognize subtle artefactual changes in cells. False positive, false negative and incorrect histogenetic interpretations have resulted from avoidable mishandling of biopsy fragments."

. . .

"The complaint of withholding information may also be lodged against the pathologist. The unsophisticated recipient of a pathologist's written consultation will seek out the usually brief, bald diagnostic statement, accept it as the truth and proceed on his definitive therapeutic way. In the majority of instances, the diagnosis is the 'truth,' assuming certain minimum standards of professional competence and permitting considerable philosophic license with the word. But the appearance of a sample of tumors and diseases difficult to classify may be thoroughly misleading when considered out of context.

"There are ways in which the pathologist can and should indicate doubts and alternative possibilities when he suspects that the tissue submitted to him may tell only part of the story of the patient's disease or may be a false representation. Retreat to the smug assertion, 'I can see only what is in the tissues you gave me,' has been forced on pathologists by colleagues who have sought miracles of extrapolation from inadequate biopsies. Differential diagnoses of tissue have been discouraged by the myth of objectivity, the dogma that pathologists have the final word, and the thundering denunciations of pathologists' speculations by physicians who want a single, solid answer, right or wrong."

. . .

"With full knowledge of the relativity of the term, we use [the term] 'inexperience' with deliberate intent. Neither pride nor pressure should force a pathologist to make a decision about a disease process that he does not recognize. The nearest approximation or look-alike in his experience may be entirely unrelated. A mismatch may result in mutilation or death of the patient.

"Recognition of one's limitations is as great an asset as the sharpest diagnostic eye. There is a chain of command for handling serious and unfamiliar problems. Colleagues immediately available may offer a rapid solution from past experience or from lack of obsessive preconception. The community may be polled. Among the members may be one who has perfect and documented recall of an entity not previously encountered. Such a survey may yield only confusion, but from it one can usually salvage a list of experts with series of entities, ones that may come to the average pathologist only once or twice in his lifetime.

"While it is true that world renowned experts are human and fallible and that there is an almost irreducible percentage of undiagnosable tumors, it is every physician's obligation to submit his insoluble problems to the highest court of appeal. Such a presentation should be made only after thorough deliberation and must be accompanied by all pertinent clinical data. A complete historical review and serial roentgen studies of a bone tumor may be more important diagnostically than a biopsy. It is sportsmanlike and of great educational value to the pathologist [seeking a second opinion] to submit his own report even if it ends with several speculative diagnoses, each preceded by a question mark."*

Biopsy

The interpretation of a biopsy is one of the most important duties of the surgical pathologist. Certain generalizations must be mentioned even though they are obvious.

Material obtained by cautery is usually unsatisfactory for biopsy because the cautery chars and distorts the tissue and prevents clear staining. If the tumor shows a central ulceration, removal of a small biopsy from the center may show only necrosis and inflammation. The biopsy should be taken with a cold knife from the margin of the ulcer and should include both normal and ulcerated tissue. In a mass of lymph nodes, a deep-seated node may be of diagnostic value whereas a superficial node is not. We have seen bone biopsies taken near the lesion but not through it. *The pathologist cannot make a diagnosis of a disease from material that is not representative.* The surgeon should be equipped with the proper instruments to obtain the best possible biopsy, whether it be from the esophagus, the bronchus, the nasopharynx, the endometrium, or the stomach.

The size of the biopsy may range from the

*From Rambo ON: The limitations of histologic diagnosis. Prog Radiat Ther 2:215-224, 1962. Reprinted by permission of Grune & Stratton, Inc., and the author.

smallest wisp of tissue to a large excision. It is imperative that the small biopsies be quickly placed in good fixative. The relative advantages and disadvantages of the various fixatives, as well as the additional procedures that sometimes need to be carried out with surgical specimens, are discussed in Chapter 2. It is unfortunate if tissue that has been carefully and tediously obtained by the surgeon is mishandled, allowed to dry, or poorly fixed.

Aspiration biopsy

There are two ways of handling an aspiration biopsy. The first is obtained with a very fine needle (OD 0.6-0.9 mm) and the second with a large-bore needle (e.g., Vim-Silverman needle or Menghini needle, OD 1.6-2.6 mm). The material obtained is either smeared on a slide or placed in a fixative and sectioned as a small tissue biopsy.[6] This largely depends on the size and amount of the material obtained, which, in turn, is dependent on the needle used for the procedure. Whenever possible, the two procedures should be combined, because the smear will result in better cytologic details and the section will provide important information regarding the architecture of the lesion. Regardless of the technique used, it should never be forgotten that if the diagnosis is negative or if the material is insufficient, cancer may still be present. The significance of a negative biopsy depends, to a great extent, upon the skill of the person taking the biopsy.[7]

The merits and indications for incisional and aspiration biopsy for the various organs are more fully discussed in the respective chapters. Suffice it to say here that the technique of fine-needle aspiration has gained great popularity in recent years, especially for lesions of the lung and pleura, mediastinum, pancreas, liver, kidney, and, in general, intraabdominal and pelvic masses.[13] Its use also has been advocated for superficially located lesions, such as those of the thyroid gland, breast, lymph nodes, and salivary glands, but for these a formal tissue biopsy is still to be preferred in the majority of cases. There is no question that fine-needle aspiration is a technique that is inexpensive, safe, and quite accurate when performed by experienced workers.

Frozen section

Frozen section technique is a procedure of great value to the surgeon.[8] The only reason for frozen section is to *make a therapeutic decision*.[1] A frozen section should be accurate, rapid, and reliable. The diagnosis is most important because upon it may rest the decision to remove a breast, to amputate a leg, to remove a lung, or to terminate an operation. A surgeon with only a slight knowledge of pathology is not equipped to interpret a frozen section, nor are pathologists with little clinical knowledge qualified to undertake frozen section diagnosis. The responsibility for frozen section diagnosis should be that of a well-trained pathologist

Table 1 Frozen section diagnosis in 2,240 consecutive cases at Barnes Hospital, St. Louis, Mo.*†

Organ	Cases	Benign lesions	Malignant lesions	False positives	False negatives	Diagnosis deferred
Breast	679	437	202	0	3 (0.5%)	6 (0.9%)
Soft tissues	298	135	163	1 (0.3%)	1 (0.3%)	7 (2.3%)
Gastrointestinal tract	251	192	59	0	3 (1.2%)	6 (2.4%)
Lymph nodes	232	108	124	0	1 (0.4%)	0
Lung	169	49	120	2 (1.2%)	0	0
Thyroid gland	112	100	12	0	0	5 (4.4%)
Central nervous system	112	18	94	1 (0.9%)	2 (1.8%)	4 (3.6%)
Bone and joints	79	42	37	0	1 (1.3%)	5 (6.3%)
Liver and gallbladder	73	29	44	0	0	1 (1.4%)
Pancreas and bile ducts	45	22	23	0	2 (4.4%)	0
Parathyroid glands	44	44	0	0	0	0
Skin	51	18	33	0	0	0
Miscellaneous	135	73	62	1 (0.7%)	0	4 (3.0%)
Total	2,240	1,267	973	5 (0.2%)	13 (0.6%)	38 (1.7%)

*Adapted from Elsner B: La biopsia por congelación: su valor asistencial y en la educación médica del patólogo. Prensa Med Arg **55**:1741-1749, 1968.
†Ear, nose, and throat and gynecologic cases excluded.