

EXCHANGES

Laboratory Reports and their Significance

MINNIE GENEVIEVE MORSE, *Plainfield, New Jersey*
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An important part of the case record, and frequently not an inconsiderable part of it, is composed of reports from the hospital laboratories. The treatment of a patient today depends, in no small degree, upon the results obtained from examinations of many kinds, made by experts in their special lines. For example, a patient is admitted to the medical service, and a routine specimen of urine is sent to the laboratory. The results of the analysis show unmistakably a disease of the kidneys, and proper treatment is at once instituted. Or a patient is running a continued fever; is it a typhoid infection; or perhaps the much discussed "undulant" fever? The appropriate laboratory tests will show the truth beyond a peradventure. Here is an accident case; is there a fracture of the ankle bones, or only a sprain? The x-ray picture leaves no doubt in the matter, and the patient is saved a possible disability.

The record librarian, unless she acts as laboratory clerk, has, of course, no responsibility for the making of laboratory reports. In the average hospital, however, she is obliged to wage a continual warfare in order to have them turned in promptly. In a small institution, especially, with insufficient personnel, laboratory reports often put in a sadly belated appearance, and when sent to wards and floors are only too frequently stuffed into desk drawers by busy nurses and forgotten. The more promptly a laboratory report is attached to the patient's chart, the more valuable the record becomes. The comparison of earlier and later urinalyses, blood counts, gastric analyses, etc., may have much to do with the subsequent treatment of the cases, while to a consulting physician, who has no previous knowledge of the case, they may be of the greatest significance. No record librarian, therefore, should be willing to file permanently charts of cases in which there is evidence that x-ray examinations have been made, cystoscopies performed, or pathological tissues examined, but no reports rendered. A plain but tactful talk with the heads of the laboratories and with the charge nurses will often be effective in remedying the situation.

There are several reasons why the record librarian should understand why the various types of laboratory tests are made, and the significance of the results. Where detailed case summaries are made from all charts, the laboratory findings must be summarized, and it is difficult to do this efficiently, if the reason for the examinations and the meaning of the terminology employed are not fully understood. Many of the inquiries which come to the record room, by letter, by telephone, and by inquirers in person, refer to laboratory findings, and to locate and impart exactly the information needed requires an intelligent comprehension of the subject. Laboratory findings are also frequently of great importance when a case is taken into court. What, then, is all this laboratory work about?

The most frequently made laboratory test is the analysis of urine, commonly known as urinalysis. It is a routine measure in cases of all kinds, but is made more frequently, and with greater elaboration, where there is a suspicion of some disease of the kidneys, or of metabolism, such as diabetes. A urinalysis may be consulted with regard to the amount of urine passed within a certain time, its color, its specific gravity, its reaction, and the presence or absence of certain constituents. A series of reports upon these items may show very plainly the condition of the case.

The amount of urine passed is especially significant where diabetes mellitus is suspected, the quantity usually being materially increased in that disease. An increase is also present in diabetes insipidus, after drinking large quantities of water or other fluids, and very frequently in cases of hysteria. A lessened amount results from loss of body fluid through profuse perspiration, and in acute fevers. Certain drugs affect the amount excreted. The specific gravity of a fluid is the amount of solid matter it contains as compared with water, and its estimation as regards urine is a general index to the way in which the bodily machinery is running. Where the kidneys are unable to carry off the waste products of the body in a normal manner, it may be low; where there is unusual tissue waste going on, it may be very high. What is known as the *Mosenthal test* is an examination at stated intervals of the amount of urine excreted, and the specific

gravity of each specimen. The color of urine is usually paler than normal where large quantities are passed, and darkened in febrile conditions, where the tissues are being burned up with abnormal rapidity. The administration of certain drugs gives the urine a characteristic color, and it is sometimes important to know how quickly this change in color occurs. The reaction of urine is ordinarily slightly acid, as a very large proportion of food substances yield acid waste products; in such disorders as rheumatism and gout, and in acute fevers, the acidity is much increased. Alkalinity is present after the taking of alkaline preparations, and sometimes in cases of debility.

Probably the information most often sought in consulting urinalyses concerns the presence or absence of appreciable amounts of albumen. The presence of considerable quantities usually means that for some reason the kidneys are embarrassed in their work of eliminating nitrogenous waste products from the body, a situation which may have disastrous results. When it occurs during pregnancy, it may lead to the dangerous condition known as eclampsia. The doctor who finds in studying a patient's urinalyses that a considerable albuminuria has at some time been present, may decide that it is necessary to terminate a pregnancy, or, if an operation is in question, to make use of local anesthesia, since ether is irritating to the kidneys. What are known as casts in the urine are molds of portions of the tiny tubules of the kidneys; the presence of both albumen and casts is evidence of definite damage to the kidneys. In febrile conditions, however, there may be an albuminuria, unaccompanied by the presence of casts, which is merely the result of excessive tissue waste. Sugar in the urine appears most frequently in diabetes mellitus, when the body becomes unable to make use of sugar. By frequent urinalysis a doctor can judge of the efficacy of the treatment being used. Pus in the urine may come from any part of the urinary tract, or, in women, from the vagina. Red blood cells may indicate some condition of irritation or ulceration, and white blood cells, or leukocytes, appear where inflammatory conditions are present, their mission being the defense and repair of the tissues. In summarizing urine reports, all of these items are significant.

Renal Function Tests are made for the purpose of estimating the working power of the kidneys, either by noting the time taken for appearance in the urine of a chemical substance which passes through the body unchanged, or by measuring the waste products from a patient on a test diet, as compared with the normal excretion after such a diet.

A number of different kinds of *Blood Examinations* are in use, and these are among the most important of all chemical laboratory tests. Of greatest importance, in most conditions, is the *cell count*, and in serious illness, where frequent blood counts are made, the results are eagerly watched by the attending physicians. The report shows the number of red cells, or erythrocytes, and of white cells, or leukocytes, in a cubic millimeter of blood. What is known as the *differential count* shows the proportion in which the different types of leukocytes are present. Of these the most important is the polymorphonuclear type; and in summarizing a blood count the white cell count and the proportion of "polys" are the most significant items in most conditions. Where infection is present, increase in the proportion of "polys" denotes increasing severity of the infective process.

The testing of blood to discover the proportion of hemoglobin, or coloring matter of the red cells, is especially valuable in cases of anaemia, especially of the pernicious type. The *blood coagulation test* is made before such operations as tonsillectomy, to make sure that there is no condition present which would delay the normal clotting of the blood and thereby endanger the patient's life. The *chemical examination* of blood gives as its chief items the total solids in a given volume, the total nitrogen content, the non-protein nitrogenous constituents, the blood sugar, and the miscellaneous constituents. A blood sugar test is most frequently made in cases where diabetes is suspected; after the taking of a certain quantity of glucose, the amount of sugar in the blood is always increased, but in the diabetic patient the reaction is much prolonged and rises to a much higher level, due to the body's inability to properly metabolize sugar. A *blood culture* is the result obtained by adding a specimen to a medium in which bacteria will grow, so that the varieties which are present may be identified.

Other blood tests very frequently made are the *Wassermann* and *Khan* tests for syphilis, and the *Widal* test for typhoid fever. The technique is very elaborate, especially in the tests for syphilis, but the results are of the greatest importance from the diagnostic standpoint, and should always appear in the summary of the laboratory findings in a case.

A specimen of the *Cerebrospinal Fluid*, obtained by the procedure known as spinal puncture, may be examined to ascertain the white cell and differential counts, the

amount of protein present, the presence of certain micro-organisms, or for the Wassermann, butyric acid, or colloidal gold tests. The report usually states whether or not the manner in which the fluid flows from the aspirating needle denotes an increase or decrease of pressure in the cerebrospinal canal. In cases of meningitis and other acute brain conditions the pressure may be very high. The fluid is ordinarily clear and colorless, but in some forms of disease the report may show it to have been cloudy, or, in cases of hemorrhage, to have contained blood. Increase in the white cell count is significant, as in the blood examination; also the amount of protein in the fluid. The *butyric acid test* is for the purpose of determining the presence of increased protein, or of globulin, a form of protein not found in normal spinal fluid, and indicating meningeal inflammation. The *colloidal gold test* gives a series of color changes in the fluid which vary according to the condition present. The *Wassermann test* upon cerebrospinal fluid is of especial value in diagnosing syphilis of the nervous system. Microscopical examination may demonstrate the presence of tubercle bacilli or other micro-organisms.

An examination of *Sputum* is most frequently made for the purpose of discovering the presence or absence of tubercle bacilli, where pulmonary tuberculosis is suspected. The result should always be included in a summary of laboratory reports.

Smears and Cultures are taken from various parts of the body for laboratory examination. *Throat Cultures* are of great value in differentiating between diphtheritic and other infections. A *Vaginal Smear* is most often taken where there is a suspicion of gonorrheal infection. With regard to this particular examination, however, it must not be forgotten that it is not uncommon for repeated reports to be returned "negative for g.c." (gonococci), in spite of positive clinical evidence.

Examination of Gastric Contents is practised very frequently in disorders of the stomach. What is known as a *test meal* is given to the patient on an empty stomach, and then withdrawn by means of the stomach tube, in some cases in fractions after specified intervals of time. Such tests are useful in the diagnosis of gastric ulcer, or cancer, gastritis, and increased or decreased secretion of gastric juice; they furnish light on the motor power of the stomach, the rate of digestion, and the secretory and absorptive activities. In summarizing a report of this type, several items are significant. Abnormal color may be due to the presence of blood, bile, etc.; the appearance known as "coffee-grounds" indicates the presence of blood mixed with the food, while bright red blood is evidence of a fresh hemorrhage. The odor may be very sour where dilatation of the stomach has caused retention of its contents, with resulting fermentation, and a fecal odor is evidence of intestinal obstruction, with regurgitation into the stomach. The most important item in many cases is the amount of hydrochloric acid present, as the digestive function of the stomach depends upon this element of the gastric juice. The report form usually calls for the recording of the quantity of free and of combined acid, and the total acidity. Microscopical examinations may give a report as to the presence of bacteria, yeasts, etc.

Examination of Duodenal Contents is very similar to the above, the tube being passed through the stomach and just beyond it. The appearance of the duodenal contents, their chemical or microscopical examination, may be of great importance, especially in disorders of the gall bladder and ducts.

Examination of Feces.—The report of a feces examination is most frequently consulted to ascertain the presence or absence of intestinal parasites or ova, as pin-worms or tape-worm, of the ameba of tropical dysentery, or of other micro-organisms which can only be detected by the microscope. However, in some conditions the color is a very significant item; in certain disorders of the liver and bile passages the stools may be pale or "claycolored," and what are known as "tarry" stools are due to the presence of blood which has been partially digested. Bright red blood comes from either a very recent hemorrhage or from one low down in the digestive canal. A report of blood in the stools, and its character, is of very great importance in cases where ulcer or cancer is in question. Certain drugs, as iron and bismuth, gave the stools a blackish hue. Another occasional reason for examining the stools is to note the passage of a foreign body known to be in the tract.

A very important feature of laboratory work is the *Examination of Tissue* which has been removed from the body, usually for the purpose of ascertaining the presence or absence of malignant disease, as where a tumor has been taken from the uterus. The reports of these examinations are more likely than any others to be tardy in their return from the laboratory, owing to the length of time required for the making of such examinations, and it takes a very wide-awake record clerk to make sure that no chart of a case where tissue has been examined is permanently filed without the report. The informa-

tion which it contains is of vital importance, and may be the first item to which a doctor consulting the chart will desire to turn. In all operative cases, the record clerk should look for a report upon the pathological specimen.

While the number and variety of the examinations and tests made by the pathological laboratory of the up-to-date hospital is constantly increasing, the record librarian is tolerably certain to be confronted with at least those which have been mentioned above. It is well to remember, however, that while reports which give a positive result have a definite value, negative reports cannot always, by any means, be relied upon as evidence that a condition is not present.

The reports from the x-ray laboratory need little comment; they show abnormal bone conditions, as fractures and dislocations, areas of inflammation, as in sinus conditions, the presence of foreign bodies, etc. The gastro-intestinal series, taken after the ingestion of a substance which can be followed through the alimentary canal, gives much valuable information regarding the condition and efficiency of the digestive organs and the presence of tumor masses or ulcerations in the digestive tract. *Graham* test for visualization of the gall bladder is frequently made in conjunction with the gastro-intestinal series. Like the reports of tissue examinations, x-rays reports are a very important part of the case records to which they belong, often consulted and frequently used in court proceedings, and before filing a chart permanently the record librarian should make sure that it includes a report of every x-ray examination that has been made. It is impossible to guess how important such information may prove at some future time.

The references to micro-organisms in laboratory reports are sometimes obscure and confusing to the record room worker without medical training. *Bacteria* are vegetable organisms, the simplest forms of plant life known. *Protozoa* are single-celled animal organisms, some of which pass through a very elaborate life-cycle. There is also a group which appears to stand midway between the two; this includes the *Spirocheta pallida*, the cause of syphilis. The bacteria group is divided into *cocci*, which are ball-shaped, *bacilli*, which are rod-shaped, and *spirilla*, which are spiral-shaped. The cocci are again divided into *diplococci*, appearing in pairs, *streptococci*, which occur in long or short chains, and *staphylococci*, which form irregular masses or clumps. Bacteria are known as *acid-fast* if they are not easily decolorized by acids when stained; also as *Gram-positive* or *Gram-negative* according as they will or will not stain by the method devised by *Graham*.

The streptococci and staphylococci are concerned in conditions characterized by pusformation. The pneumococcus is the organism most commonly present in diseases of the lungs; the meningococcus is present in epidemic cerebrospinal fever; and the gonococcus is the causative factor in gonorrhea. Of these the first may be mentioned in sputum tests, the second in examinations of cerebrospinal fluid, and the third in examinations of material from the vagina or cervix. Prominent among the *Bacillus* family are the *Bacillus tuberculosis*, whose presence may be noted in sputum tests, cultures from infected glands, etc., the *Bacillus diphtheriae*, found in the throat and occasionally in other localities, and the *Bacillus typhous*, the cause of typhoid fever. The best-known of the protozoa is the plasmodium malarie, or malarial parasite, part of whose life-cycle occurs within the human body and part within the anopheles mosquito.

Just a Minute, Please—An Obstetrical Pantomime

KATHERINE M. SCULLY, *Student Nurse*

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Time.—Early September—2 p.m.

Scene.—A country Rail-road Station, fairly clean, well lighted by several windows; equipped with a wood stove, baggage truck, pump water at the door.

Dramatis Personae.—Pregnant woman, nurse, an obliging station-master. A doctor and the woman's husband, who arrived later.

The woman had visited a relative in a nearby town. She was returning by train when the membranes ruptured.