

monous process ceases, when compared with other methods of treatment. After the symptoms of active inflammation have subsided, the joint is put in proper position and ankylosis is allowed to take place."

THE IMPORTANCE OF SYSTEMATIC EXAMINATIONS OF UTERINE SCRAPINGS AND EXCISED PORTIONS OF THE CERVIX.

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This paper has for its object: 1, the emphasis of the importance of systematic examinations of uterine scrapings and excised portions as an aid to diagnosis in gynecology; 2, the presentation of a well known method of making such examinations; 3, the setting forth of its limitations; 4, the relation of the microscopic to the macroscopic appearances; 5, the relation of the microscopic findings to the clinical manifestations.

It will be the purpose of the writer to demonstrate that such systematic examinations can be made by all who have a practical knowledge of microscopy; that without such systematic examinations a malignant growth will often escape detection until clinical manifestations point to a growth too far advanced to permit of a radical removal, and that many times such an examination is the only means of making a positive early diagnosis. It is the custom of the writer to preserve for examination all products of curettage, to make a systematic microscopic examination of them, which is kept on record, and to which subsequent reference can be made. All who have followed this routine method can not fail to appreciate the importance of such examinations. Where a malignant growth has not been suspected it has been detected in its early development; on the other hand, a condition highly suspicious of malignancy has been proven innocent. In the majority of cases the microscope has only served to verify the clinical diagnosis. Not infrequently has a timely hysterectomy been performed as a direct result of the microscopic findings, and, on the contrary, where the clinical symptoms strongly indicated a hysterectomy for a malignant growth the microscopic examination contraindicated and precluded the radical and formidable operation. It is therefore evident that the greater part of the examinations will no more than verify the clinical diagnosis, yet the occasional finding of an unsuspected malignant condition, the verification of a suspicion and the disqualification of a wrong clinical diagnosis will be sufficient reward for the time and labor expended. The practice of making these examinations is becoming more general. The busy surgeon usually trusts the work to an assistant pathologist or colleague, and in most hospitals such examinations are made as a matter of routine by the resident pathologist.

The following method adopted by the writer will be presented in the belief that it will be found to be the most reliable and simple method for diagnostic purposes; it is the simple method of practical utility to the general surgeon. Where original research in the histologic and microchemic methods is desired the reader is referred to modern works on microscopy.

Because of the difficulty in obtaining sections of the mucous membrane of the corpus uteri the tissues

are best obtained by curettage; while with the cervix the mucous membrane is so closely adherent to the underlying tissues and the desired tissue is so easily excised it is preferable to remove a wedge-shaped piece of the cervix for an examination. The section should include some healthy tissue, in order to make a microscopic field of the entire pathologic condition together with some healthy tissue. Scrapings are never so satisfactory for examination as are excised pieces; the relations of the histologic elements are disturbed, the extent of the lesion can never be ascertained, and though the scrapings may show only inflammatory changes the underlying tissue may be the seat of a malignant growth.

CELLOIDIN EMBEDDING METHOD.

The scrapings and excised pieces are first cleansed of blood in cold water. They are then placed in a 4 per cent. aqueous solution formalin for twelve hours, then in 50 per cent. alcohol for twenty-four hours, next in 70 per cent. alcohol for twenty-four hours, followed by 95 per cent. alcohol for twenty-four hours, and finally hardened in absolute alcohol for twenty-four hours. The specimen may be placed directly in 50 per cent. alcohol without fixing in formalin, and if the sections are small they may be placed directly in 95 per cent. alcohol for twenty-four to forty-eight hours and then in absolute alcohol for twenty-four to forty-eight hours. After the tissue is thoroughly hardened in the alcohol solutions they are placed in a dilute solution of celloidin for twenty-four hours. If the solution is quite dilute it is not necessary to precede this step by placing them in a solution of equal parts of commercial ether and absolute alcohol for twelve to twenty-four hours, thus saving time. The next step is to place them in a thick solution of celloidin for twelve hours, then mount on cork or a block of wood in celloidin, expose the mounted specimen to the open air for a few minutes, then place in 70 per cent. alcohol for a few hours and the specimen is ready for section cutting. The most satisfactory stain is the double stain of hematoxylin and eosin. In this way about eight days are required, but the actual time spent in the work is not so great providing all necessary material is at hand. Where time is an essential factor the paraffin method may be adopted and the specimen ready in forty-eight to seventy-two hours. For serial sections the paraffin method may be used, but for ordinary usage the serious objection to its use is the necessity of an oven for the purpose of keeping the paraffin at the proper temperature. Dr. Cullen of Johns Hopkins University has presented to the profession a freezing method by which the examination can be made in fifty to sixty minutes.¹

The steps in the method are, in brief: 1, tissues cut with a freezing microtome; 2, sections fixed in a 4 per cent. formalin solution, three to five minutes; 3, 50 per cent. alcohol, three minutes; 4, absolute alcohol for one minute; 5, stain and mount. By this method it is possible in a doubtful case to determine upon further operative procedures within an hour after the exploratory curettage, and hence is of the greatest value in those exceptional cases where an immediate diagnosis is imperative, otherwise it is not satisfactory because of the hasty and imperfect preparation of the section for microscopic examination.

By way of illustrating the importance of such examinations the writer will briefly mention his

¹ For a full description of the method see Johns Hopkins Bulletin, No. 49, April, 1895.

experience of the past two months in the examination of scrapings. In all cases clinically diagnosed as chronic endometritis the microscopic examination of the scrapings verified the diagnosis. Where the diagnosis was in doubt from a clinical point of view the microscope was indispensable. The following cases occurred in the practice of Dr. E. C. Dudley of Chicago, they have been reported in detail and will here only be referred to in brief for the purpose of illustrating the value of systematic examinations of uterine scrapings in diagnosis:²

Case 1.—Was deaf, hence no history could be obtained further than that she is 40 years of age, had menstruated regularly until the last two months, during which time she has flowed almost constantly. For two weeks the flow has been increased in amount and has had an offensive odor. The patient denied the possibility of pregnancy. Dr. Dudley examined the uterus under ether and found it free of adhesions, regular in outline and about the size of a fetal head at term and of the consistency of a pregnant uterus. From the physical examination Dr. Dudley believed it to be a pregnant uterus, but decided to explore the uterine cavity because of the negative history of pregnancy and the offensive bloody discharge. Accordingly a curette was introduced, the instrument went to the handle, an incident which for the time suggested the possibility of having penetrated the uterine wall. An offensive sloughing mass was withdrawn by the curette. From the naked-eye appearances this mass was thought to be either placental tissue, sloughing fibroid or a malignant growth.

The scrapings were examined by Dr. Eisendrath, pathologist of St. Luke's Hospital, by whom chorionic villi were demonstrated. Three days later the woman was delivered of a sloughing fetal mass which bore evidence of having lain dead in the uterine cavity several weeks. In this case the history was entirely misleading and the symptoms and local condition indicated operative interference. The microscopic examination was made in a few minutes, the specimens were neither hardened nor stained. Simply a thin section of the scrapings was made with a razor and examined under a low magnifying power.

Case 2.—Mrs. B., age 45, American. Attending physician, Franklin B. Favill of Chicago. The clinical history was that of a chronic endometritis together with some loss of flesh, nausea, loss of appetite, menorrhagia which had existed for two years and in the past two months was followed by an odorless watery discharge. Dr. E. C. Dudley performed an exploratory curettage October, 1896. Profuse vegetations were removed by the sharp curette. On examination of the scrapings I found adeno-carcinoma of the corpus uteri in its early development. The diagnosis was confirmed by Dr. Arthur Edwards of Chicago and afterward by examination of the sections of the uterus. Dr. Dudley, assisted by the attending physician, Dr. Favill, Dr. William H. Rumph and the writer, removed the uterus per vagina two weeks later. Since the exploratory curettage the uterine growth was seen to have almost filled the uterine cavity and to the naked eye appeared as a soft, red villous growth confined to the endometrium. Sections of the uterine wall including the growth were examined, and the atypical glandular growth demonstrated to have extended into the underlying tissue to a considerable depth. It is hoped that a radical removal of the growth is effected. This case would undoubtedly have passed for a chronic endometritis had no microscopic examination been made.

Case 3.—Mrs. H., age 46; was undoubtedly approaching the menopause, the menses had become more and more infrequent and scant. Six months ago she began to flow profusely and frequently and six weeks later the menorrhagia was followed by a watery discharge, which had a disagreeable odor. An exploratory curettage was made by Dr. Dudley, in which he removed a submucous polypus from the corpus uteri. Upon examination of the scrapings I was able to demonstrate the presence of a round-cell sarcoma of the corpus. The round cells were mixed with a lesser number of spindle cells and a few giant cells. Notwithstanding the fact that the patient had marked symptoms of uremia from a chronic nephritis which had existed for an unknown period prior to the exploratory curettage, the urine containing a large amount of albumin,

granular casts, blood in great quantities and 200 grains of urea secreted in twenty-four hours; a vaginal hysterectomy was performed by Dr. Dudley, assisted by Dr. Franklin Favill, Dr. Peterson and the writer. Chloroform was given and the patient came out of the operation in fairly good condition. Following the operation the uremic conditions were deepened, but gradually became less marked until the fourth week after the hysterectomy, when there ensued lobar pneumonia, with suppression of urine. At the present writing the kidneys are secreting 200 grains of urea in twenty-four hours and the patient is gradually recovering from the lobar pneumonia. Examination of the extirpated uterus demonstrated a submucous polypus which had undergone sarcomatous degeneration at the base. In addition there was a double pyosalpinx and pelvic abscess, from which a culture of streptococci was made. Microscopic examination of sections of the uterine wall including the growth established the diagnosis of round-cell sarcoma, which had not penetrated far into the uterine wall.

These three cases, briefly recorded, illustrate the importance of systematic examinations of the uterine scrapings as a means of diagnosis in gynecology.

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THE ABDOMINAL TYPE OF RESPIRATION AS OFTEN EMPLOYED IN SINGING.

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My attention was directed to this subject by observing that among a certain class of singers who practiced the abdominal type of breathing, there existed a marked disproportion in development of the chest and abdomen. Not alone this, but in seeking for a causative factor for some deranged conditions of the generative organs my investigations brought me to the abnormal employment of abdominal respiration as used in their singing. As soon as I became cognizant of the fact that the over-indulgence in this form of breathing was to blame for the trouble in hand, I readily saw the irreparable amount of damage that may come to these organs of generation by following such a method; and I thereafter made it a special point of observation and inquiry in all cases of this character to observe the type of respiration employed and to inquire as to the method taught them in their singing. In one case I was told the singing teacher laid particular stress upon the forcible employment of the abdominal muscles in the expiratory act. This was done, he explains, to add force to the act and hence volume and power to the voice. And thus regardless of all consequences, ignoring one of the important elements of physics—that no two things can occupy the same space at the same time—he tells his pupils to force down these powerful abdominal muscles, displacing the contents of the abdomen, so as to press up on the diaphragm and thus add force to the act of expiration. Apparently there is but one object in view and that is to add strength and power to this expulsive act of respiration. But in selecting the abdominal type the teacher disregards all laws of physics, physiology and health, and as a result of exercising these muscles for the purpose indicated we are so liable to see, and in many cases where we do not see, they really exist unknown to us, the want of symmetry and proper development of the chest, the over-developed and protruding abdomen, and the train of symptoms resultant from a constant and forcible displacement of the contents of the abdomen. Like any other muscle or group of muscles under persistent exercise, there is bound to result a highly developed state of its fibers, and as a consequence we often

² While this paper was under preparation, the writer received the very instructive and interesting article on "The Importance of Systematic Microscopic examinations of Uterine Scrapings and of Excised Pieces as an Aid to Diagnosis," by Hunter Robb, M.D., of Cleveland, Ohio, reported in the American Journal of Medical Sciences. This report is based on Records of 100 cases, and strongly emphasizes the importance of such examinations.