measure, but I believe not to be compared with the deliberate closing of the opening in the sac.

It is interesting to see how long surgeons have gone on opening aneurisms for abscesses. It happened in my service last year. An assistant, and a good one, thrust a knife into an aneurism and was surprised to see a clot instead of pus. There were reasons for this. The patient had signs of sepsis, had a high temperature, a leucocytosis. Pulsation was absent. He got out of the difficulty by stopping the hemorrhage with gauze. Then he was induced to go on to a more radical operation by suture. The result was that the patient died on the table.

I had the opportunity once of dealing with a varicose aneurism of the femoral. It was made easier by finding the artery accompanied by venae comites. I incised the one that was involved, sutured the opening of communication, and obliterated the vein.

Dr. Anderson (closing).—I have recommended this procedure only in great emergency cases, such as they represent.

When I did the first operation by this method in 1909 I wrote to Dr. Matas, and he wrote me that he thought this experience was entirely unique and advised me to report the case. He made mention of this case in Keen's surgery.

In cases of innominate aneurisms it is impossible to do the Matas operation without provisional hemostasis and it is a formidable operation.

As I said, it is a simple procedure and gets you out of difficulty more easily than any other method that I know.

The gentleman who stated that Symes did all of his cases like the two referred to in my paper after the method employed by myself is mistaken, as Symes did his operation by freely incising the sac and quickly inserting the finger so as to plug the afferent vessel. He then caught with a forceps through the cavity of the sac, the mouth of the vessel, and passed a suture around the mouth of the vessels that opened into the aneurismal sac.

In the cases which I report there is not a single suture employed. The point that Dr. Landry mentioned in regard to making sure that the collateral circulation is established, is good and should be emphasized.

OVARIAN FUNCTION FOLLOWING HYSTERECTOMY*

By Edw. H. Richardson, M.D., F.A.C.S.,

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Within recent years problems relating to the conservation of ovaries in pelvic operations have come again conspicuously into the foreground of gynecological thought. This has resulted primarily

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from intensive study of the whole group of endocrine glands, and from discovery of the vital interdependence now known to exist between different units of this system. Formerly the discussions with reference to conservative versus radical pelvic operations were concerned mainly with the problems of infection, of the preservation of the reproductive and the menstrual functions, and with operative technic. But, through the remarkable growth and development of endocrinology, we have come now into possession of additional knowledge regarding ovarian function which introduces new considerations of vital importance into the problems of pelvic surgery. We have learned that the ovaries are not merely simple structures designed by nature for a single purpose and operating within a restricted physiological zone, but that they are complex glandular organs possessing, broadly speaking, a dual role of equal and fundamental importance. One of these controls the sexual and reproductive phenomena, while the other, through its intimate connection with the endocrine system and the elaboration of one or more specific internal secretions, exercises a profound influence over the body metabolism far afield from the genital domain. Before determining the fate of ovaries in a specific case, therefore, either through the application of surgical procedures or of physical therapeutic agents, like roentgen rays or radium, intelligent judgment demands familiarity with the details and mechanism of ovarian function in both of these general directions. Moreover, emphasis of the essential facts by those specializing in this branch of medical science appears to be both timely and desirable now because there is danger of the profession at large being misled by the teaching of a small group of eminent but radical gynecologists who are dogmatically advocating total ablation of both ovaries in every case of whatever age where hysterectomy is required.

In a paper read before the American Gynecological Society in Philadelphia in May, 1918, and published in its proceedings, I presented a collective and detailed review of the evidence for and against retention of ovarian tissue in connection with surgical removal of the uterus, in which I

pointed out the fallacy in the argument of those advocating indiscriminate total ablation. It would be inappropriate and an imposition to burden a mixed gathering of medical men with such a detailed and highly technical analysis. My purpose now is to submit for your consideration certain facts in support of two propositions: (1) that the uterus is not essential to a continuation of normal ovarian function, except as regards menstruation and reproduction, and (2) that the ovary possesses extra-genital functions of paramount importance in the body economy, which are capable of operating quite independent of the uterus and which alone should suffice to insure its conservation whenever this is practicable. In order that we may fully comprehend the scope and complexity of ovarian function, it is essential to familiarize ourselves with certain facts, now scientifically established, regarding the epithelial constituents of the ovary. These, you will recall, consist primarily of varying numbers of Graafian follicles, with their contained ova. Secondarily, and originating from these, are the corpora lutea and the degenerated or atresic follicles. The ovum itself appears to possess at least a two-fold function. Upon its vitality depends the life of the follicle epithelium from its earliest development on to atresia. So, too, the formation and development of the corpus luteum depends upon the maturation and expulsion of the ovum. In addition to these fundamental influences upon ovarian elements, the ovum possesses the all-important function of reproduction of the species, which process begins only after fertilization with the male element.

The corpus luteum is the most conspicuous element of the ovary. Its morphology and development from the collapsed follicle following rupture and expulsion of the ovum have been exhaustively studied and described in detail by a number of investigators and need not be repeated here. But it is important to emphasize two facts which have been established through these intimate histological studies. One is that the corpus luteum undergoes constant change from day to day in its structure and appearance, first progressive and later regressive in character, indicating, of course, functional activity of a cyclic type; the

other is the remarkable prolongation of the life of the corpus luteum during pregnancy.

Relatively few follicles go on to full maturity, rupture, expel the ovum and terminate in corpora lutea. The vast majority of them undergo varying degrees of development usually approaching maturity, followed by gradual disintegration of the ovum and granulosa cells. Simultaneously the cells of the theca interna enlarge, become epithelioid in appearance and persist for a considerable time in many species of animals, but in woman this occurs only during pregnancy. These are the so-called "interstitial glands."

Now since numerically, at least, atresic follicles constitute the most important epithelial element in the ovary, and, further, since they appear to play no part either in menstruation or in reproduction, our ignorance regarding their function itself furnishes a strong argument for ovarian retention after hysterectomy.

Concerning the physiological interdependence of the ovaries and the uterus and the evidences of ovarian influence strictly within what we may conveniently call the genital domain, we are now in possession of considerable knowledge, thanks to the recent researches of a number of workers. Thus, it has been shown that cyclical changes recur with methodical regularity both in the ovaries and in the uterus and, further, that a definite correlation undoubtedly exists between these respective phenomena. In the ovaries there occur in orderly sequence (1) follicle ripening, (2) ovulation, and (3) corpus luteum formation. Co-ordinated with and dependent upon these ovarian changes there occurs in the mucous membrane lining of the uterus an equally interesting and orderly cycle consisting of (1) premenstrual hypertrophy and hyperplasia, (2) menstruation, and (3) regressive changes, followed by a period of inactivity or rest. The evidence appears to be conclusive that these changes in the endometrium are brought about through the specific action of chemical substances furnished by the corpus luteum. This remarkable structure, furthermore, has been definitely shown to inhibit ovulation, and by so doing it prolongs the sex cycle in lower animals. During

pregnancy the life of the corpus luteum is greatly prolonged, and it has been shown to be essential to the early part of pregnancy, since it has a sensitizing action on the uterine mucosa, without which the ovum is unable to implant itself thereon. In all mammals there is a striking coincidence between follicle ripening and the period of heat, which strongly suggests a stimulation of the sexual mechanism by a specific secretory product.

This whole group of important cyclical phenomena, let it be clearly understood, which are participated in by both the uterus and the ovaries and which are physiologically interdependent, are concerned primarily with menstruation and reproduction. For their normal operation integrity of the uterus as well as of the ovary is obviously essential. So that if these phenomena embraced the whole of ovarian function, there would be, of course, no reason for retaining ovaries where removal of the uterus is required. But such is not the case. On the contrary, there remain for consideration the evidences of extragenital ovarian functions which proceed quite independent of the uterus and which are not influenced even by the surgical removal of that organ.

Thus the normal growth and development of the generative tract, together with that of the whole group of secondary sex characteristics occurring at puberty, are known to depend largely upon trophic influences of the ovary. Likewise, we know that ovarian influence controls the development of the mammary glands and is responsible also for the cyclic changes which they manifest. Furthermore, abundant evidence, both experimental and clinical, is available to establish incontrovertibly the intimate and vital connection of the ovaries with other units of the endocrine system. Particularly is this true of the pituitary gland, the thyroid gland and the adrenal glands. The frequent association of menstrual disturbances, of defective genital development and of sexual impotence with certain primary diseases of the hypophysis cerebri is familiar to us all. So, also, is the fact that the onset of puberty is commonly accompanied by enlargement of the thyroid gland, which is usually transient, and later recedes. There is proba-

bly a slight enlargement of the thyroid gland even during menstruation, certainly a temporary increase in its vascularity. Again, with the onset of the menopause there is ushered in a complicated symptom complex, many features of which are identical with the clinical syndrome indicative of thyroid disease *per se*. During pregnancy there uniformly occur profound and easily demonstrable thyroid gland disturbances. On the other hand, congenital deficiency of the thyroid gland is often associated with subnormal gonad development and with absence of the secondary sex characteristics. And associated with both hyper- and hypo-thyroidism we frequently observe disturbances in menstruation, in certain cases amenorrhea, and in others excessive flow. Less convincing but highly suggestive are the observations pointing to a possible functional interrelationship between the ovaries and both the parathyroid and pineal glands. The same may be said of the possible part played by the ovaries in the general metabolism of the body. Certainly no one can at present deny the possibility, at least, of the participation of ovarian influence in these several directions also. Finally, the equilibrium of the nervous system in the human female, both in the psychic domain and particularly in that of the autonomic constituent, depends exquisitely upon the integrity of the ovaries, a fact perennially impressed upon us by the vexing group of psychoneurotic symptoms as well as the formidable list of functional disorders of vasomotor, cardiac, gastro-intestinal, urinary and endocrine origin, which we are accustomed to associate with menstruation and with both the physiological and the artificial menopause.

Although incomplete, this brief summary suffices to emphasize the scope and complexity of ovarian influence outside the genital domain. It only remains to consider to what extent, if any, this influence is discounted through surgical removal of the uterus. I have made a careful study of the recorded data bearing upon this question. From anatomical studies a point of great practical importance has been established, namely, that the blood supply furnished the ovary through the uterine artery and the drainage from the

.ovary through the uterine veins are necessarily cut off by hysterectomy; that the only possible collateral circulation must come through the anastomosis of branches from the uterine and ovarian vessels within the mesosalpinx; that, therefore, the danger to the ovarian circulation is tremendously increased through removal of the Fallopian tubes along with the uterus; and that where this is necessary every possible care should be exercised to stick close to the tube and neither to clamp nor ligate a single millimeter of the mesosalpinx beyond what is absolutely required. Failure to appreciate this anatomical fact is undoubtedly responsible for a large percentage of degenerated ovaries following hysterectomy.

From subsequent gross and microscopic studies of ovaries retained after hysterectomy, it has been shown that when degeneration occurs it is to be attributed either to associated ovarian disease or to damaged ovarian circulation or to both of these factors.

Through numerous experimental studies the theory of an essential physiological interrelationship between the uterus and the ovaries has been completely demolished, and it has been conclusively demonstrated that ovarian function, except in so far as it operates upon the uterus, may proceed uninterruptedly after hysterectomy.

Clinical studies both of series of total ablation cases and of ovarian retention cases have been on the whole unsatisfactory and have led to conflict of opinion regarding the value of the conserved ovary. This is due to the fact that no such studies have been undertaken with proper regard for all of the various factors which in reality determine the fate of retained ovaries, and without knowledge of which one can not possibly estimate clinically with any degree of accuracy to what extent hysterectomy has disturbed their function. These factors are: (1) a knowledge of the individual patient's condition prior to hysterectomy, both in the psychic domain and in that of the autonomic nervous system; (2) the cases must be grouped according to age both at the time of operation and at the time of subsequent observation; (3) they must be further grouped according to the pathology for which the operation was performed, including a careful descriptive

note on the condition of the retained ovary; and (4) the operative technic must be recorded with sufficient detail to permit accurate determination of whether or not proper measures were employed to safeguard subsequent ovarian circulation.

As far as it goes, available clinical data is overwhelmingly favorable to ovarian retention, but we need in this category more scientific observations along the lines suggested.

In conclusion, I wish to state, with all the emphasis of which I am capable, my uncompromising opposition to the teaching that ovarian function *in toto* is disrupted through surgical removal of the uterus, and to say that I believe such teaching, from whatever source, to be dangerous and without scientific justification. And I wish to go on record as condemning the removal of one or both ovaries at any age simply because hysterectomy is required.

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DISCUSSION

Dr. F. Webb Griffith, Asheville, N. C.—We all admit that the ovaries ought to be saved, but in the majority of instances, when the uterus has to be removed, the ovaries also have to be removed. In carcinoma of the cervix, most of us still feel that the ovaries should be removed. In inflammatory conditions the ovaries are usually involved and when we save them we do so at great risk of another operation in the near future. The life of the ovary, after the removal of the uterus by the average operator, I believe is short. This is due either, as Dr. Richardson has said, to interference with the circulation or to other causes. You remember that the circulation of the ovary comes partly through the infundibulo-pelvic ligament and partly from an ascending branch of the uterine. These two blood channels usually anastomose and when one is large the other is usually small. When the uterine branch is the large one and the uterus is removed, you can readily see that the nourishment of the ovary is impaired. In those cases where the tube is removed, even though by careful dissection you keep close to the tube, you have greatly endangered the blood supply of the ovary. Whenever the tube can be saved with the ovary, as in hysterectomy for myoma, it should be done to lessen the danger of interference with circulation. There was a tendency a few years ago to remove most of the ovaries. Then the pendulum swung back and we tried to save the ovaries whenever there was a possible chance of so doing, and as a result, many of our patients had to be reoperated, and that in turn caused us to become so radical that Dr. Richardson has seen fit to urge against this tendency. If at the primary operation the chances are even that the ovary will be-

come either atrophic, cystic or adherent, or remain a focus of infection, I believe we will be less apt to have a nervous patient if we relieve her of all pain and local symptoms by removing the ovary.

Dr. *William T. Black, Memphis, Tenn.*—We may have some nervous manifestations following the removal of the uterus, nevertheless they are not nearly so marked as when both ovaries are removed. Certainly they should be preserved in women who have not passed the menopause, and even after this physiological change has taken place, I can see no special reason for removing the ovaries unless we suspect malignancy, or there is some ovarian lesion present. It is very necessary where the ovaries are to be left in, in performing a hysterectomy, to leave the blood supply as much undisturbed as possible. When possible the tubes should be left and when necessary to remove them the incision should be as far away from the ovaries as possible. ' It is also best to anchor the ovaries high up, so as to prevent a prolapse. The interrelationship of the secretions of the endocrine system is becoming so well understood that no one can remove a ductless gland without fear of disturbing metabolism to a certain degree. The function of the corpus luteum has principally to do with the function of menstruation and the growth of the fetus. Its removal doubtless would make little difference. But the removal of the remaining portion of the ovaries always seriously interferes with the proper balancing of the internal secretions. I therefore wish to disagree with some of our best authorities upon the removal of the ovaries where it is necessary to remove the uterus.

Dr. *Richardson (closing)*.—I do not agree with Dr. Griffith when he says there are only occasional cases in which the ovaries can be saved. On the contrary, there are a great many cases in which the ovary can be saved if we will take the trouble to do it. The assertion that these retained ovaries often undergo secondary changes which require their removal lacks scientific proof. I have been doing gynecology for fourteen years and have rarely seen the abdomen reopened for removal of ovaries on account of degenerative changes following hysterectomy. •I do not believe it is necessary to remove the ovaries even in the operable cases of carcinoma of the cervix. During a period of nearly two years' apprenticeship in gynecological pathology in the Johns Hopkins Laboratory I saw metastasis in the ovaries only twice, I think, and these were instances of most advanced carcinoma of the cervix, where the growth had broken through and studded the pelvis. Nor do I know of a case in the literature in which metasasis was demonstrated in the ovary where the cancer of the cervix was still in the operable stage. I have two cases now in which I operated five years ago for carcinoma of the cervix; the women have been examined regularly at six-month intervals and the ovaries are perfectly normal. In one case of cervical carcinoma of a fairly advanced stage, operated upon several years ago, I saved both ovaries and was delighted to .demonstrate on reopening the abdomen recently that both of these ovaries are func-

tioning properly, and that there is no sign of carcinoma in either one. I think, therefore, that unless you have a specific, demonstrable disease of the ovary at the time of operation, no matter whether the woman is under the menopause age or over it, the burden of proof is with the operator to justify total ablation.

DIVERTICULUM OF THE POSTERIOR URETHRA*

BY G. T. TYLER, M.D.,
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For some time after I had observed the case I am to report, I was uncertain what to call it. There was a pouch in the floor. of the posterior urethra just anterior to the internal sphincter. This was a diverticulum, to be sure; but it might with equal propriety be called a dilatation of the prostatic glands in this region. I had not seen accounts of such a condition in the literature on diseases of the prostate; and that on diverticulum of the urethra deals much more extensively with the condition in the anterior urethra. There is· little on diverticulum of the prostatic portion.

The early age at which bladder stone formed in this case led me to think that if these diverticula were congenital they might explain the occurrence of vesical calculus in male children. Although it does occur more frequently in males, I have not been able to find data in support of this view. Again the difficulty of making accurate examinations in children has prevented such findings. Against this theory is the rarity of reported diverticulum with the occurrence of stone in the bladder. It is conceivable that diverticulum of the posterior urethra may be due to dilatation of the prostatic ducts. This view, I think, is tenable from the work of Lowsley on the prostate at birth. One might ask why it does not occur in the anterior or lateral wall, as well as in the posterior. I have no reply to this objection.

CASE REPORT

The patient, a boy, aged 16, having incontinence of urine, was sent to me because of swelling of the left testicle. One year previously both

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