OVARY AND

FALLOPIAN TUBE

TUMORS FEMALE SEX ORGANS

part 3

1961

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ATLAS OF TUMOR PATHOLOGY

Section IX—Fascicle 33

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TUMORS OF THE OVARY AND FALLOPIAN TUBE

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Arthur T. Hertig
Hazel Gore

TUMORS OF THE OVARY AND FALLOPIAN TUBE

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TUMORS OF THE OVARY AND FALLOPIAN TUBE

OVARY

CLASSIFICATION OF OVARIAN TUMORS

Laboratories of gynecologic pathology usually have individualized classifications of ovarian tumors. For representative examples of such classifications the reader is referred to: Schiller, "Concepts of a New Classification of Ovarian Tumors;" and to standard textbooks by Willis, "Pathology of Tumours;" Novak and Novak, "Gynecologic and Obstetric Pathology;" Herbut, "Gynecological and Obstetrical Pathology;" and Barzilai, "Atlas of Ovarian Tumors." Kottmeier, in "Carcinoma of the Female Genitalia," gives still another classification which reflects extensive experience with ovarian tumors at the Radiumhemmet in Stockholm. Emphasis in such classifications may be placed on benignancy versus malignancy, hormonal function versus nonfunction, simple gross or microscopic anatomy, or on histogenesis. All classifications encompass these features to a greater or lesser degree depending on tradition, current knowledge, and the interest of the gynecologist or pathologist concerned.

The ovary is a complex structure from an embryologic, anatomic, and functional standpoint. Therefore, it is not surprising that its tumors are diverse, complicated, and often histogenetically poorly understood. As a corollary, many ovarian tumors are difficult to diagnose. The complexity of ovarian tumors becomes more understandable when it is realized that there is not yet universal agreement as to the origin of such essential structures as germinal epithelium, primordial germ cell, or graafian follicle wall. Furthermore, it is not understood why, or precisely how, the intrinsic mesenchyme of the primordial gonad becomes estrogenic in the female and androgenic in the male. Answers to these questions would greatly clarify pathogenesis of such diverse tumors and related entities as feminizing mesenchymal tumors, virilizing tumors, gynandroblastoma, ovotestis, and other intersex problems. If the embryologic sequence leading to development of the gonad and various parts of the kidney and adrenal were clearly understood, the vexing problem of pathogenesis of teratoma, mesonephroma, dysgerminoma, and tumors resembling hilar cells and adrenal cortex could probably be answered.

Reference can be made to standard textbooks on "Human Embryology," by Patten or by Hamilton and associates, for a summary of currently accepted data on the development of the ovary. The monograph on the subject by Gillman may also be consulted for detailed information on the development of

the gonads in man and their histogenesis in relation to ovarian tumors. However, pertinent embryologic data will be presented with discussions of the individual tumors.

The classification in use at the Free Hospital for Women at the time this fascicle was written was one which had evolved through the past 50 years. This simple classification was based essentially on known or postulated histogenesis of ovarian tumors, with due cognizance of benign and malignant variants and intervening gradations. Hormonal function, when present, was duly noted, although this is not the initial or even an essential basis of classification. Reflection need only be made (1) on the apparent lack of estrogenic activity in a very sclerosed thecoma or (2) on the occasional chorionic gonadotropic or rare androgenic activity associated with a tumor of predominantly dysgerminomatous type (ordinarily nonfunctional from a hormonal standpoint) to realize that differentiation on a functional basis also has its taxonomic pitfalls.

Since this fascicle was submitted for publication in July 1955, we have noted some inconsistencies in our original classification (Hertig and Mansell) and consider the following classification a more logical development. It includes only true tumors of the ovary and omits those follicular derivatives which may be mistaken for a neoplasm. However, it must be recognized that nonneoplastic swellings do occur and should be considered in a differential diagnosis.

1. Gonadal stromal tumors
   a. Granulosa-theca cell tumor
   b. Arrhenoblastoma
   c. Gynandroblastoma
2. Germ cell tumors
   a. Dysgerminoma
   b. Choriocarcinoma
   c. Benign cystic teratoma
   d. Malignant teratoma
   e. Teratocarcinoma
3. Cystomas (germinal epithelial origin)
   a. Serous cystadenoma and cystadenocarcinoma
   b. Mucinous cystadenoma and cystadenocarcinoma
   c. Endometrial cystoma, benign and malignant
   d. Cystadenofibroma, benign and malignant
4. Congenital rest tumors
   a. Adrenal rest tumor
   b. Mesometanephric rest tumor
   c. Brenner tumor
   d. Hilar cell tumor
5. Nonintrinsic connective tissue tumors
6. Metastatic tumors

The chief difference in this classification from the original is in the grouping of all gonadal stromal tumors, whether they are derived from male-directed or female-directed gonadal stroma or from some point between these. The common origin of gonadal stromal tumors explains their histologic similarity and the subsequent frequent difficulty in distinguishing one from another.

Although the non-neoplastic cysts of graafian follicle origin have been omitted from our classification, they are of importance because they may mimic true tumors and are, therefore, considered in this fascicle before the true ovarian tumors.

NON-NEOPLASTIC CYSTS OF GRAAFIAN FOLLICLE ORIGIN

Cysts of graafian follicle origin, although non-neoplastic, may mimic the true cystomas grossly and microscopically. Even though they may occur at any age prior to menopause, they rarely cause vaginal bleeding in infants and young children; they may, however, disrupt or alter normal physiologic function during sexual maturity, arise as the result of normal or abnormal pregnancy, become gangrenous, or even rupture.

The cysts may arise at any stage of evolution or involution of the graafian follicle. Therefore, the wall may be composed of either granulosa or theca interna cells—with or without luteinization, or theca externa cells—with or without hyalinization. One or all of these follicular wall elements may be seen in a single cyst, or in multiple cysts, within the same ovary (figs. 1–6). Since there is no fixed rule to indicate when these normally cystic structures should be designated as cysts, we arbitrarily use 2.5 cm. as the dividing line.

Cystic Structures Derived From the Unruptured Follicle

Grossly, these cysts may be single or multiple, lie within or beneath the cortex, contain clear or sanguinous fluid, and often show congested or hemorrhagic walls. In our experience, the average normal ovary from a fertile patient under 40 years of age may show as many as 8 or 10 follicles in midsagittal section. Such follicles may vary from 3 to 5 mm. in size, be widely and evenly spaced within a somewhat edematous poorly demarcated pale gray cortex, and grossly show varying degrees of congestion, hemorrhage, and luteinization of their walls. If there is any significant luteinization of either the granulosa or theca elements, this may be evident grossly as diffuse or discrete yellow patches.

Abnormal cystic follicles are similar to these in appearance but tend to be closely crowded together just beneath the tunica albuginea. The most striking form of this abnormality is reached in the polycystic ovary associated with the Stein-Leventhal syndrome. McKay and Pinkerton have postulated that there is a persistence of the normal architecture of the immature ovary beyond puberty. They noted a fibrous capsule in presumably normal ovaries of autopsied patients from birth to 12 years of age.

INVOLUTING GRAAFIAN FOLLICLE OF THE OVARY

(Figures 1 and 2 are from the same case*)

NOTE: Such derivatives of the follicle may be small or large, single or multiple, and may have one or more elements of the follicular wall. This distinguishes them from those of germinal epithelial inclusion origin (figs. 65, 67, 68). Follicular derivatives measuring less than 2.5 cm. are designated here as cystic follicles, and as follicular cysts when larger. Cystic corpora lutea and corpus luteum cysts are similarly differentiated by size.

Figure 1. Photomicrograph of the wall of a cystic follicle actually representing a normally involuting graafian follicle. Note the degenerating cumulus oophorus containing the ovum. Also note the granulosa cell and theca cell layers. Hematoxylin and eosin stain. X 39. A. F. I. P. Acc. No. 216121–15081.

Figure 2. Higher power microscopic detail of the wall from this involuting follicle. Note small pleomorphic granulosa cells with relatively large nuclei and the moderate intercellular edema of the inner layer (above). Contrast the granulosa cells with the partially luteinized theca interna cells which merge imperceptibly with those of the vascularized theca externa. The edematous fibrous tissue of the ovarian cortex is seen (below). Hematoxylin and eosin stain. X 260. A. F. I. P. Acc. No. 216121–15083.

*From the Armed Forces Institute of Pathology.

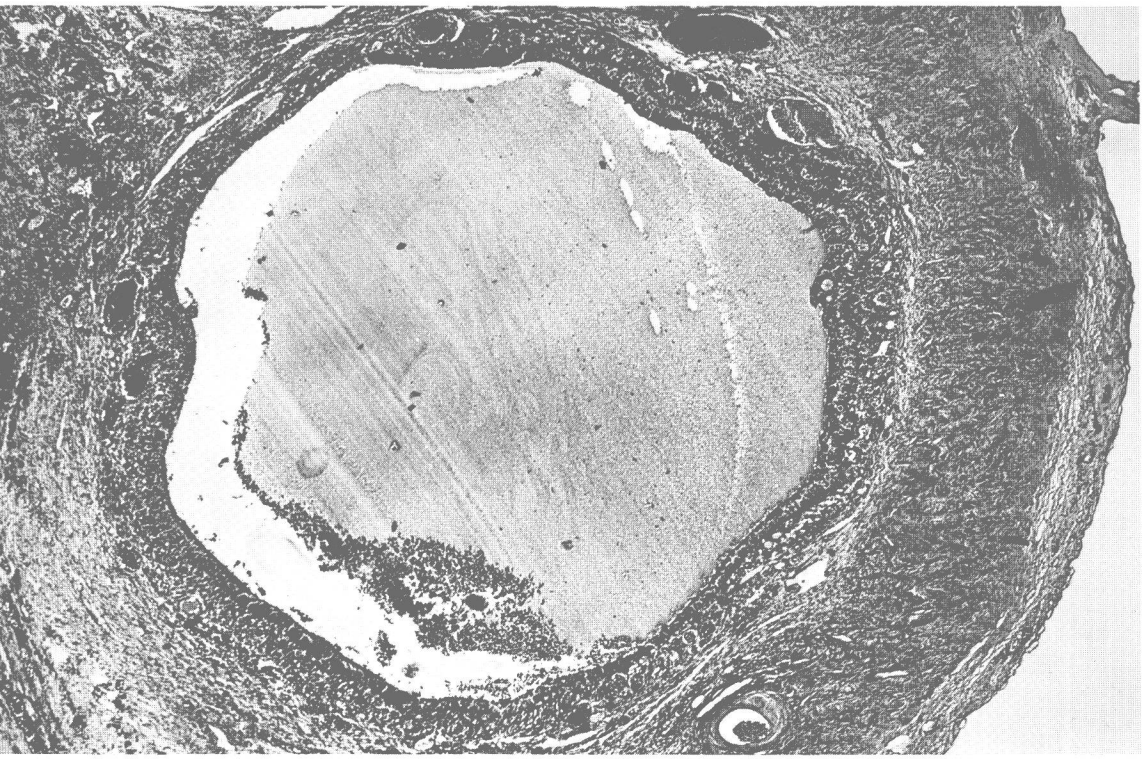

Fig. 1

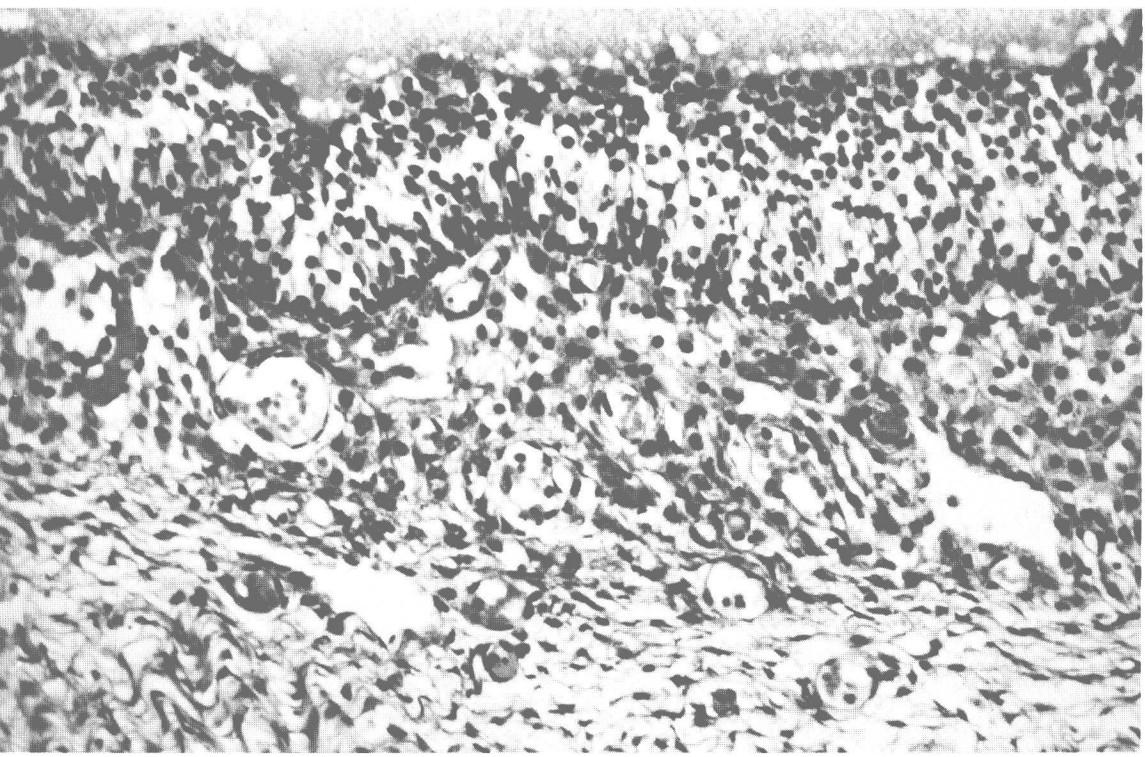

Fig. 2

CORPUS LUTEUM FORMATION

Figure 3. Convoluted wall of a recently ruptured mature follicle. In the photomicrograph note slitlike remnant of follicular cavity, thick layer of slightly luteinized granulosa cells, and vascular hemorrhagic theca—the interna cells of which show early luteinization. Hematoxylin and eosin stain. X 125. F.H.W.* S-40-693; A.F.I.P. Acc. No. 218754-781.

Figure 4. Mature corpus luteum of the normal menstrual cycle. In the photomicrograph note organization of slitlike follicular cavity, vascularized layer of large pale granulosa lutein cells, and tonguelike nest of vascularized luteinized theca interna cells. Hematoxylin and eosin stain. X 125. (This is figure 946 in Hertig, A. T., and Mansell, H. In: Anderson, W. A. D. [ed.]. Pathology. 3rd ed. St. Louis: C. V. Mosby Co., 1957.) F.H.W. S-41-272; A.F.I.P. Acc. No. 218754-782.

VARIANTS OF CYSTS DERIVED FROM GRAAFIAN FOLLICLE

Figure 5. Photomicrograph of a cyst of corpus luteum origin showing the various elements of this structure; these include organizing hemorrhagic coagulum, vascularized granulosa lutein, and theca lutein layers. All of these elements of the corpus luteum are of diagnostic importance, and are present to a variable degree in varying stages of functional activity. This particular cyst arose during pregnancy and resulted in a postpartum secretory hyperplasia of the endometrium. Hematoxylin and eosin stain. X 125. F.H.W. S-40-1; A.F.I.P. Acc. No. 218754-783.

Figure 6. Follicular cyst showing the granulosa layer. In the photomicrograph the few theca interna cells lie beneath the granulosa layer of the largest polypoid projection. Hematoxylin and eosin stain. X 125. F.H.W. S-38-1952; A.F.I.P. Acc. No. 218754-784.

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*In this and the following legends, F.H.W. stands for Free Hospital for Women, Brookline, Mass.