Lecture.

THE CLASSIFICATION OF BENIGN TUMORS OF THE BREAST.¹

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THE great frequency with which the breast is afflicted with cancer, makes any lesion of that organ a source of great anxiety to the patient and to members of the family. The importance, therefore, of a correct knowledge of all the growths of this region is such that it seemed to me that this subject would be a suitable one for one of the evening lectures of this winter's season.

The subject of this evening's lecture will therefore be a review of the different forms of tumor of the breast, more particularly the benign tumors, in order to prepare the way for the differential diagnosis between them and the malignant forms of disease of the breast.

In studying out this subject a little more exhaustively than I had hitherto done, I was struck with the lack of unison in the opinions of different writers on this subject. There seems to exist an imperfect knowledge of the pathology of the various diseases of the breast, more particularly the tumors, even among the writers of the highest authority. In going over the work, in sifting out the opinions of different authors, in summarizing them, and then in taking a general view of the whole situation, I think that I have arrived at conclusions which I should not have arrived at under any other circumstances.

We will begin at the development of the gland, and trace somewhat briefly the earliest forms of development of the gland, the period of full maturity, and the gradual decline and atrophy of it in advanced life.

The mammary gland is, as you know, an appendage of the skin; as one writer has expressed it, a sort of highly specialized sudoriparous gland. It begins as a slight outgrowth of the rete Malpighii into the cutis vera in the early weeks of fetal life, and at the period of birth it has already formed a number of radiating ducts with pear or club-shaped ends, some fifteen to thirty in number, radiating from the common point at which the outgrowth has started from the surface.

If we study the development in the embryo of mammals, we see some interesting features in the process of development which have a bearing on what we have to say about morbid growths later on. I have here three embryos of the pig of about one month's growth. An examination of the abdomen with a lens shows a faint continuous line running from the axilla to the groin on either side of the abdominal cavity, and, as the fetus grows, this line works up more nearly on to the front of the abdomen. The formation of the numerous udders, or of the mammary glands, takes place by a growth of this layer of the ectoderm, as it is called, and by a process of differentiation a thickening at three or four parts of the line occurs. Finally, we find that the line itself has disappeared, and in its place we have a row of nipples.

I have said that at birth the gland had a sort of stellate or radiating appearance, being composed of a series of ducts with pear- or club-shaped ends. An examination of them shows considerable activity within the tubes at the time of birth. There is a prolifera-

tion of the epithelium, a shedding of the epithelial cells and an accumulation of a certain amount of granular *débris* in the interior of these ducts at birth. It almost seems as if there were something akin to an inflammatory process going on in the breast at this period. This activity in the epithelium produces a dilatation of the tubes, so that there is a sort of ectasia, and finally it is so marked that it becomes at the end of the first year a cavernous structure lined with a pavement epithelium. No material change in the appearance of the gland takes place after this until the age of puberty is reached, and then we find, of course, an increase of growth again in the gland, and we notice this condition not only in the female sex, but occasionally also in the male. I have been on several occasions consulted by mothers of young boys about fourteen years of age, for a distinct swelling and tenderness of the mammary gland coming on about the age of puberty.

Comparatively few acini are developed at the ends of the ducts and smaller tubes at this period.

Outside of the ducts and tubes we find the development of a hyaline connective-tissue stroma, having parallel bundles of fibres, which is quite a marked feature; and this basement stroma is distinctly different from the connective-tissue stroma of the gland proper itself. It is quite rich in nuclei, more or less transparent, and different in its nature from the ordinary connective tissue which we get in the stroma of the mammary gland—an interesting point to remember, because it again has a bearing upon the development of certain morbid growths.

The next stage in the development is the development of the acini, and this takes place by a sort of budding process, a growing out into the surrounding connective tissue; and here we get the physiological homologue of true adenoid tissue, that is, a new development of typical gland tissue, by a growing out of little processes of epithelium, at first solid, and later containing spaces which represent a true gland growth. At the time of pregnancy this development of acini takes place at an enormous rate. After lactation is over the acini collapse, but they do not disappear; and of course they remain there to be distended again at the next period of lactation.

After the period of full maturity of the gland has passed, we come to the period of decline, which, of course, becomes more marked at the menopause; and we have there another important and interesting condition to study. We find then that the acini began to be absorbed and to disappear; and what we have finally left is merely an elongated tube which generally ends in more or less of a club-shaped extremity, and we have connected with the end histological structures which show the atrophied remains of previously existing acini of the gland. At this time also we often find a slight amount of desquamation of epithelium and granular *débris* in the interior of the tubes, as if this period of metamorphosis of epithelium was disturbed in its process of growth and decay, and was stimulated to a little greater activity at certain points than it had been before.

As the gland structures of the breast atrophy and disappear, connective tissue and adipose tissue come to take their place, and we finally have a breast containing merely the larger ducts, a small amount of fat and connective tissue, but little or no proper gland tissue.

¹ An Evening Lecture at the Harvard Medical School.

I think that you will agree with me that there is a certain parallelism in the development of the breast, as I have sketched it, and in the development of the different types of tumor at different periods of life. In the first place, I have spoken of the condition of the mammary gland at birth, and later on at the period of puberty, the great development of the gland, the peri-acinous and peri-tubular growth of the hyaline connective tissue, etc.; and we sometimes find that development occurring in a precocious and somewhat exuberant way, and the condition which is known as infantile hypertrophy illustrates that peculiar condition of the gland. I have here a photograph of a child with fully developed breasts and quite well developed figure, whose age at the time the photograph was taken was two years and seven months, a case kindly placed at my disposal by Dr. Marcy. The sexual instincts of the child were strongly developed. Another unusual form of development of the mammary gland is a condition known as gynecomastia, that is, development of a female breast in the male. Williams represents such a breast in a well-formed young man, and Henry describes the case of a man who had very well-formed breasts, and who assisted his wife to suckle a family of eight children.

I have here the photograph of such a case. This man evidently exhibited himself as half man and half woman. He has allowed the hair on one side of the body to grow and on one side of the lip. It is evident that he is a typical example of gynecomastia, having the ordinary figure of the man in every respect except in regard to the right breast.

Another form of malformation is that known as polymastia, and all I have to do is to recall to you the development of the milk line in the pig and in the lower mammalia to show how it comes about that this condition of polymastia or multiple breast occurs in certain cases. In this diagram I have indicated the line which you have seen, the milk line, and where the nipples would be likely to occur perhaps in the lower mammalia and possibly in man's earliest ancestors, as Williams has indicated in his monograph on the breast. Cases of breasts upon the thigh and back, of supernumerary nipples in these localities have been quoted, but it is probable that the majority of supernumerary breasts develop themselves along this line; and we see here in this case, which is an example not only of polymastia, but of diffuse hypertrophy, that we have the development of supernumerary gland tissue along just that line, and if we could have lifted up that breast in the photograph a little bit, we should have found beneath it a supernumerary nipple. This patient came under my observation at the hospital a year or two ago, when she was at about the middle of her pregnancy. The photograph was taken at that time. The second photograph was taken about the time of confinement in the lying-in hospital. After the confinement had taken place the breasts diminished very greatly in size. Dr. Anthony, of Bradford, afterwards took her through a second confinement, and found renewed enlargement of the breasts and subsequent subsidence. In her second confinement she was allowed to nurse the child, and the breast secreted an abundance of milk.

Diffuse hypertrophy is a condition which this patient also serves to illustrate, but really a more typical example was that which I have represented in my work on surgical pathology and which was published

by Professor Porter in the "Proceedings of the American Surgical Association," where the breasts were much more largely developed, and where he succeeded in removing by amputation both the breasts very successfully. The anatomical condition of diffuse hypertrophy of the breast seems to differ in different individuals. In some cases it appears to be simply an increase in the amount of glandular tissue. In other cases it seems to be an increase in certain constituent parts of the mammary tissue; and in the case of Dr. Porter, which was examined by Dr. Whitney, there was an interstitial growth giving rise to that cystic type of breast disease which we shall speak of presently, so that there seems to be a certain amount of tumor formation in such breasts. In the second case to which I have just alluded there did not seem to be any lobular growths which indicated any such form of growth, but a general diffuse enlargement of the breast—gigantism, if we may say so, of the mammary gland.

Now we will take up more characteristically tumor-like growths of the gland, and attempt to trace the analogy between them and the changes seen in the mamma at the different stages of its development and decline. I shall speak first of fibroma of the gland, which comes in the early period of the life-history of the adult mammary gland; and then of the cysto-adenoma of the gland, which comes in the period of the full development of the acinous portion of the gland, the more strictly glandular structures; and finally, about the cystic degeneration of the gland, which comes in the period of senile change and decline.

First, in regard to fibroma. If you remember, I called your attention to the fact that at the age of puberty there was a growth of hyaline tissue about the tubes and lobules of the gland. Fibroma of the gland, according to Billroth, is developed from that structure. These tumors appear in early life shortly after the period of puberty. There are two forms of fibroma, the solid and the cystic. In the solid forms, where there are no cysts, the average age is said to be about twenty-three years, and in the cystic forms about twenty-six years.

I will speak first of the cystic, which is, perhaps, the most common and most characteristic. I have here a diagram of that growth stained with a double stain of eosine and hematoxylin. The epithelium is stained purple, and the fibrous tissue pink; and we see in between these long slits, which are so characteristic of the cystic fibroma, or intra-canalicular papillary fibroma as it is sometimes called, this hyaline tissue. With the active growth of this tissue there is a stretching and distortion of the ducts of the glands, the acini having been but very imperfectly developed at that period of life, and these long narrow slits are thus developed. We see but little glandular structure in such tumors. These tumors reach about the size of an egg or a little larger, are more encapsuled, and when excised do not, as a rule, recur. They are generally single, but sometimes multiple. I saw yesterday a young lady operated upon three years ago for a tumor of this kind of the right breast, and find that she has another of the same character growing in the left breast. She is now about twenty-one years old.

Gross speaks of a solid fibroma of the breast, and I presume he refers to the little hard lobular tumors, about the size of a walnut, which Sir Ashley Cooper

has described as "chronic mammary." We make a section and we find none of the slits. We find a few fragments of gland-tissue, and in the interstices between the gland structure dense fibrous tissue. This is a comparatively harmless growth, does not become inflamed, increases to the size of a walnut and there remains. The patient experiences a little pain and tenderness at the period of the catamenia, but otherwise has no trouble. Lately, at the hospital, I had the opportunity of examining such a tumor which had been twenty years in the breast of a woman who came for another affection entirely, and she said she had experienced no trouble from it whatever.

We come next to a form of tumor which has to do more particularly with the gland structures of the breast; and here we find a tumor growth more distinctly in the middle period of life, the average age being about forty-three. Here we find very distinctly gland structures existing, and this is a section taken from one of these growths kindly prepared by Dr. Whitney and drawn by Mr. Kaula. You see these growths are somewhat polypoid or villous, and they have been called villous papilloma by some authors, and cystic adenoma by others. They are full of little spaces more like acini than tubes, though sometimes they become more oval and elongated like tubes and are lined with a layer of epithelium. It is evident that these tumors grow from small acini and very small ducts of the gland. They develop in different ways, according to different authors. Billroth suggests that there is a very active growth of epithelium, and quite a number of acini develop in which the epithelium afterwards breaks down and leaves cysts of considerable size. The stroma of the gland takes a comparatively small part in the development of the tumor; and so we see little of the connective tissue as compared with the great mass we see in the fibroma of the gland. Sometimes these cysts develop to a very great size; and here is one of the most marked types, which was removed at the hospital a few days ago, and we see one of these villous tumors developing in it.

Gross has almost denied that there is such a thing as true adenoma of the gland. He is very strict in his definition of what adenoma should be. He has seen, he says, but two examples of it himself, and has only eighteen examples of pure adenoma on record. I think that he has attempted to isolate too completely the gland structure from the other structures of the breast. You see that in so complicated an organ as the breast, when one part grows the other must grow to certain extent, and we get complicating and confusing pictures somewhat difficult to interpret; but if we hold fast to the point of origin of the growth we do not have that difficulty. If we hold to the acinus growth in the cystic adenomas, we shall have an ample explanation of the peculiar papillary character of the growth, which is not a papilloma any more than its surroundings oblige it to be, and therefore we should properly classify this as a true form of adenoma, modified of course to adapt itself to the structure in which it grows. This form of tumor appears at the time when the acini are in a most active stage of development, that is, in the forties. It is a softer tumor than the fibroma, and does not grow much larger. One of the characteristics is a sanæous discharge from the nipple. We can understand how that would occur in vascular growths; by the break-

ing-down process we should have little hemorrhages which would cause discharge from some neighboring excretory duct.

I pass by the lipoma, chondroma and osteomas of the gland as extremely rare forms of tumor, and tumors which have nothing in particular to do with the mammary gland, and come to the kind of tumor, or more properly disease, which we find in the declining stage of the gland; in that stage when the acini become atrophied and are replaced by connective tissue, and the tubes are somewhat dilated towards their extreme ends into club-shaped dilatations, and are lined with a somewhat thickened and desquamating layer of epithelium. The gland going through this process of atrophy, with substitution of connective tissue and fat for active gland structures, this disturbance of epithelium may easily become so altered in certain parts as to disturb the regular process of involution, and consequently constriction of the ducts leads to the formation of cysts. Now these cysts may be either single, confined to one lobe of the gland and growing to the size of a walnut, or they may permeate the whole of the gland. This is cystic degeneration, as it is sometimes called—a condition which exists probably in a slight degree in the majority of declining breasts. Some pathologists call this condition, of which I have an example here, chronic mastitis with retention cysts. This is a breast split open to show the whole interior of the gland; and you see here the whitish mammary tissue and these little cysts full of greenish material, and some again quite large, and as in this case so extensive that the whole breast had to be removed on account of the complete degeneration which had taken place. Some authors think this is a form of cysto-adenoma but there is no development of the glandular structures, as it belongs to the period when the parenchyma of the gland is atrophied and in a quiescent state, and when the gland itself is in a state of involution; and therefore it is to be looked upon rather as a degenerative process than an actively developing one. These cysts occur at about the time that malignant disease develops, and consequently they are the subjects of great solicitude to the patients suffering from them; but the characteristic symptom is the presence of a large number of little pea-like bodies diffused over the gland, sometimes in one breast, and sometimes in both breasts, accompanied with considerable pain, caused by a hyperæsthesia of the nervous filaments going to them.

I should like to say a word about the treatment of these cysts. When there is a single cyst a puncture will sometimes suffice for a cure, as the cyst will collapse and never fill again; but where the disease is more extensive and involving the whole of the gland, then it is perhaps necessary to remove the whole or portions of the gland. If the cysts do not enlarge, they may be allowed to remain, as they will probably give no trouble and many such a breast can be saved from the knife if a correct diagnosis is made. Why should these cysts have this peculiar color? The walls of the cyst being in a state of glandular irritation, the epithelium breaking down, the vessels become thrombosed through hyperæmia or perhaps constriction of their lumen, and little extravasations of blood take place, and we have hematoidin crystals and granules of fat and broken-down tissue that give them this peculiar appearance.

An affection which is likely to be mistaken for

this is one known as mastodynia or neuralgia of the breast. That sometimes accompanies this cystic degeneration of the breast, and sometimes is entirely independent of it. I think we see it at times with a certain amount of hyperemia, and perhaps a temporary enlargement of the breast without any actual structural change. These cases are extremely hard to manage, the patients becoming hypochondriacal; but the pain is usually not accompanied by any serious disease.

I have not said anything of chronic mastitis of the breast. I have left that to the last not to have it confused with any of the other affections mentioned. We may have an inflammation of the breast, and a chronic as well as an acute one. I shall say nothing about the acute inflammations. The chronic form is one which may occur and be accompanied by a considerable growth of connective tissue such as we have in the cystic degeneration. In chronic mastitis we find great growth of the interstitial tissue and destruction of the glandular structures. Billroth represents, and Williams copies from him, a form of shrinking mastitis which has all the appearance of atrophying scirrhus. Occasionally we do have a chronic inflammatory process of the breast going on to destruction of the breast. It may occur in early as well as late life. I remember a nursery maid who came to me twenty years ago with a lump in the breast. I removed it, and found no trace of malignant disease. I made the diagnosis of chronic mastitis. Presently she appeared with a similar lump in the other breast and I explained to her that she had not anything which it was necessary to remove.

Nevertheless, she had it burned out afterwards by a caustic process. She is still, so far as I know, in robust health. I think such cases are not very common, but they are to be taken into account in making a diagnosis of malignant disease of the breast.

I have not time to speak of tuberculosis or cold abscess of the breast. I think I have said enough to give you perhaps a little more intelligent idea of the origin of benign tumors of the breast and of the different types which we may expect to find at different periods of the life history of that organ.

Original Articles.

DEDUCTIONS FROM HOSPITAL WORK IN ABDOMINAL SURGERY, WITH A REPORT OF FORTY-FIVE CASES.¹

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THE following forty-five abdominal operations were done during the spring of 1896, at the Woman's Charity Club, St. Elizabeth's and Carney Hospitals.

There were nine hysterectomies.

Of the forty-five, four died; two following suprapubic hysterectomy for carcinoma, and two following celiotomy for tubercular disease of the tubes and ovaries. The two deaths following hysterectomy were at the Woman's Charity Club Hospital.

One (Case II) died of sepsis. The operation was a long one, and the patient was much exhausted by it. On the right side the disease had extended outside the uterus, infiltrating the right broad ligament as far as

the ilium. Breaking-down carcinomatous tissue could be dug out with the finger. This was a fruitful source for the sepsis.

The other (Case IV) died from shock. She was very much exhausted from long-continued loss of blood, by a long and difficult operation, and by a mortal dread of the operation. She took ether very poorly. Several times during the operation the pulse and respiration stopped, and when I had finished she was cold, and I supposed she was dead. Four of us worked over her for two hours before she began to rally at all, but spite of all we could do she died in thirty-six hours.

In the two celiotomies for tubercular disease of the pelvic organs, death was caused by sepsis. One occurred at the St. Elizabeth's Hospital (Case I), the other at the Carney Hospital (Case II). In both cases it is presumable that they became infected by the pus that escaped into the peritoneal cavity from the ruptured tube. In Case I gauze drainage was used.

For suture material within the abdominal cavity, catgut was used as much as possible. By using an absorbable material for ligatures, we avoid the trouble which so often begins weeks or months after silk has been used in the abdominal cavity, and continues until the silk is gotten rid of through the line of incision, bladder or intestines. I have had it escape by all these routes. In one case the intestine became adherent to the knot of silk used in tying off the left tube and ovary. Long-continued suppuration, with severe pain, necessitated a second celiotomy. It was found that the silk knot had worked its way into the intestine, leaving a long fistulous track.

Resection of the diseased and perforated intestine was successfully done by Dr. S. J. Mixter. Now that small and medium-sized catgut can be made perfectly sterile without impairing its strength, there is no excuse for using silk. I do not think it is safe to trust those who make a business of sterilizing suture material. If you do trust suture material sterilized by others, you will sooner or later certainly come to grief. In the sterilization of suture material, eye-servants should never be employed.

I have found two reliable methods for making catgut sterile. Catgut prepared by either of these methods is perfectly sterile. Both Dr. J. H. Wright and Dr. E. A. Darling of the Harvard Medical School, have examined catgut made sterile by these methods, and have pronounced it free from bacteria. I have never had suppuration follow the use of catgut thus prepared.

In both processes the gut is soaked in the ether for several days. It is then cut into the desired length, each length being thoroughly stretched (the stretching prevents kinking and twisting, which is so very annoying). The gut is then soaked twenty-four hours in absolute alcohol, to take out as much of the water as possible. It is then covered with a solution of bicromate of potassium in absolute alcohol (15 grains to the pint), and remains in this twelve hours.

In Process No. 1 each length is coiled up, done up in waxed paper, and put in an envelope which is sealed. The sealed envelopes are put in a dry oven, and baked for one hour at a temperature of 100° C. This removes all the moisture, and thus prevents further heating, making the gut brittle. On the following day the sealed envelopes are baked three hours at a temperature of 140° C. The gut is now ready for use. The envelopes are kept in a glass jar.

¹ Read before the Obstetrical Section of the Suffolk District Medical Society, November 4, 1896.