

# A CASE OF CARCINOMA OF THE TESTIS IN A YOUNG MAN, WITH METASTATIC DEPOSITS LYING FREE IN THE HEART AND IN THE INFERIOR VENA CAVA.<sup>1</sup>

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(PLATE XIV.)

THE specimens to be described are of great interest and pathological importance. They were obtained from the body of a young man, æt. 24 years, who suffered from a malignant tumour of the right testis, which on careful microscopic examination proved to be a columnar-celled carcinoma, exhibiting certain curious features.

## I. CLINICAL HISTORY.

A clinical description of the case will be found in the Male Surgical Register of St. Bartholomew's Hospital,<sup>2</sup> and to this account we must refer those interested in the symptoms and course of the disease. To the pathologist the following points of the clinical history are of interest:—

1. The early age of the sufferer, namely, 24 years;
2. The comparatively rapid progress of the disease (about seven months from the time that any changes were noticed);
3. The thickening of the cord;
4. The suppression of urine which set in a fortnight before death;
5. The swelling of the face, which appeared about two weeks ante-mortem, together with œdema of the left hand;
6. The appearance of glandular enlargement in the neck, which increased rapidly;
7. The onset of dyspnœa shortly before death.

<sup>1</sup> Read before the Pathological Society, December 15, 1896.

<sup>2</sup> *Male Surgical Register, St. Barth. Hosp.*, London, 1894, vol. i. No. 1359.

## II. POST-MORTEM ACCOUNT.

The post-mortem account is found in the "Surgical Post-Mortem Register," 1894, p. 88, but unfortunately it is not quite complete, and has therefore in some particulars been amended by us. We shall omit points which are merely of secondary interest and only mention the most important features.

(a) The right side of the scrotum was occupied by a solid oval swelling, not adherent to the skin.

(b) The right testis was enlarged to the size and shape of a goose's egg. There was no fluid in the sac of the tunica vaginalis. On section, no testicular substance was observed, but the testis was replaced by a soft medullary mass in which there were a number of small cysts. The epididymis was enlarged and the seat of a white deposit, extending up the cord for a short distance. The left testis showed nothing abnormal. The vas deferens was filled up by growth.

(c) The whole of the posterior wall of the abdomen in the lumbar region was occupied by a large malignant mass, evidently due to secondary deposits in the lumbar and aortic glands, which was continuous with the right testicle by a thickened cord, in which were seen dilated lymphatic vessels and enlarged lymphatic glands at intervals, the first enlargement being a short distance above Poupart's ligament.

The whole of the posterior and superior mediastinal glands along the course of the thoracic duct were the seat of considerable deposits of malignant material, and there was a large mass behind the bifurcation of the trachea, but the lumen of the tube did not appear to be pressed upon.

The left supraclavicular and cervical glands were enlarged by secondary deposits. The supraclavicular glands formed a protrusion into the left pleural cavity.

The right lymphatic glands of the neck were slightly enlarged, and apparently the seat of secondary deposits.

(d) *Viscera*.—In both lungs there were many small secondary deposits, about  $\frac{1}{2}$  in. in diameter, some, however, slightly larger, others smaller; they were situated chiefly on the surface of the lung, but on section a few were found inside the lung.

The liver was the seat of many secondary deposits, of which some were as large as a pigeon's egg. The hilus of the liver was occupied by a large malignant mass, but the bile ducts were not obstructed.

The spleen showed no deposits.

Both kidneys were large and somewhat pale; they were both displaced. The right pelvis was much distended, and filled with clear fluid, and the upper end of the right ureter was also distended and filled with clear yellowish fluid. About 4 in. below the pelvis the right ureter was obstructed, and its lumen obliterated by an ingrowth of the malignant mass from the lumbar and aortic glands. The left ureter was pressed upon by the same malignant mass, and throughout its whole extent was dilated to the size of a crow quill; the pelvis was also dilated and contained fluid, dirty in colour and foul in odour.

(e) *Heart and vessels*.—On the free border of the tricuspid valve, there was fixed a curiously branched white mass, which extended through the right auricle into the inferior vena cava, and also into the right ventricle. The curiously shaped lateral branches contained small cysts, filled with clear fluid. This mass was hollow for a distance of about 1 in. from its attachment to the tricuspid valve, and some of the cysts on the lateral branches were about the size and shape of small peas.

The inferior vena cava was considerably pressed upon by the infected lumbar and aortic glands, and in its lower part obstructed by a mass protruding into it from the glandular growth which had pierced the vena cava, had

extended upwards along the course, and in the lumen of the vein, and had sent a lateral offshoot into the right renal vein and thence into the right ureter, which it had completely blocked. The aorta, the spermatic, and other vessels were completely free.

### III. DESCRIPTION OF THE SPECIMENS.

#### (a) *Macroscopic Appearance.*

To illustrate this case we append three figures prepared from photographs.

1. Of the testis;
2. The abdominal glands and the inferior vena cava; and
3. Of the intracardiac growth.

The specimens are found in the Museum of St Bartholomew's Hospital, Nos. 2797 *m*, *n*, and *o*. Of these, Fig. 1 represents a section through the testis, which is occupied by a cystic malignant growth, the cysts being small and not numerous on macroscopic examination.



FIG. 1.—Section through the right testis occupied by a cystic malignant growth.  
—(Museum St. Barth. Hosp., 2797 *m*.)

Fig. 2 shows a portion of the aorta abdominalis, surrounded as far as and beyond its bifurcation by the infected lymphatic glands, which on section are riddled with numerous small cysts. The inferior vena cava is shown on the left, and has been laid open. Its lumen is encroached upon by the malignant glands, and it is in part occupied by a mass extending into its lumen from the infected glands. A lateral branch is seen coming off from this intravenous mass; this had been pulled out of the right renal vein and the right ureter.

Fig. 3 shows the curious intracardiac growth which was found in the right auricle and in the inferior vena cava. It is polypoid and branched, and had extended from the free border of the tricuspid valve, where it was attached, both into the right ventricle and into the right auricle and the inferior vena cava.

#### (b) *Histological Appearance.*

Passing now to the histological description we may at once state that the primary growth as well as all the secondary deposits, were distinctly and clearly proved to be carcinomatous, the carcinoma belonging to the columnar-celled type; almost all the growths, excepting

those in the lungs, liver, and some of the glands, proved to be cystic. The cystic nature was marked in the testis itself, and still more so in the intracardiac growth. The cysts were mostly microscopical.



FIG. 2.—Portion of the aorta abdominalis (top, right side) surrounded by infected lymphatic glands. The inferior vena cava (top and bottom, left side) is shown on the left, and has been laid open: it is in part occupied by a mass (shaded more deeply), extending into it from the lymphatic growth around the aorta.—(Museum, St. Barth. Hosp., 2797 *n.*)



FIG. 3.—A curiously branched mass found in the right auricle and in the inferior vena cava; it was fixed to the free border of the tricuspid valve, and thence extended partly into the right ventricle, and partly through the right auricle into the inferior vena cava.—(Museum, St. Barth. Hosp., 2797 *o.*)

We shall now proceed to describe more fully the testicular, glandular, hepatic, intravenous, and intracardiac growths; but we may mention that the deposits in the lungs were almost identical with those in the liver, and those in the mesenteric, bronchial, and cervical glands agreed with those in the lumbar glands.

*A. Testicular growth.*—The testicular growth shows many points of interest. It consists—

- (1) Of a delicate stroma, of young fibrous tissue. Embedded in this stroma we find—
- (2) Hollow cystic and alveolar spaces lined by typical columnar epithelium;
- (3) Irregular solid masses of epithelial cells;

- (4) Concentrically arranged epithelial masses ;
- (5) Tubules lined by columnar, cubical, or flattened epithelium ;
- (6) Collections of cells, irregularly arranged and more or less broken up ;
- (7) Normal testicular structure is entirely absent.

1. Taking the *stroma* first, it consists of delicate, fibrous tissues, extremely cellular in nature. The cells are spindle-shaped for the most part, and generally closely packed ; but in some parts they are less closely packed, and here the stroma resembles myxomatous tissue. In other parts the stroma is made up of round cells. Anyhow the stroma consists of soft or young cellular fibrous tissue, and is richly nucleated. It is so cellular that it resembles sarcoma tissue, which simply means that it is actively proliferating and growing fibrous tissue. This is fairly well shown on Plate XIV. Fig. 1.

2. The *cystic* or *alveolar spaces* are either round or oval in shape or of great irregularity. They vary in size, some being small, others large ; some are empty, others are filled by mucus or mucus-like material. The cellular lining is formed either by a continuous uniform layer of columnar epithelial cells, or it is thrown into folds by papillæ springing from the fibrous stroma. These columnar cells are either typical in appearance like ordinary columnar cells, or they show vacuoles, large or small, produced by some secretion distending the cells ; many of them have become typical goblet cells. In some parts the cells are considerably degenerated, and have been cast off ; and some spaces are actually denuded of their epithelium, containing a few fragments of columnar cells and mucus. In some places the epithelium lining these spaces has proliferated and at the same time undergone a curious change (Plate XIV. Fig. 1). The proliferation progresses till the alveolus is gradually filled up, but in the meantime the cell type has been transformed from the columnar shape to an almost squamous one. This is well shown in the illustration. In this manner the alveoli are gradually filled up and become converted into the solid masses of epithelial cells which we shall now describe.

3. *Solid masses of epithelial cells*.—Both large and small alveolar spaces, by a proliferation of the lining epithelium, may be transformed into curious and striking solid masses ; this is also true of the tubular structures shortly to be described. One can observe all the transition stages, from an empty alveolus or tubule to a solid round mass or cylinder. Most of the solid masses are either oval or round ; they are, however, extremely irregular in shape and size, and, like the alveoli, lie in the spaces formed by the stroma, spaces which are possibly dilated lymphatics. The epithelium of these masses varies, but in most of them it is of a peculiar type, which it is difficult to describe. The cell walls are extremely distinct, and the nucleus is often prominent, often however absent ; but the rest of the cell body is clear. The mass, at first sight, almost

resembles a collection of cartilage cells (Plate XIV. Fig. 1). Our own impression is that the cells lining the alveoli or lobules have proliferated, and that these newly grown cells have then become distended with mucus or some other clear fluid. In the testicular growth there are many such solid masses, all presenting the same striking appearance. The central cells are generally more distended and bigger than the more peripheral ones, while those at the margin or extreme periphery are often flattened or cubical. These masses, from the histologist's point of view, are of exquisite beauty. We believe that our view of the development of these large, clear cells is the true one, because some of the solid masses are made up of small cells, showing nothing of the clear substance distending the cell body; and in others, again, one may observe the gradual transition from small cells to large distended ones.

4. *Some of the solid masses show a marked concentric arrangement*, which recalls to one's mind the concentric epithelial pearls so characteristic of squamous-celled carcinoma or the cholesteatoma pearls described by Virchow many years ago. These concentric bodies, as a rule, develop in the solid masses just described. They are either firm, that is, they are made up of closely packed concentric layers, or they are loosely arranged. When they are dense and firm and lightly packed they resemble the pearl of a squamous epithelioma, so much so that we cannot always easily distinguish them from such, and they are then generally surrounded by several layers of equally tightly packed flattened cells. The firm, concentric body takes the basic stains badly, and shows only a few nuclei.<sup>1</sup> Occasionally these denser concentric bodies lie amongst the larger clear and distended cells. Sometimes a large alveolus contains a large fragmentary concentric body, and then the resemblance to a horny pearl is still closer, so that at first one may seriously ask whether or no a metaplasia from columnar to horny epithelium has taken place, such as is common enough in the laryngeal mucous membrane. That, however, is not so, for the material in those bodies is not horny, but is made up of compressed cells, and these cells are mostly the above-described clear, distended cells, for often one can still recognise their skeleton forms in the badly stained, firm substance of the concentric pearl. Furthermore, in some of these pearls, one can detect a calcareous infiltration, and some have actually become calcareous, so that we are inclined to regard these firm concentric bodies as compressed and condensed mucus and mucous cells.

This will become clear if we examine the concentric bodies which are less condensed. Here one may readily see that they are made up of concentrically moulded cells of the large, clear, and distended type.

The material of which the concentric bodies, whether condensed or

<sup>1</sup> Plate XIV. Fig 4 shows a pearl which was found in the intravenous growth. For further illustrations, see *Trans. Path. Soc. London*, 1897, vol. xlviii. plate iv. (p. 139).

not, are made up, stains with eosin, and the intensity of the staining varies with their density. Similarly, if we examine the contents of many of the alveoli, we find that, while still amorphous, it becomes frequently more and more eosinophile, and with increasing affinity for eosin also more condensed. Again, in some of the solid masses made up of the curious clear cells, eosinophile deposits appear here and there, so that there can be no doubt that the above expressed view of the origin of these concentric bodies from compressed cells, and compressed and condensed mucus, is very near the truth. We must remark here that Virchow and others have described these concentric masses, especially in innocent and malignant growths. Virchow considers them as being characteristic of cholesteatoma. Mr. Eve has more recently drawn attention to those masses.<sup>1</sup> A full discussion of the origin of those "pearls" we shall leave for a future occasion.

5. The next point to which we have to direct our attention is the *tubules* which are found here and there in the fibrous stroma. They lie in spaces which they incompletely fill, and are very variable in length and shape, and also in their epithelial lining. If cut across they appear as small round or oval spaces, and, cut longitudinally, they may be extremely long and narrow. That they are tubules no one can doubt. As to their epithelium, it is either short, cubical, or columnar, but it also may be flattened. Generally it forms a single layer, but proliferation may occur, so that the tubule becomes partially occluded, or at any rate narrow; but it also may be converted into a solid cylinder of cells, which in size, shape, and appearance agrees with the solid masses described above. Again, all transition stages between tubules and true hollow or solid alveoli may be observed.

6. In many parts the alveolar or tubular arrangement has entirely disappeared, and instead we find a mass of cells, irregularly scattered about. They lie, however, not in distinct alveolar spaces, but are mostly distributed in a more or less arbitrary manner, although often their arrangement is such as to give us a glimpse of what it has been. Fragments of tubules are detected amongst these loose cells, or columnar cells are present which form an imperfect and interrupted lining to the space in which they lie. In shape the cells are variable, for most of them are round or polyhedral; many, however, are distinctly columnar; some are small, others larger; there is, however, no interstitial substance. The columnar type is most evident when the cells form fragmentary tubules or a partial lining to the alveolus.

As far as this, the primary growth, is concerned, then, we are dealing with a columnar-celled carcinoma. There can be no doubt regarding the carcinomatous nature, nor can there be any reasonable doubt that the perfect type of the epithelial cells is the columnar type. The cells are, however, prone to degeneration, and therefore readily alter in their appearance, and become vacuolated or goblet-shaped on account

<sup>1</sup> *Trans. Path. Soc. London*, 1887, vol. xxxviii. p. 201.

of mucous changes. Their proliferation leads to the formation of solid masses, and the moulding, under pressure, of the altered cells produces the curious concentric bodies. Where the growth is rapid, the tubular arrangement and the columnar type of the cells are apt to be lost, a common experience with all columnar-celled carcinomas. Striking is the preponderance of fibrous stroma and its softness.

Having so fully described the original growth, we may pass over the secondary deposits more quickly. These were found in the abdominal glands (aortic and lumbar), whence the growth had invaded the renal vein and the tissues around, but they were also present in the liver, the lungs, the heart, and vena cava. We shall begin with the deposits in the aortic and lumbar glands.

B. *Aortic and lumbar glands.*—In the lymphatic glands the growth is much more broken up, but it is easy to recognise the true nature of the deposits, for

- (1) Amongst the loose and broken-up cells we find distinct tubes in cross-section, which are lined by typical columnar epithelium (Plate XIV. Fig. 2).
- (2) In other parts we notice larger tracts and strands of cylindrical cells, the remnants of tubules and alveoli (Plate XIV. Fig. 2).
- (3) In other parts, again, typical alveolar structures in cross-section are observed lying in large spaces in a delicate fibrous stroma identical with that of testicular growth. These structures fit the spaces badly, and their cell lining is also the same in structure as that of the alveoli in the primary growth. The epithelium is either typically columnar or cylindrical, or it shows all the various forms of degeneration above alluded to. In some alveoli the vacuolation of the cells is very evident. Some of these alveoli are filled up with mucus and cellular debris, but we have not been able, after examining a number of specimens, to find any of the curious, solid, and concentric cell masses which formed so striking a feature in the testicular growth.
- (4) Typical tubules, resembling those described in the primary tumour, may also be seen here and there.
- (5) The loose cellular collections require but little description. The cells are extremely variable in size and shape; round, oval, and polyhedral, or polygonal, and intermixed with them are single columnar cells or small masses of them. But for these columnar cells found here and there, their epithelial nature would not be easily recognised. There is, however, no intracellular substance, and in many places the loose cells have an alveolar arrangement, such as is characteristic of carcinoma.



In passing it may be mentioned that many of the alveoli or tubules are invaded by leucocytes, which tend to break up and destroy these structures. In some parts this leucocytic invasion is striking and instructive.

C. *Liver*.—In the liver again we find that the secondary deposits consist mainly of loose collections of cells and a few scattered alveoli, lined by typical columnar epithelium. Solid cell masses or concentric bodies were not observed; but amongst the loosely aggregated epithelial cells there were here as elsewhere imperfect tubules or alveoli lined with columnar epithelium, and also stray strands of cylindrical cells (Plate XIV. Fig. 3). The growth in the liver is very vascular, and much fibrin can be observed in certain parts of the growth. In its main features it agrees more or less with the lymphatic deposits.

D. *Vena cava*.—We shall now pass to what, together with the intracardiac growth, forms the most interesting point of the whole case, namely, the intravenous growth which was found in the inferior vena cava near the kidney and renal vein. The stroma of this growth is denser and more fibrous than that of the neoplasm in the testis, the glands, or the liver.

Tubules and alveoli of round, oval, or irregular shape are found in many parts, and these, as a rule, lie in spaces many times too capacious for them. Some of the tubules are of great length, and their epithelium is small, cubical, or flattened, instead of cylindrical, and others are smaller and lined by typical columnar epithelium. Concentric cell nests are also present in fair number (Plate XIV. Fig. 4), and their development is well studied in this intravenous growth. Here we have the same round (or spherical) masses of clear, large, and distended cells, some of which show the earliest steps towards a concentric arrangement (Plate XIV. Fig. 5), and the central cells of some of the concentric bodies are of the same character as those larger clear cells. Again, the gradual transition from tubular and alveolar, round or oval spaces, lined by a single layer of epithelium to solid cell masses, and the gradual transition of the latter to concentric bodies, can be readily traced. There can be no doubt that the curious round masses made up of clear large cells have developed from the primitive tubules and alveoli, and that these curious masses again become transformed into the still more striking concentric bodies.

In many spaces the tubules or cell masses have broken down, so that we obtain large spaces incompletely filled by scattered cells.

E. *Intracardiac growth*.—More interesting still is the intracardiac growth. The stroma is extremely dense and much firmer even than that of the intravenous growth. Numerous cystic spaces are present, most of which contain mucus. Many have lost their epithelium completely, while others show an incomplete lining of cubical or columnar epithelium, and others again are lined by a complete layer of columnar

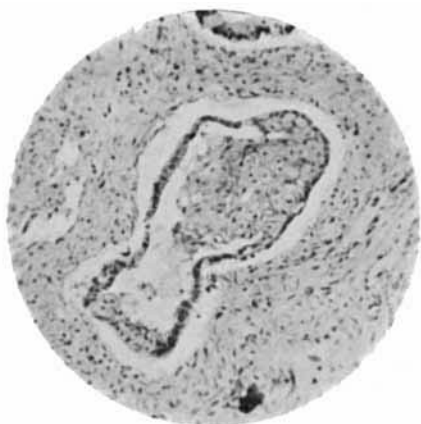


FIG. 1.

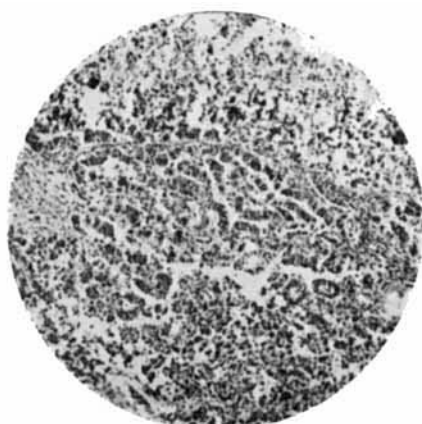


FIG. 2.

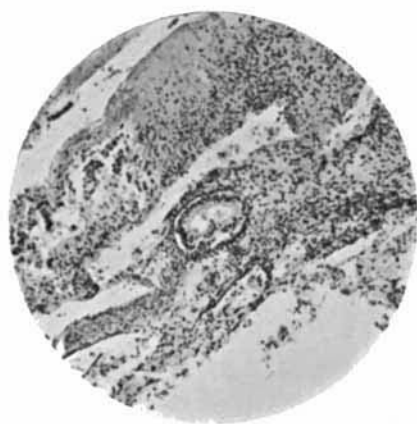


FIG. 3.



FIG. 4.

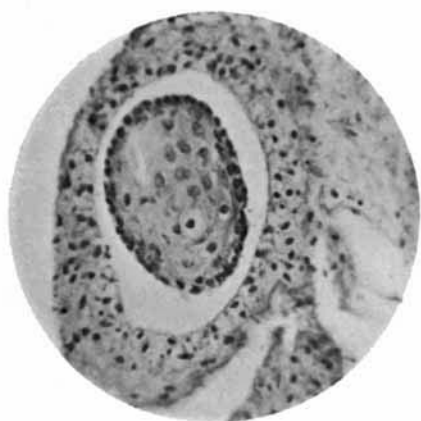


FIG. 5.



FIG. 6.

epithelium. Concentric and solid cell masses have not been found; but collections of loosely packed cells in alveolar spaces are present here and there. This growth, therefore, consists mainly of a dense fibrous matrix with alveoli or cysts, or round and oval spaces, containing either mucus or possessing a well-fitting epithelial lining (Plate XIV. Fig. 6).

#### SUMMARY.

This case is one of great interest. Of the carcinomatous nature of the growth there can be no doubt. It is a columnar-celled carcinoma, in many parts perfectly typical, but in others extremely atypical. The curious cell masses, made up of clear hyalin cells with distinct outlines, almost resembling vegetable cells, and the concentric bodies, are sufficiently striking to render the growth worthy of record.

There are, however, other points—the man's age, namely, 24 years, which for cancer generally is an early age, but for testicular cancer perhaps not quite so unusually early. At the time of the autopsy it led to a mistake in the diagnosis, for on a casual examination, prejudiced by the age, the growth was declared to be a sarcoma with cysts. No doubt the stroma and the loose collections of cells led to this error.

The most important features in the case are the intracardiac and intravenous growths. The former grafted upon the free border of the tricuspid valve extended through the right auricle into the inferior vena cava. In the lumbar region the inferior vena cava had been pierced by the growth, and the latter had extended upwards, sending a branch into the right renal vein. It is evident that a fragment of this intravenous growth must have become separated and must have been grafted upon the tricuspid valve, and must then have sprouted into the curious dendriform mass. This fragment must have consisted of cancerous epithelium and connective tissue capable of further development. Intravenous growths of this kind, lying loosely in the vessel without blocking it, are very rare in carcinoma, but certainly less rare in sarcoma, although there also very seldom met with. We have several specimens at St. Bartholomew's Hospital, showing intravenous sarcomatous growths. We shall not enter into the literature of the subject here; but we must mention that we have recently re-examined Sir James Paget's classical case of malignant chondroma of the testis, which was also complicated by intravascular growths, and to our satisfaction we have found that this case also is one of columnar-celled carcinoma, a chondro-carcinoma.

#### DESCRIPTION OF PLATE XIV.

Fig. 1.—Section taken from the primary growth of the testis, showing a large cystic alveolus, embedded in delicate connective tissue, lined by columnar epithelium, and in part filled by epithelium which has been greatly altered.

FIG. 2.—Section prepared from the lymphatic growth around the aorta abdominalis. Amongst the loose and broken-up cells there are distinct tubes in cross-section, which are lined by columnar epithelium, and in other parts there are larger tracts and strands of cylindrical cells.

FIG. 3.—Section prepared from a secondary deposit in the liver; amongst the loosely aggregated cells are seen two distinct alveoli, lined by columnar epithelium.

FIG. 4.—A concentric cell nest or pearl found in the intravenous growth.

FIG. 5.—This specimen (more highly magnified) shows the development of a pearl. (See text.)

FIG. 6.—Section prepared from the intracardiac growth, showing cystic spaces, round and oval alveoli, which partly possess a well-fitting epithelial lining.

The illustrations have been made from photographs prepared by N. Norman, Esq.