AN UP DATE ON TESTICULAR NEOPLASMS

Essay

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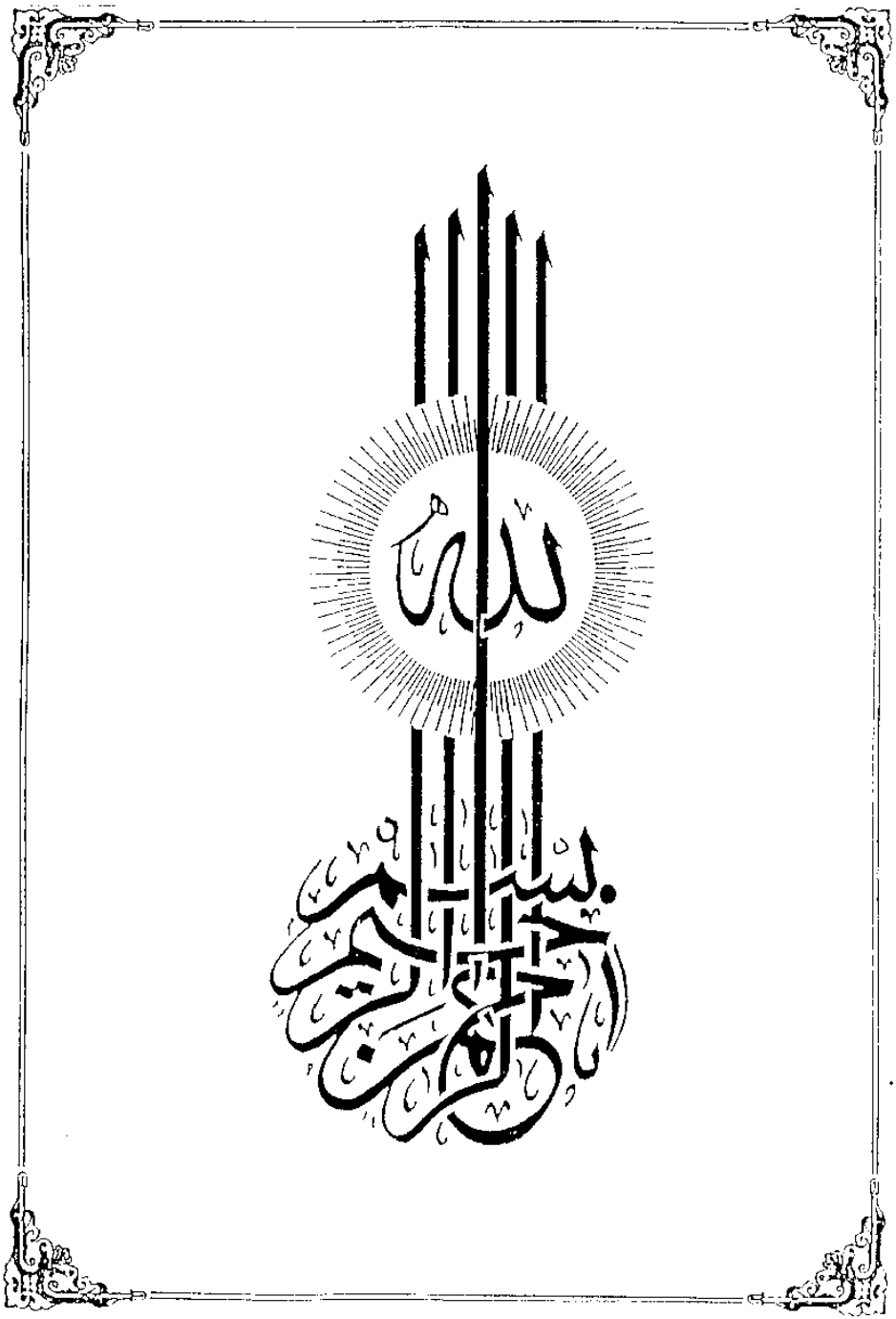

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Testicular cancer account for only 1% to 2% of malignant disease in males yet its low incidence belies its importance, among males from 15-35 years old it is that most common non haematologic neoplasm. Moreover, it is one of the few solid tumours that are curable in advanced stages. *(Hesketh, 1987)*.

Recent progress in treating the disease can be attributed to a number of factors, including refinements in pathologic diagnosis, development of accurate non-invasive staging procedures effective use of sophisticated biologic marker determinations, development of effective combination chemotherapy regimens and skillful integration of different therapeutic modalities. The strategies developed for treating testicular cancer can probably act as models for other, more common chemoresponsive tumours.

The aim of the work reviews literature as regard recent understanding of the anatomy and microanatomy of the testis. Testicular tumours are scrutinized regarding the incidence, pathology and pathogenesis including the inherited susceptibility and genetic basis of the disease. Different presentations of testicular tumours are displayed, new investigations techniques and imaging facilities are reported. Different lines of management, the current chemotherapy strategy and the role of radiotherapy are reviewed.

ANATOMY

ANATOMY

The testis, the primary reproductive organs or gonads in males are suspended in the scrotum by scrotal tissues, and by the structures forming the spermatic cord, the left testis usually hanging 1 cm lower than the right. The average dimensions of the testis are from 4 to 5 cm in length, 2.5 cm in breadth and 3 cm in anteroposterior diameter, its weight varies from 10.5 to 14g. Each testis is of an ellipsoid form, compressed laterally and has an oblique position in the scrotum, the upper extremity is tilted anterolaterally. The posterior border nearly straight and the spermetic cord is attached to the latter.

The anterior border, the medial and lateral surface and the extremities of the testis, are convex, smooth and invested by visceral layer of tunica vaginalis by which they are separated from the parietal layer and hence scrotal tissues external to this. The posterior border receives only a partial investment from the tunica vaginalis. The epididymis lies along the lateral part of the posterior border.

The testis is invested by the tunica vaginalis, tunica albuginea and tunica vasculosa *(Williams and Warwick, 1987).*

1 - The tunica vaginalis

It is the inferior extremity of the processes vaginalis of the peritoneum which in the fetus, precedes the descent of the testis from the abdomen into the scrotum. After the testis has reached the scrotum the cranial part of the processes vaginalis, from the internal ring to within a short distance of the testis, contracts and undergoes obliteration. The distal part remains as a closed sac into which the testis is invaginated. It is reflected to the

internal surface of the scrotum and hence it may be described as consisting of visceral and parietal layers *(Williams and Warwick, 1987)*.

2 - The tunica albuginea

It forms a fibrous covering for the testis. It is a dense membrane of a bluish white colour, composed of interlacing bundles of white fibrous tissue. It is covered externally by the visceral layer of the tunica vaginalis, except at the head and tail of the epididymis, and along the posterior border of the testis, where the testicular vessels and nerves enter the gland. It is applied to the tunica vasculosa, and at the posterior border of the testis is projected into its interior forming a thick but incomplete vertical septum, the mediastinum testis. This extends from the upper to near the lower end of the testis and is wider than below, from its front and sides numerous incomplete septa are given off and radiate towards the surface of the testis, where they are attached to the deep aspect of the tunica albuginea. They divide the organ incompletely into a number of cone shaped lobules.

The bases of the lobules are at the surface of the testis, and their apices converge upon the mediastinum. The arrangement of its connective tissue is very variable and in it displays monocytes amongst the collagen fibres leydig cells are absent from the mediastinum testis in man *(Williams and Warkwick, 1987)*.

3 - The tunica vasculosa

It is the vascular layer of the testis, consisting of a plexus of blood vessels held together by delicate areolar tissue. It extends over the internal aspect of the tunica albuginea and

covers the septa, and therefore, forms an investment to all the lobules of the testis *(Williams and Warwick, 1987)*.

* **Structure of the testis**

The surface covering the testis is a layer of flattened mesothelial cells similar to those which line peritoneal cavity, by some these mesothelial cells have been considered to be remenants of germinal epithelium. The main internal architecture is formed by the lobules of the testis. Their number, in a human testis is estimated to be between 200 and 300. They differ in size according to their position, those in the middle of the testis being larger and longer. Each lobule contains from one to three or more minute convoluted tubules. They are supported by loose connective tissue which contains here and there groups of interstitial cells containing yellow pigment granules. The total number of tubules in each testis is estimated to be between 400 and 600, and the length of each is 70 to 80 cms. Their diameter varies from 0.12 to 0.3 mm. Each tubule consists of a basement membrane formed of laminated connective tissue containing numerous elastin fibres, with flattened cells between the layers and covered externally by a layer of flattened epithelioid cells. Internal to the basement membrane is the epithelium of the seminiferous tubule, which consists of two elements, one spermatogenic , the other supportive in the wider meaning of the word and not merely in a mechanical sense *(Williams and Warwick, 1987)*.

A) Spermatogenic cells

This includes a group of cells which when active from spermatogonia through their derived forms, spermatocytes and spermatids, to the ultimate product, the mature spermatozoon.

1. Spermatogonia

They are the stem cells from which all spermatozoa are derived, they themselves are descendence from those primordial germ cells which reach and multiply in the genital cords of the developing testis, where they are sometimes termed gonocytes. In the fully differentiated testis they are sited along the basement membrane of the seminiferous tubules. There are 3 basic types of spermatogonia, the dark type A, pale type A, and type B. The first type divides to maintain the basic store of spermatogonia, giving rise also to some pale type A cells, which in turn divides and differentiate into type B, the immediate precursors of spermatocytes.

2 - The primary spermatocytes

With a diploid chromosome content divide to form secondary spermatocytes with a heploid content of chromosomes. In turn, the secondary spermatocytes undergo the second meiotic division to form spermatids.

3 - Spermatids

They gradually mature into spermatozoa through a series of nuclear and cytoplasmic modifications. With their formation spermatogenic multiplication is usually regarded as coming to an end *(Williams and Warwick, 1987)*.

B) The sustentacular supporting cells of sertoli

These are only non germinal in the complex cell population of the seminiferous tubuler. They are somewhat polymorphic cells both in nuclear and somatic characteristics. They are sited on the limiting membrane of the tubules, occupying it almost to the exclusion of all but occasional spermatogonia. These cells exersize a metabolic influence in

relation to the germinal elements, they are in addition considered to be phagocytic and perhaps exert an endocrine influence *(Williams and Warwick, 1987)*.

* **Testicular interstitial tissue**

The interstitial cells of the testis, usually equated with the cells of leydig include various other cells some of connective tissue type, together with the vessels and nerves in the tissues between the seminiferous tubules. The origin of the specific interstitial cells (of leydig) is probably mesenchyme, but it is also suggested that they arise from the mesonephric blastema. These cells isolated or clustered occur in the intratubular tissue. They are large, polyhedral cells with an eccentric nucleus containing one to three nucleoli and they possess scanty, poorly stained cytoplasm. They secrete androgens, however, it is not confirmed that they are sole producers of testicular androgens *(Williams and Warwick, 1987)*.

* **Blood supply of the testis**

1 - Testicular arteries

These two long slender vessels arise from the front of the aorta below the renal arteries. Each passes obliquely downwards and laterally behind the peritoneum on the psoas major muscle, the right in front of the inferior vena cava and behind the horizontal part of the duodenum, right colic and ileocolic arteries, root of the mesentry and terminal part of the ileum, the left artery passes behind the inferior mesentric vein, left colic artery and the lower part of the descending colon. Each passes in front of the genitofemoral nerve, the ureter and lower part of the external iliac artery to reach the deep inguinal ring, where it enters the spermatic cord. With other constituents of spermatic cord it traverses the inguinal canal and enters the

scrotum. At the upper end of the posterior aspect of the testis it divides into two branches which pass on to the medial and lateral surfaces, pierce the tunica albuginea and end in the tunica vasculosa. From the latter, terminal branches pass to the substance of the testis at various points over the free surface. Some pass into the mediastinum testis and loop back again before reaching their distribution. The capillaries adjoining the seminiferous tubules penetrate the layers of the interstitial tissue. These capillaries hae acquired a particular interest as a part of the anatomical site of the blood testis barrier. The capillaries either run parallel to the tubules or transversely across them. They do not enter the walls of the tubules being separated from the germinal and supporting cells by a basement membrane, and by variable amount of interstitial tissue containing leydig cells. It is at this level that highly selective exchange phenomena occur in connection with androgens and immune substances *(Williams and Warwick, 1987)*.

2 - The testicular veins

They emerge from the back of the testis and and receive tributaries from the epididymis. They unite to form convuluted mass, the pampiniform plexus the chief constituent of the spermatic cord, which ascends in the cord in front of the ductus deference. Below the superficial inguinal ring the veins of the plexus are drained by three or four veins which pass along the inguinal canal, enter the abdomen through the deep inguinal ring and coalesce into two veins, which run upwards in front of the psoas major and the ureter, behind the peritoneum, one on each side of the testicular artery. These two veins become a single vessel which on the right side opens into the inferior vena cava at an acute angle a little below the level of the renal veins, on the left side it opens into the left renal vein at right