

**Anatomical Considerations of Prostate Cancer: A Review Article****Ishan Malhotra<sup>1</sup>, Sakshi<sup>2</sup>, Subhash Upadhyay<sup>3</sup>, Jannu Manohar<sup>4</sup>**<sup>1</sup>PG Scholar, <sup>2,4</sup>Deptt of Rachana Sharir, <sup>3</sup>Principal, Sriganganagar College of Ayurvedic Science & Hospital, Tantia University, Sriganganagar , Rajasthan**Abstract**

Prostate cancer is one of the most common health threats for men in the developed world. With the advent of prostate cancer screening using serum prostate-specific antigen (PSA) tests, prostate cancer mortality has declined at the expense of substantial disease overtreatment. Prostate cancer begins when cells in the prostate gland start to grow out of control. The prostate is a gland found only in males. It makes some of the fluid that is part of semen. The prostate is below the bladder (the hollow organ where urine is stored) and in front of the rectum (the last part of the intestines). Just behind the prostate are glands called seminal vesicles that make most of the fluid for semen. The urethra, which is the tube that carries urine and semen out of the body through the penis, goes through the center of the prostate. Today, as in the past, there are two therapeutic strategies for: one aims to cure the localized process, the other to control the disseminated disease. The therapeutic option for curing the localized disease is still radical prostatectomy, although radiotherapy is also used in some patients with localized.

**Key word-** Prostate cancer, PSA, radiotherapy**Corresponding Author:- Ishan Malhotra, PGT, Sriganganagar College of Ayurvedic Science & Hospital, Tantia University, Sriganganagar , Rajasthan****Received – 15/07/2021****Revised- 25/8/2021****Accepted – 10/09/2021****INTRODUCTION**

Sometimes the past must be recalled for the present to be vindicated; this is the case with cancer of the prostate. I shall comment and enlarge upon some aspects of this pathology, which has

reawakened the interest of European urologists after 30 years.

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The publications by Walsh et al. on radical prostatectomy using the nerve-sparing procedure, have indeed had an influence, and although both the anatomical descriptions and the idea of sparing these nerve formations are not original to these authors and, oncologically speaking, are debatable, their merit in promoting radical prostatectomy should be acknowledged. Today, as in the past, there are two therapeutic strategies for: one aims to cure the localized process, the other to control the disseminated disease. The therapeutic option for curing the localized disease is still radical prostatectomy, although radiotherapy is also used in some patients with localized.

### Historic Events

There are four milestones in the 90-year history of research into CaP; in 1905, when Young, the undisputed master of prostatoperineal surgery, ushered in the age of radical surgery via the perineum; in 1941, with Huggins and Hodges and their important discovery of endocrine therapy; in 1944, with the research of S. Gil Vernet into the origin and development of CaP and his contribution to the knowledge of prostate pathology and surgery, as well as his original description of the musculature and innervation of the pelvic urogenital block; and finally, in 1945, with the retropubic approach for radical prostate

surgery by Millin and Macalister. Since then, nothing new has appeared under the sun: there have been no new basic or innovative concepts and no new anatomical descriptions. Between 1950 and 1980, surgery for CaP in Europe went through its 'darkest hour'. In 1956 in his magnificent *Traité de technique chirurgicale*. Fey wrote about prostatectomy for cancer: 'This ideal operation is almost unperformable, and has been almost completely abandoned in France, despite various attempts, despite the example of the Americans, with Young, and of the Spaniards, with Salvador Gil Vernet, who still perform it with excellent results.

This progressive decrease in surgical aggressiveness towards prostate cancer was due to several factors:

- i. The excessive enthusiasm aroused by oestrogen therapy.
- ii. The fact that very few patients, only 5-10 % of cases, presented with limited neoplasias to the surgeon.
- iii. The complications inherent in the operation (fistulae, incontinence, stenosis, impotence): technical difficulties, i.e., the depth of the operative field, hemorrhage of Santorini's plexus and the anastomosis of the membranous urethra to the bladder.

Although many years have elapsed, the main strategies to follow in CaP are still manual surgical exploration, hormone therapy and radical surgery. So today in 1996. If an editorial were to be written on this subject, it would not differ basically from the one by the Nobel laureate Charles Huggins, that appeared in 1969.

He proposed three indications for radical prostatectomy in which the operation could be lifesaving:

- (i) Early cancer.
- (ii) Late cancer made operable by endocrine means; and
- (iii) Recurrent prostate cancer after hormonal control. To avoid two major complications of radical prostatectomy. Rectal fistulae and incontinence of urine, Huggins advised young surgeons to study sagittal sections of the pelvis of the human male - 'for example, the beautiful studies of Gil Vernet'. He also stated: "Radical prostatectomy is for the technician who loves technique, who adores a quite operative scene where things move along with perfect communion and trust between the chief and the team... — it is a live-saving operation.

Radical prostatectomy is for the surgeon who cares. For cancer is safest when

completely removed and preserved in pickle.

### **Anatomo-Pathological Concepts**

Today, the division of the prostate gland proposed by S. Gil Vernet in 1953 is universally accepted; it establishes three major segments, the cranial gland, the caudal gland and the intermediate and transitional gland. Universally accepted also is that the cancer is pathogenically independent of adenoma, because it has a different topographical and embryological origin. Adenoma originates and develops in the cranial prostate, whereas cancer arises in the caudal prostate.

This difference is explained by the distinct embryological origin of the two pathologies. According to S. Gil Vernet, the cranial prostate, bladder neck and trigone originate in the mesoderm, while the caudal prostate originates in the ectoderm. These two regions react in different ways to physiological stimuli. Cancer may originate in a normal prostate, and it then constitutes the so-called primary cancer of the prostate, of exceptional presentation, but in most cases the cancer coexists with a pre-existing benign hyperplasia. The cancer arises in the prostate gland, properly speaking, totally separate from the co-existing benign hyperplasia; the opposite never occurs. In some cases, the cancerous focus

is single, but most frequently several independent foci are observed, the location of which varies. They may originate anywhere in the gland, but mostly appear in the superficial peripheral portion adjacent to the prostatic capsule, either in the posterior or lateral lobules. Another favourite site is the internal aspect of the lateral lobule adjacent to the adenoma, that is, in the intermediate or transitional prostate.

These multifocal tumours are independent of each other, possibly appearing asynchronously, and may have different structures, with zones at different stages, and independent phases of latency and growth. Furthermore, they may spread in different ways and metastasize to different sites and at different times. In 1944, S. Gil Vernet introduced various modifications in the light of new anatomical knowledge, describing the neurovascular formations that run along the lateral portions of the prostate; these formations emanate from the hypogastric plexus and are responsible for the innervation of the external sphincter of the urethra and contain the erector nerves. In 1953, the same author published his research into the connective stroma, vessels and nerves of the prostatic region, reporting: 'In radical subcapsular prostatectomy, when I have respected the

nerve columns situated on the posterolateral edge of the prostate, there is no urinary incontinence, whereas with radical extracapsular (extra-aponeurotic) prostatectomy, that is the extirpation of the prostate with its lodge, the walls of which contain the nerve formations, temporary or permanent incontinence is the rule.'

Because there is some confusion about what is meant by prostatic capsule and prostatic lodge, and because the terms intracapsular or extracapsular, and intra- or extra-aponeurotic radical prostatectomy are vague, a definition must be established, from both the anatomical and surgical perspective. The entire prostate is enveloped by a covering 0.5 mm thick, except where the gland joins the bladder, where it increases to a thickness of 2 mm. This covering is half smooth muscle fiber and half fibrous tissue and is, strictly speaking, the prostatic capsule or capsule vera, a dense fibromuscular casing that surrounds the prostate except at the level of the anterior aspect.

Outside the fibromuscular casing that surrounds the periphery of the prostatic gland there is another much thicker fibrous covering which envelops it completely and constitutes the so-called prostatic lodge, formed by an adventitious fibrovascular covering because it contains within its walls the vascular and nerve

columns from the hypogastric plexus. Between the prostatic lodge and the capsule is a cleavage which makes it possible, by blunt dissection, to isolate or remove the prostate, leaving part of its lodge.

This is what surgeons did when they used the perineal route and performed the total subcapsular or intraaponeurotic prostatectomy now popularized by Walsh et al., to distinguish it from total extracapsular or extra-aponeurotic prostatectomy, which is more radical and includes removal of the prostatic lodge together with the vessels and nerves contained within. S. Gil Vernet had stated in 1953: 'if these are preserved, urinary continence and erection are ensured; otherwise, incontinence is common, though temporary, and erectile impotence persists.'. In 1972, Jewett et al. drew attention to the risk of resecting too close to the tumour, with the possibility of leaving tumoral tissue behind and therefore of performing an incomplete operation. A way of performing a more complete removal of the neoplasia was thus required and, along these lines, extracapsular (extraaponeurotic) radical prostatectomy was described.

Knowledge of the routes of dissemination of CaP is of great interest in surgery. From the caudal prostate, the

focus of neoplasia spreads centripetally and centrifugally. like an oil stain. Centripetal dissemination follows the adenomatous route and contamination occurs at the lower end of the adenoma, which acts as a conductor for the neoplastic elements and carries them to the region of the bladder neck. Centrifugal dissemination is the most important and may occur by three routes: the lymphatics, the perineural spaces and the venous route through Santorini's venous plexus.

The prostate lymphatics drain into the periprostatic subcapsular network, from which three groups of ducts originate: the ascending, from the cranial gland, running to the external iliac nodes; the lateral, running to the hypogastric nodes; and the posterior, from the caudal gland, running towards the lateral and subaortic sacral nodes of the promontory. When neoplastic offshoots leave the prostatic capsule through the lymphatics and the perineural spaces, they follow the cellular interstices of the lateral prostatic neurovascular columns that pass through the space between the capsule proper and the wall of the lodge, and from there they may follow the ascending (genital) route or the descending route, when the tumour lies at the apex of the prostate, invading the external sphincter. Santorini's plexus and other neighboring structures.

As a result of clinical observations of urinary incontinence following radical prostate surgery, authors in the English-speaking world are beginning to question Learmonth's classical scheme, according to which the external sphincter is innervated exclusively by the pudendal nerve, and to acknowledge that the innervation of the external sphincter has not been fully elucidated, as both the autonomic and the somatic innervation of the sphincter area are damaged in this surgery. What is clear, from the standpoint of surgical anatomy, is that in the course of radical prostatectomy, whether this be retrograde or anterograde, the internal pudendal nerve and its branches cannot be damaged, as both the deep and the superficial perineal nerve pass beneath the urogenital diaphragm, while the prostate lies above it and the membranous urethra is within the walls of the diaphragm. Therefore, it seems clear that the recent anatomical findings, the clinical observations of the different results from the nerve-sparing and non-nerve-sparing surgery, as well as elementary anatomical and surgical considerations, support the thesis of S. Gil Vernet that the efferent nerves of the hypogastric plexus contain, in addition to parasympathetic fibres, somatic fibres from the medullary nucleus of the pudendal (Onuf's nucleus), the

destination of which is the striated muscle of the external sphincter.

## CONCLUSIONS

There is still a paucity of knowledge of the history of the prostate gland in the English literature. The guidelines and strategies remain as they were half a century ago, except for some modifications or variations based on the ingenuity of a few distinguished predecessors. In 1944, Salvador Gil Vernet proposed that the nerve formations be conserved to prevent urinary incontinence and 40 years later, Walsh proposed the same to prevent erectile impotence. The information provided by the work of Villers and Stamey re-opens the debate on the preservation of the nerve bundles. This is currently of great surgical importance, for there are proposals to preserve the cavernosal nerves, which indicates a compromise in the total extirpation of CaP. Even so it is worth asking whether sparing these nerve formations is necessary or desirable to maintain urinary continence and/or erection in some carefully selected patients with stage B1 disease.

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