

## URETHRAL CASE OF INSTRUMENTS.

It is advisable to introduce here a list of such instruments as will be necessary to make up a case suitable to meet the requirements of such maladies, demanding instrumentation within the urethra, as are ordinarily encountered by the general practitioner:

- Gauge.
- Conical steel sounds, Nos. 9 to 20, inclusive.
- One long and two short whalebone filiform guides.
- Thompson's probe-pointed catheter, modified by Otis.
- One silver catheter, short curve, size No. 12.
- Two silver catheters, with long prostatic curve, sizes No. 10 and 16.
- Thompson's divulsor, tunneled.
- Civiale's concealed bistoury.
- Civiale's urethrotome.
- Gouley's catheter-staff, size No. 10.
- Urethral forceps.
- Cupped sound, size No. 12.
- Four English yellow elastic catheters, assorted.
- Conical (not olivary) soft bougies, sizes Nos. 1 to 12, inclusive.<sup>1</sup>
- Half-dozen different-sized olivary French catheters.<sup>1</sup>
- Four Mercier's elbowed catheters, assorted.<sup>1</sup>
- Bulbous bougies, sizes Nos. 3 to 20, inclusive.<sup>1</sup>

## CHAPTER IX.

## DISEASES OF THE PROSTATE.

Anatomy.—Function.—Deformities.—Injuries.—Atrophy.—Hypertrophy.—Bar at the Neck of the Bladder.—Symptoms and Results of Hypertrophy.—Course of Symptoms from commencing Irritability up to Retention, Atony, Stone, Uræmia, Death.

ANATOMY.—The prostate (*προστάτης*, *standing before*), somewhat improperly called a gland, is a body composed mainly of unstriped muscle, placed like a sphincter around the first inch of the urethra and the neck of the bladder. It contains multilobular mucous glands in its substance, and is tunneled by the two ejaculatory ducts—the common canal formed by the union of the duct of the seminal vesicle with the vas deferens on either side. The ejaculatory ducts open, in the floor of the prostatic urethra, on the sides of the little crest in the median line called *veru montanum*. Here, also, most of the ducts of the mucous glands of

<sup>1</sup> These instruments should not be kept in the general case, as they are liable to soften and stick together in warm weather.

the prostate open. The latter secrete a bluish mucus, which serves to dilute the semen. Both the glands and their ducts, in late adult life, habitually contain certain small solid deposits, called prostatic concretions, formed in concentric layers, which seem to have no special significance, though they often exist in vast numbers, and of considerable size. They are occasionally encountered in the urine. The lower part of the prostate is surrounded by a few striped muscular fibres—the external vesical sphincter of Henle.

The prostate is a muscle. Its main function is to contract on the semen after the latter has collected within and distended the prostatic sinus. This contraction is coincident with the venereal orgasm. It is spasmodic in character, throwing out the seminal fluid in successive jets. The seat of the venereal orgasm is in the nerves of the mucous membrane lining the prostatic sinus, as proved by the fact that it is sometimes excited by the passage of a sound through the prostate, and is not destroyed by amputation of the glans penis.

The prostatic utricle, the analogue of the cavity of the uterus, is a little depression lying in the floor of the prostate beneath the *veru montanum*, opening by a small vertical slit in front of the summit of the latter. This cavity and the orifices of the mucous follicles, dilated by hydrostatic pressure in cases of tight stricture, are apt to catch the fine points of filiform bougies introduced through a stricture.

The base of the prostate embraces the neck of the bladder, and surrounds the vasa deferentia and necks of the seminal vesicles. The prostate lies below and directly in front of the neck of the bladder, inclosed by a fibrous capsule, in relation with the pubes in front, the rectum behind, and held in place mainly by the pelvic fascia—or posterior layer of the triangular ligament—and the pubio-prostatic ligament in front. There is never any fat between the rectum and prostate. A large plexus of veins surrounds the prostate in front, and above as well as (partly) below.

The prostate is composed of two lateral lobes, and only two. They form one symmetrical body, and never continue distinct in man, as they do in some animals. Thompson,<sup>1</sup> quoting Morgagni, Santorini, Hunter, Cruveilhier, and others, as well as concluding from his own minute investigations, decides absolutely against the existence of any third or median lobe in the healthy prostate.

In shape and size the organ resembles an Italian chestnut. Its weight is about half an ounce. It lies with its apex looking forward, and may be readily felt during life through the rectum. The finger can always reach above its posterior border, unless the organ is decidedly enlarged.

The prostate is a genital, not a urinary organ. Like the rest of the genital apparatus, it is small before puberty, and becomes notably de-

<sup>1</sup> "The Enlarged Prostate."



veloped during that epoch. Its average diameters in the healthy adult<sup>1</sup> are, longitudinal 25 to 30 millimetres, transverse 32 to 40, thickness 20–25; or, roughly,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ ,  $\frac{3}{4}$  inch. The urethra usually tunnels its upper part, but occasionally its lower portion, in which case it is only slightly separated from the rectum, a circumstance which exposes the latter to injury in the cutting operation for stone. The prostatic urethra is surrounded by a small amount of erectile tissue.

The arteries of the prostate come from the vesical and middle hemorrhoidal. Its veins discharge into the surrounding venous plexus, which is made up by their union with the dorsal veins of the penis and the veins of the bladder. The lymphatics communicate with the lymphatic glands on the sides of the pelvis. The nerves come from the hypogastric plexus.

#### DEFORMITIES OF THE PROSTATE.

Deformities of the prostate are exceedingly rare. Its roof is open in extrophy of the bladder, but its floor never seems to fail. It is never wanting except in connection with extensive lack of development of the whole genital system, particularly with non-development of the testicles. After complete castration on both sides, the prostate has been seen to disappear.<sup>2</sup>

#### INJURIES OF THE PROSTATE.

The prostate by its position is well protected from ordinary casualties, and rarely suffers unless the general injury is very extensive, in which case its implication may be considered unimportant.

The wounds of the prostate are incised wounds made in the operation for stone, lacerated wounds in the same operation from introducing dilating instruments, or extracting a large, rough stone, and penetrating wounds (false passage) made by accident or design in trying to pass a metallic instrument of an improper curve through an obstructed urethra. The prostate is a patient organ, and bears all these injuries well. Healing after stone-operations is exceptionally rapid, and the prostate may be punctured by a catheter without necessarily any evil consequence, unless it be the seat of chronic disease. Injuries to the prostate get well, usually, if let alone, even where abscess forms in the organ, and abscess is not frequent even after pretty extensive laceration, although the parts are constantly bathed in urine. Injuries of the prostate do not excite much constitutional derangement. Very different, however, is the case if the injury extends beyond the limit of the fibrous capsule of the gland. In such cases the worst complications are to be feared (pelvic infiltration, abscess, peritonitis), and if the patient escape with his life he is fortunate. These consequences are more apt to occur in the operation for extraction of very large stone. The only treatment con-

<sup>1</sup> Cruveilhier, *op. cit.*, p. 395.

<sup>2</sup> Civiale, quoted by Pitha, *op. cit.*, p. 727.

sists in seeing that the urine is thoroughly drained off, and supporting the patient's strength, keeping him at rest, and using opium as required.

#### ATROPHY OF THE PROSTATE.

Atrophy of the prostate is rare, but is occasionally encountered. Among the recognized causes may be mentioned the atrophy of old age, coinciding with general atrophy of the rest of the body. Here the glandular rather than the muscular constituent disappears. Thompson, in his admirable monograph, which obtained the Jacksonian prize, in 1860,<sup>1</sup> has, by laborious investigation, established the fact that the prostate does not necessarily enlarge with age, nor does it necessarily atrophy. As a rule, it continues about of normal size, but it may occasionally atrophy, physiologically, like other structures in old age, just as it may, and often does (pathologically) hypertrophy. Atrophy of the prostate, during general wasting disease, especially phthisis, has been noted. Pressure from a tumor, or cyst, or stone, within or near the prostate, may cause its atrophy, as may also the constant pressure of urine behind a tight stricture. Atrophy, after double castration, is possible.

Atrophy of the prostate has no symptoms except, possibly, lack of force in the ejection of semen. It is an unimportant affection, and has no direct treatment. If the cause can be discovered and removed (pressure), the tendency to atrophy may be overcome.

#### HYPERTROPHY OF THE PROSTATE.

The morbid condition to which the prostate is most liable is hypertrophy, either general, partial, or by the development of circumscribed tumors. In general hypertrophy the glandular elements, instead of being hypertrophied, often become atrophied by the excessive growth of fibrous and muscular tissue between them. In marked cases they are completely destroyed, and the prostate is converted into a homogeneous fibro-muscular tumor. The isolated, circumscribed prostatic tumors, however, always show new formation of gland-tissue.<sup>2</sup>

*Cause.*—The cause of hypertrophy of the prostate is totally unknown. The numerous hypotheses which have been advanced by authors need not be discussed: they do not cover the ground. No known diathesis, or combination of circumstances, can account for the affection. It is not venous stasis, or excessive use of the organ, or sedentary life. All that can be said is, that the disease does not occur before middle age—rarely before fifty; Thompson says fifty-five.

Hypertrophy of the prostate, although a disease incident to old age, is not caused by old age. Thompson's minute and laborious investiga-

<sup>1</sup> "On the Diseases of the Prostate," 4th ed., 1873.

<sup>2</sup> Rindfleisch, "Path. Histology," Amer. trans., p. 546.



tions<sup>1</sup> have demonstrated that prostatic hypertrophy is pathological, and not a physiological condition attaching to advanced life. The majority of prostates of old men, taken at random, will be normal in size; a few, perhaps five per cent., will be atrophied, while many will be found hypertrophied.

The prostate is analogous to the uterus in the female in regard to the nature of the muscular tissue which composes it, and this analogy is further borne out by the tendency of both organs to develop fibrous tumors (so called) after middle life. Velpeau<sup>2</sup> suggested this analogy, and justly. The portion of prostatic tissue which hypertrophies is the muscular and not the glandular (or only to a small extent), and although general or partial enlargements of the prostate are the rule, yet it is rather rare for any considerable hypertrophy of the organ to be found without the coexistence of one or more circumscribed tumors, which correspond to the circumscribed fibrous tumors of the uterus, also composed mainly of unstriped muscle. Bayle says that twenty per cent. of women, after thirty-five, have fibrous tumors of the uterus, the cause, of course, unknown. Thompson<sup>3</sup> says that thirty per cent. of males, after fifty, have fibrous tumors of the prostate. He states that moderate enlargement of the prostate may be expected in one out of three men; after fifty, marked enlargement in one out of every eight, but rarely before sixty. Thompson believes that the affection rarely commences after seventy. He quotes, from Beith,<sup>4</sup> the case of an old man who died at one hundred and three, where the only abnormal conditions found were hypertrophy of the prostate and a sacculated bladder.

**SIZE AND SHAPE.**—No positive limit in size can be named. The prostate may be encountered of the size of a man's fist. Thompson has seen the transverse diameter exceed four and a half inches. The weight of twelve ounces has been reached. This excessive amount of enlargement, however, is rare—a prostate as large as a small orange being infrequent.

The mass may take any shape, depending upon the part of the organ involved. Smooth and round in general hypertrophy, it becomes more or less irregular in unsymmetrical overgrowth, or from circumscribed tumors.

The portion most frequently involved, either alone or (usually) associated with more or less general hypertrophy, is the posterior median part, known since Sir Everard Home<sup>5</sup> as the third lobe. This nomenclature, however, is inexact. The prostate has no third lobe, and what Home, from his dissection of diseased prostates, named the "third lobe," is, in reality, a pathological formation, and is now more correctly styled median centric hypertrophy. It consists of that triangular part

<sup>1</sup> *Op. cit.*

<sup>2</sup> "Leçons Orales," vol. iii., Paris, 1841, p. 478.

<sup>3</sup> *Op. cit.*

<sup>4</sup> "Trans. Path. Soc.," 1850-'51, p. 124.

<sup>5</sup> "Philosophical Transactions," 1806, paper viii. It was not discovered by Home. It was accurately described by Santorini in 1739, and mentioned by Morgagni.

of the prostate lying between the ejaculatory ducts, and overgrowth in this situation is believed to be due to the absence of capsule here. It may be found with little or no enlargement elsewhere. In form it is usually an oval, rounded tumor (there may be two or more), which grows up from the floor of the back part of the prostatic urethra and juts out posteriorly into the cavity of the bladder. It may reach the size of a small pear, and indeed resemble a pear in shape, showing a tendency to pedunculation.

When hypertrophy invades the lateral lobes, only one may be affected, but usually both, more or less general enlargement corresponding with the local overgrowth (Fig. 57). Under these circumstances the pyriform central tumor tends to fill up the internal orifice of the urethra, leaving a passage on either side along its floor, for the urine. The mucous membrane on either side of the central mass is often drawn up, between it and the hypertrophied lateral lobes, forming a crescentic bar at the neck of the bladder.

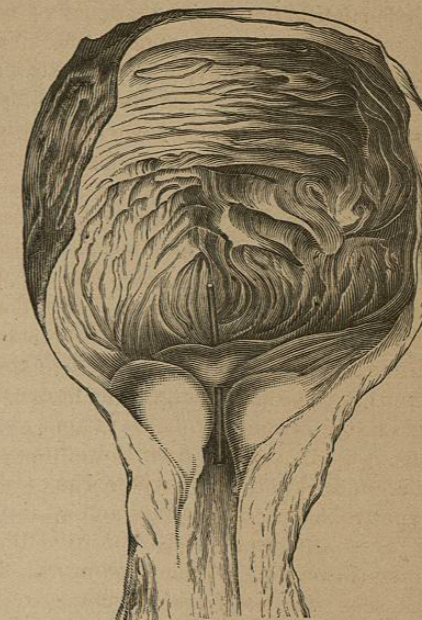


FIG. 57.—(Coulson.)  
Showing Enlarged Prostate with "Third Lobe," through the Base of which a False Passage has been made.

Embedded in the hypertrophied mass, it is usual to find several small circumscribed tumors, dense, hard, seemingly fibrous in character, easily enucleated and elastic, so that, when cut through in a clean section of the organ, the cut surface of the tumor overrides the general smooth plane of the incision, as if the little mass had previously been compressed. They are formed of unstriped muscle with some new glandular tissue, and are considered analogous to mammary glandular tumors, or to the glandular bodies which develop (pathologically) in and around the thyroid. These tumors, usually small, may become as large as a marble; many are found of the size of a pea.

Other localized hypertrophies of the prostate are more rarely encountered in the shape of distinctly pedunculated tumors, which grow from any portion of the posterior margin of the prostate, and hang into the cavity of the bladder. They may surround the neck of the bladder like a fringe. Median centric hypertrophy may take this form, consti-



tuting a sort of ball-and-socket valve at the neck of the bladder. Finally, there may develop in the thickness of the bladder-walls small supernumerary outlying prostatic glandular tumors, varying in number and in size, but only existing coincidentally with one of the ordinary forms of overgrowth.

#### BAR AT THE NECK OF THE BLADDER.

This affection has become classical since the investigations of Guthrie,<sup>1</sup> who described the muscular bar formed by hypertrophy of bladder-tissue just behind the prostate, and the bar of mucous membrane already alluded to. All the varieties of bar, of which there are three, may be considered at once, in connection with prostatic hypertrophy:

1. Centric median hypertrophy, where a transverse bar of hypertrophied tissue is formed, instead of the usual oval tumor; this form is rare.

2. The lifting up of a fold of mucous membrane between unsymmetrical lateral lobes, or between the so-called third lobe and hypertrophied lateral lobes.

3. The form of bar to which Guthrie specially called attention.

This latter may (rarely) exist without prostatic hypertrophy. Its seat is in the muscular fibres which run transversely across the trigone, behind the prostate. These fibres sometimes hypertrophy greatly, the trigone becomes contracted laterally, the orifices of the ureters approach each other, while the hypertrophied bands of fibres stand out like a bar, forming an obstruction, but an obstruction totally unconnected with any prostatic overgrowth.

*Symptoms and Result of Enlarged Prostate.*—Hypertrophy of the prostate (like stricture) does harm mechanically, and provokes lesions in other parts. Its symptoms, pure and simple, are unimportant, and do not call for treatment, unless the enlargement be sufficient to obstruct the free outflow of urine, and occasion disease of the bladder (cystitis and its consequences). A description of the special variety of the latter, due to prostatic hypertrophy, finds its place here more naturally than under the head of Diseases of the Bladder.

The immediate result of hypertrophy of the prostate is a deviation in the direction, and usually a diminution in the size, of the prostatic urethra. As the prostate enlarges, its antero-posterior diameter elongates, and with it the length of the prostatic urethra necessarily increases. Thompson has seen it three inches long. The urethra, moreover, tends to become a vertical slit, as its calibre is encroached upon from side to side by the increased size of the lateral lobes. If isolated fibrous tumors grow up from the floor or sides of the prostatic urethra, the course of the latter becomes by so much the more devious. When one lateral lobe is hypertrophied alone, or to a greater degree than its fel-

<sup>1</sup> "On the Anatomy and Diseases of the Urinary and Sexual Organs," 1836.

low, the urethra is pushed toward the opposite side. When there is posterior median hypertrophy (as occurs in the majority of cases applying for treatment), we have the greatest degree of obliteration of the canal for the least amount of overgrowth. Most cases of prostatic hypertrophy probably never come under the surgeon's notice, in consequence of there being no obstruction to the outflow of urine. Many an old man goes to his grave with enlarged prostate, the existence of which has never been suspected. Of those cases which are seen, median hypertrophy exists in

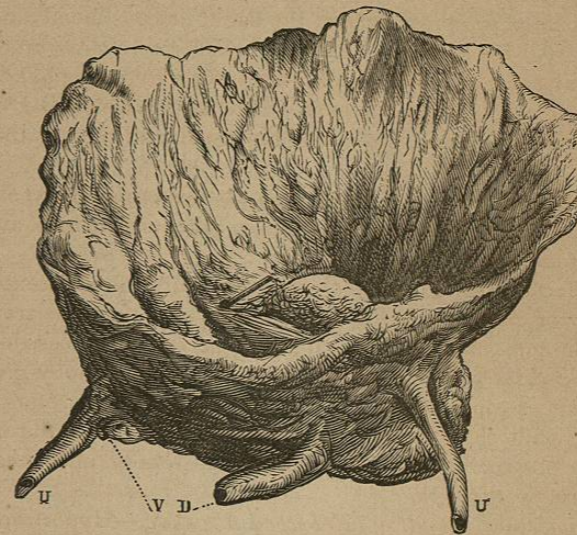


Fig. 58.

a large proportion. This median central part of the prostate lies at the neck of the bladder directly in the vesical orifice of the urethra (Fig. 58). As it grows upward and backward, it fills the mouth of the bladder, and converts its naturally rounded orifice into a crescentic slit, convexity upward. The floor of the prostatic urethra is also unnaturally tilted up, to override this bulk-head which has sprung up in its course. Fig. 59 shows the effect upon the course of the urethra of this so-called third lobe, and suggests at once the two great facts which are the key-notes to a correct understanding of the pathology of hypertrophied prostate, and of the means of relieving its most prominent symptom—retention. These facts are—

1. That such a growth occupying the vesical orifice, and jutting out behind and above it, must obstruct the free outflow of the urine from the bladder.

2. That an instrument of ordinary curve, introduced from without, must strike against this obstacle, and refuse to enter the bladder.



Consequently, a modification in the shape of the instrument is called for.

The bar at the neck of the bladder constitutes an obstruction of the

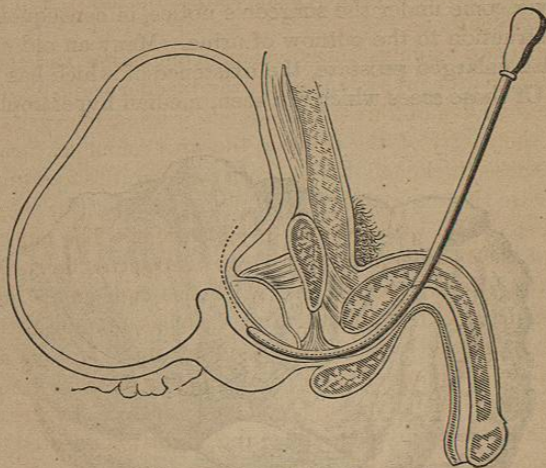


FIG. 59.—Posterior Median Hypertrophy.

same sort. If several posterior tumors exist, instead of one, the vesical orifice is correspondingly modified. If a single pediculated tumor grow anywhere around the margin of the urethral outlet hanging into the cavity of the bladder, it may act like a ball-and-socket valve, causing retention where there is very little general hypertrophy.

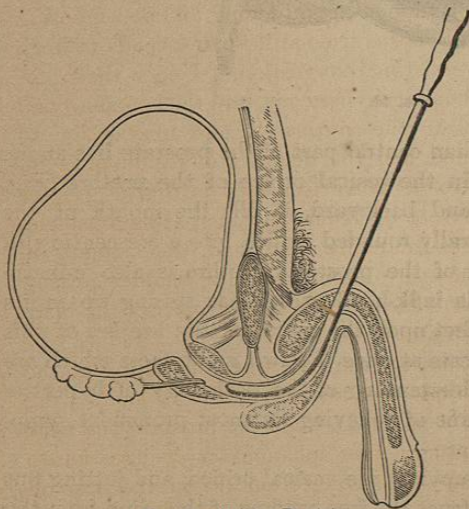


FIG. 60.—Healthy Prostate.

To follow pathologically the natural history of hypertrophy of the prostate, it must be borne in mind that the blood, returning through the vesical veins, finds its way back into the general circulation through the venous plexus lying around the prostate; consequently any enlargement of the latter tends to press upon this plexus, and by so much to obstruct the venous circulation, and establish a constantly-increasing venous con-

gestion of the bladder walls and membranes. Then, again, the deviation in the course of the prostatic urethra, and its decrease in size, mainly due to posterior central enlargement, obstruct the free outflow of the urine, and call for constantly-increasing efforts on the part of the bladder to force out its contents.

From these two circumstances, venous congestion and the need for an exercise of greater muscular power, the bladder walls go on to hypertrophy. The bundles of fibres of the detrusor urinæ increase in size, and jut out into the cavity of the bladder, like the columnæ carneæ of the heart. But these thickened bundles of muscular tissue do not proportionally increase the expulsive power of the bladder, for they are constantly congested, and working at a disadvantage. The muscular fibres of the base of the bladder are not able to contract sufficiently to bring the floor of the viscus above the level of the dam at its mouth, and hence a little urine is left behind after each act of micturition. This residuum (as it is called) announces itself by no symptom, and is unnoticed. It becomes mingled with fresh supplies of urine coming down the ureters, and is partially passed off and replaced by fresher fluid. After a time, however, the mucus, from the slightly congested membrane around the base of the bladder, being in part retained in the residuum, acts upon the latter, setting up decomposition of urea and liberation of carbonate of ammonia.

The carbonate of ammonia irritates the mucous membrane of the bladder, increases its congestion, and calls forth a new supply of mucus, which, in its turn, acts as a fresh ferment, alkalinizing and decomposing more urine. The natural acidity of the urine still further tends to keep up and aggravate the already-existing congestion. Under these circumstances—the membrane becoming hyperæmic, and thickened around the already-contracted mouth of the urethra—more obstruction to the outflow of urine is occasioned, and the quantity of residuum is increased, while the laboring detrusor urinæ is forced into still greater hypertrophy in its fruitless efforts to overcome the increasing obstacle. In this way the bladder becomes gradually distended, the amount of residual urine increasing from month to month, and the bladder getting less and less able to empty itself. Hence with hypertrophy of the bladder-walls there is, usually, also dilatation of its cavity.

Finally, retention comes on, most often excited by a chilling of the legs, the "cold" which the patient has taken "settling," as it were (where the circulation is already weakened), upon the prostate and neck of the bladder, and superadding an active inflammatory congestion to the already-existing enlargement—this congestion (as in the case of stricture) being sufficient to shut up the urethra completely. The new hyperæmia may subside in a few hours, if the patient keeps quiet in a warm place, and with its disappearance the power of voiding urine returns; or surgical relief may be afforded, or the accumulation may