

In the rabbit, according to van Beneden and Julin, whose observations have been confirmed to a certain extent by Kölliker and Heape, the rôle of the proamnion is more considerable. The history of the proamnion, as given by van Beneden, may be followed easily by the aid of the accompanying diagrams (Fig. 3882), copied

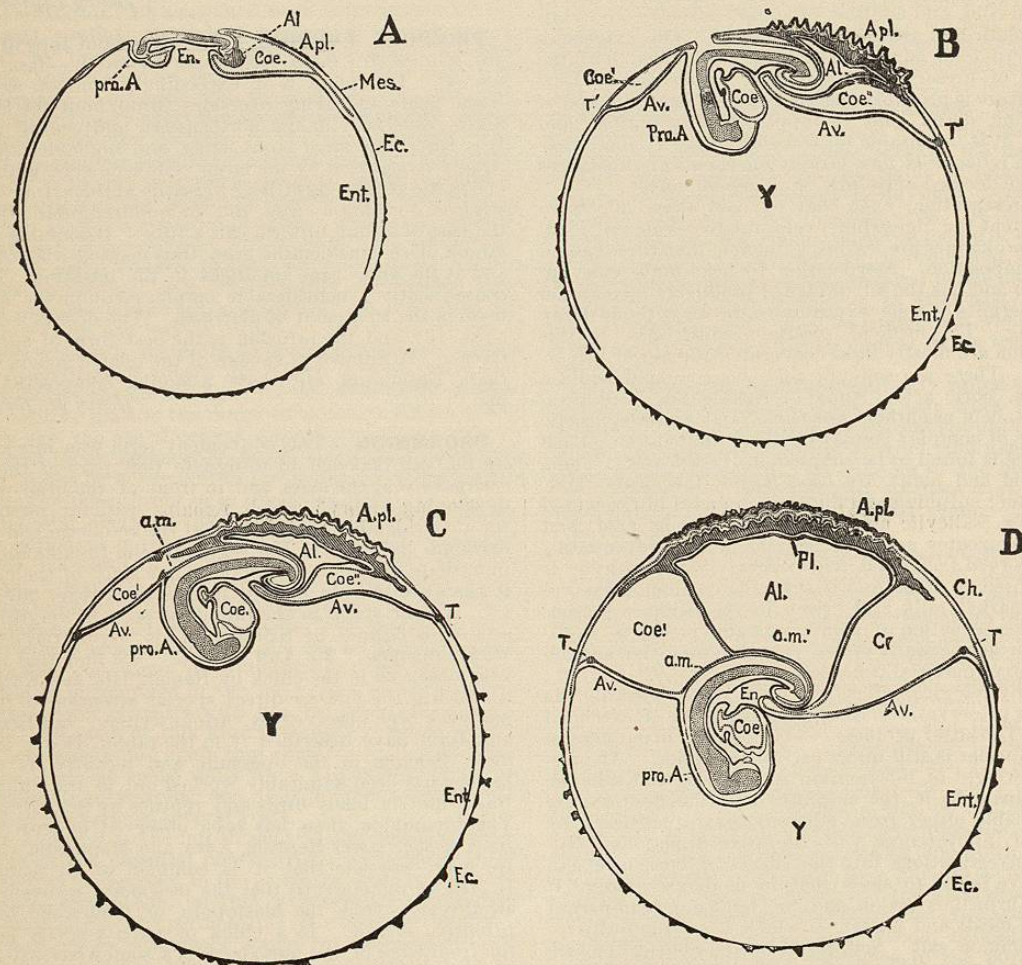


FIG. 3882.—Diagram of the Development of the Foetal Adnexa in the Rabbit. (After van Beneden and Julin.) A, B, C, D, Successive stages; pro.A, proamnion; Av, area vasculosa; Coe, coelom; Coe', Coe', extra-embryonic portion of the coelom; En, entodermic cavity of the embryo; Ent, extra-embryonic entoderm; Ec, ectoderm; Mes, mesoderm; Apl, area placentalis; Al, allantois; T, terminal sinus of the area vasculosa; Y, yolk sac; am, amnion; am', portion of the amnion united with the wall of the allantois; Ch, chorion.

from van Beneden. In A, the proamnion, pro.A, is very small, and the allantois, Al, is just growing out. In B, the embryo, which for greater clearness has been shaded with stippling, has grown very much, and the anterior half of its body is bent down at a sharp angle into the yolk sac. The embryo, however, remains separated from the cavity Y, of the yolk sac, by the proamnion, which forms as it were a hood, pro.A, over the anterior extremity of the embryo. The amnion proper is as yet developed only over the posterior end of the embryo. For the further history of the amnion see *Amnion*, Vol. I. of this HANDBOOK. The proamnion, as can be seen in C and D, retains its importance as a foetal covering for a considerable period, during which the amnion am, and allantois Al, are rapidly pursuing their development. After the stage shown in Fig. 3882, D, by the expansion of the cavity marked Coe', the amnion proper, am, encroaches more and more upon the proamnion, pro.A, until at last the embryo is entirely covered by the true amnion, and the proamnion is altogether

lost. It is to be noted especially that the amnion develops principally over the posterior end of the embryo, and grows forward. To this fact reference will be made again directly.

We possess no observations, at present, as to the existence of a proamnion in man, and it is probable, owing

to the precocious development of the human amnion and of the extra-embryonic mesoderm, that no proamnion occurs in the course of human development.

Charles Sedgwick Minot.

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PROFESSIONAL NEUROSES. See *Hands and Fingers, Diseases and Deformities of*.

PROPYLAMIN—CH₃.CH₂.CH₂.NH₂—forms colorless crystals of ammoniacal odor, and for the treatment of chorea is administered in daily dosage of 2-4 gm. (3 ss.-i.) in spirit of peppermint. W. A. Bastedo.

PROSECRETIN. See *Secretin*.

PROSTATE, THE.—The prostate gland (Gr. προστάτης, from προ and στάναν, to set, or ἵστημι, I stand) derives its name from its position at the entrance to the bladder.

ANATOMY.—The prostate is a body largely glandular in character, and in shape much like a Spanish chestnut. In the upright position of the body it lies just below the bladder and behind the symphysis pubis. The base of this heart-shaped gland is in contact with the bladder and vesiculæ seminales, while the apex rests upon the posterior layer of the deep perineal fascia; the anterior surface looks toward the pubis, and the posterior surface rests upon the anterior rectal wall.

The urethra, as it leaves the bladder (pars prostatica urethrae), traverses the prostate from near the middle of its base to its apex, and rather more than one-half of the gland lies behind the canal.

The prostate weighs from five to six drachms, and measures approximately one inch and a half in length, one and a half to two inches in breadth, and one inch in thickness (antero-posterior diameter). Slight longitudinal furrows along its anterior and posterior surfaces show an indistinct tendency toward a division into two lateral lobes, although the two halves are structurally continuous with each other. In this connection it is worthy of note that in some animals the prostate consists of two separate lobes.

That portion of the gland which lies between the ejaculatory ducts and the urethra (pars supramontana, Mercier) is usually known as the middle lobe (Home). Situated upon the floor of the urethra, just at the entrance to the bladder, it often forms a little prominence continuous with an elevation of the vesical floor (uvula vesicae).

The portions of the gland behind and in front of the urethra, connecting the lateral lobes, are known as the posterior and anterior commissures.

The substance of the prostate is made up mainly of three tissues: (1) Glands; (2) unstriped muscular fibres; and (3) fibrous tissue.

The glands are of the acinous variety, and are most abundant in the lateral portions of the organ, their ducts coalescing and opening along the floor of the urethra. The muscular fibres are disposed in circular bands which are continuous at the junction of the bladder with the circular fibres of that viscus. Hyrtl also describes a system of these fibres radiating from the caput gallinaginis. The fibrous tissue forms a firm enveloping capsule which sends off-shoots through the substance of the gland.

Just below the point of entry of the urethra the two ejaculatory ducts enter the prostate, one on each side, and, running forward through its substance and converging, they enter the floor of the urethra.

The *prostatic urethra* (pars prostatica urethrae) is slightly narrower where it enters and leaves the gland than it is within it. The hollowed floor of this portion of the canal is called the sinus prostaticus, and is divided into two equal furrows by a longitudinal ridge (verumontanum), the end of which farthest from the bladder is composed of erectile tissue, and is capable of considerable dilatation into a little round prominence which, with the verumontanum running back from it, presents a fancied resemblance to the head of a snipe—hence its name *caput gallinaginis*.

On the top of this little eminence is the opening of a minute sac—the utricle or sinus pocularis—which is thought to be the analogue of the uterine cavity in the female. Close to the edge of this sinus, and sometimes within it, are the orifices of the ejaculatory ducts.

Along the sides of the verumontanum open the prostatic glands proper, to the number of from twenty to thirty.

The prostate is enclosed in a tough fibrous capsule which is a part of the pelvic fascia. Besides its attachments to the bladder and deep perineal fascia, it is further held anteriorly by the pubo-prostatic ligaments, and posteriorly by the recto-vesical fascia. Its slight mobility is provided for by the levatores prostatae—muscular bundles, really parts of the levator ani—which, arising from the posterior surface of the pubis, are inserted along the lateral borders of the gland.

Its blood supply is derived from the internal pudic, the vesical and hemorrhoidal arteries, and the veins which form a plexus around the gland empty through the hypogastric vein. The nerves are branches of the hypogastric plexus of the sympathetic.

PHYSIOLOGY.—The prostate is a sexual gland. After birth it remains in a quiescent state up to puberty, when it begins to increase in size and development. It attains its full growth at about the twenty-fifth year.

The secretion of the glands, which are especially active during sexual excitement, is a slightly turbid fluid of feebly alkaline reaction, with a specific gravity of 1.010.

It is especially rich in chloride of sodium (one per cent.), and, as solutions of this salt are known to excite the spermatozoa to movement, its presence in the prostatic fluid is thought by some to perpetuate their activity. Probably the most important function of this secretion is in producing coagulation of the secretion of the seminal vesicles.

The prostate, further, in its character as a muscular organ, acts as an involuntary sphincter of the bladder. As the urine accumulates a point is finally reached at which the tension of the detrusor urinae muscle pulls open the rings of involuntary fibres around the neck of the bladder and allows the urine to enter the pars prostatica urethrae. Its presence there causes an urgent desire to urinate, and the escape of the water is then prevented only by the compressor urethrae muscle, which is the voluntary urinary sphincter. If this muscle does not relax and allow urination to be completed, the prostate closes down and forces the contained urine back into the bladder, where it stays until the further increased tension brings on another "besoin d'uriner."

MALFORMATIONS.—The prostate may be wholly wanting, in connection with a general lack of development of the urinary organs.

In exstrophy of the bladder there is no roof to the prostatic urethra, and the gland ducts may be seen opening through the mucous membrane over the site of the organ.

INJURIES AND WOUNDS.—The deep-seated position of the prostate makes it little liable to injury from without. In severe crushes of the pelvis with fracture about the pubis, it may be wounded. In perineal lithotomy it is always incised, and often somewhat contused by the extraction of the stone. If the crushing and laceration of the parts have not been serious, healing usually takes place kindly.

Injury of the prostate occasionally results from the passage of instruments through the urethra. This occurs most commonly in cases of hypertrophy, in which the irregular enlargement of parts of the gland has made the canal tortuous.

A specimen in the museum of the Harvard Medical School shows a very much enlarged middle lobe which so obstructed the entrance of the catheter that the instrument had been forced directly through it and had entered the bladder beyond.

The knowledge that such injuries are possible should lead to their avoidance. Much force is never needed in the passage of an instrument which is properly guided, but a thorough understanding of the nature of the possible obstacles, and considerable patience and care in overcoming them, are necessary to success in these cases.

INFLAMMATION OF THE PROSTATE—PROSTATITIS—may be either acute or chronic.

Acute prostatitis is commonly the result of the extension of an inflammation from adjacent parts.

A gonorrhœal urethritis is by far the most usual exciting cause. In this case the inflammation runs back along the urethra to the prostate. That this is not the usual course of a gonorrhœa is due to the protection afforded by the constrictor urethræ muscle. This sphincter, surrounding the membranous urethra, prevents the discharge from penetrating to the prostate and bladder, and usually protects these deeper parts from participation in anterior inflammations. Occasionally the passage of an instrument, or the forcing of an injection through the constrictor, may convey infective discharges past this natural barrier.

A non-specific urethritis or an inflammation of the bladder may, in similar manner, extend to the prostate. The passage of instruments, the application of caustics, the use of strong injections, the presence of calculi in the bladder or prostate, accidental injuries, or operations may be the exciting cause of an acute prostatitis.

Among other causes cited as occasionally giving rise to prostatitis may be mentioned sexual abuses, acrid irritating conditions of the urine, the use of stimulating diuretics such as cantharides and turpentine, the abuse of stimulants, and the presence of inflammation in the rectum. Probably these conditions are rarely, if ever, competent to excite an acute prostatitis in a healthy state of the gland, but only act to aggravate an already existing inflammation.

A stricture of the urethra greatly aggravates any deep inflammation of that canal, and makes its extension to the prostate much more liable to occur.

Pathology. In acute inflammation the prostate is much congested, with great swelling and œdema, which extend to the surrounding parts. The prostate itself may be enlarged to three or four times its natural size, and even with this degree of inflammation, resolution and a return to a comparatively normal condition are possible.

If, however, the inflammation runs a more acute course, it may lead to the formation of abscesses, which, starting as minute points of pus, may gradually enlarge and coalesce until, in an extreme case, the whole organ may be reduced to one abscess cavity.

Spontaneous opening may take place backward into the rectum, into the urethra, or into the bladder, and the pus may even occasionally find its way down through the ischio-rectal fossa, or into the perineum, and point externally. Rarely, the abscess may open into the peritoneal cavity, or into an adherent coil of intestine.

Symptomatology. The prominent symptoms are pain deep in the perineum and in the rectum, with tenesmus of the bladder and the rectum. Urination is very frequent, and is accompanied by great pain, especially during the passage of the last few drops of water, which are frequently colored with blood.

Accompanying these local symptoms there is usually considerable fever, which may or may not be ushered in by a chill. There is also often severe pain in the back, loins, and thighs.

As the inflammation increases the pains become even more severe, the urine in its passage scalds intensely, the pressure and throbbing pain in the rectum become very distressing, and defecation, which is constantly desired, is, when it happens, a new source of suffering.

The stream of urine becomes small and hard to start, owing both to the swelling of the prostate and to the spasmodic contraction of the constrictor urethræ muscle, and finally complete retention may result.

If a gonorrhœal discharge previously existed, it may disappear at the onset of prostatic inflammation, or it may be changed into a slight mucous discharge.

There is usually a good deal of tenderness in the perineum, and sometimes also close above the symphysis pubis. A rectal examination is difficult on account of the extreme sensitiveness of the parts, accompanied by spasm of the sphincter muscle.

If the inflammation gives rise to an abscess, its formation is often heralded by rigors with high fever. If the abscess breaks into the urethra or bladder, there may be

a sudden escape of pus in the urine, with an improvement of the general symptoms.

If the pus cavity attains any considerable size, its character may be made out through the rectum, where it is to be felt first as a hard, boggy swelling, which later softens and gives evidence of fluctuation.

If the abscess extends into the loose cellular tissue along the rectum pyæmic symptoms may develop, and in case of rupture into the peritoneal cavity the characteristic symptoms of peritonitis will come on abruptly, with a speedily fatal issue.

Treatment. Absolute rest is the first and most important measure when acute inflammation of the prostate makes its appearance.

The patient should keep in a horizontal position with the hips somewhat raised.

If severe pain is present—especially if frequent spasms of the bladder are aggravating the inflamed gland—opiates should be given; and it is to be borne in mind that these, by inducing rest from spasm, exert a really curative effect. Morphine and atropine subcutaneously, or opium and belladonna suppositories, may be administered under these circumstances.

All irritations from instrumentation, injections, or stimulating diuretics should be avoided.

The bowels should be kept gently open by aperients, if necessary, and this point should be carefully looked after when opiates are being used.

The urine should be rendered as unirritating as possible by the use of diluents and alkaline diuretics, and nourishment should be given in a bland, unstimulating form. Farinaceous gruels, milk, and light broths may form the bulk of the diet. Alcohol should be entirely avoided in the acute stage of the disease.

If at the outset the fever runs high, it may be somewhat mitigated by the use of quinine or some more temporary febrifuge, such as aconite or phenacetin. Late in the disease, when it has run a severe course—especially in case of exhausting suppuration—strong concentrated foods and alcoholic stimulants may be required.

Locally, all possible measures for limiting the severity of the inflammation should be employed. In an early stage of the disease, leeches applied to the perineum may be of considerable service. From six to eight should be put on along the raphe and close to the anus. The bleeding may be encouraged, especially in plethoric persons, until from fourteen to sixteen ounces have been withdrawn.

Hot applications, either by fomentations or by hot-water bottles, to the perineum and over the pubes, are useful in diminishing pain and spasm, and probably assist somewhat in limiting the inflammation. Hot hip baths are recommended for this same purpose; but the exertion and the unfavorable position required for these add so much to the pelvic congestion as greatly to diminish the otherwise favorable effect of the heat. If used, they should not be prolonged for more than five or eight minutes, as the maximum effect on the surface is produced in that time.

If retention of urine occurs, it must be relieved by the careful introduction of a small, soft catheter (Nos. 12-14 French scale).

Sometimes, when there is a spasmodic stricture at the compressor urethræ, a soft catheter will not pass, and a stiff instrument must be used, requiring, of course, the greatest gentleness of manipulation.*

When the retention persists and requires repeated catheterization, an instrument tied into the bladder (*sonde à demeure*) will often cause less irritation than would its frequent introduction.

The possibility of abscess formation is always to be kept in mind, and the condition of the gland should be watched by rectal examinations. If fluctuation is made out, the abscess should be opened at once. This may usually be done through the rectal wall with a curved

* For the discussion of catheterization see under Hypertrophy of the prostate.

bistouri caché, and the opening should be rather a puncture than a long incision. This is for the purpose of avoiding hemorrhage; and it is a good plan, with this same object in view, to make a careful examination before the puncture, to see that no vessel of any size in the rectal wall stands in danger of injury by the knife. In case of bleeding, ice pellets should be introduced into the rectum, and if these fail, pressure should be applied by a thorough plugging of the lower part of the bowel. If the abscess is a large one a drainage tube may be introduced into it through the rectal opening.

If examination shows that the abscess is working toward the perineum, it may be opened by an incision from that direction, and thus a urethro-rectal fistula with prolonged suppuration may be avoided.

When the abscess communicates with the rectum thorough irrigation of the bowel should be carried out, and an antiseptic, free from poisonous properties, should be selected, on account of the absorptive power of the rectal mucous membrane.

If the disease ends in resolution, care should be taken that the recovery is complete, for an acute inflammation may, if neglected, leave a chronic condition which is sometimes extremely hard to relieve.

Chronic Prostatitis.—Chronic inflammation of the prostate may, as has been said, follow an acute attack. It may, however, on the other hand, originate as a chronic or subacute affection.

What has been said in regard to the etiology of acute, will for the most part apply to chronic, prostatitis; but while the former is seldom the result of sexual errors alone, these are not infrequently almost wholly responsible for a chronic inflammation of the gland; and it is to be noticed that the imperfect sexual indulgence of masturbation, or partial intercourse, is much more productive of prostatic trouble than is the normal excitement of proper coition. This is probably due to the unrelieved congestion of the gland, left after these unnatural practices.

Pathology. A chronically inflamed prostate is usually somewhat enlarged, but may be natural or diminished in size. The gland is less firm than in health, and its texture is more open and spongy. Upon section the cut surface is red or dusky in hue, and moister than normal. Little points of suppuration may exist, but are usually few and small.

The mucous membrane has an increased vascularity and may be thinned, particularly if the prostatic urethra is dilated in consequence of an anterior stricture. It may, on the other hand, be thick and spongy, denuded partly of epithelium, or much roughened with spots of ulceration; sometimes, in cases of long standing, it is pigmented. The sinus pularis and dilated gland ducts about it may contain pus. Sometimes an abscess cavity exists in communication with the urethra.

Symptomatology. Patients with chronic prostatic inflammation are troubled with increased frequency of micturition, which in a mild case may be scarcely noticeable, but is often very troublesome—occurring sometimes with intervals of less than an hour.

There is sometimes pain of a dull, heavy character, referred to the perineum and lower rectum. There may also be considerable pain low down in the back, with twinges shooting into the thighs and testicles. A slight, persistent urethral discharge, often most marked in the morning, may be the only symptom. In some cases the symptoms may be almost entirely of a sexual character, such as are often spoken of as sexual neurasthenia.

The bladder, when full, may make its condition known by a feeling of discomfort or actual pain, with intensely urgent call to urinate.

The passage of urine may be accompanied by slight scalding sensations, and there may be a twinge at the end of micturition, when the bladder shuts down upon the sensitive prostate. Occasionally tenderness in the perineum may be felt upon deep pressure.

The urine may be cloudy and contain, more or less abundantly, clumps of muco-pus mixed with epithelial

cells. These are little accumulations of secretion washed out of the dilated gland ducts, and differ from the loose threads of mucus so common in chronic urethritis in being smaller, more coherent, and rounded in form. When the urine is passed in two portions, the first part is apt to be more cloudy and to contain these clumps of mucus more abundantly than the second part. Not infrequently, however, even when the inflammation is confined to the prostate, the pus is distributed throughout the urine and both portions are cloudy. The reason for this has been very clearly stated by Ultzmann,* and is as follows: The internal sphincter of involuntary fibres surrounding the vesical orifice of the urethra is comparatively feeble, while the compressor urethræ muscle, just in front of the prostate and surrounding the membranous urethra, is strong and competent, and, being under the control of the will, it forms the voluntary sphincter of the bladder.

As discharges collect in the prostate they cannot force their way forward past the constrictor, but readily escape backward into the bladder, where they diffuse themselves through the urine. Even in these cases, however, when the urine is universally cloudy, the first portion will still be somewhat more cloudy than that which follows, and will contain many more of the mucous prostatic clumps. The urine in mild cases may be clear with a moderate number of "prostatic plugs" which settle rapidly to the bottom of the urine glass.

The urine, when examined microscopically, will often be found to contain, besides the pus, a considerable number of blood cells, and occasionally also a few spermatozoa. The blood may not infrequently be perceived to come at the end of micturition, when the bladder closes down upon and squeezes the congested prostate.

A chemical examination frequently shows the presence of a little albumin, often in larger quantity than the pus and blood would account for. In other respects the urine is usually normal.

If the character of the stream is noticed, it will often be found that its force is decidedly diminished, and that after the completion of urination a few drops dribble away. Sometimes partial or total retention may occur.

This interference with urination is to be partly accounted for by the swelling of the prostatic mucous membrane, but is often largely dependent on a spasmodic contraction of the constrictor urethræ muscle; and if under these circumstances a sound is passed, it will meet with decided resistance when it reaches the voluntary sphincter. This spasmodic stricture may be so close as greatly to aggravate the difficulty and pain of micturition, for, as the bladder forces the urine into the prostatic urethra, if its further escape is prevented, the undue pressure in this sensitive part is productive of very great suffering. Usually the spasm of the constrictor is finally overcome by the accumulating intravesical pressure, and urination, beginning first by drops, presently comes with more or less freedom.

As we have said, the constrictor muscle hinders prostatic secretions from escaping anteriorly and appearing as a urethral discharge. A very slight gleet in the morning is not infrequently observed. Sometimes also in these cases a glairy discharge of prostatic mucus is pressed out and escapes while the patient is at stool; especially is this the case when the bowels are constipated and much straining is required. This is commonly interpreted by the patient as an escape of semen, and he becomes convinced that he is a victim of spermatorrhœa.

Usually the microscope fails to find spermatozoa in this discharge, which consists mainly of mucus, with sometimes a little admixture of pus and blood.

Besides the local symptoms and manifestations that have been described, we see in these prostatic cases often marked changes in the general condition of our patients. They are nervous and hysterical, or may be depressed and despondent, with often a hypochondriacal over-estimate of the gravity of their trouble. Sometimes a true neurasthenic condition may be induced in a case of long

* "Pyuria," p. 26.

standing. Digestive disturbances and palpitation of the heart may occur.

Physical Signs. An examination of the prostate through the rectum shows it sometimes slightly enlarged, but often normal or diminished in size. In consistency it is usually somewhat softer than in health.

If the urethra is explored with an instrument it is commonly very sensitive, but may be anaesthetic; the latter condition being noticed usually in old cases. The urethra should be carefully examined for a possible stricture, and it is to be remembered that the constrictor muscle will often be found to make a spasmodic contraction just behind the triangular ligament. The passage of the sound through the prostatic urethra is almost always painful, and may excite an intense desire to urinate, or an ejaculation of semen.

Diagnosis. The disease which we are considering is peculiar to young and middle-aged men, and is to be kept distinctly separate from hypertrophy of the prostate, which occurs only in the old. Inflammatory symptoms, it is true, are not uncommon in this latter affection, and will be discussed later.

Tuberculosis of the prostate offers many points of resemblance to chronic prostatitis, and a differential diagnosis is often difficult, and may be for a time impossible. The detection of small nodules in the prostate and a marked tendency of the disorder to become worse as a result of local treatment are suggestive of tuberculosis. The constitutional tendencies of the patient should be taken into consideration, and a careful search should be made for evidences of tuberculosis in other organs. An examination of the urine for tubercle bacilli may help to a solution, but a failure to find them even after careful search leaves the question where it was before, for they are often sought in vain in undoubted cases of genito-urinary tuberculosis.

The discrimination between prostatitis and deep urethritis after gonorrhoea is sometimes almost impossible.

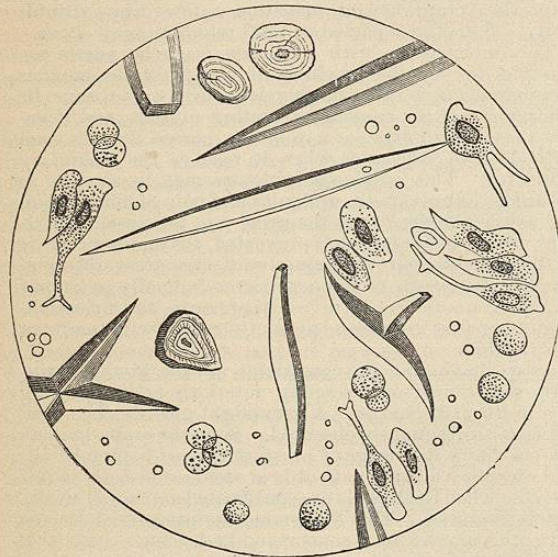


FIG. 3883.—Sediment from Prostatic Discharge, Containing Pus and Epithelial Cells, Granules, Amyloid Bodies, and Böttcher's Crystals.

The rectal examination of the prostate may help to a decision, but not infrequently it gives negative results.

A microscopical examination of the discharge obtained by pressure on the prostate through the rectum may give valuable information, but this, too, is often misleading. The discharge in either case contains pus and large and small round epithelial cells. Amyloid bodies and cylindrical or caudate epithelium may be found in considerable abundance when the discharge is prostatic.

The formation of Böttcher's crystals upon the addition of a drop of a one-per-cent. solution of phosphate of ammonia to a drop of the secretion shows beyond question that it contains prostatic fluid.

This reaction should be conducted on a microscope slide, under a cover-glass, and within an hour, usually, crystals such as are shown in Fig. 3883 make their appearance. They are composed of a phosphate formed from a base which exists in prostatic fluid, and which is supposed to impart to it its peculiar odor. Unfortunately, the mixture of urine with the secretion prevents the formation of these crystals, and so limits very much their diagnostic usefulness.

It is always to be borne in mind that a combination of urethritis and prostatitis is not uncommon.

Treatment should be addressed to both the general and the local condition.

The general treatment should be tonic, especially in the cases in which much nervous depression exists.

A generous, unstimulating diet, with moderate exercise in the open air, and with cold sponge baths in the morning; when the patient's strength will admit of them, are to be advised.

The laws of sexual hygiene should be carefully explained to the patient, and the importance of their observance made plain to him.

Preparations of strychnine and iron are often of benefit, and they may be advantageously combined with quinine or ergot, both of which seem to exert a soothing influence upon the prostate. Iodide of potassium may be of assistance when the inflammation affects the glandular portions of the organ, and the addition of bromide of potassium is sometimes distinctly useful in quieting sexual excitement.

If the urine is highly acid or otherwise irritating, its character should be modified by demulcent drinks and by alkaline diuretics.

For a more direct local effect, cantharides, turpentine, sandal-wood oil, or copaiba may sometimes be administered with advantage, especially when the inflammation is mostly confined to the prostatic urethral mucous membrane.

Various local measures of treatment may be expected to contribute to the cure.

Counter-irritation to the perineum, either with tincture of iodine or with fly blisters, is often of great use. Cantharidal collodion is a convenient blistering medium, and should be applied to a small surface close to the raphe.

Whatever counter-irritant is used, care should be taken that it does not come in contact with the scrotum or anus. After the application is dry, it is a good plan to fix a pad of absorbent cotton in the perineum with a T-bandage. This takes up the perspiration and prevents the blister from spreading to the side opposite to that where it was applied.

When there is much pain in the prostate and rectum, hot injections into the bowel may help to palliate it, and to reduce the congestion in the same manner that hot douches act upon the female pelvic organs.

The most important local treatment, however, is that applied directly to the prostate itself, and consists in the passage of sounds, massage of the prostate through the rectum, and in applications and injections into the prostatic urethra.

The use of sounds in chronic inflammation of the prostate has long been recognized as of advantage, and the benefit from them has been variously explained.

Some surgeons think that they should be used cold, and ascribe their efficiency to the astringent action of the cold. Others consider that their pressure within the prostate exerts some beneficial influence by forcing the blood out of the gland.

While some good may perhaps be attained in either or both of these ways, it is probable that the stretching of the constrictor urethra muscle, and the consequent relief from spasmodic contraction of the same, will account, in a large measure, for the good results that follow their use. As has been said above, this sphincter is not infre-

quently put in a spasmodic state of contraction by the proximity of the prostatic inflammation, and in this state of stricture it has a tendency to aggravate the deep inflammation, just as an organic stricture tends to increase and perpetuate a urethritis posterior to it. It can be readily understood, therefore, that the relief of this spasmodic contraction would act favorably upon the inflammation behind it.

As large a sound as will pass comfortably through the urethra should be used, and it should be introduced with the greatest gentleness. A sound passed roughly down through the anterior urethra will sometimes find the constrictor tightly closed against it, when, had more care been exercised, the urethra would not have resented its introduction, and it would have readily passed the moderately contracted sphincter.

If the spasmodic stricture is a tight one, it will sometimes be found necessary to precede the introduction of the sound by the passage of a French, olive-pointed, conical bougie; which, insinuating its point through the obstruction, readily dilates it and prepares the way for the larger instrument.

When excessive irritability or an access of inflammation make the application of cold to the prostate desirable, it may best be accomplished by the use of the cold sound. This is a hollow instrument, which after its introduction can be chilled down by passing a stream of water through it. It should usually be kept in place for about five minutes.

We now come to speak of local applications to the prostatic urethra, and in these we recognize the most efficient means at our command for subduing chronic inflammation of this part.

The cases which are particularly suited to this form of treatment are those in which prostatic clumps are present in the urine, with or without a purulent secretion; in short, in which the mucous membrane is distinctly affected. Medication may be conveyed to the pars prostatica urethra either by the injection of a few drops of a strong solution, or by irrigation with considerable quantities of a weak solution.

The application of soluble drugs to the prostatic urethra is probably best accomplished by the injection of solutions.

The constrictor muscle, situated just in front of the prostate, prevents the penetration of an ordinary urethral injection, and special instruments are therefore needed for medication in the urethra posterior to it. Figs. 3884 and 3886 represent such catheters for prostatic medication.

The curve shown in these instruments has advantages both in the ease of introduction, and in the readiness with which the location of the point can be determined from the position of the handle.

When the instrument is verti-

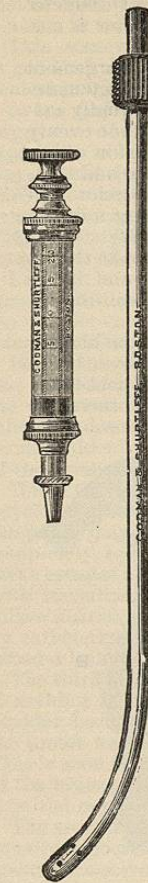


FIG. 3884.—Uitzmann's Prostatic Syringe. A capillary tube and graduated syringe for the introduction of strong solutions. The curve of this and of the irrigating catheter is modified from Uitzmann's instruments. See text.

cal* the point necessarily rests just in front of the triangular ligament; now, upon bringing it down to an angle of forty-five degrees, and at the same time advancing it slightly, the point slips on through the constrictor muscle, but never passes beyond the prostate unless a special effort is made to push it on toward the bladder. Fluid injected through the catheter, when in this position, cannot pass forward through the constrictor, but washes out the prostate and escapes backward into the bladder.

Of the various drugs used for prostatic application, nitrate of silver is perhaps the most valuable.

Two or three minims of a one- to two-per-cent. solution should be thrown into the prostatic urethra through the capillary catheter (Fig. 3884).

Some pain of a burning character, with often considerable tenesmus, follows the application; but this usually passes off in the course of an hour or two. The injection should be repeated every four or five days, and its effect may sometimes be heightened by the previous passage of a sound. As convalescence is established, the intervals in the treatment should be gradually lengthened.

Irrigation of the prostatic urethra may often be practised with great benefit. In case there is much irritability of the neck of the bladder, with considerable muco-purulent secretion, a soothing antiseptic wash is of use. A two-per-cent. solution of borax or boric acid, with the addition of a little glycerin, is a good injection for this purpose.

If the use of an astringent wash seems indicated, any of the mixtures useful in gonorrhoea may be tried. Perhaps a one-per-cent. solution of acetate of zinc is as good as any. The irrigating fluid, after washing out the prostate, flows back into the bladder, as has been said, and from there it may either be withdrawn by slightly advancing the catheter, or it may be passed by the natural efforts.

While the above-mentioned procedures are addressed to the urethral aspect of the prostate, further relief may be afforded by massage of the rectal face of the prostate. This is done by the forefinger introduced into the rectum, and should aim at expressing the contents of the prostate. The amount of pressure which may be safely used will depend on the acuteness of the inflammation, of which the tenderness will prove a safe guide. Massage should not be given at too short intervals, and is often wisely made to alternate with the other local measures above outlined.

After any manipulation or treatment of the prostate the patient should keep quiet, if possible recumbent, until all serious discomfort passes away, and should

*Throughout this article, when the manipulation of instruments is described, it is supposed that the patient is in a horizontal position.

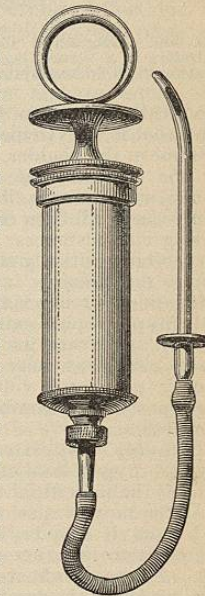


FIG. 3886.—Irrigating Catheter. (After Uitzmann.)

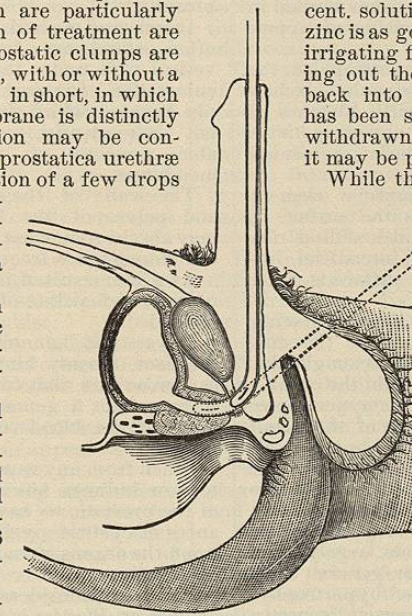


FIG. 3885.—Diagram showing that if a short-beaked instrument is held with the handle vertical, the point rests just at the triangular ligament. The dotted figure shows how the point slips through the constrictor muscle when the handle is brought to an angle of forty-five degrees with the axis of the body.

avoid any exposure to chill or fatigue for several hours.

HYPERTROPHY OF THE PROSTATE, ENLARGED PROSTATE.—*Etiology.*—The causes of enlargement of the prostate are difficult to establish by any adequate proof.

The one thing which seems to be essential to the existence of the disease is the advanced age of the patients. Hypertrophy of the prostate is practically unknown before the age of fifty, whereas after that it is extremely common.

Stone in the bladder, stricture of the urethra, irritation by the frequent use of instruments, sedentary habits, gouty or rheumatic diathesis, and exposure to cold and damp, have all been cited by surgical writers as predisposing circumstances; but none of these conditions has ever been positively shown to stand in a causative relation to the disease.

On the other hand, there is no doubt that, when prostatic hypertrophy exists, any of these conditions may greatly aggravate its symptoms; and besides those already named we may mention excesses in drink or in venery, prolonged voluntary retention, and the recumbent posture as familiar causes of increased prostatic congestion.

Pathology.—Hypertrophy of the prostate may occur through hyperplasia of the glandular portions of the organ, of the interstitial tissue, or of both.

As the normal size of a particular prostate can never be known, it may be hard to say, even on post-mortem examination, whether a given specimen is enlarged or not. For approximate determination, however, a prostate weighing six drachms may be regarded as normal in size, and anything over that is to be considered hypertrophied.

Upon section of a prostate which is hypertrophied, the cut surface bulges irregularly above the capsule. It may be grayish-yellow in color or mottled with blotches of red, yellow, and gray, with occasional dark pigmented spots.

If the glandular element predominates the surface is soft, and exudes a fluid rich in cells. In interstitial hyperplasia the surface is dryer and firmer.

Sometimes little projecting bunches announce the formation of fibrous or glandular tumors within the organ.

Usually the hypertrophy affects all parts of the gland simultaneously, but not all in the same degree.

The shape of the prostatic urethra—a matter of the first clinical and surgical importance—depends largely upon the partial or general character of the hypertrophy. If the enlargement is pretty evenly distributed throughout the organ, the urethra is in the first place considerably lengthened, sometimes measuring even 7 cm. When the hypertrophy is partial the elongation is less, though it is still marked.

When from any cause inflammation of the bladder, ureters, or kidneys has associated itself with hypertrophy of the prostate, we have the familiar pathological appearances of cystitis, pyelitis, and pyelo-nephritis engrafted upon the organs already seriously altered by the prostatic obstruction.

For a full consideration of these complications see the articles on *Bladder of the Male* and on *Kidneys, Diseases of.*

Natural History.—The progress of the disease is slow. The organs affected are not of vital importance, and the changes in them may reach a very advanced state before they seriously threaten life.

Guyon has divided the history of the disease into three

Furthermore, in cases of general hypertrophy, as the lateral lobes enlarge they compress the urethra from the sides, until it becomes a slit-like canal with tolerably firm walls in close apposition. As the lateral diameter is thus diminished, the antero-posterior diameter is correspondingly increased.

It will be readily seen that, as long as the enlargement is symmetrical, the direction of the urethra is not materially altered; but, on the other hand, it is equally evident that, if the hypertrophy is partial, and not evenly distributed, the unequal pressure from one side or the other of the canal will cause lateral deviations, and that, if the middle lobe is unduly enlarged, the posterior portion of the urethral floor will be raised, causing a deviation upward or toward the pubis (see Fig. 3887).

The projection upward of this lobe may make the internal urethral opening crescentic in shape, and if the middle coalesces with either of the lateral lobes, this orifice is pushed over toward the opposite side.

Sometimes the middle lobe grows out into the bladder as a distinct tumor, which may be attached by a broad base, or may stand off in a pedunculated polypoid form.

Besides the changes in the prostate itself, there are other alterations in associated organs which we must consider in connection with this disease, as they are instrumental in producing many of the symptoms which we shall have to study.

As the prostate enlarges the internal meatus is raised and a pocket is formed in the bladder just behind the enlarged gland. The bladder wall also becomes thickened, partly in consequence of hypertrophy of the muscular coat, owing to the increased resistance against which it has to work, and partly owing to a sclerosis of the interstitial fibrous tissue, like that which has occurred in the prostate.

Interlacing muscular bands often stand out from the vesical wall under these circumstances, forming trabeculae between which there are, not infrequently, considerable pouches of mucous membrane.

The walls of the ureters and pelvis of the kidneys may also be somewhat thickened, and the interstitial renal tissue undergoes frequently a hyperplasia.

As a later result of the prostatic obstruction the bladder, ureters, and pelvis of the kidneys may become greatly distended.

Guyon and Lannois have laid particular stress upon the fact, already hinted at and partly understood by earlier writers, that coincident with these changes in the urinary tract a general sclerosis, affecting specially the walls of the blood-vessels, is going on throughout the body.

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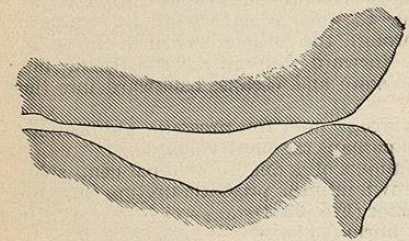


FIG. 3887.—Diagram to Show the Shape of the Urethra in a Vertical Section Through a Prostate with an Enlarged Middle Lobe.

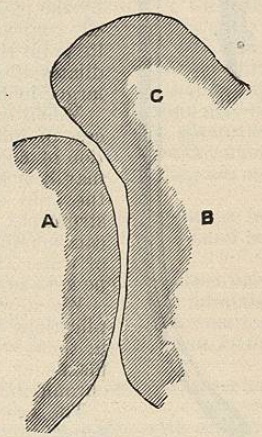


FIG. 3889.—Diagram of a Horizontal Section through a Prostate in which the right lobe, A, is moderately enlarged, the left lobe, B, somewhat less so, while the middle lobe, C, is much enlarged and is joined to the left lobe, causing a deviation of the vesical end of the urethra to the right.

periods: *First*, that of congestion, affecting mainly the prostate, but also in less degree the bladder and kidneys. *Secondly*, that of partial retention of urine. And, *thirdly*, that of distention of the bladder with usually secondary changes in the kidneys.

This somewhat empirical division gives us perhaps as good a framework as any for the classification of the clinical phenomena.

In the first stage, that of congestion, we have some enlargement of the prostate and functional disturbances, especially in the matter of urination. This condition may persist for a long time, and in certain cases, in which for any reason the calibre of the urethra is not greatly interfered with, it may exist almost indefinitely without showing any tendency to pass on to the second stage, that of retention.

Usually, however, sooner or later the obstruction to the passage of the urine becomes greater than the force of the bladder can overcome, and a state of habitual partial retention is the result.

When this condition comes on slowly, the accumulation of residual urine may be very insidious, and escape the observation of patient and physician alike; on the other hand, an increase in the prostatic obstruction may occur suddenly, and the unexpected complete stoppage of the urine may be the first announcement of trouble.

When the retention of the second stage of the disease develops gradually, and is not discovered and treated, the point may be finally reached where the bladder has completely lost its tone and is so distended that the urine escapes almost constantly by an overflow (retention with incontinence). This same condition of things may follow also an acute retention which has not been relieved by catheterization and in which nature has finally established a leakage.

The third stage of the disease is now entered upon, and if nothing is done for such a case the distention of the bladder becomes extreme, and a secondary dilatation of the ureter and of the pelvis of the kidneys takes place. This is soon followed by atrophy of the secreting portion of the kidney, and an increase of its interstitial tissue (interstitial nephritis).

The secondary changes in the heart and blood-vessels, usually associated with chronic nephritis, are likely to make themselves noticed at this time, if they have not already done so, and the disease becomes a constant and serious menace to life.

It is in this advanced stage of the disease that inflammatory processes, starting in the bladder, rapidly extend backward to the kidneys, and uræmic symptoms presently usher in the closing scene.

Symptomatology.—From what has been said in regard to the history and progress of the disease, it will be seen that the symptoms of the first stage are mainly dependent upon the condition of congestion in the prostate, bladder, and kidneys. And as this congestion is most considerable in the prostate, the most noticeable symptoms caused by it are disturbances of micturition and of sensation, due to the irritated state of the neck of the bladder.

In the second and third stages we have, in addition, a series of symptoms due to the mechanical obstruction to micturition, and to the changes in the bladder and other organs consequent upon this obstruction.

We shall have finally to consider the symptoms arising from various morbid conditions likely to appear as complications in the course of prostatic disease.

The first appearance of symptoms usually announces a morbid condition which has already been coming on for some time. When the enlargement takes place in such direction as not to encroach seriously on the calibre of the urethra, it may reach very considerable proportions before it causes any inconvenience to the patient.

One of the first symptoms to be noticed is an increased frequency of micturition, which is specially marked at night or early in the morning. Guyon regards this as evidence of congestion, which is aggravated during recumbency and sleep. He calls attention also to the frequent existence of erections in these patients, on waking,

as further evidence of an increased congestion of the prostate during sleep.

Pain is ordinarily not very noticeable in the early stages of the disease, although a dull aching or heavy dragging sensation in the perineum, rectum, and behind the pubis is not uncommon.

If attention is paid to the manner in which urination is accomplished, it will be found that early in the disease the stream is slow to start and diminished in force. This is due largely to a loss of power in the bladder, but is to be partly explained by the swelling in the prostate, and by a spasmodic contraction and stammering action of the constrictor muscle.

The diminution in the force of the stream in a prostatic patient differs from that seen in cases of stricture, in that, while a strictured patient can, by voluntary effort, increase the force of his stream, a man with enlarged prostate cannot do so.

Second Period. The symptoms which have their origin in congestion continue during this period, and are, indeed, intensified. Added to them we have other symptoms due to the retention, which is the characteristic condition of this stage of the disease.

The retention may be complete or incomplete. Complete retention may be acute and appear suddenly, or it may be preceded by a period of partial retention which always develops slowly.

The symptoms which accompany a complete retention are easy of recognition, and a physical examination reveals the bladder distended above the pubis. Incomplete retention, on the other hand, comes on very insidiously, and is often overlooked for a long period, at just the time when recognition and treatment of the condition are of great importance.

Although, as has been said, partial retention comes on quietly, still a careful examination of the symptoms will usually elicit evidence of a changed condition of things, at or soon after the time when the bladder begins to fail of emptying itself. The feeling of weight behind the pubis is likely to be increased, and the frequency of micturition, which during the first stage was decidedly more pronounced at night, begins to be almost equally noticed in the daytime. The intervals between the acts of urination become short, and the call is imperative. In short, the bladder being always partly full, it takes but a small additional quantity to distend it to its full capacity.

The only positive means of determining the conditions of the bladder is by a physical examination, and this should be made in every doubtful case.

Sometimes the bladder shows extraordinary tolerance, and the distention becomes so extreme as to cause incontinence from overflow, before the patient feels obliged to call upon a physician; and sometimes also, unfortunately, before the medical attendant recognizes the nature of the difficulty.

This incontinence is evidence of a very great degree of distention, and shows that the disease has entered upon its third stage. Usually, before it appears, the disease has already extended backward and has begun to affect the kidneys.

There is one symptom which may appear and give evidence that the disease has reached the third stage, before incontinence begins. This is polyuria. If the quantity of urine in the twenty-four hours is measured, it will be found considerably to exceed the normal.

Pain, which was an insignificant symptom in the first stage, may assume considerable importance in the second and third stages.

Besides the discomfort in the perineum and back due to the congested and irritated prostate, there is also considerable pain before and during micturition, caused by the distention of the bladder and its unavailing or partially successful attempts to empty itself. The passage of the urine through the prostate is also sometimes painful, and this is especially the case when the occurrence of inflammation has rendered the urine pungently alkaline and has made the parts particularly sensitive.

The examination of the urine may give negative results