

should be tried first, and perhaps the fluid will never reaccumulate. When the tumor contains more than ten or twelve ounces of fluid, injection ought not to be practised until its size has been reduced by repeated tapplings, assisted by pressure to lessen the extent of the secreting surface. If this cannot be effected, the patient will be wise to submit to frequent tapping, and give up the idea of radical cure, for there is danger in exciting a very extensive serous surface to inflame, and it is not justifiable to perform an operation which may compromise life for a disease which is perfectly benign. If the hydrocele is found to contain more or less blood, injection should be postponed until some future tapping yields a comparatively limpid fluid. If syphilitic or tubercular disease be found, injection is inadmissible.

To inject the tunica vaginalis, proceed as follows: Puncture with a trocar of suitable size. Be sure, by moving the end of the canula, that the instrument has penetrated well within the cavity. Allow all the fluid to run off. Examine the testicle thoroughly. If it be much larger and harder than natural, or in any way sensibly diseased, do not inject. Some hardening and thickening of the epididymis alone does not contraindicate injection. The amount of tincture of iodine thrown in should equal about one-half the quantity of fluid drawn off. It should be thrown in gradually, retained several minutes, and worked around in such a way that every portion of the inner wall of the sac may come into contact with it. The fluid is then allowed to run off, and the canula withdrawn. Great pain, with nausea and sickness, is often experienced while the injection is within the sac. The pain may continue for several hours, extending to the abdomen and thighs. Occasionally no pain is felt. The pulse sometimes falls, and there are evidences of shock. The amount of pain experienced is no criterion of success, but rather the reverse. Care should be exercised not to throw in any air with the injection, as this would prevent contact of the fluid with the walls of the sac. The more concentrated the solution, the more plastic is the inflammation which follows. A healthy man may walk about until pain compels him to keep quiet; weak or feeble patients should remain in bed for twenty-four hours after the operation. At the end of this time the testicle will commence to get large and hard, the scrotum becomes œdematous, and there will be more or less reaccumulation of fluid. The patient will often consider himself more hurt than benefited by the operation at first. If the inflammatory reaction is not very painful, the patient may go about with a suspensory bandage; if it should not come on at all, or is very slight, the testicle should be squeezed and manipulated daily for a week or ten days, so as to increase the grade of inflammation. If, on the contrary, severe inflammatory reaction sets in, the patient should be confined to bed with the testicle supported, perhaps poulticed. After four or five days, or sooner, the pain and swelling begin to subside, the fluid is absorbed, a harsh friction-sound can be produced by rub-

bing together the two folds of the tunica vaginalis, and a permanent cure is effected in from three to six weeks or longer. A second operation is rarely necessary. In double hydrocele both sides should not be injected at the same sitting. In using solutions of iodine, metallic instruments should be dipped in oil before use, and in a solution of potash afterward, or they will soon corrode. If the quantity of fluid which reaccumulates after operation be very great, keeping the surfaces covered with the plastic exudation too far apart, Lisfranc advises that it should be drawn off with a fine trocar, as in the operation of simple tapping.

Incision must be employed where there exists the least doubt as to whether or not the tumor be hernia, where the walls of the tumor are very thick or calcareous, where its contents are sero-purulent or sero-sanguinolent, and where injection has failed. Unless the position of the testicle has been positively made out beforehand, the sac should be opened upon a director, otherwise a clean incision may be made from top to bottom anteriorly. If the walls of the sac are very thick, and especially if they contain calcareous plates, they should be cut away. A type case of the sort is the following:

CASE XXIX.—A healthy man of advanced middle age applied for treatment of hydrocele. The fluid drawn by exploratory puncture was pellucid. Enough study was not bestowed upon the testicle afterward, and an injection of iodine was practised. Nothing peculiar occurred until the fourth or fifth day, when inflammation of a bad sort came on, attended by high fever and depression. The scrotum became purple, the testicle large, hard, and tender. This excessive inflammatory reaction, with general depression, was met at once by laying open the tunica vaginalis from top to bottom. Now, upon introducing the finger through the wound, the sharp edges and spiculæ of the calcareous plates could be distinctly felt. The parts were dressed with warm water, and allowed to digest for several days, after which, when the general condition had improved, the thickened calcified walls of the tunica vaginalis were cut away, and a cure followed, without other bad symptoms.

The wound is to be dressed loosely with lint or oakum, and the patient kept in bed with the testicle supported. Suppuration will be established by the fourth or fifth day, when the dressing should be removed by syringing with warm water, and reapplied daily. The wound now becomes a simple granulating cavity, and is to be treated as such. The patient is confined to bed from two to eight weeks. Incision is the most ancient of all the methods of treating hydrocele. It is too severe an operation for general application, and should not be resorted to except to meet the conditions above enumerated.

CONGENITAL HYDROCELE.

In congenital hydrocele there has been only a partial obliteration of the peritoneal prolongation at its neck, and, instead of the usual solid, thin, fibro-cellular cord (Scarpa's habenule), we have an open canal making the cavity of the tunica vaginalis continuous with that of the peri-

tonæum. The abdominal serum gravitates into this cavity, and hydrocele is the result.

The *diagnosis* is usually easy, but in certain cases there is some chance of confusion with hernia.

Congenital Hydrocele.

1. Appears soon after birth.
2. Tumor continues into inguinal canal.
3. Receives impulse on coughing.
4. Flatness on percussion.
5. Always reducible at an even rate, more or less rapidly according to size of opening; no jerk.
6. Testicle, entirely obscured by the tumor, reappears on reduction of the latter.
7. Feel soft, not doughy.
8. Always translucent.

Hernial Tumor.

1. May appear at any time.
2. Same.
3. Same.
4. Resonance on percussion.
5. If reducible, goes back suddenly, with a gurgling sound.
6. Testicle can usually be made out as a distinct lump.
7. Doughy feel—perhaps gurgling, on manipulation.
8. Never translucent.

A simple hydrocele may coexist with hernia, at any time of life, and it is not uncommon for congenital hydrocele to be complicated by congenital hernia (Fig. 129). Congenital hydrocele may be found in adults, but is rare.



FIG. 129.—(MacLise.)

Treatment of Congenital Hydrocele.—The fluid need not be reduced, but a well-fitting truss must be applied. This will usually obliterate the neck of the sac, and is Nature's method of accomplishing cure. The fluid will be absorbed in from two to eight months after closure of the neck of the sac. If not absorbed, the case, after the neck is closed, may be treated as simple hydrocele. Complication with hernia does not call for any modification of treatment. Congenital hydrocele should never be injected. Desault and Dupuytren did inject congenital hydrocele with a stimulating fluid, making, at the same time, firm pressure at the ring. This treatment, sometimes successful, has also been followed by fatal peritonitis.

HYDROCELE OF HERNIAL SAC.

An old hernial sac may become obliterated at its neck by wearing a truss, or by becoming plugged up by a portion of small intestine, or a piece of omentum. This old sac may fill with fluid, and thus become hydrocele of the hernial sac.

The *diagnosis* is made mainly by a study of the history of the case. *Treatment.*—Injection is not allowable. A careful incision is to be

made, the fluid evacuated, and any portion of intestine or omentum blocking up the neck returned into the abdomen. Dress with lint.

SPURIOUS HYDROCELE OF HERNIAL SAC.

This is a considerable accumulation of fluid around an incarcerated hernia.

Treatment.—Incision and operation for reduction of hernia.

The fluid in true and in spurious hydrocele of the hernial sac is usually dark colored.

ENCYSTED HYDROCELE OF THE TESTICLE.

Simple cysts, developed out of the pediculated or non-pediculated hydatids (so called), sometimes containing spermatozoa, are found about the head of the testicle. They may be found within simple hydrocele, and it is by the bursting of one of these cysts into the cavity of an already-distended tunica vaginalis (or its puncture during operation) that the contents of hydrocele contain spermatozoa (spermatic hydrocele). On this point Virchow and Gosselin are in accord.

Such cysts may be treated by incision or injection.

SPERMATOCELE.

Spermatocele is a collection of serous fluid, containing spermatic elements, either in the tunica vaginalis or in a cyst situated near the head of the testicle.

The title has been inappropriately bestowed upon another condition, which may be briefly disposed of. When the sexual appetite has been kindled and kept excited for some time without being gratified, seminal fluid, which has been produced and is collected in the testicle, vas deferens, and seminal vesicles, will usually be discharged in an involuntary emission at night, and no inconvenience will be felt beyond slight aching, and increase of size of the testicle. Sometimes, however, Nature fails to relieve herself, and then the testicle becomes large, hot, and excessively tender, the epididymis is distended and knotty, the whole cord tender and tense, the scrotum red, the suffering very considerable, and the testicle, apparently, about to become acutely inflamed. The origin of the mischief can always be ascertained. A cure follows a natural discharge of the excess of semen, or may be brought about by rest, elevation of the testicle, and cooling lotions. This derangement does not deserve the name of spermatocele. It might be called *spermatic congestion*.

Liston (1843) and Lloyd (1849) first found spermatozoa in the fluid of hydrocele. Spermatic hydrocele does not exist, except in an encysted form, or secondary to it. Although a tumor may resemble hydrocele

in all respects, yet it may yield, on puncture, a milky fluid containing spermatozoa. In such cases one of two accidents has occurred:

1. An encysted spermatocele, jutting out within the tunica vaginalis, and obscured by its fluid, has been punctured during tapping of the latter, and thus allowed a mingling of spermatic elements with the other contents of the hydrocele.

2. The cystic spermatocele has ruptured early in its formation, discharged its contents into the tunica vaginalis, and continued on furnishing spermatozoa mixed with the fluid of the hydrocele (Virchow, Gosselin).

There exist normally upon the head of the epididymis several little prominences,¹ solid and cystic, known as the hydatid of Morgagni or pediculated hydatid, corpus innominatum of Giraldes, and non-pediculated hydatids. They are the remains of the Wolffian body, and of the duct of Müller. From one of the non-pediculated hydatids, undoubtedly spermatocele is formed.²

¹ Rosenmüller, "Quædam de ovarii Embryonum et Fœtum humanorum," Lipsiæ, 1802. Kobelt, "Der Neben-Eierstock des Weibes," Heidelberg, 1847. Müller's "Physiology," by Baly. Virchow, "Die Krankhaften Geschwülste." Stricker, "Manual of Histology," American edition; and "Todd's Cyclopædia," vol. v., Supplement, Art. "Parovarium."

² The testicle is developed in the fœtus, near the Wolffian body, but independent of it. This Wolffian body consists of a set of tubes, all of which open into the duct of the Wolffian body. The duct terminates in the uro-genital canal. This duct becomes finally the vas deferens in the male (in the female it atrophies). Of the tubes forming the Wolffian body the central ones unite by open ends (vasa recta) with the testicle. They become the coni vasculosi, and connect the testicle with the canal of the epididymis. Of the lower caecal tubes of the Wolffian body, not connecting with the testicle, some atrophy, and others (one or more) become developed into the vasa aberrantia of Haller, while the upper tubes atrophy, or become converted into non-pediculated hydatids (so called); in other words, simple little cysts at the head of the epididymis. The corpus innominatum of Giraldes, a convolution of small tubes, shut at both ends, is another remnant of the Wolffian body. In the female, all the tubes of the Wolffian body continue caecal. They constitute the parovarium of Rosenmüller, and furnish the little cysts so often existing normally in the broad ligament, near the outer border of the ovary.

Besides the duct of the Wolffian body, there is found in the fœtus another tube, beginning in a blind extremity running over the tubes of the Wolffian body, but not connected with them or with their duct, to which it runs parallel, and emptying by a separate orifice into the uro-genital canal. This is the duct of Müller. In the female it forms the Fallopian tube. Its extremity becomes fimbriated, and its blind end atrophies or remains as a small, pediculated hydatid. In the male it atrophies, its blind extremity often persisting as the hydatid of Morgagni (so called), a pediculated cyst at the head of the epididymis. Its length lies along the border of the epididymis, as an atrophied thread, sometimes showing hydatidiform swellings, while its other extremity is represented by the prostatic utricle.

This insight into the origin of the little cysts found normally at the head of the epididymis explains why we sometimes have developed there a simple cyst, and sometimes a spermatic cyst. If the hydatid of Morgagni or one of the hydatidiform swellings of the atrophied duct of Müller should become enlarged into a cyst, we should have a simple cyst, for the duct of Müller never possessed any connection either with the testicle or with the Wolffian body. If, on the other hand, one of the far more numerous cysts, the remains of the upper blind tubes of the Wolffian body, should enlarge, it is easy to see how the connection which originally existed between this blind pouch and the duct of the Wolffian body (now canal of the epididymis and vas deferens) might be re-established (or never have been closed), and seminal elements find their way into the cyst, especially if there were some stricture of the canal of the epididymis or of the vas deferens. In the same way, if one of the vasa aberrantia should enlarge, we might readily have spermatocele. It has been supposed that some of the tubuli of the testis itself may become enlarged into a spermatocele, but this has never been demonstrated.

It tends to increase in size indefinitely. It may coexist with hydrocele, and be masked by it. It may be broken early by accident, and, continuing to secrete, form spermatic hydrocele, or it may be punctured with the trocar, when a supposed simple hydrocele is tapped.

Symptoms of Spermatocele.—When complicating simple hydrocele and jutting into the cavity of the latter, there are no symptoms by which spermatocele can be distinguished. Uncomplicated, it has peculiar features. Usually a slight uneasy sensation is experienced near the head of the epididymis, not amounting to pain, often entirely unnoticed, or at least forgotten by a patient who may afterward find the little tumor by accident. If seen early, an undefined sense of thickening with extra resistance is distinguishable by the finger, in the region of the top of the testicle. This goes on increasing, usually, at so slow a rate that the patient soothes himself with the idea that it will become no larger. It grows, however, constantly, and may attain a large size. There is no pain, except a slight dragging on the cord. The cyst keeps its position at the upper end of the testicle, and becomes gradually heart-shaped, the testicle lying below at the point, the cyst sometimes notched above. The walls are usually thin and tense, so that fluctuation cannot be always distinguished, but translucency is usually present. The fluid may be dark colored or very milky, somewhat masking translucency. The patient is very apt to become hypochondriacal, and to imagine that his sexual appetite and power are failing.

On tapping such a cyst, the fluid will usually be found milky or dark colored, and the microscope readily detects spermatic elements, often exhibiting lively movements, with others more or less decomposed, many oval heads without the tails, blood, granular and fatty matter, and some granular pigment and epithelial cells. The diagnosis can never be pronounced with absolute certainty until the microscope has detected spermatic elements in the fluid.

Treatment.—After tapping, a spermatocele will invariable refill. The proper mode of treatment is by injection or by incision, as in hydrocele.

HYDROCELE OF THE SPERMATIC CORD.

Hydrocele of the cord is either diffuse (infiltrated) or encysted. The spermatic cord is enveloped in a loose layer of connective tissue, which is continuous with the external and internal connective-tissue envelope (perimysium) of the abdominal muscles, starts at the external abdominal ring and surrounds the whole cord, the epididymis and the testicle, being firmly attached to the latter at its lower end, and inseparable from the reflected tunica vaginalis propria. The cremaster muscle is spread out upon its external surface. This loose connective tissue is described by anatomists as a separate fascia, and is called tunica vaginalis communis.

The meshes of this tunic sometimes become the seat of a diffuse

serous infiltration (first described by Pott) constituting infiltrated hydrocele. Scarpa has described it as a simple œdema. Boyers recognizes it as a special form of hydrocele. Vidal doubts its existence, and Pitha never saw it. It is very rare. Curling believes it may occur in general anasarca, and saw it once complicating acute orchitis. It is mainly interesting from its liability to be confounded with omental hernia. The symptoms readily differentiate it from ordinary hydrocele.

Symptoms.—The swelling is uniform, round, and smooth, the infiltration occupying the meshes of the connective tissue; toward the base there may be one large cavity. There is no communication with the cavity of the tunica vaginalis propria. Enlarged inguinal glands or any obstruction to the return of blood from the testis, may act as causes. The swelling ceases, according to Pott, just where the vessels enter the testicle, the latter organ being isolated from the general swelling. The tumor becomes more cylindrical in shape in the supine position, but it does not disappear. Pressure makes it recede upward slightly, but it returns in any position of the patient. The penis never appears so much retracted as in simple hydrocele of equal size.

Diagnosis is with omental hernia. The latter, however, when reduced, will remain in the abdomen until the patient stands up, while the hydrocele will return in any position (Pott). The surface is firmer in epiplocele, and the swelling larger above than below. Hydrocele is not so entirely reducible, and receives no impulse on coughing. In irreducible epiplocele the diagnosis is difficult, at times impossible. Fluctuation can be felt at the bottom, but not at the top, of diffuse hydrocele. The enlargement extends to the ring. The shape is rather pyramidal, but can be somewhat altered by pressure.

Treatment.—Palliative punctures may be made at the bottom of the swelling. Large incisions are dangerous. Pott lost a case in this way. When a diagnosis with omental hernia is impossible, and an operation seems advisable, an exploratory incision may be practised.

ENCYSTED HYDROCELE OF THE CORD.

Cysts may form along the cord in the habenula (remains of peritoneal process from the abdomen to the tunica vaginalis) when its occlusion has been imperfect at certain points. The "hydrocèle en chapelet" of Cloquet is so formed. Again, cysts may be developed at any point along the cord, in its connective tissue, or in the meshes of the tunica vaginalis communis. They vary in size from a pea to a hen's-egg, or larger. They are usually tense, smooth, oval, the long diameter parallel to the axis of the cord, translucent, sometimes fluctuating, although the tension of the cyst usually makes this sign valueless. Pain is absent or insignificant. The cysts usually occur between the external abdominal ring and the testicle, but may also be found in the inguinal canal. In the latter situ-

ation it is sometimes impossible to distinguish such a tumor from incomplete inguinal hernia, without an exploratory herniotomy. When the cyst occupies this position, whether in the male on the cord, or in the female on the round ligament, unnecessary fear and anxiety are often excited in regard to hernia, and a truss or some other retaining bandage is usually applied. This always gives rise to pain, and considerably aggravates the trouble.

Treatment.—For large encysted hydrocele of the cord, injection, as in simple hydrocele, is the best treatment. Injection is inadmissible when the cysts are strung out and communicate, as the result would be necessarily imperfect. For small cysts, whether single or multiple, incision is the best treatment, care being taken to avoid wounding the constituents of the cord. Incision is indispensable for cysts situated within the inguinal canal, or where there is any doubt as to hernia. A fine seton may be used successfully in most cases external to the ring, where the cyst is small, the thread being left in till inflammation has consolidated the tumor. The patient need not keep his bed, but should wear a suspensory bandage.

HEMATOCELE of the cord is rare, but may occur in the same way as hæmatocele of the tunica vaginalis, usually after injury. Indications for treatment are the same.

CHAPTER XXIV.

DISEASES OF THE TESTICLE.

Inflammation.—Orchitis.—Causes.—Symptoms.—Pathological Changes.—Prognosis.—Treatment.—Epididymitis.—Frequency and Date of Appearance in Gonorrhœa.—Causes.—Symptoms.—Sterility as a Result of Epididymitis.—Diagnostic Table of Orchitis and Epididymitis.—Treatment of Epididymitis.

INFLAMMATION of the testicle may be limited to the epididymis (epididymitis), or may attack the secreting structure alone (orchitis). This has been explained by the fact that the arterial supply is different for the different constituents of the testicle. Sometimes both parts inflame simultaneously—as after injury. The secreting structure may become secondarily involved by a simple inflammation commencing in the epididymis, but the latter rarely suffers in connection with primary, true orchitis. The sub-serous connective tissue of the tunica vaginalis being in direct continuation with the connective tissue of the epididymis, in the vast majority of cases of epididymitis also becomes inflamed, constituting peri-orchitis, or acute hydrocele. Peri-orchitis, on the other hand, is rarer with inflammatory orchitis, since the dense structure of the tunica albuginea keeps an inflammation originating on one side of it from being rapidly transmitted to the other.