

patients refusing radical measures. Before undertaking any operation for hydrocele the testicle must be accurately located by the testicular sensation or the light test.

Tapping.—This is best performed with the aspirator (using needle No. 2, Dieulafoy). The skin is made tense, and the needle

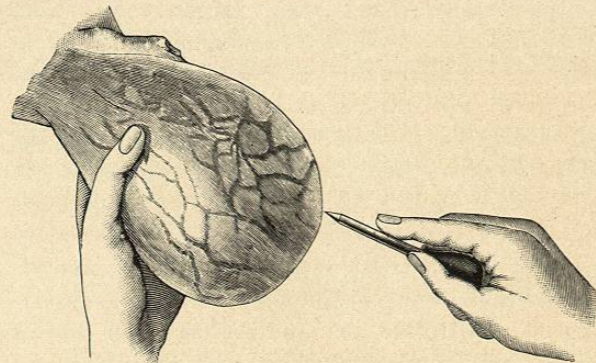


FIG. 168.—THE TAPPING OF A HYDROCELE OF TUNICA VAGINALIS. Showing finger resting on instrument and tumour compressed by hand.

plunged into the anterior part of the tumour, a little above the centre. The testicle should be carefully avoided (Fig. 168).

This simple operation will always efface the tumour at once, but in the majority of instances the sac will begin

to refill in a few days, and after some weeks, or at most months, will have regained its previous size. Sometimes the tumour never refills, and the palliative operation thus becomes radical. This rarely occurs, except in children.

Sir Astley Cooper mentions 2 cases of inflammation with sloughing, followed by death, in old men who took a long walk immediately after the operation. If the collection of fluid is very large, especially if the patient is old, it is well not to draw it all off at one sitting.

If the testicle has been wounded, the patient will complain of some pain, and blood will flow after the serum has been evacuated. To prevent the further effusion of blood into the sac it is advisable to strap the testicle immediately after the operation. Collodion is recommended by some authors to compress the testicle in this and other conditions, but its application to the thin and sensitive integument of the scrotum sometimes gives rise to exquisite and prolonged torture.

Acupuncture.—This consists in making the skin tense over the tumour, and penetrating the sac rapidly a number of times with a needle, which should be rotated as it is withdrawn. The serum, in cases so operated upon, gradually escapes into the scrotum (in twenty-four to forty-eight hours), where it does no harm, and whence it is absorbed.

Hydrocele in the adult will usually fill up after this operation, as

it will after tapping, but in children acupuncture often suffices, especially if the internal surface of the sac be scratched. If the cyst wall be thick and the tumour not translucent, neither tapping nor acupuncture will ever effect a cure. Healthy young patients can put on a suspensory bandage and resume work at once after tapping or acupuncture.

Galvano-puncture is useless.

Radical Treatment.—Of the many methods of treating hydrocele only two need be detailed—namely, injection and incision—including excision of the tunica vaginalis.

Injection.—All simple hydroceles which are translucent, no matter what their age or how great their size, are amenable to treatment and cure by injection. Injection is not applicable to cases where the contents of the tumour are sero-purulent or sero-sanguinolent, or where the tunica vaginalis is extensively thickened, with or without calcareous deposit. In such cases incision or excision should be resorted to. Hydrocele complicating syphilitic or tubercular testis should be let alone or treated by palliative tapping, as it is but rarely curable by carbolic injection. Generally the hydrocele accompanying syphilitic testicle disappears spontaneously as the testicle improves under internal medication.

Celsus alluded to the injection method of treating hydrocele, but Munro, of Scotland, Sir James Earle, and Sir James Ranald Martin, of England, are the names most prominently connected with it. Inflation with air has been employed, and the most varied substances used in injections, from distilled water to the strongest acids. Many substances have been employed successfully, such as spirits of wine, port wine, solutions of alum or sulphate of zinc, air, chlorin gas, lime-water (Curling), chlorid of zinc, bichlorid of mercury, tincture of iodine (Martin), and last and best carbolic acid. When the tumour is very large, it is best first to reduce its size by one or more tapplings, and finally to inject when the surface has become contracted by being relieved from prolonged tension.

If the hydrocele is found to contain more or less blood, injection should be postponed until some future tapping yields a comparatively limpid fluid. I have used many substances in injection for the radical cure of hydrocele, and have finally come to rely wholly upon pure carbolic acid. It is more certain, more speedy, less painful, and less dangerous than any substance I have ever used. To R. J. Levis,¹ of Philadelphia, belongs the credit of having introduced this substance to the profession as a proper injection in cases of simple hydrocele. I have adopted the suggestion with thanks, but think I have improved

¹ Trans. of the Med. Soc. of the State of Pennsylvania, 1881

the method. I have applied it with entire success to simple hydrocele, and to encysted hydrocele of the cord.

I have operated upon a child two months old and an old man past eighty, always successfully thus far, and in many instances I have effected a cure after the previous use of iodine by another surgeon had failed. In no case has any complication or serious reaction occurred at my hands. Pain is uniformly moderate. No symptoms of carbolic-acid poisoning have occurred. Upon one occasion I injected with entire success $2\frac{1}{2}$ drams into three separate cysts in the cords of an old gentleman over sixty. He was confined to the house only a few days. I have operated at the hospital clinic, and had the patient get up from the table and walk down smiling to the wards—an impossibility if iodine had been used. I have operated in New York and sent the patient home to Brooklyn in a carriage. The number of my operations I do not know, but they count by scores. I look upon the injection as entirely innocuous and harmless, but I usually ask my patient to remain in bed one day. If, at the end of that time, he can get up and go about, he may; if pain and swelling prevent, as they sometimes do, he must remain in bed until motion is possible, using a poultice and taking an anodyne if necessary. When the patient goes about he should wear a suspensory bandage. The tunica vaginalis always refills after the operation, and the testicle is generally quite tense and hot for a few days, though sometimes it remains cool and flabby and the patient suffers no pain from beginning to end of the treatment. If the fluid reaccumulates in any amount, a simple tapping between the third and the eighth day completes the cure. When this secondary tapping is performed it is cheering to note how the fresh adhesions creak under the finger after the fluid has been withdrawn.

My operative method is very simple. The instruments are a glass syringe holding 100 minims, having an ordinary hypodermic point (rather large and about 2 inches long)—this, and an aspirator. I fill the 100-minim syringe with pure carbolic-acid crystals deliquesced by heating. I plunge into the hydrocele the needle of this syringe detached, and watch for the oozing out of a drop of clear serum to announce the fact that the tip of this needle is well within the cavity of the tunica vaginalis. I now insert the aspirating needle and rapidly exhaust the hydrocele, *if possible to its last drop*, an important measure, that the carbolic acid may not be diluted. Meantime the hypodermic needle first introduced has not been disturbed. When all the serum has been removed by the aspirator, I screw upon the hypodermic needle first introduced the 100-minim syringe, and rapidly inject from 10 to 100 minims of

the pure acid, according to the size of the hydrocele, immediately withdrawing the needle, and leaving the acid within the cavity of the tunica vaginalis. This little operation is clean, almost painless, absolutely bloodless. No anesthetic is required. The testicle is manipulated a moment to insure the diffusion of the acid, an anodyne is left to be taken if required, and next day, if there is only moderate pain and swelling, the patient gets up and continues about. If the reaction has been considerable, he remains in bed for a few days with the testicle supported, and using such anodyne or local soothing measures as his surgeon thinks it proper to order. If the tension is great secondary aspiration gives relief.

The advantages of injection over any form of incision are manifest if only success may be anticipated. The failures so frequently reported are due to three causes—viz.:

1. Application of injection to cases incurable by this method—i. e.:
 - a. Most symptomatic hydroceles.
 - b. Some spermatoceles.
 - c. Hydroceles with inflamed, indurated, or calcareous walls.
 - d. Hematoceles and chyloceles.
2. Errors of technic, notably—
 - a. Endeavouring to cure too large a hydrocele. If the sac contains more than 8 ounces its contents must be reduced by one or more preliminary tapplings.
 - b. Incomplete evacuation. This I believe to be the most frequent cause of failure. To insure success the last drop must be squeezed from the vaginalis.
 - c. Injection of the carbolic acid into the cellular tissue. I need scarcely insist upon this point.
 - d. Failure to perform the secondary aspiration which is sometimes part of the cure.
3. The use of iodine instead of carbolic acid. The iodine injection is painful and uncertain, while the carbolic acid, being a local anesthetic, produces only a momentary tingling and, at my hands, has been a certain cure.

The Open Operation.—This operation is indicated when there is any possibility of hernia, when the case is not suitable to injection, or when injection has failed. Three forms of operation are employed—viz., incision, excision, and eversion.

Incision (Volkmann's Operation).—The sac is incised vertically after the position of the testicle has been ascertained, and its cut edges are sutured to the skin. The surface of the sac is swabbed with pure carbolic acid and drained. The healing of the wound requires an interminable time, and the operation has been dropped in favour of

Excision (Bergmann's Operation).—The skin and fascia are divided down to the surface of the tunica vaginalis and dissected back from it, great care being taken not to injure the sac (Horwitz¹). The sac is then opened, its contents allowed to drain away and the entire parietal layer snipped off. The visceral layer (the part adherent to the testicle) is swabbed over with pure carbolic acid and the incision closed over a drainage-tube. Complete dissection of the parietal layer is a tedious procedure, and yet recurrence has followed the operation on account of inattention to this detail. A simpler operation therefore is

Eversion of the Sac.—The sac is bared and opened as in Bergmann's operation, and all the parietal layer of the vaginalis that can be readily freed is excised. The testicle is then completely extruded from the scrotum, and the tunica, thus turned inside out, is held so by a few sutures passed behind the testis. The cavity of the vaginalis having thus been obliterated beyond peradventure, the testicle is replaced and the wound closed without drainage. Unless traumatic orchitis ensues the cure should be complete within ten days.

CONGENITAL HYDROCELE

In congenital hydrocele there has been no obliteration of the peritoneal prolongation (funicular process), and, instead of the usual solid, thin, fibro-cellular cord (Scarpa's habenula), there is an open canal making the cavity of the tunica vaginalis continuous with that of the peritoneum (Fig. 169). Congenital hydrocele is idiopathic, traumatic, or perhaps due to gravitation into the sac of an excess of the peritoneal fluid. It occurs in infancy.

Diagnosis.—The diagnosis is usually easy, but in certain cases there is some danger of confusion with hernia.

CONGENITAL HYDROCELE	HERNIAL TUMOUR
1. Appears soon after birth.	1. May appear at any time.
2. Tumour continues into inguinal canal.	2. Same.
3. Impulse on coughing.	3. Same.
4. Flatness on percussion.	4. Resonance on percussion.
5. Always reducible at an even rate, more or less rapidly according to size of opening; no jerk; no gurgle.	5. If reducible, goes back suddenly, with a gurgling sound.
6. Testicle, entirely obscured by the tumour, reappears on the reduction of the latter.	6. Testicle can usually be made out as a distinct lump.
7. Feel soft, not doughy; no gurgling.	7. Doughy feel—perhaps gurgling—on manipulation.
8. Always translucent.	8. Never translucent.

¹ J. of Cut. and Gen.-Urin. Diseases, 1896, xiv, 343.

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. Congenital hydrocele may be found in adults, but is rare. Horwitz met with it once in 110 cases, but Kocher estimates that it occurs 4 times in every 100.

Treatment.—A well-fitting truss must be applied, which will usually obliterate the neck of the sac and is Nature's cure. The fluid should be absorbed in from two to eight months after closure of the neck of the sac. If not, the case may be treated as infantile 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, at the same time making firm pressure at the ring. This treatment, though sometimes successful, has always been followed by fatal peritonitis. If the neck of the sac cannot be closed the case may be submitted to herniotomy in later life.

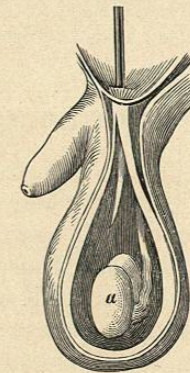


FIG. 169.—CONGENITAL HYDROCELE.

INFANTILE HYDROCELE

Infantile hydrocele is far more common than the congenital variety. Horwitz met with 22 cases. The hydrocele occupies the tunica vaginalis and the funicular process up to the inguinal canal, where it is shut off from the general peritoneal cavity (Fig. 170). It resembles a congenital hydrocele, but is quite irreducible.

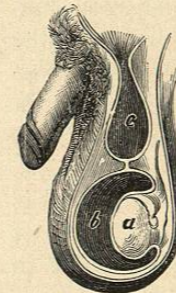


FIG. 170.—INFANTILE HYDROCELE.

Treatment.—These hydroceles may get well spontaneously, and applications of iodine, methyl salicylate, or 50% guaiacol encourage resorption. Acupuncture or tapping repeated once or twice usually cures. Carbolic injection is a difficult operation on an infant, though it insures a cure. It is best performed by injecting the carbolic (0.5 gramme) through the same hypodermic needle used to withdraw the fluid. Incision is quite uncalled for.

Abdominal Hydrocele (Bilocular hydrocele, hydrocèle en bis-sac).—This is a very rare variety of infantile hydrocele, in which the hydrocele is partly in the scrotum, partly in the abdomen. The abdominal portion, which may grow to an enormous size, usually lies between the general peritoneal cavity and the anterior abdom-

inal wall. Cures have been reported from simple drainage, injection, and incision, and the choice of treatment would depend upon the features of each individual case. Villeneuve¹ has collected 18 cases and Jacobson records several others.

MULTILOCULAR HYDROCELE OF THE SPERMATIC CORD

Multilocular hydrocele of the cord was first described by Pott and Scarpa as diffuse hydrocele of the cord, and most authors retain that title. The pathogenesis of this rare affection is habitually misunderstood. Kocher,² however, after a critical survey of the literature, concludes that an actual diffuse hydrocele can be due only to a rupture of some hydrocele or spermatocele, a temporary accumulation of fluid in the connective tissue about the cord. All other cases he classifies under five heads, viz.:

1. Echinococcus cyst.
2. Spermatocele.
3. Encysted hydrocele of the cord subdivided into loculi by adhesive inflammation.
4. Cysts of fetal remains (Müller's Duct, Wolffian Body, Organ of Giralès).
5. Cystic lymphangioma.

He cites several examples. This classification certainly merits further investigation.

Symptoms.—The symptoms are characteristic, whatever the nature of the disease. The tumour extends about the cord from the testis up or into the spermatic canal. It is smooth, rounded, translucent, and boggy rather than fluctuating, though a difference in this regard may be made out in different parts of the tumour. It may be partly reducible. There is a slight impulse on coughing.

Diagnosis.—The diagnosis from encysted hydrocele of the cord is established by the boggy feel and the irregular, indistinct outlines of the tumour. In fact it resembles an incarcerated omental hernia in everything but its translucency and its fluctuation in places. Incision may be required to establish the diagnosis.

Treatment.—The tumour may safely be let alone. To cure it multiple puncture and carbolic-acid injection may be tried, unless it is a lymphangioma. Incision has usually been employed. Pott's classical case of lymphangioma died of lymphorrhagia after incision.

¹ Mercredi méd., 1890.

² *Op. cit.*, pp. 170, 180.

ENCYSTED HYDROCELE OF THE CORD

There are three conditions commonly grouped as encysted hydrocele of the cord, viz.:

1. Hydrocele of the processus funicularis.
2. Pedunculated cysts of the epididymis.
3. Hydrocele of an old hernial sac.

1. **Hydrocele of the Processus Funicularis.**—The sac is shut off below from the tunica vaginalis, above from the peritoneum. The hydrocele may be single or multiple (*hydrocèle en chapelet*). Usually single, it presents the features of a hydrocele of the tunica vaginalis, but is situated above the testicle and about the vas. Sometimes it may be reduced into the inguinal canal, but never into the abdomen. Although it usually occurs in children, I have twice seen it in the adult.

2. (See below.)

3. **Hydrocele of an Old Hernial Sac.**—This occurs in the process of peritoneum left behind by a hernia which has been reduced and the neck of the sac closed, either spontaneously or by the use of the injection cure for hernia. The hydrocele is usually mistaken for a recurrence of the hernia, but is translucent unless its walls are thickened.

Treatment.—For large encysted hydrocele of the cord injection is the best treatment. For small cysts, as well as for multiple and multilocular cysts, 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.

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

INGUINAL HYDROCELE

Hydrocele about a retained testis is one of the indications for operation upon that organ (p. 708).

CYSTS OF THE EPIDIDYMIS—SPERMATOCELE

This condition, commonly known as spermatocele or encysted hydrocele of the testicle, is a collection of fluid "contained in a cyst or cysts, distinct from but close to the cavity of the tunica vaginalis" (Jacobson). These cysts are developed in and about the epi-

didymis, very exceptionally in the testicle itself, and should be classified as epididymal cysts. Two classes may be recognised.

1. Small cysts developing (usually) about the epididymis.
2. Large cysts originating within the epididymis.

1. The *small cysts* are rarely encountered before middle age, while they are very common in later life. They usually project more or less distinctly from the head of the epididymis, often into the tunica vaginalis, where their rupture is among the possible causes of hydrocele, and their detachment the origin, perhaps, of calculi (p. 758). They do not attain any notable size; they rarely contain spermatozoa—in short, they have little clinical significance.

2. The *large cysts* are found in the epididymis rather than projecting from it. They usually appear before middle age and commonly contain spermatozoa. They are often multiple and grow between the epididymis and the testicle, separating them and unravelling the former. Thus they form irregular fluid tumours about the top of the gland. Exceptionally, the cysts are pedunculated and grow upward, simulating hydrocele of the cord. They rarely contain more than 4 ounces, though Curling drew off 32 ounces from one individual and 40 ounces from another. Jacobson mentions a case from whose right side 49 ounces were drawn, and 58 from the left. Frost's¹ case yielded 52 ounces. The nature of these large cysts is identified by the fact that the fluid is milky and swarming with spermatozoa.

Pathogenesis.—Since the smaller cysts are met with later in life than the larger, and less frequently contain spermatozoa, many authors attribute the larger cysts to persistent fetal remains, such as the vasa aberrantia, the hydatid of Morgagni, or the paradidymis (Organ of Giraldès), and the smaller cysts to dilatations of the seminal canals. The recent tendency, however, has been to discredit the claims of the fetal elements, and to attribute the earlier and larger cysts to dilatation of the vasa efferentia or of the epididymis itself behind an obstacle more or less impervious,² and the later, smaller tumours to a cystic enlargement of the tubules due to senile changes after the organ has passed the height of its activity.

The presence of spermatozoa in the cysts is explained by those who cling to the theory of embryonal rests upon the ground that the

¹ Lancet, 1878, ii, 483.

² Griffiths (J. of Anat. and Phys., 1893-94, xxviii, 107) maintains that, like hydronephrosis, these dilatations are caused by partial obstruction due, in this case, to catarrhal inflammation. He also maintains that the hydatid of Morgagni is always a solid body, never cystic, and that there is no evidence that embryonal remains are in any way connected with spermatocele.

cyst has burst into the epididymal canal. *The absence of spermatic elements* is explained by those of the opposite camp on the ground that the cysts become occluded from the main channel and their seminal elements gradually disintegrate. The communication between a cyst and a seminal duct has been observed a number of times.

Symptoms.—The *small cysts* are occasionally met with in older men. They produce no symptoms.

The *large cysts* have 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 tumour 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 constantly, however, 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 the cyst which is notched above. The walls are usually thin and tense, so that fluctuation cannot always be distinguished, but translucency is usually present. The fluid may be dark-coloured or very milky, somewhat masking translucency. The patient is prone to become hypochondriacal, and to imagine that his sexual appetite and power are failing.

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

Diagnosis.—The heart shape of the cyst, though pathognomonic when present, is not constant. The diagnosis is usually made by the irregular shape and position (above and behind the testicle) of the tumour and the presence of fluctuation over irregular areas. Aspiration usually completes the diagnosis by withdrawing a milky fluid full of spermatozoa. If the fluid is limpid it may be distinguished from hydrocele fluid by its neutral reaction, its low specific gravity (less than 1.010), and its low percentage of albumin (about $\frac{1}{2}\%$ against 4% to 7% in hydrocele). When hydrocele and spermatocele coexist the latter is not discovered until the former is tapped.

Treatment.—A cure usually results from aspiration and injection of carbolic acid through the same needle. If this fails the cyst should be excised. There is no object in disturbing small cysts.