AN

INAUGURAL DISSERTATION

ON

HYDROCELE.

SUBMITTED TO THE EXAMINATION OF

THE REV. JOHN EWING, S. T. P. PROVOST;

THE

TRUSTEES AND MEDICAL FACULTY

OF THE

UNIVERSITY OF PENNSYLVANIA,

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MEMBER OF THE

MEDICAL AND CHEMICAL SOCIETIES

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THIS

DISSERTATION

IS

RESPECTFULLY INSCRIBED

TO

PHILIP S. PHYSICK, M. D.

ONE OF THE SURGEONS AND PHYSICIANS

TO THE

PENNSYLVANIA HOSPITAL,

AS A TRIBUTE OF GRATITUDE AND ESTEEM;

BY HIS SINCERE FRIEND,

AND AFFECTIONATE PUPIL,

SAMUEL JONES.

PREFACE.

THE Author of the following Treatiſe is of opinion that in duty to himſelf he ſhould premiſe, that unavoidable buſineſs engaged his attention, during by far the greateſt part of the time allotted to Graduates in Medicine for preparing their Theſes. He therefore particularly claims the indulgence of medical Gentlemen, and of others into whoſe hands this may come, for any inaccuracies that may appear in this his firſt public performance.

A

DISSERTATION

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HYDROCELE.

IN the following Pages I ſhall endeavour to give a conciſe view of the Diſorder generally known by the term *Hydrocele*, according to the preſent acceptation of the word. The narrow limits to which a piece of this ſort is generally confined, will unavoidably prevent a full diſcuſſion of all the particulars relating to that Diſorder; I ſhall therefore content myſelf with a relation of thoſe which appear to be the moſt important.

The Diſorder we are now treating of, was by the Ancients included under the general term Hernia, or Rupture. If the tumor in the Scrotum, or along

the Spermatic Cord, was formed by a protruſion of any of the abdominal viſcera, it was called a true Hernia; if it contained a fluid, it was called a falſe Hernia, on the ſuppoſition that the fluid came from the Abdomen, between which and the tumor they believed there was a direct communication. Moderns however, being better acquainted with the ſtructure of theſe parts, are convinced that ſuch a communication ſcarcely ever exiſts, unleſs for a ſhort time after birth.

The term *Hydrocele*, being derived from ὑδωρ *aqua* and κηλη *tumor*, might, from the Etymology of it, be applied with propriety to a watery tumor ſituated on any part of the body; but Surgeons have agreed to denominate by it, ſuch collections of water only, as are found in the Scrotum, or along the courſe of the Spermatic Cord.

For the better underſtanding the relative ſituation of the different ſpecies of this Diſorder, it appears neceſſary, before we proceed any further, to give a ſhort deſcription of the parts concerned, and the changes they undergo a ſhort time before birth.

The Teſtes in the Fœtus, till about the eighth month, are not found in the Scrotum as in the Adult; but lay in the Abdomen a little below the kidneys, on the Pſoæ muſcles. They are covered with the Peritoneum as the reſt of the abdominal viſcera, except at their back part, where it is reflected from them; at which place their blood-veſſels, nerves, &c. enter. The two ſpermatic arteries ariſe from the Aorta, between the Emulgent and inferior Meſenteric. The veins empty, the right into the Vena Cava, the left into the Emulgent. When each artery has nearly reached the Teſtis it divides into ſeveral branches, one ſupplies the Epididimis, the others enter the Teſtis, and are there curiouſly convoluted round each other, forming a conſiderable part of the body of it. In theſe convolutions the Semen is ſecreted, and carried off by the Vaſa Efferentia, ten or fifteen in number, which meeting together form the ſuperior and larger end of the Epididimis; the ſmall veſſel they form when united, by innumerable windings, makes up the ſmaller end. This veſſel, after it leaves the Epididimis, is called Vas Deferens. The blood which is not uſed in forming Semen or

nouriſhing the Teſtes is returned by the Spermatic veins.

To the lower end of each Teſtis and Epididimis is attached the largeſt end of a Ligament which is ſomething of the ſhape of a Pyramid, called Gubernaculum Teſtis. This Ligament runs down behind the Peritoneum to the Abdominal Ring, through which it paſſes, and ſtill diminiſhing in diameter, it deſcends into the Scrotum, and is united to the lower part of it. This Ligament ſerves as a director to the Teſtis in its deſcent; and the largeſt end may be uſeful in dilating the Abdominal Ring.

The Teſtes, in moſt caſes, deſcend into the Scrotum about three or four weeks before birth; in ſome inſtances ſooner, in others later: in a few, they remain in the Abdomen, or at leaſt within the Abdominal Ring, through the whole courſe of life; but theſe laſt may be conſidered as *Luſus Naturæ.*

The peritoneal covering, which the Teſtes have whilſt in the Abdomen, retains its firm attachment to them during their deſcent, and afterwards; and

forms their immediately inveſting membrane called Tunica Albuginea. As the Teſtes deſcend, they carry along with them that part of the Peritoneum, which, in the Abdomen, was reflected from them: this muſt neceſſarily form an additional covering to them. Immediately after their deſcent, that proceſs of the Peritoneum which they carried down with them forms a canal leading to the Abdomen; therefore about the time of Birth, ſome of the abdominal viſcera may deſcend into the Scrotum, without any part being ruptured; in which caſe they will be in contact with the Tunica Albuginea: this is called Congenial Hernia. In this ſtate of the parts, water may deſcend into the Scrotum; or if collected there, may be preſſed up into the Abdomen. But this is not long the caſe; for, ſoon after the Teſtis has reached its deſtined ſituation, the upper part of the canal begins to contract, and in a ſhort time it is entirely obliterated as far down as the Teſtis. The lower part which looſely invelops the Teſtis is called Tunica Vaginalis; which does not adhere except at its poſterior part, where it is reflected from the Tunica Albuginea. The Teſtes, and their inveſting membrane juſt deſcribed, are contained in what is

called the Scrotum, which conſiſts of the common integuments, and a looſe cellular membrane called Dartos. This membrane was formerly ſuppoſed to be muſcular, but that opinion is now generally conſidered as erroneous. For the muſcularity, evident in this part, is to be aſcribed to the Cremaſter; which appears to be a proceſs of the Obliquus Internus Muſcle. The cells of this membrane, which contain no adipoſe matter, freely communicate with each other, and with thoſe of the ſame ſubſtance which is found extending ſo generally over the whole body.

The courſe of the Spermatic Cord well deſerves a few remarks, as it has been differently deſcribed by different Authors. After it emerges from the Abdomen, Mr. Pott ſays it paſſes *under* the Tranſverſalis and Obliquus Internus Muſcles, and not *through* them, as ſome will have it. From ſome diſſections which I lately had an opportunity of making, I am fully convinced Mr. Pott is right. After the Cord paſſes under theſe Muſcles, it penetrates through a fiſſure in the tendon of the Obliquus Externus, and then extends down to the Teſtis. The fiſſure juſt ſpoken of is called the Abdominal Ring.

Along the whole courſe of the Spermatic Proceſs we find a cellular membrane inveſting it, and connecting its veſſels. This membrane was formerly called Tunica Vaginalis Vaſorum Spermaticorum, but very improperly, as it does not form a ſheath for the Cord. It is now moſtly denominated Tunica Communis: the cells of which have a free communication with each other, although not with the general cellular membrane.

I have been more prolix in the deſcription of the parts concerned, than I at firſt intended; but if I have in any meaſure conveyed a juſt idea of their ſtructure and relative ſituation, I may with propriety be the more conciſe in what remains.

We frequently find a collection of water in the cells of the Dartos, diſtending the whole Scrotum. Mr. Bell and others have treated of this complaint as one kind of Hydrocele, but I think improperly; as it is only ſymptomatic of general anaſarca, and not cauſed by local diſorder, or curable by local remedies. However, as the Surgeon is often called upon to afford temporary relief, it may not be amiſs to

deſcribe its appearance, and the palliative cure. The whole Scrotum is equally diſtended, the Raphe or Seam is found in the middle; upon being preſſed with the fingers, pits are formed in it, which remain for ſome time; the Teſtes lay in the middle of the tumor; the Spermatic Cord can be eaſily felt, and is of its natural ſize. A ſurgical operation, in this caſe, can but prove a palliative remedy. Either an inciſion, or punctures are to be made through the integuments into the loaded Dartos; and the water will ſoon be drawn off. The latter method, viz. by punctures, as it is as effectual, is much preferable to that by inciſion; the wounds being ſo much ſmaller, there is leſs danger of mortification. We ſhould always recollect, when operating on membranous parts, that they poſſeſs the power of reſtoration in a much leſs degree than thoſe that are muſcular. This ſhould induce us to injure them as little as poſſible ſo as to accompliſh the end in view.

Not conſidering a collection of water in the Dartos a ſpecies of Hydrocele, we ſhall have three kinds:

1ſt. An effuſion of water into the cells of the Tunica Communis;

2d. A collection of the same fluid in a cist formed either in the Tunica Communis, or in the Dartos; perhaps one of their cells enlarged; and

3d. A superabundant quantity of water in the Tunica Vaginalis. Each of these three kinds is mostly a local disease, and may be cured by local treatment. The cause of each, as of Dropsy in other parts, must depend upon increased effusion or diminished absorption. I am inclined to think the former, viz. increased effusion, is by much the most frequent cause. I can indeed conceive, that a tumor in the course of the absorbent vessels going from the part, may obstruct the passage of a fluid through them; but I suspect it is very seldom the cause of the accumulation. Neither do I think that a primary deficiency of action in the Absorbents is to be considered as the cause. But that it is owing to an inflammatory action in the Arteries of the part, causing an increased secretion, and consequently effusion. We know that inflammatory action will have this effect, as we frequently find Hydrocele produced by local injury. And Doctor Rush, the ingenious Professor of the Institutes of Medicine, to whom I thus publicly acknowledge myself indebted

for many invaluable principles in Medicine, has taught us, that inflammatory action in the Arteries will cauſe Dropſy: hence the propriety and great ſucceſs of bleeding, purging, &c. in curing it.

It is obſervable I differ from Authors who have written on this diſorder, in mentioning the part in which the ciſt may be formed. They tell us it is always formed in the Tunica Communis; and that therefore the Teſtis is found below the tumor. I am however fully convinced that this opinion is erroneous. I lately ſaw a caſe, which might be called a poſterior Hydrocele, where the collection of water was in a ciſt, formed in the Dartos. The Teſtis was eaſily diſtinguiſhed to be on the anterior ſuperior part. This could not be the caſe if the ciſt was formed in the Tunica Communis; or if the water was collected in the Tunica Vaginalis. The puncture, through which the water was evacuated when the operation for a radical cure was performed, was made in the poſterior inferior part, for the ſake of avoiding the Teſtis; and the whole ſucceeded happily. And indeed, reaſoning from analogy, I cannot ſee why the ciſt ſhould not be formed in the cellular

ſtructure of the Dartos, as well as in that of the Tunica Communis.

The Hydrocele of the cells of the Tunica Communis is a diſeaſe which ſeldom appears. When it does occur, it may be diſtinguiſhed from the other ſpecies by the following Characteriſtics: the Scrotum feels heavier on that ſide than on the other, and hangs ſomewhat lower; the Teſtis, of its natural ſize, can readily be felt below the tumor; the whole ſpermatic proceſs is enlarged, but more below than above; the pain is deſcribed as being in the loins, and not in the tumor. Sometimes the ſwelling extends up within the Abdominal Ring; in that caſe the ring is found to be ſomewhat dilated. When the tumor is ſmall, the inconvenience is too trifling to induce the Patient to ſubmit to a ſurgical operation for its removal. But when it is large, the diſagreeable appearance and pain which it produces will oblige him to ſeek for relief. This can only be had from Surgery. Punctures will produce temporary eaſe, by evacuating the water; but it will ſoon collect again. And a radical cure can only be expected from a free inciſion, made the whole length of the tumor. The

wound is afterwards to be lightly dreſſed; and if much inflammation ſhould ſucceed, bleeding, purging and a low diet will be proper, together with a poultice applied to the part.

Inciſted Hydrocele may be divided into three kinds, according to the different part where the ciſt is found; in one it is in the Tunica Communis, in another, in the Dartos, and in the other the Tunica Vaginalis forms it. The two former, however, we ſhall conſider as one ſpecies.

The preternatural ciſt in Hydrocele, as was before obſerved, may exiſt either in the Tunica Communis or in the Dartos. This ſpecies may eaſily be diſtinguiſhed from a collection of water in the cells of theſe membranes, by being more circumſcribed, and by not retaining an impreſſion of the fingers. But it is more likely to be confounded with Hernia, or Hydrocele of the Tunica Vaginalis. From the former we can diſtinguiſh it by the diſorder having come on gradually; by feeling the upper part of the proceſs free, and of its natural ſize; by the tumor not being increaſed by coughing, ſneezing, &c. and by its

being incapable of reduction. From the latter, by the Teſtis being much eaſier diſcovered, and the whole tumor having a more uniform hardneſs.

This diſorder afflicts children much more frequently than Adults; in the former, bleeding, purging and a low diet will often ſpeedily effect a cure; in the latter they will but ſeldom ſucceed.

I had a caſe of inciſted Hydrocele under my own care laſt ſummer, in a boy of ſeven or eight years of age. It yielded in five days to one bleeding, three or four purges, reſt and a low diet.

Puncture with a lancet will frequently, in children, cauſe ſo much inflammation, that adheſion will take place in the ciſt, and a radical cure be effected; this, however, is hardly ever the caſe in Adults. I ſhall defer further treating on methods of effecting a radical cure in this kind of Hydrocele, till I have deſcribed the remaining ſpecies, as I think they are both to be treated in the ſame way.

The cavity of the Tunica Vaginalis is naturally kept moiſt by a ſmall quantity of a pellucid fluid; if this ſhould be increaſed by any means it will conſtitute the third ſpecies of Hydrocele. This diſorder can be diſtinguiſhed from Hernia, by the ſpermatic veſſels being eaſily felt in the groin; by its coming on more ſlowly, and not being capable of reduction. It will not retain the impreſſion of the fingers like the anaſarcous ſwelling of the Scrotum; and thereby can be diſtinguiſhed from it. In an Hydrocele of the Tunica Vaginalis, the Teſtis is always found in the poſterior part of the tumor; and ſome tranſparency is frequently obſervable, as well as fluctuation *.

The cure of the Hydrocele of the Tunica Vaginalis, and of the inciſted Hydrocele laſt mentioned, may be divided into palliative and radical. The former may be effected with a common bleeding lancet, or with a trocar. The perforation ſhould be made in a depending part of the tumor, and at ſo great a

* I ſhall omit treating of Hæmatocele, Hernia Humoralis, Varicocele, Scirrhus, Cirſocele, Sarcocele, and ſuch other diſorders to which theſe parts are liable; although Authors generally include them in a treatiſe on Hydrocele. But they could not be compriſed within the narrow limits of a Theſis.

diſtance from the Teſtis as to avoid the danger of wounding it. The operation ſhould be performed as early in the diſeaſe as the quantity of water will admit. Upon this plan there will be a greater chance of effecting a permanent cure; which the inflammation cauſed by the puncture will ſometimes accompliſh. But in moſt caſes the relief will be but temporary; and we ſhall be obliged to have recourſe to means for a radical cure.

There have been various means deſcribed, as effectual in radically curing this diſorder: the uſe of the Tent, Canula, Ligature and Cautery I ſhall omit deſcribing, as they are now very generally diſcarded; and ſhall only treat of the Inciſion, Cauſtic, Seton and Injection, which are ſome of the moſt modern and uſeful. Each of theſe have had their ſtrenuous advocates. Mr. Elſe preferred the *Cauſtic*, Mr. Bell ſtrongly recommends the *Inciſion*, and Mr. Pott expreſſes himſelf thus, "I am, from very frequently repeated experience, convinced, that the cure by the *Seton* is by much the leaſt hazardous, painful, or fatiguing, as well as the moſt expeditious and certain of any yet propoſed." Mr. Earle, in a late edition

of Pott's Works, has adviſed the uſe of *Injection:* and from the univerſal ſucceſs which I have ſeen attend it in Dr. Phyſick's practice; the little inconvenience, pain and confinement which it cauſes; and the certainty of its proving effectual; I am induced to believe it is far preferable to any of the other means.

The end, that each method of performing a radical cure is deſigned to produce, is an adheſion of the ſides of the cavity, ſo as to entirely obliterate it. And as it is a principle in the animal economy that two inflamed ſurfaces kept in contact will adhere; our object ſhould be to produce ſuch inflammation in the internal ſurface of the ciſt, that adheſion will be effected. It is a favourable circumſtance for the patient, that a leſs degree of inflammation will produce adheſion, than takes place in ſuppuration.

Either of the methods to be treated of will produce the requiſite inflammation, but as I greatly prefer that by *Injection*, I ſhall deſcribe it firſt; and compare the other methods with it, when treating of each.

A puncture is to be made into the tumor, in a part that is depending, and sufficiently distant from the Testis. I am convinced that it is better to make the puncture with a broad lancet than with a trocar; for it will cause less pain, will heal much sooner, and there will be less danger of wounding the Testis*. Immediately after withdrawing the broad lancet, as the water flows out a canula is to be introduced, and one end of the incision grasped between the thumb and fore finger, so as to prevent the water from passing, except through the canula. After the water is all drawn off, wine of 98° of Fahrenheit is to be injected, and left in till the patient complains of pain; which will require perhaps from three to six minutes. Madeira wine I think equal to any for an

* These three particulars will appear evident upon a little reflection. A thin lancet will surely cause less pain than a thick stilette; the incised wound it makes will certainly heal much sooner than a punctured wound made by a trocar; and a sharp lancet will be far less liable than the stilette, to indent the integuments so much before it penetrates, and to go in so much with a jerk, as to be in danger of wounding the Testis on entering. It has been objected to this practice, that a difficulty may attend the introduction of the canula after the lancet is withdrawn. But I think if the puncture is made of a proper size it can easily be accomplished. Thus much at least I can say respecting it, that in the dexterous steady hand of Dr. Physick, it is a thing very practicable.

injection, as it is conſiderably uniform in ſtrength. It may be uſed undiluted, unleſs it is probable the patient is of a peculiarly irritable habit; in which caſe ſome water may be added. After the injection has cauſed the pain requiſite, it muſt be evacuated, and a piece of ſticking plaſter applied to the orifice. The Scrotum ſhould be ſuſpended by a T bandage, and the patient kept quiet for a few days. Inflammation will ſoon take place, and in a little while come to its height, which is generally very moderate: if, however, the ſwelling and pain ſhould be conſiderable, (which is but very ſeldom the caſe,) a warm bread and milk poultice ſhould be applied, laxatives adminiſtered, and the antiphlogiſtic regimen ſtrictly obſerved. In moſt caſes the ſwelling in a ſhort time begins to ſubſide, and in a few days the inflamed ſurfaces of the ſack adhering, the inflammation with all its concomitant ſymptoms going off, a radical cure is obtained *.

* Mr. Hunter was induced to prefer filling the ciſt with poultice, knowing that as the ciſt contracted, the poultice would be gradually expreſſed; and finally the cavity entirely obliterated. This plan has a great deal of plauſibility in it; but it is ſurely much more tedious, painful and loathſome than that by *Injection*.

The operation by *Inciſion* is performed by making a puncture with a lancet in the lower end of the tumor, and introducing the fore finger of the left hand, on which the integuments muſt be cut, ſo as to lay open the ſack nearly its whole length. Or a Director may be introduced at the orifice made by the lancet, and paſſed up to the upper end of the cavity, on which the inciſion may be made. This operation, it is true, will prove effectual, and is eaſily performed; but it is tenfold more painful than that by Injection, and will require as many weeks to heal, as that will days.

The operation by *Cauſtic* is worſe than that by Inciſion, as it is more painful, dangerous and tedious. A layer of paſte Cauſtic of about half an inch in breadth, and nearly the length of the ciſt, is confined on the integuments by ſticking plaſter, till it produces its effects. It will however but ſeldom penetrate into the cavity of the ſack, and muſt afterwards be aſſiſted by the Knife. It then is nearly in the ſame ſtate as that by Inciſion, only worſe, as the edges of the wound are more inflamed and uneven.

I ſhall, in the laſt place, deſcribe the operation by means of a *Seton*. Perhaps the beſt plan of operating is to have a trocar ſomewhat larger than common; which is to be plunged into the inferior part of the ciſt, and then the ſtilette withdrawn. Before the water runs off, a canula, which is at leaſt an inch longer than the ciſt, and of a proper ſize, is to be introduced through the canula of the Trocar, and the upper end of it paſſed up to the ſuperior part of the ciſt, and preſſed againſt the place in the integuments where the Seton is to be brought out. Then a ſtraight round needle with a ſharp point, armed with a Seton, is to be inſerted through the canula, and paſſed out through the integuments above. A ſufficient quantity of the Seton being brought out at the upper orifice, and the canulæ withdrawn, the operation will be completed.

Although Mr. Pott has much improved and highly recommended this his favorite plan of operating, yet I think when we reflect on the neceſſary conſequences of a rough extraneous ſubſtance being ſo long retained in contact with ſo ſenſible a membrane; the adhe-

ſions which frequently take place between it and the ſides of the ciſt; the conſequent diſtreſſing pain cauſed by moving it; and the partial affection it produces, which muſt neceſſarily be very violent to become ſufficiently general; we ſhall be induced to conſider it by no means as eligible as that by *Injection.*

FINIS.