The testicle; its arrestment in its migration through the inguinal canal; the diseases it is subject to in that situation; & the method suggested for its restoration to its natural destination.

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The testicle; its arrestment in its migration through the inguinal canal; the diseases it is subject to in that situation; & the method suggested for its restoration to its natural destination.

The migration of the testicle from the neighbourhood of the kidney in the cavity of the abdomen to its destination in the scrotum was first fully described by John Hunter.

He was induced to study the subject after reading a paper by Baron Haller on Congenital Hernia, & on observing in a foetus of 7 months duration the presence of the testicles in the abdomen.

His investigation showed that the testicles are formed in the abdomen, close to the lower border of the kidney, in front of the psoas muscle & at the side of the rectum.

(1) vide John Hunter's Animal Economy by Palmer, subject "The situation of the testis in the foetus".

He also discovered that they gradually pass towards the internal inguinal ring, which they enter about the 7th month, traverse the canal & pass out of it, into the scrotum at the time of birth.

He described the anatomical relations of the testicles to the peritoneum, the inguinal canal & scrotum; and also what he calls "the gubernaculum testis", about which he remarks, "it is hard to say what is the composition of this ligament; it is certainly vascular & fibrous, & the fibres run in the direction of the ligament itself." (1). he described this ligament as passing from the testicle while still situated in the abdomen to the bottom of the scrotum where he says "its lower & slender extremity is lost in the cellular membrane of the scrotum". He also described the musculus testis, which "appears to be composed of the lower fibres of the obliquus internus & transversalis muscles in the foetus, turning upwards

(2) Vide Curling on "Disease of the testes"
4th Ed.

& spreading upon the anterior surface of the gubernaculum, immediately under the peritoneum; it appears to be lost on the peritoneum, a little way from the testicle". He however did not believe either of these structures were in anyway accountable for the migration of the gland into the scrotum, but only that the testicle was guided into the scrotum by the gubernaculum.

Many nevertheless maintain that the migration is entirely due to the action of both the cremaster muscle & gubernaculum testis; & Curling even maintains that without the muscular action of the cremaster & the contraction of the gubernaculum testis, it would be impossible for the testis to reach the scrotum; basing his argument on the position of the foetus in utero. (2)

Cleland on the other hand believes the migratory process to be purely vital

(3). Cleland on the mechanism of the Gubernaculum testis.

in its character, as shown by the downward growth of the processus vaginalis testis into the inguinal canal; at the same time he admits the presence of muscular fibres passing upwards from the region of the internal inguinal ring to the neighbourhood of the gland, but denies that they have sufficient energy to produce the migration. The gubernaculum, he says, is a plica of the peritoneum containing within its fold fibrous & vascular tissue. (3)

The deduction to be drawn from these different views may be summed up by saying, that in the present state of our knowledge, both processes take apart in promoting the migration of the gland; the vital by opening up a way for it to pass down, & the mechanical by assisting its progression along this pathway.

This mechanico-vital process does not however always accomplish its

end; which is seen by the occasional occurrence of certain cases of failure that come to our notice. This failure of the migratory process may vary in degree, from the case in which the arrestment of the gland is entirely within the cavity of the abdomen, to the one in which it is all but completed, & where the gland lies close outside of the external ring by the side of the penis. In neither of these extremes is there any call for surgical interference; but in cases where the gland seems to have become stationary in the canal it is different, for in this situation it becomes a source of discomfort & danger to the subject of it.

Two such cases of failure to complete the migration of the gland, came under observation recently;—

The first one, in February 1884, was in a boy 3 years of age; he was brought for treatment of a balanitis

resulting from a long forestin, which yielded readily; & it was thought possible that the hidden condition of the testicle was due to reflex action, but it was found that they still remained hidden, long after any manifest cause for retraction had subsided; the scrotum was diminutive & contracted, a condition noticed on the first inspection, & also that it was devoid on both sides of its glands.

On examining the groins, one found lying just inside the external opening of the canal on both sides, two small solid, almond-like bodies, uniform in outline & moveable. They could be pressed down through the ring with some little force into what scrotum there was, but at once retired again within the canal on its removal; it was also noticed that when the child

cried, the glands were pressed out beyond the ring but immediately resumed their former position when it ceased. The parent stated that he had always been in this Condition.

The failure of the migratory process in this case was of so trifling a character that surgical interference was in no sense called for, the probability being, that as the child grew older, the ring being free, they would of themselves pass down & occupy their natural position.

The second case however was of a different character, & calls for the consideration of some means being used, to relieve the boy from the possible & already manifested discomfort of a gland arrested in the inguinal canal, as well as to abviate the certainty of its functional obliteration. It occurred about

a year subsequent to the one already mentioned, in a boy aged 14 years, in whom neither of the testicles had reached their natural destination, but where one had made its appearance in the left groin & was already giving the lad some annoyance from pain & swelling.

It was situated at the middle of Poupart's ligament & was slightly moveable in the axis of the canal.

On the right side there was the absent gland from the scrotum & though it was not so manifest as that of the left, there was certainly a bulging or fulness of the groin in the neighbourhood of the internal ring. Rest in the recumbent posture & soothing applications to the seat of discomfort relieved the patient, but as this gland had given discomfort more than once before; it would in ale

(4) vide Prof. Humphrys article on Diseases of the Male Organs. in Holmes System 2nd Ed. Vol V. p 75.

probability do so again, when the precautions which had been called forth by its present irritability were less stringently carried out. The scrotum in this case was diminutive & contracted.

The causes which are said to give rise to this condition, may be divided into two; viz.

First. Those cases which consist solely in the failure of the vital process, where the forces of nature have in some way come short of accomplishing their design.

It is quite possible this failure of the migratory process may be due to mal-nutrition either in the foetus itself or in the parent; it may be the imperfect development of the mesorchium; shortness of the vas deferens has been mentioned, but it has been found that this structure is usually coiled on itself. (4)

Second. Those cases in which mechanical causes retard the progress of the gland or obstruct its course; amongst which may be mentioned; 1st Fibrous adhesions between the testicle & the abdominal wall or between the testicle & the bowel, as the result of intra-uterine peritonitis; — 2nd some mechanical obstruction in the course which the testicle has to traverse; Hunter thought that the place where the testicle" meets with most obstruction in its descent is at the ring in the tendon of the External oblique muscle, & accordingly I think" he says "we see more men with one testis or both lodged immediately within the tendon of that muscle;" — or 3rd it may be due to what Curling calls paralysis of the cremaster in accordance with his theory of

(57) Tide Curling Diseases of bones. 4th Ed.

the muscular aversion of the gland, & which he considers a counter part of infantile paralysis. (5)

The diagnosis of an uncomplicated case of arrested testicle, would consist in. 1st The diminutive & contracted state of the scrotum. 2nd The absence from the scrotum of the gland. 3rd The presence in the groin of a semisolid resilient tumour, slightly moveable in the axis of the canal & uniform in outline, And 4th The peculiar testicular pain caused by subjecting the tumour found in the canal to pressure. All these signs would indicate the absence of the gland from the scrotum & the presence of a body in the canal bearing its characteristic features.

The diagnosis might however be complicated, more especially if the gland became inflamed &

simulated a bubo, both in the specific origin of its inflamation & in its locality; or where it was inflamed from traumatic causes, & the tissues surrounding it became either oedematous or even sloughing; or the complication might be incomplete inguinal hernia, in which case, there would be the additional signs of impulse communicated on coughing, the possible reducibility of the tumour & also the difference in the consistency of the two bodies.

The testicles thus arrested in the inguinal canal must affect both the health & equanimity of the individual who is the subject of it, but it is also a source of considerable danger to him, from the constantly recurring attacks of inflamation to which the gland is subject, & which may extend

to other tissues, where such an inflammatory attack can only be looked on as exceedingly serious in its results; the individual is also continually exposed to the dangers of strangulated inguinal hernia, because of the communication between the peritoneal cavity, & the tunica vaginalis testis remaining pervious, or the two sacs being but slightly separated from each other by the feeble union of the two layers of peritoneum which form the upper portion of the tunica vaginalis testis.

The localization also of the testicle in this situation, exposes it constantly to pressure, either from the contraction of the muscular walls of the canal or of the abdomen, or from pinching between the tendinous arches of the external oblique muscle; it may be pressed on by the weight of the abdominal viscera during respiration, or by the flexing of the

(6) Curling Disease of testis

thigh on the abdomen; it is also much more exposed to the possibility of blows.

Such pressure on an organ so sensitively constituted as the testicle must of necessity be often followed by pain, distressing in character, & by attacks of inflamation, which may be either acute or chronic, according to the nature of the exciting cause; if the exciting cause be external violence, as a blow or kick, the probability is that the attack will be acute, followed by the formation of abscesses & going on to fatal peritonitis, as in a case recorded by Curling, where a boy was kicked in the groin by a companion, & the testicle was found, after death, at the seat of injury;(6). on the other hand, if the exciting causes are of the nature of muscular pressure the resultant inflamation will more probably be of

a chronic type & the immediate effect less serious, although none the less painful & distressing & in the end none the less disastrous to the gland itself.

This constantly recurring pressure & inflamation cannot take place, with impunity to the structure of the organ, & as a consequence it is found that atrophy of the gland is the most common result of these attacks, in which fibroid changes take place, & the gland as such becomes functionally obliterated; another force which assists these attacks in terminating in atrophy, is the diminished & retarded state of the circulation, a concomitant of the pressure of the gland by the surrounding structures in this situation. Atrophy may also be due to the direct pressure of a hydrocele in those cases where the Tunica Vaginalis testis has become a distinct & separate sac from the general peritoneal cavity.

Lastly, malignant disease has been found to occur frequently in the testicle, when situated in this locality, which is not remarkable, under the varied & recurring sources of irritation to which it is subject.

From the foregoing account of the migratory history of the gland, & the causes of its failure; the diseases which the gland is liable to when situated in the inguinal canal, & the dangers to which the individual, who is the subject of it, is exposed by its arrestment, one is warranted in trying some means of treating the malplaced organ, with the object of relieving the sufferer from its inconveniences & dangers.

It has been shown, that the testicle which is arrested in the inguinal canal, & displays no tendency to pass on to the scrotum, is certain

of being destroyed functionally & also of giving much inconvenience.

On these considerations there is therefore presented to our minds the question,

Can we do anything which will obviate these evils & restore the organ to its natural situation & thus at once relieve the individual from those dangers to which he is exposed, as well as to restore that mental peace, of which such a malplaced organ must necessarily deprive him?

And this question must the more forcibly meet us, when both organs are involved, as in the second of the cases mentioned, where the left gland had already given considerable trouble & the right though not so manifest was certainly retained in the region of the internal ring, & would most probably be poorly developed as those glands which have been retained entirely within the

cavity of the abdomen have usually been found to be, unless it were, by the pressure of the abdominal viscera, to pass into the canal, where it would come under the conditions of the one we are presently considering.

But the larger question presents itself to us, whether from our knowledge of those evils to which a retained gland is liable in the inguinal canal, it does not become an essential part of our Surgical principles to anticipate them, when even only one gland is retained in one or other canal, the other being already descended into its scrotal sac, by attempting the restitution of the retained organ to its natural situation, & thus warding off those evils which we have under consideration.

That the gland of itself is

7. Curling "Diseases of testis" pp. 31. 44. 45.

perfectly innocent, has been proved by the fact, that on its dissipation on more than one occasion it has been found healthy, although diminutive & even in one case, spermatozoa were found in the juice scraped from its substance, but in a quiescent & immature state;(7) and that all the misfortunes which come upon it, when situated in the canal arise solely from its malposition.

From the consideration of the migratory process & the causes of its failure it is evident that palliative treatment, whether it be rest in the recumbent posture & local applications of a soothing character, or as Hunter suggested a hollowed out pad to protect it, can in no way be of any service in removing the difficulties of the case which are of a mechanical

rather than of a functional nature, but that it may & does remove any temporary discomfort & inflamation which arise it still however leaves the organ & the surrounding structures in their unnatural relationships, & liable therefore to the recurrence at any moment, on the slightest provocation, of all those previous evils for which the treatment was applied.

There is nothing therefore short of surgical interference which can be of any service in giving the patient permanent relief. And this interference must be of such a character as to bring the relationships of the part into a more natural condition, without at the same time injuring the gland or the walls of the canal in which it is contained.

It is, of course, only in those

cases, where the glands are located in the inguinal canal, i.e. that are situated between the external + internal inguinal rings, which have already given rise to any of those complications mentioned, & whether it be a single or a double case of malplacement, that one would at all think of proposing such operative interference.

Cases on the other, in which the gland was returnable to the cavity of the abdomen, would certainly not be considered, in the present state of our knowledge, nor those which are situated outside of the external inguinal ring by the side of the penis.

There is nothing, which would present an insurmountable obstacle to this transposition, either in the migratory history or the causes of its failure but on the contrary, whether we

believe the migratory process to be vital or mechanical in origin, it matters little, as a gland which has passed into the inguinal canal & become located there, & gives evidence of it's own special character of pain, must witness to a certain amount of structural development to which it has attained, & that for its full functional activity it only requires more suitable environments, which are only to be found in its location in the scrotum, where its functional capacity & development have been shown to be most favourably encouraged; and this even with the knowledge that glands which have been extirpated, have been found diminutive & ill developed, but this fact is to be accounted for by the fact that most of those glands so treated, have

only been extirpated after frequent attacks of pain & inflamation which have had their evil effects on the structure of the arrested gland. Whereas by an early interference on our part, we might assist nature to complete the process, whether it happened to be a halt in the vital process which she had not been able to over come, or whether the cause of failure was of a more removable character, in its being purely mechanical, either by fibrous adhesions to the gland, or narrowing of the tract the gland had to traverse; & the probability is, that if this were sufficiently early done the gland would grow & mature.

Besides, if we were not able to assist the functional growth of the gland, the operative interference would have this recommendation

in its favour, that it would remove the organ from the locality where it was most liable to the dangers which we have been considering in connection with its arrestment, but that also it would not deprive the individual of one of the special organs of his animal economy, while it would at the same time be placed in the most suitable position for its functional development.

What the exact form of this operative interference might be, could only be determined & acted upon in each individual case; but the general principles of what would be necessary, may be stated as shortly as possible.

Our object being to transpose a testicle from the inguinal canal in which it has become arrested, to the scrotum; we would require

to begin by making an incision over the gland itself in the axis of the canal, sufficiently free for the purpose of liberating the gland from the surrounding structures & any causes of obstruction we might discover on opening the canal, & also for separating that portion of the peritoneal sac which goes to form the processus vaginalis testis, from the general peritoneal cavity, if it was not already a distinct sac by itself; & this might be accomplished most satisfactorily, by passing a double row of catgut ligatures or sutures through the two layers of tissue which go to form the anterior & posterior wall respectively of this sac, after having carefully separated them from the surrounding tissues & the cord, by the dividing of the structures between the double

wor, which would serve the purpose of keeping the edges & surfaces of the tissues in accurate apposition & allow of their careful adjustment & thus promote their immediate union; it might be necessary however to open the sac, if it was found that the cause of failure in the transmission was due to fibrous adhesions between the bowel & gland or between the abdominal wall & the gland, in which case the edges of the peritoneum would require to be most carefully brought into apposition before the division between the two sacs was made.

This division & opening of the peritoneum would be the one great & serious difficulty of the operation but this has been often done in cases of congenital

hernia & other abdominal cases with perfect success & should in no way retard us; when it might possibly be necessary to do so, if we required to extirpate the gland itself, & besides it would only require to be done where the communication between the processus vaginalis testis & the peritoneal cavity was still pervious. Having then separated carefully the testicular portion of the sac from the general peritoneal sac, we would require to draw gently on the gland & its Cord in the axis of the canal without injuring them or their vessels, & then passing the forefinger down through the canal into the scrotum, push the gland down into it & fix it there.

If it were thought necessary a counter opening might be made

at the most dependent portion of the scrotum & a small drainage tube inserted; this would allow of the upper wound being carefully closed antiseptically & a little pressure applied in order to promote the adhesion of the walls of the canal with each other & thus obliterate the passage.

In the event of both glands being involved in the arrestment a unilateral operation in the first instance could only be recommended, both with the object of diminishing the danger of septic innoculation & of leaving the second gland till the success or failure of the first operation had been established.

That this operative interference must be undertaken at a very early age to assure success, will be allowed, & that if possible it ought to be done before

the child has attained so much physical development as to expose the gland to the dangers of traumatic inflamation; & certainly before it had reached the age of puberty when the functional activity of the gland was most likely to add another element to the dangers of this misplacement.

What justification have we for attempting this transposition?

It has been shown in three cases already mentioned that the gland after extirpation was found healthy & that in one spermatozoa were also found although they were quiescent & minature. And also that two cases of this transposition have already be successfully accomplished, one by Prof Koch of Munich & the other by Mr. Compston of Birmingham; the former did

8. Both cases quoted by Curling.

up the canal from the gland to the base of the scrotum, which protracted the healing, though it was finally successful, & the latter pushed down a gland he found located in the canal when operating for strangulated hernia & which he believed had increased somewhat on a second inspection after an interval of five years. These cases however were performed in adults, one had recently married & the other had suffered on more than one occasion previously.(8)

To summarize this paper as shortly as possible.

1. A testicle arrested in the inguinal canal is liable to certain diseases which are dangerous to the individual who suffers from it, as well as to it own functional obliteration.

2. Neither the history of the glands

migration, nor a study of the causes of its arrestment in the Canal Counter indicate operative interference for its restitution to its natural destination.

3. Such a restoration of the gland to the scrotum would, if successful relieve the sufferer from the prospect, both mentally & physically of many dangers & discomforts & would at the same time retain to him a special organ in his animal economy.

4. If the operation were undertaken early enough, it would probably favour the functional development of the gland.

5. There is nothing in the operation itself to contra-indicate its being performed.