

The Causes of
Ectroversion
of the
Urinary Bladder.
by
Richard Freeland
M.B.; C.M.

Broxburn,
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1.

The Causes of Ectroversion of the Human Bladder.

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Introductory or First Case.

On the morning of 26th November 1877, I was called to attend Mrs Gibb, Overtown, near Trishaw. On arrival I found her in the second stage of labour, the os uteri fully dilated and a bag of membranes presenting. I ruptured the membranes and in a short time a child was born. After separating it from the mother I examined again and found a second bag of membranes presenting.

Extroversion of the Human Bladder.

This I also ruptured, and in half an hour she was safely delivered of a second child.

The two children were thus contained in separate bags of membranes, and after a careful examination of the cords and placentae I was satisfied that they were entirely distinct from one another.

After the extrusion of the placentae the woman suffered slightly from internal haemorrhage owing to hour-glass contraction of the uterus.

Both children were affected by the same abnormality, viz. extroversion of the bladder and epispadias.

3.

Retroversion of the Bladder

I have not been able to discover a similar case to this, where twins were born both suffering from this abnormality, and at the same time both known to have been contained in separate membranes, and having entirely separate attachments to the mother, and so I propose to make this case the text for the following paper upon the cause of retroversion of the human bladder.

Personal History of the Mother. — The mother was a married woman and had always been considered strong and healthy. She had

Retroversion of the Bladder

had six children previously, all living and healthy, and one miscarriage at the seventh month. During her present pregnancy she had enjoyed good health excepting that she had suffered somewhat from indigestion and heartburn. Her feet and legs had been greatly swelled during the later months of the pregnancy, but upon testing her urine after delivery no Albumen was found. She made an excellent recovery.

She had never heard of such an abnormality as her children were suffering from and had no thought that there

5. Retroversion of the Bladder

could be anything the matter with them before her delivery. She knew of no cases of abnormality amongst any of her relations.

Personal History of the Father: - The father was a strong and healthy man, well developed, and had suffered from no diseases since boyhood. He had been employed for many years as a miner. He knew of no cases of abnormality amongst any of his relations.

Description of the Abnormality: - The two children were so almost exactly in the same condition

6

Retroversion of the Bladder.

That one description will serve for both. The umbilicus was situated rather lower down than usual, and the abdominal walls from the umbilicus downwards were open. The symphysis pubis was wanting. The anterior wall of the bladder was also absent while its posterior wall was pushed forward through the opening in the anterior abdominal wall and bulged outward as a rounded tumour having its edges intimately fused with the borders of the opening in the abdominal wall. The penis was very short and

7. Ectroversion of the Bladder

was devoid of urethra, being simply grooved upon its upper surface. The exposed mucous membrane of the posterior wall of the bladder was pale at the time of birth but it soon became red and congested and evidently very painful when touched. The openings of the ureters could be seen at the lower part of the tumour on either side, and the urine was seen coming from them in drops, or if the child was placed on its back for a short time, and afterwards placed erect, the urine came away in

8

Retroversion of the Bladder.

a little stream of ten or twelve drops at once. The children in every other respect were well developed and extremely healthy looking. The testicles had descended into the scrotum. I may here mention that they both lived till they were nearly a year old, but the constant pain of having the mucous membrane touched brought on great crying fits, and caused them to press so that the bowels acted very frequently. The want of rest and the diarrhoea gradually pulled them down and they died within a fortnight of each

Retroversion of the Bladder

other when nearly a twelve-month old.

A very good description of this affection will be found in the Cyclopaedia of Anatomy and Physiology, article, "Bladder, Abnormal Anatomy of the Urinary," where it is shown that, until a comparatively recent period viz., about the middle of last century, this malformation was regarded as a hernia of the bladder, but about this time Senon proved that there was a "complete absence of the whole of the anterior wall of the bladder, and that the tumour which

Retroversion of the Bladder.

10

is found at the hypogastrium is only the posterior parietes of the bladder with the trigone pushed forward by the abdominal viscera as if for the purpose of "backing up the opening caused by the deficiency of substance below the umbilicus." Anatomists have fully confirmed the correctness of Winslow's observations.

Causes of, or Mode of Production of Retroversion of the Bladder:— There is necessarily always a good deal of uncertainty as to the mode of production

Extroversion of the Bladder.

of any abnormality and this
 of extroversion of the bladder
 is no exception. Those who
 have given attention to this
 subject may be divided
 into two classes, (1) those
 who believe that the ab-
 normality depends upon
 an alteration of the abdomen
 purely pathological or
 mechanical, and consequently
 that it is a disease and
 not an abnormality, and
 (2) those who consider it
 an arrest of development
 or an abnormality pure
 and simple. In 1805 Duncan
 in a paper published in
 the Edinburgh Medical

Retroversion of the Bladder

and Surgical Journal tried to prove that this abnormality was caused by some obstruction taking place to the expulsion of the urine from the bladder by which the bladder became distended till it separated the pubic bones from each other, ruptured the hypogastrium, and then disorganised itself.

I do not think this theory offers a satisfactory explanation of the condition of the twins in the case taken as our text. In the first place the foetus in utero has very little

Retroversion of the Bladder.

urine to void, and consequently the presumption is against over-distention of the bladder, and in the second place it is exceedingly unlikely that a mechanical obstruction to the flow of urine would take place in both children and go on to the production of the same abnormality! The writer of the article in the Cyclopaedia of Anatomy and Physiology noticed above, also considers that this mode of production, described by Duncan, cannot be accepted, but he believes

Retroversion of the Bladder.

That the deformity is not a monstrosity, he says, "ectrophy is frequently a disease or the effect of a disease, but not a monstrosity; an ulceration, a perforation of the pubis or of the hypogastrium being the common point of origin. The bladder is only secondarily altered. If the foetus continues to live the borders of the destroyed bladder are united to the circumference of the abdominal opening or, at least, to the posterior surface of the remaining portion of the hypogastrium. The ulceration once effected

Retroversion of the Bladder

The rest is explained by the mucous nature of the organic septum which occupies the place of the pelvic or abdominal parietes. He also says that in this view he follows the lead of Velpeau who believes that "atrophy of the bladder is not simply owing to an arrested development, first, because in the normal state the bladder is split open neither anteriorly nor posteriorly; secondly, because the pubic circle is completely formed before the bladder is perceptible; thirdly, because the aspect of the fissure

Retroversion of the Bladder.

that the urinary sac should present never exists; and fourthly, because the theory in question has for its support only such analogies as do not appear to us to have been completely established." These appear very strong and good reasons for believing in the pathological or purely mechanical hypothesis, but when we come to apply them to the facts of our test case what do we find? We find twins entirely separated from one another, that is, contained in separate bags of membranes, and floating

17.

Extroversion of the Bladder

in distinct quantities of liquor amnii, and having quite distinct cords and placentae; under these circumstances is it at all likely that any purely mechanical cause or any cause likely to give rise to ulceration could affect both children so as to give rise to exactly the same amount of deformity? I think not. Consider therefore we are bound to reject the theory so ably advocated in the Cyclopaedia of Anatomy and Physiology that a mechanical obstruction or a disease going on to

Extroversion of the Bladder

ulceration is sufficient to account for the monstrosity of extroversion of the urinary bladder.

When we take all the facts of our case into consideration I think we are irresistably led to the conclusion, which has been supported by nearly all eminent teratologists, that the deformity is the result of an arrest of development. But, I consider that our case teaches more, it teaches that the arrest of development has been the result of some central cause, that is, it

Retroversion of the Bladder.

must have originated in some defect either in the mother or in the fertilising agent supplied by the father, because how else can we explain the fact of the two children being in exactly the same condition. What the original defect in the ovum or in the spermatozoa may be we are entirely in the dark but that such a defect does exist has been admitted by almost all teratologists. Prof. Allan Thomson in his paper on Monstrosities says, "The constancy with which certain

Retroversion of the Bladder.

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forms return, and the remarkable symmetry they very generally present deprives the mechanical theory of all its probability in reference at least to by far the greater number of malformations, and points to an original disposition of the ovum or germ as the cause of their production, a view which the hereditary transmission of the disposition to the occurrence of malformations renders in many instances still more certain. What the original cause, or what the unnatural condition of the germ may

Retroversion of the Bladder

21.

he, which determines to the occurrence of malformations we are as yet entirely ignorant. The circumstance that hereditary descent of the tendency to malformations may take place from the side of the male as well as from that of the female parent shows that the date of the disturbance of the formative process in the ovum dates in a certain number of instances only from the period of fecundation.

In the case which we have taken as our text there was no abnormality

Retroversion of the Bladder.

in either parent, and no history of any abnormality in either of their families, and so far as they themselves were aware they had been in good health; but still I think all this does not disprove the idea that the cause of the abnormality had its seat in one or other of the parents, because I consider that some temporary derangement in either parent might be quite sufficient to affect the germ so as to cause the arrest of development described. In support of this view I may quote

Retroversion of the Bladder

from Carpenter's Human Physiology (eighth edition) p. 990. "There seems good reason to believe that the attributes of the germ are in great degree dependent not merely on the habitual condition of the parents which have furnished its original components, but even upon the condition in which those parents may be at the time of sexual congress.

Of this we have proof in the phenomenon well known to breeders of cattle, that a strong mental impression made upon the mind of the female by a particular

Introversion of the Bladder

male will give the offspring a resemblance to him even though she has had no sexual intercourse with him." It is thus quite possible that the condition of either parent was such at the time of fecundation of the two ova in our case that some particular element was absent the presence of which was absolutely necessary for causing the development of the parts which were malformed. That the presence or absence of certain materials in the blood (the nature of which we are quite ignorant)

Retroversion of the Bladder.

is necessary for the complete development of the various organs of the body is well known. Thus, Carpenter in his Human Physiology, p. 282, says, "if the development of the male organs be prevented the evolution of the beard does not take place; whilst the cessation or the absence of activity in the female organs is often attended by a strong growth of hair on the face as well as by other changes that may be attributed to the presence of some special nutritive material in the blood for which there is

Retroversion of the Bladder

26.

no longer any other demand.
Moreover, it has been ascertained by the experiments of Sir Philip Egerton, that if a buck be castrated while his antlers are growing and are still covered with velvet, their growth is checked, they remain as if truncated, and irregular nodules of bone project from their surfaces; whilst, if the castration be performed when the antlers are full grown, these are shed nearly as usual at the end of the season, but in the next season are only

Introversion of the Bladder.

replaced by a kind of low conical stumps. That these and similar changes in the development of organs are immediately determined by the condition of the circulating fluid, that is, by the presence or absence of the appropriate substance for the parts in question, would further seem likely from the fact, that they may be artificially induced by circumstances which directly affect the condition of the blood. That the material which was wanting in our test case was not from the blood circulating

28.

Retroversion of the Bladder.

in the veins of the foetus alone, but that the defect had its origin in either the ova or semen before fecundation took place. I think is proved by the fact that both children were born in exactly the same condition. It is, however, possible that the malformation had its origin in the absence of some particular material from the blood of the mother at an early period of utero-gestation, the presence of which was absolutely necessary for the complete development of

Retroversion of the Bladder.

The parts involved in the malformation, just as we have seen that the presence of the male organs of generation are necessary for supplying some material to the blood which causes hair to grow on the face and other parts of the body at puberty, and also for causing the development of various other parts of the body.

It is easy to understand how the theory of arrested development accounts for the opening found in the abdominal walls, and also for

Retroversion of the Bladder

The want of the symphysis pubis, because these parts of the body are developed in two halves which gradually approach one another and meet in the middle line anteriorly, and if, from any cause, their development is arrested before the junction takes place then such an opening as we have met with in our case must be the result; but as the urinary bladder is not developed in two halves which gradually approach one another anteriorly the loss of the anterior wall of the bladder by arrest of

Retroversion of the Bladder

development is not so easily accounted for.

The bladder is originally developed from the allantois. In man the allantois proper or the part external to the umbilicus is insignificant in point of size and extremely limited in duration, and serves only to conduct the umbilical vessels from the body of the embryo to the chorion to form the placenta. By its lower end within the abdomen the allantois communicates with the intestine but from which it subsequently becomes separated. The

32. Ectroversion of the Bladder.

upper part of the allantois within the abdomen becomes the urachus, while the lower part of it which receives the efferent canals of the Wolffian bodies as well as those of the kidneys become widened so as to form the urinary bladder. What I think must have taken place in our case of ectroversion of the bladder is that the abdominal parietes have undergone arrest of development thus leaving the opening which was found at birth, and that the allantois has never been in the form of a sac, but has simply

Evagination of the Bladder

been a process which carries the umbilical vessels to the chorion and in its lower part the openings of the efferent ducts of the Wolffian bodies and of the kidneys pierced it, and as development proceeded instead of becoming a hollow sac, as the bladder normally is, it simply enlarged as a membrane representing the posterior parietes of the bladder having the uriners passing through it, and filling up the opening left in the abdominal wall. The low situation of the umbilicus and the absence of the crachus favour the

Extroversion of the Bladder

Theory of want of proper development of the allantois.

Supposing now we admit that it has been proved that this malformation of extroversion of the bladder had not its origin in any mechanical cause nor yet in any disease of the foetus itself, but that it was the result of an arrest of development having a central cause the very interesting speculation still remains was that cause in the male or in the female parent?

It is extremely difficult to determine this question, but

Retroversion of the Bladder

Though we may not be able to say definitely in which of them the cause lay, still I think we may do something more than make a guess at it. Orton in his paper on "The Physiology of Breeding" in the "Newcastle Chronicle" March 10th 1857, Dr Alexander Harvey "On the Relative Influence of the Male and Female Parents in the Reproduction of the Animal Species" in "The Edinburgh Monthly Journal" August 1854, and Darwin in his book "On the varieties of Species under Domestication," have all shown that different parts

Reversion of the Bladder

of the offspring are in the main derived from the different parents, or in other words that the influence of each parent is principally felt in the development of a particular part of the offspring. Orton's argument is thus expressed by Harvey, "In the reproduction of the animal species there is no casual blending of the parts and qualities of the two parents, but each parent contributes to the formation of certain structures and to the development of certain qualities." He maintains also that the male parent chiefly determines the

Reversion of the Bladder

external characters, the general appearance, in fact the outward structure and locomotive powers of the offspring (e.g. the brain, nerves, organs of sense, and skin, and likewise the bones and muscles more particularly of the limbs), while the female parent chiefly determines the internal structures and the general size and quality mainly furnishing the vital organs (e.g. the heart, lungs, glands, and digestive organs) and giving tone and character to the vital functions of growth, nutrition, and secretion." A great many

Retroversion of the Bladder

examples of this law have been brought forward, amongst the most striking are those of the mule and the hinny. The mule is the produce of the male ass and the mare, and in its external characteristics it has all the distinctive features of the ass, while in all that relates to its internal organs and vital qualities it partakes of the characters of the horse, thus in appearance it is a modified ass with the large size and rounded form of the horse. The hinny on the other hand is the produce of the horse and the ass and has all the distinctive

Retroversion of the Bladder

features of the horse, while internally it participates of the characters of the ass, thus it is essentially a modified horse having the narrow chest and smaller body of the ass. An explanation of this may be found in the fact that the germinal membrane from which the foetus is developed consists of two layers an outer and an inner, called respectively the serous and the mucous layers. Of these layers the outer or the serous gives origin to the brain, nerves, organs of sense, and integument, and likewise to the bones and muscles, and

Retroversion of the Bladder

Thus to the parts which have been ascribed to the influence of the male, while the inner or mucous layer gives origin to the lungs, glands, digestive organs, &c, and thus to the parts which have been ascribed to the influence of the female parent. The heart and blood vessels are either the joint production of the two layers, or of an intermediate layer subsequently developed and called the vascular layer. However this may be the whole vascular system stands in the same relation to the vital organs and their functions that the osseous does to the muscular

Retroversion of the Bladder

41.

and locomotive powers, that is to say is subordinate to them. The vessels are mere carriers of the nutrient fluid the blood - mere channels of irrigation to the vital organs not taking any other or more direct share in the vital process, the activity and whole character of which are determined by their organ and the specific endowments of these" (Carpenter's Human Physiology).

I think we may admit that these arguments or observations regarding animals, viz. that the male parent gives

42

Retroversion of the Bladder

rise to all the organs concerned in the strictly animal functions while the female parent gives rise to those concerned in the strictly vital functions, are in the main correct, and having admitted that, I think we may next come to the conclusion that, as in retroversion of the bladder the deformity is principally the result of an arrest of the development of the anterior wall of the abdomen including the integument, the muscles, the pubic bones, and the anterior wall of the bladder, the cause of the deformity is

Retroversion of the Bladder

43.

probably in the spermatozoa
or male fertilising agent.

What the nature of the de-
ficiency or want of power
may be we are at present
entirely in the dark.

Conclusion:- The conclusions to which
a study of our test-case have
led us may be thus ex-
pressed: Retroversion of the
urinary bladder is the result
of an arrest of development
involving the integument, muscles,
pubic bones, and anterior parietes
of the bladder; the arrest of
development is caused by the
want of some formative prin-
ciple either in the ovum or

44

Retrosion of the Bladder

in the spermatozoon but most probably in the latter; what may be the nature of the absent principle we have at present no means of knowing.

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Retroversion of the Bladder

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