Papers on hypertrophy of the prostate muscle / by Reginald Harrison.

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I.

In a paper recently published * I have shewn that the inter-ureteral bar of muscular fibres, so frequently met with in cases of enlarged prostate, is to be regarded as the outcome of efforts, by the development of extra-ordinary agents of micturition, to expel urine from a part where it is apt to lodge and cause inconvenience. In connection with these investigations, I have met with instances where an unusually depressed state of the floor of the bladder, or trigone, appeared to me to have existed previously to an enlarged prostate; in fact, that a condition of residual urine preceded, and was not the sequence of, enlargement of the so-called gland. The trigone, or floor of the bladder, though highly sensitive, seems, chiefly by reason of its more intimate connection with the subjacent parts, incapable of exercising a power of independent contraction over the contents of the viscus.

Assuming that, from any cause, such as long retention of urine, habit, position of the body, or the weakness connected with advancing years, the trigone, or non-contractile part of the bladder, becomes permanently depressed or altered in form, so that the person finds himself unable to get rid of the last half-ounce or so of urine, the effect will be frequently repeated efforts in all the muscles immediately adjacent to a part which, by reason of its connections and structure, has but little power of expelling. This will eventually lead, as I have shewn, to the hypertrophy of the muscular fibres between the orifices of the ureters—the

* *On Some Changes in Form of the Prostate and Floor of the Bladder*, *Liverpool Med. Chir. Journal*, July, 1885.

inter-ureteral bar — as well as, I believe, to that of the muscular fibres so largely entering into the composition of the prostate. In this, I submit, will be found the immediate cause of prostatic hypertrophy.

The change being an example of an hypertrophy, its production by conditions favouring the formation of other over-growths observed in the body seems to be reasonable. Such a view, as applied to the large prostate, is strengthened by certain clinical observations. A frequent desire to empty the bladder is constantly met with in what is regarded as the earliest stage of prostatic hypertrophy, and long before the part has assumed any considerable size; the more frequent are the calls to urinate, the more rapidly does the prostate grow, and all circumstances which tend to increase irritability of the bladder may be said to favour the development of this condition. Again, the only means which are known to have caused the opposite state, namely that of atrophy, to be engrafted on the hypertrophied part, are those which for a considerable time converted a muscular and physiological act into a purely mechanical one, for instance, the case I published* some years ago (since repeated with equally satisfactory results), where by the wearing of a cannula inserted through the perineum the process of micturition was reduced to the mechanical act of turning a tap on the part of the patient.

Though regarding senile enlargement of the prostate as structurally an hypertrophic change, I was at a loss to explain how it was induced until I met with instances where, from the conformation of the bladder, an irritable condition of the organ from residual urine seems to have preceded, and not to have been the consequence of, an enlarged prostate. Instances in practice are not uncommon in elderly males

* *British Medical Journal*, December 24, 1881, and April 8, 1882.

where all the symptoms usually assigned to prostatic enlargement are present, without there being evidence, beyond the presence of some urine which cannot be voluntarily expelled, that any physical change in the part has taken place.

I have frequently noticed that condition of unnatural contractility about the muscles connected with micturition, to which Sir James Paget's expression of "stammering with the urinary organs" may be applied, precede prostatic hypertrophy. I have a case under observation, where a locomotive engine-driver, aged 53, has, owing it is believed to the constant concussion connected with his occupation, been a stammerer of this kind. Rectal examination now shews that his prostate is commencing to enlarge, as not only is it breadthening, but a distinct band of what I take to be muscular tissue is to be felt stretching across and filling it up. I was able to demonstrate this to my House Surgeon, Dr. Collins, and my clinical class, who had no doubt about the facts, whatever the construction placed on them might be. The sequence of events in this case appears to have been enforced retention by reason of the man's employment, incomplete emptying of the bladder, irregular and spasmodic efforts to expel residual urine, terminating in commencing hypertrophy of the muscles principally involved, namely, those associated with the expulsive action of the lower segment of the bladder. The frequency with which the floor of the so-called gland is the first to shew the hypertrophic change, seems to strengthen the inference I have drawn from the development of the inter-ureteral bar, and to indicate that both conditions are the direct result of straining and an excess in the expulsive action of the bladder and associated parts. Structurally, the inter-ureteral bar and the hypertrophied prostate are identical, with the exception that in the latter will be found the follicles which have led to it being regarded as a glandular body. It is

impossible to examine some of the commoner forms of advanced prostatic hypertrophy without being struck with their resemblance to what I would describe as growing casts of the interior of a frequently contracting bladder.

But it may be urged that if repeated expulsive action on the part of the bladder causes enlargement of the prostate to follow, how is it that stone and urethral stricture do not in like manner occasion it as a uniform consequence? To this I would reply that stone and stricture as excitants of expulsion are general or varying in their operations, and do not, as a rule, merely involve a limited area of the bladder wall, consequently the hypertrophy following stricture is universal so far as the viscus is concerned. In the same way, the whole bladder is implicated when a growing prostate becomes in addition an obstacle to micturition. When a stone is *fixed* to the bladder, it is, I believe, subjected to precisely similar influences on the part of the bladder wall immediately adjacent to it as those described in connection with the trigone, and may result, as I have seen, in a circumferential development of muscular tissue sufficient in some instances to produce sacculation. This is not an uncommon process, and may be studied with advantage in those cases where secondary calculi are developed as a consequence of surface irregularities produced by a large prostate, and which I have referred to elsewhere as fixed or stationary stones.*

Further, it may be urged that such an explanation cannot be held to cover those instances where persons with more or less enlarged prostates do not suffer from them. I have investigated cases of this kind generally with the result of finding out that, at some period in their history, considerable urinary irritation was present and persistent. That an hypertrophy may prove to be *a precise compensation*, with-

* *Annals of Surgery*, June, 1885.

out, on the one hand, falling short, or, on the other, overlapping, I think we have evidence of here as in other parts of the body.

It has been objected that enlargement of the prostate cannot be regarded as a mere muscular hypertrophy, as it does not occur during those periods of life which are most remarkable for muscular activity and development. On the other hand, it is hardly necessary to remark that, though an hypertrophic act, in which muscular tissue is principally involved, it is really prompted by alterations in the form or function of a contiguous part which are the products of advancing years.

It may not be out of place to observe in connection with analogous processes of hypertrophy, which in general terms have been referred to, that the best marked are those where structural defects are remedied, not in the part itself at fault, but in that which is adjacent. In the heart it is not the valve that is reproduced, but the ventricle or auricle which is augmented. Nor does the analogy cease here, for as the hypertrophied heart in turn occasions symptoms peculiar to itself, in like manner does the large prostate produce its own derangements. The changes and diseases to which the hypertrophied prostate is liable, and about which there is much to be said of great practical value, must, however, not be confounded with the primary lesion it is desired here to refer to.

In addition to the valuable paper and plates by Sir Charles Bell, on the muscles of the ureters,* mention must be made of Mr. Viner Ellis' communication on the muscular arrangements of the genito-urinary apparatus. † In reference to the impossibility of dissociating the functions of the bladder and prostate, the latter author remarks: "I would

* *Med. Chir. Trans.*, London, vol. iii. † *Ibid*, vol. xxi.

propose the name *Orbicularis vel Sphincter urethræ* for both the prostate and the prolongation around the membranous urethra; whilst I would confine the old term, 'prostate' (without the word 'gland') to the thickened and more powerful part near the neck of the bladder. This orbicularis may be considered as only an advanced portion of the circular layer of the bladder, though it must have the power of acting independently of the vesical fibres." Had Professor Ellis' nomenclature been adopted at the time it was suggested, I do not believe that the pathology of the hypertrophied prostate would have remained at a standstill for so many years. The full truth of his observations I never fully realised until I had practised, and watched the result of, a considerable number of operations, undertaken with the view of permanently relieving urgent symptoms attendant upon the large prostate.

II.

In the previous paper I have pointed out that residual urine will be frequently found to precede physical signs of prostatic enlargement, and that this inability to empty the bladder may be traced to structural alterations in shape and imperfect power of contractility which chiefly involve the most dependent portion of the bladder area—namely, the posterior wall. From these observations I deduce that the initial lesion in enlargement of the prostate is the conversion of the latter into a kind of muscular buttress for providing against a structural incapacity in a contiguous part. I have further laid stress on the view which has been advanced by competent observers that the prostate is to be regarded essentially as a muscle, and not as a gland, in the ordinary acceptation of the term. In endeavouring to explain how it is that the prostate muscle may be brought under the influence of the same laws which seem to regulate the development of hypertrophies in other parts of the body, and which for the most part are compensating in their nature, there are many points connected with its clinical history and pathology, when enlarged, which may with advantage be referred to here.

In the examination of the bladder, both after death and in the course of surgical operation, it is impossible not to be struck with the altered relations which frequently exist between the viscus itself and its neck or outlet. In early adult life the bladder may be regarded as an abdominal rather than a pelvic organ; as years advance it gradually sinks within the pelvis, whilst still later on it will often be found to have become further depressed within the pelvic cavity. In this way I have seen a prominence given to the

floor of the prostate which was really due, not to the development of more prostate tissue, but to the bending back of the posterior wall of the bladder. When it is considered that the prostate is almost immovably fixed by ligament in its position, whilst the bladder can rise or fall according to circumstances, it is not difficult to understond how this can be, and how an obstacle may be put in the way of micturition which does not necessarily involve an increase in the amount of prostatic tissue. This mode of forming a prostatic bar may be very readily imitated.

That an undue sinking of the bladder within the pelvis such as I have referred to would be likely to induce hypertrophy of the prostate as a compensating process seems to me to be not unreasonable. It is stated by Sir Henry Thompson* "that actual hypertrophy of the prostate exists in about 34 per cent. of men at and above sixty years of age; that it produces manifest symptoms in about 15 or 16 per cent." From this it would appear that 18 per cent. are not injuriously affected by this change, a circumstance which almost seems to suggest that the majority of persons with large prostates are in some way or other benefited by them. These are illustrations where the compensation is precise. How frequently it happens in our daily practice that we come across instances of persons having very large prostates, but who are not conscious of suffering any inconvenience thereby. It is only very recently, when examining the rectum of a patient, I discovered that he had an enormous prostate, but beyond experiencing some degree of vesical irritability a few years ago he had now nothing to complain of so far as micturition was concerned. A good idea of the amount of support that is afforded to the most dependent portion of the bladder by a large prostate may be

* *Diseases of the Prostate.*

formed by examining such a patient as I have just referred to with the finger in the rectum when he is placed in the erect position. By this means we can judge of the value—I was going to say the comfort—of a large prostate to some elderly males with incompetent bladders.

But it may be urged that, though some cases of enlarged prostate appear capable of explanation on the ground that they are essentially hypertrophies in the usual acceptation of the term, there are others where such an explanation is not so apparent. In the latter category reference no doubt will be made to those instances where the prostatic mass is made up of more or less lobulated projections. These I would speak of as the upheavings of a frequently contracting muscular ring. In a muscle or part undergoing hypertrophic growth, and where the process is prompted by circumstances which are obviously liable to some degree of variation, tissue production may be excessive or become unnecessary. Such excess would naturally tend, under the contraction of the part, not only to protrude itself where the resistance was least, but to assume a more lowly organised form than that originally produced. In this way I believe these masses of more or less degenerated prostate tissue are formed, and just as there is a wide difference between the irritability of the bladder associated with the initial stage of the hypertrophying prostate and that caused by the fibrous projections of the gland just referred to, and which produce symptoms quite as irritating to the bladder as any stone, so is there a corresponding difference in the residual urine which accompanies each of these states.

In a paper by Mr. Savory * *On the Relation of Partial Retention of Urine to its Decomposition within the Bladder*, he points out that the mere retention of a certain quantity of

* *The Lancet*, Oct. 14th, 1882.

changing urine, though constantly occupying the bladder, cannot be regarded as explanatory of its decomposition. Because a bladder does not completely empty itself, as in the initial stage of prostatic hypertrophy, this by no means implies that what it contains is stagnant and liable to decomposition. A constant stream, though a small one, through a standing pool of water ensures sufficient interchange to prevent putrescence or anything approaching it. So long as normal urine enters a bladder capable of expelling, though incompletely, so long will what is retained remain unchanged, provided that nothing is brought in relation with the interior of the bladder which can act the part of a foreign body. A prostate with fibrous outgrowths is positively more irritating to the interior of the bladder, more productive of cystitis and mucous exudation, than almost any calculus that can be met with. It is under these circumstances that we have a very different form of residual urine to that previously alluded to. In practice it is necessary that these distinctions should be recognised.

A few words may be devoted to certain pathological conditions of the prostate as bearing upon the remarks that have been already made, and relative to its uses other than as a muscle. The only form of inflammation to which the normal prostate, so far as my experience goes, is liable, is that which primarily involves its numerous follicles; by the suppuration and coalescence of these follicles the whole area of the prostate may be converted into an abscess. Though I have known several instances in adults about the age of puberty, where the secreting portion of the prostate must in this way have been completely and permanently damaged, I cannot say that I ever knew such a suppuration followed by either sexual or procreative inability. And though the prostate may not be damaged to the same extent, in most cases of lateral lithotomy and operations of a like

nature, if it were essential to procreation, we might expect to find a certain number of fairly well authenticated cases where this function was thus brought to an end. My experience of these operations, which has been tolerably large, does not furnish grounds for believing that the procreative power has been interfered with by them.

That so important a function as procreation should, as it were, be made dependent on the integrity of *two* organs situated at a distance from each other seems on the face of it to be unlikely. It appears to me that the office of the prostate, relatively to the sexual act, is that referred to by Dr. Handfield Jones* in the following passage :—" These considerations furnish some ground for regarding the prostate as rather an assemblage of mucus follicles than really a distinct conglomerate gland; its part in the generative function is probably not to prepare any essential element of the fecundating fluid, but merely an appropriate viscid material, involved in which the seminal animalcules may be more securely transported on their destined route." The wide difference that exists in the pathology of the prostate and the testis seems to point, I submit, to their being engaged in very different functions; the former comprehend those changes which we might expect in a part consisting of follicles embedded in muscle, whilst in the latter they are those which can only happen to a highly organised gland where everything is subservient to the secreting process.

I should sum up the function of the prostate relatively to the sexual act as supplying a vehicle which mechanically enables the fecundating fluid to act with greater certainty, at the same time supplying a muscular buttress against which the ejaculatory muscles of the urethra may advantageously act in the emission of the semen.

* *The London Medical Gazette*, vol. v., 1847.

III.

In the previous communications, I have drawn attention to the nature and probable causation of prostatic hypertrophy. There are one or two points arising out of these to which I should like to refer.

We have been too much accustomed to regard the prostate from its *post-mortem* aspect—that is to say, as a mass of muscle about the size and form of a chestnut, in which is contained some secreting tissue. It will be as well clearly to understand that under no circumstances during life, save the rare and momentary one when the bladder is absolutely empty, does the healthy prostate present such a form as that referred to; on the contrary, the muscular fibres of which it is largely composed are spread out like a funnel, so as to form an ample support for the bladder and its varying amount of contents. The degree to which it is spread out is, of course, relative to the contents. Hence the action of the prostate may be said to be just as continuous as that of the heart. This is a point which can be readily determined by examining persons in different bodily positions, and under varying circumstances so far as the contents of the bladder are concerned. If a person is examined by the finger in the rectum when he is in a semi-erect position, with a healthy prostate and some urine in the bladder, it will be found that the limits of the prostatic area are bounded on either side by a marked ridge of muscular fibre in a state of more or less tone, whilst the centre of this area is softer and more yielding to the touch. In making an examination of this kind for the first time, and taking our idea from what we have previously learnt in the dissecting-room, we naturally expect

to find the converse of this—namely, a rather hard centre, which gradually loses its definition as the finger passes towards the sides. It is a matter of common remark that, unless the prostate is abnormal, a young surgeon has to examine it a good many times in the living male before he thinks he can realise what he has learnt as a part of his anatomical studies.

We may, I think, conclude that the primary function of the prostate is that of supporting and controlling the outlet of the bladder. Where there is no such function to fulfil, the prostate muscle is only met with in a rudimentary form, as we see in cases of extroversion of the bladder where there is no receptacle for the urine. In advanced life, so far as I have been able to ascertain, hypertrophy of the prostate in these malformations never occurs.

That this is the principal function of the prostate is further indicated by what follows wounds inflicted on the urinary tract from the bladder downwards. The only incision that renders a person absolutely incontinent for a time is when the prostate muscle is involved. Openings made into the membranous urethra, either for exploration or for median lithotomy, are not followed by incontinence unless the prostate has been temporarily paralysed by over-distension with the finger. In lateral lithotomy the continence of the bladder by the action of the prostate is maintained to the last moment of the deep incision, when the gush of urine will often carry the stone into the jaws of the forceps. Nor does continence return until sufficient time has elapsed for healing to take place.

I have met with several cases where stones in the bladder have occupied unusual and somewhat remarkable positions relative to what may be regarded as the laws of gravity. I refer to those instances where the calculus is lodged in a sort of space hollowed out above the pubes. On two or three

occasions I have had to reverse the blades of the forceps to extract stones from this position, and I have twice recently met with instances where the sound passed beneath calculi thus placed without giving a clue, and thus causing errors in diagnosis which this knowledge enabled me to correct. From my observation of calculi in the bladder I am disposed to connect their occasional supra-pubic position with the upheaving movement of the floor of the viscus, which is constantly, though imperceptibly, going on, principally through the medium of the spread-out muscular fibres of the prostate. From the dissecting-room standpoint it would seem almost impossible to understand how a healthy prostate could influence the position of a stone in the bladder in the slightest degree; when, however, we learn to recognise how differently the muscle is disposed and occupied during life from what we previously believed, it is not difficult to see that a vermicular movement of the muscular floor of the bladder, which is constantly going on, might tend to lodge and fix a calculus above the pubes. It is quite clear, however, that a stone independent of sacculation, occupying a resting-place in the anterior wall of the viscus, must have been put and retained there by some agency. These points will, I think, be found to have their bearing upon the practical surgery of the parts referred to.