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CLINICAL LECTURES

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BY MR. BENNETT LUCAS,

Senior Surgeon to the Institution, and one of the Lecturers on Anatomy and Physiology at the Westminster Hospital School of Medicine.

Lecture IV.—Dec. 30, 1843.

GENTLEMEN,—Before speaking of the morbid discharges to which the urethra is liable, I shall first make a few observations upon its structure and functions. In both sexes the fundamental structure of the urethra is mucous membrane; it is, in fact, a continuation—an elongation, as it were, of the mucous membrane of the bladder, eked out into a tube for the purpose of permitting the contents of the urinary bladder to be evacuated at certain intervals from that viscus. The urinary bladder itself is a reservoir in both sexes, placed in the pelvis to receive by the ureters the secretion from the kidneys, and the commencement of the urethra is placed at its antero-inferior part, the most convenient situation it could possibly occupy for the main use it has to perform. In the female the urethra is simply a curved musculo-membranous canal, seldom exceeding two inches in length, and has only the one office to perform which I have mentioned. It is capable of dilatation to a very considerable degree, so much so that calculi the size of hen's eggs have passed through it, without the intervention of art; and even when the surgeon is called upon to interfere, in such cases the use of cutting instruments is scarcely ever resorted to. Were the urethra in the male subject similar to that of the female, its diseases would doubtless be as few as they are in the latter, and would be as much under the, I was about to say *immediate*, control of medical or surgical treatment. But the male urethra is far differently circumstanced; it is destined to perform an essential part in the function of the reproduction of the species, and all the complex deviations which obtain to it in us are subservient to this end. It consists of two distinct portions, the one surrounded by muscles, the other by the vascular structure called *corpus spongiosum*. The former of these resembles in some respects the urethra of the female; it is about the same length, if any thing a little longer; it yields with facility to a distending force, particularly in the young subject, but not so readily nor to anything like the same extent as in the female.

Notwithstanding these points of similitude, this portion of the male urethra presents very important and distinct characters, which should always be borne in mind in the treatment of its diseases. In the first place it is in intimate relation at its very commencement with that important organ, the prostate gland; next it is surrounded by blood-vessels and distinct muscular fibres, which have been variously described

accordingly as they have been dissected by anatomists; and lastly it is somewhat fixed at its anterior extremity just at the point where it passes through, and is completely surrounded by, the fibrous structure of the triangular ligament.

The anatomical relations which this portion of the urethra holds to the surrounding parts have occasioned it to be spoken of under the names prostatic urethra and membranous urethra; the former is a good term, as it implies that this portion of the canal is intimately connected with the prostate gland, but the latter is not so happily chosen. If, by the term, membranous portion of the urethra, it is intended to convey that some peculiar membrane is superadded to the mucous membrane of the urethra in this situation, the term is decidedly incorrect, for such is not the case; and if it is meant simply to express the mucous membrane of the urethra itself, there is no reason why every other part of the canal should not be called membranous as well as this. The fact is, that this portion of the urethra is not so intimately connected with the parts which surround it as either the prostatic or the spongy portions; it is here loosely connected to numerous veins of no inconsiderable size when injected, and some minute arterial ramifications, all enclosed in fine cellular tissue; next to these are the muscular fibres, which have received the name of *compressores urethrae*, from their action upon this part; and, also, a partial fibrous expansion derived from the triangular ligament as the canal passes through it.

From the loose relation these parts hold to the urethra, and in the absence of such compact structures as either prostate gland or corpus spongiosum, this part of the canal has more the appearance, when superficially examined, of being simply a membranous tube, and hence the term, which, from what I have stated, you can appreciate as being correct in a negative, not in a positive sense.

The continuation of the male urethra, from the termination of the membranous portion to its distal orifice, is surrounded by the vascular structure called corpus spongiosum; it is hence named the spongy portion of the urethra. This part of the canal is in close alliance with the two corpora cavernosa, which bodies, as you are aware, form the great bulk of the penis. In all the higher classes of animals the male is provided with an organ of excitement for the purpose of perfect fecundation. In these, impregnation takes place internally, and the shape and size of the organ present many varieties, depending upon the economy of the being. In some it is merely rudimentary, as in birds; in others, as in some reptiles, it is large, but formed solely of corpora cavernosa, which unite in such a manner as to leave a groove upon the under surface of the organ, along which the seminal secretion flows. The mammiferous animals, of all others, have the most complicated

sexual organs, and the males the most perfect organs of intromission. Here, as in man, the urethra takes the form of a tube, and is surrounded by the erectile tissue called corpus spongiosum. The necessity for all this complex organisation of the penis arises from the essential organs of generation of the female being placed within the pelvis, a situation they occupy to favor the process of utero-gestation.

That portion of the human male urethra, which acts the office of intromission, is not uniformly surrounded by its corpus spongiosum. At two situations this erectile structure undergoes remarkable developments; one of these is called the bulb of the urethra, the other is the glans penis; the intermediate portion of the canal is nearly equally surrounded by this structure; if it is thicker in one part of its circumference than another it is upon the under surface.

To the attainment of the object for which the spongy portion of the urethra is superadded to the prostatic and membranous parts of the canal, the two corpora cavernosa are provided. I shall here merely remark that these organs are composed of dense, highly elastic, fibrous sheaths, containing within them an arrangement of blood-vessels, which gives them the property of erection in a most remarkable degree; that these cylindrical tubes are attached by crura to the bones of the pelvis; that they unite, after a short course, to one another; and that the union takes place in such a manner as to leave a groove upon the upper and upon the lower surface of the body of the penis. In the lower groove is lodged that portion of the urethra which is called spongy; in the upper groove are placed the dorsal arteries of the penis, branches of the pudic nerve, absorbents, and the dorsal vein; or, as it is called, *par excellence*, the *vena magna ipsius penis*. The intromittent portion of the male organ of generation in the human subject, composed of these essential parts, is enveloped by a thin cellular covering derived from the superficial fascia of the abdomen, and, like other parts of the body which are constantly exposed to the atmosphere, is enveloped with the common tegumentary membrane, which is here of extreme delicacy, and possesses more than its ordinary elasticity. At the root of the organ some of that peculiar contractile tissue from the scrotum, called *dartos*, is expanded.

From what I have said already of the parts which surround the male urethra, you can readily understand what is meant by its prostatic, its membranous, and its spongy portions; the latter term being applied to that part of the canal, which is surrounded by the erectile tissue, called corpus spongiosum; and if to these we add its vesical or proximal, and its glandular or distal orifices, we shall be furnished with most of the anatomical distinctions which are of importance to bear in mind in speaking of the treatment of its diseases.

It is necessary, however, before I dismiss this part of the subject, that I should direct your attention to the inner surface of the urethra. Like all other mucous membranes in the body, the urethra presents an attached and a free surface; the former I have just somewhat fully enlarged upon.

The inner or free surface of the urethra is continuous at its proximal orifice with the mucous membrane of the bladder, and at its distal orifice with the tegu-

mentary covering of the glans penis. Between these two points it undergoes certain dilatations and contractions corresponding to the parts upon which it is, as it were, moulded, and along its course are found the orifices of excretory ducts and of mucous lacunæ.

Where the excretory ducts and the largest of the lacunæ open, the urethra is dilated; in the rest of its course it is of equal diameter, allowance being made for the differences I have mentioned as existing in its membranous and spongy portions.

From the vesical orifice the first deviation occurs where the membrane is in contact with the prostate gland. In this situation it is not only dilated but thrown into folds by the prominent mouth of a large lacuna placed upon its under surface, and called *caput gallinaginis*; the folds are moulded upon the prostate gland, so as to form two sinuses, into which the secretion of this organ is poured by several small ducts. In the immediate vicinity of this *caput gallinaginis*, and also upon the under surface of the urethra, the ducts common to the testes and vesiculæ seminales open.

The next dilatation the urethra undergoes is in that part which corresponds to the bulb of the corpus spongiosum, and here, as in the prostatic portion, the membrane forms a sinus. The excretory ducts of Cowper's glands open at this part and upon the under surface.

No further very remarkable dilatation of the canal takes place until it approaches its distal orifice, where it again forms a sinus, to which the name of fossa navicularis has been given. This is about an inch distant from the external orifice, and belongs rather to the upper than to the lower surface of the urethra.

I shall have constantly to refer to these sinuses under the names of *prostatic sinuses*, *sinus of the bulb*, and *fossa navicularis*.

At the commencement and termination of each of these sinuses, the urethra suffers a degree of contraction, and will frequently offer an opposition, more or less great, to the passage of an instrument along the canal. In one part, where the urethra passes through the triangular ligament, this is particularly the case, and here frequently much difficulty is experienced in overcoming the impediment. But upon all these points I shall again dwell when strictures of the urethra come to be considered.

You have observed me in this institution frequently to open the dorsal vein of the penis for the relief of the acute symptoms of gonorrhoea, and not unfrequently to get as much as seven or eight ounces of blood. I was led to this practice from observing the following interesting anatomical facts, which I take from my note-book for the medical session 1838-9:—

“For the purpose of making an injected preparation of the human penis, I introduced a probe into the dorsal vein of that organ, and forcibly broke through a valve. I next proceeded to distend the vessel with air, in a direction contrary to the course of the circulation, when I was surprised to find it escape at the distal orifice of the urethra. This circumstance induced me to inject warm water in the same direction, which, after the vein was distended, passed freely from the urethra externally. I next laid open the canal by dividing the under surface of the urethra with a pair of scissors, so as to leave the orifices of

the large lacunæ upon its upper surface uninjured. Upon injecting the water through the vein a second time, it flowed freely from the cut surfaces of the corpus spongiosum urethræ, and it trickled from the orifices of the lacunæ, especially from that of the *lacuna magna*. My next care was to throw in a fine injection, which pursued the course of the other fluids, escaping from the mouths of the lacunæ as before. The preparation was then dried and preserved." I should have mentioned, that before injecting the penis with wax, I inflated both corpora cavernosa with air, in the rough manner usually done in the dissecting-room.

Turning over in my mind the facts which this preparation demonstrated, I adopted the plan of taking blood from the penis by opening its dorsal vein, and with a success which has fully warranted me to persevere in this practice for more than three years. The communications which exist between the veins of the corpus spongiosum and the dorsal vein are very direct and numerous; and probably there is no part of the body where blood can be so speedily obtained from the direct seat of inflammation, by venesection, as in the urethra. Although the fluids which were injected in the preparation I have alluded to, and which is in our museum at the Westminster Hospital School of Medicine, escaped through the lacunæ of the urethra, yet I do not wish you to infer that any direct communication takes place in the natural state of the parts, between the radicles of the vein and the mucous follicles; in this case the membranes which separated them were doubtlessly torn through by the force of the air thrown into the vein in the first instance, but the fact clearly demonstrates how intimately connected the ducts and the blood-vessels are; and very probably when hæmorrhage occurs from the urethra, from acute inflammation, as it sometimes does in gonorrhœa, the blood escapes through the lacunæ, the membranes separating these ducts, and the veins being torn through in the first instance from the congestion of the blood-vessels.

Besides the *lacuna magna* in the *fossa navicularis* there are numerous other lacunæ, with the openings of which the free surface of the urethra is studded. The largest of these are always found to occupy the upper surface of the urethra, whilst the ducts of the prostate gland, those of the testicles, and seminal vesicles, and those of Cowper's glands, are placed upon its under surface—facts which are always borne in mind by the surgeon, when introducing instruments along the urethra. The mouths of all these openings are directed forward, or towards the distal orifice.

The length of the three divisions of the urethra is of some importance for you to bear in mind; and I may here state there is some discrepancy in your dissecting books upon this head. In the adult, where the prostatic gland is fully developed, the length of the prostatic portion of the urethra seldom exceeds an inch and a quarter; the membranous portion of the urethra is not so long, being in general not more than half an inch; and the remaining portion of the canal which is enclosed by the corpus spongiosum depends for its length upon the development of the penis, which scarcely, however, makes a difference in most instances of more than an inch in length. The dimensions and length of the prostatic and membranous

portions of the urethra are of more practical importance to be acquainted with than that of the spongy portion.

The *prepuce* affords one of the best examples in the body of the continuity of skin and mucous membrane, or rather of the insensible manner in which the one is gradually lost in the other. The fine, delicate skin which envelops the penis, extends for some length beyond the organ, and is reflected upon itself in such a manner as to form a covering for the glans penis. The mucous membrane of the urethra is continued from the external orifice over the surface of the glans, and at its base, or as it is called the *corona glandis*, it is continuous with the reflected layer of the prepuce.

In some individuals, the prepuce habitually is worn over the glans, and here its inner surface and the membrane covering the glans have all the characters of mucous membranes, and subject the individuals to balanitis, excoriations, phymosis, &c.; in others the surface of the glans is always denuded, and the prepuce thrown back; such individuals seldom are subjected to these annoying diseases, and the parts have all the characters of skin.

Gentlemen, the time I have taken up in speaking of the anatomy and functions of these parts forbids me to enter upon the subject of gonorrhœa until our next meeting. I shall not, however, offer you any apologies for having dwelt upon what I know some of you are already acquainted with; because, as I have said before, it is always necessary to have a clear understanding of the meaning of the anatomical terms by which we distinguish the various parts of an organ, previously to speaking of its diseases.

FRACTURE OF THE SKULL.—COMPRESSION OF THE BRAIN.

TO THE EDITORS OF THE PROVINCIAL MEDICAL JOURNAL.

GENTLEMEN,—In a paper which I wrote on injuries of the head, in the ninth volume of the Transactions of the Provincial Medical and Surgical Association, I endeavoured to point out some characteristic signs whereby the surgeon can judge of the existence of fracture at the base of the skull. The first of the two cases I send you is a well-marked case of this description. The last case is one where symptoms of compression of the brain came on two days after an accident, without any previous indications of injury to the head, which symptoms rapidly gave way under the influence of mercury. If you consider these cases of sufficient importance, I shall be glad of their insertion in your Journal.

Your obedient servant,

Jan. 1843.

JOHN M. BANNER.

CASE I.—Joseph Bradbury, aged 26, was admitted into the Liverpool Northern Hospital on June 4, 1842.

History.—By trade he is an iron-founder, of very temperate habits. About an hour and a half before his admission into the hospital, he was struck senseless by a part of a large boiler falling and striking him the side of the head; he remained in a state of