an exciting dose, or a curative dose, we may well be puzzled in finding the correct dose in a sensitive patient.

Summary.

1. By the skin reactions half the cases of asthma can be proved to be due to some foreign protein.
2. If these causes can then be removed the patients are relieved of their asthma at once.
3. Much can be done to relieve or even cure other cases which do not give positive skin reactions, by the usage of various proteins, as antigens, to desensitize them with.
4. Asthma, hay fever, urticaria, eczema, migraines, epilepsy, and paroxysmal haemoglobinuria, have many common traits and will probably all be proved eventually to be symptoms of anaphylaxis and not separate diseases at all. This list will most likely be considerably enlarged.

In conclusion I wish to thank those many gentlemen whose patients I have tested and treated, but especially my friend Dr. Latham, through whose interest my attention and work have been so fully turned to this matter.

This new advance in medicine may be only a matter of inches, but it does allow us to see round a fresh corner and to obtain a view, and a direct view, of great possibilities in connexion with these chronic complaints, the cause and cure of which have so long baffled explanation.

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CHRONIC RETENTION OF URINE ARISING FROM PROSTATIC DISORDER:

ITS CAUSE, AND TREATMENT BY THE PRACTITIONER WITHOUT OPERATION.

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CHRONIC retention of urine is most commonly produced by some disorder of the prostate gland, and among these troubles enlargement is that most frequently met with. Retention therefrom was generally attributed to a pure mechanical cause, that is, the urethra was blocked or plugged by the intervention of a mass of abnormal gland tissue, which was thrust into the orifice during micturition, thus preventing the escape of urine. Many mechanical theories, based on this principle, have been advanced. At one time it was a large middle lobe which dropped into the orifice like a ball valve. At another it was side-flaps springing from the neck, which met together in the middle line like flood-gates. At a third it was the regular enlargement of the glands round the orifice which prolonged the urethra as a solid projection into the vesical cavity and prevented the escape of fluid, much as an excise-man's inkstand does when upset. And finally, the post-prostatic bar was accused of causing the mischief, for it was said that the bar came forward over the outlet during vesical contraction and effectually blocked it, while at the same time the pressure produced a deep pocket or pouch behind the prostate. None of these explanations appear to be entirely satisfactory. For their supposed action is not supported by the facts disclosed during the use of a catheter; neither do they account for many of the symptoms frequently met with; and finally, the removal of the irregularities—valves, flaps, nipples, bars, etc.—does not invariably restore the lost function. The whole prostatic tissue must be enucleated to ensure success. It would seem, therefore, that although mechanical obstruction may assist, it is not the principal cause of retention.

Before giving yet another explanation, on a different line, a brief sketch of the various pressures existing in the bladder and urethra is necessary to make the argument clear.

Urine within the bladder, when the organ is quiescent, is always subjected to pressure—namely, that due to the force exerted by muscle tone, and to that of the weight of the viscera above. For convenience these two forces are considered as one, and may be termed "tonal bladder pressure." It is found that this tonal pressure increases as the bladder fills—thus, for instance, when empty the pressure may register 15 mm. of mercury, but when holding 10 ounces of urine it may have risen to 30 mm.

The escape of urine is prevented by the resistance the prostatic urethra offers to dilatation. The channel is always tightly closed, and is only open when the pressure on the urine in the bladder exceeds its power of resistance. It therefore follows that as urine does not escape until the act of micturition—that is to say, not until a muscular contraction is evoked—this prostatic resistance must always be greater than the maximum tonal pressure, and if the latter is known by experiment, then the pressure of prostatic resistance must be in excess of that figure. The resistance throughout the length of the prostatic urethra is not equally distributed: it is least at the commencement and increases gradually towards the apex of the gland, where it is the greatest. The total resistance of the whole passage may be said very roughly to be between 40 and 50 mm. of Hg, and it is possible that its maximum is attained with an empty bladder, decreasing slightly as the organ is distended.

When the rise of the tonal pressure, due to the gradual filling of the bladder, approaches that exercised by the prostatic resistance, urine begins to make its way into the first part of the prostatic urethra, which then becomes an integral part of the bladder. As the invasion advances the reflex centre controlling the muscular power of the bladder is stimulated, and the desire to micturate is induced. Should the call be inconvenient, extra resistance is immediately imposed on the urethra by the contraction of the various bands of voluntary muscle distributed around the passage and also by the compressor urethrae muscle. The augmented opposition to the pressure in the bladder, and possibly the expulsion of the urine which has invaded the passage, checks the escape, and the slight wave of contraction which has swept over the bladder wall slowly dies away and with it the desire to micturate. If, on the other hand, the call is complied with, the muscular bladder wall is thrown into contraction, the prostatic resistance is overcome and the urine issues in a steady stream. During the act the voluntary muscles, if desired, may be called into play, so that more resistance is interposed; the stream then lessens, and finally stops, and urine is voluntarily left behind in the bladder. The muscular expulsive power of the bladder is found to behave similarly to that of the tonal pressure, for it is strongest when the bladder is full, and falls as it empties, but it differs in that it ceases directly evacuation is complete. The expulsive force, for instance, with 10 oz. of urine in the bladder may record 180 mm. of Hg pressure, but with 5 oz. it has fallen to 50 mm. or less, and with an empty organ there is none, only that of the tonal pressure of 15 mm. being registered. Further, under normal conditions the whole power the vesical muscle is capable of developing is not invariably called forth, the amount generated being tempered to the work that has to be accomplished, and normally there is always a good margin of reserve power.

The act of micturition is therefore effected, first, by the steady rise of the tonal pressure as the bladder fills, which gradually forces urine into a portion of the prostatic urethra, there stimulating the area governing the bladder muscles; secondly, by the contraction of this bladder muscle, which develops sufficient power to overcome the prostatic resistance.

Normally the two forces—bladder expulsive power and prostatic resistance—are so balanced that they allow of the complete evacuation of the bladder and nothing more. If, however, the balance is disturbed, as is frequently the case in disease, disorder of the act of micturition must follow. Thus, if the prostatic resistance is increased, the expulsive power remaining the same, then a point will be reached during evacuation and before the bladder is empty

at which no more urine can be thrown out, and residual urine is the result.

Again, it is obvious that if the resistance exceeds or is equal to the maximum expulsive power the bladder is capable of exerting, total retention will follow and no urine can be passed naturally. On the other hand, if the resistance is diminished below the normal, then the bladder capacity will be smaller, and the patient will pass urine more frequently but in smaller quantities.

That prostatic resistance is generally augmented by enlargement is amply proved, not only by clinical investigation of the canal and by the fact that removal of the whole tissue restores the lost power, but also by the anatomical and pathological features the gland presents. The prostate is surrounded laterally and below by a very strong fascial capsule. This space is filled with simple and compound racemose glands lying in a groundwork composed of elastic, fibrous, and muscular tissue. Any glandular growth will tend therefore to advance along the line of least resistance—namely, towards the lumen of the bladder, but at the same time will press upon the urethra, which pierces the mass centrally, and will consequently offer increased resistance to any dilatation.

For the foregoing reasons it is contended that retention from prostatic disorder is mainly caused by increased prostatic resistance, and not so much by mechanical blocking as was formerly suggested.

Treatment of Retention caused by Increased Prostatic Resistance.

The tendency at present is to operate on all cases in which retention has declared itself, and to operate early before any routine treatment has been tried. For it is urged (1) that the disease is progressive and cannot be arrested; (2) that the kidneys are subject to back-pressure, which ultimately produces renal inefficiency and degeneration; (3) that the habitual use of the catheter invariably leads to sepsis, with local and general complications.

In reply to these arguments, it may be said that although the prostatic tissue may continue to grow, it does not follow that the resistance increases in the same proportion, and if it does, the resistance may be combated by a corresponding development of the bladder expulsive power (compensation); that there never can be any back-pressure if the catheter is properly and systematically used; and that the occurrence of sepsis is nothing more than the frank acknowledgement of a breakdown in the technique adopted with regard to the preparation and passing of the catheter.

In dealing with prostatic retention it would seem advisable first, if possible, to effect a cure, or an amelioration of the symptoms by treatment, and afterwards should this course fail or catheter life be too great a tax on the patient, then to resort to operation. The time lost will have no bad effect, in fact very often the reverse, and perhaps happily the patient may then escape the trouble of a severe ordeal.

The treatment of retention due to increased prostatic resistance should be directed to two main objects: first, to reduce that resistance, and secondly, to increase the expulsive power of the bladder.

No marked success, as a general rule, attends the treatment of the prostate alone, except in a limited number of cases, where the trouble arises either from congestion, possibly brought about by straining during the too frequent act of micturition, or from the pent up glandular secretion owing to the blocking of the slender prostatic ducts by debris or small calculi. Improvement may then be attained by appropriate massage applied directly to the prostate itself, the fluids are dispersed or expressed, slight shrinkage of the prostate follows, with a corresponding alleviation of the symptom. More, however, may be expected from a combination of this with treatment undertaken to restore or increase the muscular expulsive power. The procedure may be illustrated by describing a typical case. A patient complains of obvious and definite symptoms of prostatic enlargement accompanied by chronic retention. The urine is clear and healthy, and the prostate on rectal examination is found to be full and elastic. On introducing a catheter, immediately after he has passed all he can by his own efforts, 10 oz. of urine are withdrawn. The effect produced by the constant presence of this amount of fluid in the bladder is similar to that of a limb

subjected to continuous weight extension. It relaxes and loses its power; the loss and exhaustion in the bladder is accentuated by its struggle to expel a fluid against a resistance it cannot overcome. The amount of residual urine, if allowed to remain, tends to increase independently of any further increase in the prostatic resistance. It is evident, if any amelioration of the condition is to be effected, that the bladder must be artificially relieved of its load, and the catheter should be used certainly twice, if not three times, in twenty four hours at regular intervals.

Under this treatment the symptoms disappear, and in the course of a few days the average residual urine falls from 10 to 7 or 8 ounces, but the quantity then remains stationary. The catheter has thus far restored some of the expulsive force, but will do nothing more, probably the reverse in the future, unless it is aided by some other means. For the urine is expressed from the bladder during catheterization only by the tonal pressure, and not by any muscular contraction. The muscle during the emptying remains idle, never being called upon to exert itself, and with such inaction, or with only passive movement, it soon begins to lose its power and become inoperative. To counter this defect, and to cope with the increased prostatic resistance, it is necessary not only to maintain the existing power by exercise, but also to develop muscle strength—that is, to produce compensation by hypertrophy. The line of treatment indicated is to induce the desire to micturate while the catheter is *in situ*. The urine is then expelled in a more rapid stream through the catheter, and probably at its side through the urethra, by the gentle muscular contraction, and not by tonal pressure alone, and thus the muscle is efficiently exercised.

This treatment must be repeated regularly and for a considerable period; the residual urine will gradually diminish, from 8 to 5 and from 5 to 2 ounces, and in quite successful cases total natural evacuation will result. There are, however, one or two details to which attention must be paid. In the first place it is not always easy to induce muscular contraction while the catheter is being used. The patient feels "no desire," and cannot evoke it. The best plan then is to pass the instrument when the bladder is full—that is, when it contains not only the residual urine, but also the amount he is able to void naturally. The desire then becomes almost spontaneous. Again, as the muscle grows in strength, more and more work must be imposed upon it, though it should never be overtaxed or exhausted. A catheter of a smaller internal bore than the original should be substituted, or the catheter should be drawn slightly into the prostatic urethra and the eye partly blocked. In both cases increase of flow of urine by the side of the catheter will follow. It is found, moreover, that a catheter, or "continuous" tube, is not absolutely essential to withdraw the residual urine when muscular contraction is induced; a solid instrument (a No. 6 or 7, especially if grooved on its surface) traversing the prostatic urethra will suffice, for it separates the passage walls and leaves a chink above and below it through which the urine will escape during vesical contraction.

CONCLUSIONS.

The objects, therefore, of instrumental treatment of a case of retention from prostatic enlargement are:

1. To preserve intact the activity of the existing muscle by exercise.
2. To prevent the exhaustion which must necessarily follow an ineffectual struggle, by the use of the catheter.
3. To artificially reduce the prostatic resistance while the patient is under treatment so that the bladder may be emptied by muscular contraction.
4. To develop the muscle by gradually increasing its work as it gains strength, so that ultimately the expulsive bladder power may be able to deal with the increased prostatic resistance without the aid of artificial means.

The success or failure of the treatment, however, must largely depend on the maintenance of the urine in a condition of sterility. Too much stress cannot be laid on this point. Nothing short of boiling both instrument and lubricant is of any avail. Chemical antiseptics are useless; but with this precaution, coupled with manual dexterity, an aseptic state may be maintained for an indefinite period.