

**On improvements recently made in the treatment of stricture of the urethra
: being a supplement to A treatise on stricture and stone / by James Arnott.**

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ON
IMPROVEMENTS RECENTLY MADE IN THE TREATMENT
OF
STRICTURE OF THE URETHRA;

BEING
A SUPPLEMENT
TO
A Treatise on Stricture and Stone.

BY JAMES ARNOTT, M.D.,

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LONDON:
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THE HISTORY OF THE UNITED STATES
OF AMERICA
BY JAMES MADISON
ESQ.
A SENATOR OF THE UNITED STATES

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STRICTURE OF THE URETHRA,

&c. &c.

THE new methods proposed in my Treatise on Stricture of the Urethra effected a great and very beneficial change in the treatment of this very common and serious malady. By adopting them, surgeons were enabled to pass instruments through narrow strictures which had before been deemed impermeable, and to open the urinary channel more speedily, safely, and permanently than had before been accomplished. This change of practice was rapid as respects the neighbouring country of France, but in this country, where stronger prejudices had to be overcome, it is yet far from being completed.

Since the publication of the Second Edition of the above Treatise, I have made further alterations and additions appropriate to the treatment of particular varieties of the disease, and novel practices have been suggested by others, of which one, at least, is of great importance. It is the purpose of the following pages to notice these.

Another purpose of this supplement is to show that, although a great improvement has been effected in adopting the modes recommended of cauterising and cutting strictures

in cases resisting the common method of dilatation, inasmuch as the dangers of long continued stricture are thus averted, these cases would be greatly reduced in number if, instead of bougies and catheters, the perfect mode of dilatation by fluid pressure, now for the first time fully described, were substituted.

To the observations on stricture, it was my intention to add an enlarged transcript of a paper on Stone in the Bladder, which appeared in the 'Lancet' of the 3rd of November last, but I find that the supplement would have been thus inconveniently enlarged into a volume. Lithotrity, though an improvement as respects certain cases of this disease, has not answered the expectations once formed of it. In an essay on the removal of stone without cutting, which I published soon after the Treatise on Stricture just referred to, breaking the stone was proposed only as an auxiliary to slow and painless dilatation of the passage or outlet, when this was insufficient; and M. Civiale erred in converting it into the chief expedient. It is, in consequence, still the lamentable fact, that of every four operations on adults now performed for stone, one, at an average, proves fatal. I am persuaded that opening the way for a stone (or for its fragments, when large) by an instrument constructed on the same principle of fluid pressure that has been so long successfully applied to stricture, and already to several cases of stone, would, were it generally practised, very much reduce this rate of mortality.

The methods of removing stone by dilatation and lithotrity are generally regarded as very different operations, chiefly because their names are different. From what has been stated above, it is evident that the first of these operations might have been justly called dilatation with lithotrity, and as the second is rarely unaccompanied with dilatation, the

same appellation is applicable to it. M. Civiale, in his first work on lithotrity (published two years after my essay recommending the removal of stone by these combined measures), proposes *dilatation by fluid pressure* as the first step in the operation. The imperfection of his apparatus, and the distention by it of the whole length of the urethra, probably made him abandon this preliminary measure. The methods of ascertaining the composition of the calculus, and of dissolving it, either by means of a double catheter or by enclosing it in a pouch (devices mentioned as his own by M. Civiale in his publication, but which had already been described in my essay as suggestions of Dr Neil Arnott), he appears not to have prosecuted, though they will probably, when perfected, supersede all the other remedies for stone.*

50 York street, Portman square,
10th March, 1856.

* "The entire subject of Lithotrity, in France, took its origin from Ducamp, who, in his turn, derived his ideas from the literature of England, particularly from the two publications of Dr James Arnott."
—'British and Foreign Medical Review,' October 1841.

THAT dilatation by the bougie and other wedge-acting instruments, which open the contracted urethra only to a certain extent, can, as respects the great majority of cases, yield more than a temporary or palliative benefit in confirmed or permanent stricture, has not been an opinion held by any one possessing authority in the profession. Many alleged cases of cure by such means have resembled the alleged cures of cancer by excision: the disease said to be removed has never really existed; spasmodic or temporary stricture has been mistaken for that produced by organic change. Hunter was of opinion that "no man should rely on the cure by the bougie as lasting," and Sir B. Brodie says that "excepting a few cases of incipient and spasmodic stricture, whoever is desirous of continuing well must submit to the occasional use of the bougie ever afterwards." It were fortunate if even a strict compliance with this recommendation would insure the future comfort and safety of the patient, but such is far from being the case. The stricture again becomes narrow, and the surgeon generally finds that his difficulty has increased with every successive renewal of the task of dilating it.

"The disease (to use the words of Mr Syme) too frequently maintains its hold during life—becoming more troublesome and less manageable as age advances, so as at length to destroy all comfort by day or night—exhaust the patient's strength—and finally put a period to his existence, after a long struggle between contraction and dilatation." But, very frequently, other disease, no less distressing and

more fatal than stricture itself, arises from the long continued irritation in the urethra—disease of the kidney, bladder, or prostate gland; and this may steal on even while the opposition to the passage of urine is causing little inconvenience.

Persuaded of the inefficacy of the treatment of stricture by bougies or catheters, Hunter had recourse to caustic, and his substitution of this for dilatation was for some time deemed a practical improvement not inferior in importance to that of his operation for aneurism. The abuse of the practice in the hands of his successor, Sir Everard Home, and others, who employed it without discrimination, and probably often in a very imperfect manner, soon brought it into discredit, and eventually raised in this country an obstinate prejudice to this and all other effectual remedies of stricture. There appeared what may be termed a reaction in favour of former futile practices, and a despair of finding any lasting or radical cure. English surgeons fell into the error committed by homœopaths, who substitute for excessive hap-hazard drugging, practices which, though innocuous in themselves, are pernicious by preventing recourse being had to efficient remedies.

The opinion that our sole reliance for the cure or mitigation of this disease must be on the bougie or catheter, and that repeated dilatation during the patient's life is the *ne plus ultra* of the art, is one of the most disastrous that have ever obtained in surgery. The doctrines which once prevailed, that the hot and sweating regimen in fevers was their best remedy, and that Peruvian bark was noxious in ague from its constringing the eliminating pores of the skin, were only more pernicious because the diseases they related to were more common. Yet stricture of the urethra is sufficiently frequent to render it certain that thousands have

died miserably from its consequences who might have been saved by a timely adoption of efficient treatment.

Fortunately this fatal delusion, which has so long paralysed the hand of the surgeon, is fast passing away. Our free intercourse with the French has probably conduced much to this beneficial change, and much also is due to the talents and courage of our distinguished countryman, Mr Syme. Undismayed by the "storm of abuse and indignation," to use his own expression, with which the proposal of the external incision of stricture was received, he has succeeded in silencing its opponents, and in persuading English surgeons that, as regards at least a certain class of strictures, it is bad practice to limit their endeavours to measures which at best afford an imperfect relief of very short duration. He has convinced them that the danger from cutting down upon and dividing obstinate retractile stricture is less than that which proceeds from trusting in a very defective method of dilatation; and, now, at almost every hospital his operation is performed.

The Treatise to which the present tract is supplementary advocated the necessity of departing from the routine treatment of stricture, if a permanent cure, or even much alleviation in severe cases, was desired. Although the prejudice already adverted to was too powerful here to be then resisted by any arguments, it was otherwise in the neighbouring country of France. There caustic had neither been used nor abused in modern times; and as the inefficacy of the bougie or catheter was generally admitted, there existed no indisposition to accept of any substitute of fair promise.

Through one channel or another, but principally through the works of MM. Ducamp and Amussat, almost everything which had been proposed in my work became known, and the

suggestions were speedily adopted in the appropriate cases. The extent or breadth of strictures was ascertained in order that caustic might be applied in an efficient and safe manner to their interior, instead of their front part, as formerly. The principles of dilating cross-wise, or transversely, and of both internal incision and excision, were carried into effect; as were also the principles of various plans for facilitating the passing of instruments through very narrow strictures. Unfortunately, the most valuable proposal of all, as being the most generally applicable, namely, dilatation by fluid pressure, was not well understood by those who introduced it; and the resulting imperfection in the construction of instruments of fluid pressure has prevented this plan of treatment being used in France, except as an auxiliary to other plans. They were not aware that the membranous distensible tube, which is introduced into the stricture in its collapsed state, and then filled with fluid by a powerful syringe, should be made of strong material, so as to be capable of opening the firmest stricture, and that it should have certain fixed dimensions, so as not to dilate unnecessarily the sound part of the canal. The latest, and one of the best French writers on stricture, M. Reybard, mentions that he employs, as an auxiliary to internal incision, a fluid dilator, having a distensible tube made of caoutchouc. But the objection made to the fluid dilator, in this country, by some who did not understand its principal advantage, that its bulk required that the stricture should have already a considerable width of channel, had no weight with French surgeons, for they knew how useless it is to attempt the permanent cure of stricture by a bougie or any other instrument that cannot open the canal to its full or normal extent. Nor was this unknown to those English surgeons

who were acquainted with the great difference in diameter of different parts of the urethra. Mr Guthrie recommends opening a way for very large bougies by cutting the orifice of the canal,* but even this does not overcome the difficulty. A large-sized bougie, which dilates the whole of the sound as well as the contracted part of the urethra, often causes much injurious irritation, from the great and unnecessary amount of friction and stretching. It would be absurd to compare the action of a large bougie employed in this manner with that of the short distensible tube of a fluid dilator, which, in its empty state, enters the stricture without friction, and dilates only a very short portion of the canal.

As it was a principal object of the republication of my Treatise on Stricture to claim the priority of certain suggestions contained in the first edition, I have now the satisfaction to state that this has been fully acknowledged. The institution of the sexannual Argenteuil prize of 12,000 francs for the greatest practical improvement in stricture, the adjudication of which was entrusted to the French Imperial Academy of Sciences, rendered it necessary that the claims of originality by the several competitors should be carefully inquired into. Accordingly, in the report of the last com-

* In a lecture before the Medical Society of London ('Lancet,' May 24th, 1851,) he says: "A permanent contraction, therefore, in any part of the canal, can rarely be effectually cured by dilatation unless the orifice is enlarged, which can only be done by its being divided—a fact well known to all persons of character and experience, but which, from prudential motives, is not always distinctly stated in books."

If, by "prudential motives," be meant that writers wish to conceal from their patients the impossibility of effectually curing them by the means commonly employed, the accusation is severe, for such concealment, inasmuch as it would create a false security that may endanger life, must be deemed a wrong of no little magnitude. To conceal from one afflicted with cancer, that the excision of the tumour is at best but a palliative measure, and not calculated to prolong his life, would be doing him less injury.

mission, the claim of M. Perrève for dilatation crosswise was set aside with the observation that "the idea was not novel, it belongs to M. Arnott;"* and the claim of M. Leroy for the excision of stricture called forth the similar observation, that "the operation was not new, that M. Arnott had already indicated and described it."† M. Reybard, who obtained the prize for a modification of the plan of cutting strictures by a knife opening in the urethra, has honourably acknowledged that the method of internal incision, after having been long abandoned, was revived by the publication of my Treatise; and that in it first appeared the proposal of making the incision by an instrument that cuts while being withdrawn.‡ The priority of other suggestions in my work had long before been acknowledged in France.

But it was not only in France that these suggestions were brought forward as original ideas. Two English surgeons published the internal incision and excision of stricture as their own inventions soon after my appointment to the Medical Superintendency at St Helena, and with the first of these methods one of them succeeded in associating his name. However annoying such proceedings may be to the proposer of a medical improvement, he has still the satisfaction of knowing that the public are sooner benefited

* "L'idée de cette methode n'est assurément pas nouvelle; elle appartient à Arnott."—'Rapport sur le prix Argenteuil,' Bulletin de l'Academie des Sciences, September, 1853.

† "Cette operation n'est pas nouvelle; M. Arnott l'avait deja indiquée et decrite."—*Ibid.*

‡ "Abandonnée et proscrite, l'uréthrotomie était tombée dans un oubli si universel, qu'on la regardait, pour ainsi dire, comme une découverte moderne, lorsqu'elle fut remise en usage, en Angleterre, par M. Arnott. . . . Arnott, le premier, a doté la chirurgie d'un uretrotome coupant d'arrière en avant."—'Traité des Retrécissements de l'Urethre,' 1853.

by the extraordinary pains which, from obvious motives, are then usually taken to make it known.

The improvements lately made in the treatment of stricture, and which have not been noticed in my *Treatise* on the subject, may be divided into the five following classes:—

I.—*Means of facilitating the Passage of Instruments through narrow Strictures, or such as are permeable with difficulty.*

When the channel through a long stricture is irregular, or when two strictures which have not their openings on the same line are placed near each other, M. Leroy has proposed surmounting the difficulty of passing an instrument through them by using bougies with twisted or screw points. Some writers have spoken of these as being better adapted for the purpose than a small silver catheter, however adroitly used. But if a fluid dilator, which opens the part by its own distention, and without advancing in the canal, can be introduced a very little way into the contraction, the different portions of an irregular channel may be easily opened in succession.

The plan which I introduced (*Treatise*, second edition, p. 133) of pressing a large bougie against an impermeable stricture, at intervals, until it gives way, is now very generally practised, and, according to Sir B. Brodie and others, with great success. The celebrated Swiss surgeon, M. Mayor, afterwards proposed this method as one to be generally adopted in permeable strictures; but though unexpected advantage has often followed its use in such cases, the extension was evidently made on wrong principles, and has not kept its ground.

The expedient first recommended in my *Treatise* of taking,

by means of some very soft substance, an exact cast of the front or face of the stricture, and thus ascertaining the situation and size of the opening through it, in order to regulate the choice of the instrument and manner of applying it, has, though much employed, been objected to by certain writers, because the impression, from being altered by the pressure of the urethra during its extraction, is apt to lead into error. An American surgeon has, to obviate this occurrence, proposed the employment of a gutta percha bougie which has had its point softened by heat; but, besides other objections, any substance that cannot be again softened by the heat of the urethra might, if expanded into a bulb by pressure, be of difficult extraction. A cast of very soft wax can be hardened by means of a stream of cold water injected upon or around it while in contact with the stricture; and the same device may be resorted to in passing a small wax bougie through a narrow, tortuous channel. After it has entered, and conformed by its softness to part of the irregular track, any further attempt, under ordinary circumstances, to advance it would only cause it to bend; but by being cooled, the bougie regains the strength and stiffness which it possessed before being warmed by the urethra.

The recent introduction of anæsthetics into surgery has put us in possession of another auxiliary in these cases. Chloroform has been used with advantage where there was much irritability of the urethra. Whether the same purpose is attainable without the danger attending chloroform, by causing a stream of very cold liquid to flow through the canal, I have not yet ascertained with that completeness which would justify my speaking with decision on the subject. The use of intense cold in these affections will be again adverted to in the fifth Section.

If water conducted from a high reservoir be kept, by

proper adaptations, pressing on a stricture, we have, in addition to any sedative influence of temperature, a dilating action both on its front, like that of a large bougie, and within its channel. I have sometimes used warm water in this way with great advantage, and the procedure is much facilitated by the recent invention of vulcanized caoutchouc tubes.

These measures are complicated and troublesome, but their advantage in overcoming difficulties which may be otherwise insurmountable will be ample compensation for the pains bestowed. No one who has seen many cases of stricture in advanced stages will consider anything unworthy his attention that facilitates the passing of instruments. The patient's life often depends upon this being accomplished. Surgeons, indeed, have spoken of their unfailing success with no other means than a small metallic catheter, and assuredly there are amongst practitioners many degrees of skill; but to pass a catheter into the bladder by force may be a very different thing from passing it thither through the proper channel of the urethra.

II.—*Means relating to the Dilatation of Stricture.*

Dilatation has always been, and probably will continue to be, the principal measure employed for opening a constricted urethra. When other means are adopted, they should be regarded merely as auxiliaries for accomplishing that which cannot be effected by dilatation alone; and as improved modes of dilating the urethra become more general, there will be less necessity for having recourse to them.

Little change has taken place of late years in the construction or use of bougies, sounds, and catheters. Mr Wakley has proposed that, instead of extracting one instru-

ment before introducing another, the first of a series of tubes of increasing size, fitting into each other, should be introduced upon a solid conductor, and as many of the larger sizes be afterwards slipped over it as the resistance from the stricture or other circumstances will permit. This procedure has been found to have a decided advantage in certain cases of easily dilatable stricture, but the general defects of wedge-acting instruments, the limited extent of dilatation and the injurious friction, are not obviated by it. So far, however, from seeing any defect in the usual slow action of the bougie, some writers affirm that this is an advantage; and instead of acknowledging the utility of such quick dilatation as is contemplated in Mr Wakley's process, when it can be effected without much irritation, gravely inform us that the slower the dilatation is the more permanent it will be. A more erroneous notion has rarely been enunciated. However consolatory it may be to the patient to be told that, although he can perceive no progress, yet, if he remain for many months in his surgeon's hands, he will be the better for it in the end, the assertion accords neither with fact nor reason. Rapid dilatation is more permanent than slow; and it is so because the friction from the instrument causes, every time it passes, a fresh irritation, which hardens or alters the morbid contracting tissues. Such an apology for the slow action of the bougie resembles another apology for defective surgery, which was wont to be made before the discovery of a mode of healing varicose ulcers, namely, that it would be dangerous to cure them, as they served as an issue by which bad or poisonous humours escaped from the system!

M. Perrève, and after him Mr Holt, have suggested a steel instrument, which, like the fluid dilator, dilates the stricture excentrically by the divergence of the rods of which it consists. But these diverging rods produce an unequal,

non-elastic, bruising pressure, and are not adapted for acting uniformly on various co-existing degrees of contraction, nor for widening the diseased part of the canal exclusively to the required degree. The intention with which M. Perrière's steel dilator has been generally used is fulfilled by employing the fluid dilator in the manner explained at page 173 of my Treatise, and several such applications of it are recorded in the collection of cases which I published, illustrative of the treatment by fluid pressure; but the improvements which the fluid dilator has undergone since that time enable us to use it in a different, and, in most instances, in a more advantageous manner.

The fluid dilator consists essentially of a strong membranous tube, which is introduced into the stricture, and then distended with fluid by means of a powerful syringe. In its present improved state it will gradually open the contracted part to a diameter greater than that of the orifice or any other part of the urethra. It can be passed as easily as a bougie, and, when made expressly for the purpose, will enter a very tight or narrow stricture. As it dilates without moving forward at the time, there is none of the pain and injurious irritation from friction which is caused by instruments acting on the principle of the wedge, and no danger of piercing the canal or forming a false passage. Another advantage of this excentric or directly outward action is, that more dilating force may be exerted than can be safely used with the sound, which has a tendency in its progression to push forward the stricture and tear it from the yielding canal. The rapidity of the dilatation effected by this instrument is also a valuable circumstance, saving much inconvenience and suffering, though of less importance than its durability and the safety with which it is effected. So long an interval has now elapsed since the first employment of

fluid pressure in the treatment of stricture, that I have had abundant opportunities of ascertaining the permanency of its cures.

The improvements recently made on the fluid dilator are, the substitution of a screw for the common piston rod of the syringe; of thick mucilage for water, as the injected fluid; of a strong silk tube woven for the purpose, instead of the former one made of riband; and of a mode of rolling up a waxed tube of this description, that it may pass without a wire into a narrow stricture. The instrument may now be considered perfect. The short silk tube, lined (when smallness of size is not required) with prepared gut or thin caoutchouc, is prevented from passing beyond the stricture in its earlier stages, in consequence of the bulk caused by securely tying its outer end upon the end of the metallic tube which conducts the fluid to it from the syringe; but the other end of the silk tube near the point of the instrument, which is usually tied to the end of the elastic wire projecting from the metallic conductor, ought to be of little size in order that it may enter, and be withdrawn from the stricture, without friction. The syringe is connected with the conducting metallic tube by a piece of flexible tube to prevent its jarring, and should be large enough to contain as much air and mucilage as will be required in one application. The screw piston rod enables the surgeon to make a degree of distention that would burst the strongest silk tube, which is much more than the toughest animal texture could resist; and as the amount of pressure can be exactly graduated by the screw, the patient may be desired to regulate this himself according to his sensations. I have seen a narrow stricture which had existed for years thus gradually dilated by the patient to the normal size of the urethra in one hour; and though there will generally, in such cases, be some return of

the contraction, the advantage is always proportionate to the extent of dilatation, provided this has been effected (as it usually is by the fluid dilator, and by this alone) without much irritation. As the distention of the silk tube within the stricture can be only gradually produced by the screw, the patient is relieved from all apprehension that it will be made of a degree that he cannot easily bear. Before the idea of substituting mucilage for water occurred to me, it was so difficult to make gradual distention from the oozing of the water under great pressure from the membrane, that I often preferred making it suddenly, as will appear by a reference to the collection of cases which have been published illustrating the treatment by fluid pressure. It unfortunately happens, in consequence of the rapidity and ease with which this dilatation is made, that patients are apt to put off, or altogether decline, the use of those auxiliary measures which may be sometimes required for permanent cure in cases of old mismanaged stricture, as a security against the serious consequences of long-continued irritation in the urethra.*

The permanent cure, or long-enduring relief obtained by quick dilatation of strictures, is an argument against the opinion that this disease consists principally, if not entirely, of a deposition of new matter in the coats of the urethra, which

* I have at present such a case under my care. The patient, who resides in the country, has had stricture for thirty years. There have been frequent attacks of retention of urine, and the consequences of one of them were urinary abscess and fistula. I have attended him at various times during the last twelve years; and although the disease cannot, from its long continuance and other circumstances, be permanently removed by dilatation alone, he finds such rapid relief from the fluid dilator that he will not yet be persuaded to submit to any auxiliary measure. I am more anxious that this should be done, as on each relapse the bladder becomes irritable, and unable to evacuate all its contents. He passes an instrument himself with great difficulty, in consequence of an irregularity in the canal, which, it appears, has existed ever since he was cut for the perinæal fistula.

must be absorbed before the passage can be free. The latest writer on stricture, M. Reybard, who has paid much attention to this subject, mentions, as the result of his dissections and experiments relating to it, that there is a transformation of tissue, but no deposition. But granting it were otherwise, it is clear that all that portion of the contraction which is not a consequence of the addition of new matter can be removed by mechanical dilatation alone, and it is probable that this new matter would be sooner removed by the vital action of the absorbents, or the *vis medicatrix naturæ* after the stricture had been stretched, than when a great obstacle to the passage of the urine, keeping up much irritation, remains. If there be a deposition, the absorption of it is probably promoted more by the stimulus of stretching than by that of mere pressure, which, when short, interrupted, or occasional only, is more likely to cause than remove an increase of substance in the animal textures. Nothing, indeed, would appear better calculated to produce such a deposition than the numberless unnecessary irritations from friction caused by a tedious employment of the bougie or sound.

The history of the introduction of fluid pressure in the treatment of stricture has been given elsewhere. The improvements in the construction of instruments for the purpose, and in the manner of using them, has left nothing to desire as a means of dilating the urethra and other canals. It is deeply to be regretted that either from a misapprehension of its principle, or the erroneous notion that it is very difficult to use the fluid dilator properly, it should not, long ere now, have generally superseded the other insufficient and hazardous measures. It is indeed more difficult to use a fluid dilator than a bougie, and the surgeon himself ought, if he wishes a perfect apparatus, to be to a certain extent his own instrument maker; but these circumstances, only

involving a little additional trouble, should be no objection when so much advantage is to be gained. The delay that has taken place in the adoption of the principle of fluid pressure for the removal of stricture and stone, as well as for producing other dilatations required in surgery and obstetrics, is no argument against its excellence, for it is unhappily the case that we hardly possess a valuable remedy which had not the same difficulties to overcome, and required as much time to become established. Colchicum in gout, cod-liver oil in tubercular disease, compression in aneurism, and the excision of diseased joints, are a few of the more recent illustrations of this truth; the ligature of arteries, Peruvian bark in ague, the cooling regimen in fever, inoculation for small-pox, and vaccination, are others of more ancient date.

There is even reason to think that the great medical discovery of the day, the production of insensibility in operations by inhaling intoxicating or narcotic vapours, is only the establishment of a former and neglected expedient; and the safe and convenient substitute for these in the majority of operations, which we possess in congelation, can hardly yet be said, after a period of eight years, to be very generally adopted, notwithstanding the ample evidence of its efficacy given by many eminent surgeons, and the very important fact that it prevents inflammation as well as pain from wounds.

Much of this opposition to innovation in medicine arises, doubtless, from the unwillingness with which men acknowledge that they have too long persisted in inferior practices; but the eventual adoption of a novelty may often be more creditably attributed to improvements having been made on the original idea. It can hardly be disputed that this is the case with respect to anæsthetics; and (to return to our

subject) the alterations made in the mode of applying fluid pressure have rendered it much more useful than when originally proposed.

Notwithstanding the perfection of this means of dilatation, as it often happens that the proper instrument for fluid pressure is not at hand, it is desirable that, in substituting the bougie or sound on any occasion, the patient should be subjected to as little risk as possible. This consideration led me, several years ago, to inquire whether the common instruments might not be so altered as to be free from some, at least, of the objections to which they are liable, and, in particular, from the danger of producing false passage. The result was the improvement now to be explained.

The formation of a new or false passage is the most serious injury that takes place during the use of these instruments. When a bougie breaks through the walls of the urethra, the prosecution of the treatment is not only rendered difficult, as it continues to enter the new instead of the proper passage, but the patient is in danger of suffering from effusion of urine or urinary abscess. This misfortune is occasionally the consequence of the employment of unwarrantable force, and of passing the instrument in a wrong direction; but a more common cause of the most dangerous kind of false passage, or that occurring in the portion of the canal lying between the stricture and the bladder, is the surgeon's attributing the difficulty which he experiences in making the instrument advance, after it has passed the stricture, to the resistance which this gives to the thicker part or body of the instrument, whereas it often proceeds from its point getting out of the axis of the canal and pressing against the prostate gland or the side of the dilated membranous portion of the urethra. Not suspecting this cause, he continues to

push on the instrument, and breaks through the side of the canal.*

The danger just explained may be completely avoided by employing a catheter or bougie made with a conical rising of about an inch in length, and, when the stricture occupies its usual site, distant about two or three inches from the point of the instrument; so that, when dilatation is to be made, the point may be beyond any impediment to its progress by the time the rising has reached the stricture. Such a rising may be easily made with sealing-wax, taking care that the metallic instrument shall be perfectly clean, and previously heated, in order that the adhesion may be complete; and, in this way, a dilating wedge apparatus may be reduced to the utmost simplicity, as the precise increase of size required is made at once by enlarging the protuberance of wax.

If the raised part of the bougie be merely a double cone, the distention produced by it is of very short duration, but what may be lost in this respect appears to be compensated by the little irritation from friction. If a longer distention is desired, part of the rising between the cones must have a cylindrical form on which the stricture may rest. The bougies "*à ventre*" employed by the French, which bear some resemblance to these, are intended for a different purpose. They were introduced by M. Ducamp, under the idea that they possessed one of the advantages of the fluid dilator.

* Although the treatment by the bougie can hardly be prosecuted on the formation of false passage, there is no such difficulty as respects the fluid dilator, when the passage has been formed in the urethra beyond the stricture, because this instrument acts while it is stationary in the canal. A farmer, living near Brighton, applied to me about ten years ago, in a deplorable state, after an accident of this kind. A continuance of the use of the bougie had only aggravated the mischief. The stricture was quickly opened by fluid pressure, and, although I could never pass an instrument into the bladder, he remained perfectly free from symptoms of disease of the urinary organs.

III.—*Cauterization of Stricture.*

Opinions continue much divided on the utility of using caustic in stricture, with a view of destroying it. All agree that if properly applied it may occasionally, by its sedative influence on the irritable or inflamed part, be an auxiliary of dilatation; but most surgeons think that, if employed in such quantity as to destroy the textures, there is, from the difficulty of confining it to the morbid structure by any instrument hitherto contrived, more chance that the contiguous urethra will be destroyed than the stricture itself, and that there is danger, therefore, of renewed if not aggravated contraction from the resulting cicatrix. An apparatus, however, may be constructed by which caustic can be applied with the greatest precision.

The old surgeons used medicated bougies, which, when passed through or within the stricture, exerted an action on it similar in some respects to that of caustic, and M. Ducamp introduced into France the plan I had proposed of thus applying nitrate of silver in an efficient manner. But, unfortunately, he considered it an improvement to remove the "conductor" from the instrument, which, projecting for an inch or two beyond the caustic, lodges this safely and certainly within the previously-measured stricture. M. Civiale, in his work on the Urinary Organs, claims, as *his* improvement on M. Ducamp's instrument, the restoration of this conductor! If, in addition to the employment of proper instruments, the patient is placed in such a position as would bring the dissolved caustic in contact with some bibulous substance upon the *porte caustique*, instead of allowing it to flow over the lower side of the canal, and the precaution be taken of keeping up a suction at the end of the conducting tube by means of the constantly-acting

syphon which I introduced in the treatment of uterine cancer, caustic may be applied with almost as much certainty of confining its action to the stricture as when it is applied to remove a wart from the skin. In whatever way it is used, however, caustic ought never to be regarded but as an occasional auxiliary to dilatation.

IV.—*Incision of Stricture.*

The incision of strictures is made in various ways, according to the peculiarities of the case under treatment. The instrument is either introduced into the urethra cutting outwards, or the incision is made inwards from the perinæum.

Internal incision, again, is practised either with a knife which divides the stricture as it advances in the canal, or by one which, expanding from its sheath after it has passed beyond the stricture, cuts while being withdrawn. An immense number of both kinds have been invented which it would be useless to describe.

If one or more conical or olive blades are made to occupy the place of the coating of sealing-wax on the dilating instrument described in the second Section, we should have the simplest, if not the best form of the first kind of urethrotome; the depth of the incision being increased by enlarging the diameter of the instrument, adjoining its cutting part, with sealing-wax. A sheath adapted to the blade occupies less space than a cylindrical tube, but if it be made so blunt as not to cut *without considerable pressure* there is little necessity for any such defence, while we have a security that no part of the canal beyond the stricture will be injured. It would render the instrument still more simple if, instead of a sheath, the blunt cutting edge were covered, in its passage to the stricture, by a coating of wax or gum.

M. Reybard, of Lyons, dissatisfied with the amount of advantage obtained from the ordinary mode of cutting stricture from the inside, determined upon making a much larger incision, and found that he could thus, without so much danger as might have been anticipated, obtain a much longer continued, if not a permanent relief. The danger, however, judging from the published reports of his practice, is too considerable to authorise these extensive incisions on any occasion, unless sufficient relief cannot be otherwise obtained; far less would their ordinary substitution for dilatation, as proposed by M. Reybard, be justifiable.

Soon afterwards, but quite independently of M. Reybard's proceedings, Mr Syme carried into effect the same principle of thorough incision beyond the bounds of the stricture, by cutting from the outside instead of the inside of the urethra; and though the operation has proved fatal in several instances, the danger is not so great as to be a valid objection to its adoption in cases irremediable by other and safer means.

The cases, however, in which this treatment would be proper are very few in number; and if improved means be adopted in the earlier stages of the disease, this number will still farther be diminished. If we had only to choose between external incision and the inadequate means which have usually been employed in this country, there would be no hesitation in giving Mr Syme's plan the preference in many cases, but the choice is far from being so limited. When an instrument can yet be passed through a stricture (a condition necessary in Mr Syme's operation) other measures can be had recourse to.

It is true that, with the exception probably of excision, a thorough incision beyond the bounds of the stricture, as

practised by Mr Syme and M. Reybard, promises to give longer continued relief than any other means in certain kinds of stricture, but this duration of relief is gained at a proportionate expense of safety.* Life ought not to be unnecessarily put in jeopardy. A minor incision, involving the stricture exclusively, may be made with comparatively no risk, and when followed by proper dilating measures it will probably be sufficiently effectual; but if these measures will not answer, caustic, applied as I have recommended, or excision, may be had recourse to. The great question is, which of these plans is the safest? Mr Syme's operation of laying open the contracted urethra, by cutting down upon a grooved director passed through the stricture, is no doubt a proceeding attended with little difficulty or trouble, and so is puncturing the bladder in retention of urine, compared with the passage of a catheter; but who would prefer either of these operations to other measures, merely on that account? The statement published a few years ago, by a London hospital surgeon, that he and his colleagues had punctured the bladder a great many times, with as few fatal results as are occasioned by the perinæal section, was received with astonishment, for hitherto it had been the opinion that a skilful practitioner seldom finds it necessary thus to endanger his patient's life. He safely accomplishes the same purpose by dexterously introducing a catheter. Puncture of the bladder for retention of urine, and perinæal

* Mr Syme speaks with great confidence of the long duration of relief. In one case reported in his book, which had at a former period been under my own care, the relief was of very short continuance; but it may have been in this, as it certainly was in several other circumstances, quite an exceptional case. The bougie had been confided in much too long. The irritability of the canal had become so excessive as to render any kind of continued treatment impracticable, and at the time of my attendance anæsthetics were unknown.

section for the cure of permeable stricture, are parallel cases.*

Before concluding this Section, I shall notice a remarkable diversity that obtains between the usual treatment of stricture and the treatment of a painful affection of the rectum in some respects analogous, termed spasm of the sphincter. In the first, incision is rarely practised; in the second, exclusively. Yet, as I have elsewhere shown,† the daily passage, in the latter case, of a bougie of yellow soap (and doubtless a bougie consisting of other substances calculated to heal the small ulcer on which the spasm usually, if not always, depends would answer as well) will, by the medicament coming thoroughly in contact with the sore, speedily cure the disease. As the incision of the rectum has proved fatal from phlebitis (and its not always dividing the sphincter makes no material difference), the persistence in this measure, when one so free from danger, and probably equally effectual, can be substituted, is a curious illustration of the pertinacity of medical practices, whatever their character may be.

* A fact subsequently published by the writer alluded to, may perhaps be deemed a sufficient reason for recommending a more frequent recourse to puncture of the bladder, namely, the numerous instances of fatal false passage which he himself had had the opportunity of ascertaining by post-mortem examination. He affirms that in urethras which have been long strictured false passages will generally be found. When puncture of the bladder is indispensable, the necessity arises more frequently from other causes than stricture. About six years ago I was called to see a patient of a dispensary with which I was then connected, labouring under retention of urine which it was impossible to relieve by the catheter. He died soon afterwards in a hospital to which he had been removed, when it was ascertained that the obstruction had been caused by a large mass of hydatids embedded in the prostate gland.

† See "Essay on the Present State of Therapeutical Enquiry," p. 52; and a paper on Strangulated Hernia, in the 'Lancet' for 1843.

V.—*Miscellaneous Improvements in the Treatment of Stricture.*

Under this head I shall first briefly consider the auxiliaries in the treatment of stricture which we possess in various means of influencing the temperature of the affected parts.

Heat combined with moisture, and continued without interruption for a considerable period, has long been considered a valuable remedy in inflammatory and irritable diseases, notwithstanding the great imperfection of the means used for this purpose. The heat from fomentation is pretty continuous, but this proceeding is too troublesome both to the patient and attendant to be often applied for the necessary period; and poultices retain the temperature they first possess for only a very few minutes. As a substitute for these measures, and for fulfilling other important purposes, I, many years ago, proposed the following device:—A moistened cushion of some material suitable to the case, and having two long caoutchouc tubes attached, is placed over, under, or around the affected part, when a current of water of the appropriate temperature is made to pass through it from a large elevated reservoir.* This, with some con-

* See a Treatise on "Indigestion: its Pathology and Treatment; with an Account of an Apparatus for applying Heat or Cold uniformly and continuously in various Diseases, with or without equal Pressure." A succinct description of the current apparatus is given in Dr Watson's "Lectures on the Practice of Physic," vol. i, p. 388, and in the 'Dublin Quarterly Journal of Medical Science' for April 1848. The 'Lancet' of the 1st inst., and the 'Gazette des Hôpitaux' of the 23rd ult., mention a very important purpose to which it has been lately applied by Professor Langenbeck, of Berlin, and M. Gosselin, of the Hôpital Cochin, in Paris, namely, the excluding air from large wounds, and regulating their temperature. In the majority of cases, that modification of the instrument will probably be found to answer best in which a thin membrane (bladder or vulcanized caoutchouc) is interposed between the water and the wound, but the water can be brought into immediate contact, without any injurious ligature on the limb, by causing it to press on part of the containing bag like a valve. I recommended the dressing of wounds under water, in an "Essay on the Pre-

trivance to regulate or altogether prevent the weight of the water, is the perfect "current apparatus" for applying heat

sent State of Therapeutical Enquiry," in the 'London Medical Gazette' for Jan. 2, 1845; and a convenient form of cushion or water-muff for the limbs is described in page 105 of my account of the apparatus.

It cannot be doubted that this procedure of the perfect regulation of the temperature of wounds, and the exclusion of air from them, will constitute a great improvement in this important department of surgery. In my own practice, life has been unequivocally saved by it. Professor Langenbeck and other German surgeons have found that by keeping compound fractures, and the wound from amputation or excision of the joints, constantly in water, pain, inflammation, fever, and pyæmia are prevented; and these have been the results, notwithstanding their employment of a very imperfect apparatus. Will another period of ten years be allowed to elapse before this practice is generally adopted in England? Will the complexity of an apparatus fulfilling such important indications continue to be deemed a sufficient objection to it?

Statistics have shown a frightful mortality from the greater amputations, the deaths (taking the average of European practice) amounting to one-third of the number of operations; but there is hardly a necessity for accurate inquiry respecting a fact so forcibly impressed upon every one having the opportunity of witnessing, or even hearing of the results of these amputations where they are frequently performed, as in large hospitals and after battles. Although this great mortality may not have been increased by the use of chloroform, as some suppose, it certainly has not been diminished. The important question is, whether such fatality is unavoidable, or whether a complete alteration in the management of operation wounds might not very much diminish it. At present nothing, or next to nothing, is done in aid of the healing process. There was assuredly error in the old irrational management of such cases, the loading of stumps with plasters, pledgets, ointments and bandages, in the frequent dressings and free exposures to the air; but I very much doubt whether, in attempting nothing more than keeping the wound moist, we have not committed as great a mistake. Can nature receive no assistance from art under these dangerous circumstances? To doubt this would be derogatory to the science of surgery. By the complete fulfilment of the indications above adverted to, and others of perhaps equal importance, this long existing obloquy will be removed. By the current apparatus the temperature is accurately regulated, according to the exigencies of the case and the sensations of the patient; air is thoroughly excluded; *equal* pressure of the precise amount required is made when deemed advisable; and a soft cushion is provided for the part to rest upon. If results so important have followed the very defective manner in which some of these indications have been fulfilled in Germany, what may not be hoped from the substitution of a perfect apparatus? It was the conviction that a great desideratum existed in this branch of surgery, which induced me, six years ago, to introduce the apparatus into the

or cold uniformly and continuously ; but it is usually more convenient, when an increase of temperature is required, to use one of simpler construction. By means of a water-can, and a single tube alternately raised and lowered, a heat nearly uniform is retained without removing the cushion or disturbing the patient. Tubed caoutchouc cushions are now sold (without, of course, any reference to their originator) under the names of several manufacturers, the competition amongst whom has fortunately much extended their use by lowering their cost. In reducing the irritation attendant on severe cases of stricture or its consequences, and that which follows the use of instruments or operations, such a cushion placed upon the perinæum or pelvis is often a valuable curative appliance.

But it is from a very different temperature that most benefit is to be expected in stricture and other affections attended with inflammation or morbid sensibility.

Until a few years since the idea was universally entertained, and had existed from time immemorial, that a temperature sufficiently low to suspend the circulation of the blood, could not be applied, even for the shortest period, to any part of the body without great hazard to its vitality. I ascertained that this opinion was not only an error, but that it had prevented the discovery of what has been proved a most valuable therapeutic agent. Although intense cold is as yet mostly known for its anæsthetic quality, or as a safe substitute for chloroform in surgical operations, its powers as a

Hotel Dieu at Paris, after having sent it to the Military Hospital at Chatham, and other hospitals in this country, but the erroneous idea that it was difficult to use the instrument, very much opposed its general adoption.

The recent manufacture of vulcanized caoutchouc, as thin nearly as gold-beater's leaf, and the introduction of gutta percha as the material of the connecting pieces, tubes, and 'supporters,' have much facilitated the construction of a current apparatus suitable to its various purposes.

remedy of disease are of still greater importance.* It has another excellence. Notwithstanding the maxim that medical agents are occasionally liable to produce injury proportionate to their power, as in using mercury or opium, no instance has yet been recorded of injury from congelation—an advantage which it principally owes to its action being local.

As excessive sensibility, irritability, spasm, and inflammation are common accompaniments of permanent stricture of the urethra, and often cause temporary obstruction to the passage of the urine and of instruments, it was obvious that so powerful a sedative as intense cold might be usefully employed in the removal of these morbid conditions. Nor was there much difficulty in confining the action of the agent to the diseased part. The "current apparatus," described in the preceding page, afforded, in one of its modifications, a convenient mode of accomplishing this. By passing a current, for any required length of time, of a liquid (a saline solution, mercury or alcohol) of very low temperature over any internal part, either in contact with it or enclosed in a thin metallic or membranous tube, a cold of sufficient intensity can be easily produced. This principle of a current, which was the first that occurred to me when contemplating the remedial use of congelation, has been adopted in the construction of an apparatus for applying cold as an anæsthetic in the extraction of teeth.

In all the cutting operations resorted to in stricture, especially the perinæal section, made with or without a grooved conductor passed through the stricture, the hæmorrhage which is caused not only embarrasses the operator, but often,

* See a Treatise by the Author "On the Local Application of a Benumbing or Congealing Temperature in Inflammatory, Painful, and Malignant Diseases." Also, a paper on the Use of Congelation in Strangulated Hernia, 'Medical Times and Gazette,' Dec. 22nd, 1855.

from its amount, increases the patient's danger. We have a protection against this in congelation; and in reference to the section without a conductor, it has the advantage, while preventing the pain of the external incisions by its anæsthetic quality, of leaving the patient conscious and capable of assisting the surgeon by distending, and thus pointing out, the urethra behind the stricture.

Ice and iced water had already been used with considerable advantage in some of the consequences of strictures. M. Civiale mentions, in his "Treatise on Urinary Diseases," the use of water of this temperature in catarrh or chronic inflammation of the bladder; and in orchitis, ice has been resorted to not only as an auxiliary, but as the sole remedy. The prejudice already adverted to may have prevented the more effectual application of cold, for in orchitis, at least, congelation has proved a prompt and certain remedy. It is indicated also in inflammation of the prostate gland, and in various morbid affections of the rectum, in which cold has long been used, but rarely in a way to effect much benefit. In the irritable condition of the prostatic urethra, attended with debilitating discharges, for which Lallemand's *porte caustique* is now used, this remedy promises to be of much service. As a prophylactic of stricture, congelation will probably be found useful in subduing the specific inflammation from which it usually originates, whether applied externally or internally. When my observations on these applications of it are completed, I will lay the results before the profession.*

* There is considerable analogy between some of the above affections and inflammation of the womb and contiguous parts. For an account of the efficacious treatment of inflammation of the womb by congelation, I refer the reader to the clinical lectures of M. Aran, physician to the Hôpital Saint Antoine in Paris, published in the principal French medical journals of September and October last.

One of the most embarrassing occurrences, during the treatment of stricture, is the patient's being attacked with a short though severe paroxysm of fever, resembling ague. It has been lately proposed to prevent a recurrence of these attacks by the administration of the remedy for ague, quinine; and French surgeons speak favourably of this practice. M. Ricord recommends, with the view of preventing this affection after incision of stricture, that the urine should be prevented by a catheter from coming in contact with the wound. Instead of quinine, brandy has been given with advantage on the threatening of such an attack, and, indeed, any considerable temporary excitement might probably answer the purpose. I have mentioned, in my "Treatise on Neuralgia," that violent bodily exercise will prevent the recurrence of a fit of ague; and, as a preventive or temporary cure of neuralgic attacks, I have found this expedient, when the patient is capable of such exercise, as efficacious as any we possess.

The idea which must strike every one who makes himself acquainted with the numerous points requiring attention in the treatment of stricture of the urethra, and the diversified modes by which the indications of cure require to be fulfilled under various conditions, is, that of all the diseases in the province of surgery the treatment of stricture is the most difficult and complicated.

And this idea is correct: the management of fractures, tumours, herniæ, &c., is comparatively simple. It is not only necessary that the surgeon should have a practical familiarity with several mechanical procedures, but an exercised judgment to determine aright upon the preference one or

more of these should have to the others in any particular case, and sufficient ingenuity to modify them according to circumstances. For, cases of stricture are much diversified, and hardly one occurs that does not require some peculiarity of treatment. Simplicity and uniformity in the management of this disease have been advocated by some writers who have not reflected on this diversity, and such a system is supposed to have been countenanced by the late Mr Liston. But although this able surgeon used few instruments in his practice, he displayed his ingenuity by supplying the want with unexpected substitutes, as in using his forefinger in lieu of a dilator for the extraction of stone, and when he arrested a dangerous hæmorrhage during an operation by plugging the artery with a splinter of wood cut with his scalpel from the operating table. He had too much common sense to think that the mechanical art of surgery was not to be benefited by having recourse to mechanical science; and perhaps the most valuable contribution he made to this art consists of his additions to its armamentarium.

On no point in surgery has there been more bad reasoning than on that of simplicity and complexness in surgical instruments. Complexness is objectionable when it is unnecessary, as, for example, in the trepanning instruments represented in the old work of Heister; but there are many purposes which cannot be accomplished without complicate apparatus, and some of the greatest triumphs in surgery are due to the substitution of these for simpler expedients. To this we owe the modern inventions of lithotrity, and the cure of aneurism by compression. In lieu of the simple file with which Colonel Martin is said to have reduced the stone in his bladder, the "lithotrite" has been devised; and for the simple tourniquet originally used in aneurism, the

“elastic compressor.” By the simple expedients at first employed, the two purposes so admirably answered by these complex instruments were found to be as impracticable as it would be to fulfil the purpose which a Minié rifle accomplishes, by a stone thrown from a sling. The fluid dilator was quite as much required as a substitute for the bougie or sound, as the lithotrite and compressor were required for their respective purposes; nor was the contrivance of a safe principle of internal incision, and a safe and effectual mode of applying caustic in such cases as may resist the perfect means of dilatation by fluid pressure, much less necessary, though, from being seldom needed, they are of less importance.

Notwithstanding the truth of these remarks, it is not less the case that, in the majority of instances, very considerable relief may be given by one unvarying mode of using a common bougie or catheter in stricture. If the first difficulty can be surmounted of passing an instrument through a narrow stricture, what remains to be done, if a certain amount of present relief be all which is aimed at, is easily accomplished. The surgeon has only gradually to increase the size of instruments as far as the resistance or irritability of the stricture and the narrow orifice of the urethra will permit, taking care that in using these he does not pierce the canal or produce dangerous irritation. But is this all that a conscientious practitioner should attempt—is present relief to be his sole aim? Is it not his duty to foresee the evils that long-continued irritations from the presence of imperfectly relieved stricture produce, and to endeavour to remove their cause? If there be a safer, less irritating, more expeditious and efficacious method of dilating stricture than that in common use, should not this be adopted,

notwithstanding that it is a little more complex and troublesome? And in cases of old and mismanaged stricture with great alteration of structure, confessedly irremediable by any means of dilatation however perfect, is nothing to be attempted, or nothing of efficacy, until puncture of the bladder is demanded, or other operations of equal danger? I am persuaded that, if more efficient measures than those now commonly employed in this country were had recourse to in earlier stages of the disease, the extreme conditions requiring hazardous remedies would seldom or never occur, and that we should as rarely witness the miserable deaths now so frequently occurring from long-continued stricture and its consequences.

THE END.