

Original Articles.

A COMPARISON OF GRADUAL DILATION, DIVULSION, INTERNAL AND EXTERNAL URETHROTOMY IN THE TREATMENT OF URETHRAL STRICTURE.¹

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[This paper is intended to be little more than a framework upon which to hang a discussion of the subject, and is limited to the operative measures in the title. Organic stricture only is considered.]

I shall assume that there are now comparatively few surgeons in this country who do not accept Dr. Otis's conclusions in regard to the calibre and varying sizes of urethrae, and the proportion between the circumference of the penis and the urethra it contains, that is, that people have different sized urethras just as they have different sized noses. The average urethra is 32 Fr.; that this sized urethra will be found in a penis which measures three and one-fourth inches in circumference; that for every increase of one-fourth inch in the circumference the urethra will be two millimetres larger. So that when we talk about restoring a strictured portion of the urethra to its normal calibre we have these figures in mind.

These statements are not accepted by many foreign surgeons. And the result of their operations are the less enduring by just so much as they are disregarded.

I also assume that strictures of the anterior urethra contract more readily after dilatation than those of the deep urethra, and that strictures of the meatus contract most readily of all.

Starting, then, on this basis, the operations may be considered in the order named, dwelling only on the two important factors affecting the decision of choice of method, namely, their relative dangers and the permanency of their results.

(1) Gradual dilation is generally agreed to be the safest method of restoring the calibre of the urethra. Its mortality does not rise above one per cent. The method cannot be advantageously applied to resilient strictures, to impermeable strictures, to such as are so dense that the force requisite to traverse them converts the operation into divulsion. And, last but not least, should not be continued where constitutional symptoms appear during its use. I have seen several times the advantage of the bolder course in these cases, the last being one upon whom I recently made three attempts to dilate a stricture at five and one-fourth inches. Each attempt was followed by chill, fever and retention. I divided the stricture, as well as some anterior ones, freely with internal urethrotomy. The patient has had not the slightest disturbance since. This experience, as well as others, reiterates the statement made by Sir Henry Thompson in relation to this point, who observes:

"In relation to those cases in which rigor almost always occur after passing a bougie, I know nothing so admirable as the results of internal urethrotomy. . . . Even the operation will not be followed by any rigor, nor will the patient be likely to experience another throughout his subsequent treatment."

I do not know of any one who claims permanent

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cures of stricture by gradual dilatation, but by way of exception in newly-formed ones. The contrary opinion, is that generally and strongly expressed. Dr. Keyes, for instance, says: "Occasionally, I believe, cure results from dilatation of strictures of the deep urethra, but very rarely if the stricture has any pronounced fibrous character."

Dr. McBurney says: "I do not think that gradual dilatation ever cures an organic stricture of the anterior or posterior urethra."

Dr. S. W. Gross, in the discussion in New York in 1878, said "he considered dilatation utterly unavailing as a curative procedure."

Dr. Gouley, on this occasion, resorted to gradual dilatation first and tried to effect a cure by this means and had done so, having had some (how many not stated), cases under observation for ten years; where this did not succeed after a reasonable time he would do internal urethrotomy.

Mr. Berkeley Hill similarly says, unfortunately dilatation fails to obtain an expansion which does not shrink again, and with the exception of an early stricture is a most unsatisfactory process.

Dr. Weir thinks that dilatation is entirely ineffectual in the anterior urethra, but being safer in the deep than other operations uses it there when he can do so, but does not expect to cure by it. My own experience with dilatation is derived from the treatment of over a hundred cases, of which I have been able to keep some knowledge, and it accords with the opinions above in relation to permanent results. I have had six cases in which a cure seemed to result; all were of recent formation and wide calibre. In the rest I could never bring about a permanent result, often after trying months, in some cases years, and carrying the dilatation sometimes to overstretching. I have had one case of cystitis and pyelitis follow the use of sounds, and one of cystitis alone. The chief reason for using gradual dilatation is that it allows the patients to go about their business. In the deep urethra, except in those cases where rigors, etc., follow its use, it is safer than divulsion or internal urethrotomy. The method on the other hand is responsible for more bad urethras (false passages) than anything else. It happens to the most skilful occasionally to do damage to the urethra by the use of sounds, and just so much more often to those who have less skill and experience. The steel sound has a powerful leverage, and chronically inflamed mucous membrane is easily torn.

Divulsion is chiefly associated with the name of Perreve and Voilemier in France, and Holt in England. Its mortality is from one per cent. to five per cent.

Cases. Deaths.		Cases. Deaths.	
Holt	217 0	Caswell	15 2
Weber	6 0	Hill	120 2
Ashton	13 0	Fayer	16 0
Gouley	32 5	Christopher Heath	40 6
University Hos. .	87 6	Le Dentu	24 2

Total, 590 cases, with 23 deaths, + 3%

I know of no one who claims permanent cures by this method, but by way of exception. It is only fair to say, however, that but few operators carry the splitting or dilatation subsequent to it to sufficiently high numbers, an incompleteness which internal urethrotomy also labors under in Europe. Dr. Cabot tells me, that when this is done, he has seen enduring results. With this exception and the fact that early strictures in exceptional instances as by dilatation may be cured by this method, I have not found any

claims to permanent cures. Personally, I have never seen one, but, on the contrary, have thought it the rule to find the relapses, which I have seen after the operation in the hands of those who practice it, associated with dense deposits of connective tissue, very difficult to dilate. In many of the cases recorded in the Massachusetts General Hospital and Boston City Hospital, of *relapsed* strictures, I have found, when admitted for tight, dense strictures, they had already had divulsion performed at varying dates previous.

The reason for this is to be found, I think, in the nature of the scar made by the operation of divulsion. The wounds inflicted are beyond guidance as to direction, extent and depth. There may be one clean longitudinal rent, or many, the direction is sometimes in the long axis of the canal, sometimes as a jagged tear obliquely across it. In these respects the operation not only lacks scientific accuracy, but what is more important, lays the foundation for denser and less tractable connective tissue than was originally there. Outside the urethra it will be conceded that a scar resulting from the rending or bruising of the tissues ends in greater impairment of function of the injured part, and larger deposit of connective tissue than a clean cut. Is there any reason to believe it will be otherwise in the urethra?

This theoretical reasoning and practical experience, so far as I have observed, support each other.

Like divulsion, internal urethrotomy had its origin in France, and has been extensively practised there ever since. The mortality is the same as that of divulsion, from one per cent. to five per cent.

Cases, Deaths.		Cases, Deaths.	
Sedillot	21 1	Le Dentu	24 2
Gosselin	16 1	Terrier	11 0
Maissoneuve . .	66 3	Otis	600 0
Trelat	4 0	Teevan	53 0
Dumarquay . . .	12 0	Chr. Heath . . .	130 7
Bonlt	5 0	Coulson	206 10
Desormaux . . .	10 0	Sir H. T. . . .	340 6
Reyard	14 0	Maston	333 0
Perrin	15 0	Watson	23 0
Guyon	459 20	Tilden	18 0
Mallez	180 2		

Total, 2540 cases, with 52 deaths, + 2%.

My own experience is small, being limited to twenty-three cases, without a death or serious symptom.

Is there any difference between the two operations when applied to the deep urethra? The only one is the greater liability to hæmorrhage from deep cutting than from deep divulsion. I can find no greater mortality on the score of pyæmia, shock, infiltration, extension of inflammation, suppression, etc. It is, however, very rare to hear of a death from hæmorrhage due to deep cutting. But many of the most ardent advocates of the method do not cut beyond five inches, on account of this danger, or at any rate anxiety. But the great advantage claimed for internal urethrotomy is that it produces more cures and permanent results than any other operation. This advantage is claimed in varying degrees by different operators, as will be seen from the following quotations, in which I have included, also, the opinions of the relative merits of divulsion and internal urethrotomy as compared with each other.

Sir Henry Thompson, after giving it as his opinion that urethrotomy is the safest and best and most enduring in its results, does not claim much for it as a radical cure. "While I am free to confess that my

experience does not warrant me in promising immunity from return, we may often regard the period of return as remoté. Now and then I have met with a case in which the patient's troubles have not reappeared."

His opinion of divulsion is thus expressed: "Divulsion, at one time so much in vogue, now so completely and properly neglected."

Berkeley Hill, in *British Medical Journal*, 1879, in speaking of the two operations, says: "I have abandoned the use of divulsion for its unsatisfactory results. This is manifested, on the one hand, by the speedy shrinkage of the split tissue to its former narrowness, or beyond it, and on the greater difficulty which ensues on a second course of treatment, a new formation of fibrous tissue, the result of the operation occurs." Mentions two cases of divulsion which relapsed in eighteen and five months respectively, and were found much narrower and denser than at the first operation.

Internal urethrotomy is a safe procedure, while it has this crowning advantage that it gives, in all cases, a period of relief from stricture always measured by years, and often by a long term of years.

Teevan, speaking of permanent results of the two operations in 1880 *Lancet*, October 2d, says: "I can state from personal examination of hospital and private patients years after they have been operated upon by different surgeons, that the tough non-dilatable cicatrices resulting from divulsion contrasted very unfavorably with the soft, supple, dilatable splices inserted by internal urethrotomy."

Coulson, 1884 *British Medical Journal*, Sept. 29th, considers that internal urethrotomy gives much the most enduring results. After divulsion the cicatrices often give rise to contractions as resistant as traumatic strictures.

A. Swinford Edwards thinks that relapsed strictures after divulsion are much more dense than the original disease was.

William Thornley Stoker, *Dublin Journal of Medical Science*, 1885, vol. 79, p. 410, says: "In the early years of my practice I performed divulsion frequently, and the best expression of my opinion in regard to it is that I have completely relinquished it for internal urethrotomy. The return of stricture after divulsion is as much the rule as it is the exception after urethrotomy."

In London, divulsion is practised now in only three out of fourteen hospitals. Internal urethrotomy is practised, as a rule, by Sir Henry Thompson, Messrs. Wood, Croft, Berkeley Hill, Annandale, Coulson, Jordan, Laud, Teevan, and many more of the best men in England. Are not these last two facts sufficiently suggestive? Especially are they so when we take into account that most of these men were brought up on divulsion, and all practised it.

In France we find varying opinions as to the relative advantages of the various operative procedures. These opinions were well mirrored in the discussion that took place last spring before the Societe de Chirurgie. Among the participants in the discussion were Le Fort, Tillaux, Trelat, Pollailon, Despres, Marc See, Horteloup, Le Dentu, Kirmisson, Terrier. The discussion followed a paper by Le Dentu, who compared twenty-four cases treated by divulsion with twenty-four by internal urethrotomy. Each set had two deaths. The society was about evenly

divided in its opinion as to choice between the two operations, but gave the preference to gradual dilatation, when it could be performed, to either. It is noticeable, however, that, as in England, but few radical cures are claimed. But in both countries *the old standard practically remains in regard to the extent to which the operation should be carried.* This, I think, is the reason why there is such a wide difference of opinion between American surgeons and those of other countries as to the permanency of the results. For here, the advocates of the operation claim *permanent cures of strictures anterior to five inches, as the rule*; by permanent cures, meaning a freedom from recontraction and the use of sounds for years, generally all their lives.

Dr. Otis, of New York, heads the list of those holding this belief, and asserts that if such strictures are thoroughly cut (according to the rules laid down in the beginning of this paper), and are kept open by the passage of sounds until healing is complete, they never return. From this, which is the extreme view of the situation, some of the differences may be seen by the following quotations:

Dr. Keyes says: "I always cut strictures of the pendulous urethra internally. This cures them radically, *as a rule.*"

Dr. McBurney writes: "I have a very poor opinion of divulsion for any stricture, and believe that it seldom cures. I do not think that gradual dilatation ever cures an organic stricture. Internal urethrotomy is my constant practice for all strictures anterior to five inches, and I expect a cure *as a rule.*"

Dr. Bull practices internal urethrotomy and obtains frequent permanent results. Does not practice divulsion.

Dr. Weir practices internal urethrotomy as a rule. I do not know his opinion as to final results.

Dr. S. W. Gross, of Philadelphia, says: "All permeable strictures are best treated by internal incision, while for those situated within four and a half inches from the meatus it is the only method which holds out the slightest prospect of a radical cure. I have performed the operation too frequently not to be convinced of its superiority as to enduring results over all other methods."

My own experience is too small to contribute much to any decision, but I have been at some pains to follow the cases up, and as most of them have occurred in private practice, it has often been possible, as they are all directed to come twice annually for examination, and generally do so. The number is twenty-two. There have been no deaths, and no serious symptoms in any. No stricture has been cut that was deeper than five inches.

1.	6 years ago.	Internal urethrotomy.	Uses no sounds.	Has never recontracted since.	Has no symptoms.
2.	5 years ago.	No sounds.	No recontraction.	No symptoms.	
3.	4	do.	do.	do.	do.
4.	4	do.	do.	do.	do.
5.	3	do.	do.	do.	do.
6.	3	do.	do.	do.	do.
7.	3	do.	do.	do.	do.
8.	3	do.	do.	do.	do.
9.	3	do.	do.	do.	do.
10.	1	do.	do.	do.	do.
11.	1	do.	do.	do.	do.
12.	1	do.	do.	do.	do.
13.	1	do.	do.	do.	do.
14 to 17 recent.					
4 cases lost sight of.					
22, Total.					

Four were lost sight of after a few months. One of these, however, showed signs of recontraction be-

fore he went away, and it is interesting to note that in this case I did not divide the stricture thoroughly, having only a small Maissoneuve knife. One case has had, to my knowledge, to use sounds ever since.

With an occasional exception, then, in the cases I have been able to follow, the operation has given the patients entire immunity from periods varying from six years to one year. I cannot say that they may not contract again at some time in their lives until they and I have lived our lives, but they certainly show no disposition to do so. This, so far as it goes, forms a basis for a favorable opinion in regard to the operation. I cannot go so far as Dr. Otis in thinking that all cases properly cut are always cured, because I have seen strictures recontract after it has been done, and done well, too.

But what are we to do with deep strictures? It will be seen from the following that some surgeons hesitate to cut internally beyond five inches.

Dr. Keyes says he would never divulse or cut a stricture of the deep urethra. By preference he dilates such when possible. "In all cases of severe deep urethral stricture not suitable for dilatation I think best of external urethrotomy. I have tried all the operations a number of times, and can only give as the sum of my experience that final expression of opinion namely, the personal one. If I had a deep urethral stricture not suited to treatment by dilatation I would elect to be cut externally by a competent surgeon rather than run the risk of efficient divulsion or internal urethrotomy."

Dr. McBurney says: "In a tight undilatable stricture at five inches or beyond, I would always do an external urethrotomy. Nothing could persuade me to do a divulsion in such a case."

The opinions so decidedly expressed by two such good authorities are gaining ground in many quarters, and here it is that external urethrotomy puts in a claim as a competitor. Its mortality, based on a calculation of more than a thousand cases taken from Gregory's tables, Hœurteloup, and other sources—since the days of antiseptics—is at the highest eight per cent.: if the figures are sifted it becomes three per cent., but let the figures stand, as in the other calculations, at their face value. In the earlier days the mortality was much higher, due to the fact that dirt reigned supreme, as is shown by the large number of deaths due to pyæmia and septic processes; and, also, because the operation was rarely employed except as an emergency operation. I have only done the operation eight times without mishap.

I would call attention to the fact that when perineal section is performed for purposes of exploration of the bladder, no stricture being present, there has been practically no mortality. This gives a good idea of the danger of the operation *per se*. Its danger where long-standing deep-seated stricture is present, is at its height. Here it isn't the operation that kills, but because we are obliged to operate when the patient is prepared for death by renal complications and a broken constitution. The less serious the stricture the less risk in the operation. And, although I cannot furnish figures to support this view, I feel safe in saying that if the operation were performed earlier the mortality would compare favorably with that of divulsion or internal urethrotomy. Once a deep stricture is beyond the control of dilatation it seems to me best treated by external urethrotomy. And I would suggest that the

operation be not reserved until retention and extravasation are actual present dangers, but do it while the urethra is still permeable for a guide. The permanency of results are not so good as those of internal urethrotomy, so far as I can learn, though they are sometimes enduring, as in a case which I recently saw, in which Dr. Cheever performed the operation seventeen years ago, and the patient has only recontracted to a small size recently, and has entirely neglected his urethra in the interval. Dr. Keyes tells me, also, that he has radically cured a severe traumatic stricture by this operation. A reason why, as a rule, the results are not so permanent may, perhaps, again be found in the same reason that affects the mortality, namely, that the cases so dealt with are only the severest forms, and consequently even with a guide we can seldom divide the strictured portion with one clean cut. The cut must often be extensive, and long in healing, exposed to the air, the contact of dressings, etc.

One of the objections always urged against external urethrotomy is that it is liable to leave a urinary fistula afterward. I do not know the exact proportion of cases in which this is the case. Again, it is probable that if the operation were done earlier the healing would be more complete, and fewer fistulæ would result. It is by no means a great misfortune to have a fistula, and it may be a safety-valve. A great deal of discomfort may be avoided by using a catheter. In the first case I did the patient has today a fistula. He can urinate by the natural channel without a drop coming by the fistula by standing with his legs slightly crossed. Moreover, such urinary fistulæ can often be closed by plastic operations, so that their number may be reduced. The immediate union of the wound by suture also aids in securing this end.

(1) *Conclusions.* All strictures anterior to five inches are best treated by internal urethrotomy. Dr. Otis's operation yields the most enduring results.

(2) Divulsion should be rejected as an operation for stricture, unless it can be shown satisfactorily that where carried sufficiently far it yields as permanent results in as many cases as internal urethrotomy.

(3) Dilatation where practicable should be employed in strictures deeper than five inches.

(4) For strictures deeper than five inches not suitable for dilatation external urethrotomy should be selected, and not reserved for an emergency operation only.

A CASE FOR THE MEDICAL EXAMINER.

BY S. D. PRESBRY, M.D.

ON Saturday, June 11, 1887, I was visited by a young man, who resides in a farming-district about ten miles from Taunton. He wished to notify me of a sudden death and to ask for investigation, since he had been informed by the physician who had been called, that such was the proper course. From my visitor I learned in substance the following facts. The dead body was that of a young woman twenty-one years of age, who had been living as a domestic in his father's family. The family consisted of his father, an elderly man, whose wife had been dead two years, and his brother, unmarried, about twenty-five years

of age. He himself, and his two sisters, all married, lived in the vicinity. This domestic came into the family seven years ago, and at first acted as assistant, but at the death of his mother became the house-keeper. She had relatives in Ireland, and one sister, who was then on her way to this country, was daily expected. She had no relatives in this country except an aunt, with whom she was said not to have been on good terms. My informant and all the members of the family with whom I afterward conferred, spoke in the kindest terms of the young woman, and from no one of them could I learn anything unfavorable, either as to her character or her ability.

On this Saturday forenoon my informant was at work with his younger brother, the one mentioned above, planting upon their father's farm. His father was not at home, having gone out of town on business. The young woman had attended to her household duties as usual, and was supposed to be preparing to go with his sister to a neighboring city to do some shopping. At 11.30 the young man went to the house to get seed for planting, and on entering the house he heard groans, which appeared to come from a room in the second story. He went up-stairs, as he says, and found the door of the girl's room locked. The groans continued and he got no answer to his repeated calls. Failing to fit the lock with any keys which he had with him, he forced the door open and found the young woman quite naked, sitting in a wash-tub partly full of water, leaning back and unconscious. He placed her upon her bed, covered her with blankets and at once notified his brother, his sister-in-law and his sisters, who all live not far from his house. A physician was summoned, but before he arrived, and within a few minutes after having been placed upon the bed, she ceased to breathe.

This history was given by the young man and was evidently accepted by all members of the family as correct, nor has any doubt been thrown upon it by any thing that has been since learned.

The room and its contents had been left for my inspection, exactly as found. The young woman's clothes were lying upon a chair, there was soiled water in a wash-tub, soap-dish with soap stood near, towel was handy, and in short the room justified the opinion that she was in the act of taking a bath.

The body showed no marks of violence, and from the view and inspection no satisfactory theory of the cause of her death could be formed. A conference with the selectmen of the town, to whom the above report was made, resulted in a request that an autopsy be made, and if necessary a chemical analysis of organs. After the necessary preliminaries, on Sunday morning the autopsy was made, of which the following is the report. Twenty hours after death, rigor slightly marked; body, full and round; pupils, evenly but not widely dilated; slight "black-and-blue spot" upon the middle of the left clavicle; front of body pale, back, purplish red; no froth or bloody matter about mouth or nostrils; external orifice of vagina patulous, easily admitting two fingers; hymen not seen; rugæ of vagina, coarse and hard; nothing more learned by inspection.

Internal examination. Cut surface of scalp bloody, and an excess of fluid blood found in veins and sinuses, especially in dependent portions; nothing abnormal in the brain; incisions show no traces of air in the circulation; trachea lined with a delicate coat of bub-

¹ Read before the Massachusetts Medico-Legal Society, October 5, 1887.