The galvano-cautery sound and its application, especially in hypertrophy of the prostate : with reports of cases / by Robert Newman.

WITH COMPLIMENTS OF THE AUTHOR.

THE GALVANO-CAUTERY SOUND

(10)

AND ITS APPLICATION, ESPECIALLY IN

Hypertrophy of the Prostate,

WITH REPORTS OF CASES,

BY

ROBERT NEWMAN, M. D.,

OF

NEW YORK.

READ SEPTEMBER 8, 1887, BEFORE THE SECTION OF GENERAL SURGERY OF THE NINTH INTERNATIONAL MEDICAL CONGRESS—WASHINGTON, D. C.

Reprint from New England Medical Monthly.

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THE GALVANO-CAUTERY SOUND, AND ITS APPLICATION, ESPECIALLY IN HYPERTROPHIED PROSTATE, WITH REPORT OF CASES.*

BY ROBERT NEWMAN, M.D., OF NEW YORK.

THE Galvano-Cautery Sound, originally devised by me, for treatment of the hypertrophied prostate gland, has also been applied to other localities, and proved beneficial in kindred maladies.

To show the benefit of its use as originally intended and to elicit some interest in the instrument, I will first report one successful case as a typical illustration.

CASE ONE. — HYPERTROPHY OF THE PROSTATE—CURE.

Dr. P. F. H., aet. 60 years, has been a regular practitioner in New Jersey for the last 35 years. He suffered greatly from enlarged prostate, frequent and painful micturition, and from cystitis. He was obliged to pass urine seven or eight times during the night. Seeking relief, he presented himself to me May 25, 1886. Suffering by day and deprived of rest at

* Read Sept. 8th, 1887, before the Section of General Surgery, of the Ninth International Medical Congress.

night, he was no longer equal to the performance of his professional duties.

The history of the case shows that he had a violent cystitis as early as 1874, attended with painful micturition. His urine was dark and blended with pus and blood. He had a renewed and aggravated attack in 1879. The present attack has been marked since 1884, and authorities have made the diagnosis Hypertrophy of the Prostate, and declared there was no cure. One specialist recently said, he had an enlarged prostate, cystitis and contracted urethra, and proposed porotomy. At times he had retention of urine, and was obliged to draw it off with a catheter.

Examination.—Digital examination per rectum disclosed a hypertrophied prostate, enlarged in its entirety, with a preponderance of pars intermedia. There was a slight discharge from the urethra.

Examination of the urethra with the bougie à boule showed at $2\frac{3}{4}$ and $5\frac{1}{4}$ inches respectively from the meatus, two strictures, easily passed with a No. 18 French sound. At these points the walls of the urethra were somewhat indurated. The ejaculatory ducts were $7\frac{1}{2}$ inches from the meatus; indicating that the galvano-caustic applications must be directed

to that point as a central region. Otherwise, the patient was in perfect health.

May 26th.—The fenestrum of the Galvano-Cautery Sound (in which the platinum wire is), was brought against the hypertrophied prostate at 7½ inches from the meatus, then the cautery applied by two instantaneous flashes. The operation, occupied but a moment and was painless, the patient scarcely feeling it, and without discharge or loss of blood. The patient immediately left for home by rail, 80 miles distant.

June 7th.—The patient reports that he has suffered no inconvenience from last operation. Galvano-cautery repeated in same manner as on first operation, with same result.

June 21st.—To make more room for the instrument and enlarge the calibre of the urethra, electrolysis was applied with an egg-shaped electrode (No. 23 French) as the negative pole, against the first stricture in the urethra. The positive sponge electrode was held in the palm of the hand. Only three milliampères were used for five minutes, when the electrode passed through both strictures and into the bladder.

Oct. 5th.—A No. 23 French sound passed very easily through the entire length of

the urethra, proving, that during an interval of 3½ months, the calibre of the urethra had suffered no contraction.

Oct. 12*th.*—Galvano-cautery to prostate at 7½ inches. Three effective flashes were given.

Oct. 19*th.*—Patient feels better, has suffered no pain or unpleasant effects from the cautery, which was repeated to-day.

Nov. 9*th*, 15*th and* 22*nd.*—Galvano-cautery applied as before. Patient is better, the urine is now clear, without sediment, he voids water easier, and any residue is voluntarily passed a few moments after. He has ceased to use the catheter.

Dec. 21*st and* 30*th.*—Slight flashes of galvano-cautery to prostate at 7¾ inches.

1887, *Jan.* 24*th.*—Galvano-cautery applied to prostate at eight inches.

March 9*th.*—Stronger applications are made at eight inches. Patient has no untoward symptoms, or pain; but several days after the application passed with his urine, occasionally, small coagula of blood, without unpleasant feeling.

March 21*st.*—Light applications at seven inches. Digital examination disclosed that the gland has been reduced almost to its normal size, the left lobe only, appearing little large; the other side and the pars intermedia were normal.

May 18*th.*—Patient reports continued improvement, and that he considers himself well; he passes urine voluntarily, easily, at regular intervals; sleeps undisturbed the whole night, and can retain the water for eight hours. The urine is clear, and there is no residuum. His general health is in every respect improved.

He attends to a large country practice without fatigue and is in excellent spirits. Galvano-cautery applied at eight inches, over left lobe.

May 30*th.*—Application at eight inches repeated.

June 14*th and* 28*th.*—Galvano-cautery applications.

July 12*th.*—A No. 24 sound passed easily into the bladder without irritation or inconvenience. The meatus urinarius is small and will admit no larger size; there is, however, no valid reason for cutting it. Prostate is normal. The patient is well.

In confirmation of this statement, and in order to have a full and unquestionable record, I subjoin the patient's letter:

Warren Co. N. J. July 11, 1887.

DEAR DOCTOR: I send you statement of my malady from its inception to present time.

In June or July, 1874, I first noticed urinary trouble; frequent and painful mic-

turition; urine mixed with pus and blood. The late Dr. Van Buren diagnosed my case as cystitis. Prognosis unfavorable. With care and suitable treatment I almost fully recovered in a few weeks, though at intervals feeling more or less uneasiness, but at no time experiencing material uneasiness of the rectum. In 1879 an aggravated attack followed, with constant discharge of pus from the urethra, with all the attendant symptoms of cystitis, though with but little uneasiness of the rectum. Again with care and usual treatment of hip baths, etc., I measurably recovered.

I had for some time suspected hypertrophied prostate, and in 1879 a surgeon upon examination had confirmed this view. In 1886 with all my previous troubles coming on, I consulted an acknowledged specialist, who diagnosed enlarged prostate with cystitis and contracted urethra, and advised enlarging of the meatus. Before determining to submit to the operation, I was looking over the report of the proceedings of the Am. Med. Ass. held last year at St. Louis, and was struck with your report on treatment of hypertrophied prostate and cystitis by galvano-cautery. I consulted you, and was encouraged to be so treated. I submitted at once. The application for the first few months was weekly, and then bi-weekly. The impression is that the application is painful; on the contrary it is painless. I now feel much improved. Not two weeks before you commenced treatment I was assured of cystitis with enlarged prostate, by a specialist, and told by him that I knew the

result, and that he knew of no remedy for my trouble.

What has been the effect of these applications upon the enlarged prostate, I can only judge of from my condition at the time of their commencement and at present. All symptoms have improved.

Writers on the subject, after giving the treatment of the disease, reflect on the impotency of our art to combat it.

What will be the outcome of the Galvano-Cautery, the future must decide. Judging from my case, I feel we have, at last, a remedy by which we can assure our patients of a cure.

After application I traveled over 80 miles by rail and on foot, without inconvenience. Micturition is without excitement or unusual sensation, and urine is clear.

(Signed) P. F. H.

COMMENTS.

I submit this record as a typical case, so perfect in its simplicity, that the facts must stand unquestioned and undisputed.

My diagnosis of hypertrophy of the prostate had been confirmed, by three surgeons (of New York and Philadelphia) of the highest standing as operators, teachers and authors; whose works are recommended by Colleges as text-books, and are in almost every medical man's library. The patient is a physician, and

gives, in writing, his diagnosis of the case, its treatment and result. He feels improved—nay, well—and is so jubilant over his cure, that he is ready, in person, to give any information about his case —even to submit to examination, to prove that his prostate is now normal. He testifies that treatment by galvano-cautery is painless and without inconvenience. He has had eighteen séances. The course of treatment was under unusual difficulties; the patient traveling before and after each operation 80 miles, therefore coming very irregularly, sometimes at intervals of more than three months. It is expected that better results will be obtained, where the patient is near the operator's office and comes regularly every three or five days, as directed.

Whether or not a relapse will occur, and what the post-mortem appearance may be, the future will disclose. At present it must stand as a successful case.

THE GALVANO CAUTERY SOUND,

as devised by me, was first introduced to the profession, at a meeting of the American Medical Association, held in St. Louis, when I had the pleasure to demonstrate its working at the Surgical Section, June 5th, 1886. Since when I have constantly labored to improve the instrument.

For many years I have endeavored to apply galvano-cautery directly to narrow cavities, like the deep urethra, bladder, etc., but for want of a suitable instrument was unable. The stumbling-block was, that instrument makers would not carry out my plans—declaring them impossible; or when my proposed instrument was nearly completed, the instrument maker improved according to his idea, producing a miscarried monster unrecognizable as my offspring and better adapted for a dry dock than for my purposes.

Many difficulties had to be surmounted.

The desired instrument was a catheter-shaped, smooth-surfaced sound of small size, and so easy of introduction as to glide to the spot to be cauterized. Both poles thoroughly insulated, running side by side without touching, must be placed within the small tube of this instrument, and the mechanism so arranged that the platinum burner could be heated to the desired degree instantaneously, with certainty and beyond possibility of failure. The cautery, its beginning, duration and ending, as well as the quantity used, must be under the absolute control of the operator. The platinum must not, in its entire length, touch any thing; the heat must be concentrated, and not approach

the surrounding parts of the instrument; the connections must be perfect and act promptly. The instrument must be light, small, handy, have the correct curve, and so arranged that the operator can manage the entire procedure without an assistant. The entire mechanism must be placed within the limited space of a No. 18 French scale sized tube. Next we must have a battery so constructed as to give a certain quantity of electricity of a fixed potency, suited to the work to be done and the instrument; too high a potency will melt the platinum wires or cut the tissues like a razor; on the other hand, too low a potency will fail to heat the wires or not be effective. Therefore it is imperative to adjust the electricity necessary for our work and instrument; for the same quantity of electricity under the same circumstances will always do the same work.

It is not practicable to measure the heat for galvano-cautery, or say how many degrees we need. Sufficient electricity, and no more, must be generated to heat the platinum burner to the desired degree. According to the length and size of the burner, this heat must be adjusted; a fluid battery changes it almost every instant, by polarization. The fulfillment of

these requirements required constant hard work, drawings, models, trials, vexations, and experiments with mechanics; and while the instrument shown in St. Louis worked well, it needed many improvements. Now, I am pleased to exhibit it to you altered and improved.

GALVANO-CAUTERY SOUND.

The instrument is catheter shaped, of smooth, polished metal, with a short curve at one end; at this end is a fenestrum, in which is placed the platinum wire, the burner to be heated. A serpentine form is best for this wire; each end is firmly attached to one of the two copper rods inside the tube, and represent respectively the positive and negative poles. The other end of the instrument is straight and forms the handle, in which commence the copper rods, each of which is fastened to one of the pins or heat conductors. These two pins are connected with two electric cords by binding screws. The other ends of the two electric cords are fastened respectively to the positive and negative poles of the battery. The current breaker is movable, and when set straight and pressed firmly down on the screw, electricity is evolved and the burner instantaneously heated.

The recent improvements consist in: (1) Having the handle in one light, conven-

ient piece. (2) Having the current breaker under the immediate control of the index finger. (3) Having the fenestrum filled up, whereby the instrument is more thoroughly insulated and less liable to become heated. (4) Having the tube filled up thus preventing it from getting wet, or blocked with debris inside.

THE BATTERY.

The instrument may be heated by different machinery. Any good galvano-cautery battery may be used with the instrument, but it is necessary, as before stated, to so regulate the battery that it yields the exact electrical potency to be used for the operation. I use a Dawson battery, which works to my entire satisfaction. Experiments are necessary to establish the standard.

The heat must be of a high red color, just short of white heat, the instant the current breaker is touched; this heat must be kept while the wire is in contact with the mucous lining. Less electricity is required to heat a free wire in dry air than to heat a wire held against a moist surface. The strength of the fluid is adjusted according to these requirements; the elements are immersed in the fluid to a certain depth, the electrode wires are regulated with regard to their size, length, etc.

Having determined these requirements for the operation, there will be no further trouble. It is a certainty that, in the near future, every scientific instrument maker will construct his apparatus with the graduated measure needed, attached and regulated, so that the operator can use any measure desired. We can also use the storage battery, consisting of a series of cells, which answers our purpose as well as for electrical illumination. This battery, once adjusted with reference to the quantity needed, works with equal power and steadiness till the stored electricity is exhausted. The last of its electricity has the same effect as the first. This instrument, though portable, is rather heavy. We may use the dynamo machine, which can be operated by hand, foot, hydraulic pressure or steam, according to construction and desire. The machine above described, I have seen in St. Louis, at the store of Mr. A. S. Aloe, corner 4th and Olive streets.

I repeat, no matter what kind of a machine is used, a fixed measure of electricity is necessary. You will see its action in some of the experiments; beginning with one flash of light, to be followed by several quick flashes. If the wire is heated slowly, becoming warm and gradually

hotter, till the desired heat is obtained, it shows that the instrument is faulty in its construction, consequently must be imperfect in its results. In experimenting with the instrument on mucous linings, we find that a galvano-caustic application of the same power acts differently according to the length of contact with the tissues. Thus the effects can be regulated from a light blush to the total destruction, or even amputation of the tissues.

It is a misconceived idea of many, that the galvano-cautery necessarily burns, destroys, and is followed by cicatricial tissues. Nevertheless, this is a favorite objection of some ignorant persons and enemies of electricity. If the operator bungles, or wishes to destroy, he can, but the expert will not. It is well known that eminent neurologists apply galvano-caustic directly to the faces of young ladies, without ever causing marks. All depends upon the manner of application. Even deeper applications on mucous linings may cauterize without destroying. Voltolini, Carl, Michel, Shurly and Yeamans of Detroit, and many others, have applied the cautery to the nasal and pharyngeal cavities with great success. Therefore, it is evident that different methods can be instituted with the instru-

ment, and applied for various purposes to different parts.

Each of these batteries has its advantages and disadvantages. At present none is perfect. The operator mnst adjust the quantity he needs to use in each instance.

We will now demonstrate the practical workings of the instrument, by experiments.

Please note the instantaneous heating of the wire, which I show, holding the instrument free in the air, by making :

1st, One short flash.

2nd, One long flash.

3rd, Several flashes in succession.

The physiological effect on mucous lining direct, you can see by the specimens.

No. 1 is made by one flash.

No. 2 is made by several successive flashes.

No. 3 by longer contact or deeper cauterization.

No. 4 by still stronger application, for destruction of tissue.

HYPERTROPHY OF THE PROSTATE.

We will now consider the application to the enlarged prostate, as the instrument was devised mainly for that purpose. I omit any consideration of the anatomy, phy-

siological relation, pathology, etc., of the prostate in health and disease, as it is well known to you all, and not within the scope of this article: though of late valuable additions have been made by Mr. Reginald Harrison, (Liverpool Med. Chirurg. Journal, July, 1885), and by A. H. Wilson, M.D., of Boston, at the last meeting of the Ameri. Med. Ass. (not yet published). It is sufficient to say that hypertrophy of the prostate, is of frequent occurrence, causing much suffering and death. While there are some isolated happy results by treatment, it must be admitted, that no satisfactory treatment for the cure has been established. Hence this field in surgery needs improvement. I have proposed in the treatment of prostate enlargement, three methods of galvano-cautery:

1. The regular (slow) method by the Galvano-Cautery Sound.
2. The rapid method, in one séance.
3. The operation for radical cure by the removal of the hypertrophy.

I.

THE REGULAR (SLOW) METHOD BY THE GALVANO-CAUTERY SOUND

Will principally occupy our attention. This address is chiefly to bring its utility to your attention.

I prefer and recommend this treatment, as it has done good service. It consists in giving to the substance of the enlarged gland, a short application, from an instant to a few seconds in duration. This produces not more than a white film similar to the effect of nitrate of silver, in the treatment of Desormeaux.

Modus operandi.—The Galvano-Cautcry Sound is connected with two electrode cords, which are then attached to the two binding posts of the battery, each respectively to one pole, or in case of the Dawson battery, to the zinc and platinum poles. The fluid in the cells must be of the right standard, and all the machinery in perfect order. When all is in readiness, I invariably let the elements down and try my instrument with a short flash. No matter what assurance I have of the perfection of the appliances, this little precautional trial excludes any failure. The prostatic portion, to which the cautery is to be applied must have been ascertained, and the distance from the meatus measured. This distance is then marked on the instrument by a small rubber band. The patient, according to his preference, may stand erect, be on an operating table or in bed. The instrument is then introduced so that the fenestrum with its platinum wire

is in contact with the part to be cauterized. The operator will know by touch when the instrument is in the right place and the measure will corroborate the correctness of the situation. One hand holds the instrument in this place firmly, while the other hand sets the battery in motion, and then the current breaker is placed in a straight line and pressed firmly upon the screw, a flash follows, and the raising of the finger from the current breaker disconnects the current. In one moment the operation is finished and the instrument withdrawn. It causes no pain, and in some instances the patient scarcely believes that anything has been done. He is able to walk about and is not detained from his business. In cases of very sensitive patients, I have used cocaine injections, but it was scarcely necessary. The seance should be repeated in about three days, or even in two. The instrument must be kept scrupulously clean, as the cautery will fail if there is dirt between the connections.

The question now arises how does this method bring about a cure?

The end sought, is first to remove the obstruction, so that the bladder can discharge all the urine, and at regular intervals, and then to reduce the prostate to its normal size. The theory is that the cautery

first acts as a tonic and next as an astringent; the mucous lining shrivels up, and the glandular tissue contracts, and by shrinkage the size is diminished. The stimulation gives new life and healthy action. Each repetition of the operation acts similarly, and perhaps on another part of the hypertrophy. The operation must be continued until the cure is effected. Care must be taken not to overstimulate, and cause prostatorrhœa, prostatitis, etc., thereby creating or aggravating the very ailment we seek to cure. The cautery must be given just severely enough to accomplish the object and no more. If the cauterization is too prolonged and too deep, the glandular action is overtaxed and weakened and will be followed by a terrible prostatorrhœa, which takes a long time to cure. At the same time an inflammation is created, which causes pain and swelling, and at last, the too greatly cauterized tissue will slough away and may cause septicæmia.

For these reasons I prefer the slow method described, and am opposed to rapid methods, or too deep cauterizations.

The practical workings I judge by analogy, from observations of the cautery in hypertrophied tonsils. Great similarity of structure exists between the tonsils and

the prostatic gland—both are glandular organs, covered by mucous lining, having epithelium; both are secretory organs, having ducts, follicles, canals, and one, twelve to fifteen orifices and the other twelve to twenty small excretory ducts. In hypertrophy of the tonsils, after other remedies had failed, I succeeded by using galvano-cautery with this instrument. The application was made in the cases of children of very tender age, who stood free before me, and without any aid or force opened the mouth and went through the operation without flinching. Not one complained of pain, all came back to have the cautery repeated, and then stood still with more confidence than at first. In these cases the immediate effect was a splendid illumination of the whole buccal cavity, and a white film was seen on the tonsil after withdrawing the instrument. The cautery was repeated in two or three days; in one case the next day. Sometimes the cautery was repeated in the same place, at other times, from preference, an adjoining place on the tonsils was selected. Almost daily observations of this series of cases convinced me that the galvano-cautery acted practically just as I theoretically described. The patients were benefitted, the tonsils diminished in size, and

a cure effected. It was remarkable how soon the mucous lining regained its normal color, and when a deeper cauterization was used there was no unpleasant slough, only a patch was observable, like in appearance to follicular tonsillitis. The instrument was well adapted for the tonsils, the curve suited exactly, the fenestrum could be held against the exact place to be cauterized, without possibility of accidentally burning any other part.

In treatment of the enlarged prostate by galvano-cautery, it is absolutely necessary to pay attention to other symptoms and troubles of the patient, according to established principles. Pain must at all hazards be allayed; this I generally accomplish by rectal suppositories. Chas. Mitchell, of Philadelphia, prepared for me some gelatine articles which act very well. In medication I rely mostly on belladonna. The bowels must be kept regular, as constipation adds considerably to the inflammation, and by pressure causes pain. While the galvano-cautery is used it is of the greatest importance to attend to the state of the bladder, by drawing off the urine and washing the bladder out.

This treatment is indicated in all cases of enlarged prostate, where urgent necessity for *immediate* relief does not exist,

and particularly in such cases, where the patient is perambulant. It is useless if the patient is in the last stages of albuminuria, where uræmic poisoning may carry him off at any moment. The earlier the treatment is instituted the better results may be expected. Will this treatment cure always and in all cases? No.

From present experience our treatment will improve, and cure, only when the hypertrophy has not been allowed to become too great and other complicating troubles have not advanced to a dangerous condition. It is impossible to state the exact size of the enlargement which can always be cured, or the limit of the enlargement beyond which this treatment would be useless. The general state of the constitution and health, habits, business relations, temperament, the home and its surronndings and attention to details of orders in treatment, all have an influence on the progress of the treatment and its results. The time needed to effect an improvement, or a cure, depends principally on the size of the enlargement and frequency of the applications, also on the habits of the patients.

The aim of this treatment is to remove the obstruction to a free discharge of urine, thus relieve the bladder from dis-

tention, inflammation and degeneration; finally to reduce the hypertrophy of the prostate, thereby preventing a recurrence of this painful bladder trouble and its consequences.

Theories are subject to doubt and discussion. I have given not only a theory, but have shown that a desired object has been accomplished, that hypertrophy has been reduced and bladder troubles terminated. I am sustained by patients who testify to the efficacy of the galvanocautery sound and by the report of cases.

In conclusion I again deny that the treatment properly administered will so cauterize or burn as to destroy tissues. But slight flashes, which are harmless, must be used frequently and carefully to effect the object contemplated.

For these reasons I practice and recommend this first method.

The question may be raised whether or not good results in hypertrophy of the prostate cannot be obtained by electrolysis rather than by my method of galvanocautery. Electrolysis has been used and some cases reported with favorable results. I have tried electrolysis in various ways. Sometimes progress was made; but I never could establish a method, which cured, or could be recommended. In my

report of "Electrolysis in Surgery," (Journal Am. Med. Ass., April 25th, 1885, p. 452), I have mentioned the subject. The drawback appears to be that the application to the prostate acts too quickly as an over-stimulant; causing greater inflammation instead of diminishing the hypertrophy. While I am writing this, a favorable result in one case comes to my notice. It is reported by Dr. Bryce, the genial editor of "Southern Clinic," (Southern Clinic, Aug., 1887, p. 232). The report is graphic and concise, showing the suffering and misery in this malady; corollary, the necessity of a certain method of benefit to such patients. For these reasons I quote Dr. Bryce's case in his own words:

"The subject to whom I refer was an old gentleman, 74 years of age, of fairly good general health, and whose circumstances in life no longer necessitated any exposure or business worry. For ten years he had suffered with severe cystitis, due to enlargement of the prostate. His attacks of pain, worry, burning and general discomfort would come and go, but never left him entirely, and when he came under my care he had gradually reached a state of complete wretchedness. His urine was voided every half hour, with sudden pain-

ful spasms of the bladder, in small quantities, burning like fire and loaded with fœtid pus. His general health had suffered terribly, with loss of sleep and constant pain by day, his life had become a burden to him. Utterly unable to control his frequent desire to urinate, he wore an urinal constantly, in order that he might be able to leave his house and return in any condition of comfort or cleanliness. In this condition he sought our assistance, and with a hope of palliating the trouble we undertook the case.

"Hygienic conditions were observed, local treatment by counter-irritation, attention to the evacuation of the rectum, general remedies, and everything I could think of was given a fair and honest trial. The condition of the urine was treated, the bladder irrigated, the catheter used, but all to no purpose; my poor old friend went from bad to worse. I finally told his family that I could do but little more for him, and suggested the last remedy which surgery offers these unfortunates, viz., to open the bladder and give it rest, as in the case of lithotomy. But before resorting to this I proposed the use of galvanism to prostate through the urethra. The patient and family readily consented to anything I proposed that could possibly

offer even temporary relief. Inviting my friend, Dr. R. A. Lewis, to assist me, I passed an insulate sound down to and upon the prostate, leaving a certain metallic portion in close proximity to the hypertrophied gland. I then used a current of eight cells, (McIntosh), for five or ten minutes, when the old gentleman became very faint, and I withdrew the electrode and put him to bed.

"In a few hours he had a violent urethral chill, which lasted an hour or more, and was followed by a fever which lasted for twelve hours. After this a sudden and marked improvement set in ; all his symptoms were better and he enjoyed relief he had not obtained for years. At the end of one month his trouble began to return. I again used galvanism, as before, which was followed by chill and fever with steady improvement, and I have never given him a dose of medicine or used anything else for him since. His trouble is gone, and has been gone for a year ; he has thrown away his urinal, has grown fat, is healthy, hale and happy, and I believe is cured, for the time at least, by two applications of galvanism."

While I have had in some cases good results, similar to Dr. Bryce's, I have failed in others, and in some the galvanism has

made matters worse. One difficulty is to regulate the current to each case. Then these cures are isolated and do not definitely establish anything. Besides fainting, chills, fever, etc., in old men, are not pleasant after-symptoms.

My method of treatment of hypertrophied prostate with the galvano-cautery sound I prefer for the following reasons: It has benefitted or cured all cases under observation; a reasonable time has passed without any relapse; it has caused no pain, no detention from business or pleasure; no untoward after-symptoms or circumstances have ever occurred.

Though the first case reported in this article is a typical case, I will mention briefly a few other cases.

HYPERTROPHY OF PROSTATE, STRICTURE URETHRÆ, CYSTITIS.

CASE II.—B. S. J., æt. 63 years, New York, a business man, came to be treated for stricture of the urethra. His family physician was unable to pass any instrument through his urethra, and after many weeks of hard work daily, gave it up.

December, 1885.—The patient came under my observation suffering from the effects of the strictures, cystitis and an enlarged prostate. He could not pass any stream of water, it only dribbled away;

sometimes with severe pain and tinged with blood and pus. He was treated for the stricture first till the calibre of the urethra was enlarged sufficiently for the introduction of the galvano-cautery sound.

March, 1886.—Before the galvano-cautery sound reached the prostate region, at $6\frac{1}{2}$ inches from the meatus a sore congested place was found, which caused an unpleasant hemorrhage on the slightest touch. At short intervals two applications of the cautery were made, each by a long flash.

April, 29.—The last application was so successful that the slightest hemorrhage has not since occurred even on the passage of the instrument. Patient felt well and went South.

1887, *February*.—Patient has felt comparatively well and desires to be treated for enlarged prostate.

From February till June 1st, six galvano-cautery applications were given to the prostate at $7\frac{1}{2}$ to 8 inches from the meatus. Each séance consisted of two light flashes, one towards the right, the other towards the left of the prostate.

June.—The hypertrophy has been reduced, the strictures have not reappeared, he emits normal clear urine, in a good, steady stream, without any trouble. He

considers himself well, and left for the country.

CASE III.—J. C. A., æt. 66 years, Vermont.

June 4, 1886.—Had a bad stricture, nearly fifty years old. Fonnd on digital examination per rectum, a general enlargement of the prostate. The stricture was four inches from the meatus, and admitted only a No. 12 bougie, French scale. The stricture was treated successfully by electrolysis till a No. 28 French was admitted.

The prostate was treated by the galvano-cautery sound, (as above described), with light flashes. Only three séances were held during the month of July, when the patient felt so much improved that he discontinued further treatment, because he considered himself sufficiently comfortable, and the trips between his home and my office were too troublesome for him.

CYSTITIS—HYPERTROPHY.

CASE IV.—B. H. G., æt. 63 years, New York city.

Has an aggravated cystitis, with violent spasms and pain in consequence. The prostate is very moderately enlarged. In this case it is hard to decide whether the prostate hypertrophy was the cause or the result of the cystitis. He had been treat-

ed by two physicians for strictures, who had done their work so well, that on examination, I found a healthy urethra of good size. But the pars intermedia was pushed upwards by its hypertrophy so that the whole urethra was thereby elongated, and it took nine inches to reach that part with the galvano-cautery burner.

August, 1887.—One month passed in treating the cystitis, particularly in allaying the spasm, washing out and dilating bladder.

During September four galvano-cautery applications finished the treatment, and the patient left apparently well.

Case V.—W. S. S., æt. 61 years, New York.

During four years has been unable to void urine voluntarily, and had to use the catheter frequently on account of constant desire to micturate, accompanied with pain —he had been under treatment for an enlarged prostate with the usual result. The urine is loaded with pus and mucus, appearing in thick ropy masses, and sometimes blocking up the catheter, causing more spasm and pain.

Oct. 13, 1886.—On digital examination found the prostate hypertrophy general and of the size of a hen's egg. The patient suffers greatly and his

general condition is pitiful. He has lost flesh, is very anæmic, in constant pain, unable to do any work, scarcely able to move, and his countenance indicating approaching dissolution. There is no stricture; the urethra is of good size; but a metalic catheter meets the obstructing prostate, and is grasped tightly by the bladder, so that washing out the bladder is almost impossible. The history of this case shows that hypertrophy of the prostate was the primary cause of the obstruction, using the catheter acted as an irritant and was followed by severe cystitis with spasm and loss of power of micturition.

Oct. 18*th.*—Soft rubber catheter does a little better, and was used in washing out the bladder.

During the balance of October and in November systematic washing out of the bladder was continued, the spasms allayed, and by degrees the bladder was dilated by injecting hot water, sometimes medicated, as a sedative.

Oct. 19*th.*—Patient is improved, the bladder is quiet, without spasms or pain. The urine contains no sediment and has assumed a normal color. He can hold the urine two and a half hours, when use of the catheter is necessary. He feels easier, the bladder tolerates one half pint of urine.

Bowels are better, but still act sluggishly, appetite is improved.

Nov. 24*th.*—Galvano-cautery sound applications were made at $8\frac{3}{4}$ inches from the meatus to a part of the hypertrophy ; a few slight flashes were given.

Nov. 30*th.*—Galvano-cautery repeated.

December.—Electricity was applied externally, faradic as well as galvanic. Patient is much improved, no pain in the bladder, no contractions, but a sensation that water should be voided, when he uses the catheter. Urine is now clear without any sediment.

1887, *January.*—Five galvano-caustic applications were given during this month, generally two flashes, one to the right and the other to the left side, without pain or loss of blood. Patient is much improved. The prostatic enlargement has materially decreased. The sound passes very easily, without impediment, causing no pain or inconvenience to the patient.

March.—The galvano-cautery flashes have been continued at intervals of two weeks with good success. Once, with stools, a natural micturition occurred and almost $1\frac{1}{2}$ ounces of urine passed in a good stream, per urethram, for the first time in four and one half years. I continued treatment in the same manner.

Urine now passes regularly with stools, but bladder will not always act at will.

June.—Passage of the urethra is free. Sound passes easily.

July.—The hypertrophy is so reduced that it is scarcely felt. In fact, it may be considered cured. The treatment is continued only by external electric applications, with a desire to regain voluntary action of the bladder, which has been inactive for nearly five years.

The patient has received twenty-four galvano-cautery applications.

Case VI.—W. F. R., æt. 59 years, of Brooklyn, was brought to me by Dr. Russell, to be treated for stricture. On examination with bougie à boule a stricture was found, but on subsequent electrolysis, while the electrode passed that stricture it would not enter the bladder, nor would any other small instrument.

1886, *December 14th.*—On examination the prostate was found to be greatly hypertrophied. Patient feels uneasy, and has a desire to micturate frequently. Galvano-cautery was applied to the prostate and repeated on December 28th.

1887, *January.*—Prostatic hypertrophy has diminished, patient feels much better. All the former obstructions were due to the enlarged prostate, and now a Sound,

No. 28, passes easily. Galvano-cautery repeated at 7 inches from meatus. Patient went west.

April.—On returning from the West, reports great improvement. Feels almost well.

During April and May four more galvano-cauteries were made and patient dismissed, being entirely well. Seven applications had been made.

Case VII.—D. H. M., æt. 75 years, Westchester Co., N. Y.

1886, *Dec.* 1*st.*—So much troubled with a desire to micturate frequently, that he is obliged to empty the bladder four or five times during the night.

While there is a constant desire to urinate, he feels an obstruction, and oftentimes the water only dribbles away. There is sometimes hæmaturia, and the urine is always loaded with pus and mucus. On examination found hypertrophy of the prostate, more enlarged in the lateral lobes. He also complains of hæmorrhoids and costiveness.

Rectal suppositories were ordered of iodide of potassium, hyoscyamus and nux vomica.

Five galvano-cautery applications were made direct to the prostate, once a week for five successive weeks, which caused neither pain or uneasiness.

The old gentleman traveled each time a good distance on railroad, and five miles in wagon, in very inclement weather during the winter.

He made a good recovery, the prostate was diminished in size, and he discontinued further treatment, feeling well.

I did not consider it a perfect cure, but learned in August from his family physician that he has continued well.

I have used the galvano-cautery sound with perfect satisfaction since October, 1885. It has answered its purpose and never caused pain or uneasiness, and no untoward after-symptoms ever occurred, when it was applied with care.

The cases are all so similar that the foregoing will suffice.

This treatment is indicated in all cases of enlarged prostate, where urgent necessity for *immediate* relief does not exist, and particularly in such cases where the patient is perambulant.

The galvano-cautery sound has also been employed in other diseases, with good result. I mention briefly some of its uses without record of cases.

Spermatorrhœa.—This disease is rare, but one genuine case was treated by applying the cautery to the ejaculatory ducts at 6 inches from the meatus. The

application was repeated once a week.

Impotence.—In several cases the galvano-cautery was applied to different places, such as prostate, Cowper's glands and the ejaculatory ducts. The treatment was aided by other means.

In diseases of the bladder the instrument has worked admirably, particularly in villous tumor with hæmaturia, and traumatic ulcer of the bladder. The patient had been injured; a ragged wouud near the neck of the bladder was transformed into a chronic ulcer. The place could be felt by the introduction of the instrument; the patient himself could give the best information when any instrument came in contact with the ulcer. One patient weakened by constant hæmaturia, for years, passed no bloody urine after the first application of the cautery.

Urethral granulations, denuded surfaces, and ulcers readily yield to the galvano-caustic treatment. Frequently patients present themselves to be treated for a chronic discharge; some call it leakage. I consider it error to assert that all chronic discharges of the urethra spring from strictures. On the contrary, I often find that when strictures are radically cured, the old troublesome discharge remains.

For twenty years I have treated such cases by local application through the endoscope. Generally we find chronic granulations, which yield to local circumscribed applications of nitrate silver, repeated at intervals. Sometimes we find denuded surfaces, which bleed at touch, sometimes chronic congestions, and even ulcers. With these affections the galvano-caustic has done better and cured quicker than the old method. The endoscope is needed to diagnosticate and locate the diseased spot.

II. THE RAPID METHOD BY THE GALVANO-CAUTERY IN ONE SÉANCE.

It consists in passing an instrument by galvano-cautery through the obstructing prostate and establishing a new free passage in one séance. This method is plausible, but not practicable at present. Prof. Bottini, of Padua, practiced a similar operation with success. He constructed his own instrument, and used galvano-cautery against the offending portion of the prostate, for forty-five seconds.

The patient was kept in bed afterwards, and on the twenty-fourth day, for the first time, passed water voluntarily. It took six months before he was cured. While I admire the zeal of Bottini I scarcely

think his method will become popular. His instrument is very clumsy, unhandy and needs so large a galvano-cautery battery as to be too heavy to be moved about. His instrument is shaped like Heurteloup's lithotrite, without any curve, the end only having only a short coudèe like Desormeaux's fenestrated male endoscopic tube. Such an instrument is exceedingly difficult to introduce, and in many cases of hypertrophy unintroducible. The intention is to push this instrument into the bladder, over and beyond the enlargement of the prostate, then to reverse it inside, so that the beak is turned downwards. The galvano-cautery knife is (à la cashée) inside the beak, and moves outward by turning a dial on the handle, while the battery heats it, thereby making a central cut and division in the obstructing prostate. While the idea of the operation is excellent, I cannot approve of the instrument.

There are many objections to this method. It is a very severe and uncertain operation, with an immediate shock, followed by pain, much suffering and inflammation, which may cause a new obstruction, partly by spasm of the bladder, and partly by the débris of the destroyed tissue, which may also cause a septicæmia. If

some of my friends object to this method, saying that it is effected by burning a hole through the tissues, they have a good cause for discussion. It is a dangerous and uncertain operation, and at best the patient is kept in bed for a long time, in pain and anxiety.

At the commencement of my remarks under the second division of my subject, it was stated that this operation is plausible. I have devised an instrument for performing it. But I have been disappointed by instrument makers in the satisfactory presentation of my idea. The perfection of the instrument belongs to the future.

III. THE OPERATION FOR RADICAL CURE BY GALVANO-CAUTERY.

This consists in the removal of the hypertrophy by galvano-cautery in situ, and in one operation, access being gained by either perineal section or laparotomy.

This removal may be partial or entire. It can be done with the galvano-cautery burner or wire sling.

This operation is indicated, in fact, we may say peremptorily demanded, when the patient is in immediate danger of succumbing, and no time is left for a slower method of procedure. This state has arrived, when

the hypertrophy causes absolute retention of urine, and there is no possibility of gaining an entrance through the obstruction so as to evacuate the bladder. Complications have generally taken place and the fatal end is within a few hours, either by rupture of the bladder or uræmia, as even aspiration of the bladder would only give temporary relief.

My radical operation, proposed for such a state, is not free from danger, but as the patient without such severe means will succumb in a short time, the operation cannot decrease his chances, on the contrary can only increase them.

Besides, through recent inventions and improvements in like surgical cases, and antiseptic precautions, the mortality has been reduced to a very small percentage, so that such patients have fair chances of a full recovery.

The rationale of the operation proposed will be seen better by a retrospect of recent doings in this line of surgery. Different operations have been reported of successful cases by excision of the hypertrophied prostate with the knife after perineal section. As such reports are on record and well known, I cite but one case, which I give in detail.

CASE VIII.—HYPERTROPHY OF THE PROSTATE—SUPRA-PUBIC OPERATION—GALVANO-CAUTERY—PERINEAL SECTION—PROSTATOTOMY. RECOVERY.

H. M., æt. 66, English, widower, has suffered from an enlarged prostate for ten years past, which gradually prevented voluntary micturition. Three years ago he began to use a catheter. One year ago the catheter broke, and part was left in the urethra. All efforts to remove this part failed. He went to the Hahnemann Hospital in New York, where the piece of the catheter was removed by the Supra-Pubic operation on May 20th, 1885. The broken piece had remained in the bladder two weeks. A catheter was left in the opening of the wound through the abdomen, as an outlet for the urine. This outlet was left open, so that the urine was emptied through a continuous rubber tube into a vessel, as soon as it entered the bladder, leaving the bladder in a constant collapse.

1886, *Feb.* 11*th.* I saw him for the first time. He was in a tolerable condition, in bed, at his house in Brooklyn, with his harness of rubber tubes and catheter in abdomen attached. He was troubled very much with spasm of the bladder. A metal catheter, No. 21 French, passed per

urethram into the bladder with less difficulty than expected. The water injected into one opening passed out through the other outlet pretty clear, and in a full stream. Only spasm of the bladder troubled him. Such water will run well at eight inches from meatus. Urine contains pus—some phosphatic deposits and is cloudy. Examination, per rectum, found a slightly hypertrophied prostate. Urethral suppositories were ordered, containing belladonnæ and opii. Bowels are nearly regular.

Feb. 12*th.*—Bladder was washed out and gradually dilated. It would not tolerate more than 1½ ounces of urine. The urine was allowed to accumulate in the bladder by stopping the drainage tube with a cork; when enough had accumulated, it was let out. During the night the water was let off four or five times, between which the patient enjoyed a good sleep.

Feb. 13*th.*—Had some voluntary micturition, per urethram. This is the first voluntary micturition in a year. Can hold in bladder 3½ ounces. Catheter, No. 23, passed easily over prostate, into bladder. Urine ran out at eight inches, but at 7¾ the water stops.

Feb. 16*th.*—Galvano-cautery applications were made to the prostate at differ-

ent places; four flashes were given without pain.

Feb. 18*th.*—There was improvement. Endoscope was used and showed an almost healthy bladder.

Feb. 20*th.*—Galvano-cautery to prostate—three prolonged flashes. Patient felt the cautery but no pain or inconvenience therefrom.

March 2*d.*—Had consultation with Dr. Hutchison, who approves the treatment and maps out the boundaries of an enlarged prostate. Galvano-cautery repeated.

March 9*th and* 13*th.*—Two more galvano-cautery applications to prostate.

Patient discontinued the treatment. He was improving steadily, and knew no reason for the discontinuance.

April 3*d*, 1886.—He went to Brooklyn Hospital where Dr. Hutchison performed perineal section and prostatotomy. Patient was on the operating table about one-half hour. Two hours after operation began to bleed quite freely and was in great pain and required morphia.

April 4*th.*—Passed a very restless night having a great many spasmodic contractions of the bladder. Bladder washed with borax solution and a large rubber tube inserted, but it does not seem to work very

well; much of the urine coming through the old opening.

April 5th.—Still continues to have very violent contractions occurring every half hour and not controlled by morphia. Temperature 103. Appetite poor.

April 6th.—Spasms still continue; tried silver catheter but it worked no better. General condition not so good as yesterday.

April 7th.—Continues in about the same condition. Had a tube made especially for him—it seems to work much better than anything used before. Spasms less frequent.

April 8th.—Slight improvement, but spasms still frequent and patient very weak.

April 10th.—Not much change; spasms continue. Washed out bladder with solution sodii bicarb, ℥ij—Oj.

April 12th.—Continues about the same; gave tinct. hyoscyami in aq. camphoræ. Urine somewhat increased.

April 14th.—No change for the better; growing weaker if anything.

April 16th.—Continues in same condition.

April 19th.—Patient much worse; delirious during night; face flushed; perspires very freely; pulse weak and rapid. Stopped use of hyoscyamus.

April 20th.—Not quite so delirious; spasms less frequent, but general condition not so good.

April 22d.—Seems improved in every way.

April 24th.—Continues to improve; spasms very infrequent and not severe. Most of urine passes through tube.

April 26th.—Continues to improve.

May. 4th-7th.—Improving.

May 10th.—Allowed to sit up for a short while.

May 20th.—The abdominal fistula has opened again by suppuration and the urine is discharged freely from it. The spasms are less in frequency and severity. Given suppository of iodoform every night.

May 24th.—Removed tube altogether and allowed urine to drain away through the lower opening. Spasms less and patient feels much better.

June 1st.—Commenced to-day to draw the urine every 2 to 3 hours through the lower opening; suppositories continued.

June 2d.—The above plan works admirably; patient retains all the urine and nothing drains away either above or below. The catheter has to be passed every 2½ to 3 hours; suppositories continued. Patient takes but little opium now, m xx. Deod. tinct. during the night.

June 4th.—The improvement continues; no urine has passed through the upper opening since the last plan was adopted. The urine, which is drawn, is very clear and the cystitis has entirely subsided. The spasms have left altogether and patient feels markedly improved in mind and body.

June 5th.—Patient was up to-day for the first time and feels first-rate in every way.

From this time patient continued to improve steadily. Passed urine through the natural channels on June 17th, without inconvenience, some escaping through the perineal incision. July 1st the wound had entirely closed. He remained here till July 13th, when he took his discharge.

For the above record from the Brooklyn Hospital I am indebted to Dr. Raynor, the house surgeon of the hospital.

1887, *August* 19th, Dr. Bierwith who assisted Dr. J. C. Hutchison in the operation, kindly informed me that it consisted in external median prostatotomy. The prostate was incised in the median line, but no portion of it was removed. The patient wore a large silver tube for several weeks, until the upper opening, left from the supra-pubic operation was closed.

I have further information up to date from the son of the patient as well as from his family physician, that he has enjoyed pretty good health since.

This case illustrates three points: (1) That prostatotomy by perineal section was a success, the patient remaining well: (2) That my first method of treatment by the Galvano-Cautery Sound is a success, and devoid of any danger, as was proven by the subsequent operation, and (3) That the supra-pubic operation is not dangerous as was formerly believed.

Innovations and improvements in these methods have been practiced recently To illustrate this progress I can do no better than to follow Dr. Belfield's cases in a paper read before the surgical section of the American Medical Association, held in St. Louis, 1886. (Digital exploration of the bladder, etc., including two prostatotomies by W. T. Belfield M.D., of Chicago. Journal American Medical Association, Sept. 4th, 1886).

One case commends itself to our attention.

Case 9. In hypertrophy of the prostate, etc., perineal section was performed. Two weeks later the perineal wound was opened and a channel made by galvano-cautery through the prostate, sufficiently

large to admit a lead pencil. The patient made a good recovery. Seven months later the patient died of acute uræmia. Autopsy showed contracted kidneys, and the specimen of bladder and prostate was presented at that meeting.

Later in another case Dr. Belfield removed a prostatic middle lobe, (Journal of American Medical Association, March 12th, 1887, p. 303). A hypertrophy by Supra-Pubic Prostatotomy. Recovery was uninterrupted, the fistula closing entirely on the seventeenth day. Patient has since urinated freely without a catheter, cystitis has subsided. Patient was 73 years old.

The next question to be considered is, which operation is better for our purpose, perineal section or the supra-pubic.

Several contributions considering these points have lately been added to our literature: and the latter operation has been much improved and simplified. According to Dr. Dennis' statistics, (Exploration of the bladder by the Supra-Pubic Method by F. S. Dennis, M.D., Journal American Medical Association, May 28th, 1887, p. 604), the mortality since 1879 has been reduced from 30 to 9 per cent. in cases of the largest stones. There is less danger if the operation be simply prostatotomy, than for large stones, and with

antiseptic precautions there is every reason to believe that the danger may be still further reduced by galvano-caustic prostatotomy.

The foregoing shows a decided progress in prostatotomy, and I believe I am justified in regarding galvano-caustic prostatotomy by the supra-pubic method a further advance, for which I propose the following *modus operandi.* Preparing the rectum and introducing the rubber water bag, which is dilated with sufficient water to bring the bladder upwards and forwards. The bladder may be injected but in most cases this will be impossible, as the operation is performed when the urethra is impassable. The opening in the abdomen is made in the usual way, through the linea alba and avoiding the peritoneum. When the bladder is reached sutures should be introduced to be used as retractors to avoid infiltration. As the bladder could not have been emptied before, the urine is now drawn off by a trocar and canula, and then through the canula the bladder is well washed out and disinfected. Then the bladder is opened, and the prostatotomy performed either by the galvano-cautery sling or burner. Drainage is established, and a tube introduced for after-treatment, and washing

out of the bladder to combat cystitis. Further details of the operation are omitted, as such can be found in recent articles on the subject of Supra-Pubic Cystotomy, etc.

The advantages of this operation must be considered in two parts:

First, Supra-Pubic method over Perineal section, and second, Galvano-Cautery in preference to the knife or scissors.

The *advantages* of the supra-pubic operation above the perineal section, are:

(1) The ducts and ureters are not wounded.

(2) Perineal fistula is prevented.

(3) The operator sees what he is doing and does not work in the dark.

(4) The after treatment is easier, and cystitis can be better combatted.

The former drawbacks in the supra-pubic operation are now much reduced, and with care, the peritoneum will not be wounded, nor infiltration allowed, and antiseptic precautions will prevent sepsis.

The *advantages* of the galvano-cautery above the knife are:

(1) That it avoids hemorrhage—also secondary hemorrhage.

(2) It leaves no raw surface exposed.

(3) Heals better and

(4) Avoids septicæmia.

The statement of some reporters, that in prostatotomy with the knife, hemorrhage does not take place, cannot be accepted, as the history of cases shows that primary, as well as secondary, does occur, both of which are entirely avoided with galvano-cautery.

Such an operation may be decided upon, according to circumstances, but is imperative, when the patient's death is certain without it. This operation gives him at least ninety-one per cent. of chances for a new lease of life.

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