

# Gehrung (E. C.)

## ELECTROLYSIS;

ITS VALUE IN DIAGNOSIS AS WELL AS IN TREATMENT OF

INTRA-ABDOMINAL AND INTRA-PELVIC TUMORS

BY THE AID OF A NEW INSTRUMENT.

Compliments  
of the Author,

BY

EUGENE C. GEHRUNG, M.D.,

St. Louis, Mo.



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# ELECTROLYSIS;

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ELECTROLYSIS in gynecology, though yet comparatively new, has already been described by master hands, and successes have been obtained upon which the profession may look with pride. It is not my intention to recapitulate what has been written, but merely to report a few facts which I have observed in my own practice. If I have misinterpreted the phenomena which presented themselves in my cases, it is because I have been deceived, and I shall gladly accept a more correct interpretation.

In my practice of electrolysis for the removal of fibroid tumors, I have observed two widely different processes toward their resolution.

The first is that which is generally recognized. It may be shortly described as gradual atrophy, caused by a disarrangement and subsequent absorption of the constituent elements of the neoplasm, by means of electrolysis or electro-puncture, whereby the tumor may completely disappear, be reduced in size, or its further development prevented.

The second mode of termination has heretofore not received the proper attention. It is closely allied to the former in its origin, but widely different in its ultimate conduct. It answers

<sup>1</sup> Read before the St. Louis Obstet. and Gyn. Soc., May 17th, 1888.

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to the following definition: "Cystic degeneration of fibroids caused by electrolytic puncture."

Around the tip of an electro-negative pole introduced into a uterine fibroid an accumulation of fluids and gases takes place, the product of electrolysis. Some of these mixed particles escape along the electrode, while some remain imprisoned on its withdrawal. These retained particles are usually absorbed, and may possibly represent an active principle in the process of atrophy of the fibroid. If, on the contrary, they are not absorbed, the nucleus for the formation of a cyst is planted. This cyst of electro-chemical detritus grows by gradual increase of its contents and consequent thinning of its walls. Thus a fibroid may be transformed into a cysto-fibroid, and finally into an abscess, with the symptoms of septicemia, chills, elevated temperature, rapid pulse, nausea, headache, etc., etc. When these symptoms have occurred after the use of electrolysis it was said "the patient did not take kindly to electricity," the tumor instead of diminishing began to grow, "*typhoid symptoms*" resulted, and the patient died, or laparotomy was performed and the patient recovered.

In support of the foregoing remarks I shall quote the headings of two only of the cases reported by Dr. Ephraim Cutter.<sup>1</sup>

"CASE II.—Large myo-fibroid; *softening and fluidity*<sup>2</sup> followed first operation, tumor larger; case obstinate; abdominal section successful; recovery.

"CASE X.—Abdominal tumor; at first very hard; after two applications assumed a cystic form; regarded as improved; third operation followed by *typhoid symptoms*; neglect of ordinary care; death."

To quote more such cases from the same or other authors would unnecessarily prolong this paper without proving more.

In two of my cases of the second variety (*i.e.*, cystic degeneration) the symptoms tallied closely with those of the cases just quoted.

The first case, consisting of a large bilobed myo-fibroma, progressed quite satisfactorily, and the lady, who was a complete invalid, considered herself perfectly well after a few punctures. On examination of the tumors after a longer rest, I noticed a slight increase in size of these, and thought I could detect fluc-

<sup>1</sup> AM. JOURN. OBST., etc., February, 1887, pp. 121 and 127.

<sup>2</sup> Italics mine.

tuation. Both of these facts I communicated to the patient's regular physician, and made to him propositions for the further treatment of the case.

The doctor informed me, however, that it was too late to do anything more for the patient, as she was to return to New York in a few days to join her husband. Dr. E. promised to recommend the patient into good hands. All Dr. E. and myself have learned of the case since is: "She was operated, and died from hemorrhage." Probably laparotomy.

My second case was one of exudation-tumor, formed around a subserous fibroid, diagnosed by several physicians as long as fifteen years ago. About ten years ago, attempts were made to cure this fibroid by ergot and dilatation of the uterine cervix, in the vain hope of transforming it into a submucous fibroid, to be delivered *per vias naturales*; with the sole effect of setting up pelvic cellulitis or pelvic peritonitis, or both, wherefrom the patient came near losing her life. When she was brought to me by her family physician, I found the whole pelvis, with all its contents, massed into a solid cake, of irregular outline, reaching up to the umbilicus; callous in some places, in others of a fibrous hardness and completely immovable. This tumor had impinged to such an extent on the calibre of the rectum and bladder that the action of both was seriously interfered with, and great fear was entertained that these functions might, at any time, be completely interrupted. The case appeared hopeless, and had been considered so, long before the patient was brought to me.

I applied the galvanic current, the negative pole in the vagina, for a long time, in the hope of lessening the size and causing some mobility of the tumor, but without success. The case becoming more and more hopeless, I concluded to use electro-puncture, for which I selected principally what I considered to be the fibroid. Four or five punctures, with electrolysis, seemed to cause little or no improvement. Shortly after the last the patient began to have chills, fever, and "typhoid symptoms." The tumor was found to be enlarging, and showing signs of fluctuation. Assisted by Drs. Funkhouser and Eversole, I punctured the very thick wall of the cyst through the vagina with an aspirator-needle and drained a large quantity of a serous fluid and about an ounce of pus. While the cyst was draining, I enlarged the opening by means of a narrow bistoury. Through this opening I introduced one of my uterine aspirating tubes (double canula), and by means of it established a constant drainage with carbolized water for several days and nights. The temperature and pulse were both reduced almost immediately. The tube slipped out of the cyst apparently too soon, and the cyst either refilled, or one of the other punctures went through the same process accompanied by all the symptoms of the former. The tapping was repeated, and this time the contents were a mixture of serum and pus, somewhat fetid.

The patient was so much inconvenienced by the presence of

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the drainage tube that I was prevailed upon to remove it, as I found to my regret, too soon again. The improvement that followed was soon replaced again by the same train of symptoms, and again an enlargement was detected with very obscure fluctuation. I should, however, not forget to state that each successive enlargement occupied a different position from the preceding ones. Meanwhile I had planned and constructed for me by the Leslie Surgical Instrument Co. of this city an instrument which will be described below, by the aid of which the operation and after-treatment were much simplified. Since the tapping of this last cyst, the temperature range varied from 97.7° to 99.8°. The patient ate, slept, and felt well. She gained considerably in weight, and is at this date, twenty days after the last puncture, perfectly well. She was able to sit up and walk about, with the drainage tube in situ, through which daily washing and medication of the remnants of the cyst have been practised; using two per cent carbolized water. Iodoform oil and pure tincture of iodine were used by aspiration and irrigation until the flow from the cyst was completely arrested; then only was the tube removed. Occasionally electrolysis was repeated in the hope of still further modifying the cyst-walls, or rather the walls of the new abscess, and thereby hastening the obliteration. Though almost complete anorexia and nausea existed before the evacuation, etc., the most nutritious and digestible diet was immediately allowed and profitably retained.<sup>1</sup>

The experience gained in these and other cases of my practice of electrolysis forces me to the following conclusions: 1st. That "*electrodes for puncturing intra-abdominal or intrapelvic tumors and cysts should be tubular*, and not solid, as heretofore advised by electro-therapentists. Large-sized aspirator needles or trocar and canula will do well. If by the use of cylindrical electrodes a loss by irradiation of electricity, in comparison to flat or crescentic electrodes, should really occur, this can easily be remedied by a slight increase in the quantity applied. The electrode being a tube, all fluids formed

<sup>1</sup> While this article is going through the press, I have received the following correspondence from the patient, whose case is here described. She left this city about a week after the removal of the canula.

BALTIMORE, MD., July 1st, 1888.

*Dr. Gehrung.*

DEAR SIR:—I arrived here June 8th. I had a very pleasant trip, but I was very much exhausted for several days after my arrival. I was very much afraid the first few weeks that there was another abscess forming, as I had a great deal of pain and soreness. I feel greatly improved for the last ten or twelve days, I have a good appetite and am gaining strength and flesh. Since I am here I have fully gained 15 to 20 lbs.

Yours, etc.,

Mrs. M. F.

or found in a tumor or a cyst may be allowed to escape through it after the practice of electrolysis. By this precaution the cystic degeneration of fibromas may possibly be avoided, unless otherwise desired. Or, if a cysto-fibroma be knowingly or accidentally punctured, the cyst can be drained and medicated, and the cure much hastened. This has been the result in my cases of this description.

2d. The puncture should always be made at the most dependent point, if practicable, for the sake of drainage, and preferably through the vagina whenever circumstances permit, selecting even here the most depending and most accessible part, and taking good care not to injure important organs or large blood-vessels.

3d. Almost all non-malignant pelvic tumors, whether solid or cystic (abscesses included), can be treated with advantage, if not cured, by electrolysis, electrolytic puncture, or the latter combined with drainage and proper medication, without recourse to major operations.

Dermoid cysts, on account of their solid contents, make an exception to this rule. Whether extra-uterine pregnancy, in its earlier stage, colloid or multi-locular cysts make an exception also, and for the same reason, or whether, by means of electrolysis and the judicious use of the trocar, they will be classed among the tumors curable by electrolysis and drainage, will have to be decided in the future. If the puncture through the vagina is found impracticable, it will have to be performed at the most accessible and safest point through the rectum, uterus, or abdominal walls, never forgetting the point in view—drainage.

All cysts, fibro-cysts included, should be completely evacuated after the use of electrolysis.

Much of what has been said here concerning pelvic and abdominal tumors will certainly find application to tumors, cystic and solid, in other parts of the body.

The following is a description of the instrument, which I have devised for this purpose and exclusively used in treatment of my cases of fibromata, solid and cystic, cystic tumors, and abscesses, by electrolysis, drainage, and medication :

The instrument consists of a trocar and canula.

The trocar, including the handle of two and three-fourths inches, measures seven and one-half inches. The steel of the

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trocar reaches through the handle and terminates below in an expansion or bell to receive the tip of a rheophore. Its stem is four and three-fourths inches long, and rests, with the exception of the point, in the canula. Just behind the point, the stem is thinner than elsewhere, so that the canula, by means of spring power, produced by a split in its distal extremity, will be prevented from causing any unevenness that might impede the introduction. The canula measures  $4\frac{3}{4}$  inches in length, and being arranged on the principle of a double canula, it has, inserted at an acute angle, an arm or canula one and one-half inch in length, almost parallel to the straight tube (see engraving), while the distal end of the tube is provided with a number of perforations or holes, like those in other drainage tubes, or like those in my aspirating uterine applicator.<sup>1</sup> Lastly, there is an inner tube, which can easily be inserted and withdrawn, as it is fastened merely by a conical friction joint. Near the further end

A. M. LESLIE S. I. CO.  
ST. LOUIS.



this tube carries a nut or septum which, when inserted into the outer canula, divides the perforated region into two nearly equal parts. A probe point may be attached to the inner canula so as to close the front openings of both canulæ, therefore the inner one of these has a few holes in the side, beyond the septum.

All that is necessary beyond what is here described consists in two or three pieces of india-rubber tubing, provided at the ends with perforated metallic tips for the easy attachment to the canula and an aspirator of some kind—one piece of tubing to connect a vessel or bottle with the outer or influx canula containing the fluids to be used; a short one to connect the aspirator to the inner or outlet canula, and a third piece to lead to a vessel to receive the waste. The aspirator as described in the AM. JOUR. OF OBST., etc., or as since modified by me for this purpose, renders excellent service. The calibre of the canula may vary from No. 6 American scale for catheters (No.

<sup>1</sup> AM. JOUR. OBST., etc., July and December, 1886.

9 French) to any size to suit the taste of the operator or the conditions of the case. The No. 6 is the size I used in my operations, but it is rather small, especially with thick fluids.

The trocar and canula being plunged to the requisite depth into the tumor or cyst, the rheophore of the negative pole should be attached to the handle of the trocar and electrolysis applied in the requisite amount and the desired space of time. This done, the trocar is withdrawn and the fluid, if any be present, allowed or made to flow away through the canula, which is left in position.

The cyst being drained, the next step is to introduce the inner canula into the space previously occupied by the trocar. After attaching the rubber tubes and aspirator as described (*loc. cit.*), the cyst can be washed by antiseptics and alterants, as carbolic ( $\frac{2}{100}$  to  $\frac{4}{100}$ ), and mercurial bichloride solutions ( $\frac{1}{1000}$  to  $\frac{1}{2000}$ ), iodoform oil (20 gr. to oz.), tincture of iodine even to full strength, etc. By means of this apparatus these medicaments can be applied by aspiration or irrigation as the operator may desire.

When the cyst is cleansed and treated to satisfaction, the inner canula can be withdrawn, while the outer remains as a permanent drainage tube; one of the two arms of the canula should now be closed by a cork of wood or metal, and the other should be closed by a perforated metallic tip to which is attached a very soft rubber bag,<sup>1</sup> for the purpose of collecting for inspection and examination all fluids that pass through the canula from one visit to another. In this way, the cyst or wound is hermetically sealed, without arresting the constantly secreted fluids within.

The washing, etc., should be repeated about once a day.

After the removal of the aspirating apparatus, nothing can be seen except the little rubber bag, as the whole drainage tube is safely ensconced within the vagina, just reaching to within the labia majora, enabling the patient not only to lie down with comfort, but to sit up, walk about, and to micturate and defecate with ease.

If there is no fluid present, of course the trocar and canula may, after the use of electrolysis, be removed simultaneously, unless it be desired to leave the canula for future applications of this agent, without the necessity of a repeated puncture. For

<sup>1</sup> Children's rubber balloons, etc., will meet the indication.

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the reapplication of electrolysis, either the trocar may be re-introduced through the canula and the rheophore attached, or the latter may be attached to the canula itself. A silver canula seems to be sufficient for all purposes, as, after a sojourn of twenty days in an abscess cavity with the occasional use of electrolysis and pure tincture of iodine, the canula came out as clean and sound as when introduced; of course, a little tarnished. Twenty-four hours after the removal of the canula, viz., drainage tube, neither by sight nor touch could the place be found where the tube had rested.

I should also mention that before the commencement of the operation the canula should be insulated with a thick layer of collodion or shellac, etc., taking care to leave uncovered all that part of it which is intended to penetrate the tissues, for reasons to be stated below.

We come now to the diagnostic value of electrolysis, especially as applied by means of the instrument which I have just described.

From the literature on electro-therapeutics, as well as from my own practice, I consider myself authorized to state that one of the effects of electro-puncture, especially by the cathode or negative pole is, that the tissues perforated by the non-insulated part of the electrode become matted together and form a more or less continuous fistulous tract, whereby the escape of fluids into the interstices or intervals between the different tissues so perforated is prevented. It also appears to modify the tissues along the tract of the electrodes so that inflammatory processes will rarely, if ever, be witnessed. Even punctures through the peritoneum seem to be of little importance, for which we have the attest of many trustworthy authorities.

If these premises are correct, we may conclude that:

1st. Electro-puncture, especially if combined with drainage, etc., is a curative agent for many tumors, as fibroids, cystofibroids, cysts of a great variety, and abscesses; and that,

2d. Electrolysis renders exploratory punctures comparatively harmless, and far superior to ordinary acupuncture with aspirator needles or the needles of the hydrodermic syringe, which latter means have formerly been recommended to clear up a doubtful diagnosis.

Based upon these facts, we are authorized, when the absolute differentiation between two possibilities has failed, when put to

the test of the usual legitimate means of diagnosis, and especially if both otherwise admit of electrolytic treatment for their cure, we are not only authorized, but may safely use the drainage-electrode to clear up the mystery. The question being decided, either electrolysis alone or combined with drainage may be used, as the case demands. In many cases, an otherwise doubtful diagnosis may thus be decided, while in fact the curative treatment for either is started. This appears to me to be a far safer way to differentiate than by opening the abdomen when in doubt.

Had Dr. Semeleder, in his operations on ovarian cysts by electrolysis, made his punctures at the most dependent portion and drained the cysts, he would very probably have lessened the duration of the treatment considerably, diminished the number of punctures necessary, and lessened the mortality in his cases. Dr. Semeleder would probably have found more followers.

While writing this paper, I came across *The London Medical Record*, containing an abstract of one of Dr. Apostoli's papers, in which Dr. A. advises and practises electro cautery puncture for hydro salpinx. Dr. A. makes a large fistulous tract by means of a large trocar. This corroborates my view as expressed above, that most intra-pelvic and intra-abdominal cysts can be so reached and drained, and, I feel certain, with much greater facility and safety by my trocar and canula in combination with electrolysis.

Apostoli and Engelmann both state that electrolysis does not work favorably on abscesses. This statement is correct only as long as the matter is permitted to stay in the cavity. As pus should never be retained in the body, and as it cannot well be absorbed without causing septic derangements, the electrolysis may be applied before emptying the abscess for the purpose of modifying its lining membrane. Then we should remove its contents and wash and medicate the cavity, use drainage, and if found advisable again and again electrolyze the cavity to stimulate it still more to obliteration.

Dr. H. R. Bigelow<sup>1</sup> reports a few cases operated by Dr. Martin, of Berlin. Dr. Martin found in perimetric exudates an abscess forming, and to avoid a possibility of puncturing a

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loop of intestines that might be adherent in the mass, opened the abdominal cavity, forced down the abscess, and punctured it through the vagina, leaving the drainage tube without further medication or washing of the cavity until the complete obliteration of the abscess. The propriety of opening the abdomen appears to me somewhat doubtful, as in such a case the bowel, if involved in the exudate, may not be found and consequently not be avoided with much greater certainty than if the abscess had been pushed down toward the vagina without laparotomy, and the drainage tube inserted. If with proper care the trocar is implanted in the middle line and made to pass up closely behind the womb while the abscess is pressed down in contact with the vagina, the chances of puncturing a loop of bowel, even if implicated in the exudate, are very small, while on the other hand laparotomy with its incidents, accidents, and sequelæ, if practised in a larger number of cases, will show a greater mortality and worse consequences than even a *possible* puncture of the bowel. Until the contrary is proven, I shall continue to hope and expect that an electrolytic puncture through a loop of the bowel fixed in such an exudate will, after the abscess cavity is completely obliterated and the tube removed, heal up kindly, especially if the trocar and canula are of moderate calibre.

If bad should come to worse, an entero-vaginal fistula would be the result—a condition much less bad and much more curable in such cases than most of the sequelæ of laparotomy.

The scope of this paper being merely to communicate and urge this mode of treatment in the place of laparotomy, for certain tumors, and not to report details and cases, I will not enter upon otherwise useful particulars. I shall mention, however, that in my operations from twenty-five to seventy-five milliampères from five to twenty minutes have been used with satisfactory results, in quite a variety of tumors. Whether there is any gain in those extreme doses of electricity used by certain operators, except to know how large a dose human beings can tolerate, or whether these large quantities do not themselves prevent the sought-for result, I am not able to answer. This question will be solved by accumulating experience.



