ON THE TREATMENT OF PAROXYSMAL DYSPNOEA OCCURRING IN ANEURYSM OF THE ARCH OF THE AORTA.

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PROMPT, energetic, but withal judicious, treatment can seldom be more imperatively required than in dealing with those formidable paroxysms of suffocative dyspnoea which are apt to supervene in the progress of aneurysm of the aortic arch, and which may even be the first intimation of the presence of that insidious disease. The too ready assumption that the obstruction to the passage of air was seated in the larynx has led in the past to the indiscriminate recourse to tracheotomy in these cases. Given stridulous breathing and threatening asphyxia, and this operation was at once deemed necessary to avert the fatal issue, no better result at times ensuing from its performance than to demonstrate that the obstruction giving rise to the symptoms was not in the larynx at all, but lower down. Hence the importance of having in every instance, as far as possible, a correct notion of the seat of the obstruction before deciding upon the measures to be adopted for the relief of the patient. Taking it for granted that this can vary in three ways, and in three ways only—namely, that it may be in the larynx, in the trachea, or partly in both situations—we will consider briefly each of these varieties.

1. *In the larynx.*—Here, as just observed, the obstruction was formerly thought to exist, and here alone. It was held to be due to closure of the glottis, brought about by the aneurysmal tumour causing traction or compression of the recurrent laryngeal nerve, and consequent disturbance of the innervation of the intrinsic muscles (cricothyroid, of course, excepted). The nature of this disturbance was matter of speculation. Spasm and paralysis were alternately invoked to explain the phenomena, and when bilateral effects followed upon a unilateral cause, it was assumed that reflex agency came into play. With the discovery by Dr. Felix Semon of the law that in all cases of progressive affection of the roots or trunks of the laryngeal motor nerves, due to organic lesions of the latter, the abductor fibres and muscles first succumb, we began to tread on firmer ground, and the frequent occurrence of unilateral abductor paralysis as a complication of aneurysmal or other tumours developing in the vicinity of the recurrent nerve became at once intelligible. But unilateral abductor paralysis thus brought about, it is needless to say, is a persistent condition, and fails to explain those sudden paroxysmal attacks of urgent dyspnoea, with more or less prolonged intervals of comparative freedom, which we meet with in the course of many aneurysms of the aortic arch. If we would admit, therefore, the existence of this class of cases, we have little but hypothesis to help us to understand them. Nevertheless, were the clinical facts in any case to make it clear that the obstruction was seated in the larynx, it would not be less clear that tracheotomy in ultimate resort was required to obviate this source of danger.

2. *In the trachea.*—Here, we know, the obstruction is direct and mechanical, proceeding from the aneurysmal tumour itself, which, in its growth, comes to press upon, displace, distort, or even bulge into the wind-pipe, diminishing its lumen, and producing local irritation; and this, for the self-same reason, usually happens at or near the bifurcation. To Dr. Bristowe we are indebted for having first shown that an obstruction of this seat and nature may be the sole efficient cause of the paroxysmal attacks under consideration. He had a patient with aneurysm of the aortic arch, who suffered from "occasional sudden, terrible exacerbations" of dyspnoea, and in whom, *post-mortem*, the trachea was found much compressed and narrowed by the aneurysmal tumour, while both recurrent laryngeal nerves were unaffected. Dr. Bristowe remarks (Lumleian Lectures, 1879): "Exacerbations of dyspnoea occurring in narrowing of the trachea may be due in some measure to spasm of the muscular fibres of the affected part, but are referable in some degree to the accumulation of mucus in or below the point of narrowing, and to difficulty of dislodging it, owing to the mechanical impediment existing there to the performance of an effective cough, and to temporary swelling of the mucous membrane." From what we know of analogous conditions elsewhere we cannot but recognise these influences as real and potent, and perhaps another influence of more special character may have a share in the result, namely, temporary rise of pressure in the arterial system, with corresponding distension of the aneurysmal sac. Now if a case were of this class, that is to say, if the obstruction were

clearly situated in the trachea, with laryngoscopic inspection or other evidence testifying at the same time that the recurrences were not implicated, and that the glottis was free, tracheotomy, it need not be said, would be utterly useless as a means of relief. Before proceeding to inquire what alternative means are at our disposal in such a case, we will say a word or two concerning the third variety.

3. *Partly in the larynx and partly in the trachea,* the obstruction thus being of a complex character. The proof that this co-existence does occur is derived from two circumstances. 1. In many instances in which tracheotomy has been performed, a certain amount of relief has ensued, which, as we have just seen, could not happen were the obstruction limited to the trachea at the usual spot. 2. Either during life by inspection with the laryngoscope, or after death by the observed atrophic condition of the crico-arytenoidens posticus muscle, the concurrence of unilateral abductor paralysis has been ascertained. In certain cases that have occurred in my hospital practice both these points have been well illustrated. The patient's breathing was easier after the operation, and *post-mortem* the abductor muscle of the side involved was found distinctly atrophied. I venture to think that the majority of cases of paroxysmal dyspnoea connected with aneurysm of the arch, fall under this category. Be that as it may, in reference to tracheotomy it is manifest that its utility here will vary according to the greater or less share taken by the laryngeal affection in causing the obstruction.

Having thus endeavoured to define the conditions under which tracheotomy would, or would not, be available on these occasions, we may ask now, what other resources have we at our command? Our aim of course can only be temporary relief. Aneurysms of the aortic arch, which by their size and situation give rise to compression of the recurrent nerves and constriction of the trachea, we know, are not very amenable to any curative methods yet introduced. But to relieve these terrible paroxysms of dyspnoea which are incidental to their progress, and which for the moment place the life of the patient in imminent peril, is an object worthy of every effort. Conium vapour, chloral, chloroform, etc., may perhaps occasionally be of some service in mild attacks; but in severe ones they certainly cannot be depended on, they may indeed be harmful.

There are two measures which I think may be spoken of more favourably. One is blood-letting. The good effects of this I witnessed many years ago, as I am reminded by notes of the case. It was one of identically the same character, proved to be so *post-mortem*; a free venesection was resorted to, and it brought speedy and great relief. It is a suggestive fact that in many cases of aortic aneurysm a copious hæmoptysis, when it has not *per se* caused death, has been attended with marked improvement of the breathing. Only to take up from the table the interesting autobiography of my old and honoured master (*Memoirs of Life and Work*, by Charles J. B. Williams, M.D., F.R.S., etc.), at page 227 is quoted from the *Lancet* of December 11th, 1847, Mr. Cadge's account of the last illness of the eminent surgeon, Liston, who, it will be recollected, fell a victim to the disease we are considering. We read ".....he coughed up between thirty and forty ounces of florid arterial blood; it was expelled almost without effort; the blood was in one clot, and without froth or mucus: fainting came on, and the hæmorrhage ceased.....from that moment he lost all sense of choking or constriction in the throat....." Again (and this is more directly to the point), three days before the end, when the breathing was more laboured, "it was resolved to take away more blood, and the loss of twenty ounces afforded the greatest relief: the breathing became easier....."

Nor has the benefit of venesection in the treatment of aortic aneurysm in general been altogether unrecognised by writers on the subject; but, as a resource in these particular emergencies, it would seem almost to have escaped notice. Its *modus operandi* is sufficiently clear; it relieves congestion, diminishing, perhaps, the local swelling of the mucous membrane; it relaxes spasm; and it reduces arterial pressure, temporary increase of which, as we have before observed, may have a share in the causation of these disturbances; while, in reference to more radical treatment, we know that it tends to promote coagulation in the aneurysmal sac.

Tracheotomy being contra-indicated, let us suppose that, locking at the patient all round, there is reason to hesitate in the employment of blood-letting; have we anything else to fall back on? A very limited experience would lead me to suggest the hypodermic administration of atropine in dose sufficient to produce mydriasis (¼iii to ¼iv of the solution of the sulphate of atropine). In a case of appalling severity a year or two ago, this proceeding yielded me most satisfactory results. Unfortunately, I had not the opportunity of following up this case to its termination; but the suffocative dyspnoea, coupled with the intense tracheal stridor and other physical

signs present, could leave no doubt whatever as to its nature. I do not venture upon any explanation of the mode of operation, but so striking was the relief afforded in this instance that, under similar circumstances, I should certainly have recourse to hypodermic atropine again.

ON THE TREATMENT OF FIBROIDS OF THE UTERUS BY ELECTRICITY: THE APPA- RATUS AND INSTRUMENTS.

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"QUI UTI SCIT, EI BONA." So it always has been, and so it is now. Men knew something about the power of steam before Watt made it useful. Electricity was a matter of interest before Franklin raised his first conductor. The Hunters and Bell thought and wrote about ovariectomy, but it was not ventured upon till McDowell saw how to do it and dared to do it. Others, with the principle of electrolysis in their heads, have made only imperfect attempts to apply it to the reduction of fibromas. Apostoli, by devising a simple manœuvre, has succeeded in making it effectual. Knowing how to control the power in his hands, he does what others had tried to do. *Ei bona.*

What was the problem before him? To relieve the symptoms caused by uterine fibroids, to check their growth, and, if possible, to get rid of them. Therapeutics and surgery had met with but partial success from all that was tried and all that was done. It would be useless to go into details on this point.

The *clinique* of Dr. Apostoli, in Paris, is held three times a week, and is open to all surgeons on presentation of a card. It is situated in an old part of the city, with a dense population of working people around it; but many of the patients come from long distances, recommended by their home medical attendants. The applicants are all women, mostly with diseases peculiar to their sex, and diseases of the pelvic organs are the most common. The average attendance each day is from thirty to thirty-five, and minute observations are systematically recorded by a secretary, as oral reports are made while the examinations and operations go on.

Patients present themselves, as they do to other practitioners, with tumours of every variety. It would strain the pertinacity of a Hofmeier to describe and picture them all. There are simple cases of subinvolution, giving rise to a series of tormenting symptoms, and threatening future mischief if not corrected. Women, the victims of chronic metritis, with thickening, induration, consolidation of the pelvic tissues, tubal and ovarian pains, and all the attendant miseries so difficult to manage, come in numbers. In some cases the tumours are nothing more than a symmetrical overgrowth of the walls all round the uterine cavity, though such hypertrophies are seldom free from the accompaniment of other outgrowths. There are intra-uterine polypi, dismissed without much trouble; submucous ingrowths, both small and of enormous dimensions, causing danger from loss of blood, besides the inevitable distress. There are mural or interstitial fibromas, more or less isolated, either impacted in the pelvis and the source of repeated hæmorrhages and ceaseless pain, or rising up in the abdomen and offering perplexing difficulties to an operator. Not infrequently the pedunculated subperitoneal fibroids and other complicated cases with multiple and multiform tumours have to be dealt with. Incipient ovarian and broad-ligament cysts occasionally turn up, and in a short time are made to disappear. But it is curious to note how comparatively rare are the fashionable tubal diseases. There is no stereotyped specific way of operating upon these tumours; they are treated according to circumstances. But, as most of them are amenable to electricity in some form, it is the remedy chiefly resorted to.

No novelty is claimed for the fact of electricity being used; the novelty is in the way of using it. Others have proved by unregulated proceedings that some good could be done. The intensity of the current they put in action was insufficient, uncertain, and unmeasured, and it was directed to parts out of the uterine cavity. Some patients had their sufferings relieved, and some tumours were reduced in size, but in the hands of all who tried it the operation was painful, dangerous, and empirical. Now the current passed is of an intensity formerly impossible; its strength is exactly determined, and its application is always intra-uterine. What is done is done with a definite object, with a mastery over the agent employed, and a foresight of the results to be obtained.

The two ends proposed are, first, the relief of urgent symptoms, and secondly, the diminution of the size of the tumour. These are arrived at by repeated cauterisations of the uterine mucous membrane, and the modification of the nutritive action in the diseased mass by the powerful current which is sent through its tissues.

The first point to be considered is the apparatus required for carrying out this treatment. It is necessary to have, and to understand the management of, a battery capable of generating a continuous uninterrupted current of electricity, rising from 10 to 200 or 300 milliamperes in strength, provided with a regulator by which the circuit is made to include any number of elements we may desire. It should also have both commutator and interrupter (or rheotome). Such an instrument is to be obtained without difficulty for the cabinet, from the best makers, such as Weiss. It is not so easy to find a satisfactory durable battery for transport, and the outdoor operator must be content with such as he can get till a battery combining the requisites of portability, small volume, and great development is perfected.

The instrument of next importance is the galvanometer for measuring the intensity of the current. It can no more be dispensed with in the use of electricity for the purpose in question than can be the scales in chemistry. It indicates by the deflection of the needle the passage of the current, and marks the smallest variation of intensity. Without it the attempt to estimate the strength by the number of cells engaged would lead to deception. The graduation should be extended to at least 250 milliamperes, since the essential point in this method of treatment is to secure the combined effects of the highest tolerable intensity.

After the galvanometer comes the sound, charged to convey the current into the uterine cavity. Actually, any metal will serve the purpose if properly modelled. But as the positive pole corrodes all other metals except gold, aluminium, and platinum, one of these must be chosen to avoid the double difficulty of a rough and injured instrument and the loss of power from the absorption of the electricity by the metal. Platinum is found to answer best. The usual form of the uterine sound is adopted, nearly straight or very slightly curved. The length must be such as to reach to the end of the cavity of an enlarged uterus. The sound or trocar must slide into an isolating handle, furnished with a screw for fixing it at various points, according to the penetration necessary, and an aperture for connecting the sound with the conducting wire. The end passed into the uterus is of course bare, while that part which extends from the mouth of the uterus through the vagina to the handle must be covered with a movable, insulating sheath of celluloid. Before being used the whole ought to be disinfected by plunging into boiling water or some antiseptic solution. By having one end of this sound sharpened, it is converted into a trocar for puncturing the presenting part of the mass, and forming an artificial channel for the current, when the uterine cavity is directly unattainable.

But the master point of this method of treatment—the key to the possibility of passing such strong currents of electricity through the body, lies in the modification of the external electrode. The intensity being the same at the two poles if they have the same surface, the cauterising power will be the same. The skin is a bad conductor, and the strong current employed, in escaping from the interior through it to the point of the electrode, will develop heat up to burning point. To overcome this obstacle, the surface of the cutaneous pole must be extended. The density of the current is thus diminished, and it is rendered inoffensive. If at the same time the resistance of the epidermis is lessened, by making it thoroughly wet, all fear of an eschar is removed. It was in 1882 that Dr. Apostoli devised the form of electrode which he still uses. Wet potter's earth, fine and free from sand, or the modelling clay of artists, is spread out into a layer, uniformly about half an inch thick, and large enough to cover the lower part of the abdomen. The form, which is best made in a mould, is preserved by its being enveloped in folds of large-meshed tarlatan. This allows the clay to exude sufficiently to apply itself closely to the skin, and to moisten it, without spreading too far and soiling the dress. Laid in its place when all is ready for the operation, it can be kept in perfect contact with the skin by slight pressure of the hands of the patient. The circuit is completed by partially imbedding in the clay a small plate of soft metal, properly connected with the conducting wire. This contrivance is not elegant, but it is efficient, and surpasses all that have been proposed as substitutes. It and the skin upon which it has been laid are quite cool to the touch, after the passage of a current of more than 200 milliamperes strength, for eight or ten minutes; and there is no blistering or subsequent peeling of the skin.

Ordinary telegraph-wire will answer the purpose as conductors, and is cheap and convenient, but it is not so pliant as the rheophores covered with silk. It is important to see that these conductors are