Contributions to practical medicine and surgery / by James Arnott.

CONTRIBUTIONS

TO

PRACTICAL MEDICINE AND SURGERY.

BY

JAMES ARNOTT, M.D.,

LATE SUPERINTENDING SURGEON AT ST. HELENA.

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PREFACE.

THE purpose of the following observations is to remove certain misapprehensions that exist and to correct certain misstatements that have been published respecting the therapeutical subjects treated of. To render these subjects intelligible, a slight sketch of each is given, but for details the reader will be referred to the works originally giving an account of them. The opportunity, however, has been embraced of adding some new illustrative facts, partly gathered from my own experience, and partly from that of others. That the latter should sometimes be the experience of plans of treatment essentially the same as those I have introduced, though they have been otherwise denominated and other origins assigned to them, is, as respects the interests of humanity, a matter of perfect indifference.

Cheltenham, May 17th, 1864.

SECTION I.

ON INTENSE COLD, OR CONGELATION, AS A MEANS OF PRODUCING INSENSIBILITY IN SURGICAL OPERATIONS.

We learn from the works of surgical and other writers, that attempts had been made in remote times and by various measures to produce insensibility in operations; but that although this object was fulfilled to a certain extent by some of these measures, they were accompanied with too much hazard to be retained. Two means have lately been introduced which promise greater stability, namely, the inhaling of narcotic vapours, and the application of intense cold.

The production of insensibility by the inhalation of narcotic or intoxicating gases and vapours, is an invention which we owe to the United States of America. It was known, indeed, a hundred years before, that dogs which had been rendered insensible by immersion in the carbonic acid gas contained in the Grotto del Cane, near Naples, were generally resuscitated by being brought again into the open air; and Dr. Hickman, an English physician, had brought ridicule on himself by recommending that patients about to be operated upon should be subjected to a similar process. Sir Humphrey Davy, also, had, about the beginning of the

century, suggested that nitrous oxide might be inhaled for the same purpose ; but the suggestion attracted no attention. The idea seemed preposterous that any one would expose himself to what appeared so dangerous a proceeding to prevent the fleeting pain of a surgical operation. At last, after a lapse of forty years, Mr. Horace Wells, an American dentist, extracted a tooth from a patient rendered insensible by the gas suggested by Davy, and the practice became quickly established ; the vapours of sulphuric ether and chloroform being, however, substituted for the gas originally employed, because they are more conveniently administered.

A great benefit was conferred on mankind by the discovery of etherisation, although, like most other benefits, it has been greatly abused. Before its introduction the dread of pain sometimes prevented patients from submitting to operations necessary for their recovery, or submitting at least before the diseases requiring them were too far advanced. The prevention of pain, under every circumstance, was a great good, but unhappily it is not unmixed with evil. Hundreds of sudden deaths have occurred during the administration of chloroform ; and if reliable and extensive statistics are to be received as evidence, a much greater number have died afterwards in consequence of its injurious influence on the severer kinds of operation wounds.

The mortality from certain operations, occurring at most of the large British hospitals, which had kept a record of the cases, has been ascertained, and the number of deaths proceeding from these before the introduction of chloroform has been compared with the number occurring from the same operations during a few years after its introduction. The tables show a great increase of mortality during the latter period, amounting, as respects the principal amputations,

to more than 10 per cent., or, in other words, out of every ten deaths from amputation, one is to be attributed solely to the use of chloroform. Lithotomy on the adult is a more dangerous operation, and, as might therefore have been expected, the mortality from it was in a much increased proportion. Every large hospital showed an increase, excepting that at Glasgow, and this solitary exception proved the rule, for it was ascertained that about the time that chloroform was introduced, other changes were made in the Glasgow hospital very favourable to the recovery of patients. A comparison between the mortality now occurring and that which preceded the use of chloroform would be fallacious, as the structure, ventilation, and general management of hospitals has been much improved of late years, as well as the treatment of patients after operations.

As the long-continued prostration and vomiting that so often succeed the administration of chloroform (and which may cause the patient more suffering than the knife would have done) must obviously have an unfavourable effect on the condition of patients operated upon, and decrease their chance of recovery, and as the number of sudden deaths from it shows its virulence, no one reflecting on these circumstances could have been surprised at the result of the inquiry into its effects on those operations, which, being very dangerous under the most favourable circumstances, are rendered fatal by a very slight additional cause of constitutional disturbance. When the operation is not in itself dangerous, we should expect no appreciable increase of mortality from it in consequence of the use of chloroform, and the justness of the expectation would, I have no doubt, be confirmed by statistics.*

* See a series of papers by the writer on the Effect of Chloroform on the Severer Operations, in the *Medical Times and Gazette* for 1856-57.

Although the mode of administering the anæsthetic gases and vapours may, perhaps, in the course of time, be improved, it is not probable that an agent which at once and suddenly takes away both consciousness and sensibility can ever be rendered perfectly safe, and this hazard ought never to be lost sight of when using it. In England, however, it has not only been used too frequently and indiscriminately, but in too large doses. In the hospitals of Paris patients are rarely put completely under the influence of chloroform,* and I am not aware that any death has happened there, as has been the case in this country, from its use in scarifying an infiltrated perineum, pulling out a nail, or cutting off a wart. French surgeons deem it better that the pain from operations should only be partially removed, and the memory of it prevented, than that their patients should be subjected to the additional danger arising from the larger dose of chloroform required for complete insensibility; and in respect to many operations, they are not often prevented by its use being a little more troublesome than that of chloroform from having recourse to the other and safer mode of producing insensibility—refrigeration.

The refrigeration or intense cold produced by the mixture of ice with various salts, congeals the fluids in the part to which it is applied, and within certain limits, causes a more complete insensibility than chloroform. It is a perfectly safe agent. When congelation was first proposed, the objections made were, that it might destroy the vitality of the tissues; and, if they escaped destruction, that the reaction excited by it would interfere injuriously with the healing of wounds. Experience has shown that both of these objections were

* *Lancet*, 2nd January, 1864.

unfounded. If the process be properly conducted the skin is not injured, and instead of causing detrimental reaction, the healing process is promoted by the congelation preventing that excessive degree of inflammation which so often opposes the immediate union of parts. As a prophylactic of inflammation after wounds and other injuries, it assumes a higher character than could be conceded to any mere anæsthetic, whether local or general.

The misapprehension respecting anæsthetic cold which I am most anxious to remove is, that its application should be restricted to those surgical operations which do not require deep incisions, such as herniotomy, tracheotomy, amputation of fingers, excision of small tumours, &c. It is true that in many operations, parts are cut which cannot be made insensible by cold as it is usually applied; but if the skin (the most sensitive of the tissues and answering as a protector or monitor to those possessing less sensibility lying under it) be thoroughly benumbed, these operations will not be very painful. Or, a small, and therefore a safe dose of chloroform or ether may be used in conjunction with the refrigeration. This practice would appear especially applicable to amputation performed under prostration of strength or other unfavourable circumstances, and to the excision of diseased ovarium. Dr. Clay, speaking after much experience, expresses the opinion that if women would submit to ovariotomy without chloroform, their chance of recovery would be greater.

Sometimes there is a difficulty in congealing the part which is to be cut. If it be inflamed or very vascular, either the ordinary mixture of ice and salt, or a stronger frigorific must be applied for a longer time than usual, and it may be necessary to stop or weaken the circulation through it by pressure and altering its position. When produced,

the question arises, how long the congelation should be continued. A French writer has said that the period should not exceed two minutes; but it must vary according to circumstances. If too short, the insensibility produced may not last the required time, and the antiphlogistic effect may not be sufficient; but if, on the other hand, it be kept up for too long a time, the depression produced may be more than is necessary, and the healing of the wound, instead of being accelerated, may be retarded. In the *Edinburgh Medical Journal* for July, 1862, there is a report of two operations under congelation, of which one, for the excision of a tumour on the thigh, was performed on the reporter himself, and the other for strangulated hernia, on a patient in Guy's Hospital: in both the refrigeration was continued much longer than would appear necessary, though, as it happened, without any bad effect. But I have, myself, chanced to see another case in the same Hospital in which similarly prolonged refrigeration had been employed for the excision of a tumour from a woman's breast, with the effect of preventing union by the first intention. At the time of my visit the wound was healing slowly by granulation.*

* The various modes of producing local anæsthesia by cold have been minutely described by me in a separate treatise, as well as in communications to the medical journals; the last of these being to the *Medical Times and Gazette* for June 6th, 1863. Most systematic works on surgery contain the more necessary directions; and in an essay on the subject by M. Coste, director of the medical school at Marseilles, will be found a series of cases illustrating the proceeding.

SECTION II.

ON INTENSE COLD AS A REMEDY OF DISEASE.

The history of cold as a remedy is very singular. Although one of the oldest of medicinal applications, and almost an instinctive one, there has always been a very general prejudice against it. The introduction of a cooling regimen in fevers, etc., in lieu of the "hot and sweating" one, was a greater triumph achieved by Sydenham than his overcoming the prejudice against Jesuit's bark as a remedy for ague; and even at the present day, notwithstanding the declaration of a learned German professor of surgery that he would abandon his profession if deprived of the use of cold,* the tendency is not altogether confined to nurses to substitute warm drinks and fomentations for cold ones, in cases where the latter are the appropriate remedy. It is only the craving of the patient for cold drink in cholera that has prevented the administration of hot potations in lieu of iced water, the best, if not the only useful remedy for it hitherto exhibited; and, had warm applications been as accessible to military surgeons as cold ones, the latter might not have attained their present high reputation in the treatment of gunshot wounds.

This prejudice against cold may be traced to more than one erroneous theory. In Sydenham's day, it was deemed essential for the cure of fevers that the morbid matter in the blood should be expelled through the skin, the emunctories of which, it was further supposed, were contracted by cold and by the astringent principle of bark; and in later

* Esmarch's Essay on Cold; Sydenham Society's publications for 1861.

times, the idea has prevailed that, in deep-seated inflammations, the blood was driven inwards by cold upon the morbid part. That actual freezing would almost certainly destroy the vitality of a part, has, until lately, never been doubted.

Few of our most valuable remedies act in the same way when administered in different doses or under different circumstances. Quinine, although a valuable tonic in small doses, possesses no antiperiodic power until a large quantity is administered; and similar differences of action are observable in opium, antimony, and mercury. The late Dr. Abercrombie overlooked this fact when, in his excellent work on diseases the liver, he accused those practitioners who administer mercury to produce effects apparently contradictory, of adopting "doctrines at variance with the principles of philosophical inquiry."

Cold belongs to this class of variously operating remedies, and exceeds them all in multiplicity of actions, according to its degree and continuance. Applied for a short time and in a moderate degree, whether to the whole body as a bath, or to any particular part of it as a douche, it excites reaction, and operates as a tonic. If the time be much extended, or the degree of cold be greater, it becomes a valuable depressant; cold lotions having always been amongst the remedies of inflammation. The sudden application of cold is a commonly employed stimulant in syncope, and in various spasmodic diseases; and it furnishes us also with an excellent means of checking hæmorrhage from the lungs and uterus, as well as from wounds.

The most important uses, however, of this agent, or the full extent of its power, remained unknown until a very recent period. There existed no practicable method of applying its more moderate degrees continuously and uni-

formly; and the unfounded dread of its more intense degrees had absolutely prevented their trial. But for this fear, the same endeavour would doubtless long ago have been made in respect to cold, which has been made (and generally with success) in the case of most other powerful remedies—namely, to increase its powers by increasing its dose.

It was not only the sloughing or destruction of the part which was dreaded from intense cold; inflammation was also supposed to be its inevitable consequence in those cases which might escape sphacelus. Nor was there wanting an authority for this belief. Hunter, whose doctrines on inflammation have been justly regarded as having laid the foundation of surgical science, brought forward the change produced on the animal tissues by freezing as the very type of that morbid process, and illustrates it in his great work by drawings of the frozen and unfrozen ears of a rabbit. The truth, however, is that, although the condition produced by congelation resembles inflammation in the obvious circumstance of the dilatation of the small arteries, and consequent redness of the part, it differs from it in several and much more important particulars. It is never followed by suppuration; it never spreads or extends; and, above all, it prevents and removes inflammation in parts subjected to it.

I shall now offer, under separate heads, a few remarks on the various diseases in which congelation has proved a remedy.

A. *Inflammatory Diseases.* Though it is only of late years that I have employed congelation in the treatment of disease, the idea that much benefit might be thus produced in a certain class of maladies, by suspending for a time the vitality of a part, occurred to me long before. Thirty

years ago, I applied in the military hospital at St. Helena, as great a degree of cold as I could produce without ice to the spine of a patient affected with tetanus. But the actual congelation of a part for a few minutes, as of the skin in erysipelas, does more than suspend its vitality. Amongst other organic changes produced by it, the nerves continue more or less benumbed, and the blood-vessels, which had been contracted or closed while the congelation lasted, are afterwards expanded; the latter effect proceeding, probably, from the loss of tonicity caused by their previous excessive stimulation. This enlargement of the vessels continues for several days, and constitutes a condition incompatible with inflammation.

Inflammatory diseases, as respects their treatment by intense cold, may be divided into those that are superficial and those that are deep seated.

Congelation is a certain and prompt remedy of every inflammation of the first class, or which can be thoroughly brought under its influence. It has been used in almost all the external inflammations, comprising erysipelas and other skin diseases, ophthalmia (applied to the closed eyelid), bruises, sprains, inflammation of the lymphatic glands of the neck and groin; and, when it has been used properly, the immediate arrest of the disease has generally attested its efficacy. Respecting the diseases enumerated, I have nothing to add to my observations contained in former publications, excepting that, as regards sprains, I have since had experience, in my own person, of the difference between this and the former mode of treatment. I can well recollect the suffering and long continued lameness I endured many years ago from a severe sprain, treated by leeching and fomentations, and can contrast it with the immediate ease and speedy return of power in the limb following the applica-

tion of intense cold, after a similar injury of recent occurrence. Nor is it a trifling matter that these injuries should be speedily and thoroughly repaired. M. Baudens, principal medical officer in the French army of the Crimea, states that, amongst soldiers under his charge, sixty out of seventy-eight cases of diseased joints requiring amputation could be traced back to neglected or improperly treated sprains. Although carbuncle can hardly be included amongst the external inflammations, it might, perhaps, be arrested, or its increase prevented, in a similar manner, during its early stage. I have only used congelation as an anæsthetic previously to its crucial incision, just as Mr. Prichard has done to prevent the long continued pain from its cauterisation; and when, as is often the case in this formidable malady, the system is prostrate, cold should always be employed in lieu of chloroform.*

The observation of the effects of congelation in the treatment of whitlow, throws light on its action in more important cases, and particularly on its power as a preventive of inflammation. I have sometimes failed in thoroughly congealing a severe throbbing whitlow by the usual frigorific, ice and salt; but, though the circulation in the inflamed part has continued during the application, it has been arrested in the surrounding sound parts, and the extension of the inflammation has been prevented by the organic changes produced in these. To relieve the pain from whitlow, it will generally be necessary to make the usual incision, while the anæsthesia lasts, through the distended textures; for, though the inflammation may be arrested by the cold, there may be an increase of tension from the serous effusion caused by it.

* See Mr. Prichard's Address in Surgery, at the last annual meeting of the British Medical Association.

As my experience of intense cold in deep seated inflammations has been limited, the following remarks are offered more for the purpose of facilitating future investigation, than as a guide to present practice. The propriety of the application of cold of any degree in these cases has, with one exception, been a disputed topic amongst physicians; although its manifest advantage in this exceptional case, between which and the others no real difference probably exists, ought to have created some suspicion of the soundness of the hypothesis on which the prohibition against it was founded. The exception alluded to, is inflammation of the brain or its membranes, of which there is assuredly no better remedy known than cold, notwithstanding the imperfect manner in which it has generally been applied. As it will not be asserted that cold more easily penetrates to and pervades the brain than the kidney, trachea, and other internal organs, the explanation of its exceptional use in cerebral affections must be that, from the peculiarity of the symptoms attending affections of the head, and especially delirium, the benefit from any remedy denoted by their cessation is more striking or indisputable than in the other cases. The objection to cold in thoracic and abdominal inflammations has been the speculative one, that the blood is driven inwards upon the diseased organs; and this idea has outweighed the assertions of its utility in these affections by such observers as Abercrombie and Marshall Hall. But, even admitting that this was the first or immediate effect of a cold application, it is just as probable that the vessels of the inflamed organ would, either from contiguous sympathy or reflex action, soon contract, and permit the entrance of less blood than before. We know that hæmorrhage from the lungs or uterus is speedily checked by cold; but had the theory of a determination of blood inwards, which condemns the use of

cold in deep seated inflammations, been extended to these hæmorrhages (and if applicable to one it is equally so to the other), many would have died from being deprived of this potent remedy. The truth is that, as we are ignorant of the *modus operandi* of cold in both instances, our practice should be governed by facts, and not by theories.

The opposition to medical practices, because our limited physiological knowledge prevents our understanding the mode in which they operate, has much impeded the progress of therapeutics. Striking illustrations of this are afforded by the histories of bark and ipecacuan, two drugs introduced about the same time from South America. The removal by Sydenham of the disastrous prejudice to Jesuit's bark in ague, has already been alluded to; and we may infer from a statement in one of Dr. Maclean's valuable contributions to Aiken's recently published *System of Medicine*, that some similar prejudice prevented the adoption of the original or empirical mode of administering ipecacuan in dysentery. Small doses have long been employed for causing a determination to the skin, and fulfilling other plausible theoretical purposes, with little or no benefit; but large doses, given in such a way as not to excite vomiting, and which, it appears, constitute an excellent remedy for this dangerous and widely spread disease, have not, until very recently, been ventured upon by European practitioners, because the generally received explanation of the *modus operandi* of the drug opposed such an employment of it.

In addition to an internal effect proportionate to the greater power of congelation than of moderate degrees of cold, there is advantage from a peculiar counter-irritation produced by prolonging the application, and which is indicated by redness, swelling, and sometimes vesication. But this counter-irritation, which may be an annoyance to the

patient, would in many cases be unnecessary. A degree of cold less than what produces congelation, but greater than that of dissolving ice, may, if continued for some time, be sufficient; and the modern inventions of vulcanised caoutchouc bags, and gutta percha cups fitted and adhering to the part, facilitate its application.

I have published cases of cerebral inflammation and peritonitis successfully treated by intense cold. In a case of croup it was applied externally without any benefit, but the disease had probably advanced too far to be amenable to any remedy. In the analogous disease diphtheria, a stream of cold water has, by some French practitioners, been directed upon the inflamed parts; and Dr. Jenner, in his Treatise on this disease, mentions a case of recovery, in which the frequent injection of cold water into the pharynx seemed to afford much relief. Were a stream of a frigorific solution employed, or a stream of air, highly refrigerated by means of Dr. Neil Arnott's "heat transferrer,"* or were a metallic refrigerator used, sufficiently powerful to congeal the instant it came in contact with the part, this benefit from cold would be greater; and the application might prove a powerful auxiliary to the constitutional treatment which, as I have elsewhere related, was so successful in the epidemic at St. Helena in the years 1825-26.†

There is a difference of opinion amongst our principal authorities on this disease, respecting the importance of the exudative inflammation of the fauces. According to M. Trousseau, its removal would also remove or arrest the constitutional affection; and though Dr. Jenner dissents from

* Elements of Physics, sixth ed., vol. i, p. 200. A stream of air thus refrigerated would be an excellent mode of producing congelation for other purposes, both anæsthetic and remedial.

† An Essay on the Present State of Therapeutical Inquiry, p. 11.

this doctrine, he considers it a most important indication, to prevent the extension of the inflammation to the larynx.

If cold, efficiently applied, be found a powerful and general antiphlogistic, it will supply an important desideratum in therapeutics. General or specific diseases run their several courses unaffected by the medicines usually prescribed; and many degenerations, depositions, and other organic changes, if they yield at all, yield only to the operations of nature. Nevertheless, the medical and hygienic art, though it may have no power to arrest such diseases, can still afford invaluable aid, first, by strengthening or sustaining the remedial powers of nature, which it does, principally, by regulating the different functions, and relieving the patient's sufferings; and, secondly, by preventing and remedying the local affections which spring up in general diseases, and from which their fatality usually proceeds. Of these local affections, inflammation constitutes the most important element; and the degenerations and other organic changes above enumerated are generally either caused by or cause this morbid condition. If, therefore, we had a remedy which could be depended upon for inflammation, we should less regret our ignorance of the specific cures of disease.

B. *Cancer*. There is, at the present time, not the least faith placed in specific remedies for cancer. All that is now attempted by drugs, is to support the patient's strength by tonics, and relieve his sufferings by anodynes.

If the cancer be external, as when it occurs on the female breast, various local measures are resorted to in order to palliate or cure the disease. Even granting that cancer is a constitutional affection from the first, there would still be much advantage from removing its manifestation in the form of a growth or tumour, as it is by its local effects that, like other general diseases, it usually proves fatal.

The local remedies are intended either to destroy the morbid cells or elementary constituents of the growth without injury to the textures containing them, or to destroy both of these at the same time. Of the first kind are long-continued pressure, and short applications of intense cold; of the second, are excision, cauterisation, and intense cold continued for hours.

Pressure, when it is made equably by a fluid in the manner proposed by Dr. Neil Arnott, has proved an excellent remedy in many cases of cancer. Its effects are thus summed up by Dr. Walshe.* "Removal of existing adhesions, total cessation of pain, disappearance of swelling in the communicating lymphatic glands, gradual reduction of bulky masses to small, hard, flat patches, or rounded nodules (which appear, both locally and generally, to be perfectly innocuous); and, in the most favourable cases, total removal of the morbid production."

The application of intense cold for a short period, at intervals, is another mode of destroying the elements of the disease without injuring the skin or other surrounding textures. It has been objected to this plan of employing congelation in cancer, that its mode of action cannot be satisfactorily explained; but if proof of its efficacy can be adduced, the want of such explanation is unimportant. It is doubted by no one that bark cures the ague, and that cold cures inflammation, but we are perfectly ignorant how these cures are effected. Besides the cases which I have myself reported, there is indisputable evidence that even a moderate degree of cold will remove cancerous tumours. In the fifth volume of the *Transactions of the London Pathological Society*, a case of this kind is reported by Mr. Simon, the me-

* On the Nature and Treatment of Cancer, 1846.

dical officer to the Privy Council.* Another well authenticated instance is recorded in the *Bulletin Général de Thérapeutique* for April 15th, 1859. In the first of these cases, ice alone was used; in the second, though a frigorific mixture was used eighteen times, and in the manner (the reporter M. Neboux says) which I had prescribed, it is evident from the description that it was applied so imperfectly as to raise a doubt whether actual congelation was at any time produced by it. Nevertheless, a tumour pronounced to be malignant by several surgeons, including MM. Velpeau and Manec, two leading authorities on cancer, was thus completely removed, the patient's health being perfect after a lapse of three years. Such facts as these supersede the necessity of plausible theories, though it is not improbable that the cancer cells or germs of the disease which, like hydatids, may be considered as so many independent organisms, are injured or destroyed, just as certain insects and plants are destroyed, by severe cold; and this will be more

* A woman in St. Thomas's Hospital was dissuaded by Mr. Simon from having her cancerous breast removed by the knife. Temporary advantage was obtained by leeches and pressure, but the complaint was advancing, with almost constant and severe pain. A bladder containing pounded ice was then ordered to be applied once a day—at first for about half an hour, but the length of time was gradually increased "till the congelation was continued for two hours and more at a time." "From the moment of its first use the patient experienced great relief, and within a fortnight declared that her tumour (the size of an orange) was going. This proved to be the case. The decrease advanced with striking rapidity; and in thirty-four days from the beginning of the treatment, A. D., at her own desire, and believing herself to be cured, ceased to be an in-patient of the hospital." No tumour was perceptible, the pain had entirely ceased, and the general condition of the patient had improved. The common objection to receiving such cases as proofs of the efficacy of remedies, namely, that the tumour might not have been cancer, but a different kind of growth, is obviated, in this instance, by the fact that the woman died some time afterwards of cancer in another part of the body.

likely to happen when the growth, from being superficial, can be thoroughly exposed to it.

Of the three modes enumerated of removing, or of endeavouring to remove, the whole cancerous growth, excision is the most frequently practised; and, as respects cancer of the breast, it has the recommendation of being the most easily executed. The objections to this proceeding are, that it is a dangerous one: proving fatal, according to Mr. Paget, ten times, and according to M. Lebert, sixteen times in every hundred cases;* and that it rarely, if ever, effects a permanent cure. On these accounts, some surgeons have objected to excision under any circumstances, even considering it better that nothing should be done than that a patient should be subjected to a proceeding at once hazardous and useless; but others, while admitting its hazard and insufficiency as a permanent cure, deem the operation sometimes advisable with a view to the prolongation of life. The statistics, however, brought forward in support of this view, are not unobjectionable. They may show, by a comparison between the cases which have and those which have not been operated upon, a slight prolongation of life as respects the former; but this can be accounted for by the circumstance, that the most favourable cases, or those which are least likely to run a rapid course, have always been selected for excision. Had an average description of cases been operated upon, the balance would probably have been on the other side. But granting that life may be thus extended for a few months, does the expectation of this afford sufficient compensation for the immediate danger of the operation? The same objection holds to excision as a palliative, even if we possessed no better means of this description.

The removal of cancerous growths by caustic is not so

* Aiken's System of Medicine, 1864, vol. ii, p. 377.

dangerous a proceeding as their removal by the knife; and it may afford a greater chance of a lasting cure. Erysipelas, which is occasionally caused by it, has been accounted its principal hazard; but the greater part of whatever mortality may have speedily or eventually proceeded from this measure, must be attributed to the undermining of the constitutional powers by the intense and long-continued pain which it causes, and by the strong opiates administered with the intention of alleviating this suffering.

The intense degree of cold required to destroy the vitality of the whole of a cancerous growth, is produced by the strongest frigorific mixtures, and its application must be prolonged for hours. The necessity for maintaining a very low temperature for so long a time, and of combining pressure with it, in order to extend its influence by impeding the circulation through the part, render this a very troublesome proceeding; and if mere trouble can be considered a valid objection to an operation for which there may be no equivalent substitute, there would be little chance of its ever being generally adopted. It has, I am sorry to say, been so considered by Mr. Moore, one of the surgeons of the Middlesex Hospital, in a lately published essay on cancer, containing statements relating to the demonstrations of this plan of treatment, which, with the hope of establishing it, I gave in the cancer wards of that institution about five years ago. The procedure is said to be "far too difficult of management to be generally available." It is, doubtless, better not to attempt to remove cancer in this way than to do so without bestowing the pains requisite to ensure success; but surely in an institution endowed expressly for cases of cancer, there should be no deficiency in this respect. The writer alluded to admits that "Congelation may be employed with great

* Holmes's System of Surgery, vol. i, article "Cancer".

advantage in conjunction with caustic;" but if the trouble of using it efficiently is to be a reason for rejecting this expedient when employed alone, it must likewise be a reason for rejecting it, when combined in a proper and efficient manner with caustic. The case in which I employed congelation in the Middlesex Hospital preparatory to the use of caustic, and which produced such a permanent insensibility as to admit of the removal, by the combined destructive agency of cold and caustic, of a large scirrhous tumour without the least pain, required quite as much care and trouble in order that its influence might extend to the necessary depth, as the other cases did in which it was employed alone. In reference to the pains required, my own report of these proceedings at this hospital, published in 1858, concludes with the following passage:

"But granting that these anticipations should be realised, the removal of cancerous growths by congelation alone cannot much excel that effected by its combination with caustic. The latter is not only painless, safe, and comparatively speedy, but if due care be taken that the influence of the cold shall be sufficiently pervading, the removal may be permanent. It is to be hoped, therefore, that there will be no prejudice against the proceeding on account of its difficulty, and because it will fail when badly executed; but that it will be carefully studied like those other complicated operations in surgery which, from being the only means of accomplishing their several purposes, must continue to be performed."

The points which I particularly wished to establish by these applications of intense cold, and for the establishment of which I have much pleasure in acknowledging that every facility was afforded by the surgeons of the hospital, were, first, the practicability of destroying cancerous growths by

cold alone in as defined a manner as can be done by the knife, and more defined that when the most manageable caustics are employed. This was done by fitting a gutta percha cup to the part, and filling it with the frigorific mixture. The slough or eschar thus formed was of precisely the same size as the bottom of the cup, and of a depth or thickness proportionate to the degree and duration of the cold, and the pressure simultaneously employed. Secondly, the extraordinary rapidity with which the growth may be destroyed by the combined action of intense cold and caustic. Thirdly, the perfect safety of such applications, there having been neither inflammation, nor hæmorrhage, nor exhaustion. Fourthly, their complete painlessness; the patients having taken their dinner during the application, and one of them having amused herself with reading. Fifthly, the influence of one strong application upon the whole tumour; though the total destruction of a growth requires a repetition of the process, there was no return of the usual pain from cancer after the first thorough congelation.

The shortness of the period of my attendance at the hospital would have rendered it impossible to exhibit what may be termed the specific effects of short applications of intense cold on cancerous growths; nor was it necessary to illustrate its palliative property in the relief of pain, as I had shown this, some years before, in the same hospital. A case of immediate and long-enduring relief from the agony caused by an ulcerated cancer on the breast, is inserted, amongst other cases, in my Treatise on Cancer.

Besides exerting the peculiar influence, above described, of dispelling malignant tumours, and, when this fails, destroying, by a prolonged action, the vitality of the whole growth, congelation possesses valuable qualities as a pallia-

tive in cancer. Without reducing the strength, as local bleeding does, it checks the accompanying inflammation which often precipitates the course of the disease; and, by its anodyne properties, it relieves the accompanying pain more certainly and safely than can be done by opiates.

These various properties of intense cold, adapted for the fulfilment of various indications, render it a very valuable remedy of cancer, and should ensure its employment, whether palliation or cure be the object of the practitioner. But whoever determines upon using it should, in order to prevent disappointment, previously render himself familiar with its several remedial qualities, and learn so to apply it as to bring that particular quality into action which is appropriate to the circumstances. Hitherto it has too often happened that the mere undefined use of a degree of cold only a little greater than that usually employed has been considered all that was requisite. Certain published notices of the use of this remedy in cancer have encouraged such an imperfect manner of applying it. Dr. Simpson, for instance, states (*Medical Times and Gazette*, Jan. 1859) that cancerous ulceration of the uterus has been healed by ice and salt applied by means of a muslin bag; and Velpeau, in his work on diseases of the breast, speaks of destroying cancerous excrescences by subjecting them to the action of the common frigorific mixture for so short a period as fifteen minutes. I can only say that it has not been my good fortune to succeed in producing such effects by so simple an apparatus, and so little expense of time and trouble.

In respect to practical details there is not much to add to those contained in the last edition of my work on Cancer. I shall merely mention that where the intention is to dispel the tumour, there will often be an advantage before producing actual congelation, from maintaining for a considerable

period on each application, and by means of a gutta percha cup fitted to the part, a temperature just above that which arrests the circulation ; and that I have more frequently than at first, applied pressure simultaneously with the cold, in order that, by thus closing the blood vessels, its influence may have more extension.

c. *Rheumatic and Neuralgic Affections.* As in chronic rheumatism and the analogous diseases, lumbago, sciatica, headache, pleurodyne, &c, both an inflammatory and a neuralgic affection are often present, it might have been reasonably presumed that they would yield to an agent which is at once antiphlogistic and anodyne. But when neuralgia proceeds, as it often does, from deep seated irritation or other changes in the nervous centres, cold, however intense, applied to the seat of pain merely, will rarely prove of service. I have failed in perhaps half the number of cases of neuralgia in which I have employed it. Nevertheless, as it has sometimes succeeded where there was little expectation of benefit, I think that in doubtful cases a trial ought to be made of so perfectly safe a remedy when other measures have proved of no avail. In rheumatic and other allied affections, my experience has been very different. In these this remedy will very rarely fail to afford relief. Some cases of very long standing, and of the amendment of which all hope had ceased, have been cured by it. As respects lumbago, I have elsewhere related that nine consecutive cases which came under my care at the Brighton Dispensary, were permanently cured by one, or at most two, congelations of five minutes duration.* It proved equally successful in the

* On Neuralgic, Rheumatic, and other Painful Affections, 1851. In addition to this work, a paper in the *Medical Times and Gazette* for July 14th, 1860, contains practical details on the employment of intense cold in this class of diseases.

cases of headache at the same institution, when the pain did not arise from organic cerebral affection, and was neither sympathetic with other disease, nor symptomatic of hysteria.*

d. *Epilepsy and other Spinal Affections.* In the introduction to my collected essays on congelation, published in 1852, I proposed its employment in epilepsy, founding the suggestion on its good effects in a case of disease of analogous character which had been lately under my care. Subsequent experience has confirmed the soundness of the suggestion, and subsequent pathological research, particularly by Vander Kolk, has elucidated the mode in which cold operates in such cases. There can hardly be a doubt, judging from the effect of remedies as well as pathological appearances, that the spinal marrow is that portion of the nervous system which is mainly implicated in epilepsy, and especially its upper part, including the medulla oblongata; nor is it less probable that the affection of these parts consists of an excessive susceptibility of irritation, leading eventually to organic change. Without this morbid irritability the usual "eccentric" causes of epilepsy would be incapable of producing it.

No remedy would seem better calculated than intense cold to remove this condition. It is likewise related in the publication just referred to, that on a visit which I made some years ago to the obstetric wards of the Edinburgh Infirmary, I was informed that frigorific mixtures had been beneficially applied over the lumbar vertebræ, in certain uterine affections supposed to arise from spinal irritation. Dr. Watson mentions that the late Dr. Todd suggested the application of ice to the spine in hydrophobia; and certainly, in a disease

* Practical Illustrations of the Treatment of the Principal Varieties of Headache, 1849.

that has resisted all other remedies, a more intense degree of cold than ice would produce, and, consequently, one more likely to be efficient, deserves a thorough trial. Allusion has already been made to my unsuccessful attempt by similar, though very insufficient means, to control the spasms in tetanus.

In epilepsy, as in other deep-seated affections, it may be necessary that the cold applied should be of longer continuance that what can be produced by congelation without injury to the skin; and a modification of the apparatus to be described in the next section furnishes a convenient mode of accomplishing this. Its application to the head has already been strongly recommended by Dr. Radcliffe in epileptiform affections. But actual congelation prolonged for several minutes should always succeed these minor applications of cold; and it is in cases of this description that we may expect much benefit from the deep-seated counter-irritation produced by it.

Many years ago, I adverted to the strong and sudden remedial influence which appears to be exerted in diseases of warm climates by the violent irritation near the base of the brain arising from mercurial salivation*; and counter-irritation, produced by setons and other ordinary measures, have often been used with benefit in epilepsy.†

* "An Inquiry into the Mode in which Mercurial Ptyalism operates in the cure of Acute Diseases."

† Dr. Chapman has been lately prosecuting the inquiry into the effects of severe cold applied over certain parts of the spine. His explanation of its *modus operandi* differs much from that given above, as well as from commonly received opinions; but this does not affect the value of the facts adduced in evidence of its efficacy in epilepsy. Had his mode of applying cold borne a closer resemblance to that which I have recommended, or that about to be described, the benefit derived from it would have been still more remarkable.

SECTION III.

ON THE CONTINUOUS AND UNIFORM APPLICATION OF MODERATE DEGREES OF COLD.

To secure the really efficient action of cold in all but its tonic or stimulant applications, it is necessary that it shall be either intense, or, if moderate in degree, that it shall be continuous and uniform. Intense cold will produce remedial effects which cannot be procured from moderate degrees of cold, however long they may be continued, but sometimes these modes of applying this agent may be equivalent; and when congelation is indicated, it occasionally happens that as the vitality of the superficial tissues would be endangered by its long continued suspension, it is necessary, in order to attain the object in view, to continue the application of cold in a more moderate degree as a supplementary measure.

Again, in certain cases of extensive and violent inflammation, the surgeon may fail in producing congelation, even though he employs the strongest frigorifics, aided by position and pressure; and when he succeeds in such cases, the question arises, whether the combined depressing agency of the advanced disease, and of these powerful frigorifics might not also endanger the vitality of the part. I have heard of no such result, but until further observation has elucidated this point, it would, under such circumstances, be prudent to substitute moderate and continuous cold for its more intense degrees.

Various expedients had been employed before the introduction of the "current apparatus" for obtaining uniformity and continuousness in the application of cold, but all were very defective and comparatively of little avail. The ordinary plan of applying a piece of linen dipped in cold water as a lotion, and removing it when heated in exchange for

another piece, is an intermitting use of cold, and in this way, from neglect of the attendant, cold lotions often become hot fomentations. Pounded ice in a bladder or an impervious bag partakes of the same defect, and is nearly limited to one degree of temperature. Continued cold sponging, as it secures a pretty uniform temperature, would be more employed if the necessary assistance could always be obtained. And the method of "irrigation," or causing water to drop continuously on a part can only be applied to certain portions of the body, and even as respects these, the temperature is only uniform over a very limited space.*

* With reference to the two measures last mentioned, I may state that the late Professor Royle of King's College illustrated the efficacy of continued sponging by a remarkable case of remittent fever, which was under his care while a surgeon in the Bengal Presidency, and when, therefore, he had abundant means of applying it properly. "The patient lay in a comatose state for six days and nights", during the whole of which time the sponging was ordered to be continued. "Drying of the skin was immediately revealed by the moaning of the patient, when his pulse would immediately become hard, full, and bounding." (*Manual of Materia Medica*, 1847, p. 684.)

I am indebted to another distinguished medical officer on the same establishment, the late Dr. James Duncan, for the following interesting account of "irrigation" as practised in certain parts of India. In publishing this extract from a letter of my lamented friend, I cannot refrain from stating, that the lively interest which he took in my researches respecting the medicinal qualities of cold, and the support which he afforded me while contending against a long-established prejudice respecting them, contributed greatly to whatever success my efforts may have attained. These researches, though not completed, have, I conceive, determined all the more important points.

"Irrigation is pretty generally used throughout the Himalayah regions of India as a mode of putting restless and squalling infants to sleep, and so afford freedom to the mother to pursue her field occupations. The infant, in a state of complete or semi-nudity, is taken to the nearest dripping rock, and laid underneath it so that the gelid water trickling from it shall fall, as nearly as possible, on the crown of its head. Soon, very soon indeed, its screams and contortions cease, and it gently sinks into sleep, or into a state of profound quiescence, which these untutored mountaineers mistake for it."

The current apparatus may be said to be constructed on the principle of the last of these expedients; it is a mode of directing and limiting irrigation, but it combines with the constant renewal of the water other valuable properties. A thin bladder, or membranous bag, containing a small quantity of water of the desired temperature, is placed and supported on the part to be refrigerated, and this temperature is preserved by establishing a current through the bladder by means of two flexible tubes, one connected with an elevated and capacious reservoir, the other leading to a waste vessel. In this way a perfectly uniform temperature, or one made to vary from time to time according to the feelings of the patient, has been kept for several days without intermission by merely replenishing the reservoir every six or eight hours, and regulating the flow of water by a stop-cock. The ease with which the temperature can be gradually lowered to the required degree without causing uneasiness to the patient is a considerable advantage. Ice, or a low temperature (but not so low as to benumb the part speedily) if directly applied to an inflamed part, is not well borne and may irritate; but if the temperature be gradually reduced, the low degree may be both agreeable and beneficial. From inattention to this point has proceeded much of the difference of opinion amongst surgeons respecting the utility of the local application of cold.

Some years ago, the celebrated German surgeon Langenbeck, introduced a modification of this apparatus for the purpose of promoting the healing of amputation wounds and compound fractures. Instead of placing the limb in a water muff, formed by a hollow cylinder with double membranous sides (a form of the current apparatus described in my treatise on indigestion) it was put into a metallic case with membranous endings, and the water was prevented

from escaping by tying these endings upon the limb. The proper temperature was preserved in the way which has been described, by a current of water passing constantly into and from the case through flexible tubes connected with it. Great advantage was declared to be obtained from this expedient. The wounds healed more rapidly, and the mortality was lessened. Unfortunately, however, the pressure from the tyings impeded the circulation, and a well-marked fatal result from this cause in one of the hospitals of Paris, appears to have brought the plan into complete disrepute. If there were an advantage from having the water in immediate contact with the wound, the objection from the ligatures might be removed by enclosing the limb in a case or deep ring of gutta percha, which could be softened by heat and made to adhere firmly to the skin without pressing upon it.

An essay on Cold recently published by another German, Professor Esmarch, and already referred to, is interesting, not from any novelty in the proceedings he adopts, but as an illustration of the singular fact that even now, after all that has been said by previous writers on the subject, it is necessary to bring forward new proofs (and several of his cases are very strong ones) of the safety and efficacy of continued cold. The same observation is applicable to a case of severe dislocation of the knee in which similar treatment was employed, related in Mr. Hilton's recent work on one of nature's most powerful remedies, "rest."

The doubt expressed by Dr. Watson,* whether the apparatus I have described can be easily managed, has occurred to others, and this idea of difficulty has impeded the general adoption of an expedient which was very much wanted. It is true that it is not so simple a mode of refrigerating as the application of a rag dipped in cold water—

* Lectures on the Practice of Physic, fourth ed., vol. i, p. 398.

neither, as respects locomotion, is a wheel-carriage so simple as a hurdle or a walking-stick—but it can hardly, with justice, be called a complex instrument. Some years ago I published the particulars of a case in which it was employed to arrest inflammation and hæmorrhage from a neglected injury of the elbow-joint, with the effect, probably, of saving life; and where everything required for its construction (with the exception of a bit of flexible tube) was found in the cottage of the patient, a fisherman, on the Murray firth.

I have employed this apparatus in most of those diseases in which cold is considered a remedy, including cerebral affections, irritable ulcers, wounds, and diseases of the joints. In a case of strangulated umbilical hernia, where the omentum alone appeared to be implicated, I preferred subduing the inflammation by this means and converting the strangulated into an irreducible hernia, to encountering the danger of herniotomy; but in strangulated intestinal hernia, it would be better to apply a colder fluid in a very deep gutta percha cup, in order that the combination of equal pressure with intense cold might more certainly effect reduction.*

In illustration of the comparison which has been made between continued cold and congelation, reference may again be made to M. Baudens' paper on the treatment of sprains (*Gazette Médicale*, June and July, 1852). From my experience of congelation as a remedy of this affection, I should say that in four-and-twenty hours after its prompt application, the cure, with the exception of a little remaining weakness, would generally be complete. Treated by continuous immersion of the foot in cold water, a much longer time was required to banish completely the symptoms of inflamma-

* The current apparatus is minutely described in an appendix to my Treatise on Indigestion, and in the *Dublin Quarterly Journal of Medical Science* for August 1848.

tion. In thirty-nine cases in the military hospital of Val de Grace, the time of immersion varied from five days to fifteen.

SECTION IV.

DISEASES OF THE URINARY ORGANS.

Several reasons may be assigned for the circumstance that, amongst the numerous diseases of the urinary organs, stricture of the urethra and stone in the bladder have attracted most attention. They are common and dangerous ; being mechanical diseases, and remediable chiefly by mechanical means, they have appeared more than the others to be within the reach of surgery ; and, unlike most other diseases, their cure can only be effected by art. Specific fevers are cured by the *vis medicatrix naturæ* alone, and even a dislocation or a fracture, if left entirely to the natural powers (and denying that instinct would dictate replacement) is remedied to a certain degree, as the patient recovers with only loss of power in the injured limb. But if the maxim, " laissez faire " were applied to stone and stricture, death, sooner or later, would be the inevitable consequence.

Thus associated in danger, they are also singularly analogous in their nature and modes of treatment. A free passage is required for a liquid excretion in the one, and for what may be termed a solid excretion in the other. In both the excretory duct requires to be enlarged, and it has been enlarged in both by similar measures—dilatation, incision, and rupture. We shall see, moreover, that the peculiarity in the manner of executing these measures which answers best for stricture is that which ought to be adopted in stone. In another respect, also, they unfortunately resemble each other; notwithstanding the attention that has been given them, the suffering and mortality from both continue to be great.

A. *Stricture of the Urethra.* Stricture, when recent and easily dilatable, is relieved and kept under by instruments which act on the principle of the wedge; but when it has been of long continuance and has become hard and undilatable, when the matter of which it consists is elastic, or when it is excessively irritable, other measures are required for the patient's relief or cure. Until lately, the measures employed in these severer cases were so dangerous and uncertain —such as cauterisation, external incision without the guidance of a grooved sound, and rupture of the stricture by pushing blunt instruments against it—that surgeons were generally afraid to have recourse to them, preferring the slight relief given from time to time by bougies and catheters; and the result was that many persons passed miserable lives and died eventually from strictures and affections of the bladder and kidneys caused by them, who, at the present day, would have been restored to perfect health.

The greatly improved treatment of stricture which now exists is mainly due, first, to the introduction by Dr. Neil Arnott of instruments which dilate by lateral or eccentric action; and, secondly, to the revival of an almost forgotten expedient, the internal incision of stricture, but executed with greater care than was formerly taken to confine the incision to the contracted part. My first publication on this disease contained an account of both of these practices.*

Conceiving this principle of eccentric dilatation to be very important, Dr. Neil Arnott suggested several instruments for carrying it into effect, but gave the preference to one consisting essentially of a membranous tube which, after being placed in its flaccid state within the stricture, is distended with fluid. It was supposed that a moderately distending

* A Treatise on Stricture of the Urethra and Stone in the Bladder, second ed., 1840.

and elastic force thus produced and continued for some time, would overcome every resistance; but a very short experienceshowed that though this was true as respects the softer and more recent class of strictures, for which it is an excellent remedy, the harder as well as the irritable classes required a different management. In these a plan was adopted which had been proposed in my Treatise, in the following passage: "The stricture may be ruptured without the forementioned danger, by distending it suddenly with a dilator of powerful action;" and in another work, supplementary to my Treatise, I explained and illustrated this change of practice.*

The fluid pressure dilator was, in course of time, rendered perfect in construction, and will now produce the required degree of distension, either suddenly, or, what may generally be better practice, by gradual increase during several minutes.

It is of little importance how the instrument for eccentric dilatation is constructed, provided it carries fully into effect this important principle. Half-a-dozen metallic instruments have been proposed (including one by myself) and a very little ingenuity might double the number. That introduced

* "Cases illustrative of the Treatment of Stricture by Fluid Pressure." One of the first cases in which sudden distension was employed, was that of a member of the profession distinguished by his writings on the diseases of India, whose life had been rendered miserable by a stricture that would not admit of relief from any of the common measures. I learned afterwards that he was the writer of a notice of my works on stricture, which appeared in No. 269 of the *Medical and Physical Journal*, from which I make the following extracts, for the purpose of shewing that the practice of rupturing or slitting strictures by instruments of forcible eccentric action is not so recent as some have been led to suppose. "In a large proportion of the varieties of stricture, momentary and considerable distension by the dilator is the best and most effective method of treatment." "When the use of the dilator is followed by a slight hæmorrhage, it may be regarded as an advantageous circumstance; for it seems to indicate that the membrane forming the stricture has been ruptured."

by M. Perreve of Paris, answers the purpose, and being of simple construction has, in its original or slightly modified form, been generally adopted. The term "immediate treatment," which has been lately applied to its use in this country is not sufficiently discriminative, as immediate relief can be given by other measures as well as forcible eccentric dilatation.

The other great remedial measure, internal incision, has been variously carried out, and principally by the French and other continental surgeons, who prefer it to forcible excentric dilatation or incision from the outside.

In all their methods of internal incision, however, there has been the great defect, that it is not limited to the contracted and comparatively non-vascular part; the sound part of the canal, both before and behind the stricture, having always been more or less cut. In consequence of this, hæmorrhage has occurred in the majority of cases, and occasionally infiltration of urine and pyæmia. Some years ago, I proposed a new method of making incision internally, which, by exactly limiting it to the contracted part (as exactly as if this were exposed to the surgeon's view) removes all these objections. Compared with the treatment, by the sudden or forcible distension produced by an expanding instrument, it has the advantage of exciting little or no irritation (so often the source of disease in other parts of the urinary system); the slit in the stricture is made in any desired direction, or there may be more than one made if deemed desirable; and it cannot extend deeper than the knife has penetrated. I have employed this exactly limited incision on many occasions with most satisfactory results and without a single untoward occurrence.

The space allotted for these brief notices prevents my entering upon any description of this perfectly safe and effec-

tual mode of making internal incision, which differs essentially from every other mode in use, farther than to say, that if the cutting part of the instrument be very sharp, its only motion must be eccentric; but if it has purposely been made blunt (and it is this variety that I have always employed) it must, in the act of cutting, be slightly retracted; and, whether sharp or blunt, its edge must be made to press strongly against the part which is to be divided. The instrument is very simple—consisting merely of two or three flat rods, one of which is sharpened towards the end, and a flat silver or steel tube, terminating in a grooved director, along which the sharpened rod is passed, and from which it is afterwards raised by pushing another rod under it.*

The introduction by Mr. Syme of the external incision of stricture upon the grooved director, borrowed from lithotomy, constitutes a remarkable epoch in this department of surgery. The circumstance of so bold and manifestly hazardous a measure being proposed by a surgeon of eminence, roused attention to the fact, that something else was required than bougies and sounds as a remedy in the more dangerous form of the disease. In thus dispelling a very general delusion, the introduction of this method was of the greatest service; but it was natural that an inquiry should soon be instituted whether there were not other measures equally effectual but

* The instrument is described in my Argenteuil Prize Essay, and in the *Medical Times and Gazette* for 14th September and 2nd November, 1861. M. Maisonneuve, of the Hôtel-Dieu in Paris, adopted the principle of this instrument about four years after the first of these publications. He informs us, in a paper read before the French Academy of Medicine, that all that was wanted to render an urethrotome which he had devised complete, was merely to blunt the edge of the cutting part —"*émousser simplement la partie saillante*". Merely to blunt! The blunting of the urethrotome was as great a change in principle as was effected by Hawkins when he merely sharpened the edge of the gorget in lithotomy.

more safe that could be substituted for it. For statistics have shown that external excision, even in this improved form, has not unfrequently proved fatal; and the proportion of deaths to recoveries would have been greater if the proceeding had been restricted (as Mr. Syme intended it should be) to cases that would not yield to the usual milder kind of treatment. Sudden and forcible dilatation, as well as internal incision, had been proposed for the severer cases of stricture, previously to Mr. Syme's method, but they were little known or practised, especially in this country. If a comparison be made between this operation and exactly limited internal incision, we shall find that in the first, the wound is large, deep, and exposed to the air, and made through morbid and vascular parts; whereas, in the latter, it is not of the size of a finger nail, and the blood effused has rarely exceeded a few drops. By neither plan can a permanent cure be certainly effected. It is necessary, in order to prevent recontraction, to use the bougie afterwards at lengthening intervals; but it will, doubtless, often happen when the passage, by being thus kept open, remains free from irritation, that absorption of any deposited matter will eventually take place.

B. *Stone in the Bladder*. The three methods at present in use for the removal of stone, are incision of the neck of the bladder, breaking the stone, and the dilatation of the posterior part of the urinary canal by an instrument introduced through an opening in the perineum.

Sir Benjamin Brodie first called attention to the great mortality from stone in the London hospitals, when adults are cut for it. He stated that for some time preceding his publication, the recoveries had been balanced by the deaths. The operation of breaking the stone is not so fatal, when well performed on properly selected cases. Dilating has

probably not been more successful in adult cases than cutting, unless the stone extracted has been small, when it has had a decided advantage: in the cases of children, neither operation can be considered a very dangerous one. All these proceedings are probably capable of improvement, but dilatation, though perhaps the oldest and most practised of the three, is still the most defective. When rendered perfect, it will probably constitute by far the most successful way of removing stone by mechanical means.

The two most important questions in connection with dilatation of the neck of the bladder are: what instrument or means should be used in effecting it, and whether it should be produced rapidly or slowly? How, and after what amount of previous incision of the external parts, the dilator should be introduced, are points of less importance. A knowledge of the size of the stone will often regulate these preliminary proceedings, which ought to vary according to circumstances.

The means at present employed for dilating, consists of a combination of the finger of the operator and the rude wedge formed by the forceps grasping the stone. The use of the finger as a dilator was introduced by an Italian surgeon early in this century, but his practice was unknown here until Mr. Chatto gave an account of it about twenty years ago. It is this Italian mode of dilatation, modified by Mr. Allarton and others, that has been chiefly in use in England.*

* Mr. Allarton mentions in his work called *Lithotomy Simplified*, that it was from me he first heard of this Italian proceeding. In a paper on the Extraction of Stone by Dilatation, in the *Lancet*, July 29th, 1843, I had expressed my readiness to afford to any one interested in the subject, such further information as my practical experience might enable me to give; and Mr. Allarton, some time afterwards, wrote to me respecting the employment of a fluid pressure dilator, in the case of a child upon whom he intended to operate. Fearing that he might have

Mr. Teale has endeavoured to supply the deficiency of dilating power in the finger by a steel instrument consisting of three blades, expansible by a screw; but its credit is damaged by his candidly relating that, in a fatal case, marks of the three blades were perceptible on the neck of the bladder when examined after death.

A dilator for this purpose should cause perfectly equal pressure on every part of the surface exposed to it; and the pressure, if continued, should be of an elastic nature. These requisites are possessed by a dilator of fluid pressure, or one resembling in principle that for stricture described in the last section. It may be called Nature's own dilator, for the waters in childbirth open the passages in a similar way, and artificial waters (as the fluid dilator may be called) have of late been substituted for them with the greatest advantage in several obstetric operations. The variety of this instrument used in stone, consists of a strong impermeable silk tube, which is distended with mucilage by means of a narrow screw syringe. When necessary, its dilating force can be increased by placing steel wires or some other unbending substance over the silk. Less irritation would be produced,

some difficulty in using this instrument upon the first occasion, I directed his attention to Mr. Chatto's account of the Italian method, which appeared eligible in the cases of children, on account of the great dilatability of the neck of the bladder at that age. It was perhaps as well that I did so; for the second edition of his book contains observations on the fluid pressure instrument which show that he is not yet well acquainted with its construction. His persevering advocacy, however, of the Italian mode of dilatation, which, moreover, recommends itself by its simplicity, as well as by its utility in the cases of children, has greatly aided the efforts that were previously being made to revive and improve the practice of dilatation; and there can be little doubt that this practice will ere long be rendered applicable to ordinary adult cases (in which improvement was especially wanted), by the adoption of safe and efficient means of executing it.

and there would be less chance of laceration by this than any other conceivable means. A large opening would be made by it for the passage of the stone, which could therefore be extracted without the fatal dragging and abrasion that occur when the dilatation has been insufficient.

In reply to the second question, it may be stated, that though the irritation from stretching the tissues would be less if this were done gradually, the coexistence of any considerable degree of irritation with a long continued process of dilatation, may on some occasions render this intolerable. Dr. Wright, who is mentioned in Dr. Willis' excellent treatise on this subject, as having successfully used slow dilatation, was, on a subsequent occasion, obliged, for this reason, to remove the dilator before its purpose had been completed, and to finish the operation by the knife. I have obviated the necessity of this in operating upon the female, by administering a strong opiate; but chloroform, repeated in small doses, as in obstetric cases, would, probably, have a better effect. Or, the distending fluid might, throughout or at intervals, consist of a cold benumbing solution kept under adequate pressure in its reservoir, and continuously renewed on the principle of the current apparatus. The same objection may be made to this suggestion that has been made to the removal of cancerous growths by congelation, namely, that the process is too complicated; and assuredly, there is a wide difference in this respect between it and the finger as means of dilatation. But why should surgery be deprived, in this very important instance, of all benefit conferred by advancing mechanical science? The inflated tube which, according to Alpinus, was used by the Egyptians for the extraction of stone, was a dilator of fluid pressure, and surely it may be used in an improved form, as well as the improved knives, catheters, and tourniquets, of the present day? If,

however, this proceeding were deemed too complex and tedious, rapid but not sudden distension, under etherisation (which was unknown when fluid pressure was first proposed) may be substituted for it, as the passage may thus be opened with safety to a much greater extent than that executed by the means at present in use.

It may be said that dilatation can only be made to a certain limited extent, and that the finger will produce it to this extent as well as, and more conveniently than, complex means. If so, it necessarily follows that what has been called the further dilatation by the forceps grasping the stone, and which is required in almost every case, cannot really be dilatation, but must be rupture or laceration; and it can hardly be doubted that laceration is an accompaniment both of rude attempts at dilatation, and of slight incision of the prostate in lithotomy. But if laceration frequently attends these processes, it would surely be safer to rupture or lacerate the part by an instrument which does not, like the forceps grasping the stone, at the same time contuse and abrade. Rupture is so much dreaded, because to it has been ascribed all the mischief caused by these additional sources of inflammation; but were it produced by an instrument acting equally and eccentrically, it would, I am persuaded, be less dangerous than incision as this is often performed. The tight resisting part would alone be severed; the looser textures enclosing the blood-vessels, and amongst which when cut the urine lodges, would, as when a blunt knife is used, be only stretched or pushed aside. Was the operation by the "apparatus major" (unquestionably a combination of rupture, bruising, and abrasion) more fatal than lithotomy on the adult as represented by Sir Benjamin Brodie, and as proved by Mr. Hutchinson's statistics in the *Medical Times and Gazette?* Much of the mortality re-

corded by these surgeons may have been due to the chloroform used in the operation; but, after deducting this increment, there will still remain (if Le Dran's account of its use at the Hôtel-Dieu be received) a considerable balance in favour of the "apparatus major".

I believe, however, that this idea of the very limited dilatability of the neck of the bladder, under normal circumstances, is erroneous. When the circumstances are unusual, and it will not yield sufficiently to a moderate force, or when the opening produced, though large, is yet too small for the size of the stone that has to pass through it, recourse must be had to incision conducted as the incision of a contracted urethra should be conducted, so that only the strongly resisting part shall be divided, or the opposing band must be ruptured or the stone broken; for on no account should it be dragged forcibly from the bladder. If lithotomy is still to be practised on adults, the adoption in its performance of the same principle of incision, carried out either by the eccentric pressure of a very sharp knife, or by the retraction of a very blunt one, would render it less destructive.

T. RICHARDS, 37, GREAT QUEEN STREET.