

Dr Latta of Leith: pioneer in the treatment of cholera by intravenous saline infusion

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ABSTRACT The paper assesses the contribution of Dr Thomas Latta of Leith to the treatment of cholera in Leith and Edinburgh during the cholera epidemic of 1832. The historiography of cholera treatment in the nineteenth century is discussed and contemporary analyses of the use of intravenous saline infusion are reviewed. In conclusion, the reasons why Latta's contribution and reputation did not long survive his death are examined.

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INTRODUCTION

The reputation of Dr Thomas Aitchison Latta of Leith has not survived his brief moment of medical fame during the epidemic of 1831–2, when he pioneered the treatment of cholera by the use of intravenous saline. From the time he reported his findings to the *Lancet* in a letter dated 23 May, 1832, several papers and books have made reference to his achievements, most notably those by EDW Greig in the *Edinburgh Medical Journal* in 1946, by AHB Masson in the *Book of the Old Edinburgh Club* in 1972, and by N Howard-Jones in the *Journal of the History of Medicine* in 1972.^{1–3} Professor RJ Morris, in his book which analysed the social consequences of the 1831–2 epidemic, reviewed Latta's contribution and highlighted the reaction of his contemporaries to the new treatment.⁴ These distinguished contributions apart, Latta's work has not been given the recognition it deserves in the historiography of epidemic disease and its treatment.

DR THOMAS LATTA

Most of what is known about Dr TA Latta was discovered by Dr AHB Masson and published in the *Book of the Old Edinburgh Club* in 1972. Masson established that Latta was born at Jessfield, his father's property in Newhaven, probably in the late 1790s, but there are no records of his birth. He first matriculated as a student of medicine in the University of Edinburgh in 1815, graduating MD in 1819 with a thesis entitled *De Scorbuto*, and commenced practice in Leith in 1822, where he remained until his death from pulmonary tuberculosis on 19 October 1833.

THE EPIDEMIC OF 1831–2

The arrival of the first cholera epidemic to affect the UK was not unexpected. Before the epidemic had reached this country, the government, through the Central Board

of Health, had taken steps to discover how continental states were dealing with this new threat, sending Dr David Barry (later Sir David) and Dr William Russell (later Sir William) to Russia in the summer of 1831. Cholera had reached Moscow in September 1830, where, despite sanitary cordons and enforced quarantine, the civil authorities were helpless to prevent panic and a mass exodus of people from the city.⁵ On their return, the two medical men communicated their findings to the Central Board of Health in London.⁶

The Board was established in June 1831 by order of the Privy Council – it consisted of eleven men, six from the medical profession and five from the military and the government. By October 1831, when cholera reached Hamburg, the British authorities were forced to act – Hamburg was a mere three days by steamship from the east of the country. The Central Board of Health in December 1831 circulated a set of *Sanitary Instructions for Communities*, including *Observations on the Nature and Treatment of the Disease*, drawn up by Drs Russell and Barry. The Board declared that 'no Remedy at all approaching to the Nature of a Specific has been as yet discovered for this Disease' and listed supportive measures which might relieve symptoms and in favourable cases ensure recovery.⁷

The *London Medical and Physical Journal* reported in February 1832 on the progress of cholera in the north of England and Scotland: by mid-December 1831, Sunderland, Gateshead and Newcastle were affected, and the journal described the arrival of the disease in Scotland:

'Forsaking now the continuous routes and creeping pace which had characterised its progress during the early weeks of its existence in this country, the disease bounded over an interval of nearly one hundred miles, and appeared suddenly in Scotland, in the town of Haddington...'⁸

CHEMICAL ANALYSIS OF THE BLOOD OF CHOLERA VICTIMS

With the spread of cholera, the Royal College of Surgeons of London took action: in December 1831, 'at the urgent request of one of the vice-presidents of the Royal College of Surgeons of London', Dr WB O'Shaughnessy was sent to Newcastle to study the blood of cholera victims.⁹ William Brooke O'Shaughnessy, a native of County Clare, Ireland, studied medicine in Edinburgh between 1827 and 1830, graduating MD in 1830. He presented his findings to the Central Board of Health on 7 January 1832, an account that was subsequently published by authority of the Board. His report was a meticulous survey of contemporary knowledge of the chemical composition of the blood in the normal or healthy condition, a wide-ranging review of the published analyses of the chemical pathology of the blood in cholera, concluding with an inquiry into the extent to which these investigations permitted pathological deductions. He referred to the earlier work in Russia of the chemist Hermann, and of his medical colleague, Jaehnichen; Hermann had carried out a chemical analysis of the blood of cholera patients finding that it had lost almost 30% of its water and argued that physicians should direct their efforts towards arresting the loss of fluid from the bowel. In the autumn of 1830, Jaehnichen had proposed that cholera should be treated by injection of water into the veins; on one occasion, he carried out intravenous injection of acetic acid and water but despite a temporary return of the pulse, the patient died within two hours.¹⁰

O'Shaughnessy summarised his findings as:

'denoting a great but variable deficiency of water in the blood in four malignant cholera cases; a total absence of carbonate of soda in two; and a remarkable diminution of the other saline ingredients. Again in the dejections passed by one of the patients...we find preponderance of alkali, and we recover the other saline matters deficient in the blood.'¹¹

His therapeutic conclusions were: '1st. To restore the blood to its natural specific gravity; 2nd. To restore its deficient saline matters. The first of these can only be affected by absorption, by imbibition, or by the injection of aqueous fluid into the veins. The same remarks...apply to the second.'¹²

LATTA'S METHOD

It was O'Shaughnessy's report and his conclusions that prompted Latta to treat cholera victims in advanced stages of the disease with intravenous fluid replacement. He may also have been influenced by reports that in February 1832, Professor Delpech of Montpellier, visiting

Scotland to observe cholera (which had not yet arrived in France) treated two cholera patients, either in Musselburgh or in Glasgow, by injecting intravenously water containing laudanum, and possibly camphor, but neither patient survived.¹³

First, Latta tried to replace the lost fluid and salts 'by injecting copiously into the larger intestine warm water, holding in solution the requisite salts, and also administered quantities from time to time by mouth...'. He found there to be no permanent benefit and indeed he considered that the unfortunate sufferers' vomiting and purging were aggravated. Latta wrote 'finding thus, that such, in common with all the ordinary means in use, was either useless or hurtful, I at length resolved to throw the fluid immediately into the circulation.' The injected solution was made up of 'two to three drachms of muriate of soda and two scruples of the subcarbonate of soda in six pints of water.'¹⁴

He described how 'having no precedent to guide me I proceeded with much caution.' His first patient was an elderly woman who had been given 'all the usual remedies' and who had 'apparently reached the last moments of her earthly existence, and now nothing could injure her.' Latta inserted a tube into the basilic vein and injected ounce after ounce of fluid – at first with no visible effect – but then she began to breathe less laboriously and 'soon the sharpened features, and sunken eye, and fallen jaw, pale and cold, bearing the manifest imprint of death's signet, began to glow with returning animation; the pulse returned to the wrist...'. In the space of thirty minutes after six pints of fluid had been injected, the woman announced in a strong voice that she was now 'free from all uneasiness'; her extremities were warm, and Latta, thinking that his patient was now safe, left her in the charge of the hospital surgeon. However, the vomiting and purging returned, Latta was not recalled and the unfortunate woman died within five hours.

Latta stressed the importance of continuing with the fluid injections, maintaining that 'such remedies must be persisted in, and repeated as symptoms demand...' but acknowledged that cure was by no means certain. He considered that failures were caused by giving too little fluid, or injecting the fluid at too late a stage in the illness or by the presence of concurrent extensive organic disease.

In an era when chemical knowledge was in its infancy, no attempt was made to standardise the saline solution. Substances were added to the saline with disastrous results. A Liverpool practitioner injected saline to which had been added egg white, the whole having been filtered through muslin.¹⁵ Initial response to the fluid was remarkable, but shortly thereafter every patient experienced the most intense fever with rigors, no doubt a reaction to the foreign protein. Finally, with no

knowledge of the existence of bacteria and the dangers of introducing infection, several patients who may have responded to fluid replacement possibly succumbed to septicaemia. There are several reports which are very suggestive of such outcomes.

Dr J MacKintosh, physician to the Drummond Street Cholera Hospital in Edinburgh during the epidemic, wrote in 1836 that 'the bold idea of injecting a large quantity of saline solution into the venous system, occurred to the original mind of the late Dr Latta of Leith... In Drummond Street hospital 156 patients were injected of whom twenty-five recovered, a cure rate higher than that for similarly advanced cases.' He states that 'not one of the patients operated on had a chance of recovery by any other means.' MacKintosh went on to give a comprehensive account of the hospital's experience, describing patient selection, preparation of the solution, method of infusion, results and post-mortem findings, commenting that Latta was 'ably and zealously supported by Dr Lewins'. Patients were given intravenous treatment only after 'every other means had been tried in vain, till the collapse was extreme, and the patient appeared to be in the very jaws of death – in total, 156 patients were treated with saline infusions, twenty-five of whom recovered.¹⁶ The hospital cure rate of 16% among those treated by intravenous infusion rises to 19% when the cases reported by Latta are included: 16 cases treated with 8 surviving. This fatality rate of 81% compares with an overall fatality rate of 48% in Scotland which rose to 61% in the age group 40–80; in the 1848–9 epidemic in Edinburgh the overall mortality was 64% with a very much higher mortality among advanced cases and the aged.¹⁷ Case selection was the reason for the high mortality in those treated by saline infusion – Latta emphasised that only patients who had 'reached the last moments of earthly existence' were chosen. MacKintosh was adamant that none of the patients injected with the saline solution had any chance of recovery and referring to similarly advanced cases who had been treated conventionally stated that 'we saw no such miracle out of 461 cases in the Drummond Street Hospital.' By this he meant that no patient in *extremis* treated by conventional means recovered.

The modern physician would find little to criticise in the contemporary defence of the new treatment which cited 'the prevention of stagnation of the blood, of the laborious breathing, the burning thirst, the extreme depression of the vital powers, and the chances of aggravating chronic disease, or of producing new organic lesions.'¹⁸

The leading article in the edition of the *Lancet* in which Latta's letter appeared analysed the cases reported from Edinburgh by Latta and other colleagues.¹⁹ The writer concluded that 'the method only failed in one case in which it had been fairly tried – that is, where no organic

disease had pre-existed, and where enough of life was left to sanction the least anticipation of success.'²⁰

THE REACTION OF THE MEDICAL PROFESSION

The immediate reaction to the publication of Latta's new treatment was generally favourable, although there were exceptions. Leading articles commenting on the use of intravenous saline appeared in the medical press, and there were many letters from practitioners who had used the intravenous saline treatment: in a letter dated 29 June 1832, Dr R Venables of London recounted his experience, describing two cases in detail and three others briefly; Dr D Carruthers of Dundee Cholera Hospital successfully treated a pregnant woman who delivered a dead child three days later; Dr GF Girdwood of Islington, writing in August 1832, described seven cases treated by the saline method, five successfully, and exhorted practitioners 'to give this remedy a fair trial.' The *Lancet* reported that the blood of one of Girdwood's cases had been analysed by Dr O'Shaughnessy four days after treatment, finding that the quantity of water to be exactly the natural or healthy standard but the quantity of pure salts was less than half the normal standard.²¹

There were those who were less impressed: on 19 July 1832, Archibald Robertson, Surgeon on the convict ship, *Cumberland*, wrote a highly critical letter, explaining that in his experience recovery was short-lived; Dr J Wright of the Westminster Cholera Hospital used 'the saline mode of treatment ... but not with sufficient success to induce us to persevere' (28 July 1832). At the same time as the publication of these discussions on saline treatment, letters were written advocating a great many other therapies. MacKintosh listed seventy-six different treatments in his *Principles of Pathology and Practice of Physic*, adding that 'it is not even pretended that all the remedies are enumerated.' He pointed out that the list 'would be humiliating to the whole profession were it not remembered how much anxiety and excitement prevailed among medical men at the time that several lost their reason, and many their lives on the occasion.'²²

The *London Medical Gazette* printed a letter, (9 June 1832) from Dr Robert Christison (1797–1882) advising the Dutch Government on the new treatment, advice based on the Edinburgh and Leith experience of treating thirty-seven patients. Christison said that twelve were alive, and of those who succumbed, without exception, they showed at post mortem signs of extensive organic disease. He was of the opinion that 'the result of these cases is such as to hold out the strongest encouragement to a further trial' and that 'no other remedy has anything like the *immediate* effect of the injection of the saline solution into the veins.' He described the effects of the saline injection on a moribund cholera victim, emphasising that these were

the *immediate* effects and going on to point out the possible adverse side effects: the risk of air embolism, of phlebitis and the as yet unknown danger of introducing so much saline matter into the blood. [original italics]. Despite these reservations, Christison approved of the principle and was confident that had he been in charge of cholera patients he 'should certainly have given it a trial.'

This letter showed Christison's willingness to give intravenous saline a fair trial, a readiness that does not equate with the criticisms of Dr Robert Lewins of Leith, a friend and colleague of Latta, who claimed that Christison had destroyed any hope of Latta's work being adopted.²³ A private letter from Lewins to Dr William MacLean of the Central Board of Health in London accused several of Edinburgh's leading medical men of being antagonistic to Latta's treatment; he wrote 'the Edinburgh Board of Health, I mean the medical part of them have behaved ill in this matter.'²⁴ He named Dr Robert Christison and Dr James Craufurd Gregory (1801–32) as the men responsible. Christison was a leading member of the Edinburgh Board and one of its two secretaries was Gregory who had recommended that the Board should not use or approve the saline treatment. Gregory was the third son of James Gregory (1753–1821) who succeeded William Cullen in the Edinburgh chair of the Practice of Medicine; young Gregory took his Edinburgh MD in 1824 and thereafter studied in Paris for three years where for a time he was a pupil of Lannec, the inventor of the stethoscope. On returning to Edinburgh, he was appointed physician and lecturer at the Infirmary and in 1828 was elected a Fellow of the Royal College of Physicians of Edinburgh. In 1829 he edited a new edition of Cullen's *First Lines of the Practice of Physic* 'with an appendix containing a view of the most important facts which have been ascertained, and which have been adopted, in regard to the nature and treatment of diseases since the death of the author.' The Appendix of 132 pages contained Gregory's review of modern advances (to 1828) in the categories of diseases described by Cullen. Cholera, Gregory explained, was caused by 'an obvious affection of the nervous system... also an uncommonly great and sudden alteration of the circulation and distribution of the blood [which] is commonly found dark coloured and viscid, probably in consequence of failure of the circulation.' His recommended treatment, derived from the experience of doctors treating cholera in India, was to give opium with wine or brandy, calomel and early bloodletting, while admitting that a flow of blood was often difficult to achieve.²⁵

There is no doubt that Gregory was thoroughly traditional in his philosophy and his ideas on human physiology and pathology, being entirely Cullenian in his outlook, a mindset which made his antagonism toward the new therapy inevitable. However, there was another

factor present: in 1832, Gregory had applied for the chair of medical jurisprudence, newly vacated by Christison from whom he received a testimonial, dated 23 June 1832.²⁶ It is unlikely that at such a time the young Gregory would have been inclined to declare his support for a radical new treatment – even if his beliefs had permitted such a step – beliefs which were firmly rooted in the eighteenth century and, as Bynum has commented, on 'a patho-physiology in which the nervous system was concert master.'²⁷

CONCLUSION

The period during which the saline treatment was in vogue lasted just as long as the cholera epidemic; when the epidemic in Britain ended, there was neither the need nor the opportunity for continued study of the disease or its treatment. The death of Thomas Latta in 1833, and the departure of O'Shaughnessy to India in August of that year, effectively ended research into the treatment of cholera and the chemical pathology of the blood in cholera victims.

Of greater importance in the discarding of intravenous infusion was the state of medical knowledge at this time. The prevailing orthodoxy was based on theories of disease where changes in the humours were seen as critical. It was too much to expect physicians brought up on Cullen's theories to view favourably a form of treatment in direct opposition to their beliefs in which bleeding was the mainstay. The *Lancet* in 1831 reviewing 'with admiration' GH Bell's work on cholera, published in Edinburgh in 1831, referred to Bell's belief that in cholera there was 'a deficiency of the nervous energy necessary to secretion.' Bell was an enthusiastic advocate of venesection which he believed relieved 'the heart and internal organs from a portion of that deluge of black blood in which they may be said to be drowning.'²⁸ This belief was general: Dr Dodd of Houghton-le-Spring considered 'the lancet to be our sheet anchor in the treatment of cholera; it speedily and surely removes the congested burden which oppresses the heart ...'.²⁹ It is interesting that during the next cholera epidemic to affect Edinburgh in 1848–9 venesection was used to a greater extent than intravenous infusion. The detailed records of the epidemic show that of 739 cholera victims, twenty-seven were given intravenous saline but venesection was employed seventy-eight times.³⁰

Parkes, writing in 1847, considered that however striking the first effects of intravenous saline, in the end, the treatment was not successful. He had used saline with the addition of albumen in India, observing immediate improvement, but, not surprisingly, rigours occurred and the patients died. He did point out, however, that rigours did not affect the Drummond Street Cholera Hospital patients. Parkes wrote that

'the object of the injection is not to cure cholera but to restore and to sustain the circulation ... until the healing force of nature may repair the lesions of the blood and restore to the vitiated fluid its normal composition.'³¹

Intravenous fluid replacement did not become the standard treatment for cholera or indeed for any condition causing hypovolaemic shock until Rogers in Calcutta used hypertonic saline successfully in the early years of the twentieth century.³² Although during the intervening years, occasional trials of intravenous saline were attempted, Latta's work was largely forgotten just as the work of his compatriot, James Lind, was forgotten or misunderstood for much of the nineteenth century, when scurvy appeared in Edinburgh during the potato famine of the 1840s, Lind's treatment was not used.

Rosenberg in his book on cholera in the USA quoted Sir Thomas Watson (1792–1882), a London physician who, during the cholera epidemic in Britain, said 'if the balance could be fairly struck, and the exact truth ascertained, I question whether we should find the aggregate mortality from cholera in this country was in any way disturbed by our craft.'³³ Latta's pioneering use of intravenous fluid replacement was one example of the physician's craft succeeding in rescuing at least some cholera victims from a certain death. There is no doubt that unfavourable reports questioning both the rationale for intravenous saline and its therapeutic value contributed to this failure and his death in 1833 ensured that he was soon forgotten.

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EPILOGUE

In 1832, Dr Thomas Aitchison Latta of Leith became the first physician to carry out intravenous injection of saline on a series of patients suffering from cholera. His pioneering work was continued at the Drummond Street Cholera Hospital by Dr John MacKintosh whose words stand as Thomas Latta's epitaph:

'The late Dr Latta of Leith, who by his unwearied and unremitting exertions on this occasion, contracted bad health, and died soon afterwards of consumption. Although Dr Latta's exertions and fate must have been well known to a number of influential men, his grave does not exhibit any monument of public gratitude, nor have his orphan children received any offer of support or protection.'³⁴

I hope that this review of Dr Latta's pioneering use of intravenous saline infusion will promote a new interest in his work and a reappraisal of his contribution to medical science.

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