

ON
A REMARKABLE EFFECT UPON THE HUMAN GUMS

PRODUCED BY

THE ABSORPTION OF LEAD.

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No branch of medicine is perhaps of greater importance than that which contemplates the means employed in the prevention and cure of diseases. But notwithstanding a vast number of observations have been made with a view of ascertaining the medicinal efficacy of various substances, and many well-regulated experiments instituted, yet the sum of the information resulting from these inquiries is small in comparison with the labour bestowed in collecting it, and our knowledge of the virtues of medicines still continues very imperfect. Nevertheless, the histories of cinchona, iodine, mercury, and antimony, offer proofs of the benefit which has been already experienced from the discovery of new medicines, and afford a reasonable expectation that ad-

ditional improvements in the treatment of disease will emanate from future discoveries.

The opinions however of therapeutists differ very widely in respect of the virtues of the same medicine, and it was whilst endeavouring to confirm or refute the statements published with reference to the action of lead on man, that I noticed an interesting phenomenon which, so far as I can ascertain, has not been hitherto recorded : and, as I believe it will prove useful in the treatment of disease, I hope the following references to it will deserve the favourable consideration of the Royal Medical and Chirurgical Society.

Medical authors have stated, that a salivation is occasionally produced by the action of lead, introduced in a very comminuted form into the human body. Dr. R. Warren, in an essay read before the Royal College of Physicians in 1768, gives (*Med. Trans.* vol. ii, p. 87.) an account of “ Four persons out of thirty two, who were attacked by lead colic, and fell into salivations for several hours every day, and said their pain was abated by the spitting.” Dr. Christison also, speaking of the action and symptoms of lead on man, (*Treatise on Poisons*, 1829 and 1836,) says, “ The saliva is increased in quantity, and bluish in colour.”

Dr. A. T. Thomson likewise states, (vol. ii. *Therapeutics*, p. 64.) “ The saliva assumes a bluish colour.” But these very eminent authorities have not, I believe, noticed the peculiar discolouration on the gums, produced by lead, which it is the chief object

of this paper to describe. My attention was first directed to the phenomenon in the year 1834, when a patient under the treatment of my friend and late colleague, at St. Thomas's Hospital, Dr. Roots, was said to have been salivated by the internal use of acetate of lead; and from that time I have been accustomed to examine the mouths of patients admitted into my wards, who had been exposed to the action of lead in the course of their usual avocations; and of those also who had swallowed the acetate of lead medicinally. The result of this investigation has proved highly interesting. It has led to the belief that a salivation in the ordinary sense of the word does not occur in one case out of thirty-six cases of lead colic, the number examined in my wards; nor in one case out of fourteen cases of pulmonary disease, which were treated by me with acetate of lead; but in the total number of fifty patients who were examined whilst under the influence of lead, a peculiar discolouration was observed on their gums, which I could not discern on the gums of several hundred patients, who were not under the influence of lead, and which I believe cannot be produced by any other internal remedy.

I believe the sign will enable physicians to establish with increased facility a precise diagnosis in derangements of health, depending on the unsuspected presence of lead; and also to obviate, in many cases, the infliction of lead colic, during the treatment of other diseases by saturine preparations.

The discolouration was carefully observed on fifty

patients, and although it varied a little in point of intensity as well as extent, yet the following description will apply with sufficient accuracy to the majority of cases in which it was remarked. The other phenomena referrible to the state of the mouth, noticed on these patients, were neither peculiar, nor invariably present. The edges of the gums attached to the necks of two or more teeth of either jaw, were distinctly bordered by a narrow leaden-blue line, about the one-twentieth part of an inch in width, whilst the substance of the gum apparently retained its ordinary colour and condition, so far as could be determined by comparing the gums of these patients with those of other patients of the same class in the hospital: there was no invariable tumefaction, softening or tenderness about them; neither was there any peculiar foetor in the breath, nor increased salivary discharge to be observed on any of the fifty patients; and on thirteen out of fourteen patients, who were treated in the hospital with acetate of lead, and carefully watched during its employment, the substance of the gums, the smell of the breath, as well as the quantity and colour of the saliva, preserved the same characters, after the appearance of the blue line, as they respectively possessed before the saturine preparation was administered; but on the fourteenth patient, who died from hæmoptysis, the gums, which were, previously to the use of lead, tumid and soft, became contracted and firm, after the blue line had appeared.

With reference to the state induced by lead, it should be remembered, on making an examination of the mouth, that the gums and breath of patients who frequent hospitals (and by whom the practice of cleansing the teeth is habitually neglected,) very often present an unhealthy aspect, independent of constitutional disease arising from lead; and amongst the fifty patients who were examined under the influence of this metal, as well as others not under its influence, the gums of many were either ulcerated, tumid, or partially detached from the teeth by incrustations; but even on the patients with ulcerated gums, the peculiar leaden-blue border line was distinctly visible. I do not remember to have seen one example of the bleeding tumified gum, peculiar to confirmed scorbutus, produced by the internal use of lead; nor do I think it consistent with experience or reasonable, to suppose that a powerful and very useful astringent in hæmorrhages should simultaneously check hæmoptysis, and produce bleeding and tumid gums. The colour also of the scorbutic gum differs from the blue colour produced by lead, and there is likewise a peculiar fœtor in the breath of scorbutic patients with bleeding gums, which did not exist in the fifty patients above alluded to.

Neither is the state of the gums and salivary glands induced by mercurial preparations, similar to that produced by those of lead; for in fourteen cases of pulmonary disease treated with the acetate of lead, no pain, heat, redness or tumefaction of the gums,

characteristic of the action of mercurials, were observed ; nor was there any increased flow of saliva, nor looseness of the teeth, notwithstanding the blue line was evident on the gums of all the fourteen patients. On the contrary, the blue line was obliterated on some patients with lead colic, to whom calomel was administered in quantity sufficient to affect the system.

I am bound however in fairness to state that “turgidity of the gums” is said by Dr. A. T. Thomson, to supervene large doses of acetate of lead ; and also that my friend Mr. Moyle of Chacewater has attributed to the action of the same salt, a slight enlargement of the submaxillary glands and a tenderness in them when submitted to pressure ; but in no case could he detect any increased salivary secretion ; and he further remarks that in one case the gums were firm and dry, and rather pale excepting at their edges, where he observed the blue line. I do not wish to assert that salivation and turgidity of the gums are never produced by the internal operation of lead ; but I venture to affirm they are rare occurrences, and not characteristic of its influence. On the other hand, the discolouration is a very constant occurrence ; it precedes all other unequivocal symptoms produced by lead, and is not equally exposed to the imputation urged against most medical data, of being fugitive and deceptive. For the discolouration is very permanent ; it has endured through months and until death, and having been once observed may be afterwards easily recognised. On a few patients

only had it entirely disappeared before they quitted the hospital ; on others it had only partially vanished. In many it continued with little or no change ; and on a few patients who died after the medicinal use of lead had affected their gums, the discolouration appeared more distinct a few hours after death, and before putrefaction could have begun, than during life. It cannot be confounded, when distinct, with the ordinary colour of the gums, during life ; and after death, any ambiguity which might have existed previously will be entirely removed by the strong contrast of colours disclosed on the gums of the dead body. The pathognomic value of the discolouration will bear a proportion to the regularity of its appearance under similar conditions ; and in some cases, a little ambiguity may arise from the difficulty of discriminating between imperfectly defined colours ; but this ambiguity will soon cease if the patient continues exposed to the action of fresh portions of lead ; and in all cases the phenomenon will possess some importance if viewed in connexion with the ordinary symptoms of the presence of lead.

I have frequently experienced the utility of examining the gums, and in confirmation of my assertion I may add, that the gums of fifty-four patients, men, women, and children, were examined purposely on the same day, to detect this discolouration ; but on fifty-two, nothing remarkable was noticed ; on the remaining two patients however, the peculiar blue line was unexpectedly observed, and served in both cases to establish a precise diagnosis.

One of these patients had worked in a white lead manufactory three months previous to his admission into the hospital ; the other in a glass-house ; and on both there was a slight paralysis of the wrists, which had been overlooked by myself, and disregarded by the patients themselves at their first examination.

Two other patients, on whom the discolouration was extremely well developed, were subsequently treated by me, but they were unable to give any satisfactory account of having ever been exposed to the action of lead, although they exhibited the common symptoms which are generally attributed to the influence of this metal, as well as the blue line ; and both cases deserve further notice in illustration of its therapeutic utility.

The first of these two latter patients was a carpenter. He had never worked in lead, nor had he any suspicion of having been exposed to its influence ; but he had experienced a severe illness about four years before his admission into the hospital, which had been followed by a partial paralysis of the fingers of his left hand. In other respects his health was restored, and continued good until a few weeks before he was placed under my care ; he then began to feel languid, and to experience a sense of weight about the limbs ; his appetite failed, and subsequently he suffered a pain in the stomach, which extended upwards over both breasts to the shoulders and down the arms ; the bowels had been constipated for a week previous to his admission, and during

this interval vomiting had several times occurred. His nights had been passed without sleep ; his pulse was 96, soft and regular, his skin warm, his countenance pale. In addition to these symptoms tremors were noticed in both hands when the patient extended his arms, and the gums were very distinctly marked with a leaden-blue border line. The combination of symptoms in this case was such as indicates lead colic and paralysis of the wrists ; but in what manner lead was introduced into the system could not be ascertained.

The second patient was a cordwainer, who had, until his admission, resided in the country. The features of this man were sallow ; he was spare, entirely free from paralysis of the voluntary muscles, but he had experienced for several years, at intervals, repeated attacks of colic, by which he had been confined to his bed seventeen times. During these attacks he had endured violent pains in the abdomen, frequent vomiting, and obstinate constipation, sleepless nights and loss of appetite. The gums of this patient were rather turgid, although not more so than nine-tenths of the gums of those patients who resort to hospitals ; they were also very well marked with the peculiar blue line, but no other evidence of the patient having been exposed to the action of lead could be obtained. I believe however, notwithstanding the absence of demonstrative proof, that this patient, as well as the former, was under the deleterious influence of lead. I admit, nevertheless, that reasonable objections may be raised

against the validity of the evidence on which this opinion rests ; but when the assemblage of symptoms noticed on both patients is compared with that which can be produced by the internal use of acetate of lead, the evidence is almost as conclusive as the nature of medical investigations will admit ; for although neither of these patients could give a cause for his illness, yet the supposition that both of them were under the influence of lead is quite consistent with the facts related in the numerous histories published of its action on man, and which, in the cases of the two men under consideration, suggest the extreme probability that they had been unwittingly exposed to the action of the metal, derived from one or more of those many sources which have been elaborately pointed out by Sir George Baker, (*Med. Trans.*, vols. i. and ii.) and also by Dr Christison, in his valuable treatise on poisons ; and from which this metal “may gain admittance into the human body unobserved and unsuspected.” These patients may, for instance, have drunk it with water drawn through leaden pipes from cisterns constructed of lead, or raised from wells by leaden pumps, which both of them acknowledged they had done :— or it might have been introduced with their food, after separation from the glazed earthenware utensils employed in cookery ;—or, lastly, they might, in the course of their daily work, have been exposed to the vapour of paint containing lead used by their fellow workmen.

From a careful perusal of the authors before

named, as well as from considerable personal experience, I presume to express a strong belief that the unobserved introduction of lead into the human body is continually taking place, to a much greater extent than is usually imagined, and that it has often caused an ambiguous assemblage of morbid symptoms: for although the influence of lead on the system is readily detected when the symptoms are severe and follow each other in the expected order of succession, yet when they are mild or do not follow each other in the regular and stated order of succession, if the mind of the physician is not awake to their cause, or the cause cannot be ascertained, then the symptoms appear ambiguous, and they may be misinterpreted without exposing the physician to the imputation of unpardonable ignorance, or of culpable oversight.

With reference to the irregularity observed in the order of events in colic from lead, Sir George Baker says, (*Med. Trans.*, vol. iii.) "In this disease there are certain accidental varieties; the different manner in which it attacks different persons is one of these varieties:" and, in illustration of this statement, Dr. R. Warren (*Med. Trans.*, vol. ii.) gives an account of thirty-two persons seized at the same period with lead colic. "One of these persons was attacked with an epileptic fit; three were feverish from the beginning; one was delirious, and four were salivated." These events are not usual in lead colic; "and," adds Dr. Warren, "as the complaint was not well understood when it first appeared," it

was "improperly treated," and every symptom was "increased."

Lead colic has also "many symptoms in common with a dysentery" and other abdominal diseases; and so long as their respective causes are unknown, the physician will experience much difficulty in making a precise diagnosis, and in discriminating between colic arising from lead, and that from either impacted fæces, acrid matter in the intestines, vegetable and other mineral poisons, or from worms. "The connexion," says Dr. Christison, p. 421, ed. 1829, "of colica pictonum with other causes besides the poison of lead, is upheld by so many facts, and is believed by so many authorities, that this disease cannot be assumed, even in its most characteristic form, as supplying undoubted evidence of the introduction of lead into the system."

But I contend that in abdominal diseases simulating lead colic, as well as other forms of disease about which any ambiguity exists, an inspection of the gums will decide the question, whether the symptoms were produced by lead. Thus, cases often occur in hospital practice in which the functions of the brain and cerebral nerves are paralysed by lead, and in which coma, vertigo, headache, amaurosis, and sometimes deafness, are the most evident effects; in other instances the patients complain of articular pains resembling those of chronic rheumatism, periostitis, and secondary syphilis. In many of these cases an inspection of the gums will assist in making a correct diagnosis; and with respect to the diffi-

culty of tracing chronic pains to their proper causes, Dr. Heberden, in his Commentaries, p. 131, says, "In plerisque his ægris nulla certa doloris causa investigari potuit." And in the chapter De Rheumatismo, p. 340, he adds, "Multi dolores, quibus nomina nondum propria imposita sunt, quanquam inter se distent, ex causis longe diversis orti, tamen ad rheumatismum pariter referuntur." I think articular pains, proceeding from the action of lead, have been treated sometimes as those of chronic rheumatism, at others as those of secondary syphilis, often empirically; and I could adduce evidence in proof of these opinions from my own practice; but in order to give them greater weight, I prefer adducing, on the authority of M. Andral, the case of a painter, (p. 236, tom. ii. Mal. de l'abdomen,) who, never having experienced lead colic, suffered during four or five months severe pains in the membranes of the head, which had been at first regarded as rheumatism, and unsuccessfully treated by bleeding and vapour baths; but there being afterwards reason for believing the pains were produced by lead, the patient was treated for ordinary lead colic, and recovered. To obviate, in similar cases, the opprobrium consequent on *mala praxis*, originating from an erroneous diagnosis, I repeat that a careful inspection of the gums will be sufficient in most cases of illness depending on the presence of lead, to reveal immediately the origin of the evil.

Assuming that the reasons adduced are sufficiently cogent to establish an opinion in favour of the pecu-

liar state of the gums above alluded to, being always discernible on patients under the full influence of lead, and that it precedes in the series of events the occurrence of colic and paralysis, the next problem to be solved is, whether the phenomenon can be made available as a means of averting the infliction of lead colic in the treatment of disease with saturnine preparations. To give an incontestable solution of this problem would require a greater number of data than I have hitherto been able to collect; nevertheless, on referring to my ward-books of the last few years, there appear to have been about twenty-seven patients treated with acetate of lead and opium; and out of that number, there were twenty at least in whom no colic and no other material inconvenience was induced by the remedy, except constipation; in two or three cases the colic symptoms were very severe, but in these latter the hæmorrhage was profuse, and the dose only proportionately large. But with ordinary precautions, colic does not occur severely during the medicinal use of lead; and I have frequently persevered in the use of the salt, for some time after the blue line had appeared, without producing it, or only slightly: the quantity which different patients took before the gums were affected, as well as the time, varied very much, and will be understood from an inspection of the following Table:—

Names.	Quantity of acetate of lead taken to produce the blue line, and time, how long.		Quantity taken after the blue line had appeared, and time, how long.		Total number of		Remarks.
	Grains.	Days.	Grains.	Days.	Grains.	Days.	
Bryan	15	4			15	4	Severe colic.
Bevan	96	12	112	14	208	26	Slight abdominal pains, relieved by an aperient.
Carter	66	11	100	18	166	29	Slight temporary pain.
Hamilton	70	14					No effect; incurable phthisis.
Ricketts	30	10	12	6	42	16	Slight temporary pain.
Godsell	160	21	135	12	295	33	No colic; died of profuse hæmorrhage.
Peasey	21	7	21	7	42	14	No colic.
Roach	24	4	18	3	42	7	No colic.
J. Bryan	56	7	56	7	112	14	No colic.

	Total.			Remarks.
	Grains.	Days.		
Dean	136	17	Blue line produced at an unknown period.	No colic.
Norton	116	13		No colic.
Casey	228	25		No colic.
Price	56	7		No colic.

As it is not the object of this paper to consider in detail the therapeutic uses of saturine preparations, I abstain from offering any comments on the above Table, further than to express my opinion that the difference observed in the quantity of the salt required to produce an effect on the systems of different patients, probably depended on idiosyncrasy; for some of my patients were much more obnoxious to its influence than others, under conditions apparently similar.

The time required to produce the blue line varies

in general with the amount of the dose, but not always ; and, *cæteris paribus*, large doses affect the gums sooner than small. Mr. Moyle of Chacewater produced the discolouration in twenty-four hours, by giving four doses of gr. v. each, every six hours ; and I think it very probable, that in cases of poisoning, from “ the irritant effects of large doses of the soluble salts of lead,” similar to those described by Dr. Christison in his very valuable “ Treatise on Poisons,” the discolouration would be obvious on the gums in five hours after swallowing the salts ; although the time required in several cases under my own care was much longer, in which large medicinal doses of the acetate were given frequently in twenty-four hours.

I have already stated the discolouration to have been more perceptible in several cases after death than it was during life ; and I therefore suggest, that an examination of the gums will sometimes prove useful in medico-legal investigations, when death is supposed to have been occasioned by an irritating poison ; in such cases, on the one hand, its presence will afford positive evidence of lead having been absorbed into the system ; on the other hand, its absence will supply a negative testimony of the symptoms, during life, having been produced by some other poison.

With reference to the prophylactic utility of the blue line, I venture in conclusion to express a conviction that if the public in general, and workmen in particular, who are often exposed to the operation

of lead, were to attend habitually to the condition of their gums, the discolouration would be often perceived on them in the absence of any other unequivocal symptom, and its appearance would afford them a friendly warning of the probable approach of the more serious effects of lead on the nervous system.