minimum of 19 cm., the average being 22.4 cm. In white females seven times, with maximum, 25 cm.; minimum, 22 cm.; average, 23.3 cm. In colored males six times, with maximum, 25 cm.; minimum, 21 cm.; average, 23 cm. In colored females twice, maximum, 21 cm.; minimum, 20 cm.; average, 20.7 cm. The average for all classes, 22.5 cm.

It was, of course, impossible to obtain very accurate histories of the bodies examined, consequently it is impossible to verify certain points which, from these investigations, would naturally arise. I have therefore confined myself to visible topographical points.

1508 PINE STREET

MASSAGE IN MUSCULAR RHEUMATISM, AND ITS POSSIBLE VALUE IN THE DIAGNOSIS OF MUSCULAR RHEUMATISM FROM NEURITIS.

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THE muscles of the lumbar region and their fascia are a favorite seat for muscular rheumatism, which is then called lumbago, as everyone knows. This may arise from catching cold, from strain, from fatigue, or from rheumatism in the system. The pathology of this affection is probably coagulation of the semi-fluid contractile muscular substance and adhesion of muscular fibrils, so that attempts at motion are accompanied with partial, irregular, and painful contractions. Retention of waste products occurs, and it is pretty generally conceded that uric acid is the worst of these, thus adding "fuel to the fire" and pressure upon nerve filaments. Recent cases of muscular rheumatism are sufficiently common to anyone engaged in the practice of massage. They are almost invariably cured by a few massages, sometimes by a single massage. The same result may be brought about by rest, by warmth, by electricity, or by the administration of medicines that eliminate uric acid, such as salicylate of soda, though I think not so soon. Any of these may be used separately, combined, or with massage, thus affording us a choice of one hundred and twenty combinations of these five measures ($1 \times 2 \times 3 \times 4 \times 5 = 120$). But which of these is the most effective single agent could only be determined by the skeptical if they could have lumbago or muscular rheumatism sufficiently often to try each one separately, and massage last of all; for in therapeutics this is a science of experience, and not one of experiment, as it would be in physiology when tried on healthy persons. A wearisome detail of cases

of recent muscular rheumatism successfully treated by massage is unnecessary. It is the object of this article to show that in these, massage produces changes in five different ways: mechanical, thermal, electrical, nervous, and chemical. The *mechanical* change is shown by muscular rigidity being replaced by suppleness and elasticity, minute adhesions having doubtless been detached and the coagulation of the muscular substance replaced by the semi-fluid condition. The matting together of skin, superficial fascia, and deep fascia is also removed by appropriate massage, so that the skin glides more freely over the tissues beneath it. The pressure of the previous turf-like condition is taken away from the vessels and nerves so that patients feel lighter and more supple and freer from restraint. The *thermal* change is evident from the increase of heat, imparted from the hand of the manipulator as well as that arising from the massage and from the accelerated circulation. The *electrical*, also an objective change for which we do not need to take the patient's word, is manifest by more vigorous and agreeable contraction of the muscles to the faradic current after massage than before. For the *nervous* change we have to take the patient's word for improved sensation in the disappearance of pain, discomfort, and the feeling of stiffness. The *chemical* is inferred from the removal of waste products and uric acid, by the increased circulation and flow of lymph, which in plain language removes the ashes, flushes the *sewers*, and takes away asphyxiated juices, while the increased arterial current brings a greater supply of nourishment; otherwise improvement would hardly take place. The constipation of the tissues is got rid of, let the refuse matter be what it may.

Dr. Haig has shown pretty conclusively[1] that when chilling of the surface checks the excretion from the skin, diminution of the alkalinity of the blood and retention of uric acid take place in the tissues beneath. The same result follows when fibrous tissues have been injured, strained, or excessively fatigued: uric acid accumulates in the affected parts, superadding its irritating properties, and this may be abstracted from the blood to such an extent as to show an increased alkalinity of the urine owing to diminished excretion of uric acid. This condition can be got rid of by salicylate of soda, or by alkalies. When recent, it can also be more promptly dispelled by means of massage, thus showing that this has brought about chemical changes. If massage and alkalies, or salicylate of soda, be used simultaneously, the medicine will act more quickly by reason of the improved circulation resulting from massage—as most, if not all, medicines do when the case is such as to admit of massage. This is a fact too often unrecognized, and frequently redounds unduly to the credit of massage; as when a

[1] In the London Practitioner for March, 1891.

patient has for a long time been taking a remedy that is clearly indicated, but shows no improvement until massage has been used. On this subject let us hear from old **Fuller, in his** *Medicina Gymnastica*, published in 1771: "It is to be considered that some medicines may require exercise (of the patient) in order to enhance their virtues or to remove some inconvenience attending their operation which might deter people from using them so freely as they ought to do. The ordinary circulation of the blood may not suffice to answer the nature of some medicaments and call out their efficacy. Exercise in such cases is like the just and exact incubation to the egg—that which animates the drug and gives it power to produce the desired effect."

It is hardly necessary to state here that whatever treatment be adopted for acute muscular rheumatism, the diet should be regulated, and highly nitrogenous foods and acid wines interdicted for a time.

Zahludowski, Hopadze, and others have found by careful observation that general massage on healthy people increased the excretion of urates and phosphates, and the assimilation and metamorphosis of nitrogenous food substances.

As to the mechanical effect of massage, we might learn a lesson from nature. Adhesions of the pleura are often detached by the rubbing together of the two membranes in respiration. The fascia of muscles is a sort of pumping arrangement by which lymph is sucked out of the muscles and propelled onward into the lymphatics. It consists of two layers, between which are lymph spaces terminating in lymphatic vessels. When the muscles contract, the inner layer is pressed against the outer and forces the fluid onward into the lymphatic vessels. When the muscles relax, the inner layer recedes from the outer and the lymph from the muscles finds its way into it and the lymph spaces between. Hence by the contraction of muscles, waste products are washed out of them by the flow of fresh lymph. But patients with a severe attack of lumbago cannot exercise. In such cases, massage is more than a substitute for exercise, so much more, indeed, as the pressure of massage may be greater than the pressure which muscles make upon each other during contraction. In my *Treatise on Massage*, I have not only described the manner of using massage in such cases, but also the effects of friction and deep manipulation in the direction of the lymph and venous currents. The veins and lymphatics are mechanically emptied, the blood and lymph are pushed along more quickly by the *vis a tergo* of massage, and these fluids cannot return by reason of the valvular folds in the internal coats of these vessels. More space is thus created for the returning currents coming from beyond the region *massé*d, and the suction power induced at the same time adds another accelerating force to the more distal circulation. In brief, the effects

may well be likened to the combined influence of n suction and force pump, and in people that are not too fat the veins can be seen collapsing as they are emptied and filling up again as their contents are pushed along by the hands of the manipulator. In this way the collateral circulation in the deeper vessels is aided and relieved, as well as the more distal stream in the lymphatics, capillaries, and arterioles. One would naturally suppose that the circulation in the larger arteries would in this manner be interrupted, and such is the case. But herein comes an additional advantage to aid the circulation, for the temporary and momentary intermittent compression causes dilatation of the arteries above the parts pressed upon, from an increased volume of blood, and as soon as the pressure is removed this accumulation rushes onward with greater force and rapidity into the partially emptied continuation of the arteries, in consequence of the resiliency of the arteries and the force of the heart's action upon the accumulated volume of blood.

The difference in the consistency of muscles is of much interest. The muscles of some very strong people are soft and flabby when relaxed; of others, hard and firm. This difference is no indication of muscular power or the want of it. It is due to the condition of the fascia that surrounds the muscles. When this is thick it gives a feeling of hardness; when thin, of softness. The contractile substance of muscle is semi-fluid, as has been shown by Kühne. The same difference exists in dogs and other animals. The muscles of short-haired dogs are usually hard and firm; of long-haired ones, soft and flabby; and Ludwig has shown that the former yield much lymph, the latter little. Lauder Brunton is of the opinion that this difference in the deep fascia may account for the tendency to muscular as distinguished from articular rheumatism. Where muscles are soft from thin fascia, the tendency to muscular rheumatism is probably greater; whereas persons whose muscles feel hard from thick fascia most likely have a tendency to articular rheumatism. When the fascia is soft and thin the products of waste from over-exertion or other causes would incline to remain and occasion muscular pain; when the fascia is hard and thick, waste products would be removed more quickly from the muscles and might give rise to inflammation of the joints.

I think there must be much truth in Dr. Brunton's opinion, for I have seen cases of muscular rheumatism where the muscles felt preternaturally firm and hard, so much so that one might imagine that a quantity of plaster-of-Paris had been injected under the skin and allowed to set, which under massage became soft and supple as they improved. The following case, though a somewhat obstinate one, is an example of this:

CASE I.—Mr. J., a large, stout gentlemnn, had heen subject to attacks of rheumatism in the trapezius, deltoid, or lumbar muscles all his life. At one time he was seized suddenly and severely with pain in the lumbar region, so that he could not even attempt to move. I was called to him the first day of this attack, and found all the muscles of his back, but especially those of the lumbar region, rigid, hard, and board-like, nnd almost insensitive to pressure. Perhaps the lessened sensation to external impression was owing to the nlready existing severe pain. Issues of vast importance depended upon his recovery in a short time, so massage was given twice daily for a week. At the end of this time the muscles were supple and elastic, sensitive, even tender to pressure; but the pain had disappeared and the patient could move freely.

Treatment is sometimes used to prove the diagnosis, as when iodide of potassium is given in cases of doubtful syphilis. Reasoning in the same way, Dr. Haig asserts that when any local irritation is not increased and made worse by neids given to the extent of distinctly raising the acidity of the urine and diminishing the alkalinity of the blood, or is not improved by alkalies given to the extent of decided diminution in the acidity of the urine or increase in the alkalinity of the blood, or by a salicylate given to the extent of producing a great increase in the excretion of uric ncid, then such local irritation is not directly due to uric ncid.

In the same manner I would venture the suggestion that when a case of apparent muscular rheumatism does not only yield but also does not stay improved after n few massages, then the probability is that the case is one of neuritis affectiug the nerve fibres that supply the impaired muscles. This probability would be strengthened when the pain is uniform, affecting the same muscles on both sides, when it is worse at night whilst the patient is at rest nnd warm in bed, and better when up, moving about, which calls into play the inhibitory action of the will; whereas muscular rheumatism is nggrnvated by motion and relieved by rest and warmth. The difference in favor of neuritis would be increased when the consistency of the affected muscles does not differ from that of the well muscles or is somewhnt diminished. Of course, it is not a question here of marked cases of neuritis where the pain is confined to one or more nerves nnd their distributions, with atrophy of muscles, altered electrical reactions, glossy skin, etc.

The relief from discomfort, and freedom of motion experienced after each massage in those eases which are too npt to be snappily diagnosed as muscular rheumatism, hut most likely nre neuritis, is so great that, though the temporrry improvement mny not he held, yet the patient is apt to demand that the massage he continued until the ultimate result, which, with nppropriate internal medication, should be recovery. The following cases may be cited as exnmples:

CASE II.—Mr. D. was sixty-three years of age, and had always enjoyed good health, with the exception of frequent attacks of asthma. He was well nourished, having a due proportion of muscle and adipose. He came to me in July, 1887, suffering with stiffness and discomfort of the shoulders and hips, of several weeks' duration. This first showed itself in the hips. By reason of this discomfort he was restless and uneasy at night. At first sight the trouble seemed to be entirely muscular, and this view was strengthened by the result of treatment, for he had massage and passive motion early every afternoon nine times in succession, and after each massage he could bend over freely and rise from a chair without the assistance of his arms, cross each leg over the other with ease, tie his shoes, and dress himself, even to putting on his coat, as if there were nothing the matter with his shoulders, all of which he could not do before massage. This improvement continued the remainder of the day, but, unfortunately, next morning he was almost as stiff as ever. Though his deltoids and glutei did not appear to be altered in consistency, yet, after massage, they were much suppler and afforded corresponding freedom of motion. Evidently this patient ought to have had massage twice a day, so that the effect of one *séance* would not have been gone before he had another; but instead of this there was an interval of ten days in which he had none and grew rapidly worse. Then he had massage every other day three times, with but slight temporary improvement after each time. After this he tried travelling three weeks, during which he was drowsy and depressed, and came back worse than when he went away, so that it was with great difficulty that he could raise either foot high enough to get into a carriage—indeed, he had to ask his coachman to help him raise the leg for this purpose, and it was hard work for him to get into his coat even with assistance. He stooped like an old man. Pains in the fingers had also set in, so that it was difficult for him to hold a hook. The muscles of the shoulders and upper arms, of the hips and thighs, had become somewhat atrophied and flabby, with diminished reaction to both galvanic and faradic currents, and increased irritability to percussion. Pressure on the large nerve trunks and muscles showed no tenderness. He was about four months getting into this, his worst condition, in which he remained for three months, and he was five months, or the balance of a year, getting well. During this time, as if by way of compensation, his asthma scarcely troubled him. He continued to get about and attend to business even at his worst. He had electricity occasionally in the daytime, and massage almost every evening on retiring, which gave him much relief and comfort and aided him to sleep better. He is firmly of the opinion that massage aided his recovery and shortened his suffering by at least one year.

This case was undoubtedly one of neuritis, and what is of the greatest interest is the fact that just before his first symptoms appeared he had been taking five drops of Fowler's solution of arsenic three times daily for six weeks for his asthma. Five months later arsenic was found in the urine in large quantities by Prof. E. S. Wood. During his recovery, the patient, on his own responsibility, took a secret preparation containing arsenic and hydriodic acid for his asthma. The neuritis that was most likely left by the arsenic in the first instance was probably benefited by the arsenic in

the secret preparation, and so thought an eminent neurologist, under whose care he was for a while.

CASE III.—Another case, very similar to the foregoing, came to me in September, 1891. It was that of Mr. C., sixty-seven years of age, weighing 168 pounds, who, though of pale complexion, had red lips, and had enjoyed remarkably good health all his life. Ten or twelve years before, he had slight lumbago. For about four weeks pain and stiffness in the shoulders and hips, at the back of the neck, and between the shoulders, had been gradually increasing, so that it was not easy for him to put on his coat or button his shoes. He was worse at night after he had been in bed some time, and also in the morning, but improved somewhat after getting up and moving about. Every patient is a standard for himself as to the consistency of his tissues, and, so far as could be judged through this patient's adipose, the muscles seemed to be somewhat doughy and flabby, especially the deltoids and glutei. Those of the upper arms and thighs were apparently slightly atrophied and deficient in contractility to the faradic current. His appetite was not very good, and he had not taken a vacation for many years. Salicylate of soda had been thoroughly tried without any result. The immediate effect of massage from the first was magical, affording comfort and freedom of motion the remainder of the day on which it was given, which again led us to think the trouble altogether muscular. But his nights were still bad, and in the morning he was as stiff as ever. The longer he slept the stiffer he became. He continued the massage faithfully for eleven weeks, daily or every other day, always with great temporary relief, but, on the whole, gradually becoming stiffer and more uncomfortable. Iodide of potash, tonics, and the faradic current were in turn faithfully tried with the massage, but did not afford any more relief than massage alone. Ten grains of phenacetine in the evening and ten more when he wakes at night will give him a good night and a comfortable day after. But he has to omit this for a day or two before it will have this effect again. Five or six weeks after I first saw him, pain, stiffness, and thickening gradually came in the fore and middle fingers of the right hand, and the pain was also distinctly traceable in the course of the radial nerve.

I referred this patient to Dr. E. G. Cutler for further internal treatment, and under iron and cod-liver oil his general condition has improved and his appetite is better. For a month he has done nothing for his joints and muscles, and they remain in about the same condition. He requires assistance to dress. Like the preceding case, this gentleman attends to business at his worst. His own opinion is that if he could have massage on retiring its advantages to him would be much increased; but he lives out of the city. Unlike the preceding case, he is, so far, of a cheerful disposition. He has not been exposed in any way to arsenical poisoning; he has not taken any in medicinal form, and his wall-papers are free. He, therefore, regards it as superfluous to have his urine examined for arsenic, so it has not been done; neither has it for lead. He is a temperate man, so that alcohol does not enter into the case. Three weeks after he had been under massage the urine was examined by Dr. Cutler and found to contain a large normal amount of urea (12.25 grains to the ounce), due probably to increased tissue metabolism produced by massage. A large primary deposit of oxalate of lime crystals was also found. In other respects the urine was normal.

It is a pity that we are not absolutely certain that there is no arsenic in this patient's urine; for, if there be none, as most likely there is not, it would count strongly in favor of the arsenic found in the urine of the preceding case having nothing to do with producing his neuritis. As arsenic seemed to benefit the neuritis in the first case after the poison had been eliminated, then it might be a good remedy to employ for the second case. How much better arsenic may act while a patient is undergoing massage can only be conjectured. How much more quickly it may be eliminated while the patient is having massage is also a subject for consideration. Dr. G. Tedeschi[1] has reported a case of lead poisoning cured by massage after the usual treatment had failed. By this means he found that the urine was increased in quantity and the lead eliminated more promptly than by any other means.

CASE IV.—What is called rheumatism frequently affects both muscles and nerves. An acute case of rheumatic sciatica, intractable to the usual orthodox remedies, can sometimes be speedily changed for the better by means of massage, even when this does not afford such marked temporary relief as in such cases of neuritis as those just mentioned. In March, 1888, I was kindly asked by Dr. J. B. Ayer to visit his patient, Rev. B. H., fifty-eight years of age, who was well nourished, with tissues supple and elastic, except in the affected regions. He was then in his third attack of sciatica, or, more properly, rheumatic neuritis of the sciatic nerve, all three attacks having been traceable to his getting run down from overwork, and each attack having been preceded by lumbago, which faded away as the sciatica became more pronounced. The lumbago had affected the muscles on both sides; the sciatica, the right hip, thigh, and leg. The first attack had occurred eighteen years before and lasted for three months; the second came eight years after, and lasted for six months—worse than the preceding. The third attack had lasted severely for four weeks before I saw him, and, according to the same geometrical progression, we calculated and feared that he was in for a year of it, as anti-rheumatics, tonics, sedatives, galvanism and faradism had produced no sensible amelioration. We were agreeably disappointed, for, in four weeks and a half, under massage once a day, most of this time, with morphine when the pain became intolerable, he was, to all intents and purposes, well. Afterward, whenever he felt any premonitions of a returning attack, he had recourse to massage, a few applications of which has always afforded the desired relief. And this brings me to say that, when a patient has been benefited by massage, if a relapse or reappearance of the same trouble takes place, it is much more speedily relieved or cured by massage than it was at first; in other words, the patient has become more susceptible to its influence.

At the fifth visit massage was given to leg, thigh, and hip only, as the pain in the lumbar region had disappeared and suppleness of tissues had returned. The manner of using massage was by gentle stroking or *effleurage* on the posterior aspect of the limb, and deep, vigorous manipulation on the lateral and anterior aspects. Sometimes it is well to use deep pressure, so as

[1] Giornale interno delle Sci. Med.

to squeeze congestion out of a nerve, and then vigorous percussion over it, so as produce an obtunding effect; but these were out of the question at first in this case. The sixth massage seemed to rouse a slumbering soreness, and make the whole limb uncomfortable for an hour; but after this it felt better than before, and continued so. Subsequent massages after this had a similar effect. The reason of this was, without doubt, due to the detaching of adhesions which caused matting of the tissues. This required arduous work; but as suppleness and elasticity returned, the work became easier. At the twelfth visit, after forty minutes of massage to leg, thigh, and back, the patient felt that if I did any more it would certainly arouse the pain which the massage had just quieted. This was near the end of the third week, and he could run up and down stairs freely. And so the patient improved with interesting variations, pain decreasing and intervals of comfort increasing. On the thirty-first day after massage was begun he preached twice, superintended his Sunday-school (distributing presents to the children), and felt no worse for it. Sixteen massages in four weeks and a half, then a week's vacation, and he was himself again. But the external aspect of the leg, from the knee to the toes, has remained numb ever since.

Dr. A. Symons Eccles, in an article on "Massage, Rest, and Position in the Treatment of Sciatica,"[1] has reported several cases of sciatic neuritis in previously healthy people, which he treated successfully in this manner after the failure of other means. The massage consisted of *effleurage*, kneading, and percussion, and, in the intervals, the leg was suspended in a Salter swing, as this was the only position that afforded rest.

REPORT OF A CASE OF GANGRENOUS STOMATITIS, WITH A BACTERIOLOGICAL EXAMINATION.

By Charles J. Foote, M.D.,
Demonstrator of Bacteriology in the Medical Department of Yale University.

The case reported in this paper entered the New Haven Hospital October 26, 1892, and was in the service of Dr. W. H. Carmalt, through whose courtesy I was permitted to make a bacteriological examination.

The patient, Katie M., seven years of age, was born in New Haven, of Irish parentage. There was no history of tuberculosis or any other hereditary disease in the family. The patient had lost no brothers or sisters, and her father, mother, and four brothers and sisters were living and well. Though she had been brought up in a tenement-house the hygienic surroundings had not been particularly bad. When two years old she had a fall, striking her face on a piece of board and driving a small sliver of wood into the left malar region. The wound

[1] London Practitioner, November, 1887.